RB236-06/07
R602.11.3

Proposed Change as Submitted:

Proponent: Jim W. Sealy and Kelly Cobeen, representing FEMA/BSSC Code Resource Support Committee

Revise as follows:

R602.11.3 Stepped Foundations. ~~Where stepped foundations occur, the following requirements shall apply: 1.~~ Where the height of a required braced wall line ~~panel~~ that extend~~s~~ from the foundation to floor above varies more than 4 feet (1220 mm), the braced wall line ~~panel~~ shall be constructed in accordance with the following: ~~Figure R602.11.3.~~

1 ~~2~~. Where the lowest floor framing rests directly on a sill bolted to a foundation not less than 8 feet (2440 mm) in length along a line of bracing, the line shall be considered as braced. The double plate of the cripple stud wall beyond the segment of footing that extends to the lowest framed floor shall be spliced by extending the upper top plate a minimum of 4 feet (1219 mm) along the foundation. Anchor bolts shall be located a maximum of 1 foot and 3 feet (305 and 914 mm) from the step in the foundation. See Figure R602.11.3.

2 ~~3~~. Where cripple walls occur between the top of the foundation and lowest framed floor, the bracing requirements of Sections R602.10.2 and R602.10.11.1 ~~for a story~~ shall apply.

3 4. Where only the bottom of the foundation is stepped and the lowest floor framing rests directly on a sill bolted to the foundations, the requirements of Sections R403.1.6 and R602.11.1 shall apply.

Reason: Clarification of existing IRC provisions. The above provision is based on 2003 NEHRP Section 12.4.3.6, however changes introduced in the IRC wording make the intent unclear. The change from "panel" to "line" is consistent with Figure R602.11.3.

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

Committee Action: **Approved as Submitted**

Committee Reason: This change brings the IRC in compliance with the National Earthquake Hazards Reduction Program recommended provisions and adds clarity to the code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Kelly Cobeen, Cobeen & Associates, representing herself, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

R602.11.3 Stepped Foundations. Where the height of a required braced wall line that extend from the foundation to floor above varies more than 4 feet (1220 mm), the braced wall line shall be constructed in accordance with the following:

1. Where the lowest floor framing rests directly on a sill bolted to a foundation not less than 8 feet (2440 mm) in length along a line of bracing, the line shall be considered as braced. The double plate of the cripple stud wall beyond the segment of footing that extends to the lowest framed floor shall be spliced by extending the upper top plate a minimum of 4 feet (1219 mm) along the foundation. Anchor bolts shall be located a maximum of 1 foot and 3 feet (305 and 914 mm) from the step in the foundation. See Figure R602.11.3.
2. Where cripple walls occur between the top of the foundation and lowest framed floor, the bracing requirements of Sections R602.10.2 and ~~R602.10.11.1~~ R602.10.11.4 shall apply.
3. Where only the bottom of the foundation is stepped and the lowest floor framing rests directly on a sill bolted to the foundations, the requirements of Sections R403.1.6 and R602.11.1 shall apply.

Commenter's Reason: This is an editorial correction. The code change as originally submitted referenced the 2003 IBC section number rather than the 2006 IBC.

Final Action: AS AM AMPC____ D

RB239-06/07
R606.12.2.1 (New)

Proposed Change as Submitted:

Proponent: Jim W. Sealy and Kelly Cobeen, representing FEMA/BSSC Code Resource Support Committee

Add new text as follows:

R606.12.2.1 Minimum length of wall without openings. Table R611.7(11) shall be used to determine the minimum required amount of wall length without openings at each masonry wall line. The provided percentage of solid wall length shall only include those wall segments that are 4 feet (1219 mm) or longer. The maximum clear distance between wall segments included in determining the solid wall length shall not exceed 18 feet (5486 mm). Shear wall segments required to meet the minimum wall length shall be in accordance with Section R606.12.2.2.3.

Reason: Unlike wood, steel and concrete wall systems, there is currently no regulation of the minimum length of bracing wall to be provided in masonry wall buildings. The proposed provision will be applicable to townhouses in SDC C and all buildings is SDC D_0, D_1 and D_2. The provision refers to concrete requirements, providing interim guidance until more specific masonry requirements are developed. Other proposed requirements mirror concrete Section R611.7.4, with one exception. This type of guidance is needed in order for masonry wall construction to be used in high Seismic Design Categories. The exception is the minimum length of required wall segments. Concrete allows two-foot segments in SDC C, but requires 4 foot segments in SDC D_0, D_1 and D_2; the proposed provision simplifies this by only permitting 4 foot segments, therefore providing uniform requirements for buildings in high seismic regions.

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

Committee Action: **Disapproved**

Committee Reason: There was not enough supporting data submitted to support this change. Also, it may create a conflict with Figures R606.11(2) and R606.11(3).

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jim W. Sealy, FAIA and Kelly Cobeen, FEMA/BSSC Code Resource Support Committee, representing Building Seismic Safety Council of the National Institute of Building Sciences, requests Approval as Modified by this Public Comment.

Replace proposal with the following:

R606.12.2.1 Minimum length of wall without openings. Table R606.12.2.1 shall be used to determine the minimum required solid wall length without openings at each masonry exterior wall. The provided percentage of solid wall length shall only include those wall segments that are 3 feet (914 mm) or longer. The maximum clear distance between wall segments included in determining the solid wall length shall not exceed 18 feet (5486 mm). Shear wall segments required to meet the minimum wall length shall be in accordance with Section R606.12.2.2.3.

TABLE R606.12.2.1
MINIMUM SOLID WALL LENGTH ALONG EXTERIOR WALL LINES

Seismic Design Category (SDC)	MINIMUM SOLID WALL LENGTH (percent)[1]		
	One-Story or Top Story of Two Story	Wall Supporting Light-Framed Second Story and Roof	Wall Supporting Masonry Second Story and Roof
Townhouses in SDC C	20	25	35
D_0 or D_1	25	NP	NP
D_2	30	NP	NP

NP = Not permitted, expect with design per the IBC

[1]For all walls, the minimum required length of solid walls shall be based on the table percent multiplied by the dimension, parallel to the wall direction under consideration, of a rectangle inscribing the overall building plan.

(Renumber subsequent sections)

Commenter's Reason: The current IRC permits construction of potentially hazardous buildings. As stated in the reason for the initial code change proposal there is currently no regulation of the minimum length of bracing wall to be provided in masonry wall buildings. This includes multi-story construction without engineered design in SDC C, and single story in SDC D_0, D_1, D_2. This situation must be corrected if the IRC masonry sections are to be used in areas of high seismic hazard. This proposal corrects this situation by incorporating wall length requirements developed for ICF walls, a comparable material both in terms of load requirements and capacity.

In this modified version, Table R611.7(11) has been copied and modified to avoid possible confusion. In response to the code development committee reason, it has been verified that there is no conflict with Figures R606.11(2) and R606.11(3).

Final Action: AS AM AMPC____ D

RB244-06/07
R613, R613.1

Proposed Change as Submitted:

Proponent: Michael D. Fischer, The Kellen Company, representing the Window and Door Manufacturers Association

Revise as follows:

SECTION R613
EXTERIOR WINDOWS AND ~~GLASS~~ DOORS

R613.1 General. This section prescribes performance and construction requirements for exterior window and door systems installed in wall systems. Windows and doors shall be installed ~~and flashed~~ in accordance with the manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the manufacturer for each window.

Reason: This proposal provides revisions to general requirements for windows and doors installed in exterior wall systems. The current language contains inconsistencies in scope between the section heading and technical requirements contained in the text. The requirements for flashing are also inconsistent with the requirements of section R703.8. The proposal will resolve the scoping issues, and at the same time provide clear requirements for flashing.

Section R703.8 requires that flashing should be installed at "window and door openings", and also provides important guidance on the type of materials and methods of installation for flashing application. It is appropriate that the code direct the user to that section to ensure correct installation. Including the reference to R703.8 in the general requirements for R613.1 will facilitate that installation, and as future proposals provide even greater clarification on water management issues, they will more appropriately be included in the Chapter 7 requirements. The window and door industry is collaborating with other groups, including wall material and flashing interests, to develop best practices. Moreover, Chapter 6 contains structural performance requirements for exterior fenestration products. Flashing of these openings is a question of integration between the fenestration product, the water-resistive barrier, and the wall covering- not a wall construction issue, but a wall covering issue. During the last code cycle, revisions to Chapter 7 greatly improved Section R703.8 and removed technically incorrect legacy language. Resolving the remaining issues in Chapter 6 completes the task begun in the last cycle. Furthermore, placing all flashing requirements for window and door openings in Chapter 7 will ease code interpretation and compliance.

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

Committee Action: **Approved as Modified**

Modify the proposal as follows:

SECTION R613
EXTERIOR WINDOWS AND DOORS

R613.1 General. This section prescribes performance and construction requirements for exterior window and door systems installed in wall systems. Windows and doors shall be installed and flashed in accordance with the manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the manufacturer for each window.

Committee Reason: This a needed change to clarify that the flashing is required for window and door openings. The modification was made to clarify that the window and door manufacturers are to provide flashing instructions.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Further modify proposal as follows:

R613.1 General. This section prescribes performance and construction requirements for exterior window and door systems installed in wall systems. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Commenter's Reason: The original proposal clarified that exterior windows and doors are to be flashed in accordance with Section R703.8. The modification approved by the IRC committee also requires the windows and doors to be flashed in accordance with the manufacturers written installation instructions. The net result of this would appear to be that the manufacturers written installation instructions for flashing the windows and doors are to comply with Section R703.8. What is not clear is whether those instructions should come from the manufacturer of the fenestration component, or the manufacturer of the flashing. This public comment clarifies that the installation instructions are to come from the fenestration manufacturer.

The last sentence is also revised to clarify that door manufacturers, as well as window manufacturers, are to provide written installation instructions for their product. This requirement is consistent with the remainder of the section.

Final Action: AS AM AMPC____ D

RB245-06/07
R613.5 (New)

Proposed Change as Submitted:

Proponent: Michael D. Fischer, The Kellen Company, representing the Window and Door Manufacturers Association

Add new text as follows:

R613.5 Exterior Door Thresholds. Exterior sliding and side-hinged doors shall have a maximum threshold height of 7 ¾". Required exit doors shall be installed in accordance with R311.4.3.

(Renumber subsequent sections)

Reason: This proposal will clarify threshold height requirements for exterior door systems. The IRC currently contains no specific requirement for threshold heights, but does contain requirements for the installation of exterior doors and the upper threshold height, in relationship to floor and landing elevations. During the past several code cycles, the issue of how best to regulate landing and floor elevations at exterior doors to provide safe passage through door openings has been debated incessantly, with door manufacturers caught between this confusing debate and the need to integrate structural and water management performance into their systems.

The current requirement includes a limit of 7 ¾" between the top of the threshold and the landing or floor area. This proposal does not modify any requirements in Chapter 3 related to landings at doors, but merely indicates that 7 ¾" is the maximum allowable threshold assembly height. For required exit doors, existing requirements in R311.4.3 that control the location of the threshold in relation to floors and landings are unchanged.

As door manufacturers strive to provide sliding doors and patio doors, particularly in-swinging units that are often the most popular style, the problem of how to best comply with structural performance and water management issues often results in design features, including increased threshold assembly heights. Adding the text here, in Chapter 6, links the threshold height to the structural and water penetration requirements of Sections R613.3 and R613.4. Door manufacturers will be able to produce products to comply with these requirements, while Chapter 3 will continue to provide the builder with direction on how to locate exterior doors in relation to floors and landings.

The current vague and confusing requirements have often been interpreted to require all exterior doors to have a maximum threshold of 1 ½ " whether or not it was the required exit door. This proposal solves that interpretation issue and will improve the performance of exterior doors without adding unnecessary cost.

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

Committee Action: **Disapproved**

Committee Reason: The proposal does not properly address the problem. The threshold height in relation to the landing/floor needs to be addressed.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Michael D. Fischer, The Kellen Company, representing Window and Door Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: During the past several code cycles, attempts to regulate floor and landing heights have caused confusion over the relationship between threshold height and adjacent floor levels. This proposal moves the threshold maximum dimension for non-required exit doors into the exterior wall section along with other exterior door and window requirements. The purpose of the proposal is to clarify that doors not in egress routes, and subject to structural and water performance testing, will likely require a more substantial threshold assembly. During testimony and committee debate, the IRC committee identified flaws in Chapter 3 that combined with this proposal would allow extreme changes in elevation between floors and walking surfaces. The problem language in Chapter 3 is addressed in a separate comment submitted by AAMA and supported by WDMA.

This proposal does not address floor or landing levels, or the relative placement of the door threshold. It merely regulates the actual height of the assembly. Requirements in Chapter 3 provide the necessary guidance to properly install the door in order to maintain safe passage.

Final Action: AS AM AMPC____ D

RB246-06/07
R613.8.1

Proposed Change as Submitted:

Proponent: Bob Boyer, Building Officials Association of Florida Code Development Committee, representing Building Officials Association of Florida

Revise as follows:

R613.8.1 Anchoring requirements. Window and glass door assemblies shall be anchored in accordance with the published manufacturer's recommendations to achieve the design pressure specified. Substitute anchoring systems used for substrates ~~not specified by the fenestration manufacturer~~ shall provide equal or greater anchoring performance as demonstrated by accepted engineering practice.

Exception: In locations where wind pressures determined in accordance with Table R301.2(2) exceed 30 pounds per square foot pressure (1.44 kPa), window and door assembly anchoring systems shall be tested to achieve the design pressure specified. In no case shall the anchorage exceed the spacing for the tested rated performance.

Reason: The proposed changes are intended to clarify the intent of the section and to specifically point out that the anchorage spacing cannot exceed the spacing as dictated by the tested assembly for the performance specified.

Inadequately anchored window and door assemblies can be blown out during major storms and hurricane events. We believe window and door anchorage system testing is justified where wind pressures exceed 30 pounds per square foot pressure.

Clarification of the code requirement.

Cost Impact: The code change proposal will not increase the cost of construction. It is primarily for code clarification.

Committee Action: **Disapproved**

Committee Reason: The manufacturer of these products in high wind areas should provide the proper anchorage instructions. This proposal would require calculation in some cases even if the manufacturer has provided anchorage details.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Robert Boyer, Building Officials Association of Florida, representing the Code Development Committee, requests Approval as Submitted.

Commenter's Reason: The prescriptive provisions in the International Residential Code are limited to jurisdictions with a basic wind speed of 110 mph or less. The states along the Gulf Coast and the Atlantic Ocean from Texas to Massachusetts and the coast of Alaska are exposed

to basic wind speeds greater than 110 mph as well as numerous "Special Wind Regions" within the US. The International Residential Code should be expanded to provide prescriptive provisions for the individuals in these jurisdictions. This is a multiple region issue, which could affect as many as 22 states. The Wind issues aren't any different than Snow Loads or Seismic requirements being in the Code.

This is not just a Florida Issue and we believe it deserves to be reconsidered in Rochester.

