2007/2008 PROPOSED CHANGES TO THE INTERNATIONAL ENERGY CONSERVATION CODE

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TENTATIVE ORDER OF DISCUSSION

2007/2008 PROPOSED CHANGES TO THE INTERNATIONAL ENERGY CONSERVATION CODE

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

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation does **not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair.

EC1-07/08
EC2-07/08I
EC3-07/08, Part I
EC4-07/08
EC5-07/08, Part I
EC6-07/08
EC7-07/08, Part I
EC8-07/08
EC9-07/08
G16-07/08, Part II
G17-07/08, Part II
EC10-07/08, Part I
EC11-07/08, Part I
EC12-07/08
EC13-07/08
RE2-07/08, Part II
EC14-07/08
EC15-07/08, Part I
EC16-07/08
EC17-07/08
EC18-07/08, Part I
EC19-07/08, Part I
EC20-07/08, Part I
EC21-07/08, Part I
EC22-07/08, Part I
EC23-07/08, Part I
EC24-07/08
EC25-07/08, Part I
EC26-07/08
EC27-07/08
EC28-07/08, Part I
EC29-07/08
EC30-07/08
EC31-07/08
EC32-07/08
EC33-07/08
EC34-07/08, Part I
EC35-07/08
EC36-07/08, Part I
EC37-07/08, Part I
EC38-07/08
EC39-07/08
EC40-07/08
EC41-07/08
EC42-07/08, Part I
EC43-07/08, Part I
EC44-07/08
EC45-07/08, Part I
EC46-07/08
EC47-07/08, Part I
EC48-07/08, Part I
EC50-07/08, Part I
EC51-07/08, Part I
EC52-07/08
EC53-07/08, Part I
EC54-07/08
EC55-07/08
EC56-07/08, Part I
EC57-07/08, Part I
EC58-07/08I, Part I
EC59-07/08, Part I
EC60-07/08, Part I
EC61-07/08
EC62-07/08, Part I
EC63-07/08, Part I
EC64-07/08, Part I
EC65-07/08, Part I
FS177-07/08, Part II
EC66-07/08
EC67-07/08
EC68-07/08, Part I
EC69-07/08, Part I
EC70-07/08, Part I
EC71-07/08, Part I
EC72-07/08, Part I
EC73-07/08
EC74-07/08, Part I
EC75-07/08
EC76-07/08, Part I
EC77-07/08
EC78-07/08, Part I
EC79-07/08, Part I
EC80-07/08, Part I
EC81-07/08, Part I
EC82-07/08
EC83-07/08, Part I
G183-07/08, Part II
EC84-07/08, Part I
EC85-07/08
EC86-07/08
EC87-07/08
EC88-07/08
EC89-07/08
EC90-07/08
EC91-07/08
EC92-07/08
EC93-07/08
EC94-07/08
EC95-07/08
EC96-07/08, Part I
EC97-07/08, Part I
EC98-07/08
EC90-07/08
EC100-07/08
EC101-07/08
EC102-07/08
EC103-07/08
EC104-07/08
EC105-07/08
EC106-07/08
EC107-07/08
EC108-07/08
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EC142-07/08
EC143-07/08
EC144-07/08
EC145-07/08
EC146-07/08
EC147-07/08
EC148-07/08
EC149-07/08
EC150-07/08
EC151-07/08
EC152-07/08, Part I
EC153-07/08
EC154-07/08

EC1–07/08
101.4.5

Proponent: Charles Bloomberg, City of Southlake, TX, representing the North Texas Chapter, ICC

Revise as follows:

101.4.5 (Supp) Change in space conditioning. Any ~~nonconditioned~~ unconditioned space that is altered to become conditioned space shall be required to be brought into ~~full~~ compliance with the building thermal envelope provisions of this code.

Reason: The change from nonconditioned to unconditioned is for consistency. This is the only place the term nonconditioned is used in the Energy Conservation Code; the term unconditioned is used several times. An unconditioned building may have existing, lighting systems installed under an earlier edition of the code. This change would allow the lighting system to remain but still require the significant issue of the envelope to be addressed when adding heating or air conditioning. It would be consistent with the general statement in section 101.4.3 above and the stated intent of the code to permit innovative approaches and techniques to achieve the effective use of energy. This is not impacted by the change to 101.4.4 in the 2007 Supplement because there is no change in use or occupancy by merely adding space conditioning.

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

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

EC2–07/08
102, Chapter 3, 303, 303.1, 303.1.1, 303.1.1.1, 303.1.2, 303.1.3, Table 303.1.3(1), Table 303.1.3(2), Table 303.1.3(3), 303.1.4, 303.2, 303.2.1, 303.3

Proponent: Donald J. Vigneau, Northeast Energy Efficiency Partnerships, Inc.

Relocate Section 102 to new Section 303 as follows:

CHAPTER 3
~~CLIMATE ZONES~~ GENERAL REQUIREMENTS

SECTION 303
MATERIALS, SYSTEMS AND EQUIPMENT

~~102.1~~ 303.1 Identification.
~~102.1.1~~ 303.1.1 Building thermal envelope insulation.
~~102.1.1.1~~ 303.1.1.1 Blown or sprayed roof/ceiling insulation.
~~102.1.2~~ 303.1.2 Insulation mark installation.
~~102.1.3~~ 303.1.3 Fenestration product rating.
~~Table 102.1.3(1)~~ Table 303.1.3(1) DEFAULT GLAZED FENESTRATION U-FACTOR
~~Table 102.1.3(2)~~ Table 303.1.3(2) DEFAULT DOOR U-FACTORS
~~Table 102.1.3(3)~~ Table 303.1.3(3) DEFAULT GLAZED FENESTRATION SHGC
~~102.1.4 (Supp)~~ 303.1.4 Insulation product rating.
~~102.2~~ 303.2 Installation.
~~102.2.1~~ 303.2.1 Protection of exposed foundation insulation.
~~102.3~~ 303.3 Maintenance information.

(Renumber subsequent sections)

Reason: Section 303 is proposed simply as a relocation of existing technical provisions consistent with the organization of topics as contained in the other I-codes, and to correctly identify the content. Placement of general requirements within the administrative provisions of Chapter 1 of any code creates both confusion and an opportunity for loss of any technical provisions therein. It is not uncommon for jurisdictions unknowingly to delete these by deleting Chapter 1 in its entirety in coordinating existing state administrative statutes and/or local laws into their adoptions. Identifying these properly as General Requirements eliminates these problems and provides clear direction for the code user.

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

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

EC3–07/08
102.1.1.2 (New); IRC N1101.4.2 (New)

Proponent: Craig Conner, Building Quality, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Add new text as follows:

102.1.1.2 Insulated sheathing R-value mark. The insulated sheathing R-value mark shall be printed in letters at least 3 inches in height. Where other R-values are also printed on the insulated sheathing, such as the R-value for other sheathing thicknesses, the R-value for the actual thickness determined as required by the FTC shall be at least three times as tall as any other R-value.

PART II – IRC

Add new text as follows:

N1101.4.2 Insulated sheathing R-value mark. The insulated sheathing R-value mark shall be printed in letters at least 3 inches in height. Where other R-values are also printed on the insulated sheathing, such as the R-value for other sheathing thicknesses, the R-value for the actual thickness determined as required by the FTC shall be at least three times as tall as any other R-value.

(Renumber subsequent sections)

Reason: Most insulated sheathing has multiple R-values printed on it. Typically these are for R-values for a variety of thicknesses. Determining the actual R-value is difficult if the thickness is not readily observable. Some manufacturers further confuse compliance by printing R-values determined by other than the FTC required processes. Requiring the FTC (Federal Trade Commission) regulated R-value to be prominently displayed will simplify inspection.

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

PART I – IECC

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

PART II – IRC B/E

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

EC4–07/08
102.1.3, 102.1.3.1 (New), 202, Chapter 6 (New)

Proponents: Craig Conner, Building Quality, representing himself; Julie Ruth, JRuth Code Consulting, representing the American Architectural Manufacturers Association; Rand Baldwin, Aluminum Extruders Council (AEC); Margaret Webb, Insulating Glass Manufacturers Association (IGMA); Greg Carney, Glass Association of North America (GANA)

1. Revise as follows:

102.1.3 Fenestration product rating. U-factors and solar heat gain coefficients (SHGC) of fenestration products ~~(windows, doors and skylights)~~ shall be determined in accordance with Section 102.1.3.1, 102.1.3.2, or 101.3.3 ~~.NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-factor shall be assigned a default U-factor from Table 102.1.3(1) or 102.1.3(2). The solar heat gain~~

~~coefficient (SHGC) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC shall be assigned a default SHGC from Table 102.1.3(3).~~

2. Add new text as follows:

102.1.3.1 Fenestration rating by NFRC 100 and NFRC 200. Determination of U-Factors for fenestration products shall be in accordance with NFRC 100 by an accredited, independent laboratory, and the products shall be labeled and certified by the manufacturer. Determination of the solar heat gain coefficient (SHGC) of glazed fenestration products shall be in accordance with NFRC 200 by an accredited, independent laboratory, and the products shall be labeled and certified by the manufacturer.

102.1.3.2 Commercial fenestration alternative rating by AAMA 507. U-factors and SHGC for fenestration used in commercial buildings shall be determined in accordance with AAMA 507. The product performance shall be documented by a certificate of compliance, as described in AAMA 507, that is signed and submitted to the code official by the glazing contractor or registered design professional. The product line testing and simulation, as described in AAMA 507, shall be conducted in accordance with NFRC 100 and NFRC 200 by an approved, accredited, independent laboratory.

102.1.3.3 Default values for fenestration rating. Products lacking a U-factor determined in accordance with Section 102.1.3.1 or 102.1.3.2 shall be assigned a default U-factor from Table 102.1.3(1) or 102.1.3(2).. Products lacking an SHGC determined in accordance with Section 102.1.3.1 or 102.1.3.2 shall be assigned a default SHGC from Table 102.1.3(3).

3. Revise definition as follows:

SECTION 202
GENERAL DEFINITIONS

FENESTRATION. Skylights, roof windows, vertical windows (fixed or moveable), curtain wall, storefront glazing, opaque doors, glazed doors, glazed block, and combination opaque/glazed doors. Fenestration includes products with glass and non-glass glazing materials.

4. Add standard to Chapter 6 as follows:

AAMA

507-07 Standard Practice for Determining the Thermal Performance Characteristics of Fenestration Systems Installed in Commercial Buildings

Reason: (Conner) The reason for this change is simple. Commercial windows should be rated for energy efficiency. The industry needs a rating method that works with their bid and construction process. The time between bid and construction can be days or weeks. The NFRC web site states, "it will take on average approximately 100 days to obtain a Label Certificate." The AAMA 507 procedure can be used to rate a window within a few days or less and produces the same rating.

Commercial windows are often built "on site". Commercial window makers bid windows for a specific commercial building. The combinations of available glass and window frames are too numerous to rate all combinations in advance. However, the characteristics of each separate frame and glass option are known in advance. Using the AAMA 507 standard, commercial window makers can quickly and inexpensively use the frame and glass characteristics to produce a timely rating for windows tailored to the specifications for a particular building. Therefore, the AAMA 507 produces a window rating that can be used in the commercial site-built bid process.

The NFRC standards should not be granted a monopoly in the code when those standards do not work for most of the commercial site-built industry. AAMA 507 is a good alternative to the NFRC procedures for commercial site-built windows.

Reason: (Ruth) This proposal would permit the use of AAMA 507 to determine the U-factor and SHGC of glazed assemblies in commercial buildings. By following the procedure established in AAMA 507 and working with approved, accredited testing and simulation laboratories, a framing manufacturer can create a design tool that provides the U-factor or SHGC for a glazed assembly quickly and easily, based upon the center of glass properties for the glass package and the framing system used. The values used in the design tool are determined and verified using NFRC procedures, including determination of U-factors in accordance with NFRC 100 and determination of SHGC in accordance with NFRC 200. The validity of the installation is provided by a certificate of compliance, which is completed by the glazing contractor or a registered design professional.

A similar proposal was presented to the IECC committee for consideration during the 2006/2007 ICC Code Change Cycle, but it referenced an earlier edition of AAMA 507. That earlier edition did not require the use of the certificate of compliance described in the standard. The committee had some concern that the certificate was not mandatory, and the proposal was disapproved.

AAMA has revised AAMA 507 in such a manner that the certificate of compliance is now mandatory. This new proposal also specifies that the testing to be done to establish the values included on the certificate of compliance be done in accordance with NFRC 100 and NFRC 200. A study by Architectural Testing Incorporated demonstrated that both the NFRC standards and AAMA 507 give the same results well within 1 percent.

Although NFRC has attempted to provide programs for the verification of the site built glazing systems that occur in commercial buildings, the use of such programs has encountered numerous difficulties. One of the most prominent of these is the long lag time needed to receive NFRC certification of a site built system once the components of the system have been finalized. As a result NFRC certification of site built glazing systems

has not become wide spread, with less than 1% of the projects in the U.S. making use of such certification in 2006. The state of California attempted to use the NFRC site built program, but was not able to make it workable. Although NFRC is currently attempting to put a component modeling based program in place, California has opted to add default tables for curtainwall and spandrel panels to the 2007 edition of the California Energy Code, as a safe guard in case the new NFRC program is not available in time.

The values given in AAMA 507 are significantly more accurate than anything that can be contained in default tables. And the procedure is already available, is working and has been working for a few years now. This proposal simply provides an method of receiving NFRC values for a system that is an alternative to the use of a label. It is not a replacement for NFRC ratings for fenestration in commercial buildings. The values obtained using either method are extremely close, so there should be no confusion in the marketplace, while providing multiple options for code officials and manufacturers to help increase code enforcement. Competition is a good thing, and will push both organizations to improve their standards and programs, which then benefits both the public and industry. As long as energy efficient products are being used in accordance with the code, it should not matter whether they use labeling or a certificate of compliance to determine the energy rating of the product.

We urge the committee to recognize this method in the IECC to provide architects and contractors an accurate way to determine the U-factors and SHGC of a proposed glazing system that fits within the fast track time frame of commercial construction.

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

Analysis: A review of the standard proposed for inclusion in the code, AAMA 507-07, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before January 15, 2008.

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

EC5–07/08
102.1.4; IRC N1101.6

Proponent: Craig Conner, Building Quality, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Delete without substitution:

~~**102.1.4 (Supp) Insulation product rating.** The thermal resistance *(R-value)* of insulation shall be determined in accordance with the U.S. Federal Trade Commission R-value rule (CFR Title 16, Part 460, May 31, 2005) in units of $h \cdot ft^2 \cdot {}^\circ F/Btu$ at a mean temperature of 75°F.~~

PART II – IRC

Delete without substitution:

~~**N1101.6 (Supp) Insulation product rating.** The thermal resistance (*R*-value) of insulation shall be determined in accordance with the CFR Title 16, Part 460, in units of $h \cdot ft^2 \cdot {}^\circ F/Btu$ at a mean temperature of 75°F (24°C).~~

Reason: This was approved in the last code cycle. Staff analysis of CFR Title 16, Part 460 concluded it did not meet the ICC criteria for referenced standards. The actual reference is to a 20 page Federal Register notice titled "Labeling and Advertising of Home Insulation: Trade Regulation Rule" and includes a long discussion of FTC process and public comments on the rule. This is not appropriate as a reference in the I-codes.

Since Federal law is preemptive, nothing done in the I-codes changes those requirements. The units for R-value are established by the definition of R-value. Reiterating those units is unnecessary.

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

PART I – IECC

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

PART II – IRC-B/E

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

EC6–07/08
103.1.1

Proponent: Ronald Majette, U.S. Department of Energy

Revise as follows:

103.1.1 Above code programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings approved in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as "mandatory" in Chapters 4 and 5 of this code, as applicable, shall be met.

Reason: The purpose of this proposal is to ensure that the "mandatory" requirements of the IECC such as sealing the building envelope (Section 402.4) and sealing ducts (Section 403.2.2) be complied with for all buildings. Since the ICC has deemed that the mandatory requirements should apply to all buildings, it is reasonable that "above code programs" not be allowed to bypass these requirements.

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

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

EC7–07/08
103.1.1; IRC N1101.7

Proponent: Ken Nittler, PE, Enercomp, Inc.

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise as follows:

103.1.1 Above code programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code if the program provides a detailed written energy analysis study demonstrating that the requirements in the program exceed all requirements of this code and includes a requirement for inspections of each home by an accredited independent party to determine compliance. Buildings approved in writing by such an energy efficiency program and that meet all mandatory provisions of this chapter shall be considered in compliance with this code.

PART II – IRC

Revise as follows:

N1101.7 Above code programs. The building official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this chapter if the program provides a detailed written energy analysis study demonstrating that the requirements in the program exceed all requirements of this chapter and includes a requirement for inspections of each home by an accredited independent party to determine compliance. Buildings approved in writing by such an energy efficiency program and that meet all mandatory provisions of this chapter shall be considered in compliance with this chapter.

Reason: This proposal provides additional guidance on what constitutes an above code program. The current language is inadequate. In the absence of a specific reference to "national, state or local" program normally required in a building code, this language makes it clear that in order to deem a program as equivalent, that:

- A detailed written study proving that a program is above code is required. Such a study will provide the building official with the information necessary to judge if a program deserves to be deemed as exceeding the energy efficiency requirements.
- Third party inspection is required. This is necessary because it is possible to interpret this code section as exempting the home's energy features from both plan and field checking.
- All mandatory measures must be followed. This is common sense that doing an above code program does not exclude requirements for mandatory measures.

Homebuyers deserve the opportunity to buy homes that meet this energy code. This language helps to ensure that programs identified as above code truly are above code.

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

PART I – IECC

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

PART II – IRC B/E

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

EC8–07/08
108 (New)

Proponent: Keith Drummond, CBO, CFM, MCP, County of Greenville, SC

Add new section as follows:

SECTION 108
MEANS OF APPEAL

108.1 Application for appeal. Any person directly affected by a decision of the code official or a notice or order issued under this code shall have the right to appeal to the board of appeals, provided that a written application for appeal is filed within 20 days after the day the decision, notice or order was served. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted there under have been incorrectly interpreted, the provisions of this code do not fully apply, or the requirements of this code are adequately satisfied by other means.

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

108.2.1 Alternate members. The chief appointing authority shall appoint two or more alternate members who shall be called by the board chairman to hear appeals during the absence or disqualification of a member. Alternate members shall possess the qualifications required for board membership.

108.2.2 Chairman. The board shall annually select one of its members to serve as chairman.

108.2.3 Disqualification of member. A member shall not hear an appeal in which that member has a personal, professional or financial interest.

108.2.4 Secretary. The chief administrative officer shall designate a qualified person to serve as secretary to the board. The secretary shall file a detailed record of all proceedings in the office of the chief administrative officer.

108.2.5 Compensation of members. Compensation of members shall be determined by law.

108.3 Notice of meeting. The board shall meet upon notice from the chairman, within 20 days of the filing of an appeal, or at stated periodic meetings.

108.4 Open hearing. All hearings before the board shall be open to the public. The appellant, the appellant's representative, the code official and any person whose interests are affected shall be given an opportunity to be heard. A quorum shall consist of not less than two-thirds of the board membership.

108.4.1 Procedure. The board shall adopt and make available to the public through the secretary procedures under which a hearing will be conducted. The procedures shall not require compliance with strict rules of evidence, but shall mandate that only relevant information be received.

108.5 Postponed hearing. When the full board is not present to hear an appeal, either the appellant or the appellant's representative shall have the right to request a postponement of the hearing.

108.6 Board decision. The board shall modify or reverse the decision of the code official only by a concurring vote of a majority of the total number of appointed board members.

108.6.1 Records and copies. The decision of the board shall be recorded. Copies shall be furnished to the appellant and to the code official.

108.6.2 Administration. The code official shall take immediate action in accordance with the decision of the board.

108.7 Court review. Any person, whether or not a previous party of the appeal, shall have the right to apply to the appropriate court for a writ of certiorari to correct errors of law. Application for review shall be made in the manner and time required by law following the filing of the decision in the office of the chief administrative officer.

108.8 Stays of enforcement. Appeals of notice and orders (other than Imminent Danger notices) shall stay the enforcement of the notice and order until the appeal is heard by the appeals board.

(Renumber subsequent sections)

Reason: This change would bring all ICC Codes into uniformity to establish and provide for a method of an appeal process, and a Board to hear these appeals. The change would also set a definitive time to file an appeal with the Board of Appeals.

Currently some of the ICC Codes have the Appeal Process and 20 day requirement. Code Change Proposals have been submitted for all ICC Codes to contain this Appeal Process and 20 day time frame.

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

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

EC9–07/08
202

Proponent: Guy McMann, Jefferson County, CO, representing the Colorado Association of Plumbing and Mechanical Officials (CAPMO)

Delete definition and substitute as follows:

~~**CONDITIONED SPACE.** An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent conditioned space~~

CONDITIONED SPACE. For energy purposes, space within a building that is provided with heating and/or cooling equipment or systems capable of maintaining, through design or heat loss/gain, 50°F (10°C) during the heating season and 85°F (29°C) during the cooling season, or communicates directly with a conditioned space. For mechanical purposes, an area, room or space being heated or cooled by any equipment or appliance.

Reason: This definition leaves a lot to be desired. How does one define the word "heated" or the word "cooled"? Jurisdictions electing to enforce the 2006 IECC are at a disadvantage and subject to non-uniform enforcement and non-uniform interpretation It doesn't make any sense to say that an un-insulated duct in a cold space automatically makes the cold space conditioned as a result of the un-insulated duct being located there to begin with. Why then insulate anything? This definition provides much more guidance

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

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

EC10 –07/08
Table 301.1, Table 301.2; IRC Table N1101.2, Table N1101.2.1

Proponent: Ronald Majette, U.S. Department of Energy

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

1. Revise as follows:

301.2 Warm humid counties. Warm humid counties are ~~listed~~ identified in Table ~~301.2~~ 301.1 by an asterisk.

2. Delete Tables 301.1 and 301.2 and replace with single Table 301.1 as follows:

TABLE 301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY, AND TERRITORY

Key:
A – Moist, B – Dry, C – Marine. Absence of moisture designation indicates moisture regime is irrelevant.
Asterisk '*' indicates a Warm-Humid location.

