INTERNATIONAL RESIDENTIAL CODE – BUILDING

RB7-09/10
R301.1.1, Chapter 44

Proposed Change as Submitted

Proponent: Julie Ruth, PE, JRuth Code Consulting, representing the American Architectural Manufacturers Association

1. Revise as follows:

R301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards, the design shall comply with the *International Building Code*.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual* (WFCM).
2. American Iron and Steel Institute (AISI) *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings* (AISI S230).
3. ICC-400 *Standard on the Design and Construction of Log Structures*.
4. American Architectural Manufacturers Association/National Sunroom Association (AAMA) 2100 – *Specification for Sunrooms* for the construction of sunroom additions in areas of Seismic Design Category A and B only.

2. Add new standard to Chapter 44 as follows:

AAMA
2100-10 Specification for Sunrooms

Reason: The 2009 *International Residential Code* defines a sunroom as "A one-story structure attached to a *dwelling* with a *glazing area* in excess of 40 percent of the gross area of the structure's *exterior walls* and roof." These structures are typically constructed in one of two manners: 1) using typical wood framing techniques, or 2) using a stick system that consists of prefabricated framing of aluminum, fiberglass, wood or other materials, with glass or opaque wall or roof panels, and steel or aluminum connections.

The first technique can be done in accordance with the current provisions of the IRC for wood framed construction. There are not now, however, any provisions in the IRC for the second method of constructing a sunroom other than by engineering analysis or demonstrating equivalence to the current provisions of the *International Residential Code* by some other means. This proposal seeks to add testing of sunrooms to the provisions of AAMA/NSA 2100 - 10 *Specification for Sunrooms* to the available options for approval of sunroom construction in the IRC.

In 2002 the American Architectural Manufacturers Association, the National Sunroom Association and the National Patio Association published the first U.S. standard for the construction of sunroom – AAMA/NPEA/NSA 2100 – 02. The standard established five different categories of sunrooms based upon the intended use of the space, and established specific design criteria for them, based upon those same categories and intended end use. The document establishes specific parameters for a test structure, including minimum depth, width, slope of roof, etc., while relying upon documents such as the local building code and ASCE 7 to determine the minimum design loads that the testing is to be based upon.

As the document began to be used and proposed for inclusion in various codes (it is now referenced in the 2007 Florida Building Code) the members of the AAMA Sunroom Council became aware of improvements that were needed. These improvements included revisions that would bring the document more tightly in line with the requirements of AAMA/WDMA/CSA 101/I.S.2/A440 for the design, testing and labeling of windows, glass doors and skylights, and revisions that would bring the foundation requirements more closely in line with the requirements of the *International Residential Code*. AAMA/WDMA/CSA 101/I.S.2/A440 – 08 is referenced in the 2009 edition of the International Residential Code, International Building Code and International Energy Conservation Code for these products.

The standard is currently undergoing revision to incorporate the improvements mentioned above. If the revision is completed by the Code Development Hearings in Baltimore, we will ask the IRC Building and Energy Committee to approve it at that time. If not, we will have the revision complete and the next edition of the standard published and readily available before the 2010 Final Action Hearings for the 2012 International Residential Code for consideration by the active members of the ICC at that time.

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

Analysis: A review of the standard proposed for inclusion in the code, AAMA 2100, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before September 24, 2009.

ICCFILENAME: RUTH-RB-3-R301.1.1-CH 44

Public Hearing Results

Analysis: Review of proposed new standard indicated that, in the opinion of ICC Staff, the standard did not comply with ICC standards criteria, Sections 3.6.3.1. and 3.6.2.11.

Committee Action: **Disapproved**

Committee Reason: The committee feels this is confusing and the standard does not comply with the ICC criteria. The revision to the standard is not complete. Also, there are issues with the electrical provisions that might be a conflict with respect to the standard.

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, PE, JRuth Code Consulting, representing the American Architectural Manufacturers Association, request Approval as Submitted.

Commenter's Reason: RB7, as originally submitted, added reference to AAMA/NSA 2100-10 to the IRC for the structural design of sunrooms. AAMA/NSA 2100-10 was intended to be an update to AAMA/NSA/NPEA 2100-02 *Specification for Sunrooms*, which has become widely used within the sunroom industry since its publication 8 years ago. The standard was disapproved by the IRC committee because the revision was not yet complete, the standard was not yet "published and readily available" and sufficient information regarding the consensus process used for the development and revision of the standard had not yet been provided to the ICC staff for them to make a determination regarding it.

AAMA/NSA/NPEA 2100 establishes criteria for five different categories of sunrooms, which range from "A roof or a covering of an outdoor space" with openings "enclosed with insect screening or 0.5 mm (20 mil) maximum thickness plastic film" (Category I) to "a roof or a covering of an outdoor space with enclosed walls that is designed to be heated and/or cooled and is open to the main structure" (Category V). The intent of AAMA 2100 is to define the design load and testing criteria for each category of sunrooms, relevant to the applicable model code, and also the intended use of the space.

The criteria include requirements for the structural design and testing of sunrooms to the wind, live, dead and snow load requirements of the applicable model building code. This Public Comment seeks recognition of AAMA/NSA/NPEA 2100 for the structural design of these special spaces.

During the initial efforts to revise and update AAMA/NSA/NPEA 2100, the members of AAMA staff were not able to locate contact information for the National Patio Enclosures Association. Since that time we have received that information. The NPEA is now participating in the process of updating AAMA/NSA/NPEA 2100 with AAMA and NSA, and the revised document will be designated AAMA/NSA/NPEA 2100-10.

Analysis: The standard proposed for reference in the code, AAMA/NSA/NPEA 2100 was not completed and readily available at the time of the Code Development Hearings in Baltimore. ICC Council Policy CP#/28-05, Code Development, Section 3.6.3.1, requires that the standard must be completed and readily available at the time of these Final Action Hearings in order to be considered for inclusion in the code.

Final Action: AS AM AMPC____ D

RB13-09/10
R301.2.1.1

Proposed Change as Submitted

Proponent: Gary Ehrlich, PE, National Association of Home Builders (NAHB)

Revise as follows:

R301.2.1.1 Design criteria. In regions where the basic wind speeds from Figure R301.2(4) equal or exceed ~~100 miles per hour (45 m/s) in *hurricane-prone regions*, or~~ 110 miles per hour (49m/s) ~~elsewhere~~, the design of buildings shall be in accordance with one of the following methods. The elements of design not addressed by those documents in Items 1 through 4 shall be in accordance with this code.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM); or
2. International Code Council (ICC) *Standard for Residential Construction in High-Wind Regions* (ICC-600); or

3. *Minimum Design Loads for Buildings and Other Structures* (ASCE-7); or
4. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings (AISI 230).*
5. Concrete construction shall be designed in accordance with the provisions of this code.
6. Structural insulated panel (SIP) walls shall be designed in accordance with the provisions of this code.

Reason: The purpose of this proposal is to restore the IRC scope limit for construction in high-wind areas to the original 110 miles per hour for all areas of the country. Without this revision, houses in areas along the Atlantic and Gulf coasts where the basic wind speed is 100 or 105 miles per hour will need to be engineered or designed to prescriptive requirements intended for areas at risk for Category 4 and 5 hurricanes.

As justification for the original code change made during the 2004-2005 Code Development Cycle (RB31-04/05) the Institute for Building and Home Safety (IBHS) cited four issues: roof sheathing nails, wind bracing requirements, toe-nailed uplift connections, and wall-to-wall connections at the floor line. In lieu of pursuing individual modifications to resolve these issues within the IRC, the proponent simply lowered the ceiling for using prescriptive design provisions along the Atlantic & Gulf coasts. We believe this is excessive and not supported by the observed performance of housing properly constructed to previous editions of the IRC in extreme wind events (hurricanes). At no time did the proponents ever provide documented evidence of failures of structures constructed to the previous IRC provisions. Nor did they provide technical justification in the form of engineering calculations or structural research to support their contentions. However, the 2004-2005 Code Development Cycle coincided with the four 2004 Florida hurricanes (Wilma, Ivan, Charley and Frances) and with Katrina and Rita in 2005. This led to significant political and emotional pressure on the code development community to increase the stringency of building codes, whether or not they were technically justified or appropriately targeted to the risk of severe wind events in those areas subject to the new provisions.

In the subsequent code development cycles, individual changes have been made to address all four issues raised by IBHS. The 2006 IRC increased the minimum roof sheathing nail size from 6d to 8d common nails for all roofs, and the gable and eave end zone nail spacing was tightened for dwellings in the 100mph region. The wall bracing provisions in the 2009 IRC have been reorganized, improved, and clarified and many new construction details provided. Most importantly, a new wind bracing table is provided which ties the required wall bracing for wind resistance to the wind loads determined using ASCE 7-05. Finally, a requirement for a continuous load path at the roof-to-wall, floor-to-floor, and floor-to-foundation connections at braced wall panels was added.

The 2009 IRC also provides requirements for wind resistance of exterior wood sheathing and for the installation of vinyl siding and foam sheathing. These new requirements further increase the resistance of structures built under the IRC to wind damage.

We question the age of the damaged structures used for justifying the code change reducing the IRC scope. The Federal Emergency Management Agency Summary Reports on Building Performance from the 2004 hurricane season and from Hurricane Katrina in 2005 indicated that structures built to the 2000 and 2003 IRC performed extremely well. The 2004 hurricane report stated (p.13), "no structural failures were observed to structures designed and constructed to the wind design requirements of…the 2000 IBC/IRC…" The Hurricane Katrina report stated (p.4-8), "Most structural failures observed…appeared to be the result of inadequate design and construction methods commonly used before IBC 2000 and IRC 2000 were adopted and enforced." Finally, a study conducted by the Texas Windstorm Insurance Association after Hurricane Rita showed there was substantially less damage and substantially fewer insurance claims in those areas where the 2000 or 2003 IBC and IRC were adopted and enforced.

NAHB estimates show that complying with the ICC-600 Standard for Residential Construction in High Wind Regions or the AF&PA Wood Frame Construction Manual where required by the IRC can add as much as $10,000 to the cost of a home. We believe these additional requirements make it extremely difficult to construct affordable housing along the Atlantic and Gulf coasts and place an onerous burden on builders and homeowners, and particularly on first-time home buyers. This added cost of construction will have the effect of keeping residents of these areas in older homes which do not have the robust construction provided by the IRC prescriptive provisions and which will be substantially more susceptible to structural failures, water infiltration and damage to personal property in high wind events.

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

ICCFILENAME: EHRLICH-RB-2-R301.2.1.1

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee feels that the concerns with respect to roof sheathing nails, wind bracing, uplift connectors and wall-to-wall connections have been resolved and it is appropriate to restore the 110 mph basic wind speed as the threshold for high wind design.

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, representing Institute for Business and Home Safety, requests Disapproval.

Commenter's Reason: We are requesting disapproval of RB13-09/10 standing on its own. Our support of this code change is contingent upon approval of code changes RB154-09/10 and/or RB156-09/10. RB154-09/10 and RB156-09/10 propose new requirements to improve the roof-to-wall connections for wind loads for buildings built to the IRC. With the approval of RB154-09/10, we would drop our objection to this proposal.

Final Action: AS AM AMPC____ D

RB16-09/10
301.2.2.6 (New), R1001.3, R1001.4, R1003.3, R1003.4, Table R1001.1

Proposed Change as Submitted

Proponent: Homer Maiel, PE, CBO, City of San Jose, CA, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay Chapters)

1. Add new text as follows:

R301.2.2.2.6 Masonry or concrete chimneys. Masonry or concrete chimneys shall be reinforced and anchored to the building in accordance with Sections R1001.3, R1001.4, R1003.3 and R1003.4

2. Revise as follows:

R1001.3 Seismic reinforcing. Masonry or concrete chimneys in Seismic Design ~~Category~~ Categories C, D_0, D_1 or D_2 shall be reinforced. Reinforcing shall conform to the requirements set forth in Table R1001.1 and Section R609, Grouted Masonry.

R1001.4 Seismic anchorage. Masonry or concrete chimneys in Seismic Design Categories C, D_0, D_1 or D_2 shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above *grade*, except where constructed completely within the exterior walls. Anchorage shall conform to the requirements of Section R1001.4.1.

R1003.3 Seismic reinforcing. Masonry or concrete chimneys shall be constructed, anchored, supported and reinforced as required by this chapter. In Seismic Design ~~Category~~ Categories C, D_0, D_1 or D_2 masonry and concrete chimneys shall be reinforced and anchored as detailed in Section R1003.3.1, R1003.3.2 and R1003.4. In Seismic Design ~~Category~~ Categories A and B ~~or C~~, reinforcement and seismic anchorage is not required.

R1003.4 Seismic anchorage. Masonry ~~and~~ or concrete chimneys and foundations in Seismic Design ~~Category~~ Categories C, D_0, D_1 or D_2 shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above *grade*, except where constructed completely within the exterior walls. Anchorage shall conform to the requirements of Section R1003.4.1.

TABLE R1001.1
SUMMARY OF REQUIREMENTS FOR MASONRY FIREPLACES AND CHIMNEYS

(Portions of table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929m^2.

NOTE: This table provides a summary of major requirements for the construction of masonry chimneys and fireplaces. Letter references are to Figure R1001.1 which shows examples of typical construction. This table does not cover all requirements, nor does it cover all aspects of the indicated requirements. For the actual mandatory requirements of the code, see the indicated section of text.

a. The letters refer to Figure R1001.1.
b. Not required in Seismic Design ~~Category~~ Categories A and B ~~or C~~.

Reason: The IBC Chapter 21 requirements for reinforcing and anchorage of masonry and concrete chimneys were extended to Seismic Design Category C by code change S193-07/08. That change appears in 2009 IBC Sections 2111.3 and 2111.4. This proposal intends to make the IRC minimum requirements for reinforcing and anchorage match the IBC because the effects of earthquakes and the risks to life safety from chimney collapse are independent of the code under which the chimney is permitted and constructed. Seismic Design Category C is defined in IRC Table R301.2.2.1.1 as the range of 0.33g S_{DS} 0.50g for soil Site Class D. Assuming soil Site Class D, this S_{DS} range represents a mapped short period (S_S) spectral response acceleration range of 0.32g S_S 0.55g. Earthquakes generating these moderate levels of short period ground motion (e.g., Nisqually Washington Earthquake (2001), Napa California Earthquake (2000), Coalinga California Earthquake (1983) have repeatedly caused collapse or partial collapse of large numbers of unreinforced or unanchored masonry chimneys. In at least two earthquakes, Borah Peak Idaho (1983) and Landers California Earthquake (1992), masonry chimney and fireplace collapses have resulted in fatalities.

To accomplish this change, a new section R301.2.2.2.6 is added to specify that the masonry or concrete chimneys in Seismic Design Category C must comply with sections R1001.3, R1001.4, R1003.3 and R1003.4. In each of those four sections, Category C is added to the list of Seismic Design Categories where chimney reinforcing and anchorage is necessary.

In R1003.3, Category C is deleted from the list of Seismic Design Categories where chimney reinforcement and anchorage are not required.

In Table R1001.1, footnote "b" is revised to delete Seismic Design Category C to be consistent with the changes to sections R1001.3, R1001.4, R1003.3 and R1003.4. Footnote "b" is used at two locations in Table R1001.1, in item H (vertical reinforcing) and in item S (anchorage).

In R1001.3, R1003.3, and R1003.4 and Table R1001.1 footnote "b" an editorial change is made to correct the word "Category" to the plural "Categories" as is currently used in section R1001.4 when more than one category is listed. Another editorial change occurs in R1003.4 where the word "and" between the words "masonry" and "concrete" is changed to "or" to match the wording used in the other three sections.

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

ICCFILENAME: Maiel-RB-3-R301.2.2.2.6-Ch 10

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that the failures may have been noncompliance rather than inadequate code. No data or substantiation was submitted to show that the code is inadequate.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Homer Maiel, PE, CBO, City of San Jose, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Chapters), requests Approved as Submitted.

Commenter's Reason: The Tri-Chapter continues to support RB16 as submitted. During the Preliminary Code Hearings in Baltimore, speakers from the Tri-Chapter as well as speakers from the FEMA and experts on earthquake evaluation and response spoke on behalf of the original code change proposal as submitted. Both the proponents and opponents of this code change proposal agreed that there were thousands of masonry chimney failures following prior small earthquakes throughout the United States. The documented ground motions for prior small earthquakes, such as the Nisqually Earthquake in Washington, the Napa Earthquake in California, the Landers Earthquake in California, and the Coalinga Earthquake in California, and the Borah Peak Earthquake in Idaho, are all examples of small earthquakes that created "short period" ground accelerations in the range of 0.32g<Ss< or = 0.55g. Short Period ground accelerations in this range are characteristic of Seismic Design Category "C" (SDC C). This code change specifically calls for minimal longitudinal steel reinforcement and attachment at the roof level of masonry chimneys to prevent documented chimney collapses following small and moderate earthquakes.

The proposed code change should also be approved as submitted in order to provide the same minimum protection of occupants of residential buildings constructed under the IRC as is provided for all buildings constructed under the IBC. The mitigation of the very real dangers posed from falling chimneys during minor earthquakes should not be a function of which code they were built under.

The IRC Committee failed to understand that this code change proposal is not designed to prevent masonry chimney failures during small earthquake events, but rather addresses the more important life-safety issue of chimney collapse. The collapse of masonry chimneys that are not reinforced with longitudinal steel and are not properly anchored at the roof structure of the building have contributed to excessive property damage, injury and even death following small earthquake events. Even when only a portion of a chimney falls, those pieces have the potential to kill and injure people in the vicinity of the chimney.

Finally, the Tri-Chapter does not agree that the thousands of documented chimney failures are due to "poor workmanship" alone and that this is cause to reject the proposed code change. In fact, by requiring minimum longitudinal reinforcement of masonry chimneys and by requiring attachment of masonry chimneys at the roof line we fully expect that the construction of masonry chimneys will receive better inspection and be more likely to be built to withstand small and moderate earthquakes without the potential for collapse.

In summary, we encourage all ICC voting members to support this code proposal as submitted. Minimal longitudinal reinforcement of masonry chimneys and attachment of masonry chimneys at the roof line of buildings in SDC "C" is a proven and cost effective solution to prevent the collapse of masonry chimneys in small and moderate earthquakes and to reduce property damage and save lives.

Final Action: AS AM AMPC____ D

RB19-09/10
Table R302.1

Proposed Change as Submitted

Proponent: Steven Orlowski, National Association of Home Builders (NAHB)

Revise table as follows:

TABLE R302.1
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	(Fire-resistance rated)	1 hour-tested in accordance with ASTM E 119 or UL 263 with exposure to both sides	<u><3</u> ~~5~~ Feet
	(Not fire-resistance rated)	0-Hours	<u>>3</u> ~~5~~ Feet
Projections	(Fire-resistance rated)	1-Hour on the underside	<u><2</u> ~~4~~ Feet
	(Not fire-resistance rated)	0-Hours	<u>>3</u> ~~5~~ Feet
Openings	Not Allowed	N/A	< 3 Feet
	25% Maximum of Wall Area	0-Hours	3 Feet
	Unlimited	0-Hours	5 Feet
Penetrations	All	Comply with Section R302.4	< 5 Feet
		None Required	5 Feet

Reason: The purpose of this proposed change is to retain the original fire separation distances to the dimensions used in *2003 International Residential Code*. During the 2004/2005 Code Development Cycle, the Code Committee disapproved this change given that the proponent failed to provide supporting evidence or data to sustain the increase in the fire separation distance. The committee's decision was overturned at the final action hearings without any additional substantiation being brought forth by the proponent. To this day, there are no known reports or studies that demonstrate the previously allowed 3 foot separation distance from the property line and 6 foot separation between structures failed to provide the minimum required safe distance for fire separation.

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

ICCFILENAME: ORLOWSKI-RB-4-T. R302.1

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels there is no compelling reason to change the 5 feet separation distance. This is consistent in the Assembly Action on RB184-09/10. The ICC membership voted for the 5 feet separation in past code cycles and the committee supports that.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Steve Orlowski, National Association of Home Builders (NAHB), requests Approved as Submitted.

Commenter's Reason: The committee voted against this proposal during the public hearings, stating that the ICC membership had voted against any decrease in the fire separation distance. Yet, there was a successful floor vote by the ICC membership on a similar proposal (RB184) submitted by the fire service. NAHB urges the attendees at the final action hearings to approve this code change that would reinstate the decreased fire

separation distances that were previously permitted in the 2003 IRC, based on the premise that the 2009 IRC requires residential sprinklers in all one- and two- family dwellings and townhouses. The code should be written on the basis of what is required in the model code and not on the possibilities of what may or may not be required at the state and local level when it is adopted.

Final Action: AS AM AMPC____ D

RB20-09/10
R302.1

Proposed Change as Submitted

Proponent: Don Davies, Salt Lake City Corporation, representing the Utah Chapter of ICC

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1. Structures without exterior walls at adjoining lot lines shall not have roof projections within 5'-0" of the lot line.

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: There are currently no provisions in the residential code to limit the roof projection for carports and patio covers where there is no exterior wall adjoining the lot line. Since carports and patio covers have openings exceeding 25% they must be placed at least 5 feet from the lot line as required in I.R.C. Table R302.1. Fire-resistance rating of the projections beyond the exterior walls is addressed in I.R.C. Table R302.1; but in the instance where there is no wall, rating a portion of the roof covering serves no useful purpose and is not addressed by Table R302.1 which deals with exterior walls.

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

ICCFILENAME: DAVIES-RB-1-R302.1

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this change is not needed as Table R302.1 already addresses projections. Also, referring to structures is vague and a list of specific structures would be more appropriate.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Don Davies, Salt Lake City Corporation, representing Utah Chapter, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1. ~~Structures~~ Carports and Patio covers without exterior walls at adjoining lot lines shall not have roof projections within 5'-0" of the lot line.

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Commenter's Reason: Table R302 addresses projections from an exterior wall, but where no wall exists as in a carport or a patio cover, there is no point of reference from which the projection measurement is taken. Measuring from a post or a beam, assuming that as the exterior wall, is problematic since the post or beam may be in the center of the carport or on the opposite side from the property line side. Allowing a carport to project to within 24" of the lot line with one-hour rated protection for 36" of the carport soffit makes no sense. Without a wall, the extended projection will direct heat and flames to a structure on an adjoining lot, and the protection intended by this portion of the code will not be provided. Simply stating a minimum distance to where the carport can project is a straight forward approach and meets the intent of the code. The term structures were deemed too vague by the committee, so we are using the terms carports and patio covers to address their concerns.

Final Action: AS AM AMPC____ D

RB22-09/10
R302.2, R302.2.4

Proposed Change as Submitted

Proponent: Michael Gardner, representing the Gypsum Association; Jason Thompson, PE, National Concrete Masonry Association (NCMA), representing the Masonry Alliance for Codes and Standards (MACS)

Revise as follows:

R 302.2 Townhouses. Each townhouse shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exception: A common ~~1 hour~~ 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R 302.2.4. Structural independence. Each individual townhouse shall be structurally independent.

Exceptions:

1. Foundations supporting *exterior walls* or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. Townhouses separated by a common 1~~-hour~~ 2-hour fire-resistance-rated wall as provided in Section R302.2.

Reason: (Gardner) Lost in the outcome of last fall's debate on residential sprinklers was the impact it made on the common walls that are often used to separate townhouse units. One of the approved proposals that incorporated sprinkler systems into townhouses reduced the rating on the common wall that can be used between townhouse units from two hours to one hour. This proposal is intended to restore the two hour rating to the common wall.

The 2009 IRC permits townhouses a structural independence exemption if they are separated by a common one-hour rated wall that complies with Section 302.2. The 2009 IRC also contains no mandatory sound transmission requirements for common walls. As a consequence, the 2009 IRC will permit two adjacent three story townhouse units to be separated by a common wall that displays no structural independence characteristics and has an STC rating of approximately 33.

Because of the reduced rating, a fire that overwhelms the sprinkler system in a room abutting the common wall will display an increased potential to adversely impact the structural integrity of the common wall and the adjacent townhouse units. In addition, the lack of a robust sound barrier between units creates the potential for a less than acceptable living environment.

The 2006 IRC required the common wall to maintain a two-hour rating. While the 2006 IRC also contained a structural independence exemption, the common two-hour wall required by the code provided an obvious level of increased fire protection not evidenced in the 2009 IRC. The 2006 code, by mandating a two-hour rating, also required the use of a wall that would automatically display a minimum STC rating almost 10 points higher than the minimum wall required by the 2009 code.

The code has never permitted the common wall that may be constructed by the exception to R 302.2 to display a rating that is lower than the rating that would be achieved by the standard charging language in R302.2. That section has historically required townhouses to be evaluated as separate buildings and to be constructed with separate and parallel exterior walls that separate the two adjacent units. The 2009 IRC now permits the common wall to have a lower rating than the basic walls prescribed by the code and also permits the common wall to be constructed without the structural independence characteristics required by R302.2.

Reason: (Thompson) Code change RB66-07/08 required townhouses constructed in accordance with the International Residential Code to be provided with automatic sprinkler protection. While this new requirement added a fire safety feature to townhouses the code change also reduced the level of fire safety that existed in the code by reducing the fire resistance rating required for the common wall separating dwelling units in townhouses. This code change will restore the previous IRC code requirement that the common wall separating dwelling units in townhouses to have a minimum fire resistance rating of 2-hours. There are several reasons why the common wall fire resistance rating needs to be returned to 2-hours.

First, Code Change RB66-07/08 justified the addition of mandatory sprinkler protection for townhouses based on sprinklers being the best tool for providing additional fire safety in residential occupancies. Given that the 2006 IRC already had an established level of fire safety for residential occupancies utilizing townhouse construction with 2-hour fire rated construction for the common wall, the goal for improving fire safety with the addition of sprinkler protection was not fully achieved. The existing level of fire safety was diminished by the reduction in the fire resistance rating of the common wall from 2-hours to 1-hour.

Second, Code Change RB66-07/08 created an inconsistency in the IRC. If two separate one and two family dwellings are constructed on individual lots and each built at the property line, Section R302.1 and Table R302.1 will require the exterior wall of each structure to be built with a 1-hour fire resistance rating using a fire exposure from both sides. The net result is that both dwellings are separated from the other adjacent, closely located dwelling by wall construction with a total cumulative fire resistance of 2-hours. Yet, if these same two individual structures are physically connected at the property line by a common wall the code permits the fire resistance rating between townhouse units to be reduced to 1-hour. The level of fire safety for these two dwelling configurations is not consistent

This code change achieves the full level of fire safety provided for in residential occupancies through the use of sprinkler protection and built-in fire resistant construction. It also will eliminate the fire safety inconsistency in the IRC between dwelling units built at property lines and dwelling units constructed as townhouses and connected at property lines by a common wall.

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

ICCFILENAME: GARDNER-RB-3-THOMPSON-RB-1-R302.2

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee recognizes there are similar occupancies in the IBC that allows 1-hour rated separation with fire sprinkler systems. The 1-hour rating should be retained as an incentive to local jurisdictions to retain the fire-sprinkler system.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Michael Gardner, Gypsum Association, requests Approval as Submitted.

Commenter's Reason: We continue to have concerns about the reduction of the hourly rating on the common wall that can be used to separate adjacent townhouse units constructed to the IRC.

Reducing the wall rating places the occupants of the units at greater risk in the event of a sprinkler system failure. It also creates the opportunity for a builder to install a code-compliant common wall with a low STC rating.

Section R302.2 requires townhouses to be considered as separate buildings and to be separated by fire-resistant exterior walls. Because the units are less than 5 feet apart, two independent one-hour walls have to be erected to separate adjacent units.

Prior to 2009, a historical exception to that language allowed the use of a two-hour common wall to separate adjacent units. In 2009, the exception was changed to permit the use of a one-hour common wall; however, the requirement in the body of R302.2 requiring two one-hour walls

was not modified. The reduction in rating for the common wall was justified by the language added to the 2009 IRC that required sprinkler systems to be installed in all townhouse units.

Because sprinklers are required in all townhouse construction, the reduction in hourly rating for the common wall is not justified as the exception permitting the one-hour common wall now creates a life safety threshold that is lower than that required by the basic code language of Section R302.2.

Public Comment 2:

Jason Thompson, PE, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards, requests Approval as Submitted.

Commenter's Reason: As pointed out in the reasoning statement for RB22, last code cycle code change RB66-07/08 justified the addition of mandatory sprinkler protection for townhouses based on sprinklers being the best tool for providing additional fire safety in residential occupancies. However, the existing level of fire safety was diminished in the IRC when RB66 also allowed a reduction in the fire resistance rating of the common wall from 2-hours to 1-hour. In addition code change RB66-07/08 created an inconsistency in the IRC when two separate one and two family dwellings are constructed on individual lots and each built at the property line. The IRC requires the exterior wall of each structure to be built with a 1-hour fire resistance rating with the net result that both dwellings are separated from the other adjacent, closely located dwelling by exterior wall construction with a total cumulative fire resistance of 2-hours. The level of fire safety for two dwelling separated by a common party wall configuration is not consistent with two dwellings separated by individual exterior walls. This code change eliminates this reduction in fire safety for dwellings built with a common wall and removes the inconsistency in the code for the fire resistance rating of walls between dwellings built with separate exterior walls and with common party walls.

Also, requiring the common wall between townhouses to have a 2-hour fire resistance rating is consistent with the requirements for party walls in the IBC. Section 706.1.1 of the IBC requires walls at property lines of adjacent buildings, and used for joint service between buildings, to be constructed as fire walls. IBC Table 706.4 requires fire walls and party walls between Group R-3 occupancies to have a 2-hour fire resistance rating with no reduction in the fire resistance rating for sprinkler protection. Common walls between townhouses (R-3 occupancies) in the IRC should also have 2-hour fire resistance ratings even though the townhouses are provided with sprinkler protection.

Finally the committee reason for disapproval is also not fully valid. The committee claims "there are similar occupancies in the IBC that allows 1-hour rated separation with fire sprinkler systems". That may be true for interior walls separating dwelling units in Group R-2 occupancies. However, building codes have always placed added emphasis on minimizing fire spread between separately owned properties as evidenced by the fire resistance requirements for exterior walls in Table 602 of the IBC and Table R302.1 of the IRC. Where these tables require the exterior walls to have a fire resistance rating no reduction in the fire resistance rating is permitted for fire sprinkler systems. The common wall between townhouses in the IRC, which serves as the exterior wall between separately owned properties, should have a fire resistance rating consistent with other exterior walls and with no reduction permitted for sprinkler protection.

Public Comment 3:

Rick Davidson, representing self, requests Approval as Submitted.

Commenter's Reason: The reduction in the fire rating for the walls separating townhouses to one-hour when only partial sprinkler systems are used is dangerous and short sited.

When the IRC Committee approved this code change, they stated that the IBC permitted reductions in fire ratings in sprinklered buildings so that reduction should be permitted in the IRC. But what the Committee failed to remember is that systems required in the IBC must be monitored and require periodic inspection. Systems permitted in the IRC do not have these safeguards.

Sprinkler systems required by the IRC are not required to be installed in concealed spaces such as attics and crawl spaces or in *attached garages*. Fires that occur or spread to these areas will not have sprinkler protection and the reduction in the fire rating between dwelling units through these areas is not warranted.

This exception allows only a one-hour wall between garages where previously either two one-hour or one two-hour wall would have been required. And no sprinkler protection is required in a garage.

This exception creates a huge inconsistency in exterior wall requirements between townhouses and single- or two-family dwellings that may be built near a lot line and don't enjoy the same reductions in fire ratings as townhouses do.

Sprinkler systems are not infallible. The National Fire Protection Association published a report in June 2007 entitled *"**U.S. EXPERIENCE WITH SPRINKLERS AND OTHER AUTOMATIC FIRE EXTINGUISHING EQUIPMENT**"* by John R. Hall, Jr. In that report Mr. Hall states: *"Based on 2002-2004 fires reported to U.S. fire departments, when sprinklers cover the area of fire origin, they operate in 93% of all reported structure fires large enough to activate sprinklers. When they operate, they are effective 97% of the time, resulting in a combined effectiveness reliability of 90%."*

Sprinkler systems can be shut off. The recent mortgage crises has resulted in scattered townhouse units being foreclosed and water services in these dwelling units shut off by the water utility both for nonpayment and because the dwelling units are not heated, again possibly for non-payment. This is done without the knowledge of the local building departments and even if the building departments knew of the utility shut offs; they are powerless to require a utility to provide service to a nonpaying customer. This results in occupied townhouses separated from non-occupied townhouses that have no sprinkler protection and only a 1-hour fire wall between them. Unoccupied dwellings are presumed to have a higher fire risk due to the potential for arson or vandalism and allowing the reduction in passive fire protection is inappropriate, dangerous, and short sited.

Passive fire protection will always be there.

Public Comment 4:

Rick Thornberry, P.E., The Code Consortium, representing Cellulose Insulation Manufactures Association (CIMA), requests Approval as Submitted.

Commenter's Reason: The International Residential Code Development Committee gave two basic reasons for recommending disapproval of this code change which would have restored the 2-hour fire-resistance rating for the common wall between townhouses allowed in the Exception to

R302.2 to the requirement that each townhouse have a minimum 1-hour fire-resistance rated exterior wall where they are adjacent to each other based on Table R302.1. They are as follows:

1. The Committee recognized that there are similar occupancies in the IBC that allow 1-hour rated separations with fire sprinkler systems.
2. The 1-hour rating should be retained as an incentive to local jurisdictions to retain the fire sprinkler system.

Regarding Item 1, basically the only time the IBC allows a 1-hour reduction in required separations where automatic sprinkler systems are installed is when the sprinkler system is an NFPA 13 sprinkler system. However, the IRC will allow an NFPA 13D or equivalent sprinkler system. As we all know, an NFPA 13D sprinkler system is primarily a life safety system and not a full property protection system. This is clearly stated in Section 1.2 Purpose of NFPA 13D as follows:

1.2.1 The purpose of this standard shall be to provide a sprinkler system that aids in the detection and control of residential fires and thus provides improved protection against injury and life loss.

1.2.2 A sprinkler system designed and installed in accordance with this standard shall be expected to prevent flashover (total involvement) in the room of fire origin, where sprinklered, and to improve the chance for occupants to escape or be evacuated.

But the wall provided to separate adjacent townhouses is not only intended to provide for life safety protection but also property protection so that a total burnout on one side of the wall will not effect the occupancy of the other side. Reducing the rating from 2-hours to 1-hour will significantly increase the likelihood that a total burnout could burn through the wall and cause fire damage and property loss to the townhouse on the opposite side. This is especially important since NFPA 13D sprinkler systems do not require that sprinklers be provided in the attic. Yet the attic will have a significant common space adjacent to the common wall serving both townhouses on each side of the wall. So if a fire gets into or starts in the attic, there is a significantly greater potential that the 1-hour wall currently allowed by the code will be breached.