Final Action: AS AM AMPC____ D

RB248-06/07

R202 (New), R702.1, R703.7, R703.7.2 (New), R703.7.1, R703.7.2.2, R703.7.2.3, R703.7.2.4, R703.7.2.5, R703.7.2.6, R703.7.4.1.1, R703.7.2.7, R703.7.2.8, R703.7.2.9, R703.7.2.10, R703.7.3 (New), R703.7.3.1 (New), R703.7.3.2 (New), R703.7.3.3 (New), R703.7.3.4 (New), R703.7.3.5 (New), R703.7.3.6 (New), Table R703.4

Proposed Change as Submitted:

Proponent: David W. Ware, Owens Corning

1. Add new definitions as follows:

SECTION R202
DEFINITIONS

ADHERED STONE OR MASONRY VENEER: Stone or masonry veneer secured and supported through the adhesion of an approved bonding material applied to an approved backing.

ANCHORED STONE OR MASONRY VENEER: Stone or masonry veneer secured with approved mechanical fasteners to an approved backing.

VENEER: A facing attached to a wall for the purposes of providing ornamentation, protection, or insulation, but not counted as adding strength to the wall.

2. Revise as follows:

SECTION R702
INTERIOR COVERING

R702.1 General. Interior coverings or wall finishes shall be installed in accordance with this chapter and Tables R702.1(1), Table R702.1(2), Table 702.1(3) and Table R702.3.5. Interior anchored stone or masonry veneer shall comply with the requirements of Section R703.7.1 for support and Section R703.7.2.2.4 for anchorage, except an air space is not required. Interior adhered stone or masonry veneer shall comply with the requirements of Section R703.7.3. Interior finishes and materials shall conform to the flame spread and smoke-density requirements of Section R315.

3. Revise as follows:

SECTON R703
EXTERIOR COVERING

R703.7 Stone and masonry veneer, general. Stone and masonry veneer shall be installed in accordance with this chapter, Table R703.4 and Figure R703.7. These veneers installed over a backing of wood or cold-formed steel shall be limited to the first story above-grade and shall not exceed 5 inches (127 mm) in thickness, nor 50 psf (2.39 kN/m^2).

Exceptions:

1. For all buildings in Seismic Design Categories A, B and C, ~~exterior~~ stone or masonry veneer, as specified in Table R703.7(1), with a backing of wood or steel framing shall be permitted to the height specified in Table R703.7(1) above a noncombustible foundation. Wall bracing at exterior and interior braced wall lines shall be in accordance with Section R602.10 or R603.7,and the additional requirements of Table R703.7(1).2.

2. For detached one-or two-family dwellings in Seismic Design Categories D_0, D_1 and D_2, ~~exterior~~ stone or masonry veneer, as specified in Table R703.7(2), with a backing of wood framing shall be permitted to the height specified in Table R703.7(2) above a noncombustible foundation .Wall bracing and hold downs at exterior and interior braced wall lines shall be in accordance with Sections R602.10 and R602.11 and the additional requirements of Table R703.7(2). In Seismic Design Categories D_0, D_1 and D_2, cripple walls shall not be permitted, and required interior braced wall lines shall be supported on continuous foundations.

R703.7.1 Interior veneer support. Veneers used as interior wall finishes shall be permitted to be supported on wood or cold-formed steel floors that are designed to support the loads imposed.

R703.7.2 Anchored stone and masonry veneer

R703.7.2.1 ~~Exterior v~~Veneer support. ~~Except in Seismic Design Categories D_0, D_1 and D_2, exterior~~ Anchored stone or masonry veneers having an installed weight of 40 pounds per square foot (195 kg/m^2) or less shall be permitted to be supported on wood or cold-formed steel construction. When veneer supported by wood or cold-formed steel construction adjoins veneer supported by the foundation, there shall be a movement joint between the veneer supported by the wood or cold-formed steel construction and the veneer supported by the foundation. The wood or cold-formed steel construction supporting the veneer shall be designed to limit the deflection to l/600 of the span for the supporting members. The design of the wood or cold-formed steel construction shall consider the weight of the veneer and any other loads.

R703.7.2.2.~~1~~ Support by steel angle. A minimum 6 inches by 4 inches by 5/16 inch (152 mm by 102 mm by 8 mm) steel angle, with the long leg placed vertically, shall be anchored to double 2 inches by 4 inches (51 mm by 102 mm) wood studs at a maximum on center spacing of 16 inches (406 mm). Anchorage of the steel angle at every double stud spacing shall be a minimum of two 7/16 inch (11.1 mm) diameter by 4 inches (102 mm) lag screws. The steel angle shall have a minimum clearance to underlying construction of 1/16 inch (1.6 mm). A minimum of two-thirds the width of the masonry veneer thickness shall bear on the steel angle. Flashing and weep holes shall be located in the veneer wythe in accordance with Figure R703.7.1. The maximum height of veneer above the steel angle support shall be 12 feet, 8 inches (3861 mm). The air space separating the masonry veneer from the wood backing shall be in accordance with R703.7.2.7.~~4~~ and R703.7.2.8~~.4.2~~. The method of support for the veneer on wood construction shall be constructed in accordance with Figure R703.7.2.1.

The maximum slope of the roof construction without stops shall be 7:12. Roof construction with slopes greater than 7:12 but not more than 12:12 shall have stops of a minimum 3 inch X 3 inch X l/4. inch (76 mm x 76 mm X 6 mm) steel plate welded to the angle at 24 inches (610 mm) on center along the angle or as approved by the building official.

R703.7.2.3.~~2~~ Support by roof construction. A steel angle shall be placed directly on top of the roof construction. The roof supporting construction for the steel angle shall consist of a minimum of three 2-inch by 6-inch (51 mm by 152 mm) wood members. The wood member abutting the vertical wall stud construction shall be anchored with a minimum of three 5/8-inh (15.9 mm) diameter by 5-inch (127 mm) lag screws to every wood stud spacing. Each additional roof member shall be anchored by the use of two l0d nails at every wood stud spacing. A minimum of two-thirds the width of the veneer thickness shall bear on the steel angle. Flashing and weep holes shall be located in the veneer wythe in accordance with Figure R703.7.1. The maximum height of the masonry veneer above the steel angle support shall be 12 feet, 8 inches (3861 mm). The air space separating the veneer from the wood backing shall be in accordance with R703.7.2.7.4 and R703.7.2.8~~4.2~~. The support for the masonry veneer on wood construction shall be constructed in accordance with Figure R703.7.2.2.

The maximum slope of the roof construction without stops shall be 7:12. Roof construction with slopes greater than 7:12 but not more than 12:12 shall have stops of a minimum 3 inches x 3 inches x ¼-inch (76 mm x 76 mm x 6 mm) steel plate welded to the angle at 24 inches (610 mm) on center along the angle or as approved by the building official.

R703.7.2.4.~~3~~ Lintels. Veneer shall not support any vertical load other than the dead load of the veneer above. Veneer above openings shall be supported on lintels of noncombustible materials and the allowable span shall not exceed the values set forth in Table R703.7.3. The lintels shall have a length of bearing of not less than 4 inches (102 mm).

R703.7.2.5.4 Anchorage. Veneer shall be anchored to the-supporting wall with corrosion-resistant metal ties. Where veneer is anchored to wood backings through the use of corrugated sheet metal ties, the distance separating the veneer from the sheathing material shall be a maximum of 1 inch (25.4 mm). Where the veneer is anchored to wood backings through the use of metal strand wire ties, the distance separating the veneer from the sheathing material shall be a maximum of 4-1/2 inches (114 mm). Where the veneer is anchored to cold-formed steel backings, adjustable metal strand wire ties shall be used. Where veneer is anchored to cold-formed steel backings, the distance separating the veneer from the sheathing material shall be a maximum of 4.5 inches (114 mm).

R703.7.2.6.4.1 Size and spacing. Veneer ties, if strand wire, shall not be less in thickness than No. 9 U.S. gage wire and shall have a hood embedded in the mortar joint, or if sheet metal, shall be not less than No. 22 U.S. gage by 7/8 inch (22.3 mm) corrugated. Each tie shall be spaced not more than 24 inches (610 mm) on center horizontally and vertically and shall support not more than 2.67 square feet (0.248 m^2) of wall area.

> **Exception:** In Seismic Design Category D_0, D_1 or D_2 or townhouses in Seismic Design Category C and in wind areas of more than 30 pounds per square foot pressure (1.44 kN/m^2), each tie shall support not more than 2 square feet (0.186 m^2) of wall area.

~~**R703.7.4.1.1 Veneer ties around wall openings.** Additional metal ties shall be provided around all wall openings greater than 16 inches (406 mm) in either dimension. Metal ties around the perimeter of openings shall be spaced not more than 3 feet (9144 mm) on center and placed within 12 inches (305 mm) of the wall opening.~~

R703.7.2.7.4.2 Air space. The veneer shall be separated from the sheathing by an air space of a minimum of a nominal 1 inch (25 mm) but not more than 4 ½ inches (114 mm).

R703.7.2.8.4.3 Mortar or grout fill. As an alternate to the air space required by Section R703.7.2.7.4.2, mortar or grout shall be permitted to fill the air space. When the air space is filled with mortar, a weather-resistant barrier is required over studs or sheathing. When filling the air space, replacing the sheathing and weather-resistant barrier or an approved water-resistive barrier-backed reinforcement attached directly to the studs is permitted.

R703.7.2.9.5 Flashing. Flashing shall be located beneath the first course of masonry above finished ground level above the foundation wall or slab and at other points of support, including structural floors, shelf angles and lintels when veneers are designed in accordance with Section R703.7.2.4.7. See Section R703.7.4.8 for additional requirements.

R703.7.2.10.6 Weepholes. Weepholes shall be provided in the outside wythe of anchored masonry walls at a maximum spacing of 33 inches (838 mm) on center. Weepholes shall not be less than 3/16 inch (4.8 mm) in diameter. Weepholes shall be located immediately above the flashing.

4. Add new text as follows:

R703.7.3 Adhered stone or masonry veneer. Adhered stone or masonry veneer shall comply with the following:

R703.7.3.1 Unit Sizes. Adhered veneer units shall not exceed 2-5/8 in. (66.7 mm) in specified thickness, 36 in. (914 mm) in any face dimension, nor more than 5 ft^2 (0.46 m^2 in total face area.

R703.7.3.2 Weight. Adhered stone and masonry veneer shall have a maximum weight of 15 lb/ft^2 (718 Pa).

R703.7.3.3 Wall Area Limitations. The height, length and area of adhered veneer shall not be limited except as required to control restrained differential movement stresses between veneer and backing.

R703.7.3.4 Backing. Backing shall provide a continuous moisture-resistant surface to receive the adhered veneer. Backing is permitted to be masonry, concrete, or metal lath and Portland cement plaster applied to masonry, concrete, steel framing or wood framing.

R703.7.3.5 Adhesion. Adhesion developed between adhered veneer units and backing shall have a shear strength of at least 50 pounds per square inch (psi) (0.34 Mpa) based on gross unit surface area when tested in accordance with ASTM C482 or shall be adhered in compliance with Article 3.3C of ACI 530.1/ ASCE 6/ TMS 602.

R703.7.3.6 Veneer support. Where light-frame walls with adhered veneer are supported by wood, steel, or cold formed steel construction, the supporting members shall be designed to limit deflection to 1/600 of the span of the supporting member.

(Renumber subsequent sections)

5. Revise as follows:

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

				TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b,c,d]					
SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	RESISTIVE BARRIER REQUIRED	Wood or wood structural panel sheathing	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Adhered stone or masonry veneer[z]	1/2	Section R703	Yes (Note 1)	See Section R703 and Figure R703.7[g]					
Anchored stone or masonry veneer	Section R703	Section R703	Yes (Note l)	See Section R703 and Figure R703.7[g]					
~~Brick veneer~~ ~~Concrete masonry veneer~~	~~2~~ ~~2~~	~~Section R703~~	~~Yes (Note m)~~	~~See Section R703 and Figure R703.7[h]~~					
~~Stone veneer~~	~~2~~	~~Section R703~~	~~Yes (Note m)~~	~~See Section R703 and Figure R703.7[h]~~					

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

z. Adhered stone or masonry veneer shall comply with the requirements of Section R703.7.3. ~~in Sections 6.1 and 6.3 of ACI 530/ASCE 5/ TMS 402.~~

Reason: The intent of the original submission of this proposed language change was to ensure required weight limits for masonry and stone materials were equally applied to all veneer type materials. In many cases existing code does not clearly specify the type of material which the code is intended for, leaving these decisions up for interpretation by local building departments. This amended resubmission addresses the committee's reason for disapproval by adjusting values in Table R703.4 to correlate with the equivalent table in the IBC (Table 1405.2) for ensuring minimum weather protection of exterior weather covering materials; and it addresses the issue of ensuring weight limits for the full range of veneer type materials used in residential construction are clearly specified.

Item 1. Definitions are provided for terms already incorporated in Sections R703.4 and R703.7. The definitions are taken from IBC. "Masonry veneer" is changed to "stone or masonry veneer," to be consistent with current IRC usage.

Item 2. Reason depends on version chosen.

Item 3. This part of the proposal includes three major items. First, Section R703.7 is reorganized to group current anchored veneer provisions in Section R703.7.2 and add new adhered veneer provisions in Section R703.7.3. Because the IRC is intended to include all necessary residential construction provisions it is appropriate to include basic provisions for adhered veneer. The adhered veneer requirements are taken from the IBC and Section 6.3 requirements of ACI530/ASCE5-02/TMS402 (as referenced in the IBC). Second, the revised wording consistently incorporates the terminologies "stone or masonry veneer" or "veneer" in a number of places that currently only include masonry veneer. The broader language is appropriate because the requirements do not change depending on whether the veneer is stone or masonry. Third, differentiation of interior and exterior veneer is being removed by striking the word "exterior" where it appears. For many years it has been common to install veneer on interior walls, such as fireplace walls. There is no particular reason why interior veneer should not be permitted based on the same restrictions and requirements as exterior veneer. The requirement for engineered design for vertical loads when veneer is supported on wood or cold-formed steel construction will impose some limits on interior use.

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

Committee Action: **Disapproved**

Committee Reason: This is not complete and specific and will lead to confusion. This is not ready to be placed in the code. These are two entirely different products and trying to address them together will lead to confusion. Insulation is not a veneer. The term "specified thickness" in Section R703.7.3.1 could cause enforcement problems. The term "restrained differential movement stresses" is not defined.

Section R703.7.3.5 is not written in mandatory language. This change is more design requirement rather than prescriptive.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Michael D. Fischer, The Kellen Company, representing Masonry Veneer Manufacturer's Association, requests Approval as Modified by this Public Comment.

Replace proposal with the following:

SECTION R202
DEFINITIONS

ADHERED STONE OR MASONRY VENEER: Stone or masonry veneer secured and supported through the adhesion of an approved bonding material applied to an approved backing.

ANCHORED STONE OR MASONRY VENEER: Stone or masonry veneer secured with approved mechanical fasteners to an approved backing.

Commenter's Reason: RB 248 as contained in the ICC monograph contained definitions and technical provisions for masonry veneer and provided a distinction between anchored and adhered systems. This PC brings only the definitions forward. There are significant differences between these two types of exterior wall covering systems besides the method of attachment, including completely different water management methods. The IRC contains prescriptive requirements for anchored masonry systems, and also includes a reference to adhered masonry veneer in Table R703.4. The above definitions, taken from the IBC, are necessary in the IRC to provide clarity about the differing requirements between these distinctly different systems. The MVMA will work with the original proponent of RB 248 and other stakeholders to propose the appropriate technical provisions for adhered masonry veneer systems in upcoming code cycles. The MVMA is also working within the ASTM C-15 committee to establish product performance and application standards for adhered masonry veneer, and will introduce those standards into the ICC process upon their completion. Approval of these definitions will provide clarification for the scope of the current IRC provisions while forming a foundation for future proposals.