US STATES

ALABAMA
3A Autauga*
2A Baldwin*
3A Barbour*
3A Bibb
3A Blount
3A Bullock*
3A Butler*
3A Calhoun
3A Chambers
3A Cherokee
3A Chilton
3A Choctaw*
3A Clarke*
3A Clay
3A Cleburne
3A Coffee*
3A Colbert
3A Conecuh*
3A Coosa
3A Covington*
3A Crenshaw*
3A Cullman
3A Dale*
3A Dallas*
3A DeKalb
3A Elmore*
3A Escambia*
3A Etowah
3A Fayette
3A Franklin
3A Geneva*
3A Greene
3A Hale
3A Henry*
3A Houston*
3A Jackson
3A Jefferson
3A Lamar
3A Lauderdale
3A Lawrence
3A Lee
3A Limestone
3A Lowndes*
3A Macon*
3A Madison
3A Marengo*
3A Marion
3A Marshall
2A Mobile*
3A Monroe*
3A Montgomery*
3A Morgan
3A Perry*
3A Pickens
3A Pike*
3A Randolph
3A Russell*
3A Shelby
3A St. Clair
3A Sumter
3A Talladega
3A Tallapoosa
3A Tuscaloosa
3A Walker
3A Washington*
3A Wilcox*
3A Winston

ALASKA
7 Aleutians East
7 Aleutians West
7 Anchorage
8 Bethel
7 Bristol Bay
7 Denali
8 Dillingham
8 Fairbanks North Star
7 Haines
7 Juneau
7 Kenai Peninsula
7 Ketchikan Gateway
7 Kodiak Island
7 Lake and Peninsula
7 Matanuska-Susitna
8 Nome
8 North Slope
8 Northwest Arctic
7 Prince of Wales-Outer Ketchikan
7 Sitka
7 Skagway-Hoonah-Angoon
8 Southeast Fairbanks
7 Valdez-Cordova
8 Wade Hampton
7 Wrangell-Petersburg
7 Yakutat
8 Yukon-Koyukuk

ARIZONA
5B Apache
3B Cochise
5B Coconino
4B Gila
3B Graham
3B Greenlee
2B La Paz
2B Maricopa
3B Mohave
5B Navajo
2B Pima
2B Pinal
3B Santa Cruz
4B Yavapai
2B Yuma

ARKANSAS
3A Arkansas
3A Ashley
4A Baxter
4A Benton
4A Boone
3A Bradley
3A Calhoun
4A Carroll
3A Chicot
3A Clark

3A Clay
3A Cleburne
3A Cleveland
3A Columbia*
3A Conway
3A Craighead
3A Crawford
3A Crittenden
3A Cross
3A Dallas
3A Desha
3A Drew
3A Faulkner
3A Franklin
4A Fulton
3A Garland
3A Grant
3A Greene
3A Hempstead*
3A Hot Spring
3A Howard
3A Independence
4A Izard
3A Jackson
3A Jefferson
3A Johnson
3A Lafayette*
3A Lawrence
3A Lee
3A Lincoln
3A Little River*
3A Logan
3A Lonoke
4A Madison
4A Marion
3A Miller*
3A Mississippi
3A Monroe
3A Montgomery
3A Nevada
4A Newton
3A Ouachita
3A Perry
3A Phillips
3A Pike
3A Poinsett
3A Polk
3A Pope
3A Prairie
3A Pulaski
3A Randolph
3A Saline
3A Scott
4A Searcy
3A Sebastian
3A Sevier*
3A Sharp
3A St. Francis
4A Stone
3A Union*
3A Van Buren
4A Washington
3A White
3A Woodruff
3A Yell

CALIFORNIA
3C Alameda
6B Alpine
4B Amador
3B Butte
4B Calaveras
3B Colusa
3B Contra Costa
4C Del Norte
4B El Dorado
3B Fresno
3B Glenn
4C Humboldt
2B Imperial
4B Inyo
3B Kern
3B Kings
4B Lake
5B Lassen
3B Los Angeles
3B Madera
3C Marin
4B Mariposa
3C Mendocino
3B Merced
5B Modoc
6B Mono
3C Monterey
3C Napa
5B Nevada
3B Orange
3B Placer
5B Plumas
3B Riverside
3B Sacramento
3C San Benito
3B San Bernardino
3B San Diego
3C San Francisco
3B San Joaquin
3C San Luis Obispo
3C San Mateo
3C Santa Barbara
3C Santa Clara
3C Santa Cruz
3B Shasta
5B Sierra
5B Siskiyou
3B Solano
3C Sonoma
3B Stanislaus
3B Sutter
3B Tehama
4B Trinity
3B Tulare
4B Tuolumne
3C Ventura
3B Yolo
3B Yuba

COLORADO
5B Adams
6B Alamosa
5B Arapahoe
6B Archuleta
4B Baca
5B Bent
5B Boulder
6B Chaffee
5B Cheyenne
7 Clear Creek
6B Conejos
6B Costilla
5B Crowley
6B Custer
5B Delta
5B Denver
6B Dolores
5B Douglas
6B Eagle
5B Elbert
5B El Paso
5B Fremont
5B Garfield
5B Gilpin
7 Grand
7 Gunnison
7 Hinsdale
5B Huerfano
7 Jackson
5B Jefferson
5B Kiowa
5B Kit Carson
7 Lake
5B La Plata
5B Larimer
4B Las Animas
5B Lincoln
5B Logan
5B Mesa
7 Mineral
6B Moffat
5B Montezuma
5B Montrose
5B Morgan
4B Otero
6B Ouray
7 Park
5B Phillips
7 Pitkin
5B Prowers
5B Pueblo
6B Rio Blanco
7 Rio Grande
7 Routt
6B Saguache
7 San Juan
6B San Miguel
5B Sedgwick
7 Summit
5B Teller
5B Washington
5B Weld
5B Yuma

CONNECTICUT
5A (all)

DELAWARE
4A (all)

DISTRICT OF COLUMBIA
4A (all)

FLORIDA
2A Alachua*
2A Baker*
2A Bay*
2A Bradford*
2A Brevard*
1A Broward*
2A Calhoun*
2A Charlotte*
2A Citrus*
2A Clay*
2A Collier*
2A Columbia*
2A DeSoto*
2A Dixie*
2A Duval*
2A Escambia*
2A Flagler*
2A Franklin*
2A Gadsden*
2A Gilchrist*
2A Glades*
2A Gulf*
2A Hamilton*
2A Hardee*
2A Hendry*
2A Hernando*
2A Highlands*
2A Hillsborough*
2A Holmes*
2A Indian River*
2A Jackson*
2A Jefferson*
2A Lafayette*
2A Lake*
2A Lee*
2A Leon*
2A Levy*
2A Liberty*
2A Madison*
2A Manatee*

2A Marion*
2A Martin*
1A Miami-Dade*
1A Monroe*
2A Nassau*
2A Okaloosa*
2A Okeechobee*
2A Orange*
2A Osceola*
2A Palm Beach*
2A Pasco*
2A Pinellas*
2A Polk*
2A Putnam*
2A Santa Rosa*
2A Sarasota*
2A Seminole*
2A St. Johns*
2A St. Lucie*
2A Sumter*
2A Suwannee*
2A Taylor*
2A Union*
2A Volusia*
2A Wakulla*
2A Walton*
2A Washington*

GEORGIA
2A Appling*
2A Atkinson*
2A Bacon*
2A Baker*
3A Baldwin
4A Banks
3A Barrow
3A Bartow
3A Ben Hill*
2A Berrien*
3A Bibb
3A Bleckley*
2A Brantley*
2A Brooks*
2A Bryan*
3A Bulloch*
3A Burke
3A Butts
3A Calhoun*
2A Camden*
3A Candler*
3A Carroll
4A Catoosa
2A Charlton*
2A Chatham*
3A Chattahoochee*
4A Chattooga
3A Cherokee
3A Clarke
3A Clay*
3A Clayton
2A Clinch*
3A Cobb
3A Coffee*
2A Colquitt*
3A Columbia
2A Cook*
3A Coweta
3A Crawford
3A Crisp*
4A Dade
4A Dawson
2A Decatur*
3A DeKalb
3A Dodge*
3A Dooly*
3A Dougherty*
3A Douglas
3A Early*
2A Echols*
2A Effingham*
3A Elbert
3A Emanuel*
2A Evans*
4A Fannin
3A Fayette
4A Floyd
3A Forsyth
4A Franklin
3A Fulton
4A Gilmer
3A Glascock
2A Glynn*
4A Gordon
2A Grady*
3A Greene
3A Gwinnett
4A Habersham
4A Hall
3A Hancock
3A Haralson
3A Harris
3A Hart
3A Heard
3A Henry
3A Houston*
3A Irwin*
3A Jackson
3A Jasper
2A Jeff Davis*
3A Jefferson
3A Jenkins*
3A Johnson*
3A Jones
3A Lamar
2A Lanier*
3A Laurens*
3A Lee*
2A Liberty*
3A Lincoln
2A Long*
2A Lowndes*
4A Lumpkin
3A Macon*
3A Madison
3A Marion*
3A McDuffie
2A McIntosh*
3A Meriwether
2A Miller*
2A Mitchell*
3A Monroe
3A Montgomery*
3A Morgan
4A Murray
3A Muscogee
3A Newton
3A Oconee
3A Oglethorpe
3A Paulding
3A Peach*
4A Pickens
2A Pierce*
3A Pike
3A Polk
3A Pulaski*
3A Putnam
3A Quitman*
4A Rabun
3A Randolph*
3A Richmond
3A Rockdale
3A Schley*
3A Screven*
2A Seminole*
3A Spalding
4A Stephens
3A Stewart*
3A Sumter*
3A Talbot
3A Taliaferro
2A Tattnall*
3A Taylor*
3A Telfair*
3A Terrell*
2A Thomas*
3A Tift*
2A Toombs*
4A Towns
3A Treutlen*
3A Troup
3A Turner*
3A Twiggs*
4A Union
3A Upson
4A Walker
3A Walton
2A Ware*
3A Warren
3A Washington
2A Wayne*
3A Webster*
3A Wheeler*
4A White
4A Whitfield
3A Wilcox*
3A Wilkes
3A Wilkinson
3A Worth*

HAWAII
1A (all)*

IDAHO
5B Ada
6B Adams
6B Bannock
6B Bear Lake
5B Benewah
6B Bingham
6B Blaine
6B Boise
6B Bonner
6B Bonneville
6B Boundary
6B Butte
6B Camas
5B Canyon
6B Caribou
5B Cassia
6B Clark
5B Clearwater
6B Custer
5B Elmore
6B Franklin
6B Fremont
5B Gem
5B Gooding
5B Idaho
6B Jefferson
5B Jerome
5B Kootenai
5B Latah
6B Lemhi
5B Lewis
5B Lincoln
6B Madison
5B Minidoka
5B Nez Perce
6B Oneida
5B Owyhee
5B Payette
5B Power
5B Shoshone
6B Teton
5B Twin Falls
6B Valley
5B Washington

ILLINOIS
5A Adams
4A Alexander
4A Bond
5A Boone
5A Brown

5A Bureau
5A Calhoun
5A Carroll
5A Cass
5A Champaign
4A Christian
5A Clark
4A Clay
4A Clinton
5A Coles
5A Cook
4A Crawford
5A Cumberland
5A DeKalb
5A De Witt
5A Douglas
5A DuPage
5A Edgar
4A Edwards
4A Effingham
4A Fayette
5A Ford
4A Franklin
5A Fulton
4A Gallatin
5A Greene
5A Grundy
4A Hamilton
5A Hancock
4A Hardin
5A Henderson
5A Henry
5A Iroquois
4A Jackson
4A Jasper
4A Jefferson
5A Jersey
5A Jo Daviess
4A Johnson
5A Kane
5A Kankakee
5A Kendall
5A Knox
5A Lake
5A La Salle
4A Lawrence
5A Lee
5A Livingston
5A Logan
5A Macon
4A Macoupin
4A Madison
4A Marion
5A Marshall
5A Mason
4A Massac
5A McDonough
5A McHenry
5A McLean
5A Menard
5A Mercer
4A Monroe
4A Montgomery
5A Morgan
5A Moultrie
5A Ogle
5A Peoria
4A Perry
5A Piatt
5A Pike
4A Pope
4A Pulaski
5A Putnam
4A Randolph
4A Richland
5A Rock Island
4A Saline
5A Sangamon
5A Schuyler
5A Scott
4A Shelby
5A Stark
4A St. Clair
5A Stephenson
5A Tazewell
4A Union
5A Vermilion
4A Wabash
5A Warren
4A Washington
4A Wayne
4A White
5A Whiteside
5A Will
4A Williamson
5A Winnebago
5A Woodford

INDIANA
5A Adams
5A Allen
5A Bartholomew
5A Benton
5A Blackford
5A Boone
4A Brown
5A Carroll
5A Cass
4A Clark
5A Clay
5A Clinton
4A Crawford
4A Daviess
4A Dearborn
5A Decatur
5A De Kalb
5A Delaware
4A Dubois
5A Elkhart
5A Fayette
4A Floyd
5A Fountain
5A Franklin
5A Fulton
4A Gibson
5A Grant
4A Greene
5A Hamilton
5A Hancock
4A Harrison
5A Hendricks
5A Henry
5A Howard
5A Huntington
4A Jackson
5A Jasper
5A Jay
4A Jefferson
4A Jennings
5A Johnson
4A Knox
5A Kosciusko
5A Lagrange
5A Lake
5A La Porte
4A Lawrence
5A Madison
5A Marion
5A Marshall
4A Martin
5A Miami
4A Monroe
5A Montgomery
5A Morgan
5A Newton
5A Noble
4A Ohio
4A Orange
5A Owen
5A Parke
4A Perry
4A Pike
5A Porter
4A Posey
5A Pulaski
5A Putnam
5A Randolph
4A Ripley
5A Rush
4A Scott
5A Shelby
4A Spencer
5A Starke
5A Steuben
5A St. Joseph
4A Sullivan
4A Switzerland
5A Tippecanoe
5A Tipton
5A Union
4A Vanderburgh
5A Vermillion
5A Vigo
5A Wabash
5A Warren
4A Warrick
4A Washington
5A Wayne
5A Wells
5A White
5A Whitley

IOWA
5A Adair
5A Adams
6A Allamakee
5A Appanoose
5A Audubon
5A Benton
6A Black Hawk
5A Boone
6A Bremer
6A Buchanan
6A Buena Vista
6A Butler
6A Calhoun
5A Carroll
5A Cass
5A Cedar
6A Cerro Gordo
6A Cherokee
6A Chickasaw
5A Clarke
6A Clay
6A Clayton
5A Clinton
5A Crawford
5A Dallas
5A Davis
5A Decatur
6A Delaware
5A Des Moines
6A Dickinson
5A Dubuque
6A Emmet
6A Fayette
6A Floyd
6A Franklin
5A Fremont
5A Greene
6A Grundy
5A Guthrie
6A Hamilton
6A Hancock
6A Hardin
5A Harrison
5A Henry
6A Howard
6A Humboldt
6A Ida
5A Iowa
5A Jackson
5A Jasper
5A Jefferson

5A Johnson
5A Jones
5A Keokuk
6A Kossuth
5A Lee
5A Linn
5A Louisa
5A Lucas
6A Lyon
5A Madison
5A Mahaska
5A Marion
5A Marshall
5A Mills
6A Mitchell
5A Monona
5A Monroe
5A Montgomery
5A Muscatine
6A O'Brien
6A Osceola
5A Page
6A Palo Alto
6A Plymouth
6A Pocahontas
5A Polk
5A Pottawattamie
5A Poweshiek
5A Ringgold
6A Sac
5A Scott
5A Shelby
6A Sioux
5A Story
5A Tama
5A Taylor
5A Union
5A Van Buren
5A Wapello
5A Warren
5A Washington
5A Wayne
6A Webster
6A Winnebago
6A Winneshiek
5A Woodbury
6A Worth
6A Wright

KANSAS
4A Allen
4A Anderson
4A Atchison
4A Barber
4A Barton
4A Bourbon
4A Brown
4A Butler
4A Chase
4A Chautauqua
4A Cherokee
5A Cheyenne
4A Clark
4A Clay
5A Cloud
4A Coffey
4A Comanche
4A Cowley
4A Crawford
5A Decatur
4A Dickinson
4A Doniphan
4A Douglas
4A Edwards
4A Elk
5A Ellis
4A Ellsworth
4A Finney
4A Ford
4A Franklin
4A Geary
5A Gove
5A Graham
4A Grant
4A Gray
5A Greeley
4A Greenwood
5A Hamilton
4A Harper
4A Harvey
4A Haskell
4A Hodgeman
4A Jackson
4A Jefferson
5A Jewell
4A Johnson
4A Kearny
4A Kingman
4A Kiowa
4A Labette
5A Lane
4A Leavenworth
4A Lincoln
4A Linn
5A Logan
4A Lyon
4A Marion
4A Marshall
4A McPherson
4A Meade
4A Miami
5A Mitchell
4A Montgomery
4A Morris
4A Morton
4A Nemaha
4A Neosho
5A Ness
5A Norton
4A Osage
5A Osborne
4A Ottawa
4A Pawnee
5A Phillips
4A Pottawatomie
4A Pratt
5A Rawlins
4A Reno
5A Republic
4A Rice
4A Riley
5A Rooks
4A Rush
4A Russell
4A Saline
5A Scott
4A Sedgwick
4A Seward
4A Shawnee
5A Sheridan
5A Sherman
5A Smith
4A Stafford
4A Stanton
4A Stevens
4A Sumner
5A Thomas
5A Trego
4A Wabaunsee
5A Wallace
4A Washington
5A Wichita
4A Wilson
4A Woodson
4A Wyandotte

KENTUCKY
4A (all)

LOUISIANA
2A Acadia*
2A Allen*
2A Ascension*
2A Assumption*
2A Avoyelles*
2A Beauregard*
3A Bienville*
3A Bossier*
3A Caddo*
2A Calcasieu*
3A Caldwell*
2A Cameron*
3A Catahoula*
3A Claiborne*
3A Concordia*
3A De Soto*
2A East Baton Rouge*
3A East Carroll
2A East Feliciana*
2A Evangeline*
3A Franklin*
3A Grant*
2A Iberia*
2A Iberville*
3A Jackson*
2A Jefferson*
2A Jefferson Davis*
2A Lafayette*
2A Lafourche*
3A La Salle*
3A Lincoln*
2A Livingston*
3A Madison*
3A Morehouse
3A Natchitoches*
2A Orleans*
3A Ouachita*
2A Plaquemines*
2A Pointe Coupee*
2A Rapides*
3A Red River*
3A Richland*
3A Sabine*
2A St. Bernard*
2A St. Charles*
2A St. Helena*
2A St. James*
2A St. John the Baptist*
2A St. Landry*
2A St. Martin*
2A St. Mary*
2A St. Tammany*
2A Tangipahoa*
3A Tensas*
2A Terrebonne*
3A Union*
2A Vermilion*
3A Vernon*
2A Washington*
3A Webster*
2A West Baton Rouge*
3A West Carroll
2A West Feliciana*
3A Winn*

MAINE
6A Androscoggin
7 Aroostook
6A Cumberland
6A Franklin
6A Hancock
6A Kennebec
6A Knox
6A Lincoln
6A Oxford
6A Penobscot
6A Piscataquis

6A Sagadahoc
6A Somerset
6A Waldo
6A Washington
6A York

MARYLAND
4A Allegany
4A Anne Arundel
4A Baltimore
4A Baltimore (city)
4A Calvert
4A Caroline
4A Carroll
4A Cecil
4A Charles
4A Dorchester
4A Frederick
5A Garrett
4A Harford
4A Howard
4A Kent
4A Montgomery
4A Prince George's
4A Queen Anne's
4A Somerset
4A St. Mary's
4A Talbot
4A Washington
4A Wicomico
4A Worcester

MASSACHUSETTS
5A (all)

MICHIGAN
6A Alcona
6A Alger
5A Allegan
6A Alpena
6A Antrim
6A Arenac
7 Baraga
5A Barry
5A Bay
6A Benzie
5A Berrien
5A Branch
5A Calhoun
5A Cass
6A Charlevoix
6A Cheboygan
7 Chippewa
6A Clare
5A Clinton
6A Crawford
6A Delta
6A Dickinson
5A Eaton
6A Emmet
5A Genesee
6A Gladwin
7 Gogebic
6A Grand Traverse
5A Gratiot
5A Hillsdale
7 Houghton
6A Huron
5A Ingham
5A Ionia
6A Iosco
7 Iron
6A Isabella
5A Jackson
5A Kalamazoo
6A Kalkaska
5A Kent
7 Keweenaw
6A Lake
5A Lapeer
6A Leelanau
5A Lenawee
5A Livingston
7 Luce
7 Mackinac
5A Macomb
6A Manistee
6A Marquette
6A Mason
6A Mecosta
6A Menominee
5A Midland
6A Missaukee
5A Monroe
5A Montcalm
6A Montmorency
5A Muskegon
6A Newaygo
5A Oakland
6A Oceana
6A Ogemaw
7 Ontonagon
6A Osceola
6A Oscoda
6A Otsego
5A Ottawa
6A Presque Isle
6A Roscommon
5A Saginaw
6A Sanilac
7 Schoolcraft
5A Shiawassee
5A St. Clair
5A St. Joseph
5A Tuscola
5A Van Buren
5A Washtenaw
5A Wayne
6A Wexford

MINNESOTA
7 Aitkin
6A Anoka
7 Becker
7 Beltrami
6A Benton
6A Big Stone
6A Blue Earth
6A Brown
7 Carlton
6A Carver
7 Cass
6A Chippewa
6A Chisago
7 Clay
7 Clearwater
7 Cook
6A Cottonwood
7 Crow Wing
6A Dakota
6A Dodge
6A Douglas
6A Faribault
6A Fillmore
6A Freeborn
6A Goodhue
7 Grant
6A Hennepin
6A Houston
7 Hubbard
6A Isanti
7 Itasca
6A Jackson
7 Kanabec
6A Kandiyohi
7 Kittson
7 Koochiching
6A Lac qui Parle
7 Lake
7 Lake of the Woods
6A Le Sueur
6A Lincoln
6A Lyon
7 Mahnomen
7 Marshall
6A Martin
6A McLeod
6A Meeker
7 Mille Lacs
6A Morrison
6A Mower
6A Murray
6A Nicollet
6A Nobles
7 Norman
6A Olmsted
7 Otter Tail
7 Pennington
7 Pine
6A Pipestone
7 Polk
6A Pope
6A Ramsey
7 Red Lake
6A Redwood
6A Renville
6A Rice
6A Rock
7 Roseau
6A Scott
6A Sherburne
6A Sibley
6A Stearns
6A Steele
6A Stevens
7 St. Louis
6A Swift
6A Todd
6A Traverse
6A Wabasha
7 Wadena
6A Waseca
6A Washington
6A Watonwan
7 Wilkin
6A Winona
6A Wright
6A Yellow Medicine

MISSISSIPPI
3A Adams*
3A Alcorn
3A Amite*
3A Attala
3A Benton
3A Bolivar
3A Calhoun
3A Carroll
3A Chickasaw
3A Choctaw
3A Claiborne*
3A Clarke
3A Clay
3A Coahoma
3A Copiah*
3A Covington*
3A DeSoto
3A Forrest*
3A Franklin*
3A George*
3A Greene*
3A Grenada
2A Hancock*
2A Harrison*
3A Hinds*
3A Holmes
3A Humphreys
3A Issaquena
3A Itawamba

2A Jackson*
3A Jasper
3A Jefferson*
3A Jefferson Davis*
3A Jones*
3A Kemper
3A Lafayette
3A Lamar*
3A Lauderdale
3A Lawrence*
3A Leake
3A Lee
3A Leflore
3A Lincoln*
3A Lowndes
3A Madison
3A Marion*
3A Marshall
3A Monroe
3A Montgomery
3A Neshoba
3A Newton
3A Noxubee
3A Oktibbeha
3A Panola
2A Pearl River*
3A Perry*
3A Pike*
3A Pontotoc
3A Prentiss
3A Quitman
3A Rankin*
3A Scott
3A Sharkey
3A Simpson*
3A Smith*
2A Stone*
3A Sunflower
3A Tallahatchie
3A Tate
3A Tippah
3A Tishomingo
3A Tunica
3A Union
3A Walthall*
3A Warren*
3A Washington
3A Wayne*
3A Webster
3A Wilkinson*
3A Winston
3A Yalobusha
3A Yazoo