It should also be noted that the common wall was originally required to have a 2-hour fire-resistance rating since townhouses are considered separate buildings. So the wall acted like a fire wall. This was allowed in lieu of the two 1-hour exterior walls previously noted above. Fire walls in accordance with the IBC also create separate buildings. Table 706.4 in the IBC specifies the minimum fire-resistance rating for fire walls. In no case is a fire wall allowed to have a fire-resistance rating less than 2-hours, even for Group R-3 occupancy buildings.

Regarding Part 2 of the Committee Reason, there should be no need to provide this trade-off as an incentive to local jurisdictions to retain the fire sprinkler system requirements in the IRC. The IRC needs to be treated as an entire code and it must be assumed that the code requirements act as an overall system to provide the required level of protection. This protection level should be based on the code as an entirety and not on the assumption that a jurisdiction may decide to make a modification or an amendment to the IRC when it adopts it for enforcement in that jurisdiction. Such an incentive, in our opinion, is unwise since it relies on the owners of the buildings on opposite sides of the common wall to maintain their automatic sprinkler systems in an operative condition at all times. Unfortunately, there is no supervision required for these systems and no fire department connection is provided for the fire department to boost the sprinkler system water supply as is typical of an NFPA 13 sprinkler system. Furthermore, the water supply to the system could be shut off for repairs and not turned back on since no supervision of the control valve supplying the water supply to the sprinkler system is required if the valve is locked open. Obviously, the owner of the townhouse would have the key to the lock on the valve so there would be nothing to prevent the owner from unlocking the lock and closing the valve for whatever reason. And it is not uncommon for the valve to remain closed since there is no supervisory reminder that the valve remains closed. It could easily be forgotten after the repairs have been made to the system.

There is also the question of the reliability of the sprinkler system water supply. Will it be available at all times when there is the possibility of a fire occurring? This is especially important in high seismic activity areas where fires often start soon after an earthquake and the water supplies in many cases are out of service due to main breaks and loss of power for extended periods of time.

In conclusion, we believe the reduction from 2-hours to 1-hour for the common wall separating townhouses as an Exception to the otherwise required 1-hour exterior walls for each townhouse is not justified for sprinkler systems installed based on NFPA 13D or an equivalent sprinkler system design. Thus, we strongly urge the Class A voting members to overturn the Committee's recommendation for disapproval and vote to approve this code change.

Final Action: AS AM AMPC____ D

RB23-09/10

R302.2.1, Figures R302.2.1(1)-R302.2.1(2)-R302.2.1(3) (New)

Proposed Change as Submitted

Proponent: Larry Wainright, Qualtim, Inc., representing the Structural Building Components Association (SBCA)

1. Revise as follows:

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating *townhouses* shall have a fire-resistance rating that is ~~be~~ continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*. Where the fire-resistance-rated wall or assembly is not continuous, the fire resistance rating shall be deemed continuous provided one of the following conditions is met:

1. A minimum one hour fire-resistance rating is provided on the floor or roof assembly that interrupts the fire-resistance rated wall. Fireblocking shall be provided per Section R302.11 (see Figure R302.2.1(1)). Or
2. Where an unrated floor or roof assembly interrupts the fire-resistance rated wall, the fire-resistance rating shall be deemed continuous provided:
   - 2.1. Where two one-hour walls are provided, a minimum of one 2x full height fireblock shall be installed in each of the one-hour walls as shown in Figure R302.2.1(2).
   - 2.2. Where one two-hour wall is provided, a minimum of two 2x full height fireblocks shall be installed on each side of the two-hour walls as shown in Figure R302.2.1(3).

2. Add new figures as follows:

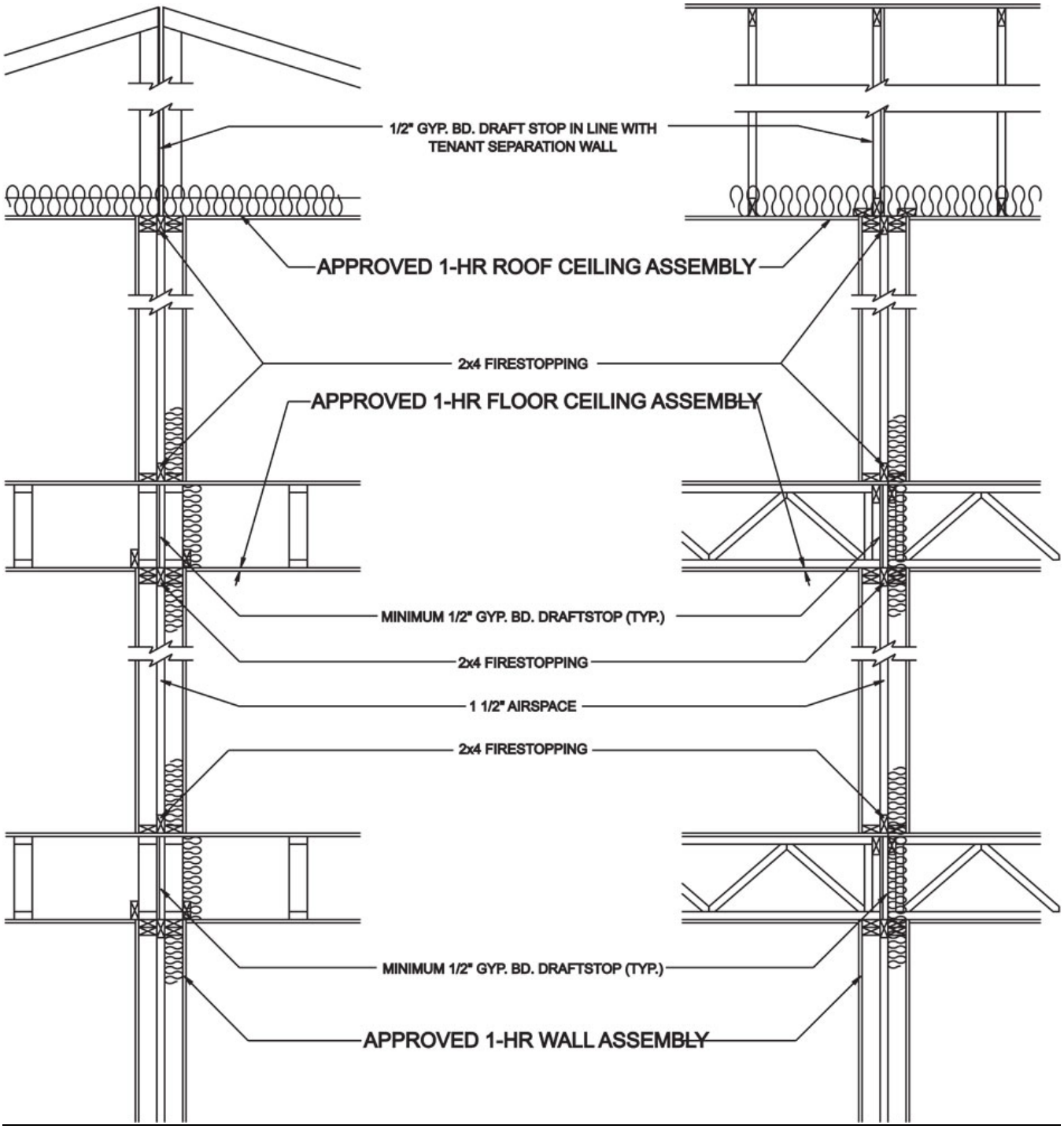


FIGURE R302.2.1(1)
Example assemblies that can be used to make up a one-hour rated system for separation between occupancies

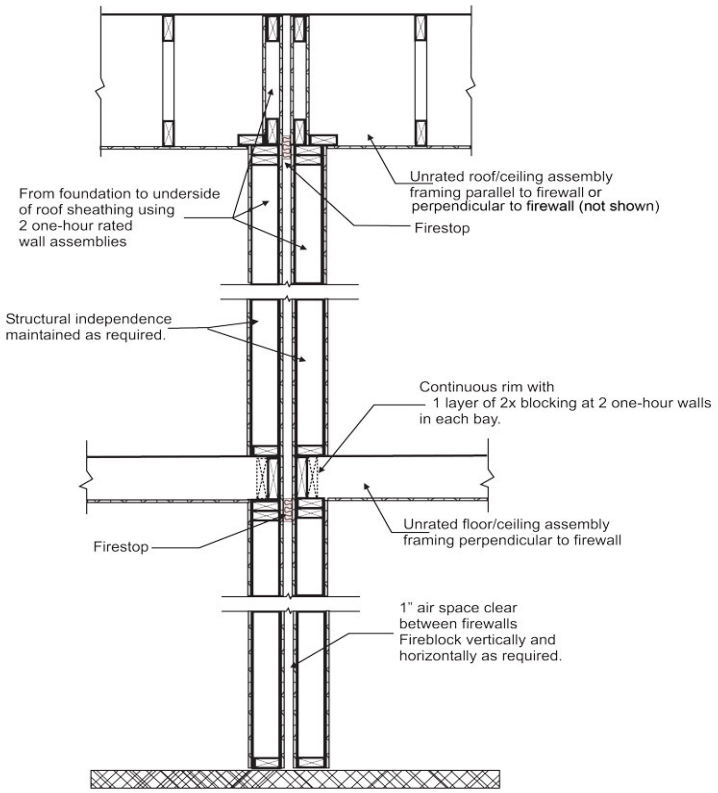


FIGURE R302.2.1(2)

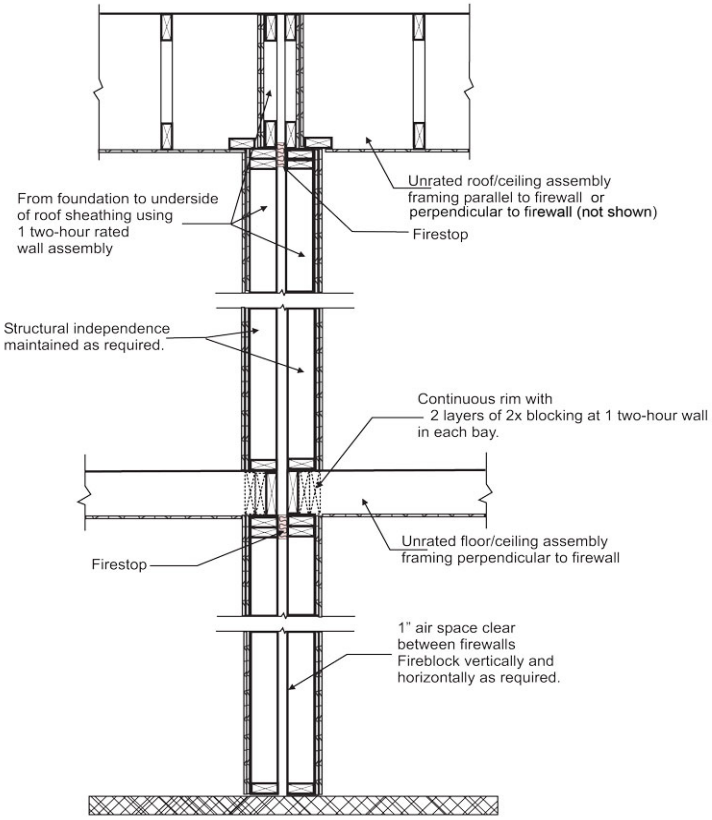


FIGURE R302.2.1(3)

Reason: The purpose of this code change is to clarify an existing provision within the code and to provide a prescriptive solution to that provision. First, it is necessary to clarify that is the fire-resistance rating of the wall assembly that needs to be continuous from the foundation to the underside of the roof sheathing, not necessarily the framing itself. Second, the prescriptive solution gives some guidance on one way the fire-resistance rating can be maintained, while allowing for framing members to bear on the wall. The use of full height blocking to attain the required fire-resistance rating is based on the use of sacrificial material and char rates based on ASTM E119 testing. Under ASTM E119 test conditions, lumber will char at a rate of 1 inch per 30-40 minutes. Therefore, at least 2 inches of sacrificial material is required to achieve the one hour rating. Likewise, 4 inches is required to achieve a 2 hour rating. Further information can be found in an article published and located at the following link: www.sbcmag.info/Archive/2006/sep/0609_code.pdf

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

ICCFILENAME: WAINRIGHT-RB-3-R302.2.1

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The language of this change is unclear and confusing. The details are not clear how they relate to tested assemblies. There are a lot of terms that are not defined. The figures limit the prescriptive solution to one specific way and there may be many others that would be acceptable. This should be reworked and brought back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Larry Wainright, Qualtim, Inc., representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exception: A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTME 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls, floor assemblies, ceiling assemblies and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.1 Continuity. The fire-resistance-rated walls and/or assemblies~~y~~ separating *townhouses* shall form a continuous fire-resistance rating that is ~~be~~ continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*.

Where a roof or floor assembly breaks the continuity of the fire-resistance rated wall, fire blocking shall extend from the top of the wall framing to the bottom of the floor or roof sheathing above. The following shall be considered acceptable fire blocking materials when designed and installed in the interstitial space above the fire-resistance rated wall:

1. Two layers of 2 inch nominal lumber fire blocking,
2. Two layers of 1-1/8 inch engineered rimboard,
3. Two layers of 5/8 inch Type X gypsum wallboard,
4. Two layers of 23/32 inch wood structural panels or
5. Other approved materials with equivalent fire resistance.

Commenter's Reason: The purpose of this public comment is to clarify an existing provision within the code. First, it is necessary to clarify that it is the fire resistance rating of the wall assembly that needs to be continuous from the foundation to the underside of the roof sheathing, not necessarily the framing itself. Second, when the framing is not continuous, direction is given to provide some guidance on how the fire resistance rating can be maintained, while allowing for roof and floor assembly framing members to bear on the fire-resistance rated wall. In townhouse construction, shorter floor framing spans are usually achieved by spanning to the common walls thereby increasing design efficiencies and potentially lowering the cost of construction.

While disapproved at the code development hearings, the committee asked that this be reworked and brought back. There were several concerns with the original proposal. First, the details originally provided have been removed because they caused some confusion and only provided one possible solution to this problem; and while wood trusses were shown in the details, the provisions would apply equally to all framing types. Second, it is important to reiterate that fire blocking is necessary to insure that if a fire gets in the floor/ceiling cavity, it cannot continue unimpeded into the separation wall. Third, the fire blocking in the floor/ceiling cavity above the separation wall needs to be sufficient to maintain the fire resistance rating of the wall. The use of full height fire blocking to attain the required fire-resistance rating is based on the use of sacrificial material and char rates based on ASTM E119 testing. Under ASTM E119 test conditions, lumber will char at a rate of 1 inch per 30-40 minutes. Therefore, at least 2 inches of sacrificial material is required to achieve the one hour rating. Further information regarding this testing can be found in an article published and located at the following link: www.sbcmag.info/Archive/2006/sep/0609_code.pdf.

Final Action: AS AM AMPC____ D

RB24-09/10
R302.2.2

Proposed Change as Submitted

Proponent: Jeffrey Anderson, representing the Chesterfield County Department of Building Inspections, Chesterfield, VA

Revise as follows:

R302.2.2 Parapets. Parapets constructed in accordance with Section R302.2.3 shall be constructed for *townhouses* as an extension of exterior walls or common walls in accordance with the following:

1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces.
2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.

   Exception: A parapet is not required in the two cases above when the roof is covered with a minimum class C roof covering, and the roof decking or sheathing is of noncombustible materials or *approved* fire-retardant-treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the exterior or common walls.

3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.

Reason: This change is proposed to provide consistency between the IRC and the IBC. Specifically, to make IRC Section R302.2.2 consistent with IBC Section 705.11(4). This change would make townhouse construction consistent between both the IRC and the IBC for this type construction.

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

ICCFILENAME: ANDERSON-RB-1-R302.2.2

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This change would impose severe restrictions on penetration at the roof. This does not mirror the IBC requirement on this issue.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Steve Orlowski, National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment:

Modify the proposal as follows

R302.2.2 Parapets. Parapets constructed in accordance with Section R302.2.3 shall be constructed for *townhouses* as an extension of exterior walls or common walls in accordance with the following:

1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces.
2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.

   Exception: A parapet is not required in the two cases above when the roof is covered with a minimum class C roof covering, and the roof decking or sheathing is of noncombustible materials or *approved* fire-retardant-treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the ~~exterior or~~ common walls.

3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.

Commenter's Reason: NAHB urges the attendees of the final action hearing to overturn the committees action and approve this proposal as modified. One of the concerns that the fire service reports is the spread of fires along the roof of adjoined dwellings, like townhouses. To allow penetrations to be within four feet of the firewall, defeats the purpose of requiring fire retardant lumber or 5/8 type x gypsum on the underside of the roof membrane. Any opening within the four feet poses as a potential hazard which will allow the passage of flames to impinge upon the adjoining dwelling unit. This code change will have a minimum impact on the cost of construction and will result in lowering the number of fire that spread along the roof.

Final Action: AS AM AMPC____ D

RB26-09/10
R302.5.1

Proposed Change as Submitted

Proponent: Sean DeCrane, Cleveland, OH Fire Department, representing the Cleveland Fire Department and the International Association of Fire Fighters

Revise as follows:

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 13/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 13/8 inches (35 mm) thick, or 20-minute fire-rated doors equipped with a self-closing device.

Reason: There are times when proposed code submittals require a very lengthy substantiation, and then there are times when code change proposals just make sense. I would believe this is one of those times where a code change proposal makes a lot of sense. We are seeking a requirement to install items for very minimal costs yet great life saving potentials.

As we place greater amounts of thermoplastics in our homes and garages, especially kids' toys, we are increasing the fuel load and toxic by-products. The most obvious by-product of incomplete combustion is carbon monoxide. We know how deadly carbon monoxide is to the occupants of homes. Carbon monoxide is also a by-product of the internal combustion engine. Especially during the winter months the fire service responds to numerous cases of potential carbon monoxide incidents. With an open door between the living quarters and the garage, where the car is warming up for the trip to work, we are allowing the free flow of carbon monoxide from the garage into the home. Some may not believe there is a concern with this situation and may also point out some difficulty in reporting the data of exactly how many individuals were killed by these incidents. Creating and submitting code proposals is about the present but also the future. With the reversal of the code requirement of a self closing door we are allowing millions of homes to be built with a potential safety hazard. Carbon monoxide is a silent and deadly killer and in many incidents the victims do not realize they are slowly being exposed to potentially life threatening levels of carbon monoxide. This is one of the reasons the ICC membership voted to require the installation of carbon monoxide detectors.

We know that requirement of carbon monoxide detectors will save lives. In fact, I have seen numerous responses where a detector alerted an occupant to the presence of dangerous amounts of carbon monoxide, which in turn, allowed them to notify the fire department. With a lack of a requirement of a self closing door we have the potential of creating a Peter Cried wolf situation that will be played out across the country. A self closing door helps to protect the occupants of a home from the dangers in the garage. During the fall and winter months many occupants warm their car before leaving for work or to run an errand. With the increase use of remote starters many of these individuals are engaging their vehicle without visual contact. This creates a potential for the migration of carbon monoxide to the living quarters, even if this amount is not in a lethal range it will be in range to initiate a response from the CO detector, thereby, requiring a response from the local fire department. A response to requires fire fighters and equipment and incurs costs. It also places a responding company in emergency mode while responding increasing the risks to those fire fighters and other drivers at an increased risk. If the fire service downgrades responses to CO alarms then we risk the potential of placing citizens at risk who are truly experiencing a CO emergency. The argument is not to remove the detectors but to place an added protection of a self closing door between the living quarters and the garage.

Even if an individual does not believe that Carbon Monoxide is a true threat there are additional products of combustion that are far deadlier than CO. Hydrogen Cyanide is increasingly being identified as a potential life hazard in fire incidents. In a report published by the Cyanide Poisoning Treatment Coalition, it is reported when the National Institute of Occupational Safety and Health completed their studies of the tragic Station Night Club fire in Warick, RI they found "Within seconds of the ignition of the fire, concentrations of the toxic products carbon monoxide and hydrogen cyanide soared and oxygen levels plummeted to create conditions incompatible with sustaining life"[1]. The report noted "that hydrogen cyanide is approximately 35 times more toxic than carbon monoxide during acute exposure". In tests conducted and referenced by the report, "a series of experiments the Swedish National Testing and Research Institute (SNTRI), assessed the emission of hydrogen cyanide and carbon monoxide under both non-flaming (i.e. pyrolizing) and flaming (i.e. fire) conditions during burning of wool, nylon, synthetic rubber, melamine, and polyurethane foam. The results show that all of these substances liberated high quantities of cyanide when burned-particularly under pyrolizing conditions characterized by low oxygen". If we take a step back and look at most garages, when the garage door is closed, they are box structures that will allow smoke and the by-products of a fire to travel in the least restrictive path, the open door. An open door between the garage and living quarters allows the easy access for the highly toxic by-products of combustion.

To summarize, deadly by-products of combustion, accidental carbon monoxide poisonings from vehicles and needless nuisance alarms are strong, and compelling, arguments to support this code change proposal requiring self closing doors between the garage and living areas in one and two-family homes.

[1] *Smoke Perceptions, Myths and Misunderstandings*, Cyanide Poisoning Treatment Coalition

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

ICCFILENAME: DECRANE-RB-3-R302.5.1

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: There is no data presented to substantiate the need for the door closer. This is a fire-rated door in a non-rated wall assembly and there is no reason for sealing or a closer. Other doors are permitted without a closer. The owner can disable this manually upon the certificate of occupancy.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This item is on the agenda for individual consideration because the proposal received a successful assembly action and public comments were submitted. Note that the assembly action, Approved as Submitted, will be the initial motion on the floor for consideration when this item is called.

Public Comment 1:

George Kellogg, City of Rocklin, representing The Sacramento Valley Association of Building Officials, requests Approval as Submitted.

Commenter's Reason: In disapproving this proposed code change the committee mentioned three general areas of concern that included lack of substantiation for the closure, a separation that has no special significance, and a safety device that can be disable. The proposal would have added the requirement for a self closing device to a door between an attached garage and a dwelling unit. From personal experience, in forensic follow up on a fire that involved the house-garage separation, I have seen how the assembly of the old UBC, that included a self closing door, performed. The assembly performed well, slowing the fire that started in the attached garage, allowing the fire department time to arrive and save the residence. The fire had spread though a fixture into the attic but was stopped at the wall between the garage and the kitchen which included a closed fire door. Eventual fire breaching occurred at the ceiling openings rather than the door. Bottom line here is that the rated closed door made a real difference. That someone can disable a safety device should never be a reason for not providing it in the first place. Regarding the committee's comment that other doors are permitted without a closer, I hope no one is mistaking other doors in a residence as being the same situation as the door between the garage and the house. The code itself in the present form makes specific requirements for this door in the separation between the garage and dwelling unit.

Public Comment 2:

Rick Davidson, representing self, requests Disapproval.

Commenter's Reason: This proposal was disapproved by the IRC Committee.

Almost annually, the membership is faced with a proposal to require closers on doors between the house and garage. The membership has consistently voted these proposals down. Primary among the reasons for these proposals being turned down is the lack of any documentation indicating closers on these doors increases the safety of the buildings. In fact, certain legacy codes, including the code on which the IRC was based, did not require closers on these doors and there is no documentation to indicate that homes built under these codes are any less safe than ones that were not.

With this proposal, one argument seems to be the proponents feeling that it "Makes Sense". But what "makes sense" to one person may not "make sense" to someone else. Code changes should be based on need supported with necessary documentation, not just on whimsy.

As is sometimes the case, anecdotal testimony is given to support proposals. But anecdotal testimony is not credible if it is not backed up by studies, statistics and research. There is almost always an equal amount of anecdotal evidence to suggest the contrary.

In this case, it has been argued without substantiation that people will throw open the door to a garage fire and leave it open and allowing the fire to spread into the house. For years the fire service has taught that whenever someone suspects a fire on another side of a door that they should feel the temperature of the door and not open it if they believe there is a fire on the other side. Has this teaching gone by the wayside?

This door will ordinarily be closed for security or to keep out heat or cold. Most people understand the concept of containing a fire in a garage and will close the door if, for some reason, they had opened it.

The code does not require a fire separation between the dwelling and garage. It only requires that gypsum board be placed on the garage side of the wall between the house and garage. Gypsum board joints are not required to be treated. Doors between the house and garage are not required to be rated. The proposal requires that these non-rated doors have ***self-closing*** devices. The term as it is applied here is undefined. Remember, these are not rated doors. A self closing device could mean spring hinges or it could mean a screen door spring or a rope, pulley, and a weight. There is no guidance in the language to encourage uniform enforcement. The language doesn't state that the self-closing device must be "approved". Therefore the building owner is fully within their rights to use whatever type of closer will slam the door shut.

And, the argument is made that the door is necessary to stem the flow of carbon monoxide into the home when cars are started in a garage to warm up and more than half of the space given to the argument focuses on carbon monoxide. Testimony was given at the Baltimore hearings that cold engines give off more carbon monoxide adding more danger. This is all anecdotal testimony.

The amount of carbon monoxide given off by cold engines is overstated. According to the US Environmental Protection Agency and in recognition of the fact that cold engines give off more CO, the 1990 Clean Air Act calls for 1994 and later cars and light trucks to meet federal carbon monoxide standards at 20 degrees Fahrenheit whereas the old rules required those standards be met at 75 degrees Fahrenheit. So the risk of increased CO levels emitting from cold engines is significantly reduced. Additionally, new car engines warm quickly reducing the time when any elevated levels of CO may occur.

Furthermore, following are excerpts from an article entitled:

The Role of Catalytic Converters in Automobile Carbon Monoxide Poisoning[*] A Case Report by Bradley Vossberg, MD and Judah Skolnick, MD, FCCP

[*] From the Frazier Rehab Center, Jewish Hospital Health Network, Louisville, KY.

Inhaling motor vehicle exhaust fumes is a common method used by people attempting to commit suicide; however, the decreased carbon monoxide concentrations found in the exhaust of late-model automobiles equipped with catalytic converters are changing the clinical presentation of exhaust inhalation.

Closed-environment exposure to MVEGE from automobiles not equipped with catalytic converters can result in death within 30 min. The introduction of catalytic converters beginning with 1975 new-car models dropped CO emission rates to 6.00 g/min. By 1989, the average new-car CO emission at idling was 0.22 g/min. The catalytic conversion process removes CO, hydrocarbons, and nitrogen oxide; the resultant emission is a more desirable mixture of nitrogen, CO_2, and water. ***Contemporary three-way catalytic converters eliminate > 99% of CO emissions.***

Given the increased efficiency of modern catalytic converters, patients presenting with closed-environment MVEGE exposure may have much lower HbCO levels than would have been previously expected; in some cases, the HbCO level may be normal. Other important factors to be considered are the role of supplemental O_2 given at the scene and the time taken to obtain the HbCO level.

More findings related to carbon monoxide poisoning can be found in a technical paper entitled "***Reducing the Risk of Accidental Death Due to Vehicle-Related Carbon Monoxide Poisoning***" by **Linsey C. Marr, Glenn C. Morrison, William W. Nazaroff, and Robert A. Harley,** *Department of Civil and Environmental Engineering, University of California, Berkeley, California.* This technical paper reports on studies and analysis of computer modeling undertaken to determine the risk of death from CO poisoning in homes and garages from automobile exhaust. Among the findings: "The risk of death ranged from 16-21% for a 3-hr exposure ***in*** a garage to 0% for a 1-hr exposure in a house."

With any study with so many variables, one can question the validity of the study. This one is no different. Among the difficulties in modeling the conditions were numerous variables including:

Age and condition of the motor vehicle
Air exchange rates for the garage and dwelling
Size of the garage and dwelling
Length of time the vehicle is running
Amount of fuel in the fuel tank
Age and health of the individual
Temperature and weather conditions
Newer vehicles have more effective catalytic converters
Socioeconomic factors may result in older, less efficient vehicles stored outside or garages with higher air exchange rates

But the study was based on very conservative conditions and it was pointed out that the risks may actually be overestimated.

The study points out that unintentional CO deaths from automobiles do occur. But most all of these deaths occurred ***in*** the garage. The most frequent cause of CO deaths were a driving into a garage (often under the influence of alcohol or drugs) and leaving the engine running (42% of deaths) and starting the car to perform vehicle maintenance (25%) or to provide heat (23%).

Importantly, the study points out that even these deaths are dropping at a rate of about 7% a year as older vehicles are replaced by newer, more efficient ones. In fact, in the technical paper by **M. Shelef** titled "***Unanticipated benefits of automotive emission control: Reduction in fatalities by motor vehicle exhaust gas***" SAE Technical Paper No. 922335, Society of Automotive Engineers: Warrendale, PA, 1992, Shelef argued that reducing CO poisoning deaths may be the biggest benefit from current motor vehicle emission control programs, even though the programs are motivated by concentration standards for outside air.

After reading the various reports and studies on automobile carbon monoxide emissions, it is difficult to come to any conclusion that automobile generated carbon monoxide creates any sort of hazard in the home that would be mitigated by putting closers on garage doors and the proponent has provided no statistical evidence that it does.

But beyond that, it is necessary to look at what you are asked to believe is common practice. That is that a home occupant would start their car parked in a cold garage, go into the home leaving the door open, and allow the carbon monoxide as well as the noise and cold air to enter the house unabated and ignored. Then you are further led to believe that the homeowner would allow this to happen long enough for carbon monoxide levels to build to dangerous levels all the while forgetting why they started the automobile in the first place. This is a fairy tale.

I suggest that people will not leave the door to a frigid garage open, they will not want the cold air and noise to infiltrate their home, and they will not leave the automobile running for extended periods of time but will continue on with whatever caused them to start the automobile in the first place.

Last, the argument is made that the door is necessary to protect the occupants of the dwelling from hydrogen cyanide. The example is then given of the Station Night Club fire and the deaths that resulted from that tragedy. But comparing the circumstances surrounding an old overcrowded night club and a new dwelling are like comparing apples and horse shoes. They are two different types of structures housing two different occupancies.

Homes have multiple smoke alarms. If a fire occurs in a garage and smoke enters the home by whatever means, the smoke alarms would sound allowing the occupants to exit. There is no technical data to support the notion that a garage door would frequently be left open and that fires spread into dwellings through these open doors.

As code officials, we are morally and ethically obligated to explain to a homeowner why a code requirement exists. How can we, with any honesty, tell a homeowner that they must comply with a rule that has no basis in fact? It "makes sense" that we shouldn't require the public to spend money to correct a problem that doesn't exist. Please support the IRC Committee's action for disapproval.

Final Action: AS AM AMPC____ D

RB31-09/10
R302.7 (New), R502.14 (New), Table R502.14 (New)

Proposed Change as Submitted

Proponent: Dennis Pitts, American Forest and Paper Association

Add new text and table as follows:

R302.7 Floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch (12.7 mm) gypsum wallboard ceiling membrane.

Exception:

1. Floor assemblies protected by an automatic sprinkler system in accordance with NFPA13, NFPA 13R, NFPA13D, or Section R313.
2. Floor assemblies having a minimum fire resistance of 15 minutes, supporting at least 50% of the full design load, and complying with one of the following:
   2.1. Tested in accordance with ASTM E119 or UL 263, or;
   2.2. Determined in accordance with *International Building Code* Section 721.
3. Floor assemblies located directly over a crawl space.
4. Floor assemblies complying with Section R502.14.
5. A portion of a floor assembly area not greater than 100 square feet per story.

R502.14 Fire resistant assemblies. Wood floor assemblies shall comply with the provisions of Section R302.7 or any one of the following:

1. Wood floor assemblies using dimension lumber equal to or greater than 2 inches in thickness by 8 inches in width, nominal.
2. Wood floor assemblies using structural composite lumber, complying with ASTM D5456, equal to or greater than 1 ½" in thickness by 7 ¼" in width.
3. Wood floor assemblies having a minimum fire resistance time of 15 minutes determined from any of the following options or the sum of the times from any combination thereof:
   3.1. Time assigned to a ceiling membrane or membranes in Table 502.14.
   3.2. Finish rating time for a ceiling membrane not listed in 502.14.
   3.3. Time to structural failure of framing members, supporting at least 50% of the full design load, and complying with one of the following:
      3.3.1. Tested in accordance with ASTM E119 or UL 263, or;
      3.3.2. Determined in accordance with *International Building Code* Section 721.

TABLE R502.14
TIME ASSIGNED TO CEILING MEMBRANES

DESCRIPTION OF FINISH	TIME (MINUTES)[A]
3/8" gypsum *board*	*10*
½" gypsum board	*15*
5/8" gypsum board	20
½" Type X gypsum board	25
5/8" Type X gypsum board	40
Double 3/8" gypsum board	25
3/8" wood structural panel	5
½" wood structural panel	10
5/8" wood structural panel	15

a. Times for individual membranes are additive.

Reason: The fire service has asked for minimum fire resistance of floor/ceiling systems equivalent to 2x lumber floor construction. The basis of the requirements assume that a floor/ceiling assembly constructed using 2x lumber and loaded to 50% of full design load will provide 15 minutes of structural fire resistance as confirmed by recent UL testing reported in *Structural Stability of Engineered Lumber in Fire Conditions*.

The proposed R302.7 provides a simple method of meeting this 15 minute requirement for all floor assemblies by requiring ½" gypsum wallboard as a protective ceiling membrane. Exceptions to this requirement are provided.

The proposed R502.14 provides additional methods of meeting this 15 minute requirement for wood floor framing, including different options for ceiling membrane protection recognized in IBC 721.6, finish ratings from approved ASTM E119 test reports, fire test results from ASTM E119 tests, structural fire resistance calculations per IBC 721.1, or any combination of these provisions.

The proposed Table R502.14 is taken from IBC Table 721.6.2(1).

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

ICCFILENAME: PITTS-RB-3-R302.7-R502.14

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this is a good start and the proponent should work with the proponents of RB85-09/10 through RB88-09/10 to bring back a solution that protects the firefighters and the occupants. The modification that was ruled out of order would be a good basis to begin for rework and bring back. There should be ways other than fire-rating to achieve the solution. Also, this change would force the use of dimensional lumber.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Jonathan Humble, AIA, American Iron & Steel Institute, representing American Iron and Steel Institute and Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R302.7 Floor separation. Floor assemblies within dwelling units shall have a minimum of ½ inch (12.7 mm) gypsum board applied to the underside of the framing members in accordance with R702.3, when not required elsewhere in this code. This provision shall not supersede Sections R302.3, R302.4 or R302.5 where fire resistance ratings or greater thicknesses of gypsum board are required. Penetrations through the gypsum board shall be allowed for stairways, ducting, piping, and electrical and telecommunications outlet boxes, wiring and conduits.