Final Action: AS AM AMPC____ D

RB251-06/07
R703.2

Proposed Change as Submitted:

Proponent: Ronald Majette, United States Department of Energy

Revise as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved weather-resistive sheathing paper.
4. Insulating sheathing with corrosion-resistive flashings extending not less than 2 inches (51 mm) behind top boards and overlapping bottom boards by not less than 2 inches (51 mm) on all horizontal joints, and with vertical joints taped with an approved sheathing tape or ship-lapped or tongue-and-grooved with a ship-lap or tongue-and-groove width of not less than 3/4 inch (19 mm).

Reason: The purpose of this code change proposal is to permit insulating sheathing as an alternative to weather resistant sheathing paper without requiring additional testing and approval. Insulating sheathing with drainage joints exceeds the performance of sheathing papers as a weather resistant barrier in preventing water from entering the wall system.

The proposed change has been identified by the teams of the U.S. Department of Energy's Building America program as the number one priority for code changes needed to allow techniques employed by Building America. Insulating sheathing can be used as weather resistant barriers only if they meet AC-71 criteria developed by the ICC Evaluation service or meet similar requirements now part of IRC R-703.1 and R-703.2 requirements for weather resistant barriers. These requirements mean that insulating sheathing joints must be taped, and all flanged windows must have flanges taped on all four sides. This adds significant cost and disallows drained joints and flashings, which are longer term cost-effective solutions. In several jurisdictions, Building America teams have obtained approval from local authorities to use insulating sheathing as weather resistant barriers as an alternative material using the provision R104.11. Use of insulating sheathing as weather resistant barrier has been effective in new homes built under the Building America program.

Section R703.2 in the IRC require a weather-resistant sheathing paper in wall assemblies and requires nearly all other weather resistant materials to be "approved" by the code official. For many years confusion has existed regarding whether foam plastic sheathing meets the requirement for a weather-resistant barrier. The ICC Evaluation Service developed an "Interim Criteria For Foam Plastic Sheathing Panels Used As Weather-Resistive Barriers" – AC71 that became effective March 1, 2003. This interim criteria, AC71 provides strict performance requirements. The specific requirement is a two hour water test under ASTM E-331 under 6.24 psf without the presence of a cladding. In comparison, windows need only perform to a 15 minute test at 1/3 of the pressure. This requirement means that draining joints are not allowed. This requirement places an artificially high barrier to a new technology that is superior to existing "grandfathered" technologies. It has not been proven that building paper passes such a requirement. In addition, insulating sheathing panels can be provided with flashing and drainage joints that are durable and long term strategies for a weather resistive barrier. The Building America teams believe insulating sheathings in general perform favorably compared to building paper. This code change is needed to permit this technology as a alternative method of preventing accumulation of water within the wall assembly.

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

Committee Action: **Disapproved**

Committee Reason: Based on the proponent's request for disapproval. This is a complex and controversial issue and the proponent will rework and bring this back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Ronald Majette, United States Department of Energy, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved weather-resistive sheathing paper.
4. ~~Insulating sheathing with corrosion-resistive flashings extending not less than 2 inches (51 mm) behind top boards and overlapping bottom boards by not less than 2 inches (51 mm) on all horizontal joints, and with vertical joints taped with an approved sheathing tape or ship-lapped or tongue-and-grooved with a ship-lap or tongue-and-groove width of not less than 3/4 inch (19 mm).~~ Over insulating foam/plastic sheathing with:
   a. horizontal joints flashed with approved corrosion-resistive flashings extending not less than 2 inches (51 mm) behind the sheathing above the joint and overlapping sheathing below the joint by not less than 2 inches (51 mm), and
   b. vertical joints taped with an approved sheathing tape or ship-lapped or tongue-and-grooved with a ship-lap or tongue-and-groove width of not less than 3/4 inch (19 mm).

Commenter's Reason: The code development committee cited confusing language in the original proposal and recommended that it be clarified and reworked. The proposal, as modified by this public comment, is a clearer statement of the original intent.

This change is needed to allow the cost-effective construction of very-efficient exterior walls such as are common among homes in DOE's Building America program, Energy Star homes, and homes qualifying for 50%-better-than-code tax credits.

Final Action: AS AM AMPC____ D

RB256-06/07
R703.7.3

Proposed Change as Submitted:

Proponent: Charles Clark, Brick Industry Association

Revise as follows:

R703.7.3 Lintels. Masonry veneer shall not support any vertical load other than the dead load of the veneer above. Veneer above openings shall be supported on corrosion-resistant lintels of noncombustible materials and the allowable span shall not exceed the value set forth in Table R703.7.3. The lintels shall have a length of bearing not less than 4 inches (102 mm).

Reason: To require corrosion-resistance for lintels.

This change introduces text to require corrosion-resistance of lintels supporting masonry veneer. Steel angles are commonly used as lintels. Corroded steel can expand up to six times its original volume. This volume change can stress and potentially crack the masonry veneer above. As the corrosion progresses, the loadbearing capacity of the lintel also decreases.

To a large extent, most lintels supplied to support masonry veneer already have a corrosion-resistant coating. This requirement should have a minimal, if any, effect on construction costs.

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

Committee Action: **Disapproved**

Committee Reason: The committee feels the current code language is adequate. The term "CORROSION-RESISTANT" is not defined.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Charles Clark, Brick Industry Association, representing Masonry Alliance for Codes and Standards (MACS), requests Approval as Modified by this Public Comment.

Modify proposal as follows:

R703.7.3 Lintels. Masonry veneer shall not support any vertical load other than the dead load of the veneer above. Veneer above openings shall be supported on ~~corrosion-resistant~~ lintels of noncombustible materials and the allowable span shall not exceed the value set forth in Table R703.7.3. The lintels shall have a length of bearing not less than 4 inches (102 mm). Steel lintels shall be shop coated with a rust-inhibitive paint, except for lintels made of corrosion-resistant steel or steel treated with coatings to provide corrosion resistance.

Commenter's Reason: The Masonry Alliance for Codes and Standards (MACS) is requesting that this code change proposal be approved as modified by this Public Comment.

The committee recommendation for disapproval was based on the code not defining "corrosion-resistant". However, the term "corrosion-resistant" is used elsewhere in the code as in Section R407.2 which requires steel columns to be protected. Specifically, the section reads, "**R407.2 Steel column protection.** All surfaces (inside and outside) of steel columns shall be given a shop coat of rust-inhibitive paint, except for corrosion-resistant steel and steel treated with coatings to provide corrosion resistance."

We have modified this proposal to use similar language as required by Section R407.2 which allows shop coats of rust-inhibitive paint while exempting such a coating for corrosion-resistant steel and steel treated coatings to provide corrosion resistance.

Providing protection for steel lintels to inhibit the development of rust is crucial. Corroded steel can expand up to six times its original volume. This volume change can stress and potentially crack the masonry veneer above. As corrosion progresses, the loadbearing capacity of the lintel also decreases.

Providing such protection after a steel lintel has been installed by painting the exposed portion of the lintel provides no protection to unexposed portions of the lintel. The cost which must be born by a homeowner to repair such damage when steel lintels corrode is substantive compared to the minimal cost of providing a shop coating on the steel when delivered to the home site.

Therefore, we request that the ICC voting membership overturn the Committee's recommendation for disapproval and vote to approve this code change proposal as modified in accordance with this Public Comment.

Final Action: AS AM AMPC____ D

RB257-06/07

R703.7.3, R703.7.3.1 (New), R703.7.3.2 (New), Table R703.7.3, Table R703.7.3.2 (New), Figure R703.3.2 (New)

Proposed Change as Submitted:

Proponent: Charles Clark, Brick Industry Association, representing the Masonry Alliance for Codes and Standards

1. Revise as follows:

R703.7.3 Lintels. Masonry veneer shall not support any vertical load other than the dead load of the veneer above. Veneer above openings shall be supported on lintels of noncombustible materials ~~and the allowable span shall not exceed the value set forth in Table R703.7.3~~. The lintels shall have a length of bearing not less than 4 inches (102 mm). Construction of openings shall comply with either R703.7.3.1 or R703.7.3.2.

2. Add new text as follows:

R703.7.3.1 The allowable span shall not exceed the values set forth in Table R703.7.3.1.

R703.7.3.2 The allowable span shall not exceed 18 feet 3 inches (5562 mm) and shall be constructed to comply with Table R703.7.3.2, Figure R703.7.3.2 and the following:

1. Provide a minimum length of 18 inches (457 mm) of masonry veneer on each side of garage door opening as shown in Figure R703.7.3.2.
2. Provide a minimum 5 inch x 3½ inch x 5/16 inch (127 mm x 89 mm x 7.9 mm) steel angle above the garage door opening and shore for a minimum of 7 days after installation.
3. Provide double-wire joint reinforcement extending 12 inches (305 mm) beyond each side of garage door opening. Lap splices of joint reinforcement a minimum of 12 inches (305 mm). Comply with one of the following:
   3.1. Double-wire joint reinforcement shall be 3/16 inch (4.8 mm) diameter and shall be placed in the first two bed joints above the garage door opening.
   3.2. Double-wire joint reinforcement shall be 9 gauge (0.144 inches or 3.66 mm diameter) and shall be placed in the first three bed joints above the garage door opening.
4. Additional opening(s) may be placed above garage door opening. Such openings shall be sized according to Table R703.7.3.2 and located within the allowable area for additional opening(s) shown in Figure R703.7.3.2. The allowable area for additional opening(s) shall be within 12 inches (305 mm) above the garage door opening and 6 inches (152 mm) below the top of masonry veneer as shown in Figure R703.7.3.2. Lintels supporting masonry veneer above additional opening(s) shall be sized according to Table R703.7.3.1.

3. Revise table as follows:

TABLE R703.7.3.1
ALLOWABLE SPANS FOR LINTELS SUPPORTING MASONRY VENEER[a,b,c]

(No change to table entries)

4. Add new table and figure as follows:

TABLE R703.7.3.2
DETAILING MASONRY VENEER ABOVE GARAGE DOOR OPENING

MAXIMUM HEIGHT OF MASONRY VENEER ABOVE GARAGE DOOR OPENING (FT)	MINIMUM HEIGHT OF MASONRY VENEER ABOVE GARAGE DOOR OPENING EDGE (IN)	MAXIMUM HEIGHT OF ADDITIONAL OPENING(S) ABOVE GARAGE DOOR OPENING
<3	13	Not Allowed
3 - 5	13	1/2 the Height of Adjacent Masonry Veneer [a]
12	24	
35	60	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
a. See Figure R703.7.3.2

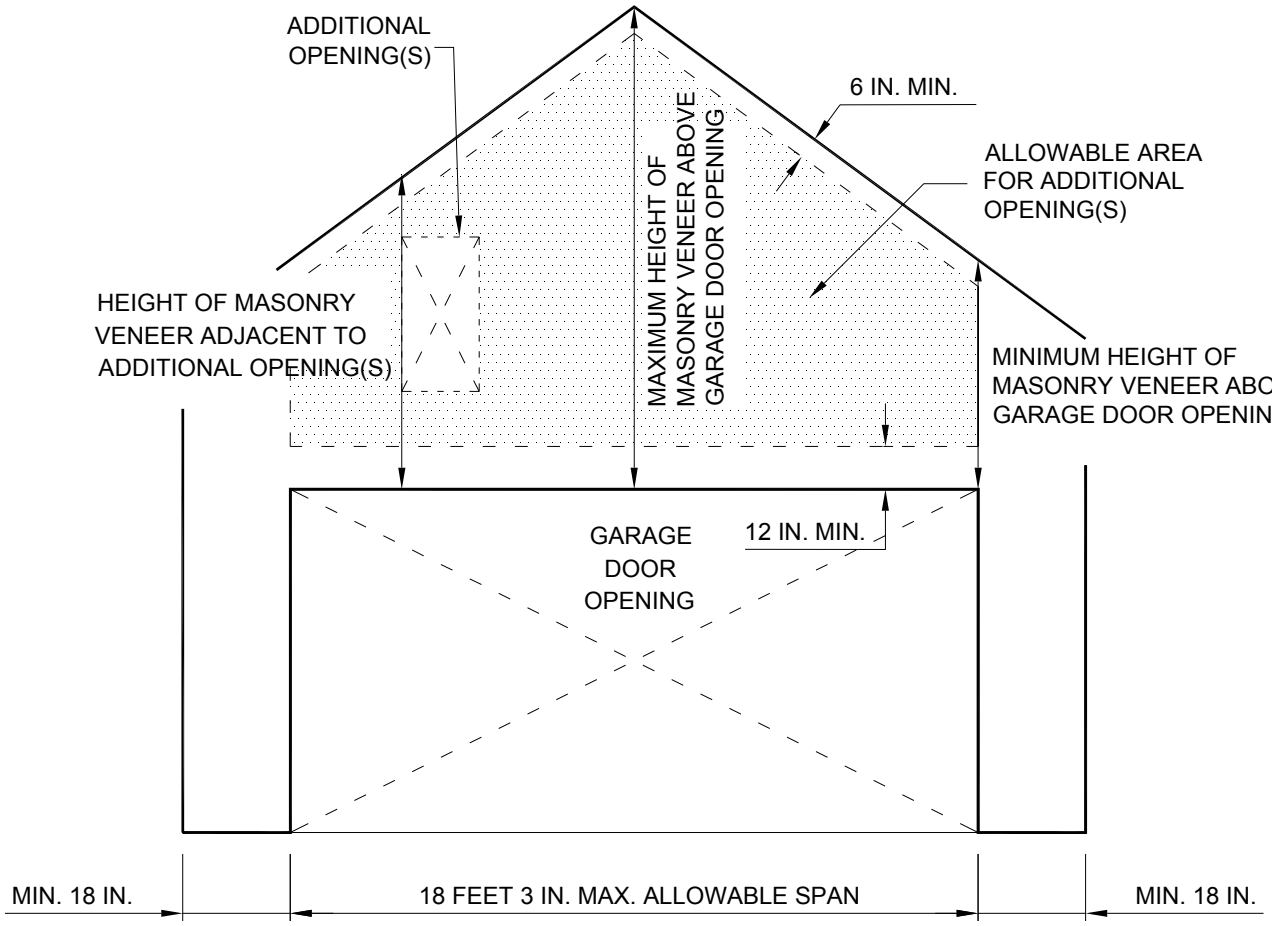


FIGURE R703.7.3.2
MASONRY VENEER GARAGE DOOR OPENING

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

Reason: To offer a more economical alternative for spanning large masonry veneer openings such as two-car garage door openings.

This change introduces a means to span large masonry veneer openings using horizontal joint reinforcement and a steel angle. It builds on RB186-04/05 by presenting the concept in a clear, concise manner. While RB 186-04/05 was recommended for approval by the Residential Committee, some testifying at the final hearings felt the language could be more clearly presented. This change keeps the reference to the existing Lintel Table while giving an alternate means of spanning large openings.

Bibliography:
McGinley, W. Mark, Johnson, Eric N., Bennett, Richard M., Considerations in the Design of Lintels for Masonry Veneer, Ninth North American Masonry Conference, Clemson, South Carolina, June, 2003.