MISSOURI
5A Adair
5A Andrew
5A Atchison
4A Audrain
4A Barry
4A Barton
4A Bates
4A Benton
4A Bollinger
4A Boone
5A Buchanan
4A Butler
5A Caldwell
4A Callaway
4A Camden
4A Cape Girardeau
4A Carroll
4A Carter
4A Cass
4A Cedar
5A Chariton
4A Christian
5A Clark
4A Clay
5A Clinton
4A Cole
4A Cooper
4A Crawford
4A Dade
4A Dallas
5A Daviess
5A DeKalb
4A Dent
4A Douglas
4A Dunklin
4A Franklin
4A Gasconade
5A Gentry
4A Greene
5A Grundy
5A Harrison
4A Henry
4A Hickory
5A Holt
4A Howard
4A Howell
4A Iron
4A Jackson
4A Jasper
4A Jefferson
4A Johnson
5A Knox
4A Laclede
4A Lafayette
4A Lawrence
5A Lewis
4A Lincoln
5A Linn
5A Livingston
5A Macon
4A Madison
4A Maries
5A Marion
4A McDonald
5A Mercer
4A Miller
4A Mississippi
4A Moniteau
4A Monroe
4A Montgomery
4A Morgan
4A New Madrid
4A Newton
5A Nodaway
4A Oregon
4A Osage
4A Ozark
4A Pemiscot
4A Perry
4A Pettis
4A Phelps
5A Pike
4A Platte
4A Polk
4A Pulaski
5A Putnam
5A Ralls
4A Randolph
4A Ray
4A Reynolds
4A Ripley
4A Saline
5A Schuyler
5A Scotland
4A Scott
4A Shannon
5A Shelby
4A St. Charles
4A St. Clair
4A Ste. Genevieve
4A St. Francois
4A St. Louis
4A St. Louis (city)
4A Stoddard
4A Stone
5A Sullivan
4A Taney
4A Texas
4A Vernon
4A Warren
4A Washington
4A Wayne
4A Webster
5A Worth
4A Wright

MONTANA
6B (all)

NEBRASKA
5A (all)

NEVADA
5B Carson City
5B Churchill
3B Clark
5B Douglas
5B Elko
5B Esmeralda
5B Eureka
5B Humboldt
5B Lander
5B Lincoln
5B Lyon
5B Mineral
5B Nye
5B Pershing
5B Storey
5B Washoe
5B White Pine

NEW HAMPSHIRE
6A Belknap
6A Carroll
5A Cheshire
6A Coos
6A Grafton
5A Hillsborough
6A Merrimack
5A Rockingham
5A Strafford
6A Sullivan

NEW JERSEY
4A Atlantic
5A Bergen
4A Burlington
4A Camden
4A Cape May
4A Cumberland
4A Essex
4A Gloucester
4A Hudson
5A Hunterdon
5A Mercer
4A Middlesex
4A Monmouth
5A Morris
4A Ocean
5A Passaic
4A Salem
5A Somerset
5A Sussex
4A Union
5A Warren

NEW MEXICO
4B Bernalillo
5B Catron
3B Chaves
4B Cibola
5B Colfax
4B Curry
4B DeBaca

3B Dona Ana
3B Eddy
4B Grant
4B Guadalupe
5B Harding
3B Hidalgo
3B Lea
4B Lincoln
5B Los Alamos
3B Luna
5B McKinley
5B Mora
3B Otero
4B Quay
5B Rio Arriba
4B Roosevelt
5B Sandoval
5B San Juan
5B San Miguel
5B Santa Fe
4B Sierra
4B Socorro
5B Taos
5B Torrance
4B Union
4B Valencia

NEW YORK
5A Albany
6A Allegany
4A Bronx
6A Broome
6A Cattaraugus
5A Cayuga
5A Chautauqua
5A Chemung
6A Chenango
6A Clinton
5A Columbia
5A Cortland
6A Delaware
5A Dutchess
5A Erie
6A Essex
6A Franklin
6A Fulton
5A Genesee
5A Greene
6A Hamilton
6A Herkimer
6A Jefferson
4A Kings
6A Lewis
5A Livingston
6A Madison
5A Monroe
6A Montgomery
4A Nassau
4A New York
5A Niagara
6A Oneida
5A Onondaga
5A Ontario
5A Orange
5A Orleans
5A Oswego
6A Otsego
5A Putnam
4A Queens
5A Rensselaer
4A Richmond
5A Rockland
5A Saratoga
5A Schenectady
6A Schoharie
6A Schuyler
5A Seneca
6A Steuben
6A St. Lawrence
4A Suffolk
6A Sullivan
5A Tioga
6A Tompkins
6A Ulster
6A Warren
5A Washington
5A Wayne
4A Westchester
6A Wyoming
5A Yates

NORTH CAROLINA
4A Alamance
4A Alexander
5A Alleghany
3A Anson
5A Ashe
5A Avery
3A Beaufort
4A Bertie
3A Bladen
3A Brunswick*
4A Buncombe
4A Burke
3A Cabarrus
4A Caldwell
3A Camden
3A Carteret*
4A Caswell
4A Catawba
4A Chatham
4A Cherokee
3A Chowan
4A Clay
4A Cleveland
3A Columbus*
3A Craven
3A Cumberland
3A Currituck
3A Dare
3A Davidson
4A Davie
3A Duplin
4A Durham
3A Edgecombe
4A Forsyth
4A Franklin
3A Gaston
4A Gates
4A Graham
4A Granville
3A Greene
4A Guilford
4A Halifax
4A Harnett
4A Haywood
4A Henderson
4A Hertford
3A Hoke
3A Hyde
4A Iredell
4A Jackson
3A Johnston
3A Jones
4A Lee
3A Lenoir
4A Lincoln
4A Macon
4A Madison
3A Martin
4A McDowell
3A Mecklenburg
5A Mitchell
3A Montgomery
3A Moore
4A Nash
3A New Hanover*
4A Northampton
3A Onslow*
4A Orange
3A Pamlico
3A Pasquotank
3A Pender*
3A Perquimans
4A Person
3A Pitt
4A Polk
3A Randolph
3A Richmond
3A Robeson
4A Rockingham
3A Rowan
4A Rutherford
3A Sampson
3A Scotland
3A Stanly
4A Stokes
4A Surry
4A Swain
4A Transylvania
3A Tyrrell
3A Union
4A Vance
4A Wake
4A Warren
3A Washington
5A Watauga
3A Wayne
4A Wilkes
3A Wilson
4A Yadkin
5A Yancey

NORTH DAKOTA
6A Adams
7 Barnes
7 Benson
6A Billings
7 Bottineau
6A Bowman
7 Burke
6A Burleigh
7 Cass
7 Cavalier
6A Dickey
7 Divide
6A Dunn
7 Eddy
6A Emmons
7 Foster
6A Golden Valley
7 Grand Forks
6A Grant
7 Griggs
6A Hettinger
7 Kidder
6A LaMoure
6A Logan
7 McHenry
6A McIntosh
6A McKenzie
7 McLean
6A Mercer
6A Morton
7 Mountrail
7 Nelson
6A Oliver
7 Pembina
7 Pierce
7 Ramsey
6A Ransom
7 Renville
6A Richland
7 Rolette
6A Sargent
7 Sheridan
6A Sioux
6A Slope
6A Stark
7 Steele
7 Stutsman
7 Towner
7 Traill
7 Walsh

7 Ward
7 Wells
7 Williams

OHIO
4A Adams
5A Allen
5A Ashland
5A Ashtabula
5A Athens
5A Auglaize
5A Belmont
4A Brown
5A Butler
5A Carroll
5A Champaign
5A Clark
4A Clermont
5A Clinton
5A Columbiana
5A Coshocton
5A Crawford
5A Cuyahoga
5A Darke
5A Defiance
5A Delaware
5A Erie
5A Fairfield
5A Fayette
5A Franklin
5A Fulton
4A Gallia
5A Geauga
5A Greene
5A Guernsey
4A Hamilton
5A Hancock
5A Hardin
5A Harrison
5A Henry
5A Highland
5A Hocking
5A Holmes
5A Huron
5A Jackson
5A Jefferson
5A Knox
5A Lake
4A Lawrence
5A Licking
5A Logan
5A Lorain
5A Lucas
5A Madison
5A Mahoning
5A Marion
5A Medina
5A Meigs
5A Mercer
5A Miami
5A Monroe
5A Montgomery
5A Morgan
5A Morrow
5A Muskingum
5A Noble
5A Ottawa
5A Paulding
5A Perry
5A Pickaway
4A Pike
5A Portage
5A Preble
5A Putnam
5A Richland
5A Ross
5A Sandusky
4A Scioto
5A Seneca
5A Shelby
5A Stark
5A Summit
5A Trumbull
5A Tuscarawas
5A Union
5A Van Wert
5A Vinton
5A Warren
4A Washington
5A Wayne
5A Williams
5A Wood
5A Wyandot

OKLAHOMA
3A Adair
3A Alfalfa
3A Atoka
4B Beaver
3A Beckham
3A Blaine
3A Bryan
3A Caddo
3A Canadian
3A Carter
3A Cherokee
3A Choctaw
4B Cimarron
3A Cleveland
3A Coal
3A Comanche
3A Cotton
3A Craig
3A Creek
3A Custer
3A Delaware
3A Dewey
3A Ellis
3A Garfield
3A Garvin
3A Grady
3A Grant
3A Greer
3A Harmon
3A Harper
3A Haskell
3A Hughes
3A Jackson
3A Jefferson
3A Johnston
3A Kay
3A Kingfisher
3A Kiowa
3A Latimer
3A Le Flore
3A Lincoln
3A Logan
3A Love
3A Major
3A Marshall
3A Mayes
3A McClain
3A McCurtain
3A McIntosh
3A Murray
3A Muskogee
3A Noble
3A Nowata
3A Okfuskee
3A Oklahoma
3A Okmulgee
3A Osage
3A Ottawa
3A Pawnee
3A Payne
3A Pittsburg
3A Pontotoc
3A Pottawatomie
3A Pushmataha
3A Roger Mills
3A Rogers
3A Seminole
3A Sequoyah
3A Stephens
4B Texas
3A Tillman
3A Tulsa
3A Wagoner
3A Washington
3A Washita
3A Woods
3A Woodward

OREGON
5B Baker
4C Benton
4C Clackamas
4C Clatsop
4C Columbia
4C Coos
5B Crook
4C Curry
5B Deschutes
4C Douglas
5B Gilliam
5B Grant
5B Harney
5B Hood River
4C Jackson
5B Jefferson
4C Josephine
5B Klamath
5B Lake
4C Lane
4C Lincoln
4C Linn
5B Malheur
4C Marion
5B Morrow
4C Multnomah
4C Polk
5B Sherman
4C Tillamook
5B Umatilla
5B Union
5B Wallowa
5B Wasco
4C Washington
5B Wheeler
4C Yamhill

PENNSYLVANIA
5A Adams
5A Allegheny
5A Armstrong
5A Beaver
5A Bedford
5A Berks
5A Blair
5A Bradford
4A Bucks
5A Butler
5A Cambria
6A Cameron
5A Carbon
5A Centre
4A Chester
5A Clarion
6A Clearfield
5A Clinton
5A Columbia
5A Crawford
5A Cumberland
5A Dauphin
4A Delaware
6A Elk
5A Erie
5A Fayette
5A Forest
5A Franklin
5A Fulton
5A Greene
5A Huntingdon
5A Indiana
5A Jefferson
5A Juniata
5A Lackawanna
5A Lancaster

5A Lawrence
5A Lebanon
5A Lehigh
5A Luzerne
5A Lycoming
6A McKean
5A Mercer
5A Mifflin
5A Monroe
4A Montgomery
5A Montour
5A Northampton
5A Northumberland
5A Perry
4A Philadelphia
5A Pike
6A Potter
5A Schuylkill
5A Snyder
5A Somerset
5A Sullivan
6A Susquehanna
6A Tioga
5A Union
5A Venango
5A Warren
5A Washington
6A Wayne
5A Westmoreland
5A Wyoming
4A York

RHODE ISLAND
5A (all)

SOUTH CAROLINA
3A Abbeville
3A Aiken
3A Allendale*
3A Anderson
3A Bamberg*
3A Barnwell*
3A Beaufort*
3A Berkeley*
3A Calhoun
3A Charleston*
3A Cherokee
3A Chester
3A Chesterfield
3A Clarendon
3A Colleton*
3A Darlington
3A Dillon
3A Dorchester*
3A Edgefield
3A Fairfield
3A Florence
3A Georgetown*
3A Greenville
3A Greenwood
3A Hampton*
3A Horry*
3A Jasper*
3A Kershaw
3A Lancaster
3A Laurens
3A Lee
3A Lexington
3A Marion
3A Marlboro
3A McCormick
3A Newberry
3A Oconee
3A Orangeburg
3A Pickens
3A Richland
3A Saluda
3A Spartanburg
3A Sumter
3A Union
3A Williamsburg
3A York

SOUTH DAKOTA
6A Aurora
6A Beadle
5A Bennett
5A Bon Homme
6A Brookings
6A Brown
6A Brule
6A Buffalo
6A Butte
6A Campbell
5A Charles Mix
6A Clark
5A Clay
6A Codington
6A Corson
6A Custer
6A Davison
6A Day
6A Deuel
6A Dewey
5A Douglas
6A Edmunds
6A Fall River
6A Faulk
6A Grant
5A Gregory
6A Haakon
6A Hamlin
6A Hand
6A Hanson
6A Harding
6A Hughes
5A Hutchinson
6A Hyde
5A Jackson
6A Jerauld
6A Jones
6A Kingsbury
6A Lake
6A Lawrence
6A Lincoln
6A Lyman
6A Marshall
6A McCook
6A McPherson
6A Meade
5A Mellette
6A Miner
6A Minnehaha
6A Moody
6A Pennington
6A Perkins
6A Potter
6A Roberts
6A Sanborn
6A Shannon
6A Spink
6A Stanley
6A Sully
5A Todd
5A Tripp
6A Turner
5A Union
6A Walworth
5A Yankton
6A Ziebach

TENNESSEE
4A Anderson
4A Bedford
4A Benton
4A Bledsoe
4A Blount
4A Bradley
4A Campbell
4A Cannon
4A Carroll
4A Carter
4A Cheatham
3A Chester
4A Claiborne
4A Clay
4A Cocke
4A Coffee
3A Crockett
4A Cumberland
4A Davidson
4A Decatur
4A DeKalb
4A Dickson
3A Dyer
3A Fayette
4A Fentress
4A Franklin
4A Gibson
4A Giles
4A Grainger
4A Greene
4A Grundy
4A Hamblen
4A Hamilton
4A Hancock
3A Hardeman
3A Hardin
4A Hawkins
3A Haywood
3A Henderson
4A Henry
4A Hickman
4A Houston
4A Humphreys
4A Jackson
4A Jefferson
4A Johnson
4A Knox
3A Lake
3A Lauderdale
4A Lawrence
4A Lewis
4A Lincoln
4A Loudon
4A Macon
3A Madison
4A Marion
4A Marshall
4A Maury
4A McMinn
3A McNairy
4A Meigs
4A Monroe
4A Montgomery
4A Moore
4A Morgan
4A Obion
4A Overton
4A Perry
4A Pickett
4A Polk
4A Putnam
4A Rhea
4A Roane
4A Robertson
4A Rutherford
4A Scott
4A Sequatchie
4A Sevier
3A Shelby
4A Smith
4A Stewart
4A Sullivan
4A Sumner
3A Tipton
4A Trousdale
4A Unicoi
4A Union
4A Van Buren
4A Warren
4A Washington
4A Wayne
4A Weakley
4A White
4A Williamson
4A Wilson

TEXAS

2A Anderson*
3B Andrews
2A Angelina*
2A Aransas*
3A Archer
4B Armstrong
2A Atascosa*
2A Austin*
4B Bailey
2B Bandera*
2A Bastrop*
3B Baylor
2A Bee*
2A Bell*
2A Bexar*
3A Blanco*
3B Borden
2A Bosque*
3A Bowie*
2A Brazoria*
2A Brazos*
3B Brewster
4B Briscoe
2A Brooks*
3A Brown*
2A Burleson*
3A Burnet*
2A Caldwell*
2A Calhoun*
3B Callahan
2A Cameron*
3A Camp*
4B Carson
3A Cass*
4B Castro
2A Chambers*
2A Cherokee*
3B Childress
3A Clay
4B Cochran
3B Coke
3B Coleman
3A Collin*
3B Collingsworth
2A Colorado*
2A Comal*
3A Comanche*
3B Concho
3A Cooke
2A Coryell*
3B Cottle
3B Crane
3B Crockett
3B Crosby
3B Culberson
4B Dallam
3A Dallas*
3B Dawson
4B Deaf Smith
3A Delta
3A Denton*
2A DeWitt*
3B Dickens
2B Dimmit*
4B Donley
2A Duval*
3A Eastland
3B Ector
2B Edwards*
3A Ellis*
3B El Paso
3A Erath*
2A Falls*
3A Fannin
2A Fayette*
3B Fisher
4B Floyd
3B Foard
2A Fort Bend*
3A Franklin*
2A Freestone*
2B Frio*
3B Gaines
2A Galveston*
3B Garza
3A Gillespie*
3B Glasscock
2A Goliad*
2A Gonzales*
4B Gray
3A Grayson
3A Gregg*
2A Grimes*
2A Guadalupe*
4B Hale
3B Hall
3A Hamilton*
4B Hansford
3B Hardeman
2A Hardin*
2A Harris*
3A Harrison*
4B Hartley
3B Haskell
2A Hays*
3B Hemphill
3A Henderson*
2A Hidalgo*
2A Hill*
4B Hockley
3A Hood*
3A Hopkins*
2A Houston*
3B Howard
3B Hudspeth
3A Hunt*
4B Hutchinson
3B Irion
3A Jack
2A Jackson*
2A Jasper*
3B Jeff Davis
2A Jefferson*
2A Jim Hogg*
2A Jim Wells*
3A Johnson*
3B Jones
2A Karnes*
3A Kaufman*
3A Kendall*
2A Kenedy*
3B Kent
3B Kerr
3B Kimble
3B King
2B Kinney*
2A Kleberg*
3B Knox
3A Lamar*
4B Lamb
3A Lampasas*
2B La Salle*
2A Lavaca*
2A Lee*
2A Leon*
2A Liberty*
2A Limestone*
4B Lipscomb
2A Live Oak*
3A Llano*
3B Loving
3B Lubbock
3B Lynn
2A Madison*
3A Marion*
3B Martin
3B Mason
2A Matagorda*
2B Maverick*
3B McCulloch
2A McLennan*
2A McMullen*
2B Medina*
3B Menard
3B Midland
2A Milam*
3A Mills*
3B Mitchell
3A Montague
2A Montgomery*
4B Moore
3A Morris*
3B Motley
3A Nacogdoches*
3A Navarro*
2A Newton*
3B Nolan
2A Nueces*
4B Ochiltree
4B Oldham
2A Orange*
3A Palo Pinto*
3A Panola*
3A Parker*
4B Parmer
3B Pecos
2A Polk*
4B Potter
3B Presidio
3A Rains*
4B Randall
3B Reagan
2B Real*
3A Red River*
3B Reeves
2A Refugio*
4B Roberts
2A Robertson*
3A Rockwall*
3B Runnels
3A Rusk*
3A Sabine*
3A San Augustine*
2A San Jacinto*
2A San Patricio*
3A San Saba*
3B Schleicher
3B Scurry
3B Shackelford
3A Shelby*
4B Sherman
3A Smith*
3A Somervell*
2A Starr*
3A Stephens
3B Sterling
3B Stonewall
3B Sutton
4B Swisher
3A Tarrant*
3B Taylor
3B Terrell
3B Terry
3B Throckmorton
3A Titus*
3B Tom Green
2A Travis*
2A Trinity*
2A Tyler*
3A Upshur*
3B Upton
2B Uvalde*
2B Val Verde*
3A Van Zandt*
2A Victoria*
2A Walker*
2A Waller*
3B Ward
2A Washington*
2B Webb*
2A Wharton*
3B Wheeler
3A Wichita
3B Wilbarger

2A Willacy*
2A Williamson*
2A Wilson*
3B Winkler
3A Wise
3A Wood*
4B Yoakum
3A Young
2B Zapata*
2B Zavala*

UTAH
5B Beaver
6B Box Elder
6B Cache
6B Carbon
6B Daggett
5B Davis
6B Duchesne
5B Emery
5B Garfield
5B Grand
5B Iron
5B Juab
5B Kane
5B Millard
6B Morgan
5B Piute
6B Rich
5B Salt Lake
5B San Juan
5B Sanpete
5B Sevier
6B Summit
5B Tooele
6B Uintah
5B Utah
6B Wasatch
3B Washington
5B Wayne
5B Weber

VERMONT
6A (all)

VIRGINIA
4A (all)

WASHINGTON
5B Adams
5B Asotin
5B Benton
5B Chelan
4C Clallam
4C Clark
5B Columbia
4C Cowlitz
5B Douglas
6B Ferry
5B Franklin
5B Garfield
5B Grant
4C Grays Harbor
4C Island
4C Jefferson
4C King
4C Kitsap
5B Kittitas
5B Klickitat
4C Lewis
5B Lincoln
4C Mason
6B Okanogan
4C Pacific
6B Pend Oreille
4C Pierce
4C San Juan
4C Skagit
5B Skamania
4C Snohomish
5B Spokane
6B Stevens
4C Thurston
4C Wahkiakum
5B Walla Walla
4C Whatcom
5B Whitman
5B Yakima

WEST VIRGINIA
5A Barbour
4A Berkeley
4A Boone
4A Braxton
5A Brooke
4A Cabell
4A Calhoun
4A Clay
5A Doddridge
5A Fayette
4A Gilmer
5A Grant
5A Greenbrier
5A Hampshire
5A Hancock
5A Hardy
5A Harrison
4A Jackson
4A Jefferson
4A Kanawha
5A Lewis
4A Lincoln
4A Logan
5A Marion
5A Marshall
4A Mason
4A McDowell
4A Mercer
5A Mineral
4A Mingo
5A Monongalia
4A Monroe
4A Morgan
5A Nicholas
5A Ohio
5A Pendleton
4A Pleasants
5A Pocahontas
5A Preston
4A Putnam
5A Raleigh
5A Randolph
4A Ritchie
4A Roane
5A Summers
5A Taylor
5A Tucker
4A Tyler
5A Upshur
4A Wayne
5A Webster
5A Wetzel
4A Wirt
4A Wood
4A Wyoming

WISCONSIN
6A Adams
7 Ashland
6A Barron
7 Bayfield
6A Brown
6A Buffalo
7 Burnett
6A Calumet
6A Chippewa
6A Clark
6A Columbia
6A Crawford
6A Dane
6A Dodge
6A Door
7 Douglas
6A Dunn
6A Eau Claire
7 Florence
6A Fond du Lac
7 Forest
6A Grant
6A Green
6A Green Lake
6A Iowa
7 Iron
6A Jackson
6A Jefferson
6A Juneau
6A Kenosha
6A Kewaunee
6A La Crosse
6A Lafayette
7 Langlade
7 Lincoln
6A Manitowoc
6A Marathon
6A Marinette
6A Marquette
6A Menominee
6A Milwaukee
6A Monroe
6A Oconto
7 Oneida
6A Outagamie
6A Ozaukee
6A Pepin
6A Pierce
6A Polk
6A Portage
7 Price
6A Racine
6A Richland
6A Rock
6A Rusk
6A Sauk
7 Sawyer
6A Shawano
6A Sheboygan
6A St. Croix
7 Taylor
6A Trempealeau
6A Vernon
7 Vilas
6A Walworth
7 Washburn
6A Washington
6A Waukesha
6A Waupaca
6A Waushara
6A Winnebago
6A Wood

WYOMING
6B Albany
6B Big Horn
6B Campbell
6B Carbon
6B Converse
6B Crook
6B Fremont
5B Goshen
6B Hot Springs
6B Johnson
6B Laramie
7 Lincoln
6B Natrona
6B Niobrara
6B Park
5B Platte
6B Sheridan
7 Sublette
6B Sweetwater
7 Teton
6B Uinta
6B Washakie
6B Weston

US TERRITORIES

AMERICAN SAMOA
1A (all)*

GUAM
1A (all)*

NORTHERN
MARIANA ISLANDS
1A (all)*

PUERTO RICO
1A (all)*

VIRGIN ISLANDS
1A (all)*

PART II – IRC

1. Revise as follows:

N1101.2.1 Warm humid counties. Warm humid counties are ~~listed~~ identified in Table ~~N1101.2.1~~ N1101.2 by an asterisk.