Exceptions:

1. Floor assemblies located over crawl spaces, where the crawl space does not contain mechanical equipment or water heater(s).
2. Dwellings protected with an automatic sprinkler system designed and installed in accordance with NFPA 13D or in accordance with Section P2904.

(Renumber remaining sections)

Commenter's Reason: We propose to modify the original proposal with a product and provision neutral approach to code enforcement. At the 2009 code hearings there were five (5) proposals on the same subject. Each had their own spin on the approach to a design which would accomplish the goal of providing the fire service with some separation of spaces from spaces where framing members that are normally exposed in dwellings today. In this case that separation is gypsum board, not unlike the protection outlined in IRC Section R302.6. Unfortunately, it was the number of variations and subsequent opinions of preference which convinced the code development committee to recommend disapproval for all five of those proposals (e.g. RB31, RB85, RB86, RB87, and RB88).

The modification acts on the following aspects:

Title:
The title chosen is "floor separation" which more appropriately describes the intent.

Neutral Approach:
The modification before you attempts to neutralize those original opinions by focusing on the basic applications necessary for that separation. The modification is product neutral, meaning it applies to all light frame constructions without exception. In addition, the provision is proposed for inclusion into Chapter 3 which further retains that neutrality.

Coordination:
The modification coordinates the other provisions which require gypsum board by referencing the specific sections and the priority, in the second sentence.

Penetrations:
The modification also addresses the impact of stairs, ducting, piping and electrical wiring and conduit penetrating the gypsum board ceiling, in the third sentence.

Exceptions
The modification includes only those exceptions that were found to be a common theme amongst the five original proposals, and practical for this application.

Public Comment 2:

Larry Wainright, Qualtim, Inc, representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R302.7 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch (12.7 mm) gypsum wallboard membrane, 5/8 inch (15.9 mm) wood structural panel membrane, or equivalent on the underside of light frame construction, steel bar joists and wood chord / metal web joists.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, NFPA 13R or NFPA 13.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   - 3.1 The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   - 3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.

NFPA 13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height.

Commenter's Reason: RB31-09/10 merely proposes to require a minimum of ½" gypsum wallboard, or equivalent on all unprotected floor assemblies with exceptions for sprinklered buildings, certain crawlspaces and other limited areas that would otherwise be difficult to cover due to obstructions. SBCA's position on this subject is to provide a requirement that applies equally to all building component types and does not provide a competitive advantage to specific types of construction where they would be exempt from the requirements.

The following link shows statistics of firefighter deaths. It is a global report that shows all firefighter deaths and their causes from 1980-2008. This report shows that less than 5% of all firefighter deaths occur from injuries sustained in structural collapses.
http://www.sbcindustry.com/images/fire/firefatalstats.pdf

The following spreadsheet is a list of NIOSH reports showing firefighter fatalities that involved a structural collapse. Of those reports, 11 involved firefighter deaths from the collapse of solid sawn lightweight construction and 9 (with potentially 2 more) involved I-joists, MPC wood trusses, and steel trusses combined. This shows that there is no compelling evidence to suggest that engineered products are any more dangerous than solid sawn materials in real fire situations.
Links to the full NIOSH reports are included for more details.

NIOSH Report date	Construction	SBCs	State	Fatality #	NIOSH Report # (link)
4/4/2008	Solid Sawn 2x10- Floor collapse		OH	2	F2008-09
7/5/2008	Brick parapet wall collapse		TX	1	F2008-21
7/22/2008	Solid Sawn - Floor collapse		IL	1	F2008-26
1/26/2007		I-Joist- Floor collapse	TN		F2007-07
2/4/2007	Canapy collapse on garage - traditional wooden construction		PA	2	F2007-08
2/21/2006	Wall collapse-ordinary construction		AL	2	F2006-07
6/25/2006		I-Joist Floor collapse	IN	1	F2006-24
8/13/2006		I-Joist/Floor trusses - Floor collapse	WI	1	F2006-26
12/30/2006	Collapsed awning- 2x4 framing lumber		TX	1	F2007-01
2/19/2005	Solid Sawn roof collapse (wood framed building		TX	1	F2005-09
1/9/2004	Solid sawn - floor collapse		PA	1	F2004-05
4/8/2004	Brick façade collapse		TN	1	F2004-37
1/20/2003	Crushed by concealed chimney - balloon frame		PA	1	F2003-04
6/15/2003		Open web steel truss-roof collapse	TN	2	F2003-18
2/11/2002	Brick veneer collapsed. Wood frame platform construction		TX	1	F2002-07
3/4/2002	Wood frame w/masonry veneer - floor collapse		NC	1	F2002-11

NIOSH Report date	Construction	SBCs	State	Fatality #	NIOSH Report # (link)
3/7/2002		LW Pre-engineered trusses w plywood sheathing & various floor coverings	NY	2	F2002-06
7/4/2002	Duplex -twin frame of a balloon frame - roof collapse		NJ	3	F2002-32
9/14/2002	Balloon frame- roof collapse		IA	1	F2002-40
9/30/2002	Parapet wall collapse		IN	1	F2002-44
11/1/2002	Exterior wall collapse- balloon frame		PA	1	F2002-49
11/25/2002	2x10s heavy timber roof - collapse		OR	3	F2002-50
2/25/2001	Wall collapse-ordinary construction		WI	1	F2001-09
3/8/2001		MPC wood trusses - floor collapse	OH	1	F2001-16
3/18/2001	2nd floor collapse - unspecified construction		MO	2	F2001-15
6/16/2001		MPC roof trusses-roof collapse	SC	1	F2001-27
2/14/2000		MPC roof trusses-roof collapse - McDonalds	TX	2	F2000-13
4/20/2000		MPC floor trusses- floor collapse	AL	1	F2000-26
12/28/2000		MPC roof trusses-roof collapse	AR	4 injured	F2001-03
1/10/1999	Balloon frame- roof collapse (singled our balloon framing in notes of action)		CA	1	99-F03
1/19/1999	Chimney Collapse - fire investigator		NY	1	99-F06
3/8/1998		Wooden truss roof collapse (unsure if SBC)	CA	1	98-F07
6/5/1998	2nd level collapse - wood frame		NY	2 and 4 seriously injured	98-F17
6/11/1998	Roof porch collapse - tin roofing supported by 4 colums		VA	1	98-F18
9/5/1998	Parapet wall collapse - heavy wood truss construction		VT	1	98-F20
8/29/1998	2x10s roof - collapse		MS	2	98-F21
12/31/1998	Balloon frame walls & heavy wood gabled roof - roof collapse		GA	1	99-F04
2/17/1997	Wood framing - floor collapse		KY	1	97-04
3/18/1996		Roof trusses 2x6 collapse - not sure if SBCs	VA	2	96-17
Total:	11	9 (with potential 2 more)			

Public Comment 3:

Larry Wainright, Qualtim, Inc, representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R302.7 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch (12.7 mm) gypsum wallboard membrane, 5/8 inch (15.9 mm) wood structural panel membrane, or equivalent on the underside of light frame construction, steel bar joists and wood chord/steel web joists.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, NFPA 13R or NFPA 13.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   3.1 The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Solid sawn wood joists of at least 2x10 nominal.
5. Metal Plate Connected Wood trusses

NFPA 13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height.

Commenter's Reason: This public comment merely proposes to require a minimum of ½" gypsum wallboard, or equivalent on all unprotected floor assemblies with exceptions for sprinklered buildings, certain crawlspaces and other limited areas that would otherwise be difficult to cover due to obstructions. In addition, solid sawn 2x10 lumber and MPC Wood Trusses are exempted. SBCA's position on this subject is to provide a requirement that applies equally to all building component types and does not provide a competitive advantage to specific types of construction where they would be exempt from the requirements. Recognizing that this may not be possible, this comment offers a compromise where those products that survive the longest in fires are exempted.

Final Action: AS AM AMPC____ D

RB35-09/10
R302.11, M1501.2 (New)

Proposed Change as Submitted

Proponent: Julius Ballanco, PE, JB Engineering and Code Consulting, P.C., representing In-O-Vate Technologies, Inc.

1. Revise as follows:

R302.11 Fireblocking. In combustible construction, fireblocking shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top *story* and the roof space.

Fireblocking shall be provided in wood-frame construction in the following locations:

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs, as follows:
   1.1. Vertically at the ceiling and floor levels.
   1.2. Horizontally at intervals not exceeding 10 feet(3048 mm).
2. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R302.7.
4. At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an *approved* material to resist the free passage of flame and products of combustion. The material filling this annular space shall not be required to meet the ASTM E 136 requirements.
5. For the fireblocking of chimneys and fireplaces, see Section R1003.19.
6. Fireblocking of cornices of a two-family *dwelling* is required at the line of *dwelling unit* separation.
7. At penetrations of walls by dryer exhaust duct at the dryer location in accordance with Section M1501.2.

2. Add new text as follows:

M1501.2 Dryer exhaust duct penetrations. Where a clothes dryer exhaust duct is located within a framed wall, the penetration of the wall membrane at the location of the dryer shall have the annular space sealed with noncombustible material, approved fire caulking, or a noncombustible dryer exhaust duct wall receptacle.

Reason: This change corrects the concerns expressed during the last cycle. I have modified the proposed change to remove penetration of rated walls, since such penetrations are not permitted by the Code. The remaining issues have been addressed as suggested by the Code Committee.

The difference between a dyer exhaust duct penetration and other penetration is that it is in close proximity to a fuel fired appliance or electric heating appliance. Dryers are more prone to fire than other appliances. To protect the structure, it is important to have a higher level of protection.

The language in this change is consistent with the requirements found in the International Mechanical Code.

The CPSC identified 15,600 fires associated with dryers in a single year. Studies have shown that metal ducts protect the structure from the spread of fire. Additionally, noncombustible material or fire caulk around the annular space prevents the fire from spreading into the wall or ceiling cavity. The same can be accomplished with manufactured noncombustible receptacles. The noncombustible receptacles also allow for the proper storage and recoil of the transition flexible duct to a metal duct.

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

ICCFILENAME: BALLANCO-RB-1-R302.11

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this is product driven and it would limit the options available to seal around the dryer duct exhaust. This change would require protection around a penetration in a non-rated wall assembly.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Julius Ballanco, PE, JB Engineering and Code Consulting P.C., representing In-O-Vate Technologies, Inc, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.11 Fireblocking. In combustible construction, fireblocking shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top *story* and the roof space.

Fireblocking shall be provided in wood-frame construction in the following locations:

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs, as follows:
   1.1. Vertically at the ceiling and floor levels.
   1.2. Horizontally at intervals not exceeding 10 feet (3048 mm).
2. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R302.7.
4. At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an *approved* material to resist the free passage of flame and products of combustion. The material filling this annular space shall not be required to meet the ASTM E 136 requirements.
5. For the fireblocking of chimneys and fireplaces, see Section R1003.19.
6. Fireblocking of cornices of a two-family *dwelling* is required at the line of *dwelling unit* separation.
7. At penetrations of walls by dryer exhaust duct at the dryer location in accordance with Section M1501.2.

M1501.2 Dryer exhaust duct penetrations. Where a clothes dryer exhaust duct is located within a combustible framed wall, the penetration of the wall membrane at the location of the dryer shall have the annular space sealed with one of the following methods or materials:

1. ~~with~~ N~~n~~oncombustible material,
2. A~~a~~pproved fire caulking, putty, or foam,
3. ~~or a~~ A noncombustible dryer exhaust duct wall receptacle
4. 2 inch nominal lumber isolating the wall cavity space above the penetration.

Commenter's Reason: The Committee thought the original proposal did not include all of the available options. The modification adds the option of firestopping with 2 inch nominal lumber. This is a current method that should be maintained. The fire caulking has also been expanded to include putty or foam.

There was also concern that this would prohibit plastic dryer boxes. This modification would clarify that plastic boxes could be installed. The wall cavity above the plastic box would have to be isolated with 2 inch nominal lumber above the box, or fire caulk, putty, or foam could be added above the plastic box.

Final Action: AS AM AMPC____ D

RB38-09/10
R305.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN

Revise as follows:

R305.1 Minimum height. Habitable space, hallways, ~~bathrooms, toilet rooms,~~ laundry rooms and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms and toilet rooms shall have a ceiling height of not less than 6 feet 8 inches (2036 mm) including above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead in showers or tubs equipped with showerheads.

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. ~~Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2036 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1. The ceiling height above fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2036 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.~~
2. The ceiling height above water closets and lavatories shall be permitted to be of any height.

Reason: First section R305.1 sets a minimum ceiling height for bathrooms and toilet rooms at 7 feet. Then Exception 2 reduces that ceiling height in bathrooms (but not toilet rooms) to 6'8" at the center of the front clearance area for fixtures shown in Figure R307.1 and in tubs and showers with showerheads. It is safe to assume that toilet rooms should have been included in this section. It is probably also safe to assume that ceiling heights in bathrooms and toilet rooms need only be 6'8" at any location in the room, not just in the most used areas of the room. It isn't reasonable to think that the ceiling heights in these rooms should be 7 feet but only 6'8" near the fixtures, but this is what the text implies. Since bathrooms and toilet rooms do not have "required floor areas" but rather "clearance area for fixtures", Exception 1 does not apply to bathrooms and toilet rooms. That exception only applies to required floor area. Therefore, Exception 2 is really not an exception to the charging language but is the charging language and should not be in an exception. This proposal corrects that flaw.

The third exception that states "The ceiling height above fixtures shall be such that the fixture is capable of being used for its intended purpose" is unenforceable and any attempt at enforcement would be arbitrary. It is unenforceable because "capable of being used for its intended purpose" is not defined and is subject to discretionary action. The converse would be what ceiling height is acceptable over a water closet? Is 5 feet acceptable? What about 5 ½ feet? Or, 6 feet? And, if in your opinion an acceptable height is 6 feet and you encounter a situation where the height is 5 ½ feet, how do you enforce your opinion? If it can't be enforced it shouldn't be in the code. There is no basis on which to write a correction order no matter what the height above the fixtures is. The language will result in a lack of uniformity. It will lead to confusion as to what is an acceptable height. It will create conflicts between building departments, contractors, and homeowners. The proposed language specifically calls out water closets and lavatories because those are the only fixtures illustrated in Figure 307.1 besides tubs/showers and there are specific height requirements for tub/showers that are retained. Because of the reasons stated and because the market will likely dictate what an acceptable height is, this proposal deletes the offending language and permits the homeowner to decide what height is most appropriate.

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

ICCFILENAME: DAVIDSON-RB-6-R305.1

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that this change will cause confusion and would permit a ceiling height that is unusable.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Rick Davidson, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows

R305.1 Minimum height. Habitable space, hallways, laundry rooms and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms and toilet rooms shall have a ceiling height of not less than 6 feet 8 inches (2036 mm) including above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead in showers or tubs equipped with showerheads.

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet 2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. ~~The ceiling height above water closets and lavatories shall be permitted to be of any height~~
2. The ceiling height above fixtures shall be such that the fixture is capable of being used for its intended purpose.

Commenter's Reason: The current language creates an odd set of circumstances for bathrooms and toilet rooms in that it first requires that ceiling height in these rooms are 7 feet. Then by exception #2, the ceiling height is reduced to 6 feet 8 inches "at the center of the front clearance area for fixtures". Read literally, one could reduce the ceiling height in the most used areas of the room to 6 feet 8 inches but the remainder and least used spaces would need to be 7 feet. Clearly the intent is to permit the entire area within bathrooms and toilet rooms to have ceiling heights of 6 feet 8 inches.

There was concern expressed at the Baltimore hearings how the rules for sloped ceilings would be impacted by this change. However, the rules relating to sloped ceilings only apply to rooms that have a required floor area, such as a bedroom. Bathrooms and toilet rooms do not have a required floor area, only clearance area at the fixtures.

There was also concern that deleting the remaining portion of exception #2 that references ceiling heights at fixtures would leave the ceiling height above fixtures unregulated. To eliminate that concern, the current language is retained.

The net result of this code change is that it permits ceiling heights in all bathrooms and toilet rooms to be 6 feet 8 inches throughout the room and not just in front of the fixtures and continues to regulate the height above fixtures by permitting it to be of a height capable of being used.

Public Comment 2:

Rick Davidson, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R305.1 Minimum height. Habitable space, hallways, bathrooms, toilet rooms~~,~~ laundry rooms and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). ~~Bathrooms and toilet rooms shall have a ceiling height of not less than 6 feet 8 inches (2036 mm) including above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead in showers or tubs equipped with showerheads.~~

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. ~~The ceiling height above water closets and lavatories shall be permitted to be of any height.~~
2. Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2036 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1. The ceiling height above water closets, bathtubs without showerheads and lavatories shall be permitted to be of any height. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2036 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

Commenter's Reason: This modification addresses only the matter of the ceiling height above fixtures. The **proposal** states that the ceiling height above water closets, bathtubs without showerheads, and lavatories can be of any height. The committee disapproved this proposal because they said it "would cause confusion and would permit a ceiling height that is unusable." Is the proposed language confusing? It simply states that the ceiling height above certain fixtures can be of any height. The language is clear. There is no confusion. Would it permit a ceiling height that is unusable? That question could be answered with a question. Would someone spend the money to design and construct a bathroom with unusable fixtures? Not likely.

Can we enforce what we have? Is the current language confusing? Would it permit a ceiling height that is unusable?

Current language in the code states that the "ceiling height above fixtures shall be such that the fixture is capable of being used for its intended purpose." This language is unenforceable as it relies on the physical stature of the user, the posture of the user, and how the fixture is used to determine what height is sufficient. But those limitations are moving targets and are limitless in their combination. It is therefore impossible to plan check a plan with a lowered ceiling height above a fixture. If one were to attempt to do so, what height is acceptable? Would the field inspector agree? The building department could adopt a policy but policies can't be enforced in court. The must be based on some type of physiologic evidence. It is unknown if there exists a study on the amount of ceiling height that is needed for a six foot male while sitting on a water closet, presuming the water closet would only be sat on by a male. So is the current language confusing? It certainly is.

The reason why the offending language was put into the code was to permit fixtures to be placed in cramped locations, most often in remodeled homes. The only thing this proposal changes is that it takes the building department off the hook regarding arguments on the appropriate ceiling height above plumbing fixtures and places that responsibility on the person who will be using the fixtures, the homeowner.

For purposes of uniformity, the proposed amendment provides clearer direction regarding this issue using a language format already found in the code.

Final Action: AS AM AMPC____ D

RB39-09/10
R308.4

Proposed Change as Submitted

Proponent: William E. Koffel, Koffel Associates, Inc., representing the Glazing Industry Code Committee (GICC)

Revise as follows:

R308.4 Hazardous locations. The following shall be considered specific hazardous locations for the purposes of glazing:

1. Glazing in all fixed and operable panels of swinging, sliding and bifold doors.

   Exceptions:

   1. Glazed openings of a size through which a 3-inch diameter (76 mm) sphere is unable to pass.
   2. Decorative glazing.

2. Glazing in an individual fixed or operable panel adjacent to a door where the nearest vertical edge is within a 24-inch (610 mm) arc of the door in a closed position and whose bottom edge is less than 60 inches (1524 mm) above the floor or walking surface.

   Exceptions:

   1. Decorative glazing.
   2. When there is an intervening wall or other permanent barrier between the door and the glazing.
   3. Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position.
   4. Glazing adjacent to a door where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth.
   5. Glazing that is adjacent to the fixed panel of patio doors <u>which is not required to be safety glazing by another section</u>.

3. Glazing in an individual fixed or operable panel that meets all of the following conditions:
   3.1. The exposed area of an individual pane is larger than 9 square feet (0.836 m2); and
   3.2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor; and
   3.3. The top edge of the glazing is more than 36 inches (914 mm) above the floor; and
   3.4. One or more walking surfaces are within 36 inches (914 mm), measured horizontally and in a straight line, of the glazing.

   Exceptions:

   1. Decorative glazing.
   2. When a horizontal rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 11/2 inches (38 mm) in cross sectional height.
   3. Outboard panes in insulating glass units and other multiple glazed panels when the bottom edge of the glass is 25 feet (7620 mm) or more above *grade*, a roof, walking surfaces or other horizontal [within 45 degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.

4. All glazing in railings regardless of area or height above a walking surface. Included are structural baluster panels and nonstructural infill panels.
5. Glazing in enclosures for or walls facing hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface.

   Exception: Glazing that is more than 60 inches (1524 mm), measured horizontally and in a straight line, from the waters edge of a hot tub, whirlpool or bathtub.

6. Glazing in walls and fences adjacent to indoor and outdoor swimming pools, hot tubs and spas where the bottom edge of the glazing is less than 60 inches (1524 mm) above a walking surface and within 60 inches (1524 mm), measured horizontally and in a straight line, of the water's edge. This shall apply to single glazing and all panes in multiple glazing.
7. Glazing adjacent to stairways, landings and ramps within 36 inches (914 mm) horizontally of a walking surface when the exposed surface of the glazing is less than 60 inches (1524 mm) above the plane of the adjacent walking surface.

   Exceptions:

   1. When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 11/2 inches (38 mm) in cross sectional height.
   2. The side of the stairway has a guardrail or handrail, including balusters or in-fill panels, complying with Sections R311.7.6 and R312 and the plane of the glazing is more than 18 inches (457 mm) from the railing; or
   3. When a solid wall or panel extends from the plane of the adjacent walking surface to 34 inches (863 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a *guard*.

8. Glazing adjacent to stairways within 60 inches (1524 mm) horizontally of the bottom tread of a stairway in any direction when the exposed surface of the glazing is less than 60 inches (1524 mm) above the nose of the tread.

   Exceptions:

   1. The side of the stairway has a guardrail or handrail, including balusters or in-fill panels, complying with Sections R311.7.6 and R312 and the plane of the glass is more than 18 inches (457 mm) from the railing; or
   2. When a solid wall or panel extends from the plane of the adjacent walking surface to 34 inches (864 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a *guard*.

Reason: After several attempts, Exception #5 was added to the 2009 Edition of the IBC. The rationale submitted in RB42-07/08 was that "it is unlikely that the sliding doors will be reversed by the owner and people are familiar with their home environments." There was not corresponding proposal submitted to address eh issue in the same manner within dwelling units covered by the IBC.

The original rationale is flawed for the following reasons:

1. The new language "patio doors" instead of the original language "sliding doors" extends the application to far more doors.
2. The assumption that the people are familiar with their home environment does not take into consideration guests and horseplay activities.
3. The exception is too broad in nature and could be read to override the other provisions. For example, what if the panel is part of a hot tub enclosure? What if the panel is less than 18 inches above the floor?
4. The proponent based the rationale in part on Exception No. 3 but that exception only applies when the wall is perpendicular to the door.

We do not have injury data to support this proposal since historically the panel was required to be safety glazing. However, there was no technical substantiation to the change proposed last cycle to eliminate the requirement for safety glazing.

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

ICCFILENAME: KOFFEL-RB-1-R308.4

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this change is unnecessary and it contains a circular reference.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Thomas S. Zaremba, Roetzel & Andress, representing Glazing Industry Code Committee (GICC), requests Approval as Submitted.

Commenter's Reason: R308.4 defines "hazardous locations" and, by doing so, defines where safety glazing must be used. R308.4.2 deals with hazardous locations involving glazing in fixed or operable panels adjacent to doors. Exception #5 to R308.4.2 currently provides that "[g]lazing that is adjacent to the fixed panel of patio doors" are not hazardous and, therefore, exempt from safety glazing requirements. This proposal would limit the applicability of this exemption to those applications where safety glazing is not required by any other provision of R308.4.

This change to exception #5 is needed to ensure that the exception is properly applied. If the proposed language is not added, exception #5 could well be interpreted to eliminate the use of safety glazings in a number of applications where it is otherwise required by R308.4.

For example, what if the glass panel at issue is part of a hot tub enclosure that meets the definition of a hazardous location in R308.4.5? Or, what if the glass panel at issue is less than 18 inches above the floor and otherwise meets the definition of a hazardous location in R308.4.3? In the absence of exception #5, both applications clearly require the use of safety glazing and for very good reasons. However, when exception #5 is applied, it could be interpreted to allow the use of non-safety glazing as part of a hot tub enclosure. Likewise, it could be interpreted to permit non-safety glazing in the panel that is less than 18 above a floor. Adding the proposed language to exception #5 will narrow its application and ensure that, when it is applied, it will not swallow other rules governing where safety glazing must be used.

Historically, exception #5 to R308.4.2 was added to the 2009 Edition of the IRC through RB42-07/08. It was based on the rationale that "it is unlikely that … sliding doors will be reversed by the owner and people are familiar with their home environments." That rationale was, however, flawed for several reasons:

1. The new language "patio doors" instead of the original language "sliding doors" extends the safety glazing exception to far more doors.
2. The assumption that people are familiar with their home environment does not take into consideration guests, rental units, or accidental impacts, for example, resulting from horseplay, that can result in human impact with "[g]lazing that is adjacent to the fixed panel of patio doors."
3. RB42-07/08 was based, in part, on the rationale used to substantiate the existence of exception # 3; however, exception #3 only applies when the wall is perpendicular to the door. Exception #5, as currently written, contains no such limitation.

Given the flawed rationale leading up to the adoption of exception #5 to R308.4.2, its application should be limited to only those situations where it is not in conflict with any other rule governing the use of safety glazing.

Final Action Agenda voters are urged to vote against the standing motion to disapprove in order to vote in favor of a motion to adopt RB39 "As Submitted."

Final Action: AS AM AMPC____ D

RB42-09/10
RB310.1.5

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN

Add new text as follows:

R310.1.5 Identification. Windows installed as an emergency escape and rescue opening and meeting the requirements of Sections R310.1.1 thru R310.1.4 shall be identified as an "Emergency Escape and Rescue Opening". The identification shall be affixed to the frame or glass of the window as to be visible during inspection. The identification shall be of a type which once applied cannot be removed without being destroyed.

Reason: How do confirm that a window has safety glazing? You look for identification. How do you determine the grade of a floor joist? You look for a grade stamp. How do you confirm the R value of an insulation batt? You look for a label. Why, so the component can be identified in the field as meeting a specific standard or requirement. How do you identify whether or not a window meets emergency egress requirements? We might try measure it and then decide if it is compliant or require additional information from the contractor or window supplier. We don't require any identification for windows used as emergency escape and rescue openings like we do with most other building components. This makes it difficult to verify compliance in the field with egress requirements. Manufacturers identify windows that meet egress requirements in their catalogs. That can be verified at plan review. But a disconnect occurs when that window, or one that is close in size, is installed in the field. Field inspectors cannot

carry with them the manufactures literature for the dozens or hundreds of window manufacturers. They can only rely on field measurements. Herein lays the problem. There are numerous windows specified by manufacturers as having clear openable areas that meet egress requirements or that are hundredths of a square foot greater or lesser than required. Field inspectors cannot measure these openings to the exactness necessary to determine if windows that are close to meeting requirements are of the appropriate size. We already require windows to be identified for safety glazing and energy compliance reasons. Placing identification on the window that it meets egress requirements will have a minimal increase in cost and will greatly improve timely validation and compliance in the field.

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

ICCFILENAME: DAVIDSON-RB-8-R310.1.5

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based upon the proponent's request for disapproval. The proponent will work with industry on this issue and bring this back later.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Rick Davidson, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows

R310.1.5 Identification. ~~Windows installed as an emergency escape and rescue opening and meeting the requirements of Sections R310.1.1 thru R310.1.4 shall be identified as an "Emergency Escape and Rescue Opening". The identification shall be affixed to the frame or glass of the window as to be visible during inspection. The identification shall be of a type which once applied cannot be removed without being destroyed.~~ Where windows are used to meet the requirements of this section, they shall be provided with a manufacturer's designation or mark that provides one of the following:

1. the net clear opening area, the net clear opening height, and the net clear opening width of the window or
2. shall be identified as meeting emergency escape and rescue requirements with a manufacturer's designation or mark that reads "Emergency Escape and Rescue Opening 5.0 sq. ft" or Emergency Escape and Rescue Opening 5.7 sq. ft." as applicable or similar language to indicate that the window meets the requirements of this section. The manufacturer's designation or mark shall be affixed to the window as to be visible for inspection and shall be of a type which once applied cannot be removed without being destroyed.

Commenter's Reason: It was requested that this proposal be disapproved by the IRC Committee in Baltimore to enable a dialogue to occur with window manufacturers. Concern was expressed by the manufacturer's that identifying windows as "Emergency Escape and Rescue Openings".

It must be pointed out that most window manufacturers' already have statements in their literature that clearly indicate which of their windows meet or exceed national egress requirement.

Some manufacturers already provide a manufacturer's designation or mark. Following are pictures taken of labels found on some window brands that would meet the proposed rule and excerpts from the websites of several manufacturer's that illustrate those points.

Please note that the information from the manufacturers clearly states that their windows meet or exceed national egress requirements. If there truly was a concern about liability, it isn't demonstrated by the information on the manufacturer's own websites and advertising information.

The proposed amendment provides two options for identifying that the window meets egress requirements. The designation or mark may either provide the height, width, and opening dimensions or a statement that it meets either the 5.0 or 5.7 square foot opening requirements. The designation or mark is not required to be a permanent label. The label may be a paper label but must be designed so that it cannot be transferred from one window to another. This will enable the field inspector the ability to approve windows without the need to measure them with the same accuracy as the manufacturer and without the need to perform multiplication of fractional numbers in the field. The terms "manufacturer's designation" and "mark" are defined in the code. The term "once applied cannot be removed without being destroyed" is already used in the code to describe other labels, designations, or marks.

MANUFACTURER'S DESIGNATION. *An identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules. (See also "Mark" and "Label.")*

MARK. *An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material. (See also "Manufacturer's designation" and "Label.")*

Why can't the field inspector measure the windows in the field? If you review the hundreds of sizes and styles of windows available from dozens of manufacturers, it is apparent that there are thousands of windows that meet or come close to meeting egress requirements. You will find that some windows are exactly 5.7 square feet or 5.0 square feet. And there are others that are just a few hundredths of a square foot more or less. Herein lays the problem. Manufacturers measure window openings to the $1/16^{th}$ or to the hundredths of an inch. This degree of accuracy cannot be achieved in the field. Incorrectly measuring the window size by even a $1/16^{th}$ of an inch can give the impression that a window meets or fails to meet egress requirements when the opposite is true. Validating this takes time and can lead to unnecessary expense and delays. And if one window brand is approved that is just short of meeting minimum standards, the door is open for every other window manufacturer who has a window just slightly below minimum to request the same treatment.

Identifying windows as meeting egress requirements will also provide consumers, contractors, sales people and others concerned about a window used as an emergency escape and rescue opening the information they need to make informed decisions regarding the window without the need to search a catalog or website. It will also help to increase awareness of egress requirements.

The information that would go on the label is already in the manufacture's printed literature. It doesn't require the manufacturer to generate new information. The manufacturer need not indicate that the window complies with egress requirements if they so choose even though their catalogs may already state that certain windows meet national egress requirements.

The code requires labels on windows for energy code compliance and compliance with safety glazing. Almost every building product used today is identified with labels, designations or marks in one way or another. Windows used for egress purposes should be no different.

200 SERIES TILT-WASH DOUBLE-HUNG WINDOWS

WINDOWS · DOORS Andersen

Table of Basic Unit Sizes—Tilt-Wash Double-Hung Windows Scale ⅛" = 1'-0" (1:96)

Grille Patterns		Circle Top	
Sunburst	Renaissance*	Unit Dim. Height	Rough Opg. Height
244CT18*		1'-0 5/8" (321)	1'-1 1/8" (333)
244CT20*		1'-2 5/8" (371)	1'-3 1/8" (384)
244CT24		1'-4 5/8" (422)	1'-5 1/8" (435)
244CT28		1'-6 5/8" (473)	1'-7 1/8" (486)
244CT30		1'-8 5/8" (524)	1'-9 1/8" (537)
244CT34		1'-10 1/8" (575)	1'-11 1/8" (587)

*Renaissance pattern not available for 18 or 20 sizes.

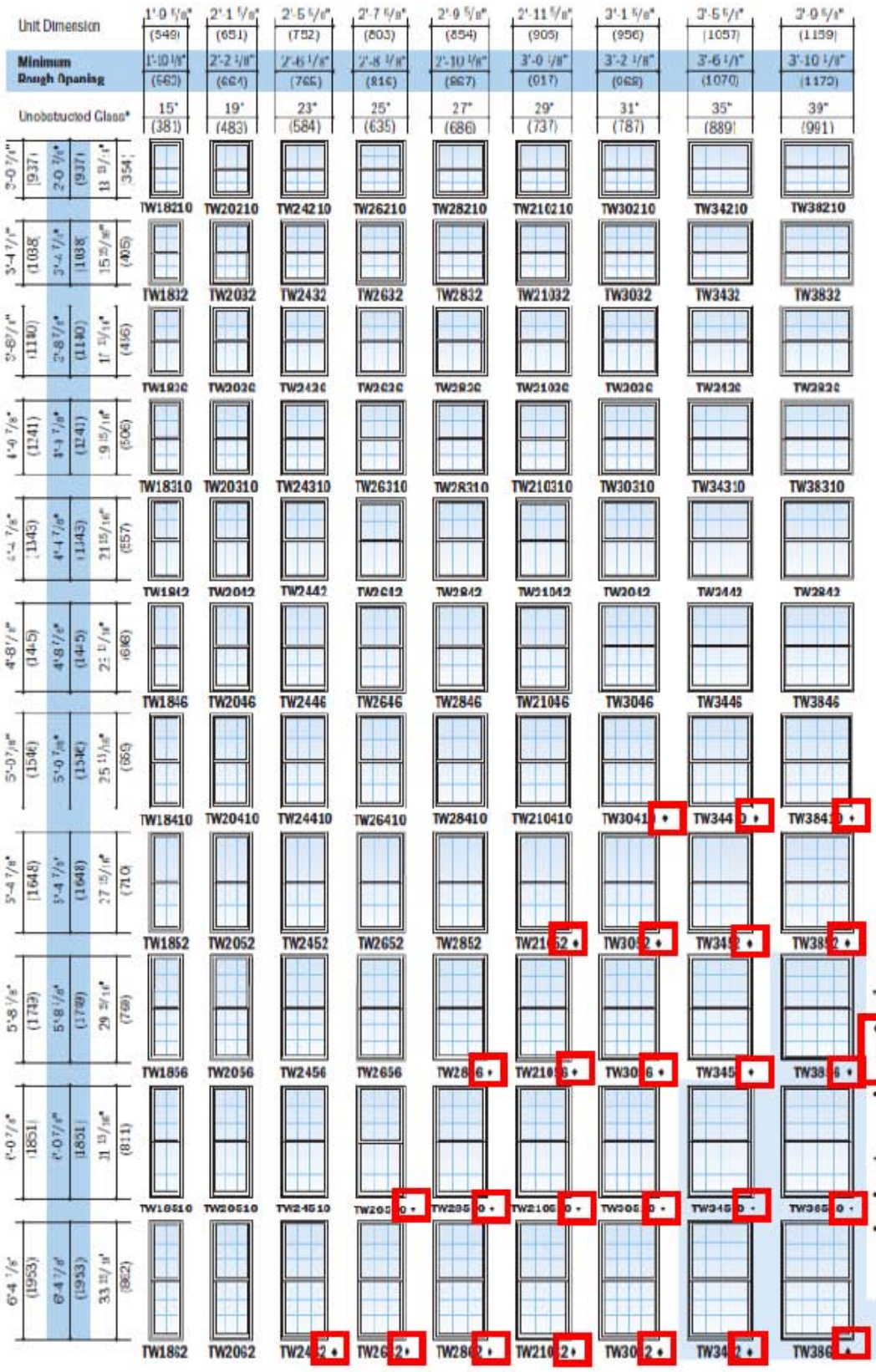
- The "Unobstructed Glass" measurement shown for double-hung windows is for single sash only.
- **Rough opening dimensions may need to be increased to allow for use of building wraps, flashing, sill panning, brackets, fasteners or other items.**
- "Unit Dimension" always refers to outside frame to frame dimension.
- Dimensions in parentheses are in millimeters.