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

Committee Action: **Disapproved**

Committee Reason: The span of 18 feet 3 inches needs to be increased to 18 feet 6 inches for the rough opening. Also, this should not be limited to garage doors but should be made to apply to any large opening. The proponent should rework this and bring it back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Charles Clark, Brick Industry Association, representing Masonry Alliance for Codes and Standards (MACS), requests Approval as Submitted.

Commenter's Reason: The Masonry Alliance for Codes and Standards (MACS) is requesting that this code change proposal be approved as submitted.

This code change proposal as submitted allowed for another option to span a large masonry veneer opening in a house which is typically a two-car garage door opening. The first option allowed by proposed section R703.7.3.1 would be to span an opening of up to 20 feet using the existing Table R703.7.3 currently in the code. The second option allowed by proposed section R703.7.3.2 would allow an opening of up to 18 feet 3 inches by incorporating joint reinforcement into the masonry veneer and having the brickwork act as a deep beam. This second option also allows additional openings (typically windows) in a gable end over the garage door opening as long as they meet certain sizing and placement criteria.

The committee recommendation for disapproval of this proposal was based on a desire to have a rough opening of 18 feet 6 inches be spanned by the second option introduced by this proposal. However, what the committee did not recognize at the time of their decision was that the first option still allowed an opening of up to 20 feet and could be used to span an18 feet 6 inch opening. The basis for the 18 feet 3 inch maximum span is substantiated by calculations in the paper submitted to support the code change – Considerations in the Design of Lintels for Masonry Veneer by Mark McGinley, Eric Johnson and Richard Bennett as published in the Ninth North American Masonry Conference Proceedings, Clemson, South Carolina, June 2003.

The committee recommendation was also based on a desire to not limit the opening to garage doors. However, what the committee did not recognize at the time of their decision was that the large opening was designated as a "garage door opening" so as not to be confused with the "additional opening(s)" allowed above the garage door. Such large openings on most residential structures are in fact garage door openings. Residential structures that have openings larger than 18 feet 3 inches will typically have a professional engineer as a part of the design team that can size the appropriate structural members for such openings. As an option to be considered for a typical house, such openings would likely be "garage door openings".

A similar provision has already been in use in certain states that have modified the IRC to include this option. North Carolina is one such state that has had an option for many years to allow masonry veneer reinforced with joint reinforcement to span large garage door openings.

In short, this provision adds another means of spanning masonry veneer openings while leaving the existing span table alone. It provides another option to span masonry veneer openings that is supported by analysis and use in the field and should be made a part of the code.

Therefore, we request that the ICC voting membership overturn the Committee's recommendation for disapproval and vote to approve this code change proposal as submitted.

Final Action: AS AM AMPC____ D

RB264-06/07

R802.10.5, R802.11.1, Table R802.11

Proposed Change as Submitted:

Proponent: Dennis Pitts, American Forest & Paper Association (AF&PA)

1. Revise as follows:

R802.10.5 Truss to wall connection. Trusses shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 175 pounds (779N) and shall be installed in accordance with the manufacturer's specifications. ~~For roof assemblies subject to wind uplift pressures of 20 pounds per square foot (960 Pa) or greater, as established by Table R301.2(2), adjusted for height and exposure per Table R301.2(3), see section R802.11.~~

R802.11.1 Uplift resistance. ~~Roof assemblies which are subject to wind uplift pressures of 20 psf or greater shall have roof rafters or trusses attached to their supporting wall assemblies by connections capable of providing the resistance required in Table R802.11. Wind uplift pressures shall be determined using an effective area of 100 sq. ft. in Zone 1 in Table R301.2(2), as adjusted for height and exposure per Table R301.2(3).~~
Where wind uplift loads determined in accordance with Table R802.11 exceed 100 plf, rafters or trusses shall be attached to supporting wall assemblies by connections capable of providing the required resistance.

A continuous load path shall be provided to transmit the uplift forces from the rafter or truss ties to the foundation.

2. Delete current Table R802.11 and substitute as follows:

TABLE R802.11
REQUIRED STRENGTH OF TRUSS OR RAFTER CONNECTIONS
TO RESIST WIND UPLIFT FORCES [a,b,c,e,f]

pounds per linear foot (plf) of wall

BASIC WIND SPEED (3-second gust)	ROOF SPAN (feet) 12	20	24	28	32	36	40	OVERHANG [d] (lb/ft of overhang)
85	36	60	73	85	97	109	121	19.3
90	46	76	91	106	121	136	151	21.6
100	66	109	131	153	175	197	218	26.7
110	88	146	176	205	234	263	292	32.3

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mph = 1.61 km/hr, 1 lb/ft = 1 plf = 14.5939 N/m, pound = 0.454 kg

a. The uplift connection requirements are based on a 30 foot mean roof height located in Exposure B. For Exposures C and D and for other mean roof heights, multiply the above loads by the Adjustment Coefficients in Table R-301.2(3).
b. The uplift connection requirements are provided on a pound per linear foot (plf) of wall basis. Multiply the values by 1.33 for truss or rafter spacing of 16 inches on center and 2.0 for truss or rafter spacing of 24 inches on center.
c. The uplift connection requirements include an allowance for 5 psf roof dead load.
d. The uplift connection requirements assume no eave overhangs. Where overhangs exist, the magnitude of the tabulated values shall be increased by adding the Overhang loads provided in the table, multiplied by the overhang length. For truss or rafter spacing greater than 1 foot, Note (b) also applies.
e. The uplift connection requirements are based upon wind loading on end zones as defined in Section 1609.6 of the International Building Code. Connection loads for connections located a distance of 20% of the least horizontal dimension of the building from the corner of the building are permitted to be reduced by multiplying the table connection value by 0.7 and multiplying the overhand load by 0.8.
f. For wall-to-wall and wall-to-foundation connections, the capacity of the uplift connector is permitted to be reduced by 100 plf for each full wall above (For example, if a 292 plf uplift connector is used on the roof to wall framing, a 192 plf uplift connector is permitted at the next floor level down).

Reason: The purpose of this change is to simplify the method for determining the required capacity of wind uplift connection requirements. The magnitude of the uplift force that must be resisted is a function of the roof span, not just the uplift pressure, which is how the current requirements are triggered (>20 psf uplift pressure). For larger roof spans, uplift forces can greatly exceed the resistance of toe-nailed rafter and ceiling joist connections and the dead load of supporting walls. The change to R802.11.1 adjusts the threshold at which special uplift connections are required in order to ensure sufficient connections are provided and that the uplift can be resisted by the dead load of supporting walls. In addition, this change avoids a need to adjust braced wall requirements for the effects of uplift loads.

The existing Table R802.11 is deleted and a new table proposed in its place. The numbers in the existing table (with negative signs) are uplift forces, not required strengths as the table's title suggests. The new table provides minimum required strengths to resist uplift forces (strength is always a positive). Additionally the proposed table provides uplift requirements as pounds per linear foot of wall with adjustments to the minimum strengths based on center-to-center spacing of rafters or trusses contained in Footnote "b". The proposed table will work correctly with the new threshold proposed in R802.11.1 and the table footnotes, correcting a problem between the existing table and footnotes.

Striking the second sentence of R802.10.5 is consistent with the intent of this change. If approved, truss-to-wall connections will have a minimum capacity of 175 pounds, which is the current requirement. Section R802.11.1 will require greater connection capacity when the actual uplift force exceeds 200 pounds, based on a 24 " center-to-center spacing.

Cost Impact: The code change proposal will increase the cost of construction. The cost is attributed to the possibility of needing a rafter-to-plate connector, where it hasn't been required. Truss-to-plate connectors, although previously required, will likely need to be of greater capacity.

Committee Action: **Disapproved**

Committee Reason: Based on proponent's request for disapproval. Based on previous actions on RB265-06/07, RB266-06/07 and RB267-06/07.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Kirk Grundahl, WTCA, representing the Structural Building Components Industry, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

~~**R802.10.5 Truss to wall connection.** Trusses shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 175 pounds (779N) and shall be installed in accordance with the manufacturer's specifications.~~

R802.11.1 Uplift resistance. ~~Where wind uplift loads determined in accordance with Table R802.11 exceed 100 plf, rafters or trusses shall be attached to supporting wall assemblies by connections capable of providing the required resistance.~~ Roof assemblies shall have roof rafters or trusses attached to their supporting wall assemblies by connections capable of providing the resistance required in Table R802.11. Roof ties shall not be required when required strength values per Table R802.11, including applicable adjustments, do not exceed 185 lbs using 2-16d toe-nails per Table R602.3(1) or 280 lbs using 3-16d toe-nails per rafter or truss connection to wall plate.

> **Exception:** For trusses designed per Section R802.10.1, the connections shall resist the uplift force, if any, specified on the Truss Design Drawing or as specified by the registered design professional. The uplift force need not exceed the values in Table R802.11 as applicable to clear span uniformly spaced trusses.

When roof ties are required by this section, a continuous load path shall be provided to transmit the uplift forces from the rafter or truss ties to the foundation In accordance with footnote e of Table R802.11.

Delete proposed Table R802.11 and substitute as follows:

TABLE R802.11
REQUIRED STRENGTH OF TRUSS OR RAFTER CONNECTIONS TO RESIST WIND UPLIFT FORCES
(Pounds per connection)

Basic Wind Speed	Roof Uplift Reaction Force (lbs) Roof Span (feet) 12	20	24	28	32	36	40
	Roof Slopes <= 4:12						
85	86	115	130	145	160	175	189
90	114	155	176	197	218	239	260
100	174	243	277	311	346	380	414
110	241	339	388	437	486	536	585
	Roof Slope 5:12						
85	35	42	45	48	51	54	57
90	57	73	81	88	96	104	112
100	104	141	159	177	195	213	231
110	156	215	245	274	304	334	363
	Roof Slope 6:12						
85	0	0	0	0	0	0	0
90	8	9	9	10	10	11	11
100	44	62	71	80	89	98	107
110	83	120	138	157	175	194	212
	Roof Slopes >=7:12						
85	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0

ForSI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mph = 0.447 m/s, 1 pound/foot = 14.5939 N/m, 1 pound = 0.454 kg.

a. The uplift connection requirements are based on a 30 foot mean roof height located in Exposure B. For Exposures C and D and for other mean roof heights, multiply the above loads by the Adjustment Coefficients in Table R301.2(3).

b. The uplift connection requirements are based on the framing being spaced 24 inches on center. Multiply by 0.67 for framing spaced 16 inches on center and multiply by 0.5 for framing spaced 12 inches on center.

c. The uplift connection values require a minimum of 10 pounds per square foot of roof/ceiling dead load.

d. The uplift connection requirements account for overhangs not exceeding 24 inches.

e. For wall-to-wall and wall-to-foundation connections, the capacity of the uplift connector is permitted to be reduced by 100 pounds for each full wall above. (For example, if a 600-pound rated connector is used on the roof framing, a 500-pound rated connector is permitted at the next floor level down).

Commenter's Reason: The above modifications to RB265 simplify the roof uplift connection provisions, clarify when conventional framing connections provide adequate uplift resistance and load path, increase the nailing required for conventional roof-to-wall connections for added strength, and update uplift resistance requirements based on ASCE 7-05 low-rise building wind load provisions.

The uplift value of 280 lbs for 3-16d toe-nails and 185 lbs for 2-16d toe-nails is based on an evaluation of more than 120 roof assembly uplift tests conducted by State Farm Insurance, Clemson University (FEMA/Project Blue Sky), and USDA Forest Products Laboratory. This data is available and the evaluation of this data (prepared by ARES Consulting, Jay Crandell, P.E.) has been shared with various individuals

and proponents of RB264, RB265, and RB268 in relation to the wind uplift issue. The safety margins used to determine these toe-nail values provide a level of safety, considering the system effects observed in the data for the tested roof assemblies, comparable to that required for wood member design. A similar approach was also recommended by NIST in a landmark 1948 study of structural engineering data and practices for the design of residential buildings. If such action had been taken then, we would likely not be debating this issue now. Furthermore, conventional construction would have been efficiently designed and built such that it is not over-designed in low wind regions (as proposed in RB265) or under-designed in high wind regions (as has occurred in past construction). This proposal attempts to finally resolve this issue in a practical manner.

The proposed wind loads are calculated based on the latest provisions of ASCE 7-05 and the low-rise building provisions which accounts for variation in roof slope. The proposed values for the 4:12 roof pitch conditions are similar to those currently in the code. These calculations also are conservative relative to actual field experience. For example, when the required uplift values are scaled up to 150 mph wind speed, a design resistance value of about 980 lbs would be required for a 4:12 pitch, 28 ft span roof with trusses at 24 inches on center (typical south Florida home). In Hurricane Andrew, typical roof tie brackets on homes were sized to about 750 lbs design capacity and failures of correctly installed roof ties in this 160 mph, 300-year event were rare as expected. Therefore, these calculated resistance values are conservative when compared to actual experience.

This public comment is based on feedback from several people regarding code changes RB-264 through RB-268 and our desire to come up with a solution that can meet the needs for everyone. This code change is the result of Richard Zimmermann, WTCA technical staff member and Jay Crandell, ARES Consulting, taking this feedback and crafting language that does its best to meet the needs of everyone involved in the discussions.

Final Action: AS AM AMPC____ D

RB265-06/07

R802.10.5, R802.11.1

Proposed Change as Submitted:

Proponent: Joseph Hill, RA, New York State Department of State

Revise as follows:

R802.10.5 Truss to wall connection. ~~Trusses shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 175 pounds (79.45kg.) and shall be installed in accordance with the manufacturer's specifications.~~ Provide minimum required uplift fasteners or connectors as specified by the roof truss design drawings for the roof truss to wall connection. Fasteners or connectors shall be installed in accordance with the manufacturer's specifications~~. For roof assemblies subject to wind uplift pressures of 20 pounds per square foot (0.958 kN/m2)or greater, as established in Table R301.2(2), adjusted for height and exposure per Table R301.2(3), see Section R802.11.~~

R802.11 Roof tie-down.

R802.11.1 Uplift resistance. Roof assemblies which are subject to wind uplift pressures of 20 pounds per square foot(0.958 kN/m2) or greater shall have roof rafters or trusses attached to their supporting wall assemblies by connections capable of providing the resistance required in TableR802.11.Wind uplift pressures shall be determined using an effective wind area of 100 square feet (9.3m2) and Zone 1 in Table R301.2(2), as adjusted for height and exposure per Table R301.2(3).

For roof trusses- In instances where there is a discrepancy between uplift values as specified by Table R802.11 and the truss manufacture's specified uplift value, the latter will govern.

Reason: The current IRC requirements for attachment of roof trusses to wall plates for uplift of not less than 175 lbs is seen to be inadequate. An in-depth study of prefabricated roof truss (engineered roof truss certificates) which shows the actual required uplift resistance connectors as required by the truss manufacturer indicates in *general, typical uplift forces of 300 lbs and greater* at the bearing end of a typical roof truss. Material for the study was sampled randomly from several industry providers of prefabricated roof trusses, and end users- contractors, architects, material suppliers as well. It should be noted that in several cases, uplift forces far in excess of the 175 lbs. code required minimum have been observed, these not being isolated instances. This is especially critical in the instance of uplift forces on girder roof trusses, which involve uplift forces imposed on large tributary roof areas. Girder truss uplift forces can be in excess of ten times the minimum code required uplift force. This is the greatest argument for use of the fabricator's required uplift loads. Therefore, It is seen to be inadequate to recommend a low minimum uplift resistance value of 175 lbs.