2. Delete Tables N1101.2 and N1101.2.1 and replace with single Table N1101.2 as follows:

TABLE N1101.2
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY, AND TERRITORY

Key:
A – Moist, B – Dry, C – Marine. Absence of moisture designation indicates moisture regime is irrelevant.
Asterisk '*' indicates a Warm-Humid location.

(SEE TABLE 301.1 IN PART I)

Reason: This change is merely a clarification. The existing format of tables mapping U.S. counties to IECC/IRC climate zones is difficult to read in many cases because not every county is listed. Rather than scanning the code text for their county, users often must scan the table to see if their county is *not* listed to determine the correct zone/moisture regime. Further, the existing format requires such lookups in two separate tables to determine both zone/moisture regime and warm/humid status for Southeastern locations.

Unless all counties in a state have identical zone and warm/humid designations, the proposed table lists each and every county to avoid user confusion.

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

PART I – IECC

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

PART II – IRC B/E

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

EC11–07/08
Table 301.1; IRC Table N1101.2

Proponent: Ronald Majette, U. S. Department of Energy

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise table as follows:

TABLE 301.1
CLIMATE ZONES BY STATE, COUNTY AND TERRITORIES

Minnesota
Zone 6 except Zone 7
…
Koochiching
Lake
Lake of the Woods
…

Wyoming
…
Zone 7
Lincoln
Sublette
Teton

(Portions of table not shown remain unchanged)

PART II – IRC

Revise table as follows:

TABLE N1101.2
CLIMATE ZONES BY STATE, COUNTY AND TERRITORIES

Minnesota
Zone 6 except Zone 7
…
Koochiching
Lake
Lake of the Woods
…
Wyoming
…
Zone 7
Lincoln
Sublette
Teton

(Portions of table not shown remain unchanged)

Reason: Lake county in Minnesota should be listed in the counties in Zone 7. Also Teton county in Wyoming is misspelled.

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

PART I – IECC

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

PART II – IRC B/E

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

EC12–07/08
301.3.1, Table 301.3(1)

Proponent: Donald J. Vigneau, Northeast Energy Efficiency Partnerships, Inc.

1. Delete without substitution:

~~**301.3.1 Warm humid criteria.** "Warm humid" locations shall be defined as locations where either of the following conditions occurs:~~

1. ~~67°F (19.4°C) or higher wet-bulb temperature for 3,000 or more hours during the warmest six consecutive months of the year;~~
2. ~~73°F (22.8°C) or higher wet-bulb temperature for 1,500 or more hours during the warmest six consecutive months of the year.~~

2. Revise table as follows:

TABLE 301.3(1)
INTERNATIONAL CLIMATE ZONE DEFINITIONS

MAJOR CLIMATE TYPE DEFINITIONS
Warm-Humid Definition – Moist (A) locations where either of the following wet-bulb temperature conditions shall occur during the warmest six consecutive months of the year: 1. 67^0F (19.4^0C) or higher for 3,000 or more hours; or 2. 73^0F (22.8^0C) or higher for 1,500 or more hours

For SI: °C = [(°F)-32]/1.8; 1 inch = 2.54 cm.

(Portions of table not shown remain unchanged)

Reason: Warm-humid criteria in Section 301.3.1 belong with the other climate definition criteria in Table 301.3(1) and not separately; no technical changes; editorial changes made to existing warm-humid definition only for clarity.

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

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

EC13–07/08
Table 301.3(2)

Proponent: Donald J. Vigneau, Northeast Energy Efficiency Partnerships, Inc.

Delete table and substitute as follows:

~~**TABLE 301.3(2)**~~
~~**INTERNATIONAL CLIMATE ZONE DEFINITIONS**~~

TABLE 301.3(2)
INTERNATIONAL CLIMATE ZONE TABLE
MAJOR CLIMATE TYPE DEFINITIONS

0	**HDD**	1000	HDD	**2000**	**HDD**	**3000**	**HDD**	**4000**	**HDD**	**5000**	**HDD**	6000	HDD	**7000**	**HDD**		**Celsius (a,c)**
				ZONE 1													
9000 CDD																	**5000 CDD**
				ZONE 2													
6300 CDD																	**3500 CDD**
4500 CDD				**ZONES 3A & 3B**			**ZONE 5**		**ZONE 6**			**ZONE 7**			**ZONE 8→**		**2500 CDD**
1800 CDD			**ZONE 3C**			**ZONE 4**											1000 CDD
0 CDD																	**0 CDD**
Fahrenheit(b) **0**	**HDD**	1800	HDD	**3600**	**HDD**	**5400**	**HDD**	**7200**	**HDD**	**9000**	**HDD**	10,800	HDD	**12,600**	**HDD**		

Notes:
a. For SI units: $^0C = [(^0F) - 32] / 1.8$
b. IP UNITS: $CDD50^0F / HDD65^0F$
c. SI UNITS: $CDD10^0C / HDD18^0C$

Reason: Table 301.3(2) is confusing at best for Zones 3A, B, C and Zone 4 due to overlaps in the heating and cooling degree day (HDD/CDD) parameters, and that relevant HDD information is missing in Zones 1 & 2, relevant CDD information is missing in Zones 3C, 4C and 5-8. That is easily misinterpreted in the existing definitions table 301.3(2), whereas the graph covers all conditions. Chuck Murray's explanatory chart submitted with EC-30/2006-2007 showed how to present the information so that it is clear and readily understandable by virtually all code users.

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

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

EC14–07/08

202 (New), 401.2, Table 402.1.1, Table 402.1.3, 402.1.5 (New), Table 402.1.5 (New), Table 402.1.6 (New), Table 402.1.7 (New), 402.2.1, 402.2.2, 402.4.1, 402.4.1.1 (New), 402.4.1.2 (New), 402.4.1.3 (New), 402.4.1.4 (New), 402.4.1.5 (New), 402.4.1.6 (New), 402.7 (New), Table 402.7 (New), 403.2.4 (New), 403.4, 403.4.1 (New), 403.4.2 (New), 403.4.3 (New), 403.6, 404, 404.1, 404.2, Table 404.5.2(1)

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

1. Add new definitions as follows:

SECTION 202
GENERAL DEFINITIONS

AIR BARRIER. A material intended to prevent the flow of air between a conditioned space and an unconditioned space.

LIGHT FIXTURE. A complete lighting unit consisting of a lamp or lamps, and ballasting (when applicable) together with the parts designed to distribute the light, position and protect the lamps, and connect the lamps to the power supply. For built-in valence lighting, strings of low-voltage halogens, and track lights, each individual bulb shall count as a fixture.

QUALIFYING LIGHT FIXTURE. A hard-wired light fixture comprised of any of the following components: a) high efficacy luminaire; or b) exterior light fixtures controlled by a motion sensor(s) with integral photo-control photo-sensor.

QUALIFYING LIGHT FIXTURE LOCATIONS. Hard-wired light fixtures located in kitchens, dining rooms, living rooms, family rooms/dens, bathrooms, hallways, stairways, entrances, bedrooms, garage, utility rooms, home offices, and all outdoor fixtures mounted on a building or pole. This excludes portable luminaires, closets, unfinished basements, and landscape lighting.

2. Revise as follows:

401.2 Compliance. Projects shall comply with Sections 401, 402.4, 402.5, 402.6, 402.7, and 403 (referred to as the mandatory provisions) and either:

1. Sections 402.1 through 402.3 (prescriptive); or
2. Section 404 (performance).

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT [a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[h]	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[H]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	~~1.20~~ 0.65	0.75	~~0.37~~ 0.25	30	~~13~~ 15	3 / 4	13	0	0	0
2	~~0.75~~ 0.50	0.75	~~0.37~~ 0.25	~~30~~ 38	~~13~~ 15	4 / 6	13	~~0~~ 10/13	0	0
3	~~0.65~~ 0.40	0.65	~~0.40[e]~~ 0.25[e]	~~30~~ 38	~~13~~ 18	5 / 8	19	~~0~~ 10/13	0	5/13
4 except Marine	~~0.40~~ 0.35	0.60	NR	~~38~~ 49	~~13~~ 18	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	~~38~~ 49	~~19 or 13+5[g]~~ 21	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	~~49~~ 60	~~19 or 13+5[g]~~ 21	15 / 19	30[f]	~~10~~ 15/19 ~~13~~	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	~~49~~ 60	~~21~~ 24	19 / 21	~~30~~ 38[f]	~~10~~ 15/19 ~~13~~	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

a. *R*-values are minimums. *U*-factors and SHGC are maximums. R-19 shall be permitted to be compressed into a 2 × 6 cavity.
b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
c. "15 / 19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall. ~~The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.~~
d. R-5 shall be added to the required slab edge *R*-values for heated slabs.
e. There are no SHGC requirements in the Marine zone.
f. Or insulation sufficient to fill the framing cavity, R-19 minimum.
g. ~~"13+5" means R-13 cavity insulation plus R-5 insulated sheathing.~~ Any combination of insulation shall be permitted to meet the requirements by summing the R-value of the cavity insulation and the R-value of the insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS [a]

CLIMATE ZONE	FENES-TRATION U-FACTOR	SKY-LIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	~~1.20~~ 0.65	0.75	0.035	~~0.082~~ 0.069	0.197	~~0.064~~ 0.060	0.360	0.477
2	~~0.75~~ 0.50	0.75	~~0.035~~ 0.029	~~0.082~~ 0.069	0.165	~~0.064~~ 0.060	~~0.360~~ 0.059	0.477
3	~~0.65~~ 0.40	0.65	~~0.035~~ 0.029	~~0.082~~ 0.056	0.141	~~0.047~~ 0.046	~~0.220~~ 0.059	0.136
4 except Marine	~~0.40~~ 0.35	0.60	~~0.030~~ 0.024	~~0.082~~ 0.056	0.141	~~0.047~~ 0.046	0.059	0.065
5 and Marine 4	0.35	0.60	~~0.030~~ 0.024	~~0.060~~ 0.051	0.082	~~0.037~~ 0.033	0.059	0.065
6	0.35	0.60	~~0.026~~ 0.020	~~0.060~~ 0.051	0.060	0.033	~~0.059~~ 0.050	0.065
7 and 8	0.35	0.60	~~0.026~~ 0.020	~~0.057~~ 0.047	0.057	~~0.033~~ 0.027	~~0.041~~ 0.050	~~0.057~~ 0.065

(Footnotes remain unchanged)

3. Add new text and tables as follows:

402.1.5 Envelope component default values. When calculating the U-factor of an assembly as part of Section 402.1.3, 402.1.4, or 404.5.2, the values in Table 402.1.5 through 402.1.7 shall be used unless alternate values are documented and approved by the code official. In addition, the U-factor of the assembly shall be calculated using a series-parallel calculation.

TABLE 402.1.5
FRAME WALL COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.68	
Drywall Layer R-Value	0.45	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 86%	Framing: 14%
Proposed Design Default Insulation / Framing Fraction	Insulation: 77%	Framing: 23%
Sheathing Layer R-Value	0.63	
Siding Layer R-Value	0.44	
Exterior Air Film R-Value	0.45	

TABLE 402.1.6
FLOOR COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.92	
Floor Covering R-Value	1.23	
Floor Subfloor R-Value	0.63	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 92%	Framing: 8%
Proposed Design Default Insulation / Framing Fraction	Insulation: 90%	Framing: 10%
Exterior Air Film R-Value	0.92	

TABLE 402.1.7
CEILING COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.61	
Drywall Layer R-Value	0.45	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 93%	Framing: 7%
Proposed Design Default Insulation / Framing Fraction	Insulation: 89%	Framing: 11%
Exterior Air Film R-Value	0.61	

4. Revise as follows:

402.2.1 Ceilings with attic spaces. When Section 402.1.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly R-38 shall be deemed to satisfy the requirement for R-49 or higher wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves.

402.2.2 Ceilings without attic spaces. Where Section 402.1.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section 402.1.1 shall be limited to 500 square feet (46 m_2) or 20% of the total insulated ceiling area, which ever is less.

402.4.1 (Supp) Building thermal envelope. The building thermal envelope shall be durably sealed to limit infiltration and prevent thermal bypasses. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The thermal envelope, including insulation and air barriers, shall be inspected in accordance with Sections 402.4.1.1 through 402.4.1.6. ~~The following shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material:~~

~~1. All joints, seams and penetrations.~~
~~2. Site-built windows, doors and skylights.~~
~~3. Openings between window and door assemblies and their respective jambs and framing.~~
~~4. Utility penetrations.~~
~~5. Dropped ceilings or chases adjacent to the thermal envelope.~~
~~6. Knee walls.~~
~~7. Walls and ceilings separating a garage from conditioned spaces.~~
~~8. Behind tubs and showers on exterior walls.~~
~~9. Common walls between dwelling units.~~
~~10. Attic access openings.~~
~~11. Other sources of infiltration.~~

5. Add new text and tables as follows:

402.4.1.1 Walls adjoining exterior walls or unconditioned spaces. Fully insulated wall in substantial contact with air barrier at both interior and exterior, or for Climate Zones 1 thru 3, sealed exterior air barrier aligned with fully supported insulation. The following areas shall meet these requirements: wall behind shower/tub, wall behind fireplace, insulated attic slopes for un-vented attic spaces, attic knee walls, skylight shaft walls, wall adjoining porch roof, staircase walls, double walls.

402.4.1.2 Floors between conditioned and exterior spaces. An air barrier shall be installed at any exposed insulation edges. Insulation shall be installed to maintain substantial contact w/ sub-floor above and air barrier below. The following areas shall meet these requirements: Insulated floor above un-conditioned and semi-conditioned space.

402.4.1.3 Shafts. Openings and gaps to unconditioned space shall be fully sealed with an air barrier. The following areas shall meet these requirements: duct, piping and flue shafts and associated penetrations.

402.4.1.4 Attic and ceiling interface. Attic penetrations and dropped ceilings shall include a full interior air barrier aligned with insulation with any gaps fully sealed. Insulation shall fit snugly in opening and the opening air barrier shall be fully gasketed. The following areas shall meet these requirements: attic access panel, attic drop-down stair, dropped ceiling/soffit, recessed lighting fixtures, whole-house fan.

402.4.1.5 Common walls between dwelling units. Gap between drywall shaft wall (common wall) and structural framing between units shall be sealed at all exterior boundary conditions.

402.4.1.6 Gaps and penetrations. Gaps and penetrations in the thermal envelope of the home shall be sealed and insulated. The following areas shall meet these requirements: the perimeters of windows, doors, skylights, and utility penetrations, hose bibs, exterior electrical outlets and light fixtures.

402.7 Minimum opaque envelope requirements (Mandatory). The thermal requirements for opaque envelope components shall not be less than the requirements in Table 402.7 when determining alternatives to the R-values in Table 402.1.1 under Sections 402.1.3, 402.1.4, or 404.

TABLE 402.7
MINIMUM INSULATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	STEEL FRAME WALL CONTINUOUS R-VALUE [c]	FLOOR R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE & DEPTH	CRAWL SPACE WALL R-VALUE
1	25	11	0	R-11+3	11	0	0	0
2	25	11	3	R-11+3	11	0	0	0
3	25	11	4	R-11+3	13	0	0	0
4 except Marine	30	11	4	R-11+3	13	5/11 [b]	5, 2ft	5/11 [b]
5 and Marine 4	30	13	5	R-13+5, or R-15+4, or R-21+3	19	5/11 [b]	5, 2ft	5/11 [b]
6	38 [a]	13	13	R-13+5, or R-15+4, or R-21+3	19	5/11 [b]	10, 2ft	5/11 [b]
7 and 8	38 [a]	19	15	R-13+9, or R-19+8, or R-25+7	19	5/11 [b]	10, 2ft	5/11 [b]

a. R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves or the design of the roof/ceiling assembly does not allow sufficient space for the required insulation. This reduction of insulation shall be limited to 500 square feet (46 m^2) of ceiling area.

b. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation configuation meets the requirement.

c. Cavity insulation R-value is listed first, followed by continuous insulation R-value.

403.2.4 Distribution System Efficiency. Ducts shall be located completely within the building thermal envelope or achieve an equivalent distribution efficiency of 0.88 or greater.

Exceptions:

1. In climate zones 1-2, duct systems that supply air from cooling equipment with an efficiency that exceeds prevailing federal minimum standards by at least 15%;
2. In climate zone 3, duct systems that supply air from either cooling equipment or heating equipment with an efficiency that exceeds prevailing federal minimum standards by at least 15%
3. In climate zones 4-8, duct systems that supply air from heating equipment with an efficiency that exceeds prevailing federal minimum standards by 15%.

403.4 Service water heating. Service water heating systems and piping shall be installed in accordance with the applicable requirements of Sections 403.4.1 through 403.4.2

403.4.1 Insulation. All Service Hot Water piping shall be insulated to at least R-2 for the distance between the Service Water Heater to within 5 feet of each fixture connected to the hot water pipe.

Exception: Distribution systems that supply hot water from Service Water Heating systems with an efficiency that exceeds prevailing federal minimum standards by at least 15% for gas service water heating equipment and achieve efficiency of at least 1.0 EF for electric service water heating equipment.

403.4.2 Stub-in for solar water. All Service Water Heating distribution systems shall have a stub-in connection point for future Solar Hot Water Systems in an accessible location within 5 feet of the roof.

Exception: Distribution systems that supply hot water from Service Water Heating systems with an efficiency that exceeds prevailing federal minimum standards by at least 15% for gas service water heating equipment and achieve efficiency of at least 1.0 EF for electric service water heating equipment.

6. Revise as follows:

~~**403.4**~~ **403.4.3 Circulating hot water systems.** All circulating service hot water piping shall be insulated to at least R-2. Circulating hot water systems shall include an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use.

403.5 Mechanical ventilation. (No change to current text)

403.6 Equipment sizing. Heating and cooling equipment shall be sized in accordance with Section M1401.3 of the *International Residential Code*.

The maximum oversizing limit for air conditioners and air-source and ground-source heat pumps is 15% with the following two exceptions: single-speed air-source and ground-source heat pumps in buildings with heating loads that exceed cooling loads have a limit of 25%, and multi-stage heat pumps do not have a strict limit, but shall be sized to allow adequate humidity control in the cooling mode. The maximum oversizing limit for gas, oil or propane heating equipment is 40%.

The following operating conditions shall be used in the sizing calculations and verified where reviewed by the code official:

1. Outdoor temperatures shall be the 99.0% and 1.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the home's location or most representative city for which design temperature data are available;
2. Indoor temperatures shall be 75 F for cooling and 70 F for heating;
3. Infiltration rate shall be selected as "tight", or the equivalent term.

In specifying equipment, the next available manufactured size may be used. In addition, indoor and outdoor coils shall be matched in accordance with ARI Standard 210/240.

SECTION 404 (Supp)
ELECTRICAL POWER AND LIGHTING SYSTEMS

404.1 Dwelling unit interior and exterior lighting power (Prescriptive). 50% of all dwelling unit interior and exterior hard-wired lighting sockets shall be a qualifying light fixture. All exterior lighting equipment shall be a qualifying light fixture or shall comply with the exterior lighting power requirements of Section 505.7

Exceptions:

1. Swimming pool lighting systems
2. Landscape lighting systems

~~**404.1**~~ **404.2 (Supp) Interior lighting power (Prescriptive).** Lighting in spaces other than dwelling units, e.g. common areas, shall be high efficacy luminaires or shall comply with the interior lighting power requirements in Section 505.5.

~~**Exception:** Dwelling units.~~

SECTION 404
SIMULATED PERFORMANCE ALTERNATIVE
(Performance)

404.1 Scope. This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling, lighting, and service water heating energy only.