† These units meet or exceed the following dimensions: Clear Openable Area of 5.7 sq. ft., Clear Openable Width of 20" and Clear Openable Height of 24".

Tilt-Wash Double-Hung Windows

StormWATCH PROTECTION

Table of Basic Unit Sizes Scale 1/8" = 1'-0" (1:96)



To find compatible Circle top, arch and other shaped windows, see the specialty window section beginning on page 37.

Cottage Style Units

Available for these heights, up to TW3852, in all widths. Contact dealer for lead times.

- Unobstructed glass height is for single sash only.
- ♦ These units meet or exceed the following dimensions: Clear Operable Area of 5.7 sq. ft., Clear Operable Width of 20" and Clear Operable Height of 24".
- Rough opening dimensions may need to be increased to allow for use of building wraps, flashing, sill panning, brackets, fasteners or other items. See page 7 for more details.
- "Unit Dimension" always refers to outside frame to frame dimension.
- Dimensions in parentheses are in millimeters.
- When ordering, be sure to specify color desired: White, Sandtone, Terratone* or Forest Green.

NOTE: These sizes with Design Pressure Upgrade are rated at +50/-55

CASEMENT: TRADITION PLUS WOOD—CLAD WOOD

1-WIDE UNITS

Bookcode	Sizing		SqFt	LinFt	Divided Lites
	Frame Size	Rough Opening			Lite Pattern
TCC1732	17 X 32	17-3/4 X 32-3/4	3.78	8.17	2W3H
TCC1736	17 X 36	17-3/4 X 36-3/4	4.25	8.83	2W3H
TCC1740	17 X 40	17-3/4 X 40-3/4	4.72	9.50	2W3H
TCC1742	17 X 42	17-3/4 X 42-3/4	4.96	9.83	2W3H
TCC1748	17 X 48	17-3/4 X 48-3/4	5.67	10.83	2W4H
TCC1754	17 X 54	17-3/4 X 54-3/4	6.38	11.83	2W4H
TCC1756	17 X 56	17-3/4 X 56-3/4	6.61	12.17	2W5H
TCC1760	17 X 60	17-3/4 X 60-3/4	7.08	12.83	2W5H
TCC1764	17 X 64	17-3/4 X 64-3/4	7.56	13.50	2W5H
TCC1766	17 X 66	17-3/4 X 66-3/4	7.79	13.83	2W5H
TCC1772	17 X 72	17-3/4 X 72-3/4	8.50	14.83	2W6H
TCC1784 +	17 X 84	17-3/4 X 84-3/4	9.92	16.83	2W7H
TCC2032	20 X 32	20-3/4 X 32-3/4	4.44	8.67	2W3H
TCC2036	20 X 36	20-3/4 X 36-3/4	5.00	9.33	2W3H
TCC2040	20 X 40	20-3/4 X 40-3/4	5.56	10.00	2W3H
TCC2042	20 X 42	20-3/4 X 42-3/4	5.83	10.33	2W3H
TCC2048	20 X 48	20-3/4 X 48-3/4	6.67	11.33	2W4H
TCC2054	20 X 54	20-3/4 X 54-3/4	7.50	12.33	2W4H
TCC2056	20 X 56	20-3/4 X 56-3/4	7.78	12.67	2W5H
TCC2060	20 X 60	20-3/4 X 60-3/4	8.33	13.33	2W5H
TCC2064	20 X 64	20-3/4 X 64-3/4	8.89	14.00	2W5H
TCC2066	20 X 66	20-3/4 X 66-3/4	9.17	14.33	2W5H
TCC2072	20 X 72	20-3/4 X 72-3/4	10.00	15.33	2W6H
TCC2084	20 X 84	20-3/4 X 84-3/4	11.67	17.33	2W7H
TCC2432	24 X 32	24-3/4 X 32-3/4	5.33	9.33	2W3H
TCC2436	24 X 36	24-3/4 X 36-3/4	6.00	10.00	2W3H
TCC2440	24 X 40	24-3/4 X 40-3/4	6.67	10.67	2W3H
TCC2442	24 X 42	24-3/4 X 42-3/4	7.00	11.00	2W3H
TCC2448	24 X 48	24-3/4 X 48-3/4	8.00	12.00	2W4H
TCC2454	24 X 54	24-3/4 X 54-3/4	9.00	13.00	2W4H
TCC2456	24 X 56	24-3/4 X 56-3/4	9.33	13.33	2W5H
TCC2460	24 X 60	24-3/4 X 60-3/4	10.00	14.00	2W5H
TCC2464	24 X 64	24-3/4 X 64-3/4	10.67	14.67	2W5H
TCC2466	24 X 66	24-3/4 X 66-3/4	11.00	15.00	2W5H
TCC2472	24 X 72	24-3/4 X 72-3/4	12.00	16.00	2W6H
TCC2484	24 X 84	24-3/4 X 84-3/4	14.00	18.00	2W7H
TCC2832	28 X 32	28-3/4 X 32-3/4	6.22	10.00	2W3H
TCC2836	28 X 36	28-3/4 X 36-3/4	7.00	10.67	2W3H
TCC2840	28 X 40	28-3/4 X 40-3/4	7.78	11.33	2W3H
TCC2842	28 X 42	28-3/4 X 42-3/4	8.17	11.67	2W3H
TCC2848	28 X 48	28-3/4 X 48-3/4	9.33	12.67	2W4H
TCC2854	28 X 54	28-3/4 X 54-3/4	10.50	13.67	2W4H
TCC2856	28 X 56	28-3/4 X 56-3/4	10.89	14.00	2W5H
TCC2860	28 X 60	28-3/4 X 60-3/4	11.67	14.67	2W5H
TCC2864	28 X 64	28-3/4 X 64-3/4	12.44	15.33	2W5H
TCC2866	28 X 66	28-3/4 X 66-3/4	12.83	15.67	2W5H
TCC2872	28 X 72	28-3/4 X 72-3/4	14.00	16.67	2W6H
TCC2878	28 X 78	28-3/4 X 78-3/4	15.17	17.67	2W7H
TCC2884 *	28 X 84	28-3/4 X 84-3/4	16.33	18.67	2W7H

+ Tempered Glass Standard

*Stationary Only

Bolded Bookcodes indicate unit meets Egress Requirements for IRC code. State and local egress codes may differ. Always refer to local building codes for complete requirements. Check with local officials to ensure compliance before installing the unit.

CHAPTER 1A

CLAD ULTIMATE CASEMENT (CUCA)
CLAD ULTIMATE PUSH OUT CASEMENT (CUPCA)

Product Information

NOTE:

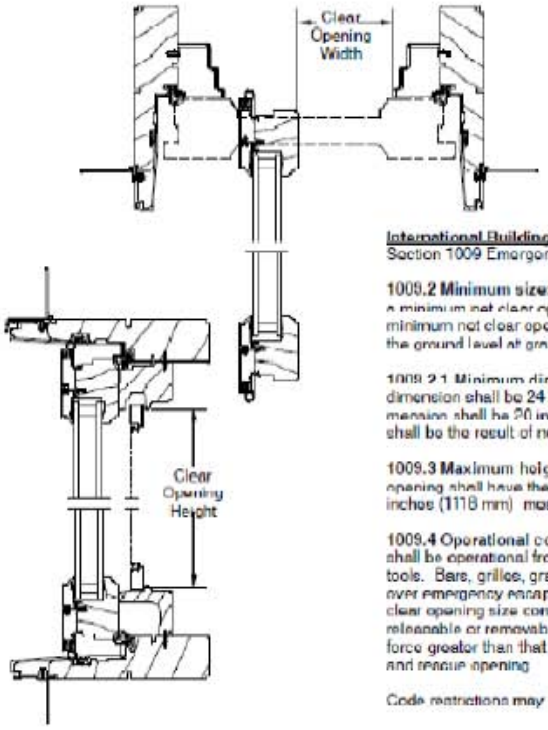
Specifications and technical data are subject to change without notice.
Allow 1/16" (2) tolerance on all measurements.
Metric measurements are shown in parenthesis.
For accessories dimensions and applications see the Accessories section of this manual.
For technical assistance about Marvin products you may call 1-800-346-3363 or visit our website: www.marvin.com.

CUCA Hardware:

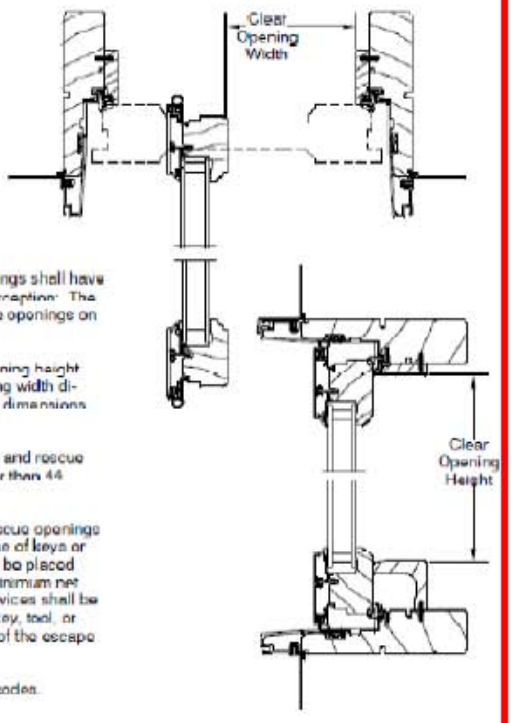
- Casement operator includes a crank hardware system that allows the window to open to a full 90 degrees with a minimal reduction of egress net clear opening. Single arm operators, steel coated with Egard®. Operation force at handle is 5lbs. or less.
- Casement hinges allow the user the ability to slide the sash across the frame opening so the sash exterior will rotate toward the user for easy washability. Hinges are steel coated with Egard™ and the standard track is stainless steel. Frame OM width of 20" (508) to under 24" (610) use 18" (457) wash/egress hinge. Frame OM width greater than 24" (610) use 22" (559) wash/egress hinge. Frame OM width less than 20" (508) use dyad hinge (dyad hinges do not have special easy washability feature).

Egress Information

Ultimate Casement - Operator



Ultimate Push Out Casement - Operator



International Building Code - 2003 and 2006
Section 1009 Emergency Escape and Rescue

1009.2 Minimum size: Emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.53 m²). Exception: The minimum net clear opening for emergency escape and rescue openings on the ground level at grade is 5.0 square feet (0.46 m²).

1009.2.1 Minimum dimensions: The minimum net clear opening height dimension shall be 24 inches (610 mm). The net clear opening width dimension shall be 20 inches (508 mm). The net clear opening dimensions shall be the result of normal operation of the opening.

1009.3 Maximum height from the floor: Emergency escape and rescue opening shall have the bottom of the clear opening not greater than 44 inches (1118 mm) measured from the floor.

1009.4 Operational constraints: Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates, or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with Section 1009.2 and such devices shall be releasable or removable from the inside without the use of a key, tool, or force greater than that which is required for normal operation of the escape and rescue opening.

Code restrictions may vary depending on your local building codes.

MARVIN Windows and Doors
Built around you.

CLAD ULTIMATE CASEMENT

Egress Measurements and Vent Measurements

CUCA Egress and Vent Measurements Operating Casement			Width					
		CN	16	18	20	24	26	28
		OM	16 (406)	18 (457)	20 (508)	24 (610)	26 (660)	28 (711)
Height		Clear Opening	6.40 (163)	8.40 (213)	12.89 (327)	16.89 (429)	18.89 (480)	20.89 (531)
CN	OM	Clear Opening	Square Feet (Square Meters)					
14	13.13 (333)	8 (203)	0.36 (0.03)	0.47 (0.04)	0.72 (0.07)	0.94 (0.09)	1.05 (0.10)	1.16 (0.11)
16	15.13 (384)	10 (254)	0.44 (0.04)	0.58 (0.05)	0.90 (0.08)	1.17 (0.11)	1.31 (0.12)	1.45 (0.14)
18	17.13 (435)	12 (305)	0.53 (0.05)	0.70 (0.07)	1.08 (0.10)	1.41 (0.13)	1.58 (0.15)	1.74 (0.16)
20	19.13 (486)	14 (356)	0.62 (0.06)	0.82 (0.08)	1.25 (0.12)	1.64 (0.15)	1.84 (0.17)	2.03 (0.19)
24	23.13 (587)	18 (457)	0.80 (0.07)	1.05 (0.10)	1.61 (0.15)	2.11 (0.20)	2.36 (0.22)	2.61 (0.24)
28	27.13 (689)	22 (559)	0.98 (0.09)	1.28 (0.12)	1.97 (0.18)	2.58 (0.24)	2.89 (0.27)	3.19 (0.30)
32	31.13 (791)	26 (661)	1.16 (0.11)	1.52 (0.14)	2.33 (0.22)	3.05 (0.28)	3.41 (0.32)	3.77 (0.35)
36	35.13 (892)	30 (762)	1.33 (0.12)	1.75 (0.16)	2.69 (0.25)	3.52 (0.33)	3.94 (0.37)	4.35 (0.40)
40	39.13 (994)	34 (864)	1.51 (0.14)	1.98 (0.18)	3.04 (0.28)	3.99 (0.37)	4.46 (0.41)	4.93 (0.46)
44	43.13 (1095)	38 (965)	1.69 (0.16)	2.22 (0.21)	3.40 (0.32)	4.46 (0.41)	4.99 (0.46)	5.51 (0.51)
48	47.13 (1197)	42 (1067)	1.87 (0.17)	2.45 (0.23)	3.76 (0.35)	4.93 (0.46)	5.51 (0.51)	6.09 (0.57)
54	53.13 (1349)	48 (1219)	2.13 (0.20)	2.80 (0.26)	4.30 (0.40)	5.63 (0.52)	6.30 (0.59)	6.96 (0.65)
56	55.13 (1400)	50 (1270)	2.22 (0.21)	2.92 (0.27)	4.48 (0.42)	5.87 (0.54)	6.56 (0.61)	7.25 (0.67)
60	59.13 (1502)	54 (1372)	2.40 (0.22)	3.15 (0.29)	4.83 (0.45)	6.33 (0.59)	7.09 (0.66)	7.84 (0.73)
64	63.13 (1603)	58 (1473)	2.58 (0.24)	3.38 (0.31)	5.19 (0.48)	6.80 (0.63)	7.61 (0.71)	8.42 (0.78)
72	71.13 (1807)	66 (1677)	2.90 (0.27)	3.85 (0.36)	5.91 (0.55)	7.74 (0.72)	8.66 (0.80)	9.58 (0.89)
78	77.13 (1959)	72 (1829)	3.20 (0.30)	4.20 (0.39)	6.45 (0.60)	8.45 (0.78)	9.45 (0.88)	10.45 (0.97)
84	83.13 (2111)	78 (1981)	3.47 (0.32)	4.55 (0.42)	6.98 (0.65)	9.15 (0.85)	10.23 (0.95)	11.32 (1.05)
92	91.13 (2315)	86 (2185)	3.82 (0.36)	5.02 (0.47)	7.70 (0.72)	10.09 (0.94)	11.28 (1.05)	12.48 (1.16)
96	95.13 (2416)	90 (2286)	4.00 (0.37)	5.25 (0.49)	8.06 (0.75)	10.56 (0.98)	11.81 (1.10)	13.06 (1.21)

CUCA Egress and Vent Measurements Operating Casement			Width			
		CN	30	32	36	40
		OM	30 (762)	32 (813)	36 (914)	40 (1016)
Height		Clear Opening	22.89 (581)	24.89 (632)	28.89 (734)	32.89 (835)
CN	OM	Clear Opening	Square Feet (Square Meters)			
14	13.13 (333)	8 (203)	1.27 (0.12)	1.38 (0.13)	1.61 (0.15)	1.83 (0.17)
16	15.13 (384)	10 (254)	1.59 (0.15)	1.73 (0.16)	2.01 (0.19)	2.29 (0.21)
18	17.13 (435)	12 (305)	1.91 (0.18)	2.08 (0.19)	2.41 (0.22)	2.74 (0.25)
20	19.13 (486)	14 (356)	2.23 (0.21)	2.42 (0.21)	2.81 (0.26)	3.20 (0.30)
24	23.13 (587)	18 (457)	2.86 (0.27)	3.11 (0.29)	3.61 (0.34)	4.11 (0.38)
28	27.13 (689)	22 (559)	3.50 (0.33)	3.80 (0.35)	4.42 (0.41)	5.03 (0.47)
32	31.13 (791)	26 (661)	4.13 (0.38)	4.50 (0.42)	5.22 (0.48)	5.94 (0.55)
36	35.13 (892)	30 (762)	4.77 (0.44)	5.19 (0.48)	6.02 (0.56)	6.85 (0.64)
40	39.13 (994)	34 (864)	5.41 (0.50)	5.88 (0.55)	6.82 (0.63)	7.77 (0.72)
44	43.13 (1095)	38 (965)	6.04 (0.56)	6.57 (0.61)	7.63 (0.71)	8.68 (0.81)
48	47.13 (1197)	42 (1067)	6.68 (0.62)	7.26 (0.67)	8.43 (0.78)	9.60 (0.89)
54	53.13 (1349)	48 (1219)	7.63 (0.71)	8.30 (0.77)	9.63 (0.89)	10.97 (1.02)
56	55.13 (1400)	50 (1270)	7.95 (0.74)	8.64 (0.80)	10.03 (0.93)	11.42 (1.06)
60	59.13 (1502)	54 (1372)	8.59 (0.80)	9.34 (0.87)	10.84 (1.01)	12.34 (1.15)
64	63.13 (1603)	58 (1473)	9.22 (0.86)	10.03 (0.93)	11.64 (1.08)	13.25 (1.23)
72	71.13 (1807)	66 (1677)	10.49 (0.97)	11.41 (1.06)	12.24 (1.22)	15.08 (1.40)
78	77.13 (1959)	72 (1829)	11.45 (1.06)	12.45 (1.16)	14.45 (1.34)	16.45 (1.53)
84	83.13 (2111)	78 (1981)	12.40 (1.15)	13.48 (1.25)	15.65 (1.45)	17.82 (1.66)
92	91.13 (2315)	86 (2185)	13.67 (1.27)	14.87 (1.38)	17.26 (1.60)	19.65 (1.83)
96	95.13 (2416)	90 (2286)	14.31 (1.33)	15.56 (1.45)	18.06 (1.68)	20.56 (1.91)

NOTE: Standard bottom rail

CLAD AND PRIMED WOOD DOUBLE HUNG WINDOWS

1-WIDE UNITS

Clad Unit Dimension			1' 9-1/2"	2' 1-1/2"	2' 5-1/2"	2' 9-1/2"	3' 1-1/2"	3' 5-1/2"	3' 9-1/2"
Primed Unit Dimension			1' 11-15/16"	2' 3-15/16"	2' 7-15/16"	2' 11-15/16"	3' 3-15/16"	3' 7-15/16"	3' 11-15/16"
Rough Opening			1' 10-1/2"	2' 2-1/2"	2' 6-1/2"	2' 10-1/2"	3' 2-1/2"	3' 6-1/2"	3' 10-1/2"
Soft Metric R.O. (mm)			572	673	775	876	978	1080	1181
Sash Opening			1-8	2-0	2-4	2-8	3-0	3-4	3-8
3' 0-1/8"	3' 1-7/8"	3' 0-5/8"	930	2-10	18210	20210	24210	28210	30210	34210	38210
3' 4-7/8"	3' 5-7/8"	3' 4-5/8"	1032	3-2	1832	2032	2432	2832	3032	3432	3832
4' 0-1/8"	4' 1-7/8"	4' 0-5/8"	1235	3-10	18310	20310	24310	28310	30310	34310	38310
4' 4-1/8"	4' 5-7/8"	4' 4-5/8"	1337	4-2	1842	2042	2442	2842	3042	3442	3842
4' 8-1/8"	4' 9-7/8"	4' 8-5/8"	1438	4-6	1846	2046	2446	2846	3046*	3446	3846
5' 0-1/8"	5' 1-7/8"	5' 0-5/8"	1540	4-10	18410	20410	24410	28410	3041*	3441*	3841*
5' 4-1/8"	5' 5-7/8"	5' 4-5/8"	1641	5-2	1852	2052	2452	2852	305*	345*	38*
5' 8-1/8"	5' 9-7/8"	5' 8-5/8"	1743	5-6	1856	2056	2456	285*	305*	345*	385*
6' 0-1/8"	6' 1-7/8"	6' 0-5/8"	1845	5-10	18510	20510	24510	285*	3051*	3451*	385*
6' 4-1/8"	6' 5-7/8"	6' 4-5/8"	1946	6-2	1862	2062	24*	28*	306*	346*	386*
6' 8-1/8"	6' 9-7/8"	6' 8-5/8"	2048	6-6	1866	2066	24*	28*	306*	346*	386*

CLAD AND PRIMED WOOD DOUBLE HUNG WINDOW

EXTENDED EYEBROW

Chord Height			3"	3-7/8"	4-15/16"
Radius Top of Head Jamb			38"	38"	38"
Clad Unit Dimension			2' 5 1/2"	2' 9 1/2"	3' 1 1/2"
Primed Unit Dimension			2' 7-15/16"	2' 11-15/16"	3' 3-15/16"
Rough Opening			2' 6-1/2"	2' 10-1/2"	3' 2-1/2"
Soft Metric R.O. (mm)			775	876	978
Sash Opening			2-4	2-8	3-0
4' 0-1/8"	4' 1-7/8"	4' 0-5/8"	1235	3-10	24310	28310	30310
4' 8-1/8"	4' 9-7/8"	4' 8-5/8"	1438	4-6	2446	2846	3046
5' 4-1/8"	5' 5-7/8"	5' 4-5/8"	1642	5-2	2452	2852	3052

COTT-1836
Ratio for Cottage
2/3, 3/3

ORIE-1836
Ratio for Oriel
3/3, 2/3

Also available in Cottage Style and Oriel Style

**Units shown with asterisk meet UBC Egress Code requirements of 20" clear opening width, 24" clear opening height and 5.7 sq. ft. or larger opening. Local codes may vary.*

***Egress option available*

CASEMENT

Wood and Aluminum EnduraClad® Exterior Size Tables

1/8" = 1' 0"

Transoms

Opening	(451) (432) 1' 5 3/4"	(552) (533) 1' 9 3/4"	(603) (584) 1' 11 3/4"	(654) (635) 2' 1 3/4"	(756) (737) 2' 5 3/4"	(908) (889) 2' 11 3/4"
Frame	1' 5"	1' 9"	1' 11"	2' 1"	2' 5"	2' 11"
(451) (432) 1' 5 3/4"	1717 (F)	2117 (F)	2317 (F)	2617 (F)	2917 (F)	3517 (F)
(552) (533) 1' 9 3/4"		2121				
(603) (584) 1' 11 3/4"			2323			
(654) (635) 2' 1 3/4"	1725 (F)	2125 (F)	2325 (F)	2525	2925 (F)	3525 (F)
(756) (737) 2' 5 3/4"					2829	

(F) = Fixed Only

Opening dimensions shown are for clad units only. See wood unit notes below for wood opening dimensions.

Venting transoms are available as casements or awnings.

For windows and patio doors with HurricaneShield® impact-resistant glass, see product instructions or refer to local building code requirements.

Traditional grille patterns shown. See Grille Types page for additional patterns and profiles.

Vent and Fixed Units

	1735	2135	2335	2535	2935	3535
2' 11 3/4" (908) (889)					E3	E1
3' 5 3/4" (1 060) (1 041) 3' 5"	1741	2141	2341	2541 E3	2941 E2	3541 E
3' 11 3/4" (1 213) (1 194) 3' 11"	1747	2147	2347	2547 E2	2947 E	3547 E
4' 5 3/4" (1 365) (1 346) 4' 5"	1753	2153	2353	2553 E2	2953 E	3553 E
4' 11 3/4" (1 518) (1 499) 4' 11"	1759	2159	2359	2559 E2	2959 E	3559 E
5' 5 3/4" (1 670) (1 651) 5' 5"	1765	2165	2365	2565 E2	2965 E	3565 E
5' 11 3/4" (1 822) (1 803) 5' 11"	1771 T	2171 T	2371 T	2571 T	2971 E T	3571 E T

T Tempered glass is standard.

Egress Notes:

E = Window meets minimum clear opening of 24" height, 20" width, and 5.7 ft². Check all applicable local codes for emergency egress requirements.

E1 = Window meets minimum clear opening of 24" height, 20" width, and 5.0 ft². Check all applicable local codes for emergency egress requirements.

E2 = With optional egress hardware, window meets minimum clear opening of 24" height, 20" width, and 5.7 ft². Check all applicable local codes for emergency egress requirements.

E3 = With optional egress hardware, window meets minimum clear opening of 24" height, 20" width, and 5.0 ft². Check all applicable local codes for emergency egress requirements.

See Design Data pages in this section for clear opening dimensions.

Clear opening (egress) information does not take into consideration the addition of a Rolscreen (or any other accessory) to the product. You should consult your local building code to ensure products with Rolscreens meet egress requirements.

CASEMENT

Opening Specifications

CASEMENT (with Friction Hinges)

Unit Code	Sq. Ft. [cm²] Clear Opening[g] with Retractable Screen	Sq. Ft. [cm²] Clear Opening[g] with Hinged Screen	Clear Opening[d] inches [mm] Width w/ 14" [356] Friction Hinges[g]	Clear Opening[d] inches [mm] Height w/ Retractable Screen	Clear Opening[d] inches [mm] Height w/ Hinged Screen	Sq. Ft. [cm²] Daylight Opening	Sq. Ft. [cm²] Vent	Floor to Bottom of Clear Opg. Ht.[e] inches [mm]	Sq. Ft. [cm²] Overall Unit Area[f]
28 x 24	3.89 [2778]	3.19 [2984]	14 [357]	23 15/16 [608]	25 1/2 [648]	3.19 [2984]	4.55 [4227]	55 1/16 [1399]	6.01 [3862]
28 x 28	3.49 [3242]	3.69 [3427]	14 [357]	27 15/16 [710]	29 1/2 [749]	3.85 [3577]	5.31 [4933]	51 1/16 [1297]	7.19 [6680]
28 x 32	3.89 [3707]	4.19 [3891]	14 [357]	31 15/16 [811]	33 1/2 [851]	4.52 [4199]	6.07 [5639]	47 1/16 [1195]	8.06 [7507]
28 x 36	4.49 [4171]	4.69 [4357]	18 [457]	35 15/16 [913]	37 1/2 [953]	5.18 [4812]	6.83 [6345]	43 1/16 [1094]	8.97 [8333]
28 x 40	4.89 [4636]	5.19 [4821]	18 [457]	39 15/16 [1014]	41 1/2 [1054]	5.84 [5426]	7.59 [7051]	39 1/16 [992]	9.86 [9160]
28 x 44	5.49 [5100]	5.69 [5286]	18 [457]	43 15/16 [1116]	45 1/2 [1156]	6.51 [6048]	8.35 [7757]	35 1/16 [891]	10.75 [9987]
28 x 50	6.24 [5797]	6.44 [5983]	18 [457]	49 15/16 [1268]	51 1/2 [1308]	7.50 [6968]	9.59 [8816]	29 1/16 [738]	12.06 [11223]
28 x 54	6.74 [6262]	6.94 [6447]	18 [457]	53 15/16 [1370]	55 1/2 [1410]	8.17 [7590]	10.25 [9523]	25 1/16 [637]	12.97 [12050]
28 x 58	7.24 [6726]	7.44 [6912]	18 [457]	57 15/16 [1472]	59 1/2 [1511]	8.83 [8203]	11.01 [10229]	21 1/16 [535]	13.86 [12876]
28 x 68	8.49 [7887]	8.69 [8073]	18 [457]	67 15/16 [1726]	69 1/2 [1765]	10.49 [9748]	12.92 [12003]	11 1/16 [281]	16.08 [14939]
28 x 72	8.99 [8352]	9.19 [8538]	18 [457]	71 15/16 [1827]	73 1/2 [1867]	11.15 [10359]	13.68 [12709]	7 1/16 [179]	16.97 [15766]
28 x 76	9.49 [8818]	9.69 [9002]	18 [457]	75 15/16 [1929]	77 1/2 [1969]	11.81 [10972]	14.44 [13415]	3 1/16 [78]	17.86 [16592]
32 x 24	3.66 [3400]	3.90 [3623]	22 [559]	23 15/16 [608]	25 1/2 [648]	3.73 [3466]	5.22 [4850]	55 1/16 [1399]	7.09 [6587]
32 x 28	4.27 [3967]	4.51 [4190]	22 [559]	27 15/16 [710]	29 1/2 [749]	4.50 [4181]	6.09 [5658]	51 1/16 [1297]	8.09 [7516]
32 x 32	4.88 [4534]	5.12 [4757]	22 [559]	31 15/16 [811]	33 1/2 [851]	5.27 [4896]	6.96 [6466]	47 1/16 [1195]	9.09 [8445]
32 x 36[b]	5.49 [5100]	5.73 [5323]	22 [559]	35 15/16 [913]	37 1/2 [953]	6.05 [5621]	7.83 [7274]	43 1/16 [1094]	10.09 [9374]
32 x 40[a]	6.10 [5667]	6.34 [5890]	22 [559]	39 15/16 [1014]	41 1/2 [1054]	6.82 [6336]	8.70 [8083]	39 1/16 [992]	11.09 [10303]
32 x 44[a]	6.71 [6234]	6.95 [6457]	22 [559]	43 15/16 [1116]	45 1/2 [1156]	7.60 [7061]	9.57 [8891]	35 1/16 [891]	12.09 [11232]
32 x 50[a]	7.63 [7088]	7.87 [7311]	22 [559]	49 15/16 [1268]	51 1/2 [1308]	8.76 [8138]	10.88 [10108]	29 1/16 [738]	13.59 [12626]
32 x 54[a]	8.24 [7655]	8.48 [7878]	22 [559]	53 15/16 [1370]	55 1/2 [1410]	9.53 [8854]	11.75 [10916]	25 1/16 [637]	14.59 [13555]
32 x 58[a]	8.85 [8222]	9.09 [8445]	22 [559]	57 15/16 [1472]	59 1/2 [1511]	10.31 [9578]	12.62 [11724]	21 1/16 [535]	15.59 [14484]
32 x 68[a]	10.38 [9643]	10.62 [9866]	22 [559]	67 15/16 [1726]	69 1/2 [1765]	12.24 [11371]	14.80 [13750]	11 1/16 [281]	18.09 [16806]
32 x 72[a]	10.99 [10210]	11.23 [10433]	22 [559]	71 15/16 [1827]	73 1/2 [1867]	13.02 [12098]	15.67 [14558]	7 1/16 [179]	19.09 [17735]
32 x 76[a]	11.60 [10777]	11.84 [11000]	22 [559]	75 15/16 [1929]	77 1/2 [1969]	13.79 [12811]	16.55 [15375]	3 1/16 [78]	20.09 [18664]
36 x 24	4.32 [4013]	4.60 [4274]	26 [660]	23 15/16 [608]	25 1/2 [648]	4.26 [3958]	5.88 [5463]	55 1/16 [1399]	7.88 [7321]
36 x 28	5.04 [4682]	5.33 [4952]	26 [660]	27 15/16 [710]	29 1/2 [749]	5.15 [4785]	6.86 [6373]	51 1/16 [1297]	8.99 [8352]
36 x 32[c]	5.77 [5361]	6.05 [5621]	26 [660]	31 15/16 [811]	33 1/2 [851]	6.03 [5602]	7.85 [7293]	47 1/16 [1195]	10.10 [9383]
36 x 36[a]	6.49 [6029]	6.77 [6290]	26 [660]	35 15/16 [913]	37 1/2 [953]	6.92 [6429]	8.83 [8203]	43 1/16 [1094]	11.22 [10424]
36 x 40[a]	7.21 [6698]	7.49 [6958]	26 [660]	39 15/16 [1014]	41 1/2 [1054]	7.80 [7248]	9.81 [9114]	39 1/16 [992]	12.33 [11455]
36 x 44[a]	7.93 [7367]	8.22 [7637]	26 [660]	43 15/16 [1116]	45 1/2 [1156]	8.69 [8073]	10.79 [10024]	35 1/16 [891]	13.44 [12486]
36 x 50[a]	9.02 [8380]	9.30 [8640]	26 [660]	49 15/16 [1268]	51 1/2 [1308]	10.02 [9309]	12.27 [11399]	29 1/16 [738]	15.10 [14028]
36 x 54[a]	9.74 [9049]	10.02 [9309]	26 [660]	53 15/16 [1370]	55 1/2 [1410]	10.90 [10126]	13.25 [12310]	25 1/16 [637]	16.22 [15069]
36 x 58[a]	10.46 [9718]	10.74 [9978]	26 [660]	57 15/16 [1472]	59 1/2 [1511]	11.79 [10953]	14.23 [13220]	21 1/16 [535]	17.33 [16100]
36 x 68[a]	12.27 [11399]	12.55 [11659]	26 [660]	67 15/16 [1726]	69 1/2 [1765]	14.00 [13006]	16.69 [15506]	11 1/16 [281]	20.10 [18674]
36 x 72[a]	12.99 [12068]	13.27 [12328]	26 [660]	71 15/16 [1827]	73 1/2 [1867]	14.89 [13833]	17.67 [16416]	7 1/16 [179]	21.22 [19714]
36 x 76[a]	13.71 [12737]	13.99 [12997]	26 [660]	75 15/16 [1929]	77 1/2 [1969]	15.77 [14651]	18.65 [17326]	3 1/16 [78]	22.33 [20745]

[a] These sizes meet or exceed emergency escape and rescue opening requirements per 2006 IBC (International Building Code). **Minimum size:** emergency escape and rescue openings shall have a minimum net clear opening of 5.7 sq. ft. [5295 cm²]. **Exception:** minimum net clear opening for emergency escape and rescue grade-floor openings shall be 5.0 sq. ft. [4645 cm²]. **Minimum dimensions:** the minimum net clear opening width dimension shall be 20" [508mm]. The minimum net clear opening height dimension shall be 24" [610mm]. **Maximum height from floor:** emergency escape and rescue openings shall have the bottom of the clear opening not greater than 44" [1118mm] measured from the floor. Verify local or state emergency escape and rescue opening sizes with your local building inspector.