Since a roof truss is an engineered element, loading values prescribed by its designer should be the governing factor in specifying its required uplift magnitude. Especially since that value is readily available on the truss certifications.

This proposed text will benefit both designers and code officials by providing clear criteria for the uplift resistance requirement in construction of buildings utilizing roof trusses.

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

Committee Action: **Disapproved**

Committee Reason: The proposed text is not written in mandatory language. Section R802.11.1 contains non-mandatory language. The proponent needs to rework and bring it back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Joseph P. Hill, RA, New York State Department of State, Codes Division, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

~~**R802.10.5 Truss to wall connection.** Provide minimum required uplift fasteners or connectors as specified by the roof truss design drawings for the roof truss to wall connection. Fasteners or connectors shall be installed in accordance with the manufacturer's specifications.~~

R802.11 Roof tie-down.

R802.11.1 Uplift resistance. Roof assemblies ~~which are subject to wind uplift pressures of 20 pounds per square foot(0.958 kN/m2) or greater~~ shall have roof rafters or trusses attached to their supporting wall assemblies by ~~connections~~ fasteners or connectors capable of providing the resistance required in TableR802.11. ~~Wind uplift pressures shall be determined using an effective wind area of 100 square feet (9.3m2) and Zone 1 in Table R301.2(2), as adjusted for height and exposure per Table R301.2(3).~~

~~For roof trusses. In instances where there is a discrepancy between uplift values as specified by Table R802.11 and the truss manufacture's specified uplift value, the latter will govern.~~

Exceptions;

1. When transfer of loads and the anchorage of each truss or rafter to the supporting structure is specified by the design professional of record.
2. When transfer of loads and the anchorage of each truss to the supporting structure is accomplished by the use of approved fasteners or connectors specified by the minimum required force(s) specified by the roof truss design drawings, at the truss bearing points indicated. Fasteners or connectors shall be installed in accordance with approved installation procedures and/or the manufacturer's specifications.

A continuous load path shall be provided to transmit the uplift forces from the rafter or truss ties to the foundation.

Commenter's Reason: The Committee disapproved this proposal on the reason that non-mandatory language was used in Section 802.11.1 of the original proposal. The non-mandatory language contained in the original proposal has been replaced with mandatory language in the modification herein.

The need for this code change can be justified by the following:

For reason of continuity for roof structures built using rafters and/or roof trusses, we propose that Table R802.11 be utilized for uplift forces on **all** residential roof structures, both rafters and roof trusses. This aligns the IRC with the IBC in terms of roof uplift requirements. In this way, the Residential code is simplified, and follows the lead of the IBC. In the IBC "*Wind uplift"* **requires rafters and truss ties to wall below**, per *Table 2308.10.1 Required Rating of Approved Uplift Connectors*, which is essentially the same as the *IRC Table R802.11*. Our opinion is that the IRC should follow the lead of the IBC, and **remove** IRC language which allows Table R802.11 to be bypassed when uplift pressures do not exceed 20 psf. This also serves the purpose of simplifying the code for the user, by eliminating any calculations which would be required to determine uplift pressures on a roof structure. The code user simply reads the values in Table R802.11 to determine required uplift forces. Referenced standards can be used to determine the number and size of nails required, and whether the nails are adequate for the connection.

We are finding evidence to support a position that toe nailing of roof structures to top plates for the purpose of uplift resistance should be utilized carefully. Our observation is that toe nailing has *limited* acceptable application in uplift resistance. Regarding toe nailing of rafters or trusses, the IBC *Tables 2304.9.1 Fastening Schedule*, limits rafter to top plate connections to 3-8d toe nails. The *IBC Section 2308.10.* 1. *Wind Uplift* requires roof assemblies to have rafter and truss ties to wall below, which is a separate requirement from the toe nails indicated in schedule *2304.9.1*. This does not preclude the use of toenails for uplift resistance, but suggests that the connection be designed. *The ANSI/AF&PA WFCM-2001,* which is one of the IRC referenced standards, provides box nail withdrawal design values for wind design, which can be utilized for determining adequate number of toe nails for the connection.

The arbitrary value of 175 lbs uplift resistance currently required by code *Section R802.10.5 Truss to Wall Plate Connection* is seen to be inadequate in many circumstances as evidenced by the truss examples submitted with the original proposal. These are attached again to this proposal. The seemingly arbitrary value of 175 lbs. gives no consideration for a myriad of potential truss design fluctuations. For this reason, Section R802.10.5 has been eliminated by this proposal. The importance of the code change is underscored by the fact that manufactured roof trusses are engineered building elements which have varying uplift load resistance values based on the design and function of the truss members. The location of the required uplift resistance connectors may vary with the design of the truss, and in some cases require uplift connectors in addition to the normally expected exterior wall locations. Two examples of which are;

1.) Split or two piece trusses, *and*

2.) Multiple ply girder trusses which carry larger roof tributary areas. In many of the more complex homes being constructed, we see increased reactions in roof trusses, and at their supporting structure(s).

For these reasons, two alternatives to uplift resistance have been added to the proposal. One allowing the truss uplift values given by a truss fabricator, and the only realistic alternative, which would be to allow as an exemption that the design professional of record determine the forces acting on a building and to follow, the uplift forces acting on the roof trusses (or rafters).

Further information regarding toe nailed connections;

It is noted that in most instances roof truss uplift reactions greatly exceed the capacity of minimum prescribed toe nailed connections. As an authority having jurisdiction, we have seen instances in which a multiple ply, or girder truss reaction can exceed the capacity of a toe nailed connection by a factor of ten and higher. This represents a situation in which specialized connectors must be utilized, and load path to the foundation must be maintained.

Additional support for use of mechanical connections is evidenced by the publication entitled "TESTING AND ANALYSIS OF THE TOE-NAILED CONNECTION IN THE RESIDENTIAL ROOF –TO-WALL SYSTEM", authored by Mr. Jim Cheng, PHD. This report cautions against utilizing toe nailed connections in wind speeds of 90 mph and above. The publication cautions against utilizing toe nailed connections of truss to top plate when wall plates are of SPF lumber species. Specific examples taken from this report cite uplift resistance of 102 lbs. for two 16D nails with wall plates of SPF lumber species. It should be noted that these numbers are generated from actual testing results performed in a testing laboratory, utilizing industry recognized safety factors. In our experience, nearly all (if not all) residential structures are constructed using SPF lumber. For that reason alone this caution should be taken. The capacity of 102 lbs falls far short of residential roof uplift loads that are typically seen in 90 mph wind zones.

Final Action: AS AM AMPC____ D

RB266-06/07

R802.10.5, R802.11.1

Proposed Change as Submitted:

Proponent: Kirk Grundahl, P.E., WTCA, representing the Structural Building Components Industry

1. Delete without substitution:

~~**R802.10.5 Truss to wall connection.** Trusses shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 175 pounds (79.45 kg.) and shall be installed in accordance with the manufacturer's specifications. For roof assemblies subject to wind uplift pressures of 20 pounds per square foot (0.958 kN/m2) or greater, as established in Table R301.2(2), adjusted for height and exposure per Table R301.2(3), see section R802.11.~~

2. Revise as follows:

R802.11 Roof tie-down.

R802.11.1 Uplift resistance. Roof assemblies which are subject to wind uplift pressures of 20 pounds per square foot (0.958 kN/m2) or greater shall have roof rafters or trusses attached to their supporting wall assemblies by connections capable of providing the resistance required in Table R802.11.Wind uplift pressures shall be determined using an effective wind area of 100 square feet (9.3m2) and Zone 1 in Table R301.2(2), as adjusted for height and exposure per Table R301.2(3).

> **Exception:** For trusses designed per Section R802.10.1, the connections shall resist the uplift force, if any, specified on the Truss Design Drawing. In areas where the basic wind speeds do not exceed 90 mph, truss to wall connections shall be permitted to be in accordance with rafter connections per Table R602.3(1).

A continuous load path shall be provided to transmit the uplift forces from the rafter or truss ties to the foundation.

Reason: The purpose of the code change is to clarify the code and remove possibly onerous requirements. Wood trusses are required to provide uplift forces on a code required Truss Design Drawing per Section R802.10.1, item #6.

The current section R802.10.5 text is confusing in a number of ways. It creates an inconsistency between truss-to-wall and rafter-to-wall connections. It is not clear whether toe-nails are an approved connector, and as a result causes enforcement problems. The 175 pound connector capacity is arbitrary, and it is not clear what to do if the uplift force is larger than 175 pounds. It does not clearly state where this uplift force comes from. It also appears to disallow toe-nailing as a valid connection, even though provisions for toe-nailing are provided in the National Design Specification® for Wood Construction (NDS®). This section, as written causes unnecessary additional cost.

The current section R802.10.5 appears to require metal connectors regardless of the truss uplift forces. Many trusses, particularly those with very short spans such as in hip sets, are subject to far lower uplift forces. It seems unreasonable and unnecessary to require pre-manufactured metal connectors for such trusses, especially when properly-installed toe-nailing provides adequate resistance and are recognized by the NDS®.

The current section does not account for distribution of lateral loads, where a toe-nailed connection may be far superior in capacity when compared to a standard pre-manufactured connector.

Section R802.10.3 Bracing includes a reference to TPI/WTCA BCSI 1. This industry guideline for handling, installing and bracing metal plate connected wood trusses also includes a section on toe-nailing for uplift. A sample is included from BCSI 1, Section B-8. Please note that the values in this table are for normal load duration and have not been increased for wind load applications.

UPLIFT RESISTANCE OF TOE-NAILED CONNECTIONS
RESISTENCIA A EL LEVANTAMIENTO DE CONECCIONES DE CLAVADO OBLICUAMENTE

Find the nominal uplift value in Table 1 based on type of nail and species of top plate. For example, three 16d common nails toe-nailed into a Southern Pine top plate will provide 216 lbs. (3 x 72 lbs.) of nominal uplift resistance.

Table 1: Nominal Uplift Design Capacity per Toe-Nail
Tabla 1: Capacidad de diseño de levantamiento nominal por clavado-oblicuamente.

Based on NDS-97 & NER-272

	Inches		Value for Top Plate Species Pounds				
Nail Type	Diam.	Len.	SP	DF-L	HF	SPF	SPFs
16d Gun Nail	0.131	3.5	58	46	32	30	20
12d Gun Nail	0.120	3.25	50	39	27	25	17

The proposed text changes will clarify the code requirements, will reduce construction cost, and will help ensure that connections between the trusses and walls are adequate for the appropriate design loads. It makes enforcement easier because code compliance confusion is eliminated and the building official can clearly ask the builder or homeowner to show that design uplift forces are being resisted properly.

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

Committee Action: **Disapproved**

Committee Reason: Based on proponent's request for disapproval. Based on previous action on RB265-06/07. This section needs additional work and clarification and the proponent is urged to rework and bring to the Final Action.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Kirk Grundahl, WTCA, representing the Structural Building Components Industry, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

R802.11 Roof tie-down.

R802.11.1 Uplift resistance. ~~Roof assemblies which are subject to wind uplift pressures of 20 pounds per square foot (0.958 kN/m2) or greater~~ Structures having a mean roof height not greater than 30 feet in Exposure B where the basic wind speed does not exceed 110 mph and not within a hurricane-prone region, or with a mean roof height not greater than 30 feet in Exposure C and where the basic wind speed does not exceed 90 mph shall have roof rafters or trusses attached to their supporting wall assemblies by connections as specified in Table R602.3(1).~~capable of providing the resistance required in Table R802.11.Wind uplift pressures shall be determined using an effective wind area of 100 square feet (9.3m2) and Zone 1 in Table R301.2(2), as adjusted for height and exposure per Table R301.2(3).~~

> ~~**Exception:** For trusses designed per Section R802.10.1, the connections shall resist the uplift force, if any, specified on the Truss Design Drawing. In areas where the basic wind speeds do not exceed 90 mph, truss to wall connections shall be permitted to be in accordance with rafter connections per Table R602.3(1).~~

R802.11.2 Uplift resistance other regions Where conditions exceed R802.11.1 but do not exceed those defined in R301.2.1.1, structures shall have roof rafter or trusses attached to their supporting wall assemblies by connections capable of providing the resistance required in Table R802.11.

> **Exception:** For trusses designed per Section R802.10.1, the connections shall resist the uplift force, if any, specified on the Truss Design Drawing or as specified by the registered design professional.

A continuous load path shall be provided to transmit the uplift forces from the rafter or truss ties to the foundation.

Commenter's Reason: The purpose of this comment is to modify the submitted code change to clearly define precisely how we believe the language in the code was intended to be applied and so that we ensure that the intent is well known. If we have accuracy of current language and how it should be applied as the foundational code change language then all other issues surrounding this specific code language can be more easily understood and debated.

The special requirements for truss to wall connections at R802.10.5 are deleted, since there is no reason to have separate requirements from those at R802.11. The reason given for the language introduced at R802.10.5 in the 2003 cycle actually had little to do with addressing uplift concerns.

We have done a great deal more review and have come to the conclusion that the prescriptive connection requirements given in Table R602.3(1) are based upon the empirical performance of structures within the defined limits of the code for wind, seismic, gravity loads and building geometry. Although they may be difficult to confirm by engineering, they have demonstrated that they are adequate within the design expectations of the code formulators. The connection requirements in IRC Table R602.3(1) date back to, at least, the 1998 International One- and Two-Family Dwelling Code and most likely back to the CABO 1995 (or earlier) One and Two Family Dwelling Code. Similar prescriptive connection requirements have also been included in most of the model building codes in the wood chapter: IBC-00 to -09 Table 2304.9.1, BOCA-93 & -95 Table 2305.2, UBC-97 Table 23-II-B-1, and SBC-97 Table 2306.1.

We are proposing to clarify the scope of use for the connections indicated in R602.3(1) and the method for determining when they can be used. It is confusing for builders and building code officials to have to go to a pair of tables to figure out whether or not you have to connect based on Table R802.11 or R602.3(1). It is additionally confusing to have to go to a Components & Cladding wind pressure table, R301.2(2), intended for window and door design to locate a 20 psf pressure value which, when applicable, directs one to a table for roof to wall uplift connections (R802.11) which are based on MWFRS values. This is clear only if one follows the footnote "e" reference to ASCE 7, Figure 6-2, MWFRS Simplified Method.

The presentation of the uplift connection requirements in the 2000 IRC was much clearer. This clarity was compromised when updated engineering values were brought over from the IBC without consideration of the impact on the design requirements of the IRC.

Based on this, there now is an exposed "gap" between the connections allowed based on:

1. empirical resistance values in Table R602.3(1), and
2. the load values that are determined by engineering practice in Table R802.11.

There is a gap between the load and resistance determined by engineering and what has historically been working from a code perspective. Focusing on this connection without consideration of the design basis of the residential code leads to a disjointed and inconsistent code as is found in this case. If the design basis assumed for the IRC or prescriptive light-frame construction in general is no longer applicable, then the entire code needs to be reviewed, not just this one connection requirement.

Our preference is to find a compromise position (see comment on RB264) that allows the use of empirically determined connections within a specified scope of use. Outside of the scope of use limit as defined in the IRC, the connection requirements need to be based on engineering requirements.