TABLE 404.5.2(1) (Supp)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: mass wall if proposed wall is mass; otherwise wood frame Gross Area: same as proposed U-Factor: from Table 402.1.3 Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed, assuming gaps/missing insulation equal to 5%, unless otherwise verified[a] As proposed As proposed
Basement and crawl-space walls	Type: same as proposed Gross Area: same as proposed U-Factor: from Table 402.1.3, with insulation layer on interior side of walls	As proposed As proposed As proposed, assuming gaps/missing insulation equal to 5%, unless otherwise verified[a]
Above-grade floors	Type: wood frame Gross Area: same as proposed U-Factor: from Table 402.1.3	As proposed As proposed As proposed, assuming gaps/missing insulation equal to 5%, unless otherwise verified[a]
Ceilings	Type: wood frame Gross Area: same as proposed U-Factor: from Table 402.1.3	As proposed As proposed As proposed, assuming gaps/missing insulation equal to 5%, unless otherwise verified[a]
~~Doors~~	~~Area: 40 ft^2~~ ~~Orientation: North~~ ~~*U*-Factor: same as fenestration from Table 402.1.3~~	~~As proposed~~ ~~As proposed~~ ~~As proposed~~
~~Glazing~~Fenestration[a-b]	Total area[b-c] = (a) The proposed ~~glazing~~fenestration area; where the proposed ~~glazing~~fenestration area is less than ~~18%~~15% of the conditioned floor area (b) ~~18%~~15% of the conditioned floor area; where the proposed ~~glazing~~fenestration area is ~~18%~~15% or more of the conditioned floor area Orientation: equally distributed to four cardinal compass orientations (N, E, S & W) U-Factor: from Table 402.1.1~~2~~ SHGC: For glazing, which shall equal the total area as defined above minus 40 ft^2, from Table 402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used; for opaque doors, which shall equal 40 ft^2, SHGC = 0 for all climates, equally distributed to four cardinal compass orientations. Interior shade fraction: Summer (all hours when cooling is required) = ~~0.70~~ 0.90 Winter (all hours when heating is required) = ~~0.85~~ 0.90 External shading: none	As proposed As proposed As proposed Same as standard reference design[c-d] As proposed
Air Exchange Rate	Specific Leakage Area (SLA)[d-e] = ~~0.00036 assuming no energy recovery~~ 0.00015 combined with the mechanical ventilation rate, which shall be 0.01 x CFA + 7.5 x (Nbr+1) where: CFA = conditioned floor area Nbr = number of bedrooms and assuming continuous balanced ventilation using a energy/heat recovery ventilator with a recovery efficiency of 76% [g]	For residences that are not tested, ~~the same as the standard reference design~~ 0.00060 SLA assuming no energy recovery For residences without mechanical ventilation that are tested in accordance with ASHRAE 119, Section 5.1, the measured air exchange rate [~~e~~e-f] but not less than 0.35 ACH For residences with mechanical ventilation that are tested in accordance with ASHRAE 119, Section 5.1, the measured air exchange rate [e-f] combined with the mechanical ventilation rate [g], [f] which shall not be less than 0.01 x CFA + 7.5 x (Nbr+1) where: CFA = conditioned floor area Nbr = number of bedrooms

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Internal Gains	IGain = 17,900 + 23.8 x CFA + 4104 x Nbr + $\Delta IG_{lighting}$ (Btu/day per dwelling unit) Where $\Delta IG_{lighting}$ represents the reduced internal gains from efficient lighting as defined by the lighting building component.	~~Same as standard reference design,~~ IGain = 17,900 + 23.8 x CFA + 4104 x Nbr + $\Delta IG_{lighting}$ (Btu/day per dwelling unit) Where $\Delta IG_{lighting}$ represents the reduced internal gains from efficient lighting as defined by the lighting building component.
Heating systems~~h, i~~ j	Fuel type: same as proposed design Efficiencies: Electric: air-source heat pump with ~~prevailing federal minimum~~ efficiency as proposed, unless the proposed is greater than 15% above the federal minimum, in which case it shall be 15% above the federal minimum. Nonelectric furnaces: natural gas furnace with ~~prevailing federal minimum~~ efficiency as proposed, unless the proposed is greater than 15% above the federal minimum, in which case it shall be 15% above the federal minimum Nonelectric boilers: natural gas boiler with ~~prevailing federal minimum~~ efficiency as proposed, unless the proposed is greater than 15% above the federal minimum, in which case it shall be 15% above the federal minimum Capacity: sized in accordance with Section M1401.3 of the *International Residential Code*	As proposed As proposed As proposed As proposed As proposed
Cooling systems~~h, j~~ i, k	Fuel type: Electric Efficiency: as proposed, unless the proposed efficiency is greater than 15% above the ~~in accordance with~~ prevailing federal minimum ~~standards~~ efficiency, in which case it shall be 15% above the federal minimum. Capacity: sized in accordance with Section M1401.3 of the *International Residential Code*	As proposed As proposed As proposed
Service Water Heating~~h, k~~ i, l	Fuel type: same as proposed design Efficiency: as proposed, unless the proposed efficiency is greater than 15% above the ~~in accordance with~~ prevailing federal minimum ~~standards~~ efficiency, in which case it shall be 15% above the federal minimum. Use: ~~gal/day=30 + (10 x N_{br})~~ Same as proposed design	As proposed As proposed ~~Same as standard reference~~ Use: gal/day=30 + (10 x N_{br})
Thermal distribution systems	A thermal distribution system efficiency (DSE) of ~~0.80~~ 0.88 shall be applied to both the heating and cooling system efficiencies	~~Same as standard reference design,~~ A thermal distribution system efficiency (DSE) of 0.80 shall be applied to both the heating and cooling system efficiencies, except as specified by Table 404.5.2(2)
Thermostat	Type: Manual, cooling temperature setpoint = ~~78~~ 75°F; Heating temperature set point = ~~68~~ 70 °F	Same as standard reference
Lighting	kWh/yr = (455 + 0.80 * CFA) + □kWh/yr where: □kWh/yr = [29.5 – 0.5189*CFA *50% –295.12*50% + 0.0519*CFA] Internal gains in the Standard Reference Design shall be reduced by 90% of the impact from efficient lighting, calculated in btu/day using the following equation: $\Delta IG_{lighting}$ = - 0.90 * ΔkWh/yr * 10^6 / 293 / 365	kWh/yr = (455 + 0.80 * CFA) + □kWh/yr where: □kWh/yr = [29.5 – 0.5189*CFA*FL% –295.12*FL% + 0.0519*CFA] FL% = the ratio of Qualifying Light Fixtures to all light fixtures in Qualifying Light Fixture Locations. The Proposed Design shall not have FL% more than 50% from CFL. Internal gains in the Proposed Design shall be reduced by 90% of the impact from efficient lighting, calculated in btu/day using the following equation: $\Delta IG_{lighting}$ = 0.90 * ΔkWh/yr * 10^6 / 293 / 365

a. Insulation installation, including percent of insulation missing and insulation substantially filling cavity and, shall be determined and documented by an independent party approved by the code official.

(Re-letter current notes a. through k. to become notes b. through l.)

404.2 Mandatory requirements. Compliance with this section requires that the criteria of Sections 401, 402.4, 402.5, 402.6, 402.7, and 403 be met.

Reason: The **International Energy Conservation Code** is badly in need of updating, to reflect the new era of higher energy prices and the increased focus on energy efficiency at all levels of government and the private sector. The stringency of the IECC has not increased significantly in many years, yet energy prices have risen sharply and promise to remain high. Our energy systems are strained by rising demand. Global warming creates a new imperative to reduce America's energy use. For these reasons, the time has come for the ICC to do its part to improve the energy efficiency of America's buildings. This proposal comprises a number of changes that, taken together, are intended to achieve at least a 30% efficiency improvement in the IECC's residential provisions.

Members of the **Energy Efficient Codes Coalition** have put forward this proposal as part of our fulfillment of commitments made under the **National Action Plan for Energy Efficiency**. The NAPEE initiative has drawn formal commitments from state and local governments, utilities, utility regulatory bodies and others to engage in a renewed effort to increase energy efficiency in American homes.

This proposal complements the initiative being taken by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) to improve energy efficiency levels by 30% in the **ASHRAE 90.1** commercial building standard. It also reflects the energy efficiency improvement targets set in federal legislation pending in Congress.

A chorus of leading voices from across the country is calling for this type of energy efficiency upgrade in American homes and buildings. The Secretary of the **U.S. Department of Energy** has launched a new Energy Efficiency Campaign, calling for the evaluation and strengthening of building codes in both the residential and commercial sectors. Colorado Gov. Bill Ritter opened a **Western Governors Association** workshop earlier this year calling for recommendations "to achieve at least a 30% improvement over the current International Energy Efficiency Codes."

On July 18, 2007, the **National Petroleum Council** delivered a report to Secretary of Energy entitled Facing the Hard Truths about Energy: A Comprehensive View to 2030 of Global Oil and Natural Gas. Five strategies for meeting future energy challenges are identified in the report. Listed first is: "Moderate the growing demand for energy by increasing efficiency of transportation, residential, commercial, and industrial uses."

The need for more efficient consumption of energy in buildings has been echoed by the **American Institute of Architects** in its "2030 Challenge" to the global community of architects and builders to make all new buildings carbon-neutral by 2030. Building energy code upgrades also form part of the plan put forward by the **Mayors for Climate Protection**, a new alliance of 400+ US mayors who have committed their cities in 43 states to addressing climate change.

We have also submitted these proposals separately so that each could also be considered on its own merits and so that we could identify the rationale and supporting information for each individual change. As a result, rather than repeat them, we incorporate the supporting information for those changes by reference in this reason statement.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC15–07/08
Table 402.1.1; IRC Table N1102.1

Proponent: Craig Conner, Building Quality, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise table footnote as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

For SI: 1 foot = 304.8 mm.

a. *R*-values are minimums. *U*-factors and SHGC are maximums. ~~R-19 shall be permitted to be compressed into a 2 × 6 cavity.~~ R-19 batts compressed into a nominal 2x6 framing cavity such that the R-value is reduced by R-1 or more shall be labeled with the compressed batt R-value in addition to the full thickness R-value.

(Portions of table and footnotes not shown remain unchanged)

PART II – IRC

Revise table footnote as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

a. R-values are minimums. U-factors and SHGC are maximums. ~~R-19 insulation shall be permitted to be compressed into a 2x6 cavity~~. R-19 batts compressed into a nominal 2x6 framing cavity such that the R-value is reduced by R-1 or more shall be labeled with the compressed batt R-value in addition to the full thickness R-value.

(Portions of table and footnotes not shown remain unchanged)

Reason: R-19 batts are routinely used in a nominal 2x6 frame wall cavity. The compressed batt R-value is about R-1 or R-2 less than the rated R-value. Batts should be produced to fit the common cavity size, or the compressed batt R-value should be added to the batt label. Batts with other R-values are produced to fit the intended cavity.

The effect of compressing fiberglass batts on batt R-value was quantified in the study entitled, "The Effect of Compression on the Material R-Value of Fiberglass Batt Insulation.[1]

> *"Installations that result in batt thicknesses less than the label thickness can have substantially lower material R-values. Compression of the insulation specimens to 90% of full thickness reduced the R-values by 5.6 to 9.4%."*

R-19 batts are 6.25 or 6.5 inches thick; however, the 2x6 cavity is only 5.5 inches thick. A 6.25-inch batt compressed into a 5.5-inch cavity is compressed 12%. A 6.5-inch batt compressed into a 5.5-inch cavity is compressed about 15%. Based on the study quoted above, compression reduces the batt R-value by about R-1 or R-2.

NAIMA, the trade association for fiberglass insulation and slag/rock wool insulation, has acknowledged the R-1 reduction in stating that an R-19 batt in a 2x6 cavity is really R-18.[2]

> "*When a standard R-19 batt (6" to 6 ¾" thick) is used to fill the 5 1⁄2" wall cavity, it has to be compressed. Compressing the insulation causes it to lose some of its thermal effectiveness, reducing its R-value to R-18.*"

Other batts are correctly sized to fit the cavity they are designed for and marked with the R-value they achieve when placed in that cavity. R-21 batts, a higher R-value than R-19, are correctly sized to fit in a nominal 2x6 cavity. Either the R-19 batt should also be marked with the R-value it achieves in a 2x6 wall application, or R-19 batts should be produced to fit in a 2x6 cavity without compression and without loss of R-value.

Quotes from:

[1] Graves, Ronald S., and David W. Yarbrough. 1992. "The Effect of Compression on the Material R-Value of Fiberglass Batt Insulation." *Journal of Building Physics*, Vol. 15, No. 3, 248-260 (page 258). Building Materials Group Oak Ridge National Laboratory Oak Ridge, TN 37831 http://jen.sagepub.com/cgi/content/abstract/15/3/248

[2] NAIMA (North American Insulation Manufacturers Association). *Insulation Facts #32, A Guide To Selecting Fiber Glass Insulation Products for New Home Construction and Remodeling*.

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

PART I – IECC

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

PART II – IRC B/E

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

EC16 –07/08
Table 402.1.1, Table 402.1.3

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	~~1.20~~ 0.65	0.75	0.37	30	13	3 / 4	13	0	0	0
2	~~0.75~~ 0.50	0.75	0.37	30	13	4 / 6	13	0	0	0
3	~~0.65~~ 0.40	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	~~0.40~~ 0.35	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	~~1.20~~ 0.65	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	~~0.75~~ 0.50	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	~~0.65~~ 0.40	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	~~0.40~~ 0.35	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

Reason: This proposal increases energy efficiency in climate zones 1-4 by specifying more realistic fenestration U-factors that more closely resemble actual windows and, as a result, will close a significant gap in trade-off compliance paths and compliance software. This is a more robust and more stringent alternative proposal to set realistic window U-factors for the IECC's prescriptive path. A second, less stringent proposal has also been submitted as another option for consideration.

The present window U-factor requirements in the three southernmost climate zones are unreasonably high, given the SHGC requirements of 0.37 and 0.40. To meet the SHGC requirement in these three zones, builders typically use low solar gain, low-e glass, which, with a reasonable frame, has a much lower U-factor value than the current requirements for these climate zones. The practical effect of this lower U-factor for actual windows is that users who follow the Total UA alternative or the Simulated Performance Alternative automatically receive unnecessary free trade-off credit (the difference between the artificially high U-factor requirement and the window's actual U-factor), which is then used to reduce efficiency elsewhere in the home.

The proposed change sets U-factors at more aggressive levels than the alternative proposal we have submitted, but is still designed to match windows available in all markets. According to the ASHRAE Handbook (page 31.8, Table 4), a low solar gain, low e window (0.05 emissivity) with a ½ inch air space typically achieves the following U-factors:

	Operable w/o Argon	Fixed w/o Argon	Operable w/Argon	Fixed w/Argon
Aluminum	0.67	0.48	0.63	0.44
Aluminum Thermal Break	0.47	0.41	0.44	0.37
Wood/Vinyl	0.39	0.35	0.36	0.31

Based on this data, this proposal should generally continue to allow, under the prescriptive compliance path, metal frames in zone 1, and metal frames with thermal break in zone 2. For prescriptive compliance, a vinyl, wood or composite frame would likely be necessary for zone 3 (although some thermally broken metal frames may also qualify). Of course, any frame type could also be continued to be used in zone 3 under either the Total UA alternative or the Simulated Performance Alternative. As for zone 4, the increase from 0.40 to 0.35 would not involve any change in frame, but only require that a more efficient vinyl, wood or composite window be used, possibly with a gas fill (like climate zones 5-8 and marine climate zone 4).

In our experience, these values are already achieved by many, if not most, of the windows sold in these climate zones. Indeed, from a cost-effectiveness standpoint, it could be easily contended that the U-factor for zones 1 and 2 also be set at 0.40, since there does not appear to be an additional cost to achieve this level, given competitive pricing between vinyl and aluminum window frames. For example, the state of California is presently using the 0.40 level as the baseline for the pending upgrades to their standard for all three climate zones.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC17–07/08

Table 402.1.1, Table 402.1.3

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	~~1.20~~ 0.65	0.75	0.37	30	13	3 / 4	13	0	0	0
2	~~0.75~~ 0.55	0.75	0.37	30	13	4 / 6	13	0	0	0
3	~~0.65~~ 0.55	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	~~1.20~~ 0.65	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	~~0.75~~ 0.55	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	~~0.65~~ 0.55	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

Reason: This proposal increases energy efficiency in climate zones 1-3 by conservatively specifying more realistic fenestration U-factors that more closely resemble actual windows and, as a result, will close a significant gap in trade-off compliance paths and performance path calculations. A second, alternative proposal, with more stringent, but still cost-effective and realistic U-factors, is also being submitted for consideration.

The present window U-factor requirements in the three southernmost climate zones are unreasonably high, given the SHGC requirements of 0.37 and 0.40. To meet the SHGC requirement in these three zones, builders typically use low solar gain, low-e glass, which, with a reasonable frame, has a much lower U-factor value than the current requirements for these climate zones. The practical effect of this lower U-factor for actual

windows is that users who follow the Total UA alternative or the Simulated Performance Alternative automatically receive unnecessary free trade-off credit (the difference between the artificially high U-factor requirement and the window's actual U-factor), which is then used to reduce efficiency elsewhere in the home.

The proposed change sets U-factors at very conservative levels designed to match windows available in all markets. According to the ASHRAE Handbook (page 31.8, Table 4), a low solar gain, low-e window (0.05 emissivity) with a ½ inch air space typically achieves the following U-factors:

	Operable w/o Argon	Fixed w/o Argon	Operable w/Argon	Fixed w/Argon
Aluminum	0.67	0.48	0.63	0.44
Aluminum Thermal Break	0.47	0.41	0.44	0.37
Wood/Vinyl	0.39	0.35	0.36	0.31

This proposal would continue to allow, under the prescriptive compliance path, metal frames in zone 1, and metal frames with thermal break in zones two and three. In our experience, these values are already achieved, if not exceeded, by many of the windows sold in these climate zones. Indeed, it could be easily contended that the U-factor for all three zones be set far lower, at 0.40, since there does not appear to be an additional cost to achieve this level, given competitive pricing between vinyl and aluminum window frames. For example, the state of California is presently using the 0.40 U-factor level as the baseline for the pending upgrades to their standard for all three climate zones.

This proposal represents a reasonable and cost effective improvement that will provide states and local jurisdictions with an option to easily increase the efficiency of their code.

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

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

EC18–07/08

Table 402.1.1, Table 402.1.3; IRC Table N1102.1, Table N1102.1.2

Proponent: Craig Conner, Building Quality, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	~~0.75~~ 0.55[i]	0.75	0.37	30	13	4 / 6	13	0	0	0
3	~~0.65~~ 0.55[i]	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

a. through h. (No change to current text)

i. For impact rated glazing the maximum U-factor shall be 0.70.

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	~~0.75~~ 0.55	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	~~0.65~~ 0.55	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

PART II – IRC

Revise tables as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Climate Zone	Fenestration U-Factor	Skylight[b] U-Factor	Glazed Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-value	Mass Wall R-value[h]	Floor R-VALUE	Basement[c] Wall R-Value	Slab[d] R-value & Depth	Crawl Space[c] Wall R-value
1	1.2	0.75	0.40	30	13	3	13	0	0	0
2	~~0.75~~ 0.55[n]	0.75	0.40	30	13	4	13	0	0	0
3	~~0.65~~ 0.55[n]	0.65	0.40[e]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10/13	10, 4 ft	10/13

a. through g. (No change to current text)

h. For impact rated glazing the maximum U-factor shall be 0.70.

TABLE N1102.1.2
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	~~0.75~~ 0.55	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	~~0.65~~ 0.55	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

Reason: The proposed U-factor, 0.55, better reflects the windows already used to meet zone 2 and 3 requirements. Windows in climate zones 2 and 3 require a low SHGC. Low-E coatings are routinely used to achieve a low SHGC, which leads to a double pane window. In practice a double pane window with low-E will have U-factors below the 0.65 and 0.75 currently required for zones 2 and 3. Since a 0.55 U-factor is more reflective of a typical window it is also more appropriate as a base case for the performance modeling. A lower U-factor will also lower the heating energy used in climate zones 2 and 3, especially in the northern part of zone 3. This value (0.55) could also be applied in zone 1, but due to the overwhelming dominance of cooling loads it is not clear if a performance analysis in zone 1 would show a higher or lower U-factor saves energy.

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

PART I – IECC

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

PART II – IRC B/E

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

EC19–07/08
Table 402.1.1, Table 402.1.3; IRC Table N1102.1, Table N1102.1.2

Proponent: Ronald Majette, U.S. Department of Energy

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	~~0.75~~ 0.65	0.75	0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	~~0.75~~ 0.65	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

PART II – IRC

Revise tables as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.2	0.75	0.40	30	13	3	13	0	0	0
2	~~0.75~~ 0.65	0.75	0.40	30	13	4	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE N1102.1.2
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	~~0.75~~ 0.65	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

Reason: The purpose of this proposal is to improve residential fenestration U-factor requirements in climate zone 2.

The codes' current zone-2 fenestration U-factor requirement of 0.75 is unreasonably high given the state of today's residential window market. A U-factor of 0.75 is out of step with the SHGC requirement of 0.4 for all glazings in this zone. The National Fenestration Ratings Council Certified Products Directory reveals that there are over 46,000 aluminum-framed products that would meet a U-0.65/SHGC-0.40 requirement. Nearly all wood and vinyl fenestration products far exceed the U-0.65 requirement.

Thus, the proposed change from U-0.75 to U-0.65 will have minimal impact on most buildings that comply via the prescriptive path (because the 0.4 SHGC requirement already tends to result in U-0.65 or better), but will eliminate an unreasonable efficiency credit in the total UA or simulated performance alternative compliance paths. Changing the zone-2 glazing U-factor requirement to 0.65 will help prevent trade-offs of other code requirements to substandard levels.

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

PART I – IECC

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

PART II – IRC B/E

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

EC20–07/08

Table 402.1.1, Table 402.1.3; IRC Table N1102.1, Table N1102.1.2

Proponent: Ronald Majette, U.S. Department of Energy

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Climate Zone	Fenestration U-Factor	Skylight[b] U-Factor	Glazed Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-value	Mass Wall R-value[h]	Floor R-VALUE	Basement[c] Wall R-Value	Slab[d] R-value & Depth	Crawl Space[c] Wall R-value
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	0	0	0
3	~~0.65~~ 0.55	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	~~0.65~~ 0.55	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

PART II – IRC

Revise tables as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Climate Zone	Fenestration U-Factor	Skylight[b] U-Factor	Glazed Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-value	Mass Wall R-value[h]	Floor R-VALUE	Basement[c] Wall R-Value	Slab[d] R-value & Depth	Crawl Space[c] Wall R-value
1	1.2	0.75	0.40	30	13	3	13	0	0	0
2	0.75	0.75	0.40	30	13	4	13	0	0	0
3	~~0.65~~ 0.55	0.65	0.40[e]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE N1102.1.2
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	~~0.65~~ 0.55	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

Reason: The purpose of this proposal is to improve residential fenestration U-factor requirements in climate zone 3.

The codes' current zone-3 fenestration U-factor requirement of 0.65 is unreasonably high given the state of today's residential window market. A U-factor of 0.65 is out of step with the SHGC requirement of 0.4 for all glazings in this zone. The National Fenestration Ratings Council Certified Products Directory reveals that over 99% of wood and vinyl fenestration products with an SHGC of 0.40 or lower and a U-factor of 0.65 or lower also have a U-factor of 0.55 or lower. For aluminum-framed products, 67% of the products meeting the 0.40 SHGC and U-0.65 requirement also have a U-factor of 0.55 or below. Consequently, a large majority of homes that comply with the 0.4 SHGC requirement will already have glazing U-factors at or below 0.55.

Thus, the proposed change from U-0.65 to U-0.55 will have minimal impact on most buildings that comply via the prescriptive path (because the 0.4 SHGC requirement already tends to result in U-0.55 or better), but will eliminate an unreasonable efficiency credit in the total UA or simulated performance alternative compliance paths. Changing the zone-3 glazing U-factor requirement to 0.55 will help prevent trade-offs of other code requirements to substandard levels.

The residential fenestration zone 3 U-factor requirement of 0.65 in the 2006 IECC and IRC is less stringent than the corresponding requirements in the 2003 IECC and IRC in many cases. For example, in old 2003 IECC/IRC climate zone 6 (Dallas, etc.) the 2003 IECC/IRC requires U-0.60 for lower window areas below 15% with more stringent requirements (U-0.52 or even lower) for higher window areas. In old climate zone 7 (for example, Atlanta) the 2003 IECC/IRC requires U-0.55 for window areas of 12% to 15%. DOE is aware of some states that are reluctant to adopt the newer codes because of its apparent reduction in zone-3 efficiency in some cases relative to the 2003 edition.

This improvement in U-factor will save $25 a year in Atlanta for a house with 300 ft^2 of windows area with $1.20/therm natural gas and 10 cents/kWh electricity according to the RESFEN 5.0 simulation software. A U-factor requirement of 0.55 is still well short of the Energy Star window requirement of U-0.40 in almost all of Zone 3.

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

PART I – IECC

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

PART II – IRC B/E

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

EC21–07/08

Table 402.1.1, Table 402.1.3; IRC Table N1102.1, Table N1102.1.2

Proponent: Craig Conner, Building Quality, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	~~0.35~~ 0.32 or 0.35 if SHGC ≥ 0.45[i]	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	~~0.35~~ 0.32 or 0.35 if SHGC ≥ 0.45[i]	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

a. through h. (No change to current text)

i. SHGC shall be NFRC tested value.

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	~~0.35~~ 0.32	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	~~0.35~~ 0.32	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

PART II – IRC

Revise tables as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.2	0.75	0.40	30	13	3	13	0	0	0
2	0.75	0.75	0.40	30	13	4	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10/13	10, 2 ft	10/13
6	~~0.35~~ 0.32 or 0.35 if SHGC ≥ 0.45[h]	0.60	NR	49	19 or 13+5[g]	15	30[f]	10/13	10, 4 ft	10/13
7 and 8	~~0.35~~ 0.32 or 0.35 if SHGC ≥ 0.45[h]	0.60	NR	49	21	19	30[f]	10/13	10, 4 ft	10/13

a. through g. (No change to current text)

h. SHGC shall be NFRC tested value.

TABLE N1102.1.2
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	~~0.35~~ 0.32	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	~~0.35~~ 0.32	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remains unchanged)

Reason: This proposal would lower the U-factor for windows in the northern climate zones. Two trends make more energy efficient windows cost effective in northern windows-- the increased range of window energy efficiency options available at a reasonable cost and the increased price of the natural gas used for heating.