[b] These windows, with the hinged screen option, meet or exceed emergency escape and rescue opening requirements.

[c] These windows meet or exceed emergency escape and rescue opening requirements if installed lower in the wall so the "Floor to Bottom of Clear Opening Height" does not exceed 44" [1118mm].

[d] Clear opening width and height dimensions are rounded down to the nearest 1/16" [2mm].

[e] Floor to bottom of clear opening dimensions are based on 82" [2083mm] jamb height of Collections Center Hinged French Doors and Inswing French Doors. Dimensions are rounded to the nearest 1/16" [2mm].

[f] Sq. Ft. [cm²] Overall Unit Area is calculated on the jamb dimension.

[g] Clear opening width is calculated with sash open 90°.

Final Action: AS AM AMPC____ D

RB45-09/10
R311.3.2

Proposed Change as Submitted

Proponent: Homer Maiel, PE, CBO, City of San Jose, CA, representing the ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay Chapters)

Revise as follows:

R311.3.2 Floor elevations for other exterior doors. Doors other than the required egress door shall be provided with landings or floors not more than 7 ¾ inches (196 mm) below the top of the threshold provided the door does not swing over the landing or floor.

Exceptions: A landing is not required where a stairway of two or fewer risers is located on the exterior side of the door, provided the door does not swing over the stairway.

Reason: This revision is needed to make sure that Section R311.3.2 is consistent with Section R311.3.1. Tripping hazards will be equal regardless of whether a door is or is not a required egress door. The Exception to this section indicates that the door should not be swung over one-riser or two-riser stairway. However, the main body of the section fails to address that a door should not swing over a lower landing, as Section R311.3.1 clearly states.

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

ICCFILENAME: MAIEL-RB-4-R311.3.2

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based on proponent's request for disapproval. The proposal would require the door to not swing or not have a floor or landing. The proponent should rework and bring back later.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Homer Maiel, P.E., CBO., City of San Jose, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay Chapters), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R311.3.2 Floor elevations for other exterior doors. Doors other than the required egress door shall be provided with landings or floors not more than 7 3/4 inches (196 mm) below the top of the threshold provided the door does not swing over the landing or floor. For doors that swing over the landing or floor, the threshold shall comply with Section R311.3.1.

Exceptions: A landing is not required where a stairway of two or fewer risers is located on the exterior side of the door, provided the door does not swing over the stairway.

Commenter's Reason: The Tri-Chapter recommends the following modification to RB45 in order to address the condition when a door, other than the main egress door, swings over a landing or floor. We believe that this presents the same hazard as would exist with the primary egress door and that the landing or floor should be limited to no more than 1 1/2 inches below the top of the threshold. The proposed Amendment to the original code change proposal addresses this condition by adding a sentence to the original code change proposal that states "For doors that swing over the landing or floor, the threshold shall comply with Section R311.3.1." The Reason Statement for the original code change proposal does not change, with the exception that the additional threshold condition associated with the condition of the door swinging over a landing or floor is addressed.

Final Action: AS AM AMPC____ D

RB46-09/10
R311.7.4.1, R311.7.4.2, R311.7.4.2.1 (New), R311.7.43

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN

1. Revise as follows:

R311.7.4.1 Riser height. The maximum riser height shall be 73/4 inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). Risers shall be vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.

Exception: The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.

R311.7.4.2 Tread depth. The minimum tread depth shall be 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch (9.5 mm) of the rectangular tread depth. ~~Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than 3/8 inch (9.5 mm).~~

2. Add new text as follows:

R311.7.4.2.1 Winder treads. Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than 3/8 inch (9.5 mm).

3. Revise as follows:

R311.7.4.3 ~~Profile~~ Nosings . The radius of curvature at the nosing shall be no greater than 9/16 inch (14 mm). A nosing not less than 3/4 inch (19 mm) but not more than 11/4 inches (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8 inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosings shall not exceed 1/2 inch (12.7 mm). ~~Risers shall be vertical or sloped under the tread above from the underside of the nosing above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.~~

Exception~~s~~:

1. ~~1.~~ A nosing is not required where the tread depth is a minimum of 11 inches (279 mm).
2. ~~2. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.~~

Reason: Language related to risers is relocated from the section on “Profile” to the section on “Risers”, which is more appropriate. This change is strictly cut and paste. The language on winder treads is made into its own subsection of Treads to enable the user of the code to more easily find that text. The purpose of this code change is to ease use of the code.

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

ICCFILENAME: DAVIDSON-RB-5-R311.7.4

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R311.7.4.1 Riser<u>s</u> ~~height.~~ The maximum riser height shall be 73/4 inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). Risers shall be vertical or sloped from the underside of the ~~leading edge~~ <u>nosing</u> of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.

Exception: The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.

R311.7.4.2 Tread<u>s</u> ~~depth.~~ The minimum tread depth shall be 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). ~~Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch (9.5 mm) of the rectangular tread depth.~~

R311.7.4.2.1 Winder treads. Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than 3/8 inch (9.5 mm). <u>Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch (9.5 mm) of the rectangular tread depth.</u>

R311.7.4.3 Nosings. The radius of curvature at the nosing shall be no greater than 9/16 inch (14 mm). A nosing not less than 3/4 inch (19 mm) but not more than 11/4 inches (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8 inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosings shall not exceed 1/2 inch (12.7 mm).

Exception:

A nosing is not required where the tread depth is a minimum of 11 inches (279 mm).

Committee Reason: The committee feels this change makes the code easier to use by breaking out the winder text into its own section. The modification corrects the term "leading edge" to "nosing" and moves the winder walking criteria into the new winder section.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jake Pauls, representing self, requests Disapproval.

Commenter's Reason: The approval of this code change leaves the RB46 badly broken and it should be disapproved. There are other code change proposals that deal with the issues better, specifically RB47-09/10 dealing with treads, with separate sections for separate topics:
R311.7.4.2 Tread Depth
R311.7.4.2.1 Uniformity of Rectangular Tread Depths
R311.7.4.2.2 Uniformity of Winder Treads

Complementing the foregoing proposal is E75-09/10 Part 2 which also deals with separate requirements for the separate topics:
R311.7.4.3 Nosing and Riser Profile
R311.7.4.3.1 Nosing Projection Size
R311.7.4.3.2 Nosing Projection Uniformity
R311.7.4.3.3 Open Risers

Proposal RB46 leaves different topics within the same section, thus making use of the code more difficult and compliance less likely both at the design and construction process and at inspection.

Notably, the IRC BE Code Change Committee took a different approach than did the IBC Means of Egress Code Change Committee on this matter. The latter's action on E75-09/10 Part I was approved as submitted with the differentiation of sections recommended also for E75-09/10 Part II. The IRC BE Committee disapproved E75-09/10 Part II. As such, the IRC will remain broken—or at least not fixed to the extent warranted and to the extent fixed for the IBC.

Thus, with the IRC BE Committee's action, there is an inadequate response to a major safety problem with many home stairs. Moreover, this problem is still badly dealt with in the guides ICC publishes for builders and inspectors (Residential Inspector's Guide Based on the 2006 IRC, Chapters 1-11, and Home Builders' Jobsite Codes: a Pocket Guide to the 2009 International Residential Code). If the ICC-sanctioned writers of guides cannot even get the intent and content of the code requirements right, then what can we expect from ordinary users?

Note that the two Committees saw the problem differently in their reason statements for E75-09/10. The IBC Means of Egress Committee said, "By breaking the current text into smaller sections the proposal clarifies the requirements for stair nosings and risers." The IRC BE Committee said, "The committee feels the code already addresses this and it is an enforcement and education issue. There is a concern about correlation of this with the previous action on RB46-09/10. The committee suggests both parties work together and bring this back later."

The problem here is not having the proponents working together, it is a problem of the IRC and IBC committees not working together on exactly

the same issues. Clearly in the view of this commenter, the IRC BE Committee does not understand the problem. A bad code is a bad code and we should not rely on enforcement and education to overcome the code's defects.

As this is simply a reformatting issue and not a technical change, why is there such backwardness on the part of the IRC BE Committee? This is now a matter for membership. Do you want the inadequate change proposed in this proposal, RB46-09/10, or do you want the IRC clarified as proposed in RB47-09/10 and its complementary change E75-09/10? The choice is very simple, do you want ICC and ICC Code users saddled with an inadequate code for another three years or do you want to have it fixed properly? If you want it fixed properly, you should vote in favor of this comment and disapprove RB46-09/10.

More important, as spelled out in detail in the comment on RB47, confusion over what the Code requires is costing dearly in terms of flawed stair design, construction and inspection. There are many needless injuries caused by the bad formatting of the IRC's requirements. Again, there is no technical change here—and thus no cost involved in getting better benefit out of the IRC. Vote to disapprove RB46-09/10, a proposed change that does not provide the needed improvement in code clarity and public safety.

Final Action: AS AM AMPC____ D

RB47-09/10

R311.7.4.2, R311.7.4.2.1 (New), R311.7.4.2.2 (New)

Proposed Change as Submitted

Proponent: Jake Pauls, representing self

1. Revise as follows:

R311.7.4.2 Tread depth. The minimum tread depth shall be 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's nosing ~~leading edge~~. ~~The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch (9.5 mm) of the rectangular tread depth. Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than 3/8 inch (9.5 mm).~~

2. Add new text as follows:

R311.7.4.2.1 Uniformity of rectangular tread depths. The greatest tread depth, measured horizontally between nosings of treads as specified in R311.7.4.2 and including the top tread, within each flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm).

R311.7.4.2.2 Uniformity of winder treads. Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch (9.5 mm) of the rectangular tread depth. Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than 3/8 inch (9.5 mm).

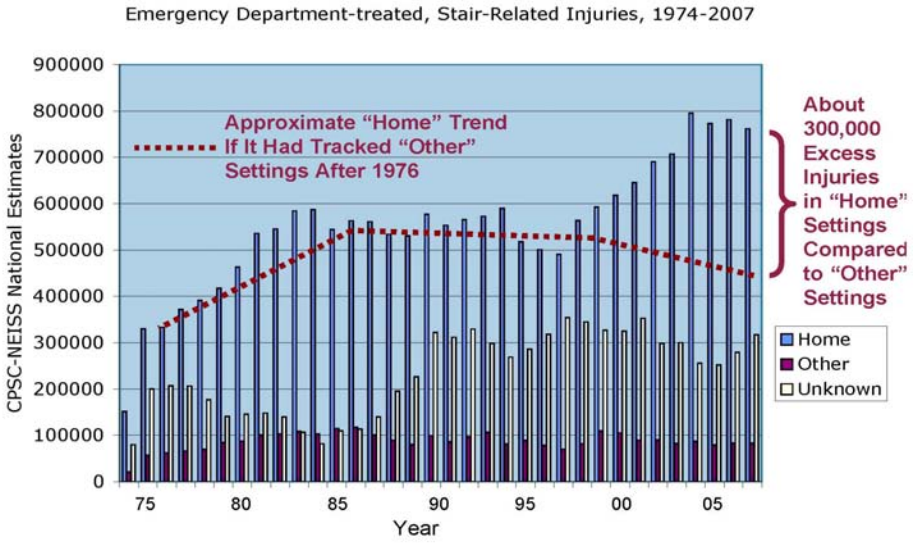
Reason: There is no technical change to the requirement in this proposal. It is a clarification of intent by separating out and labeling the separate issues of tread depth and the uniformity of tread depths for rectangular and winder treads, the only two forms of tread addressed in the current code. This proposed change, along with another for R311.7.4.3, is intended to clear up what appears to be widespread confusion resulting in flawed design, inspection, and ICC training plus published guidance regarding the need for every step of a flight to have uniform tread depth (or run) dimensions, measured horizontally, nosing to nosing. (Note that the change also incorporates the change of term "leading edge of tread" to "nosing" as that term was defined in the last cycle and is the term used in R311.7.4.3.) For consistency and to utilize defined terms, "nosing" should be the standard term used here.

A far too common error in design and construction of stairways is the lack of attention to keeping all tread depths, especially the top one in a flight, uniform in size, particularly where projecting nosings are provided on a flight of stairs installed as a manufactured unit which does not include the top or landing nosing projection. ICC IRC guides for inspection and for the homebuilding industry (published by ICC in conjunction with NAHB) fail to even mention these important rules. These two ICC publications are listed in the Bibliography.

The resulting non-uniformities in tread depths, with a larger top tread followed by smaller treads in the flight make the stair flight orders of magnitude more dangerous for descent-direction users. This pervasive systemic defect has also become so concerning to leading stairway safety professionals such as myself that a special website page has been created simply to deal with this issue. See http://web.me.com/bldguse/Site/Stairways.html for information on this including the graph provided below as Figure 1 showing a large increase in the number of home stair-related injuries identified in the CPSC NEISS national estimates for the USA in the last several years. Excerpts of text from the Stairways website page are also quoted below as are excerpts from an American Society of Safety Engineers 2008 Professional Development Conference paper by Pauls and Harbuck. The full ASSE conference paper is freely accessible as a PDF download from the Downloads area of my website, http://web.me.com/bldguse/Site/Downloads.html. Generally, it is suspected that with recent greater use of

manufactured stair flights, the incidence of systemic, top-of-flight non-uniformities has grown with resulting significant increases in home stair-related injuries.

Figure 1. Growth of Home Stair-related Injuries in USA in Recent Years.



On the Stairways website page, referenced above, is the following text and photograph (here identified as Figure 2) of a typical dwelling unit stairway with the systemic top-of-flight defect in tread depth non-uniformity. Below Figure 2 is an additional photograph, Figure 3, showing what a stair flight looks like it very likely conforms to the uniformity requirements but which should be properly measured, at least at the top three steps, to confirm that there is not a rare coincidence of both larger tread depth and larger rise dimensions at the top step. Here follows the text from the website which has been publicly available since May 2009.

"While more investigation is required, it appears that a major reason for the recent 'excess' injuries related to home stairs might be a systemic defect on many home stairways (as well as some in other settings) in the USA and Canada. This defect is a non-uniformity of the nosing projection at the top of stair flights; due to the omission of a $10 nosing piece, at the landing level, at the time of stairway construction. This makes the top tread below the landing effectively larger than all the steps below it.

This common defect greatly increases the risk of an 'overstepping misstep' on the second or third step down the flight. Such missteps can lead to a very serious fall down the stair flight, with resulting injuries.

This is why we should now give our stairways 'a second look.' Specifically we should perform the simple 'crouch and sight' test. Do this from the landing above the stair flight you wish to check. Crouch down so you are able to see all the stair nosings (the leading edges) line up. If the top, landing nosing does not line up with all the other step nosings, your stair likely has the systemic defect. Here is a home stairway with the systemic defect."

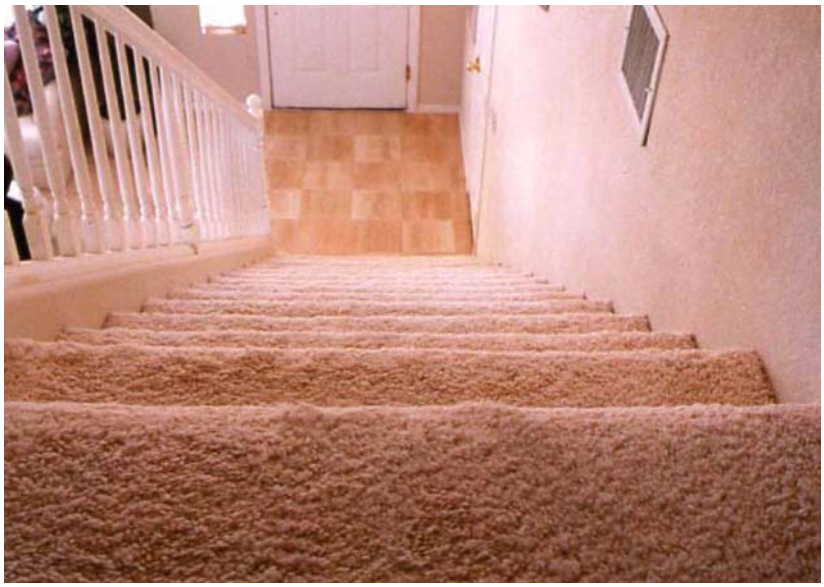


Figure 2. Typical Dwelling Unit Stairway with the Systemic, Top-of-Flight Defect.

The "Stairways" page of the website goes on to provide advice specifically for homeowners who perform the "crouch and sight" test and discover that their stairway has the systemic, top-of-flight defect.

"If your home stairway has this defect—which results from the non-uniformities of nosing projections and of what are called 'tread depth' or 'run' dimensions—and your home was recently constructed, call your local building inspection authorities and request that the stairway be re-inspected

for building code compliance. Both the non-uniform nosing projection and the non-uniform tread depth or run are building code violations, for example under widely used codes in the USA.

If there has been a fall and significant injury on the non-uniform stair flight, you might also want to confer with an attorney (experienced in dealing with stair-related injury cases), especially if the home was recently constructed.

Much more information on this (and other) safety problems with stairways is found in the downloadable files associated with this website. See especially the latest papers and presentations by Jake Pauls on home stairways in the two most recently posted folders.

•Home Stairway Safety and Codes (Posted February 2009)

•Presentations at MUTN Conference in BC, Canada, April 2009

Also, in early summer 2009, watch this website for an announcement of the availability of an educational DVD package, based on the one-day workshop at the MUTN Conference in BC, Canada, in April 2009. (Contact Jake Pauls for purchase information.)"

Figure 3. Dwelling Unit Stair Very Likely Not Having the Systemic, Top-of-Flight Defect.

Any ICC chapter wishing to have their members participate in a one-day workshop (also slated for presentation in Eastern Canada on September 14, 2009) should contact Jake Pauls. It is available in a not-for-profit mode. Code authorities should be prepared to deal knowledgeably with consumers who, upon discovering the systemic defect in their homes (after performing their own "crouch-and-sight" test), contact their local building department and ask for a re-inspection of their home stairways. If there has been an injurious fall on such a stairway they should also be prepared to deal with resulting legal actions that might name the local building department as a third party defendant. They should know how to perform the measurements of the stair step geometry that are of a quality expected in such litigation actions. These measurement techniques, usually requiring use of a spirit level or electronic level, are all described in the workshop materials posted on the above-mentioned website Downloads area and on the DVD of the Spring 2009 workshop noted above. These measurement techniques are consistent with the ICC requirements both as currently stated and as further clarified if this proposal is accepted.

In order to begin stopping all future misinterpretations of the IRC requirements for tread depth uniformity, it is hoped that all code enforcement authorities heed very carefully the current and clarified requirements of R311.7.4.2 as well as of R311.7.4.3.

Bibliography

ICC (2007). Residential Inspector's Guide Based on the 2006 IRC, Chapters 1-11. International Code Council, Washington, DC., ISBN 978-1-58001-568-4.

ICC and NAHB. Home Builders' Jobsite Codes: a Pocket Guide to the 2006 International Residential Code. International Code Council, Washington, DC and National Association of Home Builders, Washington, DC.

Pauls, J. and Harbuck, S. (2008). Ergonomics-based Methods of Inspecting, Assessing and Documenting Environmental Sites of Injurious Falls Resulting from Missteps on Small Elevation Differences, Slopes and Steps. *Proceedings of the American Society of Safety Engineers Professional Development Conference & Exposition*, Las Vegas, NV, 2008. (Downloadable as file, "Pauls-Harbuck-ASSE-paper.pdf," from folder, "Home Stairway Safety and Codes," accessible from the Downloads area of http://web.me.com/bldguse/Site/Downloads.html.)

Cost Impact: The code change proposal will not increase the cost of construction. (The nosing piece required to comply with both the current code and the code as amended by this proposal costs about $10 per flight in terms of material, in oak, at retail level.)

ICCFILENAME: PAULS-RB1-311.7.4.2

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based on the committee's previous action on RB46-09/10. The committee prefers the rewrite of RB46-09/10.

Assembly Action: **None**

Individual Consideration Agenda

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

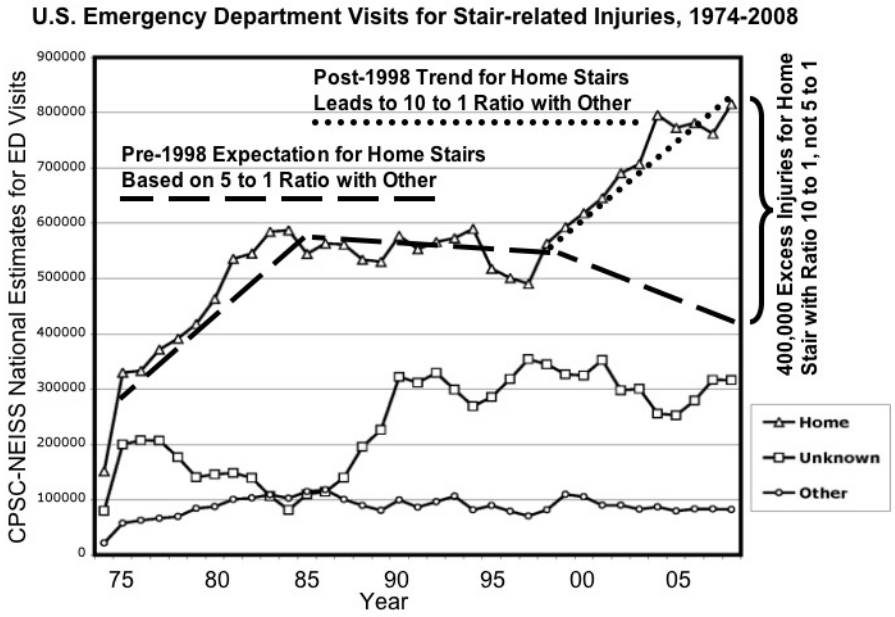
Public Comment:

Jake Pauls, representing self, requests Approval as Submitted.

Commenter's Reason: First, this change is an improvement over RB46-09/10 and reference should be made to my comment on RB46-09/10 which should be disapproved so RB47-09/10 can be approved instead along with E75-09/10 Part II. Both RB47-09/10 and E75-09/10 Part II should be approved as submitted.

RB47-09/10 solves a problem created by the current inadequate organization of tread geometry requirements in the IRC by simply breaking the text into more manageable sections, with each section dealing with a particular issue. E75-09/10 Part II does the same for riser geometry. Neither changes the requirements in the particular sections so there is no cost impact. However, clarity thus achieved will reduce design, construction and enforcement costs while contributing to safety levels that were intended by the rules but which are not being achieved. See the evidence of the home stairway safety problem below, in Figure 1 and the discussion of the five apparent reasons for the poor safety record of home stairways. One of the five reasons is addressed by this comment (and by the approval of RB47-09/10 and E75-09/10 Part II); other of my comments address some of the other reasons.

Figure 1. Growth of Home Stair-related Injuries in USA in Recent Years
This is an update, including data for 2008, of Figure 1 in proposal RB47-09/10



Rather than repeat the extensive justification provided for RB47-09/10, this comment focuses on newer data and improved presentation of the data (as in Figure 1) coming from the US Consumer Product Safety Commission (CPSC) National Electronic Injury Surveillance System (NEISS).

Five reasons have been identified recently for the diverging injury records for home stairways and for stairways in all other settings. The former are rising rapidly (approaching a growth rate of over 4 percent, about five times US population growth) in a trend begun at about the time the ICC started affecting residential codes in the USA through its production and promotion of the International Residential Code. The latter are now dropping at a notable rate (about 2 percent reduction per year at a time of about 1 percent a year of population growth in the USA). These factors, in no particular order, are:

(A) Significantly lower ICC standard for maximum rise and minimum tread depth for home stairs (the result of the code-development compromise and the code-adoption compromise).
(B) The systemic top-of-flight defect in many homes' (and some other buildings') stairs partly due to ICC's failure to provide clearly stated code requirements and to include the rules preventing this in their inspection guides.
(C) ICC's adoption of seriously compromised requirements for handrails for home stairways.
(D) An apparent deterioration in enforcement/inspection quality generally in relation to homes, partly influenced by the widespread perception—possibly nurtured by ICC leaders—that the builders' work should receive minimal scrutiny in view of their "Strategic Partnership."
(E) The concurrent deterioration of movement performance of population capability generally with the effects of reduced physical activity, overweight and obesity. (In a public health model, this should lead to increased—*not decreased*—compensation with the design and construction of critical built environment features such as stairways, particularly in the home settings where the most vulnerable populations and use conditions are common and easily predicted.)
(F)

This comment, and Proposal RB47-09/10, address the second of these reasons, i.e., (B). This defect with many home stairs is caused by the failure to have a uniform tread depth on all the steps of a stair when the floor or landing nosing projection is less than that of all the other

treads in the flight. Figure 2 shows such a badly constructed stair in a new US home. The defect is easily identified without any tools; the inspector (or builder) need only do the simple “crouch and sight test” from the upper landing to check to see if all the nosings line up as they will do with a code-complying stair. (See also the website, http://web.mac.com/bldguse/Site/Stairways.html for additional information on this problem and its elimination.)

Figure 2. Typical Home Stair with Top-of-Flight, Tread Uniformity Defect

The re-organization of R311.7.4.2 by separates different topics into new sections, R311.7.4.2.1 Uniformity of rectangular tread depths and R311.7.4.2.2 Uniformity of winder treads. My proposal E75-09/10 Part II complements proposal RB47-09/10 by dealing with the important matter of nosing projection uniformity, the main mechanism for making the tread depths consistent for all steps of a flight. (The IBC Means of Egress Committee got proposal E75-09/10 Part I right with their approval while the IRC BE Committee got the corresponding IRC proposal, E75-09/10 Part II wrong with their disapproval.)

These proposals do not introduce technical changes. Rather these are badly needed clarifications of the Codes’ intent and requirements which are clumped together in the current codes so that important features are missed by designers, builders and enforcers. The separate issues should be given separate sections so they are not lost in a mass of text.

Note that the Code is so broken that even the experts who write two of ICC guides get this matter wrong. They completely miss the important rules that are separated into distinctive sections with the approval of RB47-09/10. (Those two guides, purchased from ICC as recently as January 2010 to confirm they are still defective, are the Residential Inspector’s Guide Based on the 2006 IRC, Chapters 1-11, and Home Builders' Jobsite Codes: a Pocket Guide to the 2009 International Residential Code.)

Of all the five reasons for increased home stair-related injuries, the systemic top-of-flight defect is the most potent. It increases the risk of a misstep and fall near the top of the stair flight by orders of magnitude (one or more factors of ten). This is the simplest of all five defects to prevent. The cost is very small, about 10 dollars of material for the landing or floor level nosing piece. The benefit of this small fix—which the codes demand but which builders and inspectors too often miss—is many, many times greater.

Again, proposal RB75-09/10 should be adopted as submitted along with E75-09/10 Part II. (Note, as addressed in a separate comment on RB74-09/10, that code change proposal should be disapproved; it does a very inadequate job in fixing the organization of the code requirements for reasonable clarity.)

For additional detail, refer to the substantiation provided with proposal RB75-09/10**.**

Final Action: AS AM AMPC____ D

RB48-09/10
R311.7.3 (New), R311.7.5

Proposed Change as Submitted

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers'

1. Add new text as follows:

R311.7.3 Vertical rise. A flight of stairs shall not have a vertical rise larger than 12 feet (3658 mm) between floor levels or landings.

2. Revise as follows:

R311.7.5 Landings for stairways. There shall be a floor or landing at the top and bottom of each stairway. The minimum width perpendicular to the direction of travel shall be no less than the width of the flight served. The edges of landings may be curved or segmented. Landings used to turn the direction of travel less than 90 degrees but no less than 60 degrees shall not be considered winder treads provided the depth at the walk line is no less than 18 inches and the minimum depth is no less than 6 inches (152 mm). Where the stairway has a straight run the minimum depth in the direction of travel need not exceed 36 inches (914 mm).

Exception: A floor or landing is not required at the top of an interior flight of stairs, including stairs in an enclosed garage, provided a door does not swing over the stairs. ~~A flight of stairs shall not have a vertical rise larger than 12 feet (3658 mm) between floor levels or landings. The width of each landing shall not be less than the width of the stairway served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.~~

Reason: There are certain attributes of landings that are intended to be or need to be regulated by the code but this section currently needs improvements to consistently determine the allowed dimensions or shape of landings. The common interpretations currently referenced in the commentary have been used to develop this proposal. Further the fractured arrangement of text following the exception is eliminated and prevents confusion of requirement and exception.

1. The **Vertical rise** section being added is actually relocated without change from below the exception in **R311.7.5**. The name and text is technically consistent with the IBC. The information in this section is needed to calculate the number of risers between levels, the riser height, and the tread depth of each flight or stair in a stairway. For this reason, if such a requirement is needed, it should be included with the essential elementary sections that precede the tread and riser sections to assure understanding and compliance.
2. The revision adds text to **R311.7.5** that clarifies what dimension is actually the width or widths of the landing. By stating that width is perpendicular to the direction of travel the shape of landings and the intent to allow curved and segmented corners as stated in the commentary is covered. The required sizes are not changed and remain the same.
3. Differentiation between angular shaped landings and winder treads is also needed and provided by the additional text. The text defines the minimum size that is comparable and slightly exceeds the minimum distance of travel the user experiences on the most common 90-degree landing. Please see figures 1, 2, and 3 attached. It is easy to see that the shape of the landing can be inconsequential to its width and its use in the stairway provided the minimum criteria suggested here are achieved. The clear differentiation between landings and winders stated here is important because landings separate flights and winders do not. Stair components regulated "within a flight" such as handrails, riser height, tread depth, dimensional uniformity, etc. are all dependent upon a determination that currently requires better description for consistent understanding.

R311.5.7 Stairway Landings

Figures 1,2, & 3 below illustrate the minimum dimensions proposed of a stairway landing that turns less than 90 degrees.
Note: The outside of each landing is shown with both segmented and curved options that would clarified if the minimum width of the landing described as "measured perpendicular to the line of travel" by this proposal is clarified.

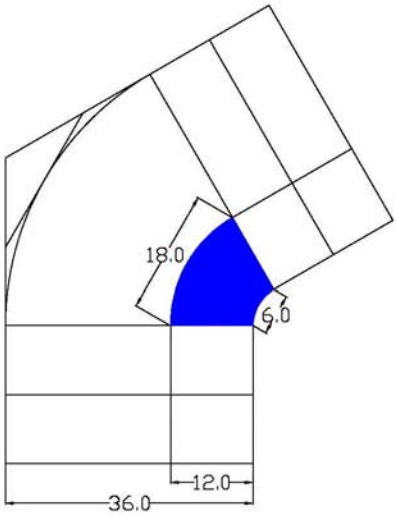


Figure 1:
Proposed 60 degree minimum Landing. The critical area inside of the walk line is shaded.

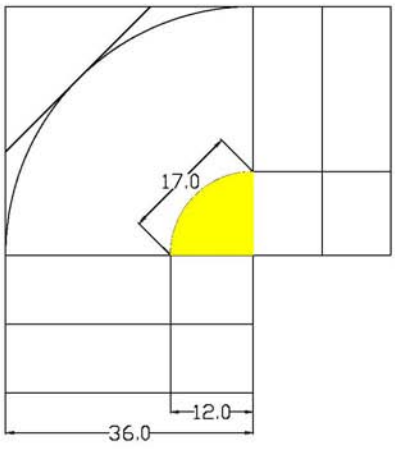


Figure 2:
Convetional 90 degree Landing. The total area inside of the walk line is shaded

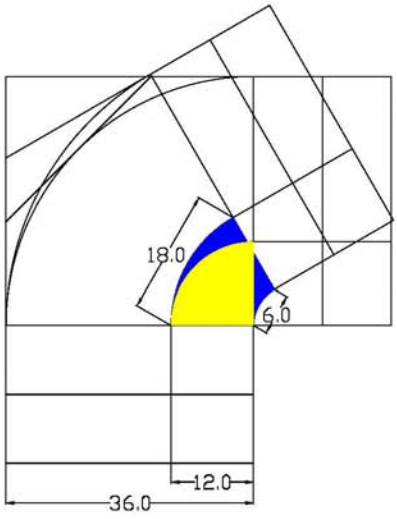


Figure 3:
The 60 and 90 degree landings are shown superimposed . The total area inside of the walk line of the 60 degree winder is clearly comparable to that of conventional landings when the suggested minimum dimensions are applied.

4. The needed exception remains in tact without change.

5. Please note all the text deleted following the exception has been incorporated within **R311.7.5** or relocated under **Vertical rise** as stated above.

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

ICCFILENAME: COOPER-RB-3-R311.7.3-R311.7.5

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that the definition of winders historically works for the geometry that is here. If the proposed geometry is specific to a specific type of stairway then a new code section specifically addressing the problem is needed. The last sentence is such that it would allow a landing less than 36 inches. This should be reworked and brought back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

David W. Cooper, Stair Manufacturing and Design Consulting, representing Stairway Manufacturers' Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R311.7.3 Vertical rise. A flight of stairs shall not have a vertical rise larger than 12 feet (3658 mm) between floor levels or landings.