With this as background, an effort is being made in this revised proposal to retain the historical prescriptive requirements for all connections for low wind areas even though there is a significant difference between the historic prescriptive requirements as reflected in Table R602.3(1) compared to Table R802.11. It may be appropriate in the next code cycle to review the empirical requirements of Table R602.3(1) and revise them as necessary.

This public comment is based on feedback from several people regarding code changes RB-264 through RB-268 and our desire to come up with language that clearly delineates what the IRC requirements are today. This code change is the result of a great deal of work by Richard Zimmermann, WTCA technical staff member.

Final Action: AS AM AMPC____ D

RB268-06/07

R802.11.1

Proposed Change as Submitted:

Proponent: T. Eric Stafford, Institute for Business and Home Safety

Revise as follows:

R802.11.1 Uplift resistance. Roof ~~assemblies~~ rafters or trusses ~~which are subject to wind uplift pressures of 20 pounds per square foot (960 Pa) or greater~~ shall ~~have roof rafters or trusses~~ be attached to their supporting wall assemblies by connections capable of providing the resistance required in Table R802.11. ~~Wind uplift pressures shall be determined using an effective wind area of 100 square feet (9.3 m²) and Zone 1 in Table R301.2(2), as adjusted for height and exposure per Table R301.2(3)~~.

Exceptions:

1. Where uplift forces in Table R802.11 do not exceed 150 pounds, roof rafters and trusses are permitted to be attached in accordance with Table R602.3(1) and Section R802.10.5 respectively.
2. Where uplift forces in Table R802.11 do not exceed 210 pounds, roof rafters are permitted to be attached with 3 16d toenails.
3. Where uplift forces in Table R802.11 do not exceed 210 pounds, and rafters are fastened to ceiling joists at the plate, rafters and ceiling joists are permitted to be attached in accordance with Table R602.3(1).
4. For trusses designed per Section R802.10.1, the fasteners or connectors shall resist the uplift force specified on the Truss Design Drawing.

A continuous load path shall be designed to transmit the uplift forces from the rafters or trusses ~~ties~~ to the foundation.

Reason: The IRC requires roof assemblies to be sufficiently attached to wall assemblies when the roof pressure is 20 psf or greater. The code requires the pressure to be determined in accordance with Table R301.2(2) based on Zone 1 using an effective wind area of 100 sq feet. These parameters and the existing table do not provide a realistic value of what the actual uplift reactions would be expected to occur. Table R301.2(2) is a components and cladding wind load table. Roof uplift is determined using Main Wind Force Resisting System loads, not components and cladding loads. Furthermore, the 20 psf pressure that triggers additional uplift requirements is only one factor that is needed to determine the uplift reaction at the end of the rafter/truss. The roof span, overhang, and rafter/truss spacing all affect the uplift reaction. These additional factors are included in Table R802.11, which makes this table a more appropriate reference for this code section.

R301.1 states that "buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including… wind loads… as prescribed by this code." It goes on to state that "the construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section."

The prescriptive fastening of a rafter to a wall plate is two 16d smooth common, box, or deformed shank nails toe nailed (Table R602.3(1)). This prescriptive fastening is inadequate to safely support wind uplift loads in excess of 150 pounds per rafter. Table 7B of the 2001 Wood Frame Construction Manual provides withdrawal design values for box nails (lowest of the three) that include a 1.60 load duration factor. The allowable load for a 16d box nail into framing with a specific gravity of 0.49 or higher is 72 pounds per nail. The prescriptive fastening pattern described in R602.3(1) has an allowable wind uplift capacity of 144 pounds. This was rounded to 150 pounds in the proposed code change.

The word "ties" was removed from the last sentence because the point of origin of the wind uplift load is the roof assembly, not the "tie". Additionally, R802.11.1 requires a "connection" which may or may not be a "tie".

Bibliography:
IRC Reference No. WFCM—2001
2001 Wood Frame Construction Manual for One- and Two-family Dwellings
American Forest and Paper Association
111 19th Street, NW, Suite 800
Washington, DC 20036

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

Committee Action: Disapproved

Committee Reason: There is insufficient technical data to support this. The proponents and the opponents are urged to work together on testing protocol to achieve a consensus on the correct load path.

Assembly Action: None

Individual Consideration Agenda

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

Public Comment:

T. Eric Stafford, P.E., representing the Institute for Business and Home Safety, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

R802.11.1 Uplift resistance. Roof rafters or trusses shall be attached to their supporting wall assemblies by connections capable of providing the resistance required in Table R802.11.

Exceptions:

1. ~~Where uplift forces in Table R802.11 do not exceed 150 pounds, roof rafters and trusses are permitted to be attached in accordance with Table R602.3(1) and Section R802.10.5 respectively.~~
2. ~~2.~~ 1. Where uplift forces in Table R802.11 do not exceed ~~210~~ 225 pounds, roof rafters or trusses are permitted to be attached ~~with 3 16d toenails~~ in accordance with Table R602.3(1).
3. ~~3.~~ 2. Where uplift forces in Table R802.11 do not exceed ~~210~~ 225 pounds, and rafters are fastened to parallel ceiling joists at the plate in accordance with Table R602.3(1) , rafters and ceiling joists are permitted to be attached in accordance with Table R602.3(1).
4. ~~4.~~ 3. For trusses designed per Section R802.10.1, the fasteners or connectors shall resist the uplift force specified on the Truss Design Drawing.

A continuous load path shall be designed to transmit the uplift forces from the rafter or truss to the foundation.

Revise as follows:

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

Rafter or truss to plate, toe nail	**~~2~~ 3-16d (3½" × 0.135²)**	**2 fasteners on one side, one on the other--**

(Portions of table not shown remain unchanged)

TABLE R802.11
REQUIRED STRENGTH OF TRUSS OR RAFTER CONNECTIONS TO RESIST WIND UPLIFT FORCES [a, b, c, d, e, f, g]
(No change to table values or Notes a through f)

g. Connection loads for hip roofs with 5:12 and greater slopes are permitted to be reduced by multiplying the table values by 0.7. This reduction shall not be combined with the reductions specified in Footnote e.

Delete without substitution:

~~**R802.10.5 Truss to wall connection.** Trusses shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 175 pounds (779 N) and shall be installed in accordance with the manufacturer's specifications. For roof assemblies subject to wind uplift pressures of 20 pounds per square foot (960 Pa) or greater, as established in Table R301.2(2), adjusted for height and exposure per Table R301.2(3), see section R802.11.~~

Commenter's Reason: Conventional construction techniques used in wood frame construction have historically performed reasonably well except when the homes have been subjected to extreme wind events. However, the new building stock is being characterized by larger homes with larger span roofs and the inherent margins of safety are being significantly reduced below those of older smaller homes. We are seeing more and more damage when wind gusts approach 90 mph. This code change will provide reasonable limits for requiring larger homes to use strapping to anchor the roof structure to the walls. Under this proposal, homes in the 90 mph zone, exposure B, with roof spans less than or equal to 24-feet with overhangs of 1-foot or homes with a roof span of 28-feet with no overhang would be exempt from requiring additional strapping. Where ceiling joists are installed next to rafters and both are anchored as specified in Table R602.3(1), the threshold for requiring additional strapping increases to 28-feet with a 1-foot overhang and 34 feet with no overhang. In many cases, the additional strapping would only be required near the gable ends.

Final Action: AS AM AMPC____ D

RB269-06/07

R202 (New), R806.4, Table R806.4 (New), Chapter 43 (New)

Proposed Change as Submitted:

Proponent: Joseph Lstiburek, Building Science Corporation, representing himself

1. Add new definition as follows:

SECTION R202
GENERAL DEFINITIONS

AIR-IMPERMEABLE. A material or assembly having an air permeance equal to or less than 0.02 L/s-m^2 at 75 Pa pressure differential tested according to ASTM E 2178 or E 283.

2. Revise as follows:

R806.4 ~~Conditioned~~ Unvented attic assemblies. Unvented ~~conditioned~~ attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) ~~are~~ shall be permitted ~~under~~ if all the following conditions are met:

1. The thermal envelope insulation is above the attic.
2. No interior class I or II vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
2. ~~An air-impermeable insulation is applied in direct contact to the underside/interior of the structural roof deck."Air-impermeable" shall be defined by ASTM E 283.~~

   ~~**Exception:** In Zones 2B and 3B, insulation is not required to be air-impermeable.~~

3. ~~In the warm-humid locations as defined in Section N1101.2.1:~~

   ~~3.1. For asphalt roofing shingles: A 1-perm (5.7 °x10-11 kg/s¯ m2¯ Pa) or less vapor retarder (determined using Procedure B of ASTM E 96) is placed to the exterior of the structural roof deck; that is, just above the roof structural sheathing.~~

   3.~~2.~~ ~~For~~ Where wood shingles ~~and~~ or shakes are used~~:~~, a minimum continuous ¼ inch (6 mm) vented air space separates the shingles~~/~~ or shakes and the roofing ~~felt placed over~~ underlayment above the structural sheathing.

4. Either “a” or “b” shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
   4.1. Air-impermeable insulation. Insulation shall be applied in direct contact to the interior surface (underside) of the structural roof sheathing as specified in Table R806.4. In climate zones 5, 6, 7 and 8, the insulation, including any coating or covering applied or installed continuously in direct contact with the interior surface of the insulation, shall be a class I or II vapor retarder.
   4.2. Any other insulation. In addition to the nonair-impermeable insulation below and in contact with the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.4. ~~In Zones 3 through 8 as defined in Section N1101.2~~ Alternately, sufficient insulation shall be installed to maintain the monthly average temperature of the condensing surface above 45°F (7°C). The condensing surface is defined as either the interior surface of the structural roof deck or the interior surface of an air-impermeable insulation ~~applied in direct contact with the underside/interior of the structural roof deck. “Air-impermeable” is quantitatively defined by ASTM E 283.~~ For calculation purposes, an interior temperature of 68°F (20°C) is assumed. The exterior temperature is assumed to be the monthly average outside temperature.

3. Add new table and standard as follows:

TABLE R806.4
MINIMUM INSULATION

CLIMATE ZONE	MINIMUM R-VALUE
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8	R-35

CHAPTER 43
REFERENCED STANDARDS

ASTM E 2178-03 Standard Test Method for Air Permeance of Building Materials

Reason: This change clarifies the requirements for unvented attics and includes a few requirements that were modified based on field experience.

Some have questioned whether unvented attics need a separate conditioned air source. To clarify this question, the term “conditioned attics” was changed to “unvented attics.” These attics do not need to be directly conditioned, but they do need to be inside the thermal envelope (insulation above the attic) as clarified in No.1.

A definition for “air impermeable” material or assembly was added. This change brings the specific value for air-impermeable into the code, rather than making it an indirect reference.

The newly proposed definition for vapor retarder class was added. Some vapor retarder requirements were also modified based on analysis of field experience. The use of asphalt shingles and other roof coverings without the vapor retarder over the roof deck has been successful over composite insulation panels, so the extra details about vapor retarders, etc. can be eliminated.

A prescriptive R-value table was added for the portion of the insulation required to be above the roof structural deck. Having the prescriptive table avoids the need for a calculation.

A definition for vapor retarder class is in a separate proposal.

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

Analysis: Results of review of the proposed standard will be posted on the ICC website by August 20, 2006.

Note: The following analysis was not in the Code Change Proposal book but was published in the “Errata to the 2006/2007 Proposed Changes to the International Codes and Analysis of Proposed Reference Standards” provided at the code development hearings:

Analysis: Review of proposed new standard indicated that, in the opinion of ICC Staff, the standard did comply with ICC standards criteria.

Committee Action: **Disapproved**

Committee Reason: This change needs additional clarification. The second sentence in Section 4-b should be an exception. The third sentence in Section 4-b is a definition. The last two sentences should be footnotes to Table R806.4 A footnote should be added that indicates that this insulation is part of the Chapter 11 requirements.. The code defines a conditioned space and no technical data has been submitted to justify deleting the term “conditioned”. This change may create problems with using in conjunction with Chapter 11.

Assembly Action: Approved as Modified

Modify proposal as follows:

R806.4 Unvented attic assemblies. Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) shall be permitted if all the following conditions are met:

1. The thermal envelope insulation is above the attic.
2. No interior ~~class I or II~~ vapor retarder~~s are~~ is installed on the ceiling side (attic floor) of the unvented attic assembly.

3. Where wood shingles or shakes are used, a minimum continuous ¼ inch (6 mm) vented air space separates the shingles~~/~~ or shakes ~~and~~ above the roofing underlayment ~~above the~~ placed over structural sheathing.
4. Either “a” or “b” shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
   ~~4.1~~a. Air-impermeable insulation. Insulation shall be applied in direct contact to the interior surface (underside) of the structural roof sheathing as specified in Table R806.4. In climate zones 5, 6, 7 and 8, the insulation, including any coating or covering applied or installed continuously in direct contact with the interior surface of the insulation, shall be a ~~class I or II~~ vapor retarder.
   ~~4.2~~b. Any other insulation. In addition to the ~~nonair-impermeable~~ air-permeable insulation below and in contact with the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.4. Alternately, sufficient insulation shall be installed to maintain the monthly average temperature of the condensing surface above 45°F (7°C). The condensing surface is defined as either the interior surface of the structural roof deck or the interior surface of an air-impermeable insulation For calculation purposes, an interior temperature of 68°F (20°C) is assumed. The exterior temperature is assumed to be the monthly average outside temperature.

TABLE R806.4
MINIMUM INSULATION FOR CONDENSATION CONTROL

(Portions of proposal not shown remain unchanged)

Individual Consideration Agenda

This item is on the agenda for individual consideration because an assembly action was successful and Public Comments were submitted.

Public Comment 1:

Joseph Lstiburek, Building Science Corporation, representing himself, requests Approval as Modified by this Public Comment.

Replace the original proposal with the following:

Section 202
Definitions

Air-impermeable insulation. An insulation having an air permanence equal to or less than 0.02 L/s-m^2 at 75 Pa pressure differential tested according to ASTM E 2178 or E 283.

R806.4 ~~Conditioned~~ Unvented attic assemblies. Unvented ~~conditioned~~ attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) ~~are~~ shall be permitted ~~under~~ if all the following conditions are met:

1. The unvented attic space is completely contained within the building thermal envelope.
2. No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
~~2. An air-impermeable insulation is applied in direct contact to the underside/interior of the structural roof deck. “Air-impermeable” shall be defined by ASTM E 283.~~
   ~~**Exception:** In Zones 2B and 3B, insulation is not required to be air impermeable.~~
~~3. In the warm humid locations as defined in Section N1101.2.1:~~
   ~~3.1. For asphalt roofing shingles: A 1-perm (5.7 °x10-11 kg/s⁻ m2⁻ Pa) or less vapor retarder (determined using Procedure B of ASTM E 96) is placed to the exterior of the structural roof deck; that is, just above the roof structural sheathing.~~
   3.~~2. For~~ Where wood shingles ~~and~~ or shakes are used~~:~~, a minimum ~~continuous~~ ¼ inch (6 mm) vented air space separates the shingles~~/~~ or shakes and the roofing ~~felt placed over~~ underlayment above the structural sheathing.
~~4. In Zones 3 through 8 as defined in Section N1101.2 sufficient insulation shall be installed to maintain the monthly average temperature of the condensing surface above 45°F (7°C). The condensing surface is defined as either the structural roof deck or the interior surface of an air-impermeable insulation applied in direct contact with the underside/interior of the structural roof deck. “Air-impermeable” is quantitatively defined by ASTM E 283. For calculation purposes, an interior temperature of 68°F (20°C) is assumed. The exterior temperature is assumed to be the monthly average outside temperature.~~
4. In climate zones 5, 6, 7 and 8, any air-impermeable insulation shall be a vapor retarder, or shall have a vapor retarder coating or covering in direct contact with the underside of the insulation.