The US windows market is moving towards a "northern window" and "southern window", both defined by their U-factor and SHGC. Heating dominates in the north. Cooling dominates in the south. Northern window performance is dominated by the need for a low U-factor. This proposal lowers the northern window U-factor requirement to 0.32, which is readily available in the current market. Southern windows also do better with a low U-factor, but the low of a U-factor is not justified in the southern zones.

The SHGC (solar heat gain coefficient) is a measure of the solar heating transmitted through a window. The impact of window SHGC literally varies with the season. A lower SHGC means lower solar heat gain, consequently lower cooling loads and peak cooling loads-- therefore a low SHGC is beneficial during the cooling season. On the heating side, a higher SHGC means higher solar heat gain, consequently lower heating loads due to the free solar heating-- therefore a higher SHGC is beneficial in heating seasons. Wherever one season dominates in a region, that season determines the preferable SHGC for that region. Therefore the "southern window", where the cooling season dominates, benefits from a low SHGC. Likewise the "northern window", where the heating season dominates, benefits from a high SHGC.

Typically windows with a U-factor of 0.32 or less have an SHGC of 0.35 or less. Some types of low-E windows tend to have higher SHGC, typically with slightly higher U-factors. This proposal recognizes a limited U-factor "tradeoff" to achieve a higher SHGC and greater free solar heating, based on work done at the Lawrence Berkley National Laboratory. The Efficient Windows Collaborative web site also shows the value of higher SHGC in the northern climates.

Window costs are difficult to determine. There are a few "break points" that produce price jumps; for example the transition from double to triple pane, or the transition from clear glass to low-E glass. A reasonable estimate for the cost of decreased window U-factor, provided none of these "break points" is crossed, comes from a study done in the Pacific Northwest. The study estimated a cost of $\$0.08/ft^2$ per 0.01 U-factor improvement (Quantec 2002). Using this estimate, this proposal would increase costs by $\$0.24/ft^2$, or about \$72 for a residence with 300 ft^2 of window. The same study predicted that the incremental cost would fall with time, so current costs are probably slightly lower.

Another constraint on residential windows, is the need to be relatively clear. Tinted and reflective windows are not suitable for the residential market. Putting all these constraints together, double pane, not tinted, not reflective, U-factor <= 0.32 (or <=0.35 if SHGC >= 0.45) defines a group of windows. An examination of the NFRC data for the "horizontal slider" window type showed over 10,000 entries for windows meeting this criteria. Therefore, these windows are available.

Simple payback times were estimated based on examining the Efficient Windows Collaborative web site's projections of window costs for the cities in the northern climates and comparing window choices with higher and lower U-factors. Simple paybacks for a 0.32 U-factor window were about 3 to 6 years for the cities in zones 6, 7 and 8. Therefore this proposal is cost-effective for the northern zones.

Bibliography:
Dariush Arasteh, Robin Mitchell, and Steve Selkowitz. August 1, 2003. *Performance Based Ratings for the ENERGY STAR® Windows Program: A discussion of issues and future possibilities.* Lawrence Berkeley National Laboratory. Berkeley, California.

Efficient Windows Collaborative. http://www.efficientwindows.org/
Information on individual cities is at http://www.efficientwindows.org/selection.cfm and http://www.efficientwindows.org/factsheets.cfm

Quantec. January 2002. *Market Progress Evaluation Report for the Energy Star Windows Project*. Northwest Energy Efficiency Alliance, Portland, Oregon.

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

PART I – IECC

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

PART II – IRC B/E

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

EC22–07/08
Table 402.1.1; IRC Table N1102.1

Proponent: Craig Conner, Building Quality, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	~~0.37~~ 0.30[i]	30	13	3 / 4	13	0	0	0
2	0.75	0.75	~~0.37~~ 0.30[i]	30	13	4 / 6	13	0	0	0
3	0.65	0.65	~~0.40~~[e] 0.30[i]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

a. through h. (No change to current text)
i. For impact rated glazing the maximum SHGC shall be 0.40

PART II – IRC

Revise table as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.2	0.75	~~0.40~~ 0.30[h]	30	13	3	13	0	0	0
2	0.75	0.75	~~0.40~~ 0.30[h]	30	13	4	13	0	0	0
3	0.65	0.65	~~0.40~~[e] 0.30[h]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10/13	10, 4 ft	10/13

a. through g. (No change to current text)

h. For impact rated glazing the maximum SHGC shall be 0.40.

Reason: Low SHGC windows reduce cooling energy use and increase heating energy use. Climate zones 1, 2 and 3 are predominately cooling dominated, thus low SHGC windows offer an energy savings. Glass is available with a variety of residential low-E coatings, including several products at or below 0.30 SHGC and some products with an SHGC as low as 0.25.

Most energy-saving options come at an increased cost but manufacturer-applied low-E coatings are different. The inherent cost difference for the various available low-E options is small, provided the glass with that coating is produced in large commercially viable quantities. With this code change, large quantities of low-SHGC windows would be required for climate zones 1, 2 and 3.

Small commercial buildings often use "residential-style" windows, made by the same companies that manufacture residential windows and requiring SHGCs below 0.30. Between the existing commercial requirement and this new residential requirement, a large market will be created for low SHGC windows. Therefore, these windows will be available for essentially no incremental cost. Additionally, because low SHGC reduces peak load sizes, there will be a small reduction in the required cooling capacity, which is also a possible first-cost savings.

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

PART I - IECC

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

PART II – IRC B/E

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

EC23–07/08
Table 402.1.1; IRC Table N1102.1

Proponents: Thomas S. Zaremba, Roetzel & Andress, representing Pilkington North America; Tom Mewbourne, representing AFG Industries, Inc.

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	Max. 0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	Max. 0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	Max. 0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	~~NR~~ Min. 040 to Max. 0.59	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	~~NR~~ Min. 040 to Max. 0.59	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	~~NR~~ Min. 040 to Max. 0.59	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

a. *R*-values are minimums. *U*-factors ~~and SHGC~~ are maximums. SHGC Max = Maximum and Min = Minimum. R-19 shall be permitted to be compressed into a 2 × 6 cavity.

(Portions of footnotes not shown remain unchanged)

PART II – IRC

Revise table as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.2	0.75	Max. 0.40	30	13	3	13	0	0	0
2	0.75	0.75	Max. 0.40	30	13	4	13	0	0	0
3	0.65	0.65	Max. 0.40[e]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	~~NR~~ Min. 0.40 to Max 0.59	38	19 or 13+5[g]	13	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	~~NR~~ Min. 0.40 to Max 0.59	49	19 or 13+5[g]	15	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	~~NR~~ Min. 0.40 to Max 0.59	49	21	19	30[f]	10/13	10, 4 ft	10/13

a. *R*-values are minimums. *U*-factors ~~and SHGC~~ are maximums. SHGC Max = Maximum and Min = Minimum. R-19 insulation shall be permitted to be compressed into a 2× 6 cavity.

(Portions of footnotes not shown remain unchanged)

Reason: The purpose of the proposed change is to increase energy efficiency in zones 5 through 8 by requiring a minimum SHGC of 0.40 and a maximum SHGC of 0.59 for labeled fenestration products. (Unlabelled fenestration product will not satisfy the proposed SHGC range of 0.40 to 0.58 since the default values that attach to unlabelled glazed fenestration range from 0.60 to 0.80 pursuant to Table N1101.5(3).)

The use of high SHGC glazing in heating dominated climates can significantly reduce residential energy consumption. Unfortunately, window manufacturers prefer to stock a "one size fits all" glass, which means a product that can meet the low SHGC values prescribed for southern climates. Unless the prescriptive code in zones 5-8 is changed, the "one size fits all" mentality will allow low-SHGC windows, designed for use in the south, to be used in homes built in the north. The use of these low-SHGC windows in heating dominated northern climate regions will increase already high heating bills by depriving homeowners of the benefits of free solar energy.

The need to add a minimum SHGC in the north is explained in this excerpt from the November 2006 edition of "*Energy Design Update*: "Most builders prefer to order just one type of glazing. Window manufacturers share the same interest, since they prefer to promote a limited number of glazing options. As a result … low SHGC is fast becoming the industry norm, from the Canadian border to the Gulf of Mexico….[H]owever, builders who do so are 'leaving a lot of BTUs on the table … [For] a typical custom house with 200 square feet of windows [in] a 212-day heating season,' heating a house with low-solar-gain windows requires an additional 1,170 kWh (or 4 million BTUs) compared to a house with high-soar-gain windows."

Bibliography:
Energy Design Update, Vol. 26, No 11, pp. 9-16 (November 2006). Aspen Publishers, a WoltersKluwer Company, NY, NY. (Ph: 1800-638-8437), www.aspenpublishers.com.

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

PART I – IECC

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

PART II – IRC B/E

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

EC24–07/08
Table 402.1.1

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise table as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	~~0.37~~ 0.25	30	13	3 / 4	13	0	0	0
2	0.75	0.75	~~0.37~~ 0.25	30	13	4 / 6	13	0	0	0
3	0.65	0.65	~~0.40~~[e] 0.25[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

Reason: This proposal increases energy efficiency, reduces peak demand and sizing of cooling systems, and improves comfort in climate zones 1-3 by lowering the prescriptive SHGC values to 0.25. This is a more robust and more stringent alternative proposal to set more aggressive SHGCs for the IECC's prescriptive path. While proposals by other parties to adopt 0.25 in climate zones 1 and 2 were not adopted in the last cycle, technology has continued to improve, energy costs have continued to rise, and unlike the previous proposals, this proposal establishes a lower, uniform SHGC in all three affected climate zones.

The 2006 IECC prescriptive window SHGC requirements in climate zones 1-3 for residential construction are set at 0.40, which were originally established in the 1998 IECC. The need for and viability of lower SHGCs for these cooling climates are already recognized in the 2006 IECC for commercial buildings, where the prescriptive value without an overhang is 0.25, establishing a precedent for a 0.25 SHGC. This proposal would establish the same value for residential as well.

In the last code cycle, the values for climate zones 1–2 for residential windows were debated and the IECC adopted a slight reduction to 0.37. This proposal suggests a substantial further improvement to 0.25 and an extension of that requirement to all three zones that presently have SHGC requirements. This proposal would reduce fenestration solar gain in hot climates (zones 1-3) by more than 30%. There should be little or no construction cost impact from this sizeable increase in energy code stringency since the existing SHGC requirements already effectively dictate a low solar gain low-e window and the new requirements will also require low solar gain low-e glass, but only with a lower SHGC. Finally, by maintaining the same SHGC requirements for all three zones (instead of different requirements for climate zones 1-2 compared with zone 3), this proposal will promote lower costs of construction as a result of economies of scale, reduced inventory requirements and increased competition among suppliers.

This proposal represents a reasonable and cost effective improvement that will provide states and local jurisdictions with an option to easily increase the efficiency of their code.

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

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

EC25–07/08
Table 402.1.1; IRC Table N1102.1

Proponent: Vickie J. Lovell, InterCode Incorporated, representing the Association of Industrial Metallized Coaters and Laminators

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[i]	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

a. through h. (No change to current text)

i. Fenestration with a projection factor of ≥ 0.50 shall comply with the following SHGC requirements: Climate Zone 1- No Requirement; Climate Zone 2- No Requirement; Climate Zone 3 – No Requirement. Projection factor shall be calculated using Equation 5-1.

PART II – IRC

Revise table as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[h]	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.2	0.75	0.40	30	13	3	13	0	0	0
2	0.75	0.75	0.40	30	13	4	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10/13	10, 4 ft	10/13

a. through g. (No change to current text)

h. Fenestration with a projection factor of ≥ 0.50 shall comply with the following SHGC requirements: Climate Zone 1- NR; Climate Zone 2- NR; Climate Zone 3 - NR. Projection factor shall be determined using Figure 1102.1.

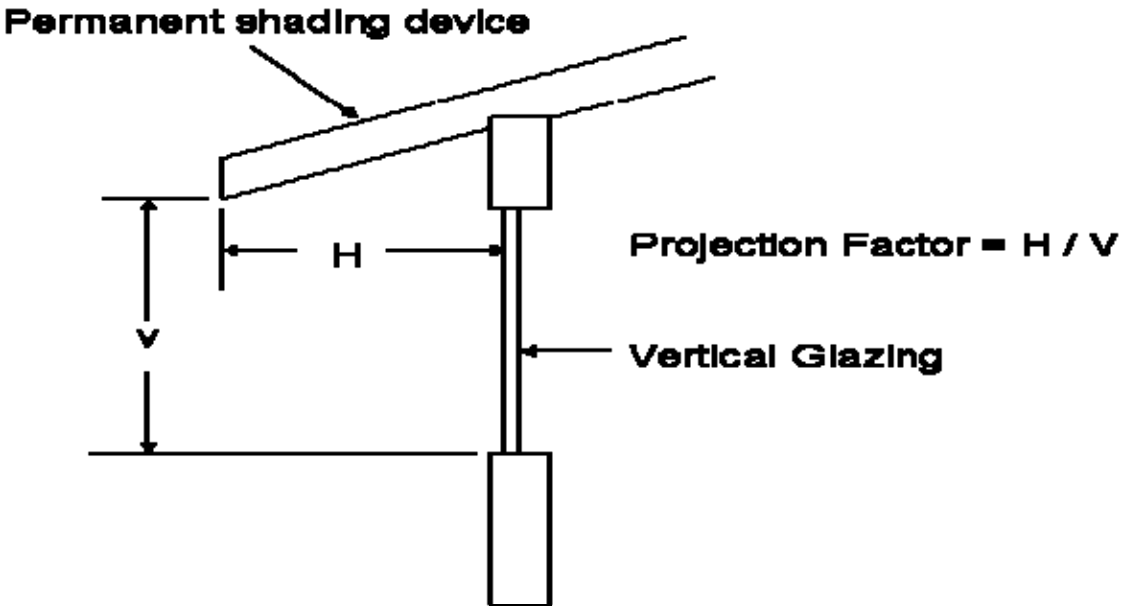


FIGURE N1102.1
PROJECTION FACTOR

Reason (Part I): This proposed code change allows for the use of overhangs to meet the solar heat gain coefficient requirements within the IECC. Overhangs are considered permanent exterior shading devices and are allowed to be used in IECC Chapter 5 as a prescriptive trade-off to meeting the SHGC requirements within the code. The calculation for determining the projection factor for overhangs has been in the 2000, 2003 and 2006 IECC for commercial buildings and has been proven to be very simple to calculate, fitting well into a prescriptive approach. The overhang credit is orientation independent to match the simplicity of the SHGC requirement in Table 402.1.1.

The projection factor of 0.5 will require at least a 3 ½ foot overhang on a 5 ft tall window and 4 foot overhang on a 6'8" patio door to allow a trade-off. The SHGC adjustment is based on Table 5.5.4.4.1 SHGC Multipliers for Permanent Projections of ASHRAE 90.1-2004, which is currently allowed by code. The SHGC adjustment was based on a weighted average SHGC Multiplier accounting for overhangs on the East, West and South orientation (75% of the weighting) and overhangs on the North orientation (25% of the weighting). Weighting the value accounts for a portion of the windows on the North orientation and therefore reduces the credit for an overhang.

Allowing flexibility in meeting the solar heat gain coefficient through the use of proven shading alternatives will increase the usability of the prescriptive code for the building and design community while ensuring that the new fenestration is energy efficient. The IECC Code development committee disapproved a similar proposed code change for the 207 IECC Supplement stating that this trade-off is allowed under the performance approach. Unfortunately, very few areas in states that use the IECC, have the infrastructure in place, to support performance based modeling needed to perform a Section 404 performance based computer run. Owner builders and other building contractors that only have access to US DOEs' REScheck software, are limited in their ability to trade off the SHGC requirement and would be required to either purchase performance based software for approximately $277 (REM Design Software) or higher a consultant for an equivalent price to trade-off the SHGC requirement. Note that the use of these shading devices were previously allowed under the 2003 IECC and is currently allowed as a trade-off under the commercial provisions of the IECC.

Reason (Part II): This proposed code change allows for the use of overhangs to meet the solar heat gain coefficient requirements within the IRC. Overhangs are considered permanent exterior shading devices and are allowed to be used in IECC Chapter 5 as a prescriptive trade-off to meeting the SHGC requirements within the code. The calculation for determining the projection factor for overhangs has been in the 2000, 2003 and 2006 IECC for commercial buildings and has been proven to be very simple to calculate, fitting well into a prescriptive approach. The overhang credit is orientation independent to match the simplicity of the SHGC requirement in Table 402.1.1.

The projection factor of 0.5 will require at least a 3 ½ foot overhang on a 5 ft tall window and 4 foot overhang on a 6'8" patio door to allow a trade-off. The SHGC adjustment is based on Table 5.5.4.4.1 SHGC Multipliers for Permanent Projections of ASHRAE 90.1-2004, which is currently allowed by code. The SHGC adjustment was based on a weighted average SHGC Multiplier accounting for overhangs on the East, West and South orientation (75% of the weighting) and overhangs on the North orientation (25% of the weighting). Weighting the value accounts for a portion of the windows on the North orientation and therefore reduces the credit for an overhang.

Allowing flexibility in meeting the solar heat gain coefficient through the use of proven shading alternatives will increase the usability of the code for the building and design community while ensuring that the new fenestration is energy efficient. The use of these shading devices were previously allowed under the 2003 IECC and is currently allowed as a trade-off under the commercial provisions of the IECC. Currently the only method available for accounting for the benefits for overhangs is by using a Section 404 Simulated Performance Alternative approach allowed under the IECC but not Chapter 11 of the IRC.

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

PART I – IECC

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

PART II – IRC B/E

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

EC26–07/08
Table 402.1.1

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise table as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	~~0.37~~ 0.35	30	13	3 / 4	13	0	0	0
2	0.75	0.75	~~0.37~~ 0.35	30	13	4 / 6	13	0	0	0
3	0.65	0.65	~~0.40~~ 0.35[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

Reason: This proposal increases energy efficiency, reduces peak demand and sizing of cooling systems, and improves comfort in climate zones 1-3 by lowering the prescriptive SHGC values to 0.35. A second, alternative proposal, with a more aggressive and stringent, but still cost-effective and realistic SHGC of 0.25, is also being submitted for consideration. Controlling window solar heat gain is enormously important to control home cooling loads.

The 2006 IECC prescriptive window SHGC requirements in climate zones 1-3 for residential are set at 0.40, which were originally established in the 1998 IECC. However, technology has continued to improve in this area. The need for and viability of lower SHGCs are already recognized in the 2006 IECC for commercial buildings, where the prescriptive values range from 0.25 to 0.40 depending on projection factor (0.25 with no overhang).

In the last code cycle, the values for climate zones 1–2 for residential windows were debated and the IECC adopted a slight reduction to 0.37. This proposal suggests a further improvement to 0.35 and extends that requirement to all three zones that presently have SHGC requirements. It is not expected that this requirement will have a significant impact on those complying under the prescriptive path (most windows that meet 0.37 also meet 0.35), but will strengthen performance trade-offs (through a 5% reduction in solar gain in zones 1-2 and a 10% reduction in zone 3) and, by maintaining the same requirements for all three zones, will promote economies of scale and lower costs of construction.

This proposal represents a small, but reasonable and cost effective improvement that will provide states and local jurisdictions with an option to easily increase the efficiency of their code.

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

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

EC27–07/08
Table 402.1.1, Table 402.1.3, 402.2.1

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables and section as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	~~30~~ 38	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	~~30~~ 38	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	~~38~~ 49	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	~~38~~ 49	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	~~49~~ 60	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	~~49~~ 60	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	~~0.035~~ 0.031	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	~~0.035~~ 0.031	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	~~0.030~~ 0.026	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	~~0.030~~ 0.026	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	~~0.026~~ 0.023	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	~~0.026~~ 0.023	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

402.2.1 Ceilings with attic spaces. When Section 402.1.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly R-38 shall be deemed to satisfy the requirement for R-49 or higher wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves.

Reason: This code proposal is intended to improve the thermal envelope efficiency through improved insulation in ceilings. By increasing the ceiling insulation from R-30 to R-38 in climate zones 2 & 3 residential buildings can achieve approximately 1 to 1.5 % heating and cooling energy cost savings. By increasing from R-38 to R-49 in climate zones 4 & 5, residential buildings can achieve approximately 6 to 7 % heating and cooling energy cost savings. By increasing from R-49 to R-60 in climate zones 6, 7 & 8, residential buildings can achieve approximately 4 to 6 % heating and cooling energy cost savings. These savings are significant and when coupled with other proposed code modifications can lead to significant overall energy savings for homes.

As energy prices continue to climb, energy costs are becoming a burden to every person in the country, in addition to increasing energy imports that are becoming a burden on the US economy and energy independence. Residential buildings consume 22% of the United States primary energy and 37% of all electricity consumption (EIA 2005).

The residential building energy efficiency requirements in ICC codes have not had a substantial overall national improvement in many years. During that time, fuel prices have increased dramatically and environmental concerns from energy usage (notably global warming) have come to the

forefront. Improving residential new construction energy efficiency is one of the most cost-effective ways to reduce consumption within the country. This proposal represents one reasonable and cost effective improvement that will provide states with an option to easily increase the efficiency of their code.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC28–07/08

Table 402.1.1, Table 402.1.3; IRC Table N1102.1, Table N1102.1.3

Proponent: Craig Conner, Building Quality, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h,i]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	~~19~~ 21[i] or 13+~~5~~ 7	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	~~19~~ 21[i] or 13+~~5~~ 7	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

a. through h. (No change to current text)

i. R-19 spray foam or blown-in (cellulose, fiberglass) wall insulation shall be deemed to meet this requirement when installed to fill wall cavities, including corners and headers, in a nominal 2X6 wood frame wall.

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	~~0.060~~ 0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	~~0.060~~ 0.057	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

PART II – IRC

Revise tables as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.2	0.75	0.40	30	13	3	13	0	0	0
2	0.75	0.75	0.40	30	13	4	13	0	0	0
3	0.65	0.65	0.40[c]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	~~19~~ 21[h] or 13+~~5~~ 7	13	30f	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	~~19~~ 21[h] or 13+~~5~~ 7	15	30 f	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19	30 f	10/13	10, 4 ft	10/13

a. through g. (No change to current text)

h. R-19 spray foam or blown-in (cellulose, fiberglass) wall insulation shall be deemed to meet this requirement when installed to fill wall cavities, including corners and headers, in a nominal 2X6 wood frame wall.

TABLE N1102.1.3
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	~~0.060~~ 0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	~~0.060~~ 0.057	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnote remains unchanged)

Reason: This proposal seeks to increase the northern wall insulation R-values from R-19 to R-21, and specifies a complying R-value for cellulose and spray foam provided headers and corners are filled.

Proposals to increase wall insulation to R-15 and R-21 have been heard in the last two code cycles. In the 2005-2006 cycle, a proposal for R-15 walls in southern zones and R-21 walls in northern zones was decisively defeated by a vote of 80% of the code officials. In the following code cycle, the proponent withdrew the proposal.

Several arguments were made against the R-15 and R-21 wall insulation. The strongest arguments were made against requiring R-15 in the south. R-15 batts are seldom used in the south. R-15 batts are expensive, partly because the higher density fiberglass inherently requires more material to get to an R-15. R-15 was seen as a proprietary value selected partly to preserve the dominance of fiberglass batts over two growing insulation upstarts--cellulose and spray foam. Blown cellulose and the spray foam used in residential construction can achieve R-13 in a 2x4 wall cavity but can not achieve R-15 in a 2x4 wall cavity, without additional R-value from elsewhere (e.g.: insulated sheathing).