R311.7.5 Landings for stairways. There shall be a floor or landing at the top and bottom of each stairway. The minimum width perpendicular to the direction of travel shall be not less than the width of the flight served. Landings of shapes other than square or rectangular shall be permitted provided ~~The edges of landings may be curved or segmented. Landings used to turn the direction of travel less than 90 degrees but no less than 60 degrees shall not be considered winder treads provided~~ the depth at the walk line and the total area is not less than that of a quarter circle with a

radius equal to the required landing width. ~~is no less than 18 inches and the minimum depth is no less than 6 inches (152 mm).~~ Where the stairway has a straight run the minimum depth in the direction of travel shall be not less than ~~need not exceed~~ 36 inches (914 mm).

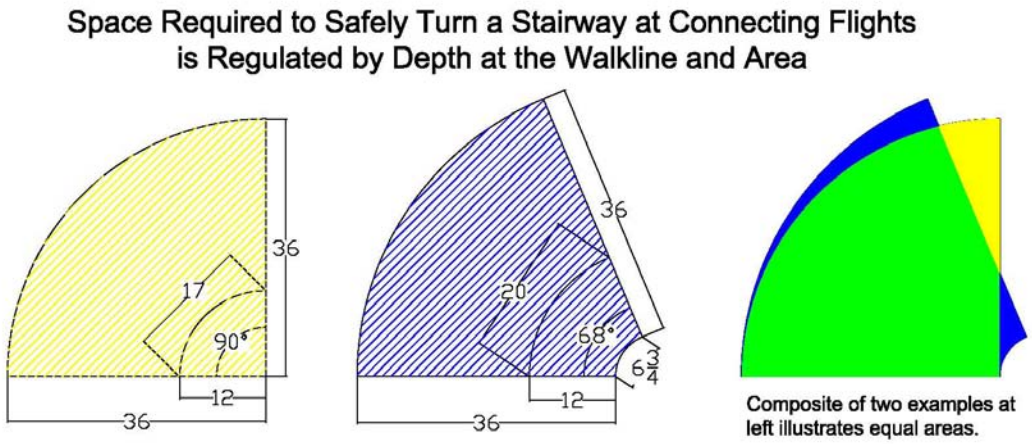
Exception: A floor or landing is not required at the top of an interior flight of stairs, including stairs in an enclosed garage, provided a door does not swing over the stairs.

Commenter's Reason: In Baltimore the committee commented in agreement with the addition of the new vertical rise section and the proponent's reason. They also liked the clarification that landing width is perpendicular to the direction of travel. Part of the confusion in the current text is the reference to width and no correlation with depth. Tread depth is measured in the direction of travel and depth is so associated. The depth of landings is clarified by using the term "depth in the direction of travel" in the last sentence. These solutions remain in tact in this modification and are supported in the proponent's original statement. It is important to understand that although the minimum stairway width is 36 inches the minimum landing size is related to the width of the flight served.

The intent of the original proposal was to clarify that landings of different shapes are not to be excluded if they provide sufficient space to serve as landings. The original drawings submitted clearly identify that other shapes can provide the same space or more than that of square or rectangular landings at the turn. The commentaries clearly state it is not the intent to require that a stairway landing be shaped as a square or rectangle. Although the original language of the proposal provides specific requirements the same intent has been accomplished and simplified in this modification to allow ease of enforcement without measuring angles.

The requirement now essentially relates that the landing be designed with concern for the gait of the user at the walkline by providing a depth at the walkline of not less than that which would be experienced on a rectangular landing. Further more the provision for an area equivalent to the relevant portion of a square landing has been added slightly increasing the size from the original proposal. Please see that the two landings illustrated below have the same width and area but are of different shapes allowing the safe turning of the stair at an angle of less than 90 degrees with out resorting to winder treads. In this example both landings would be considered acceptable minimum size landings for a stairway that is 36 inches wide.

Finally the committees concern to modify the language of the last sentence has also been addressed. (Please see the drawings submitted below) This modification provides clarification of the most common enforcement practices and substantially improves the interpretation and enforcement of the code.



Final Action: AS AM AMPC____ D

RB49-09/10
R311.7.7.1

Proposed Change as Submitted

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers'

Revise as follows:

R311.7.7.1 Height. Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

Exceptions:

1. The use of a volute, turnout, or starting easing shall be allowed over the lowest tread.
2. When handrail fittings or bendings are used to provide continuous transition between flights, transitions at winder treads, the transition from handrail to guardrail, or used at the start of a flight, the handrail height at the fittings or bendings shall be permitted to exceed the maximum height.

Reason: Winder treads do not separate flights and the handrail transitions that must occur above them are not considered included by the text of this exception. As the original proponent of this exception adopted in 2007 this was an oversight. When using readily available fittings and bendings to provide continuity of the handrail above winder treads, especially at the side of the stair where the treads are narrower the height of the handrail may exceed the limits of 34 to 38 inches. The radical changes of angle in the short distances are best understood by studying this condition in elevation. Figure 1 shows a typical stairway plan and Figure 2 illustrates the unfolding of the elevation of the handrail and stair geometry. This additional condition should be included as it is of the same nature as those conditions already recognized and cited in the exception.

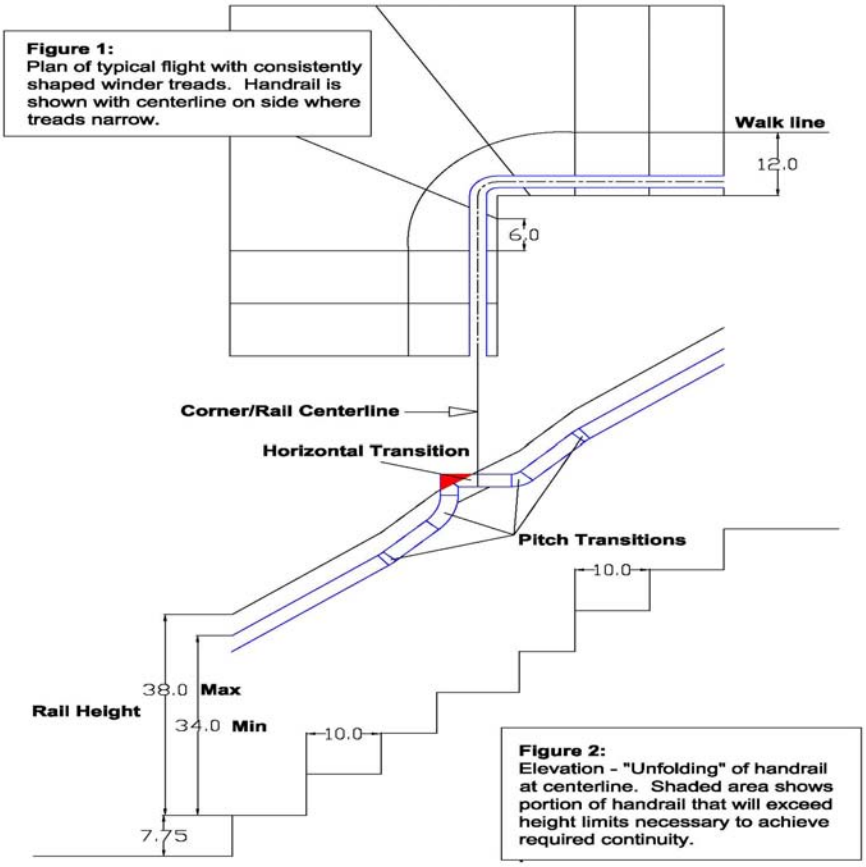


Figure 1:
Plan of typical flight with consistently shaped winder treads. Handrail is shown with centerline on side where treads narrow.

Figure 2:
Elevation - "Unfolding" of handrail at centerline. Shaded area shows portion of handrail that will exceed height limits necessary to achieve required continuity.

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

ICCFILENAME: COOPER-RB-2-R311.7.7.1

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee feels this is a good change that is a necessary addition to clarify the condition of continuity of the handrail at windows.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jake Pauls, representing self, requests Disapproval.

Commenter's Reason: RB49-09/10 is a bad code change. It permits significant discontinuities in handrail continuity at points in a stairway where such continuity is especially important, for example in moving between rectangular and winder treads. It makes a dangerous part of the stairway more dangerous**.**

Here it should be noted that the Stairway Manufacturers' Association (SMA) has contributed a great deal to reducing the usability and safety of required handrails for stairways. This is yet another step away from reasonably safe stairways because it allows ones handhold—to

the limited extent that a handhold is even possible with the railing sections SMA favors, particularly the Type II railings—to be broken as a angular transition is introduced instead of a smooth curve. Smooth curves were traditionally possible when stairway design and construction was the highest example of the art and technology of joinery. It was done in wood as well as metal, there are even excellent examples of smooth transitions or curves being done in Type I handrails of wood. Figure 1 shows an extreme example of how badly handrails are done on some new home stairways at winders. Not only does the configuration look awful, it is even worse to hold on to than to look at. This change permits and encourages this kind of crude design and construction. If the stairway industry is going to mix rectangular and winding steps it should spend some effort to rediscovering how traditional craftsmen accomplished much more elegant and functional solutions to the problem of curved handrails. Moreover they did it without computers, using only pencil and paper.

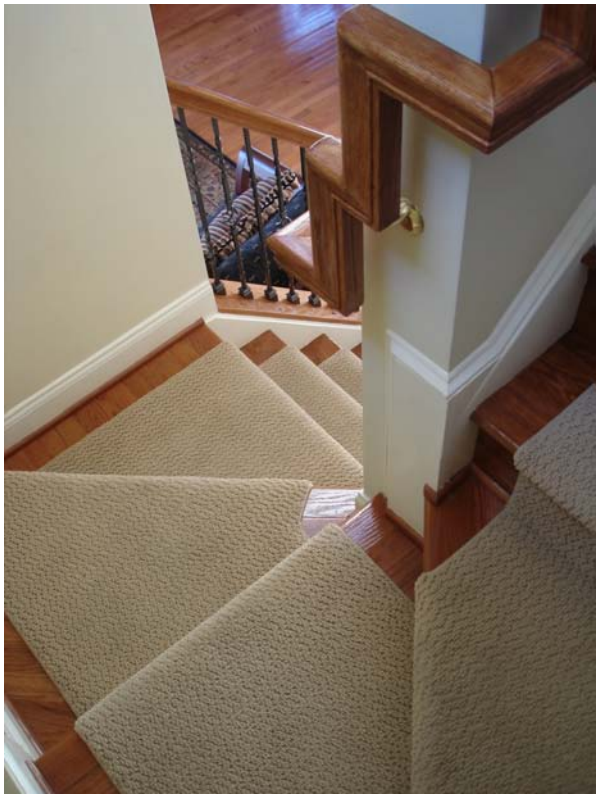


Figure 1. Crude fittings permitted at winders by relaxed Code rules.

Final Action: AS AM AMPC____ D

RB51-09/10
R312.1, R312.2

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN

Revise as follows:

R312.1 Where required. Guards shall be located along ~~open-sided walking surfaces, including~~ open sides of decks, porches, balconies, raised floor surfaces, stairs, ramps and landings~~,~~ that are located more than 30 inches ~~measured vertically to~~ above the floor or grade below ~~at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a guard.~~

Guards shall be provided on porches, balconies, and decks enclosed with insect screening when the porch, balcony, or deck floor is located more than 30 inches (762 mm) above the floor or grade below.

R312.2 Height. Required guards ~~at open-sided walking surfaces, including stairs, porches, balconies or landings,~~ shall be not less than 36 inches (914 mm) high ~~measured vertically above the adjacent walking surface, adjacent fixed seating or the line connecting the leading edges of the treads~~.

Exceptions:

1. Guards on the open sides of stairs shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
2. Where the top of the guard also serves as a handrail on the open sides of stairs, the top of the guard shall not be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

Reason: The current language referencing "open sided walking surfaces" is vague, undefined and unenforceable. It isn't clear if this means ***any*** surface upon which someone could walk, defined walking surfaces, or only those surfaces that are part of a dwelling. One could interpret a driveway adjacent a stepped lot line being a regulated "open sided walking surface" and require a guard along its entire length. One could interpret the upper surface of a retaining wall as a walking surface requiring a guard. If a yard is a walking surface, one could interpret egress window wells as needing a guard. Is this what is intended? Conceivably we could have guards crisscrossing residential lots in willy nilly fashion whenever we have elevation changes. If a retaining wall exists on my neighbors property and there is a 3 foot drop from the top of this wall to the grade below and my driveway or my sidewalk is within 36 inches of this retaining wall, is a guard required even if the elevation change does not occur on my property? It would seem so! The code requires that I measure up to 36 inches away from the walking surface. Then, is it his responsibility to install the guard or is it mine? His lot creates the perceived hazard, not mine. If I install the guard on my property, there is still space on the other side of the guard to walk. Is the neighbor also required to install a guard? If my deck is 24 inches above grade below and 2 feet from my lot line and my neighbor has a 16 inch high retaining wall adjacent the lot line, does my deck require a guard? Is it me that creates the hazard or is it my neighbor? Who is responsible for the guard?

The new language addressing insect screening changes the original intent of these terms. When the code states that insect screening shall not be considered a guard, is it implying that windows must have fall protection and that screening does not constitute a guard? One must ask not just how a building official might interpret this language but how might a jury interpret this language if faced with a fall from a window that had only window screening. Might they conclude the code required additional protection?

Last, the code requires that guard height be measured from "adjacent fixed seating". How far must a fixed seat be from the edge of the surface in question before it isn't considered "adjacent"? Must it be in contact with the guard? If I say my house is adjacent to the park, do I mean my house is on the immediate border of the park or some short distance away? And, if I have a fixed seat next to the edge of a walking surface, is it an open walking surface that would require a guard or not? I can no longer walk on the surface near the elevation change.

This is a horribly worded code section that cannot be understood by the public and cannot be easily interpreted by the building official. The language is vague, ambiguous, and confusing. That is the worst kind of language to try to enforce.

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

ICCFILENAME: DAVIDSON-RB-7-R312.1

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that although there isn't a specific definition of open sided walking surfaces, it is understood what a walking surface is and the difference is not significant enough to limit to the items proposed. This change would delete the fixed seating requirements. The committee likes getting rid of open sided walking surface. The proponent should get together with the proponent of E100-09/10, Part II and rework and bring back.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Rick Davidson, representing self, requests Approval as Submitted.

Commenter's Reason: The requirements for guards in the 2006 IRC were clear, succinct, and direct. It read:

Guards. *Porches, balconies, ramps or raised floor surfaces located more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 36 inches (914 mm) in height. Open sides of stairs with a total rise of more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 34 inches (864 mm) in height measured vertically from the nosing of the treads.*

Guards were only required for "porches, balconies, ramps or raised floor surfaces" and "open sides of stairs".

It was clear that the rule did not apply to retaining walls, landscaping features, driveways, or any other location on the property except for those locations specifically listed.

Then the code was "improved". The language in the 2009 IRC reads:

Where required. *Guards shall be located along open-sided walking surfaces, including stairs, ramps and landings, that are located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a guard.*

Now the code requires guards "along open-sided walking surfaces". Interpreted literally, virtually any place on the lot, inside or outside of the dwelling could be considered a "walking surface". No longer is the guard requirement applicable to something that is constructed as a part of

the dwelling but physical features of the site may also trigger guard requirements. Comments made during the hearings in Baltimore suggested that it was the intent of the language to require guards along retaining walls. This opens the door to requiring guards around window wells and the difficulties that creates. There is no direction given in the language to provide guidance for interpretation and there will be no uniformity in its enforcement.

This is a huge departure from what was required in the 2006 IRC that limited guards to features normally considered part of the dwelling.

Even the IRC Committee is confused about the language. In their reason statement for disapproving this code change they stated: "The committee feels that although there isn't a specific definition of open sided walking surfaces, it is understood what a walking surface is and the difference is not significant enough to limit to the items proposed." Then they further stated: "The committee likes getting rid of open sided walking surface." And last, "The proponent should get together with the proponent of e100-09/10, Part II and rework and bring it back."

The language that is proposed is the same language that was in the first three editions of the IRC. It covered all of those scenarios likely found in residential dwelling construction.

The current language also creates confusion regarding the use of insect screening. The 2006 IRC language was patterned after that found in the IBC and read: "Porches and decks which are enclosed with insect screening shall be equipped with guards where the walking surface is located more than 30 inches (762 mm) above the floor or grade below." It was clear that the intent was to prohibit screening that was commonly used in screen porches and similar structures from meeting the requirements of a guard.

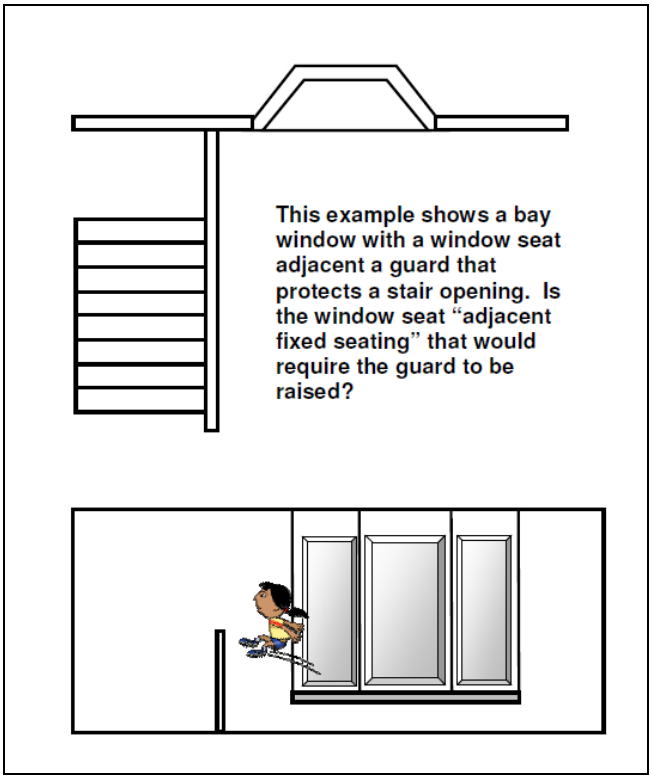
The language in the 2009 IBC has not changed. It continues to read: "1013.4 Screen porches. Porches and decks which are enclosed with insect screening shall be provided with *guards* where the walking surface is located more than 30 inches (762 mm) above the floor or grade below." It is clear that the screening language in the IBC applies only to screen porches.

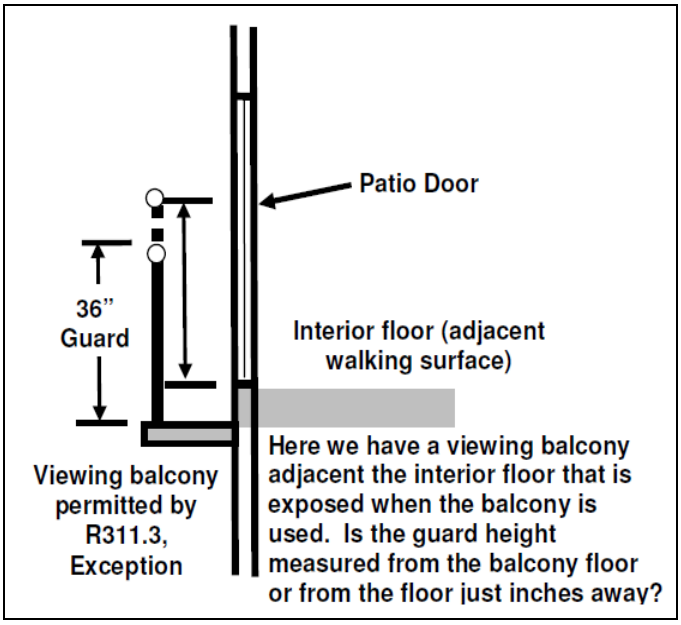
The new language in the IRC simply states: "Insect screening shall not be considered as a guard." There is no qualifying language that references screen porches. It states that screening can't be used as a guard along "open sided walking surfaces". Now we are back to what constitutes an "open sided walking surface". The language is already being challenged in the courts to include certain windows. Since the most common application of insect screening is for windows, it is reasonable to make that connection. That should not be the direction of the code. The language in the IRC is significantly different than that found in the IBC.

The last issue that the proposal addresses is that of measuring the height of guards from "adjacent fixed seating". There has been no data to support the notion that fixed seating occurring near a guard is dangerous. And isn't it much more likely that moveable seating and other furnishings will be placed adjacent guards also creating a "hazard" and they are unregulated. The 2009 language is a solution looking for a problem. As the rule applies to decks, people have decks so they can sit outside and enjoy the views and fresh air, not the inside of a guard. And it isn't uncommon to have window seats near a guard as shown in one of the following illustrations. The hypocrisy is that the window seat could be next to an open window with no regulation but a guard that may be considered "adjacent" would need to tower 36 inches above the window seat.

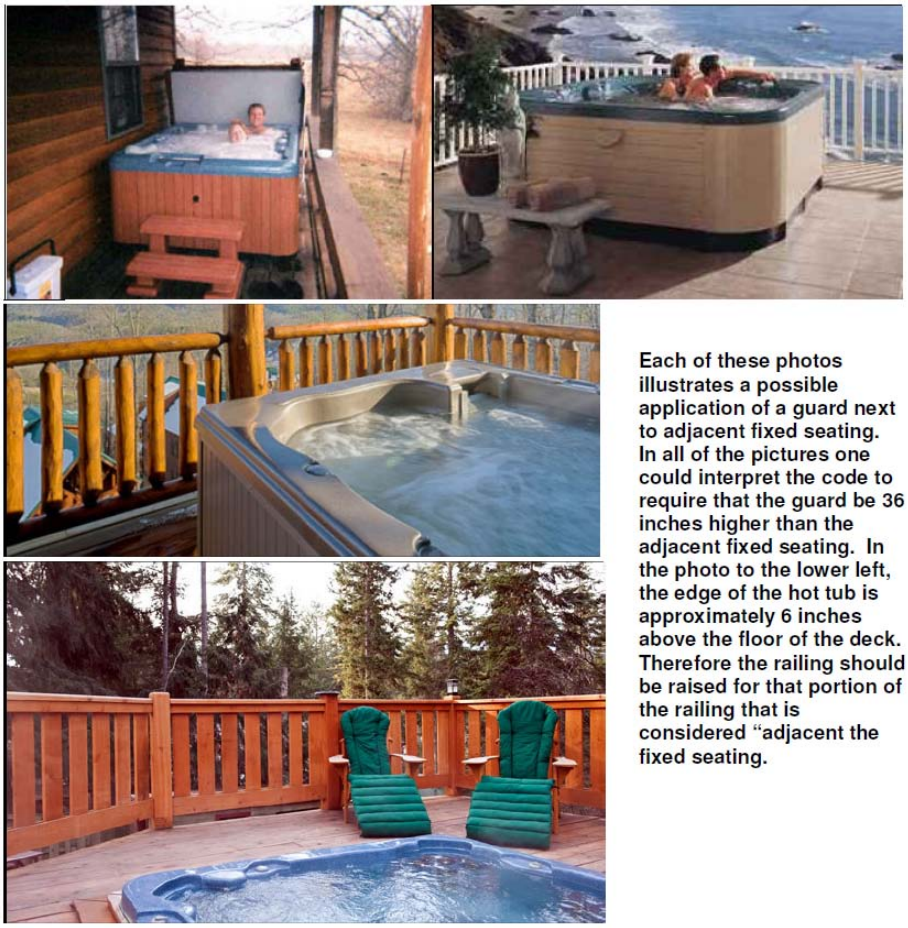
Because the code requires that guards be able to resist a single concentrated load of 200 pounds at any point along the top of the guard, attaching a five or six foot tall guard to meet this requirement becomes expensive and unnecessary for residential construction.

The current language creates all sorts of unintended consequences, is confusing and difficult to interpret, and removed language from the code that was never shown to be a problem.

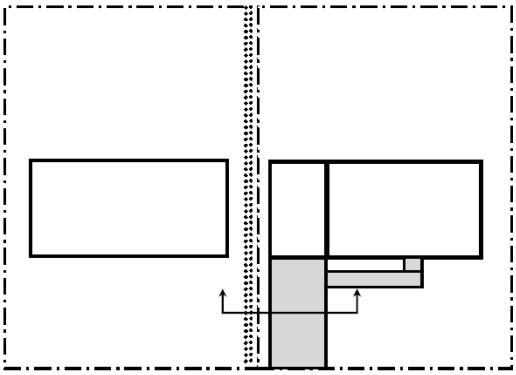


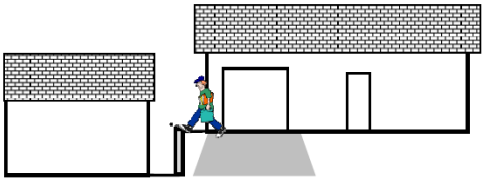


This picture illustrates two issues that arise with the current language on guards. First, we have a walking surface that is more than 30 inches above a point within 36 inches of the open side of the walking surface. Therefore a guard 36 inches high is required. Then we have adjacent fixed seating in the form of the seating around the edge of the hot tub. The seating is 42 inches above the walking surface. Therefore the total height of the guard at this location will be 78 inches. The IRC requires that the guard be able to resist a "single concentrated load (of 200 pounds) applied in any direction along the top." This will require some very substantial mounting hardware to attach the guard to the patio to resist such forces.



Each of these photos illustrates a possible application of a guard next to adjacent fixed seating. In all of the pictures one could interpret the code to require that the guard be 36 inches higher than the adjacent fixed seating. In the photo to the lower left, the edge of the hot tub is approximately 6 inches above the floor of the deck. Therefore the railing should be raised for that portion of the railing that is considered "adjacent the fixed seating.





If the retaining wall is more than 30 inches high, must a guard be placed along the driveway which creates an open sided walking surface if the edge of the driveway is less than 36 inches from the wall? The retaining wall is on the neighbor's property. Who must install the guard, the owner creating the hazard or the owner creating the walking surface? Could the owner of the driveway place a guard along the driveway or must it be installed at the lot line?

Public Comment 2:

Gerald Anderson, City of Overland Park, KS, requests Approval as Modified by this Public Comment.

Replace proposal as shown:

R312.1 Where required. Guards shall be located along open-sided walking surfaces, ~~including~~ on stairs, ramps ~~and~~ landings, decks, porches, balconies and other raised floor surfaces~~.~~ that are located more than 30 inches measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a guard.

Guards shall be provided on porches, balconies, and decks enclosed with insect screening when the porch, balcony, or deck floor is located more than 30 inches (762 mm) above the floor or grade below.

R312.2 Height. Required guards ~~at open sided walking surfaces, including stairs, porches, balconies or landings,~~ shall be not less than 36 inches (914mm) high. ~~measured above the adjacent walking surface, adjacent fixed seating or the line connecting the leading edges of the treads~~.

Exceptions:

1. Guards on the open sides of stairs shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
2. Where the top of the guard also serves as a handrail on the open sides of stairs, the top of the guard shall not be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

Commenter's Reason: As the original proponent has stated, the current code language regarding "open sided walking surfaces" is vague, undefined and unenforceable. The primary problem is that the code doesn't restrict where one might find an open sided walking surface. As the code is currently written one might find an open sided walking surface along a small retaining wall out in the middle of a yard. The code has never required a guard in such a space. This change is needed in order to more clearly specify where guards are required.

Final Action: AS AM AMPC____ D

RB60-09/10
R315, R315.1.1, R315.1.2, R315.1.3, Chapter 44

Proposed Change as Submitted

Proponent: Scott Dornfeld, City of Delano, MN

1. Delete without substitution:

~~**SECTION R315**~~
~~**CARBON MONOXIDE ALARMS**~~

~~**R315.1 Carbon monoxide alarms.** For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in *dwelling units* within which fuel-fired *appliances* are installed and in dwelling units that have attached garages.~~

~~**R315.2 Where required in existing dwellings.** Where work requiring a *permit* occurs in existing *dwellings* that have attached garages or in existing dwellings within which fuel-fired *appliances* exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.~~

~~**R315.3 Alarm requirements.** Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions.~~

2. Delete standard as follows:

UL
~~2034-2008 Standard for Single and Multiple Station Carbon Monoxide Alarms~~

Reason: A new rule should never be imposed unless it can be shown that there is a significant hazard posed that can be directly influenced by the rule. It is not the goal of the I-Codes, the stated purpose of which is to provide minimum standards, to eliminate all hazards such that no one will ever be killed or injured as a result of the design of or a defect in a building. It is simply too expensive and impractical to do so. Such is the case with the addition of carbon monoxide requirements in the IRC that nationwide will increase costs to homeowners in the hundreds of millions of dollars with a potentially negligible impact on CO deaths. Additionally, it requires that the alarms be installed any time work is done and a permit is required. This means if I have my house reroofed, I must install CO alarms (but not smoke alarms). I would be required to install them if I have an attached garage even when studies show the likelihood of carbon monoxide poisoning occurring from motor vehicles is extremely low and even if portions of the garage are permanently open to the outside.

Following are some excerpts taken from a publication by the Consumer Product Safety Commission entitled ***"Non-Fire Carbon Monoxide Deaths Associated with the Use of Consumer Products 2003 and 2004 Annual Estimates".***

P. 4 - During 2004, the most recent year for which nearly complete data are available, there were an estimated 162 carbon monoxide (CO) poisoning deaths associated with the use of a consumer product under the jurisdiction of the U.S. Consumer Product Safety Commission (CPSC). There were an estimated 154 fatalities in 2003. Carbon monoxide poisonings referred to in this report do not include those where the CO gas resulted from a fire or a motor vehicle, were intentional in nature or were directly work-related.

Comment: The number of CO deaths was often cited as being in the thousands, not 150-160, which is the accurate number.

Table 1

Estimated Non-Fire Carbon Monoxide Poisoning Deaths

By Associated Fuel-Burning Consumer Product, 1999-2004.

Consumer Product	2002 - 2004+		Annual Estimate					
	Average Estimate	Average Percent	1999	2000	2001	2002	*2003+*	*2004+*
Total Deaths	*166*	*100%*	109	137	122	181	*154*	*162*
Heating Systems	*82*	*49%*	50	81	72	97	*66*	*84*
Unspecified Gas Heating	*7*	*4%*	5	1	5	2	*4*	*14*
LP Gas Heating	*29*	*18%*	22	28	24	41	*22*	*25*
Natural Gas Heating	*30*	*18%*	20	42	28	32	*27*	*30*
Coal/Wood Heating	*3*	*2%*	0	2	6	4	*2*	*4*
Kerosene/Oil Heating	*6*	*4%*	2	8	6	8	*6*	*4*
Diesel Fuel	*< 1*	*< 1%*	*	*	*	1	*	*
Heating Systems, Not Specified	*7*	*4%*	1	*	3	9	*5*	*7*
Charcoal Grills or Charcoal	*7*	*4%*	17	8	10	11	*8*	*3*
Gas Water Heaters	*3*	*2%*	1	3	1	1	*7*	*1*
Gas Grills, Camp Stoves, Lanterns	*5*	*3%*	14	4	1	5	*2*	*8*
Gas Ranges/Ovens	*3*	*2%*	6	12	9	3	*3*	*4*
Other Appliances	*1*	*1%*	1	0	0	0	*2*	*1*
Multiple Appliances	*8*	*5%*	6	2	7	12	*8*	*4*
Engine-Driven Tools	*54*	*33%*	13	27	22	51	*57*	*55*
Generators	*44*	*27%*	7	19	21	41	*50*	*41*
Other Engine-Driven Tools	*10*	*6%*	6	8	1	10	*7*	*14*

\+ Data collection for 2003 and 2004 is incomplete. Italicized estimates may change in the future.

* No reports received by CPSC staff.

Source: U.S. Consumer Product Safety Commission / EPHA.
CPSC Death Certificate File, CPSC Injury or Potential Injury Incident File, CPSC In-Depth Investigation File, National Center for Health Statistics Mortality File, 1999 - 2004.

Note: Reported average percentages by product may not add to total due to rounding.

P. 6 - Of the 47 estimated deaths in 2003 and 2004 that were associated with LP gas heating systems, 32 (68%) involved unvented portable propane heaters. These unvented portable propane heaters were fueled by a propane tank and were not a component of an installed heating system. Unvented portable propane heaters were either camping heaters that used disposable propane tanks, one pound propane bottles, or tank top heaters that used bulk tanks larger than one pound.

Comment: Unvented portable propane heaters cannot be used as a primary heat source in a building. Therefore these incidents likely occurred when they were used for temporary heat or in locations outside a home such as a camping unit. Requiring CO alarms in homes will have no impact on CO deaths that occur in camping trailers and locations other than the home. Requiring CO alarms in homes because someone might bring an unvented heater into their house and improperly use it is unwarranted.

P. 6 - In 2003 and 2004, an estimated 11 CO deaths (3% of the 316 total consumer product estimate) were associated with charcoal or charcoal grills; an estimated eight deaths (3% of the total consumer product estimate) were associated with a gas water heater; gas grills, camp stoves and lanterns were associated with an estimated eight deaths (3% of the total consumer product estimate); gas ranges and ovens were associated with an estimated seven deaths (2% of the total consumer product estimate); and three deaths were either associated with consumer products that did not fit into the categories given above or there was insufficient detail to categorize the appliance. One fatality was associated with a propane-fueled refrigerator, one was associated with a product simply defined as a "propane appliance" and another as a "gas-fueled appliance". These incidents were categorized as "Other appliances". Additionally, in 2003 and 2004 an estimated 12 deaths were associated with multiple appliances (4% of the total consumer product estimate). The multiple appliances category included all incidents where multiple fuel-burning products were used simultaneously such that a single source of the CO could not be determined. Of the 12 multiple appliance fatalities, six were associated with a generator and another product. These other products were a kerosene heater (three deaths), an LP gas heater (two deaths) and a wood stove. Other fatalities where multiple products were simultaneously used and associated with a CO poisoning death involved a portable propane heater and a gas-powered snow thrower; a portable propane heater and a propane lantern; a kerosene heater and a propane heater; a natural gas heater and hot water heater; a propane furnace and a propane oven in a travel camper; and a natural gas furnace and natural gas oven.

Comment: While it may seem cruel, at times one needs to invoke the "any idiot rule". The code should not require CO alarms to deal with people operating charcoal grills or lawn mowers in their living rooms.

P. 6 - An estimated 112 CO poisoning deaths (35% of the estimated total from 2003 and 2004) were associated with engine-driven tools, which includes generators, riding mowers, a concrete cutter, a gas-fueled welder, power washers, a water pump, an air compressor and an ATV. Generator associated deaths comprise the majority of this category. There were an estimated total of 91 generator-related CO poisoning deaths in 2003 and 2004 (81% of all engine-driven tool fatalities and 29% of the total consumer product estimate).

P. 7 - Of the 123 liquid fueled appliance-related fatalities in 2003 and 2004, 112 (91%) were associated with all engine-driven tools (generators, lawn mowers, power washers, concrete saws, etc.). Generators accounted for 91 of the estimated 123 fatalities (74%) in the Liquid Fueled Appliances category.