5. Either “a”, “b”. or “c” shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
   a. Air-impermeable insulation only. Insulation shall be applied in direct contact to the underside of the structural roof sheathing.
   b. Air-permeable insulation only. In addition to the air-permeable installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.4 for condensation control.
   c. Air-impermeable and air-permeable insulation. The air-impermeable insulation shall be applied in direct contact to the underside of the structural roof sheathing as specified in Table R806.4 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.

TABLE R806.4
INSULATION FOR CONDENSATION CONTROL

Climate Zone	Minimum rigid board or air-impermeable insulation R-Value [a]
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8	R-35

a. Contributes to but does not supersede Chapter 11 energy requirements.

Commenter's Reason: Unvented attics are attics where the insulation and air barrier boundary is moved to be directly above the attic space, instead of on top of the ceiling. Unvented attics eliminate the extreme temperatures of the attic, thereby placing the HVAC, ducts, pipes, and anything in the attic space into a more favorable environment. Unvented attics increase energy efficiency and decrease wear and tear on equipment in the attic.

The committee agreed that unvented attics should be an option. The main committee objection to the RB269 proposal was the confusing code language. A simpler proposal was suggested. The successful floor motion demonstrated the assembly desire to clarify this section of the code.

This Public Comment proposes simpler code text and clarifies what “air impermeable” means by adding a definition. Several minor improvements are made to the language. The overly complicated language of the existing item #4 is replaced with a table to look up of the required R-value for insulated sheathing. The table lookup eliminates the calculation.

If this public comment prevails, the existing RB806.4 will be simplified. For clarity the resulting R806.4 code text is below:

Section R 202, Definitions
Air-impermeable insulation. An insulation material having an air permeance equal to or less than 0.02 L/s-m^2 at 75 Pa pressure differential tested according to ASTM E 2178 or E 283.

R806.4 Unvented attic assemblies. Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) shall be permitted if all the following conditions are met:
1. The unvented attic space is completely contained within the building thermal envelope.
2. No interior vapor retarder is installed on the ceiling side (attic floor) of the unvented attic assembly.
3. Where wood shingles or shakes are used, a minimum ¼ inch (6 mm) vented air space separates the shingles or shakes from the roofing underlayment.
4. In climate zones 5, 6, 7 and 8, any air-impermeable insulation shall be a vapor retarder, or shall have a vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Either “a” or “b” or “c” shall be met, depending on the air permeability of the insulation under the structural roof sheathing.
   a. Air-impermeable insulation only. Insulation shall be applied in direct contact to the underside of the structural roof sheathing.
   b. Air-permeable insulation only. In addition to air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.4 for condensation control.
   c. Air-impermeable and air-permeable insulation. The air-impermeable insulation shall be applied in direct contact to the underside of the structural roof sheathing as specified in Table R806.4 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.

Table R806.4
Insulation for Condensation Control

Insulation for Condensation Control Climate Zone	Minimum rigid board or air-impermeable insulation R-Value [a]
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8	R-35

a. Contributes to but does not supersede Chapter 11 energy requirements.

Public Comment 2:

Charles Cottrell, North American Insulation Manufacturers Association, requests Disapproval.

Commenter's Reason: The proposal that was disapproved by the IRC Committee and approved as modified by the floor action should be disapproved because it is confusing. For example a sheet insulation such as extruded polystyrene is not permeable, but it is included in the category for permeable materials without any apparent justification.

Final Action: AS AM AMPC____ D

RB271-06/07
R807.1

Proposed Change as Submitted:

Proponent: Rick Davidson, City of Hopkins, MN

Revise as follows:

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that exceed 30 square feet (2.8m^2) and have a vertical height of 30 inches (762 mm) or greater.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in ~~a hallway or other readily accessible location~~ an approved location. A 30-inch (762 mm) minimum unobstructed headroom in the attic space shall be provided at some point above the access opening. See Section M1305.1.3 for access requirements where mechanical equipment is located in attics.

Reason: The IBC (Section 1208.2) is silent on the matter of the location of attic access. But, in a similar proposal, the IRC Committee expressed concern that removing reference to a hallway, etc., in the IRC would result in the access being placed in a location that would not be useable. However, the reference to "hallway" makes a strong suggestion that the access must be in an interior location when access through a garage attic, a knee wall, or an exterior location may be desirable. The revised text allows the access to be in any location provided the building official approves it. That will allow the building official the opportunity to review the proposed location to determine if it is useable and give greater flexibility as well. This text is also more consistent with generally used code language.

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

Committee Action: **Approved as Submitted**

Committee Reason: This change removes an ambiguity in the code. The addition of "approved location" adds flexibility to the code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Lawrence Brown, CBO, National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify proposal as follows:

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that exceed 30 square feet (2.8m^2) and have a vertical height of 30 inches (762 mm) or greater.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location, ~~an~~ or other approved location. A 30-inch (762 mm) minimum unobstructed headroom in the attic space shall be provided at some point above the access opening. See Section M1305.1.3 for access requirements where mechanical equipment is located in attics.

Commenter's Reason: This modification retains the change made by the original Proposal, and reinstates the proposed stricken text that is shown above in underlined. This modification allows a prescriptive method for the location of the attic access, and also allows an other "approved" location for those situations where an available access location may pose a hardship in complying with the prescriptive locations.

Final Action: AS AM AMPC____ D

RB284-06/07
R905.2.8.6 (New)

Proposed Change as Submitted:

Proponent: Matthew T. Skowron, City of Kerrville, TX; Roger Vermillion, City of Tempe, AZ, representing the Arizona Building Officials

Add new text as follows:

R905.2.8.6 Drip edge. Provide drip edge at eaves and gables of shingle roofs. Overlap to be a minimum of 2 inches (51 mm). Eave drip edges shall extend 0.25 inch (6.4 mm) below sheathing and extend back on the roof a minimum of 2 inches (51 mm). Drip edge shall be mechanically fastened a maximum of 12 inches (305 mm) o.c.

Reason: Drip edge is not located in the IRC, therefore this cannot be enforced in residential construction. There is no requirement in the IRC for drip edge to protect the underlayment from rotting and termite damage.

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

Committee Action: **Disapproved**

Committee Reason: This is only applicable to high wind regions. This is not written in proper code language.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Robert Boyer, Building Officials Association of Florida, representing the Code Development Committee, requests Approval as Submitted.

Commenter's Reason: The prescriptive provisions in the International Residential Code are limited to jurisdictions with a basic wind speed of 110 mph or less. The states along the Gulf Coast and the Atlantic Ocean from Texas to Massachusetts and the coast of Alaska are exposed to basic wind speeds greater than 110 mph as well as numerous "Special Wind Regions" within the US. The International Residential Code should be expanded to provide prescriptive provisions for the individuals in these jurisdictions. This is a multiple region issue, which could affect as many as 22 states. The Wind issues aren't any different than Snow Loads or Seismic requirements being in the Code.

This is not just a Florida Issue and we believe it deserves to be reconsidered in Rochester.

Final Action: AS AM AMPC____ D

RB285-06/07
R905.2.8.6 (New)

Proposed Change as Submitted:

Proponent: Bob Boyer, CBO, representing Building Officials Association of Florida Code Development Committee

Add new text as follows:

R905.2.8.6 Drip edge. Provide drip edge at eaves and gables of shingle roofs. Overlap to be a minimum of 3 inches (76 mm). Eave drip edges shall extend ½ inch (13 mm) below sheathing and extend back on the roof a minimum of 2 inches (51 mm). Drip edge at eaves shall be permitted to be installed either over or under the underlayment. If installed over the underlayment, there shall be a minimum 4 inches (51 mm) width of roof cement installed over the drip edge flange. Drip edge shall be mechanically fastened a maximum of 12 inches (305 mm) on center. Where the basic wind speed per Figure R301.2(4) is 110 mph (177 km/h) or greater or the mean roof height exceeds 33 feet (10 058 mm), drip edges shall be mechanically fastened a maximum of 4 inches (102 mm) on center,

Reason: The *International Building Code* requires the installation of drip edges with shingles. The *International Residential Code* should require the same for a shingle roof on a residence. These criteria were taken from the IBC Section 1507.2.9.3. Modifications to the criteria in Section 1507.2.9.3 were based on recommendations for use in high wind regions.

Cost Impact: The code change proposal will not increase the cost of construction. The installation of a drip edge is required under the IBC for building using shingle roofs. The same minimum criteria should be required for a residence. The Code already requires that each building component is to be designed and installed to resist the design wind. By providing prescriptive criteria, the IRC allows the user to either use the prescriptive criteria or design an attachment system for the drip edge.

Committee Action: **Disapproved**

Committee Reason: Based on previous action on RB284-06/07.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Robert Boyer, Building Officials Association of Florida, representing the Code Development Committee, requests Approval as Submitted.

Commenter's Reason: The prescriptive provisions in the International Residential Code are limited to jurisdictions with a basic wind speed of 110 mph or less. The states along the Gulf Coast and the Atlantic Ocean from Texas to Massachusetts and the coast of Alaska are exposed to basic wind speeds greater than 110 mph as well as numerous "Special Wind Regions" within the US. The International Residential Code should be expanded to provide prescriptive provisions for the individuals in these jurisdictions. This is a multiple region issue, which could affect as many as 22 states. The Wind issues aren't any different than Snow Loads or Seismic requirements being in the Code.

This is not just a Florida Issue and we believe it deserves to be reconsidered in Rochester.

Final Action: AS AM AMPC____ D

RB287-06/07

R905.3.8 (New), R905.3.8.1 (New), R905.3.8.2 (New)

Proposed Change as Submitted:

Proponent: Bob Boyer, CBO, representing Building Officials Association of Florida Code Development Committee

Add new text as follows:

R905.3.8 Hip and ridge tiles. Hip and ridge tiles installed where the basic wind speed exceeds 100 mph shall be secured to hip and ridge boards attached to the roof framing per procedure 1 or 2 or installed in a full bed of mortar per procedure 3.

R905.3.8.1 Hip and ridge boards. Hip and ridge boards shall be attached to the roof framing to resist the uplift pressure listed in the appropriate Table R301.2(2) assuming the exposed width of the hip/ridge tile is 1 foot (304.8 mm). For installations not covered in Table **R301.2(2)**, the uplift pressure for the hip/ridge tile shall be determined in accordance with Section **1609** of the ***International Building Code*** as a non air-permeable roof covering based on the actual exposed width of the tile.

R905.3.8.2 Installing hip and ridge tiles. Hip and ridge tiles shall be installed using either procedure 1, 2, or 3:

1. **Mechanically fastened hip/ridge tiles.** Mechanically fastened hip/ridge tiles shall use a wood ridge board and either nails or screws to secure the hip/ridge tiles. Drill a $^{3}/_{16}$" hole in the lower one-third of the hip/ridge starter tile. Use a #8 wood screw or a 10d ring shank nail and secure the starter tile at both the drilled hole in the lower third of the tile and in the preformed hole at the head of the tile. The remaining hip/ridge tiles are to be installed with a minimum 2" headlap unless the roof tile manufacturer recommends a different headlap. Place the nose of each subsequent hip/ridge tile into a 4" to 5" bead of roof tile adhesive along the head of the lower tile. The head of each subsequent hip/ridge tile is to be secured using a #8 wood screw or a 10d ring shank nail. Fasteners are to have a minimum embedment of ¾ into the roof framing. Seal the head of the fastener with a UV resistant sealant.

2. **Adhesive set hip/ridge tiles.** Adhesive set hip/ridge tiles shall use a wood or metal ridge board and an approved expansive adhesive to secure the hip/ridge tiles to the hip/ridge board. Install the hip/ridge starter tile by applying a bead or paddy of an approved expansive roof tile adhesive along the hip/ridge board for the entire length of the starter tile. Center the hip/ridge starter tile over the hip/ridge board and center the hip/ridge starter tile in place. The remaining hip/ridge tiles are to be installed with a minimum 2" headlap unless the roof tile manufacturer recommends a different headlap using one of the following methods.

   Procedure 1: Apply a bead or paddy of an approved expansive adhesive along hip/ridge board for the entire length of the hip/ridge tile and center the hip/ridge board in place.

   Procedure 2: Place a 4" to 5" bead or paddy of approved expansive adhesive between the head of the lower hip/ridge tile and the hip/ridge board. Center and place the head of this hip/ridge in the bead or paddy. Place a 4" to 5" bead or paddy an approved expansive adhesive on the head of the lower tile and center and place the overlap of the nose of the upper tile into the bead or paddy. Fasteners shall be installed in the hip/ridge tiles on roof slopes greater than 7:12. These fasteners shall be sufficient to prevent the hip/ridge tiles from sliding while the adhesive cures.

3. **Mortar set hip/ridge tiles.** Install the hip/ridge starter tile by placing a full bed of approved mortar under the entire length of the hip/ridge tile. Within 2 minutes of placing the bed of mortar embed the hip/ridge starter tile into the solid bed of mortar. The remaining hip/ridge tiles are to be installed with a full bed of approved mortar under the entire length of the hip/ridge tile with a minimum 2" headlap unless the roof tile manufacturer recommends a different headlap. Tiles shall be embedded in the mortar within 2 minutes of placing the mortar. The entire unexposed surface of the hip/ridge shall be in contact with the mortar bed. Fasteners shall be installed in the hip/ridge tiles on roof slopes greater than 7:12. These fasteners shall be sufficient to prevent the hip/ridge tiles from sliding while the mortar cures.

(Renumber existing R905.3.8 to R905.3.9)

Reason: Hip and ridge tiles are subjected to the largest wind forces on a roof. The Florida Department of Community Affairs in cooperation with the roof tile industry has developed three procedures for securing hip and ridge tiles. The prescriptive information provided in this section is a summary of the installation procedures. Since the prescriptive procedures are not in a consensus document, this summary is being provide to improve the attachment of hip and ridge tile under the *International Residential Code*.

Cost Impact: The code change proposal will increase the cost of construction for the installation of hip and ridge roof tiles. The increased cost is necessary to reduce the loss of hip and ridge tiles when exposed to high winds. The cost increase will depend on the procedure used.

Committee Action: **Disapproved**

Committee Reason: This is a high wind provision and is outside the scope of the IRC. This belongs in the High Wind Standard.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Robert Boyer, Building Officials Association of Florida, representing the Code Development Committee, requests Approval as Submitted.

Commenter's Reason: The prescriptive provisions in the International Residential Code are limited to jurisdictions with a basic wind speed of 110 mph or less. The states along the Gulf Coast and the Atlantic Ocean from Texas to Massachusetts and the coast of Alaska are exposed to basic wind speeds greater than 110 mph as well as numerous "Special Wind Regions" within the US. The International Residential Code should be expanded to provide prescriptive provisions for the individuals in these jurisdictions. This is a multiple region issue, which could affect as many as 22 states. The Wind issues aren't any different than Snow Loads or Seismic requirements being in the Code.