In contrast to R-15, R-21 is routinely used in some northern areas; for example, R-21 batts are the predominate insulation in the 2x6 walls common in the Pacific Northwest. Where R-21 batts are in common use, the cost premium is much more modest than for the R-15 batts.

R-21 is considered a "proprietary" value in the sense that blown cellulose and the spray foam used in residences can achieve R-19 but do not typically achieve R-21 in a 2x6 wall cavity. Although cellulose and spray foam do not achieve R-21, they do provide a higher level of air sealing. Like any blown product, including blown fiberglass, blown cellulose and spray foam are better suited for small spaces and odd-sized cavities. In addition, cellulose is perhaps the premiere recycling success story for building products, consisting of about 80% recycled newsprint. This proposes cellulose and spray foam be deemed to comply if headers and corners are filled with insulation. Filling headers and corners reduces the overall U-factor and more aggressively seals the thermal envelope than fiberglass batts.

The insulated sheathing R-value is also increased by R-2 to R-7. This tracks the cavity insulation increase by the same amount.

his proposal addresses one additional issue with R-19 batts--the reduced R-value for R-19 batts in a 2x6 wall cavity. R-19 batts are not properly sized for a nominal 2x6 wall cavity and must be compressed to fit. A nominal 2x6 frame wall has a 5.5-inch cavity for insulation. R-19 batts are 6.25 or 6.5 inches thick. The compressed R-19 batt R-value is about R-1 or R-2 less than the rated R-value. In contrast, R-21 batts are produced to fit the 2x6 cavity size without losing R-value from compression.

The effect of compressing fiberglass batts on batt R-value was quantified in the study entitled, "The Effect of Compression on the Material R-Value of Fiberglass Batt Insulation."[1]

> *"Installations that result in batt thicknesses less than the label thickness can have substantially lower material R-values. Compression of the insulation specimens to 90% of full thickness reduced the R-values by 5.6 to 9.4%."*

A 6.25-inch batt compressed into a 5.5- inch cavity is compressed 12%. A 6.5-inch batt compressed into a 5.5-inch cavity is compressed 15%. Based on the study quoted above, compression reduces the batt R-value by about R-1 or R-2.

NAIMA, the trade association for fiberglass insulation and rock/slag wool insulation, has acknowledged the R-1 reduction in saying that an R-19 batt in a 2x6 cavity is really R-18.[2]

> "*When a standard R-19 batt (6" to 6 ¾" thick) is used to fill the 5 1⁄2" wall cavity, it has to be compressed. Compressing the insulation causes it to lose some of its thermal effectiveness, reducing its R-value to R-18.*"

In contrast to the reduced R-value of the compressed R-19 batt, the R-21 batt is correctly sized for a 2x6 wall cavity and will not lose R-value by compression. Replacing the R-19 batt requirement with R-21 results in a "double bump"--the compression loss for R-19 batts is eliminated by specifying a batt with the correct size, and the cavity insulation R-value is modestly increased.

Quotes from:

[1] Graves, Ronald S., and David W. Yarbrough. 1992. "The Effect of Compression on the Material R-Value of Fiberglass Batt Insulation." *Journal of Building Physics*, Vol. 15, No. 3, 248-260 (page 258). Building Materials Group Oak Ridge National Laboratory Oak Ridge, TN 37831 http://jen.sagepub.com/cgi/content/abstract/15/3/248

[2] NAIMA (North American Insulation Manufacturers Association). *Insulation Facts #32, A Guide To Selecting Fiber Glass Insulation Products for New Home Construction and Remodeling*.

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

PART I – IECC

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

PART II – IRC

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

EC29–07/08

Table 402.1.1, Table 402.1.3

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	~~13~~ 15	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	~~13~~ 15	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	~~13~~ 18	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	~~13~~ 18	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	~~19 or 13+5~~[g] 21	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	~~19 or 13+5~~[g] 21	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	~~21~~ 24	19 / 21	30[f]	10/13	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

a. through f. (No change to current text)

g. ~~"13+5" means R-13 cavity insulation plus R-5 insulated sheathing.~~ Any combination of insulation shall be permitted to meet the requirements by summing the R-value of the cavity insulation and the R-value of the insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

h. (No change to current text)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	~~0.082~~ 0.076	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	~~0.082~~ 0.076	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	~~0.082~~ 0.062	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	~~0.082~~ 0.062	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	~~0.060~~ 0.055	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	~~0.060~~ 0.055	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	~~0.057~~ 0.053	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

Reason: This proposal sets the wall insulation requirements based on relative need within a given climate zone, instead of being based on specific products. This proposal simplifies the requirements to be an individual requirement instead of having multiple requirements that are not equivalent. The individual numbers can be achieved through a combination of cavity insulation and insulated sheathing types. This approach allows for any combination of products or insulation types to be installed to meet the required value. These insulation requirements can also be consistently modeled for a performance path.

The current code approach includes R-Value combinations that are not equal to their "equivalent" u-factor. This change will allow for a single consistent baseline between the prescriptive and performance paths.

This would entail an increase in insulation to R-15 in climate zones 1 and 2, R-18 in climate zones 3 and 4, R-21 in climate zones Marine 4, 5 and 6, and R-24 in climates 7 and 8. These insulation requirements in increments of 3 can easily be achieved with current products and construction techniques. R-15 can be achieved with R-15 or R-13 plus insulating sheathing of R-2 or greater. R-18 can be achieved with R-19, R-15 + R-3 or R-13 + R-5. R-21 can be achieved with R-21, R-19 + R-2, or R-15 + R-7.5. R-24 can be achieved with R-19 + R-5 or R-21 + R-3.

In addition to the consistency and clarity of the code, this proposal increases the frame wall insulation values to achieve up to 8% heating and cooling energy cost savings. As energy prices continue to climb, energy costs are becoming a burden to every person in the country, in addition to increasing energy imports that are becoming a burden on the US economy and energy independence. Residential buildings consume 22% of the United States primary energy and 37% of all electricity consumption (EIA 2005).

The residential building energy efficiency requirements in ICC codes have not had a substantial overall national improvement in many years. During that time, fuel prices have increased dramatically and environmental concerns from energy usage (notably global warming) have come to the forefront. Improving residential new construction energy efficiency is one of the most cost-effective ways to reduce consumption within the country. This proposal represents one reasonable and cost effective improvement that will provide states with an option to easily increase the efficiency of their code.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC30–07/08
Table 402.1.1, Table 402.1.3

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Climate Zone	Fenestration U-Factor	Skylight[b] U-Factor	Glazed Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-value	Mass Wall R-value[h]	Floor R-VALUE	Basement[c] Wall R-Value	Slab[d] R-value & Depth	Crawl Space[c] Wall R-value
1	1.20	0.75	0.37	30	13+3 or 15+2[g]	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13+3 or 15+2[g]	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13+3 or 15+2[g]	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13+3 or 15+2[g]	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

a. through f. (No change to current text)

g. "13+3" means R-13 cavity insulation plus R-3 insulated sheathing. "15+2" means R-15 cavity insulation plus R-2 insulated sheathing. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

h. (No change to current text)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	~~0.082~~ 0.065	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	~~0.082~~ 0.065	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	~~0.082~~ 0.065	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	~~0.082~~ 0.065	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

Reason: This proposal modifies the insulation requirements in climate zones 1-4.

By increasing the frame wall insulation by approximately R-3 in the climates 1, 2, 3 & 4, residential buildings can achieve approximately 2% in climate zone 1 to 5% in climate zone 4 for heating and cooling energy cost savings. This would entail an increase from R-13 in climates 1, 2, 3 & 4 to R-13+3 or 15+2. These savings are significant and when coupled with other proposed code modifications can lead to significant overall energy savings for homes.

As energy prices continue to climb, energy costs are becoming a burden to every person in the country, in addition to increasing energy imports that are becoming a burden on the US economy and energy independence. Residential buildings consume 22% of the United States primary energy and 37% of all electricity consumption (EIA 2005).

The residential building energy efficiency requirements in ICC codes have not had a substantial overall national improvement in many years. During that time, fuel prices have increased dramatically and environmental concerns from energy usage (notably global warming) have come to the forefront. Improving residential new construction energy efficiency is one of the most cost-effective ways to reduce consumption within the country. This proposal represents one reasonable and cost effective improvement that will provide states with an option to easily increase the efficiency of their code.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC31–07/08
Table 402.1.1, Table 402.1.3

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Climate Zone	Fenestration U-Factor	Skylight[b] U-Factor	Glazed Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-value	Mass Wall R-value[h]	Floor R-VALUE	Basement[c] Wall R-Value	Slab[d] R-value & Depth	Crawl Space[c] Wall R-value
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 + 3 or 21 or 13+~~5~~7.5 [g,h]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 + 3 or 21 or 13+~~5~~7.5 [g,h]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21+3[i]	19 / 21	30[f]	10/13	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

a. through f. (No change to current text)

g. "19+3" means R-19 cavity insulation plus R-3 insulated sheathing. "13+~~5~~7.5" means R-13 cavity insulation plus R-~~5~~7.5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

h. The second R-value applies when more than half the insulation is on the interior of the mass wall.

i. "21+3" means R-21 cavity insulation plus R-3 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	~~0.060~~ 0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	~~0.060~~ 0.057	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	~~0.057~~ 0.047	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

Reason: By increasing the frame wall insulation by approximately R-3 in the coldest climates (Marine 4, 5, 6, 7 and 8), residential buildings can achieve approximately 3.5% heating and cooling energy cost savings. This would entail an increase from R-19 or 13+5 in climates 5 & 6 to R-19+3 or 21 or 13+7.5, and an increase from R-21 in climates 7 & 8 to R-21+3 or equivalent. These savings are significant and when coupled with other proposed code modifications can lead to significant overall energy savings for homes.

As energy prices continue to climb, energy costs are becoming a burden to every person in the country, in addition to increasing energy imports that are becoming a burden on the US economy and energy independence. Residential buildings consume 22% of the United States primary energy and 37% of all electricity consumption (EIA 2005).

The residential building energy efficiency requirements in ICC codes have not had a substantial overall national improvement in many years. During that time, fuel prices have increased dramatically and environmental concerns from energy usage (notably global warming) have come to the forefront. Improving residential new construction energy efficiency is one of the most cost-effective ways to reduce consumption within the country. This proposal represents one reasonable and cost effective improvement that will provide states with an option to easily increase the efficiency of their code.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC32–07/08
Table 402.1.1, Table 402.1.3

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	~~0~~ 10/13	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	~~0~~ 10/13	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	~~0.360~~ 0.059	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	~~0.036~~ 0.059	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes not shown remain unchanged)

Reason: By increasing the basement wall insulation requirement from no insulation to R-10 continuous or R-13 cavity insulation in climates 2 and 3, residential buildings can achieve approximately 1% to 1.5% heating and cooling energy cost savings. These savings are significant and when coupled with other proposed code modifications can lead to significant overall energy savings for homes. As energy prices continue to climb, energy costs are becoming a burden to every person in the country, in addition to increasing energy imports that are becoming a burden on the US economy and energy independence. Residential buildings consume 22% of the United States primary energy and 37% of all electricity consumption (EIA 2005).

The residential building energy efficiency requirements in ICC codes have not had a substantial overall national improvement in many years. During that time, fuel prices have increased dramatically and environmental concerns from energy usage (notably global warming) have come to the forefront. Improving residential new construction energy efficiency is one of the most cost-effective ways to reduce consumption within the country. This proposal represents one reasonable and cost effective improvement that will provide states with an option to easily increase the efficiency of their code.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC33–07/08
Table 402.1.1, Table 402.1.3

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	~~10/13~~ 15/19	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	~~10/13~~ 15/19	10, 4 ft	10/13

a. (No change to current text)
b. (No change to current text)
c. "15 / 19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall. ~~The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.~~

d. through h. (No change to current text)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	~~0.059~~ 0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	~~0.059~~ 0.050	0.065

(Footnotes remain unchanged)

Reason: By increasing the basement wall insulation requirement from R-10 continuous or R-13 cavity insulation to R-15 continuous or R-19 cavity insulation in climates 6, 7 and 8, residential buildings can achieve approximately 4% to 6% heating and cooling energy cost savings. These savings are significant and when coupled with other proposed code modifications can lead to significant overall energy savings for homes. As energy prices continue to climb, energy costs are becoming a burden to every person in the country, in addition to increasing energy imports that are becoming a burden on the US economy and energy independence. Residential buildings consume 22% of the United States primary energy and 37% of all electricity consumption (EIA 2005).

The residential building energy efficiency requirements in ICC codes have not had a substantial overall national improvement in many years. During that time, fuel prices have increased dramatically and environmental concerns from energy usage (notably global warming) have come to the forefront. Improving residential new construction energy efficiency is one of the most cost-effective ways to reduce consumption within the country. This proposal represents one reasonable and cost effective improvement that will provide states with an option to easily increase the efficiency of their code.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC34–07/08
Table 402.1.1; IRC Table N1102.1

Proponent: Chuck Murray, Washington State University Extension Energy Program, representing Northwest Energy Code Group

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise table footnote as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

(No change to table entries)

a. through f. (No change to current text)

g. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. ~~If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.~~ The minimum R value for insulated sheathing installed on up to 25 percent of the wall area shall be R 2.5 when the insulated sheathing is installed over structural sheathing.

PART II – IRC

Revise as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

(No change to table entries)

a. through f. (No change to current text)

g. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. ~~If structural sheathing covers 25% or less of the exterior, R-5 sheathing is not required where structural sheathing is used. If structural sheathing covers more than25%of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.~~ The minimum R value for insulated sheathing installed on up to 25 percent of the wall area shall be R 2.5 when the insulated sheathing is installed over structural sheathing.

Reason: Footnote g is intended to provide a prescriptive option for wall construction that integrates minimum structural sheathing requirements with the use of exterior foam sheathing. The current language is confusing, and allows a much less efficient wall to be constructed than necessary.

The primary problem being addressed by footnote g is the integration of ½ inch structural sheathing with 1 inch thick R-5 insulated sheathing. This proposal would result in the following application of insulated sheathing and structural sheathing. Over areas where structural sheathing is not required, R-5 (1 inch) insulated sheathing is used. Over areas with structural sheathing ½ inch structural sheathing is covered with R-2.5 (1/2 inch) insulated sheathing. This provides a consistent sheathing thickness of 1 inch over the entire wall area. This method is detailed in the illustration below from the Foam Sheathing Coalition (FSC) publication, "IRC Wall Bracing: A Guide."

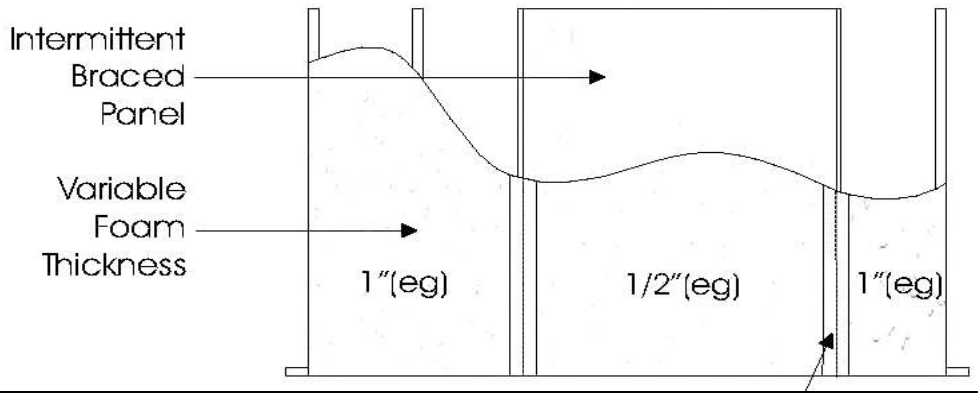
The current footnote does not provide the thermal protection required of other systems listed for the effected climate zones. The following table notes the possible range of U-factors for the assemblies allowed under the current standard and the proposed footnote. You will note that the current footnote g does not provide nearly the thermal control as the target u-factor. The proposed footnote g provides an option that is closer to this performance.

Assembly	U-factor
R-13 2X4	0.085
R-13+R2	0.071
R-13+R2.5	0.068
R-13+R5 (without structural sheathing)	0.060
R-13+R-5	0.058
R-19 (R-19 compressed to 5.5")	0.062
R-19	0.060
R-21	0.057
Current Footnote g 25 percent R-13 75 percent R-13+R2	0.075
Proposed Footnote g 25 percent R-13+R2.5 75 percent R-13+R5	0.062
Target U-factor from N1102.1.2	0.060

IRC Wall Bracing: A Guide Page 28

Example 3: *Continuous, Variable Thickness Foam Sheathing over Intermittent Brace Panels*

Benefit	Installation Details
• Maximizes energy efficiency • Provides a thermal blanket to reduce thermal short-circuiting through studs • Reduces moisture condensation during cooler months that may occur with non-insulating exterior sheathing in mixed and cold climates]	• Place foam-sheathing directly over intermittent brace panels in the braced wall line (e.g., install ½" foam over brace panel and 1" foam between brace panel). • Detail foam to act as an air and/or water-resistive barrier (e.g., joints taped and/or seams flashed at window and door edges) and to replace building paper or wrap under siding.



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

PART I – IECC

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

PART II – IRC B/E

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

EC35–07/08
Table 402.1.1, Table 402.1.3

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	~~30~~ 38[f]	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	~~0.033~~ 0.028	0.059	0.065

(Footnotes remain unchanged)

Reason: By increasing the floor insulation from R-30 to R-38 in the climates 7 & 8, residential buildings can achieve energy cost savings in the coldest climates on heating costs, their largest portion of their energy bill.

As energy prices continue to climb, energy costs are becoming a burden to every person in the country, in addition to increasing energy imports that are becoming a burden on the US economy and energy independence. Residential buildings consume 22% of the United States primary energy and 37% of all electricity consumption (EIA 2005).

The residential building energy efficiency requirements in ICC codes have not had a substantial overall national improvement in many years. During that time, fuel prices have increased dramatically and environmental concerns from energy usage (notably global warming) have come to the forefront. Improving residential new construction energy efficiency is one of the most cost-effective ways to reduce consumption within the country. This proposal represents one reasonable and cost effective improvement that will provide states with an option to easily increase the efficiency of their code.

Cost Impact: The code change proposal will increase the cost of construction. The initial cost of this improvement may be higher, but the long-term energy savings outweigh these costs.

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

EC36–07/08
Table 402.1.1, Table 402.1.3; IRC Table N1102.1, Table N1102.1.2

Proponent: Ronald Majette, U. S. Department of Energy

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.37	30	13	3 / 4	13	0	0	0
2	0.75	0.75	0.37	30	13	4 / 6	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5 / 8	19	~~0~~ 5/13[f]	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5 / 10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13 / 17	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15 / 19	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	30[f]	10/13	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

a. through e. (No change to current text)

f. Basement wall insulation is not required in warm-humid locations as defined by Figure 301.1 and Table 301.1.

(Re-letter f. through h. to become g. through j.)

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	~~0.360~~ 0.091[c]	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

a. Non-fenestration U-factors shall be obtained from measurement, calculation or an approved source.

b. When more than half the insulation is on the interior, the mass wall U-factors shall be 0.17 in zone 1, 0.14 in zone 2, 0.12 in zone 3, 0.10 in zone 4 and the same as the wood frame wall in zones 5 through 8.

c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure 301.1 and Table 301.2.

PART II – IRC

Revise tables as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[h]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.2	0.75	0.40	30	13	3	13	0	0	0
2	0.75	0.75	0.40	30	13	4	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5	19	~~0~~ 5/13[f]	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15	30[f]	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10/13	10, 4 ft	10/13

a. through e. (No change to current text)

f. Basement wall insulation is not required in warm-humid locations as defined by Figure N1101.2 and Table N1101.2.

(Re-letter f. and g. to become g. and h.)

TABLE N1102.1.2
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	~~0.360~~ 0.091[b]	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

a. Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.

b. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure N1101.2 and Table N1101.2.

Reason: The purpose of this proposal is to add basement wall insulation requirements for the colder regions of climate zone 3. Currently, no insulation is required for conditioned basements (floor insulation is required over unconditioned basements) in Zone 3. Though basements are uncommon in Zone 3, there are some and they tend to be in the colder parts of the zone where winter temperatures can reach as low as single digits. When basements are used as a conditioned living space, they often have furred in walls that allow space for insulation.

Energy simulation analyses shows that foundation wall insulation in cold climates is cost effective. For conditioned basements, the Building Foundation Design Handbook reports that R-5 insulation wall insulation 8 ft. deep saves 0.16 MBtu/lineal foot of foundation perimeter of heating energy use compared to an uninsulated wall in Atlanta. Assuming a house with a 130 ft. perimeter basement, this is 20.8 MBtus a year. Assuming $10/MBtu natural gas cost, this insulation will save $208 a year in heating costs. For example, with the NAHB estimated insulation cost of $990 (EC42-06/07 Public Comment), the simple payback will be in about five years in Atlanta. The lost floor space from insulating basement walls should be minimal as conditioned basements are normally finished, and exterior insulation is an option. On the cooling side, the Building Foundation Design Handbook reports that R-5 insulation wall insulation 8 ft. deep saves a modest 0.12 kWh/lineal foot of foundation perimeter of heating energy use compared to an uninsulated wall in Atlanta. For a house with the 130 ft. perimeter, this is a savings of 15.6 kWh, or a little over a dollar at typical electricity prices. A basement with insulated walls will still benefit from cool summer temperatures of the deep earth because the entire basement floor will be in direct contact with the earth.

This proposal has an important improvement over a similar proposal in the 06/07 code change cycle. A compliant about the proposal in the last cycle was that zone 3 had very mild climate, particularly in the southern areas of zone 3. This new proposal exempts the "warm-humid" region of zone 3 from basement wall insulation, which includes about half of zone 3 in the eastern U.S. Therefore, basement wall insulation would only be required in the areas where basement wall insulation makes the most sense-the colder areas.

It is important to understand the insulation options for basements currently in the IECC and IRC contain a perverse incentive. Consider two houses with basements that are identical in all ways but one has a conditioned basement and the other has an unconditioned basement. Which will use more energy? Clearly, the one with a conditioned basement. Therefore, logically the envelope of the house with a conditioned basement should be at least as well insulated than the house with an unconditioned basement. However, in climate zone 3 the IECC requires R-19 insulation in the ceiling above an unconditioned basement whereas a conditioned basement is not required to have any insulation at all in either the ceiling or walls of the basement. In terms of reducing construction costs, it is to the builders economic advantage to build a "conditioned" basement, which will raise energy use.

Furthermore, under the IECC's definitions, a basement will be a "conditioned space" simply if ducts in the basement are not insulated. It is not even necessary to install registers or otherwise provide a heating or cooling source. Therefore the builder can not only eliminate basement ceiling insulation but also not insulate the ducts, both of which will substantially increase energy use. This is in conflict with the IECC's intent for the "effective use of energy". The IECC allows trade-offs where the energy efficiency of one measure can be reduced below code if a compensating improvement is made to another measure. In this case, a reduction in energy efficiency (removing basement ceiling insulation) not only allows absolutely no compensating improvement, but illogically allows yet another reduction in efficiency (removal of duct insulation).