Table 2

Estimated Non-Fire Carbon Monoxide Poisoning Deaths

Associated with Consumer Products Organized by Fuel Type, 1999-2004.

Consumer Product	2002-2004+		Annual Estimate					
	Average Estimate	Average Percent	1999	2000	2001	2002	*2003+*	*2004+*
Total Deaths	*166*	*100%*	109	137	122	181	*154*	*162*
Gas Fueled Appliances	*84*	*51%*	67	91	71	92	*72*	*89*
Room / Space Heater	*33*	*20%*	20	39	23	35	*30*	*34*
Natural Gas Fueled	*8*	*5%*	3	17	5	9	*8*	*8*
Propane Fueled	*19*	*12%*	16	21	17	21	*19*	*18*
Other / Unspecified	*5*	*3%*	1	1	1	5	*3*	*8*
Furnace	*40*	*24%*	25	33	37	48	*28*	*43*
Natural Gas Fueled	*22*	*13%*	16	25	23	24	*19*	*23*
Propane Fueled	*10*	*6%*	6	8	7	20	*3*	*7*
Other / Unspecified	*8*	*5%*	3	*	7	4	*6*	*13*
Range, Oven	*3*	*2%*	6	12	9	3	*3*	*4*
Water Heater	*3*	*2%*	1	3	1	1	*7*	*1*
Refrigerator	*<1*	*<1%*	1	*	*	*	*1*	*
Lantern	*2*	*1%*	8	3	*	2	*1*	*4*
Gas Grill, Camp Stove	*2*	*1%*	5	1	1	3	*1*	*2*
Other	*1*	*<1%*	1	*	*	*	*1*	*1*
Solid Fueled Appliances	*11*	*7%*	17	10	16	15	*10*	*7*
Charcoal / Charcoal Grill	*7*	*4%*	17	8	10	11	*8*	*3*
Wood / Coal Heater	*3*	*2%*	*	2	6	4	*2*	*4*
Coal Furnace	*1*	*<1%*	*	1	1	1	*	*1*
Wood / Coal Stove	*1*	*1%*	*	1	5	1	*2*	*1*
Chimney / Fireplace	*1*	*1%*	*	*	*	2	*	*2*
Liquid Fueled Appliances	*61*	*37%*	16	34	28	59	*63*	*60*
Oil Heater / Heating	*1*	*1%*	*	4	5	3	*1*	*
Kerosene Heater / Heating	*5*	*3%*	2	3	1	4	*5*	*4*
Generators	*44*	*27%*	7	19	21	41	*50*	*41*
Other Engine-Driven Tools	*10*	*6%*	6	8	1	10	*7*	*14*
Lantern / Product / Appliance	*<1*	*<1%*	1	1	*	1	*	*1*
Multiple Products Involved	*8*	*5%*	7	2	8	13	*8*	*4*

\+ Data collection is incomplete for 2003 and 2004. Italicized estimates may change in the future.

* No reports received by CPSC staff.

Source: U.S. Consumer Product Safety Commission / EPHA.
CPSC Death Certificate File, CPSC Injury or Potential Injury Incident File, CPSC In-Depth Investigation File, National Center for Health Statistics Mortality File, 1999 - 2004.

Note: Reported average percentages by product may not add to total due to rounding.

Table 3
Estimated Non-Fire Carbon Monoxide Poisoning Deaths Associated with Engine-Driven Tools, 1999-2001 vs. 2002-2004.

Engine-Driven Tools	1999-2001 Average Estimate	2002-2004+ Average Estimate	Annual Estimate 1999	2000	2001	2002	*2003+*	*2004+*
Total	**21**	*54*	**13**	**27**	**22**	**51**	*57*	*55*
Generators	**16**	*44*	**7**	**19**	**21**	**41**	*50*	*41*
Other Engine-Driven Tools	**5**	*10*	**6**	**8**	**1**	**10**	*7*	*14*
Lawn Mowers[!]	5	*6*	6	7	1	5	*6*	*8*
Gas Welder	*	*1*	*	*	*	2	*1*	*
Concrete Saw	*	*1*	*	*	*	1	*	*1*
Power Washer	*	*1*	*	*	*	*	*	*2*
ATV	*	*1*	*	*	*	1	*	*1*
Snow Blower	< 1	*	*	1	*	*	*	*
Air Compressor	*	*< 1*	*	*	*	*	*	*1*
Water Pump	*	*< 1*	*	*	*	*	*	*1*

! Lawn Mowers includes riding mowers, garden tractors and gas-fueled powered push mowers.
\+ Data collection is incomplete for 2003 and 2004. Italicized estimates may change in the future.
* No reports received by CPSC staff.
Source: U.S. Consumer Product Safety Commission / EPHA.
CPSC Death Certificate File, CPSC In-Depth Investigation File, CPSC Injury or Potential Injury Incident File, National Center for Health Statistics Mortality File, 1999 - 2004.
Note: Reported average percentages by product may not add to total due to rounding.

P. 11 - Table 6 shows that in 2003 and 2004, an estimated 230 CO poisoning deaths occurred in homes, including manufactured and mobile homes. From 2002-2004, an annual average of 72 percent of CO poisoning deaths occurred in homes, including manufactured and mobile homes. In 2003 and 2004, an estimated 45 deaths took place in temporary shelters, such as tents, recreational vehicles, cube vans, seasonal cabins, and trailers (including horse trailers). In 2002- 2004, an annual average of 17 percent of CO poisoning deaths took place in temporary shelters. In 2003 and 2004, 25 of the 45 estimated deaths in temporary shelters were most commonly associated with portable gas or LP gas heating or cooking appliances. Generator usage in a temporary shelter was the second largest product category with an estimated 11 deaths in 2003 and 2004. Other scenarios included charcoal and charcoal grills, LP gas lanterns, kerosene heaters and a kerosene cooker. A consistently small percentage of deaths occurred in passenger vans, trucks, or automobiles in which victims were spending the night. For 2003 and 2004, of the estimated 13 CO fatalities in this category, nine were associated with portable LP gas heaters.

Comment: CO alarm requirements in the IRC would not impact incidents in mobile homes, tents, RV's, seasonal cabins, trailers, passenger vans, trucks, and automobiles.

Table 6
Estimated Non-Fire Carbon Monoxide Poisoning Deaths by Location of Death, 1999-2004.

Location of Death	2002-2004+ Average Estimate	2002-2004+ Average Percent	Annual Estimate 1999	2000	2001	2002	*2003+*	*2004+*
Total	*166*	*100%*	**109**	**137**	**122**	**181**	*154*	*162*
Home	*119*	*72%*	60	88	85	128	*110*	*120*
Temporary Shelter	*28*	*17%*	35	34	24	39	*23*	*22*
Auto	*7*	*4%*	7	2	10	8	*8*	*5*
Other	*10*	*6%*	7	13	3	5	*10*	*15*
Unknown	*1*	*1%*	*	*	*	2	*2*	*

\+ Data collection is incomplete for 2003 and 2004. Italicized estimates may change in the future.
* No reports received by CPSC staff.
Source: U.S. Consumer Product Safety Commission / EPHA.
CPSC Death Certificate File, CPSC In-Depth Investigation File, CPSC Injury or Potential Injury Incident File, National Center for Health Statistics Mortality File, 1999 - 2004.
Note: Reported average percentages by product may not add to total due to rounding.

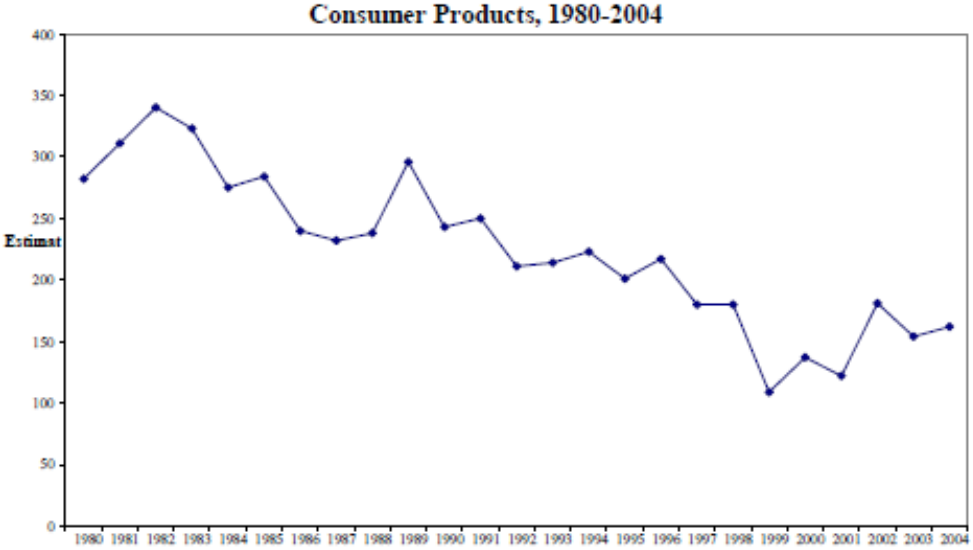
Appendix B: National Estimates of Consumer Product-Related CO Poisoning Deaths, 1980 - 2004

Estimated Non-Fire Carbon Monoxide Poisoning Deaths Associated with Consumer Products, 1980-2004

Year	Estimate
1980	282
1981	311
1982	340
1983	323
1984	275
1985	284
1986	240
1987	232
1988	238
1989	296
1990	243
1991	250
1992	211
1993	214
1994	223
1995	201
1996	217
1997	180
1998	180
1999*	109
2000	137
2001	122
2002	181
2003	154
2004	162

* The Tenth Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) was implemented.
Source: U.S. Consumer Product Safety Commission / EPHA.

Figure 1: Estimated Non-Fire CO Poisoning Deaths Associated with Consumer Products, 1980-2004



Reading through even these brief excerpts, one wonders if requiring CO alarms would have any impact on CO related deaths at all given the circumstances surrounding most deaths. Furthermore, the number of deaths decreased without government regulation from 340 in 1982 to 162 in 2004. This decrease occurred during a time when the population increased from about 225 million to 296 million in 2004. The steadily decreasing number of deaths and their location doesn't indicate that requiring CO alarms would have any statistical impact on deaths.

Regarding the matter of CO deaths and attached garages, following are excerpts from an article entitled:
The Role of Catalytic Converters in Automobile Carbon Monoxide Poisoning* A Case Report by Bradley Vossberg, MD and Judah Skolnick, MD, FCCP
* From the Frazier Rehab Center, Jewish Hospital Health Network, Louisville, KY.

Inhaling motor vehicle exhaust fumes is a common method used by people attempting to commit suicide; however, the decreased carbon monoxide concentrations found in the exhaust of late-model automobiles equipped with catalytic converters are changing the clinical presentation of exhaust inhalation.

Closed-environment exposure to MVEGE from automobiles not equipped with catalytic converters can result in death within 30 min. The introduction of catalytic converters beginning with 1975 new-car models dropped CO emission rates to 6.00 g/min. By 1989, the average new-car

CO emission at idling was 0.22 g/min. The catalytic conversion process removes CO, hydrocarbons, and nitrogen oxide; the resultant emission is a more desirable mixture of nitrogen, CO_2, and water. Contemporary three-way catalytic converters eliminate > 99% of CO emissions.

Given the increased efficiency of modern catalytic converters, patients presenting with closed-environment MVEGE exposure may have much lower HbCO levels than would have been previously expected; in some cases, the HbCO level may be normal. Other important factors to be considered are the role of supplemental O_2 given at the scene and the time taken to obtain the HbCO level.

Attached garages do not pose a risk. By definition, an attached garage is three walls and a roof. A garage door is not required. There are no requirements that the garage be air tight or enclosed to a degree that would create any danger, even if CO levels were high.

Clearly, expecting CO alarms to have any positive impact on CO death rates is extremely optimistic and likely unrealistic. If we are going to require the public to spend their money on safety related devices, surely we can find a more productive area on which to spend it.

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

ICCFILENAME: DORNFELD-RB-2-R315

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that deleting carbon monoxide detectors would weaken the code relative to life safety. Carbon monoxide detectors are within the intent of the IRC and the ICC membership voted to place them into the code.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Rick Davidson, representing self, requests Approval as Submitted.

Commenter's Reason: One of the most egregious acts that our organization can impose on the public is the adoption of rules that provide little or no benefit to improving life, health and safety yet increase the cost of owning a home.

The rule requiring the installation of carbon monoxide alarms is one of those acts.

There have been attempts at placing carbon monoxide alarms in the code for perhaps a decade. The membership has voted every one of them down because there was no factual evidence to indicate that there was a problem that warranted or could be solved by costly regulation.

Is carbon monoxide a problem? There is no question that carbon monoxide kills people. But is it a problem in homes worthy of expensive corrective action? And are corrective actions available that will change the number of deaths that occur? Adopting rules aimed at preventing deaths may make people feel good but if they don't achieve their intended purpose, they are a costly failure.

Unlike some issues, there is a wealth of information available regarding carbon monoxide deaths. The Consumer Product Safety Commission regularly produces a document, the most recent of which is entitled "Non-Fire Carbon Monoxide Deaths Associated with the Use of Consumer Products 2006 Annual Estimates."

The report states that 180 accidental carbon monoxide deaths occurred in 2006 in the US. To put the number of CO deaths in perspective, how does the number of CO deaths compare with other accidental deaths? Compared to the 180 CO deaths in 2006:

784 people died in bicycle accidents in 2005 (nearly 4 ½ times more than died of CO poisoning).
3,579 people died from accidental drowning in 2006.
20,823 people died from accidental falls in 2006.
43,313 people died in auto crashes in 2008.
3,320 people died in fires in 2008.
18,573 people were murdered in 2006.
27,531 people died from accidental poisoning in 2006.
31 people died from dog attacks in 2006

The number of accidental CO deaths pales compared too many other common types of accidental deaths.

But, if we take a position that accidental CO deaths are a problem, is the solution of putting CO alarms in new homes going to have an impact, any impact, on the number of CO deaths.

The CPSC 2006 report listed a number of key findings. Among them:

- *"There were an estimated 180 unintentional non-fire CO poisoning deaths associated with consumer products under CPSC's jurisdiction. The estimated annual average from 2004-2006 was 181 deaths."*
- *"Engine-Driven Tools were associated with the largest percentage of non-fire CO poisoning fatalities at 58 percent (104 deaths). Heating Systems-related CO fatalities were associated with 28 percent (50 deaths) and five of the remaining six product categories [Charcoal Grills or Charcoal (10 deaths), Gas Water Heaters (4 deaths), Gas Grills, Camp Stoves, Lanterns (4 deaths), Other Appliances (1 deaths), and Multiple Appliances (7 deaths)] combined were associated with a total of 14 percent. There were no reported deaths in the Gas Ranges/Ovens category."*

Comment: 180 accidental CO deaths occurred. 58% of the CO deaths were a result of engine-driven tools. How many could have been prevented if CO alarms were in new homes? Some of these deaths occurred in garages, tents, campers and locations other than the home. If one subtracts the 104 deaths from engine-driven tools, 10 deaths from charcoal grills, and 4

deaths from gas grills, camp stoves, and the like, that leaves only 62 deaths occurring from heating systems, water heaters, and other appliances likely to be found in a home. Clearly, CO alarms would have prevented few if any of the 114 CO deaths attributed to engine-driven tools, camps stoves, charcoal grills and similar devices not found in homes. That leaves 62 deaths that may have been impacted by CO alarms.

• *"Of the estimated 104 CO fatalities in 2006 that were associated with Engine-Driven Tools, 82 percent (85 deaths) involved generators. Additionally, generator usage was associated with three of the estimated seven multiple appliance CO poisoning fatalities."*
• *"There is a statistically significant increasing trend in consumer product-related non-fire CO fatalities from 1999 to 2006 that is attributable to generators."*

Comment: Generators are not a home appliance and should not be operated in a home. Should homes be provided with CO alarms because someone may run engine driven tools in their home? Where does this stop? Is the solution to this problem putting alarms in homes or are there better solutions such as public education or better labeling and instructions for engine-driven tools. The entire US population should not have to pay hundreds of millions of dollars to install CO alarms in their homes because 50 people operated gas powered tools or charcoal grills inside their homes.

• *"Of the estimated 50 Heating Systems-related fatalities in 2006, 90 percent involved gas heating. Natural gas heating accounted for 46 percent of heating system-related fatalities, liquefied petroleum (LP or propane) gas heating accounted for 38 percent, and an additional six percent were only identified as unspecified gas heating. Kerosene/oil heating and unspecified heating systems accounted for the remaining eight percent."*

Comment: Since the adoption and enforcement of model codes in rural areas of the country is sporadic to non-existent, those areas are seen as less likely to benefit from a CO alarm mandate because there is no agency to educate the public or enforce rules. Because of the cost of installing gas lines, natural gas is usually only available in communities or more highly developed areas. Rural areas are more dependent on propane, fuel oil, and kerosene. Of the 50 estimated CO deaths attributable to heating systems, 23 occurred with a natural gas appliance. The remainder of the deaths was attributed to propane, fuel oil, and kerosene. These deaths are more likely to have occurred in areas that wouldn't be reached by code adoption. How many of these 50 estimated deaths could be saved with a CO alarm mandate?

• *"Seventy-one percent of the estimated 180 CO deaths in 2006 occurred in a home; while an estimated 17 percent of deaths occurred in tents, campers, and other temporary shelters."*

Comment: 31 of the 180 CO deaths occurred outside the home. Requirements for CO alarms would have no impact on these deaths.

•*"CO poisoning fatalities in isolated locations account for a larger proportion of all CO fatalities (13% in 2004 through 2006) than the proportion of the U.S. population living in isolated areas (4%). The disparity is even higher at isolated non-home locations which account for 25 percent of all CO fatalities occurring at non-home locations."*

Comment: The model codes are not adopted uniformly across all areas of the country. Often, rural areas are not governed by codes. This statistic indicates that more isolated areas have a greater incidence of CO deaths. Could it be that rural areas have less supervision of building construction that leads to more CO deaths? What other explanations are there? What impact would a CO alarm mandate have on these areas?

• *"… for non-engine driven tool products, the mortality rate has decreased by 16 percent since 1999/2000, from 3.67 in 1999/2000 down to a 3.08 average mortality rate in 2004 through 2006."*

Comment: So with no requirements for CO alarms in the I-Codes, the mortality rate has decreased by 16% since 2000. With the number of deaths decreasing at a steady pace, how necessary is it to require CO alarms?

The report goes on to say:

"Of the estimated 19 deaths in 2006 that were associated with LP gas heating systems, 11 (58%) involved unvented portable propane heaters. These unvented portable propane heaters were fueled by a propane tank and were not a component of an installed heating system. Unvented portable propane heaters were either camping heaters that used disposable propane tanks, one pound propane bottles, or tank top heaters that used bulk tanks larger than one pound."

And,*"…an estimated 10 CO deaths (6% of the 180 total consumer product estimate) were associated with charcoal or charcoal grills"*

"…an estimated four deaths (2% of the total consumer product estimate) were associated with a subcategory of products which include gas grills, camp stoves, and lanterns; and one death was either associated with a consumer product that did not fit into the categories given above or there was insufficient detail to categorize the appliance involved. This latter incident involved the use of a grill inside a house, but it is unclear whether the grill was a gas grill or a charcoal or wood burning grill. This incident was categorized as Other Appliances."

"Additionally, in 2006, an estimated seven deaths were associated with multiple appliances (4% of the total consumer product estimate). The Multiple Appliances category includes all incidents where multiple fuel-burning products were used simultaneously such that a single source of the CO could not be determined. Of the estimated seven multiple appliance fatalities, three were associated with the simultaneous use of a gasoline-fueled generator and an LP heater. Of the estimated seven multiple appliance fatalities, six were associated with some type of LP heater."

"An estimated 104 CO poisoning deaths (58% of the estimated total from 2006) were associated with the category of Engine-Driven Tools, which includes generators, riding mowers or garden tractors, pressure washers, a snowmobile, a snow thrower, an air compressor, a water pump, and a non-vehicular internal compression engine."

There is much discussion in the report regarding the type of appliances that cause the CO problems. Often they are found to be old, poorly maintained products. This indicates that the problems aren't in new homes and requiring CO alarms in new homes won't solve these problems.

The current rules require CO alarms if the home contains an attached garage. Presumably, the reason for this requirement is the assumption that automobiles in garages generate sufficient carbon monoxide to be a hazard. There is no data to indicate this is so.

According to the US Environmental Protection Agency and in recognition of the fact that cold engines give off more CO, the 1990 Clean Air Act calls for 1994 and later cars and light trucks to meet federal carbon monoxide standards at 20 degrees Fahrenheit whereas the old rules required those standards be met at 75 degrees Fahrenheit. So the risk of increased CO levels emitting from cold engines is significantly reduced.

Furthermore, following are excerpts from an article entitled:

The Role of Catalytic Converters in Automobile Carbon Monoxide Poisoning[*] A Case Report by Bradley Vossberg, MD and Judah Skolnick, MD, FCCP

[*] From the Frazier Rehab Center, Jewish Hospital Health Network, Louisville, KY.

Inhaling motor vehicle exhaust fumes is a common method used by people attempting to commit suicide; however, the decreased carbon monoxide concentrations found in the exhaust of late-model automobiles equipped with catalytic converters are changing the clinical presentation of exhaust inhalation.

Closed-environment exposure to MVEGE from automobiles not equipped with catalytic converters can result in death within 30 min. The introduction of catalytic converters beginning with 1975 new-car models dropped CO emission rates to 6.00 g/min. By 1989, the average new-car CO emission at idling was 0.22 g/min. The catalytic conversion process removes CO, hydrocarbons, and nitrogen oxide; the resultant emission is a more desirable mixture of nitrogen, CO_2, and water. ***Contemporary three-way catalytic converters eliminate > 99% of CO emissions.***

Given the increased efficiency of modern catalytic converters, patients presenting with closed-environment MVEGE exposure may have much lower HbCO levels than would have been previously expected; in some cases, the HbCO level may be normal. Other important factors to be considered are the role of supplemental O_2 given at the scene and the time taken to obtain the HbCO level.

More findings related to automobile carbon monoxide poisoning can be found in a technical paper entitled "***Reducing the Risk of Accidental Death Due to Vehicle-Related Carbon Monoxide Poisoning***" by **Linsey C. Marr, Glenn C. Morrison, William W. Nazaroff, and Robert A. Harley,** *Department of Civil and Environmental Engineering, University of California, Berkeley, California.* This technical paper reports on studies and analysis of computer modeling undertaken to determine the risk of death from CO poisoning in homes and garages. Among the findings: "The risk of death ranged from 16-21% for a 3-hr exposure ***in*** a garage to 0% for a 1-hr exposure in a house."

With any study with so many variables, one can question the validity of the study. This one is no different. Among the difficulties in modeling the conditions were numerous variables including:

Age and condition of the motor vehicle
Air exchange rates for the garage and dwelling
Size of the garage and dwelling
Length of time the vehicle is running
Amount of fuel in the fuel tank
Age and health of the individual
Temperature and weather conditions
Newer vehicles have more effective catalytic converters
Socioeconomic factors may result in older, less efficient vehicles stored outside or garages with higher air exchange rates

But the study was based on very conservative conditions and it was pointed out that the risks may be overestimated.

The study points out that unintentional CO deaths from automobiles do occur. But most all of these deaths occurred ***in*** the garage. The most frequent cause of CO deaths were a driving into a garage (often under the influence of alcohol or drugs) and leaving the engine running (42% of deaths) and starting the car to perform vehicle maintenance (25%) or to provide heat (23%).

Importantly, the study points out that even these deaths are dropping at a rate of about 7% a year as older vehicles are replaced by newer, more efficient ones. In fact, in the technical paper by **M. Shelef** titled "***Unanticipated benefits of automotive emission control: Reduction in fatalities by motor vehicle exhaust gas***" SAE Technical Paper No. 922335, Society of Automotive Engineers: Warrendale, PA, 1992, Shelef argued that reducing CO poisoning deaths may be the biggest benefit from current motor vehicle emission control programs, even though the programs are motivated by concentration standards for outside air.

After reading the various reports and studies on automobile carbon monoxide emissions, it is difficult to come to any conclusion that automobile generated carbon monoxide creates any sort of hazard in the home and the proponent has provided no statistical evidence that it does.

But beyond that, it is necessary to look at what you are asked to believe is common practice. That is that a homeowner would start their car parked in a cold garage, go into the home leaving the door open, and allow the carbon monoxide as well as the noise and cold air to enter the house unabated and ignored. Then you are further led to believe that the homeowner would allow this to happen long enough for carbon monoxide levels to build to dangerous levels, never mind why they started the automobile in the first place which they are supposed to have forgotten. I suggest that people will not leave the door to a frigid garage open, they will not want the cold air and noise to infiltrate their home, and they will not leave the automobile running for extended periods of time but will continue on with whatever caused them to start the automobile in the first place.

The current rules require CO alarms in homes that have any fuel burning appliances. But some appliances have an extremely high safety record when it comes to CO incidents. No deaths were attributed to CO poisoning from gas ranges or ovens in 2006. Only four deaths occurred from water heaters. 2,426,264 people died during 2006. The number of deaths attributable to CO poisoning from water heaters is .0001648% of the total number of deaths. Given the low number of deaths compared to overall US mortality rates, deaths attributable to CO poisoning is statistically irrelevant.

Is there a problem with CO poisoning in the home that occurs to a degree that warrants expensive regulation? I would say that the evidence indicates there is not.

What will this rule cost the American public? If an average of 1 million new homes are built each year and only one alarm is required in each home and if it costs $50 to install that one alarm, the cost to the American public is $50 million! Furthermore, since alarms must be installed in existing homes whenever any permit is required and since there may be 10, 15, 20 homes that have repairs for each new home, the cost can quickly reach the hundreds of millions of dollars. And at the end of the five year life expectancy of the alarms, will they be replaced like they should? If they are, the costs above will double. If there are 20 or 30 lives that are currently lost that could be prevented with CO alarms, is it worth it to the public to spend hundreds of millions of dollars to do that? I suggest is it is not.

It has been argued that several states have adopted CO regulations. That is true and Minnesota is one of them. Deaths attributable to CO poisoning in Minnesota are extremely rate. However, some years ago, the tragic death of a young girl occurred in a home where an older heating system had not been properly maintained. As is often the case, grieving parents fail to take responsibility for what occurred and stated that if carbon monoxide alarms had been required in all homes that perhaps their daughter wouldn't have died. The grandparents of the young girl approached the Minnesota IRC Advisory Committee about placing a mandate in the state building code that adopted the 2006 IRC. However, amendments to the state code needed to pass a need and reasonable test and there were insufficient reasons to require them to be installed. The grandparents then went to several legislators who crafted a poorly worded law that makes CO alarms mandatory in all dwellings in the state except those owned by the state. The state legislature has no burden to prove that their rules are necessary or reasonable. The rule is not in the Minnesota State Building Code and there is no enforcement mechanism. The law sold a few alarms and creates necessary work for some attorneys.

It is important that unnecessary regulation not be approved and that any that has been approved be removed. If you believe in costly unnecessary regulation, then you should vote to maintain CO alarms. If you believe that there should be a reason why rules exist, then you should support this proposal.

Public Comment 2:

Steve Orlowski, National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R315.1 Carbon monoxide alarms. For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in *dwelling units* within which fuel-fired *appliances* are installed and in dwelling units that have attached garages with a communicating opening.

R315.2 Where required in existing dwellings. Where work requiring a *permit* occurs in existing *dwellings* ~~that have attached garages or in existing dwellings within which fuel-fired *appliances* exist~~, carbon monoxide alarms shall be provided in accordance with Section R315.1 for the following:

1. Mechanical or gas work requiring a *permit* in which fuel-fired *appliances* are being replaced or installed.
2. Addition and/or renovation of attached garages with communicating openings requiring building permit.

Commenter's Reason: In an attempt to provide clearer guidance into the requirements for where and when a CO detector is required, NAHB urges the final action assembly to approve the following modification. There are situations where one- and two- family dwellings are constructed with an attached garage that does not open directly into the dwelling unit, such as is found with homes with breezeways that separate the garage from the dwelling but share the same roof. When there is no direct communication between the garage and the dwelling unit or when there is adequate ventilation to reduce the transmission of any potential CO emission from entering the dwelling, CO detection should not be required.

As for the second modification, the original proponent is correct that there are many in the code enforcement community that interpret the existing language to include any work that is performed under a permit , requires existing homes to be equipped with a carbon monoxide detector. The premises for requiring any retrofitting requirement must be tied to the potential cause of the hazard and not an unrelated act. Carbon monoxide detectors should only be required when the work being performed is related to potential causes of carbon monoxide. Bathroom renovation, kitchen upgrades and additions that do not involve fuel-fired appliances should not trigger the installation of carbon monoxide detectors.

Final Action: AS AM AMPC____ D

RB64-09/10

R202 (New), R317.5 (New), R317.5.1 (New), Chapter 44 (New)

Proposed Change as Submitted

Proponent: Marcelo Hirschler, GBH International, representing the American Fire Safety Council

1. Add new text as follows:

PLASTIC LUMBER. a manufactured product made primarily from thermoplastic materials (filled or unfilled) and typically supplied in sizes that correspond to traditional lumber board and dimensional lumber sizes.

R317.5 Plastic lumber. Plastic lumber used in exterior deck boards shall bear a *label* indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 6662 and ASTM D 7032.

R317.5.1 Plastic lumber decks shall be installed in accordance with the manufacturer's instructions.

2. Add new standard as follows:

ASTM
D 6662-09 Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards

Reason: Numerous plastic lumber decks are used throughout the US, but the IRC and IBC do not reference them. Wood-plastic composite decks, complying with ASTM D 7032, are permitted in the IRC (section R317.4). This proposal adds plastic lumber decks, with the requirements from ASTM D 7032 and also the requirements from ASTM D 6662.

ASTM D 6662 is a specification for plastic lumber decking boards that requires the plastic lumber to comply with properties based on the following ASTM standards:
ASTM D 2565 Standard Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications
ASTM D 2915 Standard Practice for Evaluating Allowable Properties for Grades of Structural Lumber
ASTM D 4329 Standard Practice for Fluorescent UV Exposure of Plastics
ASTM D 6109 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products
ASTM D 6341 Standard Test Method for Determination of the Linear Coefficient of Thermal Expansion of Plastic Lumber and Plastic Lumber Shapes Between −30 and 140°F [−34.4 and 60°C]
ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM G 151 Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
ASTM G 154 Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
ASTM G 155 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

ASTM D 7032 (already referenced in the IRC) is a Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails). It requires the material to comply with flexural properties (ASTM D 6109), accelerated decay (ASTM D 2017), Xenon-arc exposure (ASTM D 2565), resistance to termites (ASTM D 3345), structural lumber grade classifications (ASTM D 2915), and so on.

With regard to fire properties, ASTM D 6662 requires that plastic lumber meet ASTM E 84, Steiner tunnel test, with a flame spread index of no more than 200, with a material that is required to remain in place during the test. The wording with regard to ASTM E 84 flame spread testing in ASTM D 6662 is much more explicit than the wording in the test method itself. The following wording is included in the ASTM D 6662 standard: "6.4.2 The test specimen shall either be self-supporting by its own structural characteristics or held in place by added supports along the test specimen surface. The test specimen shall remain in place throughout the test duration, without such severe sagging that it interferes with the effect of the gas flame on the test specimen. Test results are invalid if the bulk of the test specimen melts or drops to the furnace floor."

ASTM D 7032 also requires wood-plastic composite decks to comply with a flame spread index of no more than 200 when tested to ASTM E 84. However, ASTM D 7032 does not have the additional requirements that the material stay in place.

By requiring that plastic lumber comply with the requirements of ASTM D 6662 and ASTM D 7032 the code would include all physical property and fire test requirements associated with both types of decking materials. Just for information: wood normally complies with a flame spread index of no more than 200. ICC ES has an Evaluation criterion for thermoplastic composite lumber products (AC 109), based on ASTM D 7032, which is used for approving plastic lumber decks.

Structural plastic lumber combines the benefits of long lasting, weather resistant plastic lumber with the structural characteristic of dimensional wood lumber. It is made primarily from recycled plastics from post-consumer waste like plastic milk and detergent bottles. It then includes strengthening additives, UV–inhibited pigments, anti-oxidant processing aids and foaming agents for a highly stable material that is superior to wood lumber in some measures.

A few photographs of actual decks follow.

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

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 6662-09, for compliance with ICC criteria for referenced standards given in Section 3.6 of Council Policy #CP 28 will be posted on the ICC website on or before September 24, 2009.

ICCFILENAME: HIRSCHLER-RB-4-R202-R317.5

Public Hearing Results

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

Committee Action: **Disapproved**

Committee Reason: The committee feels there are a number of different products this could apply to and just limiting it to deck boards is going to create a number of issues. The definition is too broad, primarily is vague and thermoplastic requires chemical knowledge. Also, the issue of labeling as stated on the committee's previous action on S207-09/10, Part II. This should be reworked and brought back later.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Marcelo M. Hirschler, GBH International, representing American Fire Safety Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1. Revise text as follows:

PLASTIC LUMBER DECKING BOARD. a manufactured product made ~~primarily from thermoplastic~~ of plastic materials (filled or unfilled) which is generally rectangular in cross-section and is typically supplied in sizes that correspond to traditional lumber board and dimensional lumber sizes.

R317.5 PLASTIC LUMBER DECKING BOARDS. Plastic lumber decking boards used in exterior decks ~~deck boards~~ shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 6662 and ASTM D 7032.

R317.5.1 Plastic lumber decking boards ~~decks~~ shall be installed in accordance with the manufacturer's instructions.

2. Add new text as follows:

R502.1.8 EXTERIOR PLASTIC LUMBER DECKING BOARDS. Plastic lumber decking boards used in exterior decks shall comply with the provisions of Section R317.5.

3. Add new standard as follows:

ASTM
D 6662-09 Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards

Commenter's Reason: The technical committee was concerned that if the definition of plastic lumber was introduced into the code, plastic lumber could be considered to be a new material and permitted to be used for applications beyond plastic lumber decking boards. This comment fixes that problem by defining plastic lumber decking boards, and that directly correlates with the intended application in R317.5. The committee was also concerned about the use of the terms "thermoplastic" and "primarily" and they have been eliminated from the definition.