This is not just a Florida Issue and we believe it deserves to be reconsidered in Rochester.

Final Action: AS AM AMPC____ D

RE3-06/07
N1102.5.1

Proposed Change as Submitted:

Proponent: Michael D. Fischer, The Kellen Company, representing The Window and Door Manufacturers Association

Revise as follows:

N1102.5.1 Maximum fenestration *U*-factor. The area weighted average maximum fenestration U-factor permitted using tradeoffs from Section N1102.1.3 in Zones 4-5 shall be 0.48 and Zone~~s~~ 6 through 8 shall be 0.40 ~~0.55~~.

To comply with this section, the maximum U-factor for skylights shall be 0.75 in zones ~~6~~ 4 through 8.

Reason: The purpose of this code change proposal is to establish more effective fenestration U-factor trade-off maximums in the IRC consistent with the levels established in the comparable section of the IECC, substantially reduce the potential of occupant discomfort from cold windows, reduce the potential of condensation from cold windows, and save energy by avoiding thermostat increases to offset discomfort. The proposed revisions to the maximums will continue to permit reasonable flexibility through trade-offs, while ensuring that the potential of unlimited window area incorporated in the code in the last cycle does not result in window performance issues.

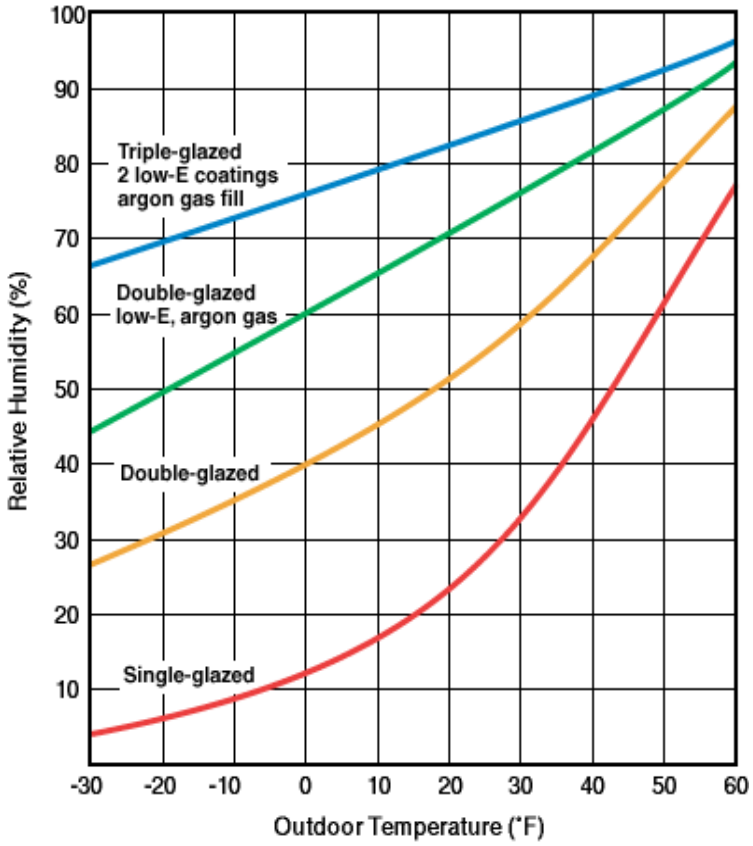
Revising N1102.5.1 as necessary to mirror its sister counterpart provision in the IECC is a big step toward establishing consistent maximum performance limits in the codes. It will enhance enforcement capabilities and streamline requirements. Section 1.3.1 of the *Code Development Process for the International Codes* states: "[t]he provisions of all Codes shall be consistent with one another so that conflicts between the codes do not occur." Since the IECC is the lead energy code, and the IRC references the IECC, the energy provisions of the IRC should be consistent with the IECC requirements. There is no issue of cost-effectiveness related to this proposed revision, since the prescriptive values, which have been found to be cost-effective, are all more stringent than these trade-off maximums.

In its current format, although the IRC version acknowledges the principle of and the need for U-factor limits, its limits are simply insufficient to ensure reasonable performance. Unlike the IRC, IECC section 402.6 establishes maximum fenestration U-factor trade-offs for zones 4-5 of 0.48, recognizing that these climate zones have significant heating requirements and the potential for discomfort and condensation. These values were established on a compromise basis for the IECC and should be adopted for the IRC as well. Similarly, the IECC establishes more effective limits in Zones 6-8, setting the bar at 0.40, rather than 0.55, recognizing that low-e windows are crucial in these very cold climates (the IECC Committee stated that as to this issue a 0.55 maximum U-factor was insufficient to insure adequate condensation resistance and occupant comfort). Finally, the IECC extends the skylights maximum of 0.75 across all of heating climate zones - zones 4 to 8, and the IRC's application of this maximum only to zones 6-8, should be similarly extended.

Such limits are also necessary given the change to the IRC during the previous code cycles from a 15% window area maximum to permit unlimited window area without tying additional window area to increased energy performance. In exchange for allowing unlimited glazing area, the limits proposed here and included in the IECC are intended to guarantee a baseline level of reasonable window energy performance no matter how many windows are installed.

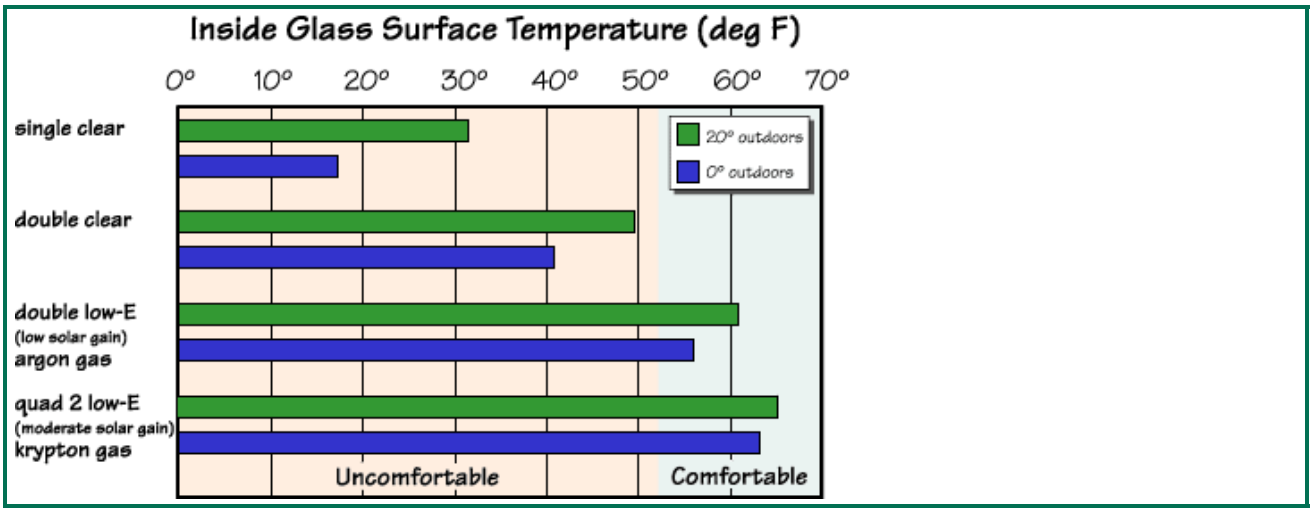
The likelihood of condensation is directly related to the product's U-factor, the indoor relative humidity and the winter design temperature. In a nutshell, the lower the U-factor, the higher the room-side glass temperature will be and the better a window will be able to support higher relative humidity before condensation forms on the glass. Even relatively mild heating climates – like zones 4-5 – are affected by condensation with reasonable levels of relative humidity because of low winter design temperatures. A reasonable U-factor maximum helps provide a degree of reasonable resistance to such condensation. The 0.48 maximum selected by the IECC for zones 4-5 and the 0.40 maximum for zones 6-8 are the minimum reasonable choices for these zones.

The following chart produced by the Lawrence Berkley National Laboratory (and found on the Efficient Window Collaborative website – www.efficientwindows.org) shows the condensation potential for different types of configurations at various outdoor temperature and indoor relative humidity conditions.

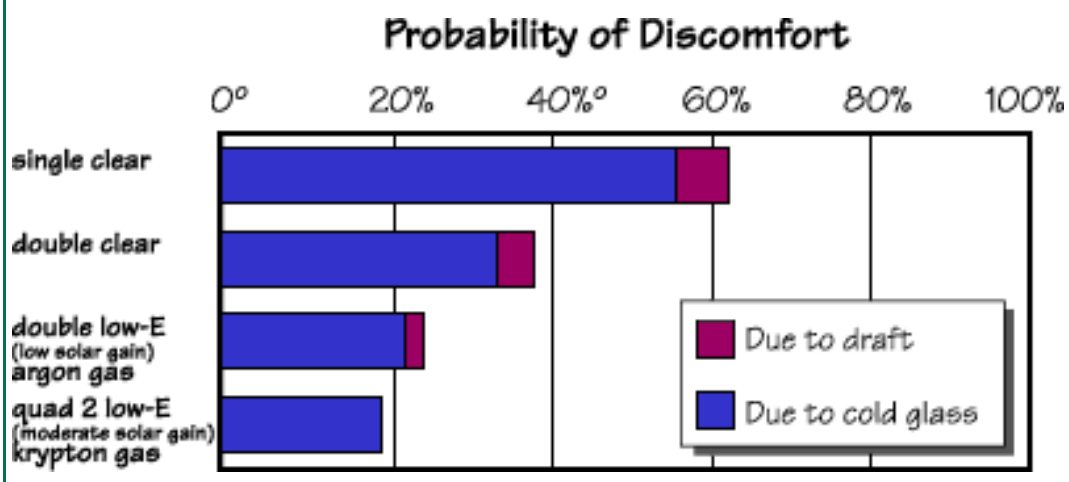


This graph indicates that condensation will occur at any point on or above the curves. For example, at 0°F a double-glazed clear window represented by the gold line (approximately 0.55 U-factor) will have condensation present at 40% relative humidity. For a double-pane low-E window (0.48 in an aluminum frame, 0.40 U-factor or better in a vinyl or wood frame) – represented by the green line – the relative humidity could be as high as 60% before condensation would occur. This graph clearly shows that as the U-factor of windows improves, there is a much smaller range of conditions where condensation will occur, and establishes the need for this level of U-factor limits.

The following two charts produced by the Lawrence Berkley National Laboratory (and found on the Efficient Window Collaborative website – www.efficientwindows.org) illustrate the comfort issues with using the wrong windows (higher U-factors) in colder climates. Specifically, the first chart shows the temperature of the inside glass surface on various windows. The 0.55 U-factor requirement in the IRC would be comparable to double clear glass. The 0.40 U-factor requirement in the IECC for zones 6-8 would be comparable to double low-e.



Similarly, the second graph shows the probability of winter discomfort from the same types of glass.



It is clear from these two charts that reasonable comfort requires low-e windows in heating climates, particularly with unlimited window area now allowed. It should be noted that even at a 0.40 U-factor, such a window allows far more heat loss than an un-insulated frame wall. For all of these reasons, the IRC provision should be revised to be consistent with the IECC provision.

With adoption of consistent requirements, window suppliers and manufacturers will be able to streamline inventory and production to meet code. Approval of this proposal will reduce variations in local requirements and help reduce homeowner dissatisfaction due to discomfort.

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

Committee Action: **Disapproved**

Committee Reason: Based on previous action on EC58-06/07, Part II. This change would place into the code the artificial restraints without energy savings the committee's previous action removed.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Michael D. Fischer, The Kellen Company, representing The Window and Door Manufacturer's Association, requests Approval as Submitted.

Commenter's Reason: Several proposals dealing with the issue of fenestration trade-offs and limits were considered during the September hearings. The current requirements between the IECC and the IRC Energy Chapter are inconsistent. WDMA urges approval of RE3 in order to provide a reasonable expectation of product performance in terms of appropriate levels of comfort. Without some boundaries to the range of allowable thermal performance values, there is a likelihood- actually a guarantee- of inconsistent temperature zones within a house depending upon solar orientation as well as window size and locations. Inconsistent temperature zoning leads to overheating in order to compensate for "cold spots". Advocates for unrestricted trade-off options cite equivalent energy performance but do not consider the direct relationship between the myriad variables that affect the economic- and energy consumption- of the trade-off. Looking at the "average" data range without any consideration of the min and max temperature levels ignores the realities of residential energy use. Without these reasonable caps, thermostats will be raised to deal with the wide temperature ranges that will occur in space and time.
This proposal only considers modifications in climate zones 4-8 where heating is a significant part of the total energy bill. Less restrictive trade-off limits in more tropical climate zones do not translate into colder regions where the temperature differential is greater.
This proposal will aid code officials in interpretation and enforcement, product suppliers with streamlined product offering within a given climate zone, and homeowners in the form of consistent envelope performance that will directly affect energy usage, resulting in savings- and energy conservation. The added bonus of consistency with the IECC provisions makes this proposal the most favorable option. Even the Energy Star program authors realized the inherent problems with tradeoffs in northern climates during the last program review, and limited the trading to southern zones.

Public Comment 2:

Garrett A. Stone, Brickfield, Burchette, Ritts & Stone, P.C., representing Cardinal Glass Industries, requests Approval as Submitted.

Commenter's Reason: This code change proposes to revise the limits on window U-factors in the IRC to make them the same (as stringent) as the limits contained in the IECC. In disapproving this proposal, the IRC Building & Energy Committee ignored the fact that the levels established by the IECC are necessary to ensure reasonable protection from condensation and protection of occupant comfort as demonstrated in detail in the proponent's reason statement. As the proponent (and the IECC Committee in EC 58, Part I) explains, the failure to provide good windows for occupant comfort can be expected to result in substantially increased energy use as the uncomfortable occupant adjusts the thermostat upward to compensate for cold windows. These protections are particularly critical since unlimited window area (without an increase in stringency) is now allowed by the energy code, a feature newly included in the both the 2006 IRC and 2006 IECC. It should also be kept in mind that even the proposed maximum U-factors still provide less insulating value than an un-insulated wall. The limits contained in the IECC are reasonable and should be included in the IRC. [See also our public comment on EC 58, Part II, where we address these issues in more detail in responding to the IRC Committee's decision to remove these limits entirely from the IRC. On EC 58, Part I, the IECC Committee reaffirmed the need for these limits.]

The failure to approve this code change for the IRC will result in continued, unwarranted inconsistencies between the IECC and IRC energy chapter. The two codes should not diverge in their basic underlying requirements. The IECC is the lead energy code and the IRC references the IECC. The IRC energy chapter should not serve as a weaker alternative to the IECC requirements. Section 1.3.1 of the ICC *CP# 28-05 Code Development* states: "The provisions of all Codes shall be consistent with one another so that conflicts between the codes do not occur." It should be noted that the IRC Building & Energy Committee cited "consistent with the IECC Committee's action" in the reasoning statements to their decisions on code proposals EC15, EC32 and EC41, and consistency of codes in the reasoning statements supporting their actions on RB27, RB30, RB118 and RB315. The IRC Building & Energy Committee should have acted consistently here.

Final Action: AS AM AMPC____ D