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

PART I – IECC

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

PART II – IRC B/E

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

EC37–07/08
Table 402.1.1; IRC Table N1102.1

Proponent: Ronald Majette, U.S. Department of Energy

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise table footnote as follows:

TABLE 402.1.1 (Supp)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

(No change to table entries)

a. through c. (No change to current text)
d. R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be 2 ft in zones 1 through 3 for heated slabs.
e. through h. (No change to current text)

PART II – IRC

Revise table footnote as follows:

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

(No change to table entries)

a. through c. (No change to current text)
d. R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be 2 ft in zones 1 through 3 for heated slabs.

Reason: The purpose of this proposal is to clarify requirements for heated slabs in climate zones 1 through 3. DOE's Building Energy Codes Program technical support staff has fielded questions about what is required here. On the one hand, footnote d indicates that R-5 insulation is required for heated slabs. On the other hand, the table specifies an insulation depth of zero. This is confusing. This proposal would clarify that insulation is indeed always required for heated slabs. A hydronic slab radiant system in a slab under a carpeted floor should be heated to 130 F (http://oikos.com/esb/43/radiantfloor.html). Even with mild ground and air temperatures in zones 1 through 3, some insulation is merited because of the high temperature difference between the slab and the outside.

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

PART I – IECC

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

PART II – IRC

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

EC38–07/08

Table 402.1.3, 402.1.5 (New), Table 402.1.5 (New), Table 402.1.6 (New), Table 402.1.7 (New)

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

1. Revise table as follows:

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS [a]

CLIMATE ZONE	FENES-TRATION U-FACTOR	SKY-LIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR[b]	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	1.20	0.75	~~0.035~~ 0.036	0.082	0.197	~~0.064~~ 0.060	0.360	0.477
2	0.75	0.75	~~0.035~~ 0.036	0.082	0.165	~~0.064~~ 0.060	0.360	0.477
3	0.65	0.65	~~0.035~~ 0.036	0.082	0.141	~~0.047~~ 0.046	0.360	0.136
4 except Marine	0.40	0.60	~~0.030~~ 0.031	0.082	0.141	~~0.047~~ 0.046	0.059	0.065
5 and Marine 4	0.35	0.60	~~0.030~~ 0.031	0.060	0.082	0.037	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.041	0.057

a. Nonfenestration U-factors shall be obtained from measurement, calculation, or an approved source.
b. When more than half the insulation is on the interior, the mass wall U-factors shall be 0.17 in zone 1, 0.14 in zone 2, 0.12 in zone 3, 0.10 in zone 4 and the same as the wood frame wall in zones 5 through 8.

2. Add new text and tables as follows:

402.1.5 Envelope component default values. When calculating the U-factor of an assembly as part of Section 402.1.3, 402.1.4, or 404.5.2, the values in Table 402.1.5 through 402.1.7 shall be used unless alternate values are approved by the code official. In addition, the U-factor of the assembly shall be calculated using a series-parallel calculation.

TABLE 402.1.5
FRAME WALL COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.68	
Drywall Layer R-Value	0.45	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 77%	Framing: 23%
Proposed Design Default Insulation / Framing Fraction	Insulation: 77%	Framing: 23%
Sheathing Layer R-Value	0.63	
Siding Layer R-Value	0.44	
Exterior Air Film R-Value	0.45	

TABLE 402.1.6
FLOOR COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.92	
Floor Covering R-Value	1.23	
Floor Subfloor R-Value	0.63	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 90%	Framing: 10%
Proposed Design Default Insulation / Framing Fraction	Insulation: 90%	Framing: 10%
Exterior Air Film R-Value	0.92	

TABLE 402.1.7
CEILING COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.61	
Drywall Layer R-Value	0.45	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 89%	Framing: 11%
Proposed Design Default Insulation / Framing Fraction	Insulation: 89%	Framing: 11%
Exterior Air Film R-Value	0.61	

Reason: This proposal is intended to make the calculations within the code and the use of code consistent and transparent. The proposal does not change the insulation R-value requirements, but does change the U-factors to be calculated based on the component default value tables. This proposal makes the standard reference design and proposed design framing fractions explicit, along with all of the layers of the envelope components that are used in energy calculations.

Without explicit values that indicate how energy modeling tools are to model exact building envelope components, software tools have the discretion to select "appropriate" but inconsistent envelope layers. This inconsistency between modeling tools can create inconsistent results for what proposed designs comply with code. By adopting explicit component default value tables, the industry tools can increase consistency in how buildings are modeled.

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

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

EC39–07/08

Table 402.1.3, 402.1.5 (New), Table 402.1.5 (New), Table 402.1.6 (New), Table 402.1.7 (New)

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

1. Revise table as follows:

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS [a]

CLIMATE ZONE	FENES-TRATION U-FACTOR	SKY-LIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	1.20	0.75	0.035	~~0.082~~ 0.075	0.197	~~0.064~~ 0.060	0.360	0.477
2	0.75	0.75	0.035	~~0.082~~ 0.075	0.165	~~0.064~~ 0.060	0.360	0.477
3	0.65	0.65	0.035	~~0.082~~ 0.075	0.141	~~0.047~~ 0.046	0.360	0.136
4 except Marine	0.40	0.60	~~0.030~~ 0.029	~~0.082~~ 0.075	0.141	~~0.047~~ 0.046	0.059	0.065
5 and Marine 4	0.35	0.60	~~0.030~~ 0.029	~~0.060~~ 0.054	0.082	0.037	0.059	0.065
6	0.35	0.60	~~0.026~~ 0.024	~~0.060~~ 0.054	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	~~0.026~~ 0.024	~~0.057~~ 0.051	0.057	0.033	0.041	0.057

a. Nonfenestration U-factors shall be obtained from measurement, calculation, or an approved source.
b. When more than half the insulation is on the interior, the mass wall U-factors shall be 0.17 in zone 1, 0.14 in zone 2, 0.12 in zone 3, 0.10 in zone 4 and the same as the wood frame wall in zones 5 through 8.

2. Add new text and tables:

402.1.5 Envelope Component Default Values. When calculating the U-factor of an assembly as part of Section 402.1.3, 402.1.4, or 404.5.2, the values in Table 402.1.5 through 402.1.7 shall be used unless alternate values are documented and approved by the code official. In addition, the U-factor of the assembly shall be calculated using a series-parallel calculation.

TABLE 402.1.5
FRAME WALL COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.68	
Drywall Layer R-Value	0.45	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 86%	Framing: 14%
Proposed Design Default Insulation / Framing Fraction	Insulation: 77%	Framing: 23%
Sheathing Layer R-Value	0.63	
Siding Layer R-Value	0.44	
Exterior Air Film R-Value	0.45	

TABLE 402.1.6
FLOOR COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.92	
Floor Covering R-Value	1.23	
Floor Subfloor R-Value	0.63	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 92%	Framing: 8%
Proposed Design Default Insulation / Framing Fraction	Insulation: 90%	Framing: 10%
Exterior Air Film R-Value	0.92	

TABLE 402.1.7
CEILING COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.61	
Drywall Layer R-Value	0.45	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 93%	Framing: 7%
Proposed Design Default Insulation / Framing Fraction	Insulation: 89%	Framing: 11%
Exterior Air Film R-Value	0.61	

Reason: This proposal is intended to make the calculations within the code and the use of code consistent and transparent. This proposal makes the standard reference design and proposed design framing fractions explicit, along with all of the layers of the envelope components that are used in energy calculations.

Without explicit values that indicate how energy modeling tools are to model exact building envelope components, software tools have the discretion to select "appropriate" but inconsistent envelope layers. This inconsistency between modeling tools can create inconsistent results for what proposed designs comply with code.

The standard reference design and proposed design default are proposed to be different to allow proposed residential buildings to take advantage of proper framing techniques. The changes in framing fractions for the Standard Reference Design are intended to represent current proper framing techniques, while the proposed design defaults are intended to represent typical framing techniques. While this proposal does not help to improve the worst framing techniques, which can include a significant number, such as 10-15 2x4's tacked side by side, this proposal does give guidance and opportunity to address framing of building envelopes.

By adopting explicit component default value tables, the industry tools can increase consistency in how buildings are modeled. By adopting improved standard reference design default values, builders can take advantage of having proper or improved framing techniques.

The residential building energy efficiency requirements in ICC codes have not had a substantial overall national improvement in many years. During that time, fuel prices have increased dramatically and environmental concerns from energy usage (notably global warming) have come to the forefront. Improving residential new construction energy efficiency is one of the most cost-effective ways to reduce consumption within the country. This proposal represents one reasonable and cost effective improvement that will provide states with an option to easily increase the efficiency of their code.

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

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

EC40–07/08
Table 402.1.3

Proponent: Ronald Majette, U. S. Department of Energy

Revise table footnote as follows:

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

(No change to table entries)

a. Non-fenestration U-factors shall be obtained from measurement, calculation or an approved source.
b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in zone 1, 0.14 in zone 2, 0.12 in Zone 3, 0.10 in zone 4 except Marine, and the same as the ~~wood~~ frame wall U-factor in Marine zone 4 and zones 5 through 8.

Reason: The purpose of this proposal is to fix a number of issues in footnote b of Table 402.1.3. First, all residential building envelope requirements in both Table 402.1.1 and Table 402.1.3 of the IECC are the same for zone 5 and Marine zone 4. This proposal would make the mass wall requirements in footnote b consistent with this practice of combining Marine zone 4 and zone 5. Second, this would clarify that the U-factors requirements are a maximum. Third, there are two minor editorial wording changes that do not affect content.

Cost Impact: The code change proposal will increase the cost of construction. This will only impact Marine zone 4 and buildings with mass walls when more than half of the insulation is to the interior of the wall if the U-factor based compliance approaches are used.

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

EC41–07/08
Table 402.1.3

Proponent: Craig Conner, Building Quality, representing himself

Revise table footnote as follows:

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

(No change to table entries)

a. (No change to current text)
b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in zone 1, 0.14 in zone 2, 0.12 in zone 3, 0.10 in zone 4 except Marine, and the same as the ~~wood~~ frame wall U-factor in Marine zone 4 and zones 5 through 8.

Reason: This footnote was approved in the last code cycle as a part a larger change of revising the format for mass wall requirements. The approved footnote contained an error in value for the "Marine 4" climate zone. This change aligns the footnote with the value still in the IRC. This also aligns the climate zones in the footnote with the zones in the table and makes several editorial changes.

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

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

EC42–07/08

Table 402.1.3, Table 404.5.2(1); IRC Table N1102.1.2

Proponent: Ronald Majette, U.S. Department of Energy

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Revise tables as follows:

TABLE 402.1.3 (Supp)
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor[c]	Crawl Space Wall U-Factor[c]
1	1.20	0.75	0.035	0.082	0.197	0.064	~~0.360~~ 0.948	~~0.477~~ 0.948
2	0.75	0.75	0.035	0.082	0.165	0.064	~~0.360~~ 0.948	~~0.477~~ 0.948
3	0.65	0.65	0.035	0.082	0.141	0.047	~~0.360~~ 0.948	~~0.136~~ 0.192
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	~~0.059~~ 0.084	~~0.065~~ 0.084
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	~~0.059~~ 0.084	~~0.065~~ 0.084
6	0.35	0.60	0.026	0.060	0.060	0.033	~~0.059~~ 0.084	~~0.065~~ 0.084
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	~~0.059~~ 0.084	~~0.065~~ 0.084

a. Non-fenestration U-factors shall be obtained from measurement, calculation or an approved source.
b. When more than half the insulation is on the interior, the mass wall U-factors shall be 0.17 in zone 1, 0.14 in zone 2, 0.12 in zone 3, 0.10 in zone 4 and the same as the wood frame wall in zones 5 through 8.
c. Foundation U-factor requirements include wall construction and interior air films but exclude soil conductivity and exterior air films.

TABLE 404.5.2(1) (Supp)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Foundations	Type: same as proposed foundation wall area above and below grade: same as proposed	As proposed As proposed

(Portions of table and footnotes not shown remain unchanged)

PART II – IRC

Revise table as follows:

TABLE N1102.1.2
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor[b]	Crawl Space Wall U-Factor[b]
1	1.20	0.75	0.035	0.082	0.197	0.064	~~0.360~~ 0.948	~~0.477~~ 0.948
2	0.75	0.75	0.035	0.082	0.165	0.064	~~0.360~~ 0.948	~~0.477~~ 0.948
3	0.65	0.65	0.035	0.082	0.141	0.047	~~0.360~~ 0.948	~~0.136~~ 0.192
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	~~0.059~~ 0.084	~~0.065~~ 0.084
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	~~0.059~~ 0.084	~~0.065~~ 0.084
6	0.35	0.60	0.026	0.060	0.060	0.033	~~0.059~~ 0.084	~~0.065~~ 0.084
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	~~0.059~~ 0.084	~~0.065~~ 0.084

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.
b. Foundation U-factor requirements include wall construction and interior air films but exclude soil conductivity and exterior air films.

Reason: The purpose of this code change is to remove the ground (earth) conductance from the U-factor requirements in the IECC and Chapter 11 of the IRC. The ground is not an inherent characteristic of the building construction and is therefore an unnecessary and confusing element to include code's U-factor requirements. Additionally, the code gives no information about how the ground conductance effect is to be accounted for in the U-factor requirements and it is therefore difficult for code users (including code compliance software developers) to correctly and consistently match their calculations to the code requirements.

The proposed U-factors include only the foundation structure and insulation elements. They are based on the assumption of solid concrete foundation walls with an R-value of 0.375 for an assumed 6 inches of concrete. Where R-13 cavity or R-10 continuous insulation is required, the U-factor proposed here is based on the assumption of a finished framed wall with R-13 cavity insulation.

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

PART I – IECC

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

PART II – IRC

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

EC43–07/08

402.1.4, Table 402.1.4; IRC N1102.1.4, Table N1102.1.4

Proponent: Craig Conner, Building Quality, representing himself

THESE PROPOSALS ARE ON THE AGENDA OF THE IECC AND THE IRC B/E CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IECC

Add new text and table as follows:

402.1.4 Insulation tradeoff. The insulation requirements in Table 402.1.4 shall be permitted as a tradeoff for the specified improvement.

(Renumber subsequent section)

TABLE 402.1.4
INSULATION TRADEOFFS

Climate Zone	Improvement from Minimum Requirement	Reduction in Prescriptive Insulation Requirement
4	SEER 14 with AFUE 90, or SEER 14 with HSPF 8.5, or Ground source heat pump, or Reduced leakage residence, or Reduced leakage ducts	R-38 → R-30 ceiling
5 and 4 Marine	AFUE 90, or SEER 14 with HSPF 8.5, or Ground source heat pump, or Reduced leakage residence, or Reduced leakage ducts	R-19 → R-13 wall
5 and 4 Marine	Ground source heat pump, or AFUE 90 with reduced leakage residence or ducts, or SEER 14 with HSPF 8.5 with reduced leakage residence or ducts	R38 → R-30 ceiling, R-19 → R-13 wall, and R-30 → R-19 floor
6	AFUE 90, or Ground source heat pump, or Reduced leakage residence, or Reduced leakage ducts	R-19 → R-13 wall
6	Ground source heat pump, or AFUE 90 with reduced leakage residence, or AFUE 90 with reduced leakage ducts	R-49 → R-38 ceiling, R-19 → R-13 wall, and R-30 → R-19 floor

Notes:
1. Residences with electric furnaces or electric baseboard heating as the primary heat source are not eligible to use this table.
2. Oil boiler or oil furnace with AFUE 85 meets the AFUE requirement.
3. Ground source heat pump minimum is 2.9 COP with 13 EER.
4. An approved person shall conduct airtight testing and provide written results to the code official.
5. "Reduced leakage residence" means leakage does not exceed 4 air changes per hour at 50 Pascals when tested as specified by ASTM E779-03.
6. "Reduced leakage ducts" means duct and plenum leakage does not exceed 3 CFM per 100 ft^2 of conditioned floor area when tested at 25 Pascals (0.1" w.g.) as specified by ASTM E1554-2003. All ducts and HVAC air handler within conditioned space meets the reduced leakage duct requirement.

PART II – IRC

Add new text and table as follows:

N1102.1.4 Insulation tradeoff. The insulation requirements in Table 402.1.4 shall be permitted as a tradeoff for the specified improvement.

TABLE N1102.1.4
INSULATION TRADEOFFS

Climate Zone	Improvement from Minimum Requirement	Reduction in Prescriptive Insulation Requirement
4	SEER 14 with AFUE 90, or SEER 14 with HSPF 8.5, or Ground source heat pump, or Reduced leakage residence, or Reduced leakage ducts	R-38 → R-30 ceiling
5 and 4 Marine	AFUE 90, or SEER 14 with HSPF 8.5, or Ground source heat pump, or Reduced leakage residence, or Reduced leakage ducts	R-19 → R-13 wall
5 and 4 Marine	Ground source heat pump, or AFUE 90 with reduced leakage residence or ducts, or SEER 14 with HSPF 8.5 with reduced leakage residence or ducts	R38 → R-30 ceiling, R-19 → R-13 wall, and R-30 → R-19 floor
6	AFUE 90, or Ground source heat pump, or Reduced leakage residence, or Reduced leakage ducts	R-19 → R-13 wall
6	Ground source heat pump, or AFUE 90 with reduced leakage residence, or AFUE 90 with reduced leakage ducts	R-49 → R-38 ceiling, R-19 → R-13 wall, and R-30 → R-19 floor

Notes:

1 Residences with electric furnaces or electric baseboard heating as the primary heat source are not eligible to use this table.
2. Oil boiler or oil furnace with AFUE 85 meets the AFUE requirement.
3. Ground source heat pump minimum is 2.9 COP with 13 EER.
4. An approved person shall conduct airtight testing and provide written results to the code official.
5. "Reduced leakage residence" means leakage does not exceed 4 air changes per hour at 50 Pascals when tested as specified by ASTM E779-03.
6. "Reduced leakage ducts" means duct and plenum leakage does not exceed 3 CFM per 100 ft^2 of conditioned floor area when tested at 25 Pascals (0.1" w.g.) as specified by ASTM E1554-2003. All ducts and HVAC air handler within conditioned space meets the reduced leakage duct requirement.

Reason: Many builders settle for the prescriptive table out of frustration with the complex IECC performance method, even though they would rather incorporate alternative energy improvements in lieu of some prescriptive requirements. The tradeoff table allows some common energy-efficient upgrades that trade off on some more costly and/or difficult prescriptive requirements without the need to hire energy experts to calculate code compliance for every house as is already allowed in IECC Section 405 Simulated Performance Alternative.

The improvements listed in Table 402.1.4 / N1102.1.4 have been tested by the NAHB Research Center for multiple homes within multiple cities for each climate zone to ensure that the net energy used in the home will be LESS after the tradeoff than before. Baseline simulations were performed using the Standard Reference Design as defined in Table 404.5.2.1. Baseline homes were constructed on a vented crawlspace.

Several specifics in the tradeoff table deserve comment:

1) The AFUE 90 furnace requirement represents a threshold for condensing furnaces, even though an AFUE less than 90 that would meet the energy equivalency requirement energy efficiencies between 83 and 90 are not available in the market.
2) Heat pumps become less efficient (and less common) in northern climates, and therefore are not included in zone 6. The new Energy Star criteria also specifies a heat pump HSPF of 8.5 in zones 4 and 5, and requires a performance path (Section 405 in this code) in zones 6 and above.
3) The airtightness of new homes varies considerably; however, a 4 ACH (under house airtightness testing pressure) would represent a tight home; in most situations it would exceed the airtightness required by Energy Star.
4) Duct losses are often stated to be in the 15% to 25% range; therefore, moving the ducts indoor or testing ducts for air tightness can save substantial energy.
5) Users are not eligible to use this table for residences primarly heated with electric resistance furnaces and electric baseboard heating because of the poor efficiency of electric resistance heating.
6) Oil boilers and furnaces are allowed to have a lower AFUE because the available AFUEs do not go as high as gas AFUEs.
7) The airtightness tests for the house and the ducts are specified at the most commonly used pressures for those tests.

Including this "prescriptive" tradeoff table in the code encourages users to use the efficiency improvements in the table. The table streamlines compliance with these tradeoffs. These tradeoffs are conservative. In some cases the optional improvement saves significantly more energy than the allowed tradeoff. Overall, the table nets additional energy efficiency because code users choose the option of using energy efficiency improvements that may more than compensate for the insulation levels allowed.

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

PART I – IECC

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

PART II – IRC

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

EC44–07/08

401.2, 402.7 (New), Table 402.7 (New), 404.2

Proponents: Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

1. Revise as follows:

401.2 Compliance. Projects shall comply with Sections 401, 402.4, 402.5, 402.6, 402.7, and 403 (referred to as the mandatory provisions) and either:

1. Sections 402.1 through 402.3 (prescriptive); or
2. Section 404 (performance).

2. Add new text and table as follows:

402.7 Minimum opaque envelope requirements (Mandatory). The thermal requirements for opaque envelope components shall not be less than the requirements in Table 402.7 when determining alternatives to the R-values in Table 402.1.1 under Sections 402.1.3, 402.1.4, or 404.

TABLE 402.7
MINIMUM INSULATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	STEEL FRAME WALL CONTINUOUS R-VALUE [c]	FLOOR R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE & DEPTH	CRAWL SPACE WALL R-VALUE
1	25	11	0	R-11+3	11	0	0	0
2	25	11	3	R-11+3	11	0	0	0
3	25	11	4	R-11+3	13	0	0	0
4 except Marine	30	11	4	R-11+3	13	5/11 [b]	5, 2ft	5/11 [b]
5 and Marine 4	30	13	5	R-13+5, or R-15+4, or R-21+3	19	5/11 [b]	5, 2ft	5/11 [b]
6	38 [a]	13	13	R-13+5, or R-15+4, or R-21+3	19	5/11 [b]	10, 2ft	5/11 [b]
7 and 8	38 [a]	19	15	R-13+9, or R-19+8, or R-25+7	19	5/11 [b]	10, 2ft	5/11 [b]

a. R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves or the design of the roof/ceiling assembly does not allow sufficient space for the required insulation. This reduction of insulation shall be limited to 500 square feet (46 m^2) of ceiling area.

b. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation configuation meets the requirement.

c. Cavity insulation R-value is listed first, followed by continuous insulation R-value.

3. Revise as follows:

404.2 Mandatory requirements. Compliance with this Section requires that the criteria of Sections 401, 402.4, 402.5, 402.6, 402.7, and 403 be met.

Reason: This proposal ensures a minimum set of insulation levels in all climates. This proposal is intended to remove the current loophole that allows for the residential building envelope efficiency to be reduced by trade-off from other efficiency improvements that do not have the same life expectancy. This is intended to make certain that all home occupants have equal access to comfort that is achieved from having a quality building envelope.

It is particularly important that such minimum standards be set for the building envelope, since the fundamental integrity of the envelope is so crucial to energy efficiency and satisfactory home occupancy. Moreover, unlike other measures (like equipment) that may be traded-off against the building envelope, the envelope often goes significantly unchanged for decades making the opportunity to get it right the first time particularly important. Unfortunately, this much longer life is not factored into trade-off calculations.

New construction is the most economical time to install insulation. Incremental increases in insulating value with little immediate cost impact will pay off dividends (in lower energy bills) for decades. A minimum R-values table ensures that there are no "weak zones" in the thermal envelop of the home where little or no insulation would create uncomfortable and inefficient conditions. The point of the simple prescriptive path was not to facilitate a reduction or elimination of insulation in certain areas of the home, but rather, to provide reasonable values that could be uniformly applied throughout the home. This proposal recognizes that the home operates as a working system, and that each component – walls, floors, ceiling, etc. – plays an integral role in maintaining an efficient thermal environment.

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

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