Note that the IRC currently allows wood plastic composites to be used in exterior deck boards and requires them to be labeled (which, of course, would be done on the non exposed surface). The proposed wording exactly mirrors that wording. The applicable acceptance criteria used by ICC Evaluation Services are those of AC 109, Acceptance Criteria for Thermoplastic Composite Lumber Products, which covers not just wood plastic composites but all types of plastic lumber. However, the IRC is silent with regard to plastic lumber decking boards unless they are "made primarily from wood or cellulose-based materials and plastic". Plastic lumber decking boards often contain no wood or cellulose-based materials and are thus excluded from the IRC. This proposal would cover such materials.

The requirements that plastic lumber decking boards have to meet, with this proposal, are not just those of ASTM D 7032 but they will additionally have to meet the requirements of ASTM D 6662, which impose more severe fire testing requirements. As shown in the text below, ASTM D 6662 requires that the boards be tested to ASTM E 84 (Steiner tunnel) and that they pass the same flame spread index as wood deck boards. ASTM D 6662 also states that the ASTM E 84 test specimens are not allowed to fall to the tunnel floor or otherwise interfere with the effect of the gas flame on the test specimen. This is a more severe requirement than the fire test requirement in ASTM D 7032 or than the fire test requirements in many other material specifications.

Text of ASTM D 6662 on fire testing:

6.4 Fire Properties:

6.4.1 The flame spread index of plastic lumber decking boards shall be determined by testing in accordance with Test Method E 84.

6.4.2 The test specimen shall either be self-supporting by its own structural characteristics or held in place by added supports along the test specimen surface. The test specimen shall remain in place throughout the test duration, without such severe sagging that it interferes with the effect of the gas flame on the test specimen. Test results are invalid if the bulk of the test specimen melts or drops to the furnace floor. Appendix X1 of Test Method E 84 provides guidance on mounting methods.

6.4.3 Products shall have a flame spread index no greater than 200 when tested in accordance with Test Method E 84.

NOTE 12 — For combustible construction, codes often require fire performance at least equivalent to that of wood. A maximum flame spread index of 200 when tested in accordance with Test Method E 84 is considered to be equivalent to that of wood. For outdoor applications, there is no requirement specified for smoke developed index.
NOTE 13—Fire retardants are available to increase the resistance to ignitability and flame spread of plastic lumber and shall be incorporated as needed.
6.4.4 The plastic lumber industry has developed a qualification fire test based on end-use of the material in decking. This method, a modification of Test Methods E 108 originally intended for roofing materials, is presented in Appendix X4 along with a commentary for its use.

Text of IRC on wood plastic composite decks:

WOOD PLASTIC COMPOSITE. A composite material made primarily from wood or cellulose-based materials and plastic.

R317.4 Wood plastic composites. Wood plastic composites used in exterior deck boards, handrails and guardrail systems shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032.

R317.4.1. Wood plastic composites shall be installed in accordance with the manufacturer's instructions.

R502.1.7 Exterior wood plastic composite deck boards. Wood plastic composites used in exterior deck boards shall comply with the provisions of Section R317.4.

Final Action: AS AM AMPC____ D

RB67-09/10
R322.3.2, R322.3.3

Proposed Change as Submitted

Proponent: Rebecca C. Quinn, RCQuinn Consulting, Inc., representing the Department of Homeland Security, Federal Emergency Management Agency

Revise as follows:

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high hazard areas shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of ~~mat or raft foundations,~~ piling, pile caps, columns, grade beams and bracing, is:
   1.1. Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees (0.35 rad) from the direction of approach, or
   1.2. Located at the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees (0.35 rad) from the direction of approach.
2. Basement floors that are below *grade* on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.

   Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

R322.3.3 Foundations. Buildings and structures erected in coastal high-hazard areas shall be supported on pilings or columns and shall be adequately anchored to those pilings or columns. Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. ~~Mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions.~~ Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.

Reason: The purpose of this code change is to clarify that an observed practice of using mat or raft foundations that are above eroded grade is not consistent with the regulations of the National Flood Insurance Program (NFIP) regarding foundations in coastal high hazard areas (V Zones). See §60.3(e)(4), below. The NFIP regulations require use of pile or column foundations in V Zones, and do not explicitly provide for use of mat or raft foundations. Note that ASCE 24 *Flood Resistant Design and Construction*, a referenced standard in the IRC, allows use of mat or raft foundations under limited circumstances; notably, it requires that such elements be at or below eroded grade. The language in R322.3.2 does not impose a limitation on the elevation of mats, and rafts and thus could lead to violations of the NFIP requirements which would also have significant cost implications for federal flood insurance premiums. ASCE 24 is permitted to be used as an alternate to the IRC provisions for coastal high hazard areas (see R301.2.4.1 and R322.1.1). In addition, designers may use ASCE 24 as guidance, even if not required.

44 CFR §60.3(e)(4) Provide that all new construction and substantial improvements in Zones V1-30 and VE, and also Zone V if base flood elevation data is available, on the community's FIRM, are elevated on pilings and columns so that . . . *[remainder not shown]*

Cost Impact: The code change proposal has no cost impact because it is consistent with local ordinances that are adopted by local jurisdictions for participation in the NFIP.

ICCFILENAME: QUINN-RB-5-R322.3.2

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that observation of non-compliance of a code provision is not sufficient justification to remove a requirement. The use of mat or raft foundation under limited conditions should remain in 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:

Rebecca C. Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency, Department of Homeland Security, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high-hazard areas shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of ~~mat or raft foundations,~~ piling, pile caps, columns, grade beams and bracing, is:
   1.1. Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees from the direction of approach, or
   1.2. Located at the base flood elevation plus one foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees from the direction of approach.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings, and for support of parking slabs, pool decks, patios, and walkways.

   Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

R322.3.3 Foundations. All buildings and structures erected in coastal high-hazard areas shall be supported on pilings or columns and shall be adequately anchored to <u>such</u> ~~to those~~ pilings or columns. Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. <u>Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave–velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24.</u> Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.

Commenter's Reason: The original proposal would have completely deleted reference to mat or raft foundations because an observed practice of using mat or raft foundations that are above eroded grade is not consistent with the regulations of the National Flood Insurance Program (NFIP) regarding piling and column foundations in coastal high hazard areas (V Zones). This public comment responds to testimony that mat or raft foundations could be acceptable under the NFIP if designed in accordance with ASCE 24 *Flood Resistant Design and Construction*, a referenced standard in the IRC. The modification proposes to add "spread footing" because the specific language in ASCE 24 consistently refers to use of spread footings along with mat or raft foundations (see ASCE 24 Sec. 4.5.1, 4.5.7, and Sec. 4.5.8).

Final Action: AS AM AMPC____ D

RB72-09/10
R403.1.3

Proposed Change as Submitted

Proponent: Homer Maiel, PE, CBO, City of San Jose, CA, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay Chapters)

Revise as follows:

R403.1.3 Seismic reinforcing. Concrete footings located in Seismic Design Categories D_0, D_1 and D_2, as established in Table R301.2 (1), shall have minimum reinforcement. Bottom reinforcement shall be located a minimum of 3 inches (76 mm) clear from the bottom of the footing.

In Seismic Design Categories D_0, D_1 and D_2 where a construction joint is created between a concrete footing and a stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing, have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall.

In Seismic Design Categories D_0, D_1 and D_2 where a grouted masonry stem wall is supported on a concrete footing and stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing and have a standard hook.

In Seismic Design Categories D_0, D_1 and D_2 masonry stem walls without solid grout and vertical reinforcing are not permitted.

> **Exception:** In detached one- and two-family *dwellings* which are three stories or less in height and constructed with stud bearing walls~~, plain concrete footings without longitudinal reinforcement supporting walls and~~ isolated plain concrete footings supporting columns or pedestals are permitted.

Reason: In seismic design categories D_0, D_1 and D_2, the flexural demands placed upon footings by the variety of braced wall panels configurations described in IRC Chapter 6, some of which require a hold-down device at one end or each end make the use of plain concrete footings unacceptable. The footing is an integral part of the seismic force load path and deserves to be constructed in as robust a manner as the braced wall panels it is supporting. The exception to use plain concrete isolated footing pads at columns or pedestals is retained because these are not use to support or anchor braced walls unless designed in accordance with accepted engineering practice per Section R602.10.7 Item 2.

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

ICCFILENAME: MAIEL-RB-2-R403.1.3

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This change would make the IRC inconsistent with the IBC and the NEHRP recommendations. The proponent should rework and bring back later.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Homer Maiel, City of San Jose, CA, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay Chapters), requests Approval as Submitted.

Commenter's Reason: In seismic design categories D0, D1 and D2 the flexural demands placed upon footings of stud wall framed detached one- and two-family dwellings make the use of plain concrete footings devoid of any longitudinal reinforcing unacceptable. IRC Section R301.1 specifically states "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*." The foundation is an integral part of the seismic force-resisting load path and deserves to be constructed in a manner consistent with the seismic-resisting braced wall panels it is supporting. The current specific allowance for absence of any longitudinal reinforcing will also prevent any vertical reinforcing from being placed in the footing, since there is nothing to tie any vertical bar to; consequently the current provision is allowing totally unreinforced footings in dwellings up to three stories in height.

Since the mid-1990's wood light-frame prescriptive provisions for alternative wall bracing using tie-downs (as currently shown in IRC Figure R602.10.3.2) have required that the foundation at these alternative panels utilize one No. 4 bar top and bottom. Also, more recent IBC alternative wall bracing provisions utilizing a portal frame concept (Section 2308.9.3.2) that includes providing tie-downs similarly specifies footings with one No. 4 bar top and bottom. Unfortunately the equivalent portal frame provisions in IRC Section R602.10.3.4 do not address the footing's reinforcement. In addition, tie-downs are also specified in IRC Table R602.12(2) when stone or masonry veneer is installed, and in IRC Section R602.10.1.4.1 when brace wall panels are offset from the end of the wall line, yet neither of these IRC provisions mention minimum footing reinforcement. Further, IRC Section R301.1.1 explicitly allows use of AF&PA Wood Frame Construction Manual (WFCM) as a permitted alternative, but in that document all walls providing lateral resistance are required to use various types of tie-downs. Each time a tie-down is installed, the footing should be capable of resisting the flexural demands induced by that connection, yet the current Section R403.1.3 exception 1 ignores this need.

While we recognize there is a cost of installing this minimum reinforcing, we believe that most builders of dwellings in Seismic Design Categories D0, D1 and D2 are already providing this level of reinforcing, and that the cost of repairing cracks caused to interior and exterior finishes not to mention the foundation itself would far exceed the cost of minimal reinforcement of footings during the original construction.

With regard to any inconsistency of this proposal with the NEHRP Provisions, it must be noted that the applicable NEHRP provision (Sec. 9.4.2.2 Exception 1) has not been updated since its publication in 2004 (FEMA 450-1/2003) while during that period many of the IRC's provisions for the use of tie-downs at the ends of brace wall panels have been added to the code.

Final Action: AS AM AMPC____ D

RB73-09/10
R202 (New), R403.1.6

Proposed Change as Submitted

Proponent: Gary Ehrlich, National Association of Home Builders (NAHB)

1. Add new definitions as follows:

SILL PLATE. A horizontal wood member anchored to the foundation and supporting floor joists.

SOLE PLATE. A horizontal wood member at the bottom of a wood stud wall, attached to a concrete slab.

2. Revise as follows:

R403.1.6 Foundation anchorage. Where wood sill and sole plates and cold-formed steel framed walls are supported directly on continuous foundations walls or monolithic slabs with integral footings required by the provisions of this code, they shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of *braced wall panels* at building interiors on monolithic slabs with integral footings, and all wood sill plates shall be anchored to the foundation with ½ inch (12.7 mm) diameter anchor bolts spaced a maximum of 6 feet (1829 mm) on center or approved anchors or anchor straps spaced as required to provide equivalent anchorage to the ½-inch-diameter (12.7 mm) anchor bolts. Bolts shall be at least ½ inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundations with integral footings that are not part of a *braced wall panel* shall be positively anchored with *approved* fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts.

~~2~~ 1. Walls 24 inches (610 mm) total length or shorter connecting offset *braced wall panels* shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent *braced wall panels* at corners as shown in Figure R602.10.4.4(1).

~~3~~ 2. Connection of walls 12 inches (305 mm) total length or shorter connecting offset *braced wall panels* to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent *braced wall panels* at corners as shown in Figure R602.10.4.4(1).

Reason: The purpose of this proposal is to revise the language for anchorage of light-frame wood and cold-formed steel stud walls to the foundations of the house. Without these revisions, we are concerned that the code will present an enforcement nightmare for plan reviewers and inspectors, and lead to anchor bolts and continuous footings being required where they are not necessary and have not traditionally been provided.

The ICC Ad-Hoc Committee on Wall Bracing revised this section during the 2007/2008 code cycle with the intent of insuring that sufficient anchorage is provided on braced wall lines and panels inside a dwelling to transfer lateral loads to either monolithic (thickened) slab foundations or continuous footings. While we agree that providing a continuous load path is important, the change was overly broad in its application and will present an enforcement problem. For instance, the first sentence of the 2009 IRC Section R403.1.6 effectively requires all light-frame walls to be provided with anchor bolts to the foundation. Thus, a non-bearing interior partition that is not part of a braced wall line but which just happens to sit atop a foundation wall or continuous foundation (e.g. at a partial basement, crawlspace, or interior knee wall) would be required to be fastened to the wall or footing below with 1/2" diameter anchor bolts at 6 foot spacing. We are also concerned the new language (in particular the change for walls on interior monolithic slabs) does not explicitly permit anchor bolts to be replaced by wedge anchors, expansion bolts, mudsill straps, or other equivalent anchorage, and also that it may require thickened slabs or continuous footings where they have not traditionally been provided or are not required by other sections of the IRC.

Further, there was no technical justification provided for the increased anchorage requirements. Whole-building structural tests have shown that our current methods of construction are stronger than current engineering practice and engineering design standards give them credit for. An actual house in the field tested by researchers in New Zealand performed 50% better than predicted by engineering design, even with sill plates attached only by single nails, rather than anchor bolts. We also note that the bottom plate of a braced wall line on the interior and supported on floor framing (including a raised floor system over a crawlspace or pier-and-beam foundation) can be attached to the framing with 3-16d nails at 16" spacing, but the same plate on a continuous footing will require 1/2" anchor bolts at 7" spacing. Thus, by implementing these new requirements for additional anchor bolts on braced wall lines inside our structures we are essentially contradicting 40 years of research into light-frame wood construction. We are not aware of any racking failures on interior braced wall lines that would justify adding bolts to these lines.

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

ICCFILENAME: EHRLICH-RB-5-R202-R403.1.6

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The definition of sill plate and sole plate is unclear. The proponent should get with industry and rework this with the modification that was ruled out of order and bring this back to 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:

Gary J. Ehrlich, P.E., National Association of Home Builders, Bonnie Manley, P.E., AISI, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SILL PLATE. A horizontal wood member anchored to the foundation and supporting floor joists.

SOLE PLATE. A horizontal wood member at the bottom of a wood stud wall~~, attached to a concrete slab~~.

R403.1.6 Foundation anchorage. Where wood sill and sole plates ~~and cold-formed steel framed walls~~ are supported directly on continuous foundation walls or monolithic slabs with integral footings required by the provisions of this code, they shall be anchored to the foundation in accordance with this section.

Cold-formed steel floor and wall framing shall be fastened to wood sill or sole plates anchored to the foundation in accordance with this section, or shall be anchored directly to the foundation in accordance with Section R505.3.1 or R603.3.1.

Wood sole plates at all exterior walls, wood sole plates of *braced wall panels* at building interiors on monolithic slabs with integral footings, and all wood sill plates shall be anchored to the foundation with 1/2 inch (12.7 mm) diameter anchor bolts spaced a maximum of 6 feet (1829 mm) on center or *approved* anchors or anchor straps spaced as required to provide equivalent anchorage to the 1/2-inch-diameter (12.7 mm) anchor bolts. Bolts shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt

diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundations with integral footings that are not part of a *braced wall panel* shall be positively anchored with *approved* fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. ~~Cold-formed steel framing systems shall be fastened to the wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1~~.

Exceptions:

1. Walls 24 inches (610 mm) total length or shorter connecting offset *braced wall panels* shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent *braced wall panels* at corners as shown in Figure R602.10.4.4(1).
2. Connection of walls 12 inches (305 mm) total length or shorter connecting offset *braced wall panels* to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent *braced wall panels* at corners as shown in Figure R602.10.4.4(1).

Commenter's Reason: The purpose of this public comment is to address the concerns raised by the IRC-B/E Committee. First, this change implements the floor modification which was ruled out-of-order. The modification, requested by the Steel Framing Alliance, moves the anchorage requirements for cold-formed steel out of the larger paragraph, which mostly concerns wood framing. The relocated paragraph becomes "charging language" which points the user to the appropriate CFS provisions in Chapters 5 and 6. This greatly clarifies the anchorage requirements for cold-formed steel. Second, this change removes the "attached to a concrete slab" language from the sole plate definition. A sole plate can occur at any level of the building, not just at the foundation. The text of Section R403.1.6 makes it clear that the section addresses only those sole plates which do occur at foundation walls or monolithic slabs.

Final Action: AS AM AMPC____ D

RB80-09/10

R404.1.9 (New), R404.1.9.1 (New), R404.1.9.2 (New), R404.1.9.3 (New), R404.1.9.4 (New), R404.1.9.5, R602.10.7

Proposed Change as Submitted

Proponent: Gary Ehrlich, National Association of Home Builders (NAHB)

1. Add new text as follows:

R404.1.9 Isolated masonry piers. Isolated masonry piers shall be constructed in accordance with this section and the general masonry construction requirements of Section R606. Hollow masonry piers shall have a minimum nominal thickness of 8 in. (203 mm), with a nominal height not exceeding four (4) times the nominal thickness and a nominal length not exceeding three (3) times the nominal thickness. Where hollow masonry units are solidly filled with concrete or grout, piers shall be permitted to have a nominal height not exceeding ten (10) times the nominal thickness. Footings for isolated masonry piers shall be sized in accordance with Section R403.1.1.

R404.1.9.1 Pier cap. Hollow masonry piers shall be capped with 4 inches (102 mm) of solid masonry or concrete, a masonry cap block, or shall have cavities of the top course filled with concrete or grout unless a sill plate of 2-inch (51 mm) minimum nominal thickness and bearing on two face shells is provided. The sill plate shall provide a minimum nominal bearing area of 48 square inches (30 865 square mm). Where required, termite protection for the pier cap or sill plate shall be provided in accordance with Section R318.

R404.1.9.2 Masonry piers supporting floor girders. Masonry piers supporting wood girders complying with Tables R502.5(1) and R502.5(2) shall be permitted in accordance with this section. Piers supporting girders for interior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 10 feet (3 048 mm) from top of footing to bottom of sill plate or girder. Piers supporting girders for exterior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 4 feet (1 220 mm) from top of footing to bottom of sill plate or girder. Girders and sill plates shall be anchored to the pier or footing in accordance with Section R403.1.6 or Figure R404.1.5(1).

R404.1.9.3 Masonry piers supporting braced wall panels. Masonry piers supporting braced wall panels shall be constructed in accordance with Figure R602.10.7.

R404.1.9.4 Seismic design of masonry piers. Masonry piers in all dwellings located in Seismic Design Category D0, D1, D2, and townhouses in Seismic Design Category C, shall be designed in accordance with accepted engineering practice.

R404.1.9.5 Masonry piers in flood hazard areas. Masonry piers for dwellings in flood hazard areas shall be designed in accordance with Section R322.

2. Revise as follow:

R602.10.7 Braced wall panel support. *Braced wall panel* support shall be provided as follows:

1. Cantilevered floor joists, supporting *braced wall lines*, shall comply with Section R502.3.3. Solid blocking shall be provided at the nearest bearing wall location. In Seismic Design Categories A, B and C, where the cantilever is not more than 24 inches (610 mm), a full height rim joist instead of solid blocking shall be provided.
2. Raise floor system ~~Elevated~~ post or pier foundations exceeding 4 feet (1 220 mm) in height and supporting *braced wall panels* shall be designed in accordance with accepted engineering practice. Raised floor system masonry pier foundations not exceeding 4 feet (1 220 mm) in height, and isolated masonry piers in basements, shall be permitted to be designed in accordance with Section R404.1.9.
3. Masonry stem walls with a length of 48 inches (1220 mm) or less supporting *braced wall panels* shall be reinforced in accordance with Figure R602.10.7. Masonry stem walls with a length greater than 48 inches (1220 mm) supporting *braced wall panels* shall be constructed in accordance with Section R403.1 *Braced wall panels* constructed in accordance with Sections R602.10.3.2 and R602.10.3.3 shall not be attached to masonry stem walls.

Reason: The purpose of this proposal is to introduce provisions for isolated masonry piers used as foundations for raised wood floor systems. Masonry pier foundations are a common construction method. However, besides a brief mention in R606.6, no other guidance is given for the construction of these piers, other than a reference in R602.10.6 calling for engineered design of piers supporting braced wall panels.

Language is proposed for Chapter 4 to provide prescriptive guidance for isolated masonry piers constructed inside a basement or crawlspace. The language proposed for R404.1.9 for masonry piers is based on the empirical design limits contained in the MSJC. The language is adopted from the paragraph on Foundation Piers in NCMA's TEK Note 5-3A: "Concrete Masonry Foundation Wall Details". Further limits are provided for piers supporting floor girders, braced wall panels, and for piers in high-seismic or flood hazard areas.

The language in R602.10.6 is modified and coordinated with the proposed R404.1.9 language to allow prescriptive design of short exterior masonry piers and of isolated interior masonry piers complying with R404.1.9. Taller masonry piers supporting an elevated deck, sunroom, or other substantially raised portion of a dwelling are relegated to engineered design. It was the original intent of R602.10.6 to address these full-height piers, not to require engineered design for every raised wood floor/crawlspace regardless of pier height.

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

ICCFILENAME: EHRLICH-RB-6-R404.1.9-R602.10.7

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee likes the concept but feels that there is potential for conflict or unintended consequences with Section R606.6. There is a concern about the sill plate bearing on the face shells. The proponent should rework and bring this back later.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment1:

Gary J. Ehrlich, PE, National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R404.1.9 Isolated masonry piers. Isolated masonry piers shall be constructed in accordance with this section and the general masonry construction requirements of Section R606. Hollow masonry piers shall have a minimum nominal thickness of 8 in. (203 mm), with a nominal height not exceeding four (4) times the nominal thickness and a nominal length not exceeding three (3) times the nominal thickness. Where hollow masonry units are solidly filled with concrete or grout, piers shall be permitted to have a nominal height not exceeding ten (10) times the nominal thickness. Footings for isolated masonry piers shall be sized in accordance with Section R403.1.1.

R404.1.9.1 Pier cap. Hollow masonry piers shall be capped with 4 inches (102 mm) of solid masonry or concrete, a masonry cap block, or shall have cavities of the top course filled with concrete or grout ~~unless a sill plate of 2-inch (51 mm) minimum nominal thickness and bearing on two face shells is provided. The sill plate shall provide a minimum nominal bearing area of 48 square inches (30 865 square mm)~~. Where required, termite protection for the pier cap ~~or sill plate~~ shall be provided in accordance with Section R318.

R404.1.9.2 Masonry piers supporting floor girders. Masonry piers supporting wood girders sized per Tables R502.5(1) and R502.5(2) shall be permitted in accordance with this section. Piers supporting girders for interior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 10 feet (3 048 mm) from top of footing to bottom of sill plate or girder. Piers supporting girders for exterior

bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 4 feet (1 220 mm) from top of footing to bottom of sill plate or girder. Girders and sill plates shall be anchored to the pier or footing in accordance with Section R403.1.6 or Figure R404.1.5(1). Floor girder bearing shall be in accordance with Section R502.6.

R404.1.9.3 Masonry piers supporting braced wall panels. Masonry piers supporting braced wall panels shall be ~~constructed~~ designed in accordance with ~~Figure R602.10.7~~ accepted engineering practice.

R404.1.9.4 Seismic design of masonry piers. Masonry piers in all dwellings located in Seismic Design Category D0, D1, D2, and townhouses in Seismic Design Category C, shall be designed in accordance with accepted engineering practice.

R404.1.9.5 Masonry piers in flood hazard areas. Masonry piers for dwellings in flood hazard areas shall be designed in accordance with Section R322.

R602.10.7 Braced wall panel support. Braced wall support shall be provided as follows:

1. Cantilevered floor joists, supporting *braced wall lines*, shall comply with Section R502.3.3. Solid blocking shall be provided at the nearest bearing wall location. In Seismic Design Categories A, B and C, where the cantilever is not more than 24 inches (610 mm), a full height rim joist instead of solid blocking shall be provided.
2. Raised floor system post or pier foundations ~~exceeding 4 feet (1 220 mm) in height and~~ supporting *braced wall panels* shall be designed in accordance with accepted engineering practice. ~~Raised floor system masonry pier foundations not exceeding 4 feet (1 220 mm) in height, and isolated masonry piers in basements, shall be permitted to be designed in accordance with Section R404.1.9.~~
3. Masonry stem walls with a length of 48 inches (1220 mm) or less supporting *braced wall panels* shall be reinforced in accordance with Figure R602.10.7. Masonry stem walls with a length greater than 48 inches (1220 mm) supporting *braced wall panels* shall be constructed in accordance with Section R403.1 *Braced wall panels* constructed in accordance with Sections R602.10.3.2 and R602.10.3.3 shall not be attached to masonry stem walls.

Commenter's Reason: The purpose of this public comment is to address the issues raised by the IRC-B/E Committee. The Committee expressed concerns about the provision to allow hollow cells at the top of the pier if a sill plate section is used to support the floor framing. The public comment deletes this language, restoring the solid-bearing requirement. A pointer to the existing Chapter 5 language for bearing of floor framing on concrete and masonry supports is provided.

The Committee was also concerned about potential conflicts with Chapter 6. These masonry pier provisions do not conflict with any of the requirements in Section R606. Chapter 6 is primarily intended for above-grade, full-story walls. Chapter 4 is the proper section for requirements dealing with foundations. Other requirements for masonry foundations such as basement walls and pier-and-curtain wall systems, appear in Chapter 4, as well as the requirements for crawlspaces. Adding requirements to Chapter 4 for masonry piers used as foundation elements maintains this consistency.

These provisions are necessary to insure masonry pier foundations used to support wood floor framing are an accepted code practice. Currently, interpretation of the code is inconsistent, and some jurisdictions have not permitted these systems. This is why the wood industry felt it necessary to submit RB71-09/10 to clarify these pier-and-beam systems are permitted. Further, this proposal will provide engineers with guidance to use in designing masonry pier foundations for IRC applications. This will result in potential savings for homeowners on foundation construction costs.

Public Comment 2:

Gary J. Ehrlich, PE, National Association of Home Builders, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R404.1.9.3 Masonry piers supporting braced wall panels. Masonry piers supporting braced wall panels shall be ~~constructed~~ designed in accordance with ~~Figure R602.10.7~~ accepted engineering practice.

> **Exception:** For one- and two-story buildings where the basic wind speed does not exceed 90mph, the wind exposure category is B or C, the wall height does not exceed 10 feet, the eave-to-ridge height does not exceed 10 feet, and the maximum spacing between braced wall lines does not exceed 30 feet, square masonry piers shall be permitted to support braced wall panels. The masonry piers shall be 16 inches nominal in width and shall not exceed 48 inches in height. The masonry piers shall be grouted solid and reinforced with 1-#4 vertical bar each cell.

R602.10.7 Braced wall panel support. Braced wall support shall be provided as follows:

1. Cantilevered floor joists, supporting *braced wall lines*, shall comply with Section R502.3.3. Solid blocking shall be provided at the nearest bearing wall location. In Seismic Design Categories A, B and C, where the cantilever is not more than 24 inches (610 mm), a full height rim joist instead of solid blocking shall be provided.
2. Raised floor system post or pier foundations ~~exceeding 4 feet (1 220 mm) in height and~~ supporting *braced wall panels* shall be constructed per Section R404.1.9.3 or designed in accordance with accepted engineering practice. ~~Raised floor system masonry pier foundations not exceeding 4 feet (1 220 mm) in height, and isolated masonry piers in basements, shall be permitted to be designed in accordance with Section R404.1.9.~~
3. Masonry stem walls with a length of 48 inches (1220 mm) or less supporting *braced wall panels* shall be reinforced in accordance with Figure R602.10.7. Masonry stem walls with a length greater than 48 inches (1220 mm) supporting *braced wall panels* shall be constructed in accordance with Section R403.1 *Braced wall panels* constructed in accordance with Sections R602.10.3.2 and R602.10.3.3 shall not be attached to masonry stem walls.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The purpose of this public comment is to provide additional prescriptive guidance for builders and code officials in constructing raised floor systems supported on masonry piers.

A desire was expressed for a prescriptive detail for a reinforced pier to handle lateral loads. Accordingly, we have added language under proposed new Section R404.1.9.3 to allow a 16x16 CMU pier with 4-#4 vertical bars under braced wall lines and braced wall panels in low-wind areas. The prescriptive design was generated using wind loads from the calculations used to develop the wind bracing table in Section R602.10 and using strength design per TMS 402-08 Building Code Requirements for Masonry Structures. All of the strength design load combinations per Section 2.4 of ASCE 7 were considered. The limitations on number of stories, braced wall line spacing, story and ridge heights are necessary to keep the required reinforcing to a minimum.

This additional prescriptive detail will provide building officials with the guidance to be able to review and approve masonry pier foundations without necessarily having to require engineered designs. In addition to keeping with the intent of the IRC to supply prescriptive provisions, this proposal will result in savings for homeowners who will not have to pay additional engineering costs and who will also save on foundation construction costs.

Final Action: AS AM AMPC____ D

RB82-09/10

R405.1, R405.1.1 (New), R405.2, R405.2.1, R405.2, R405.2.2, R405.3

Proposed Change as Submitted

Proponent: James Jorgensen, PE, City of Lenexa, KS, representing the Metropolitan Kansas Chapter of ICC

1. Revise as follows:

R405.1 Concrete or masonry foundations. Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below *grade*. Drainage tiles, gravel or crushed stone drains, perforated pipe or other *approved* systems or materials shall be installed ~~at or~~ below the floor level of the area to be protected and shall discharge ~~by gravity or mechanical means~~ into an *approved* drainage system in accordance with Section R405.3.. Gravel or crushed stone drains shall extend at least 1 foot (305 mm) beyond the outside edge of the footing and 6 inches (152 mm) above the top of the footing, be at least 12 inches deep, and be ~~covered~~ surrounded by ~~with~~ an *approved* filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper., ~~and~~ The drainage tiles or perforated pipe shall be placed on a minimum of 2 inches (51 mm) of washed gravel or crushed rock at least one sieve size larger than the tile joint opening or perforation and covered with not less than 6 inches (152 mm) of the same material. Perforated pipe drains shall be covered with an approved filter membrane or an approved filter membrane shall surround the gravel/crushed rock covering the drain. Drains shall be placed level or at a positive slope to the point of collection for removal from the structure.

Exceptions:

1. A drainage system is not required when the foundation is installed on well-drained ground or sand-gravel mixture soils according to the Unified Soil Classification System, Group I Soils, as detailed in Table R405.1.
2. Perforated pipe drains may be placed on top of a concrete footing in lieu of a bed of gravel or rock provided it is below the floor level of the usable space.

2. Add new text as follows:

R405.1.1 Perforated pipe drains. Perforated pipe drains and drain tile shall have a minimum interior diameter of 4 inches.

3. Revise as follows:

R405.2 Wood foundations. Wood foundations enclosing habitable or usable spaces located below *grade* shall be adequately drained in accordance with Sections R405.2.1 ~~through~~, R405.2.~~3~~2 and R405.3.

R405.2.1 Base. A porous layer of gravel, crushed stone or coarse sand shall be placed to a minimum thickness of 4 inches (102 mm) under the *basement* floor. Provision shall be made for automatic draining of this layer and the gravel or crushed stone wall footings. To drain the base layer, interior drains complying with Section R405.1 shall be provided below the base layer, around the perimeter of the enclosed area and connected to the drainage system.

R405.2.2 ~~Vapor retarder~~ Moisture barrier. A 6-mil-thick (0.15 mm) polyethylene ~~vapor retarder~~ moisture barrier shall be applied over the porous layer with the *basement* floor constructed over the polyethylene.

~~**R405.2**~~ **R405.3 Drainage system.** In other than Group I soils, an approved drainage system shall be provided to ~~a sump shall be provided to~~ drain the ~~porous~~ base layer and footings. The system shall discharge by gravity or mechanical means and shall be capable of removing any accumulated water and discharging it to an approved location to move water away from the structure. Where drainage is by mechanical means a sump shall be provided. The sump shall be at least 24 inches (610 mm) in diameter or 20 inches square (0.0129 m2), shall extend at least 24 inches (610 mm) below the bottom of the *basement* floor ~~and shall be capable of positive gravity or mechanical drainage to remove any accumulated water. The drainage system shall discharge into an *approved* sewer system or to daylight~~. For gravity drainage systems solid pipe shall be provided between the termination point and the connection at the structure and shall terminate in a manner to facilitate cleaning.

Reason: The foundation drainage requirements in the code need clarification to be a more effective component of the code. These requirements have not been updated for many years. A frequent complaint on existing homes is water infiltration into the basement areas. More and more basement areas are used as primary living space. Repairs to dwellings resulting from ineffective installation of the foundation drainage system are costly and is preventable. The codes lack of clarity on this issue leads to ineffective enforcement.

In R405.1 the location of the drains "at or below" the floor level allows for installations that may be ineffective at removing water from the foundation area by allowing water to enter the usable space before it can be drained away. Clarifying that the drains must be below the floor level (top of the floor surface) provides more clarity. Where gravel or crushed stone drains are used the code does not specify a depth of the drain, only that it extends 6 inches above the level of the footing. Since the minimum floor thickness is 4 inches the drain is above the level of the floor which is ineffective. Many standards that address drainage systems require that stone drains be completely enclose to prevent fines from clogging the drainage system. Simply covering the material with a filter membrane does not prevent fines from clogging the drains.

The term "approved filter membrane" does not provide good direction for code officials or builders. Although my research indicates that many roadway projects use AASHTO M288-00 for class 3 for use in drains and French drains I am not sure if this is what is commonly supplied with prefabricated socks for perforated drains. Clarification can be provided in a future code change.

The current code required gravel and stone drains to be covered with a filter membrane, however; the code is silent on the requirements for the protection of perforated drains. To prevent fines from penetrating the openings in the perforated pipe protection by a filter membrane is required around the pipe or around the stone/gravel covering the pipe.

The requirements for removal of water by gravity or mechanical means as been moved to the section on drainage where it can more comprehensively addressed.

The code does not specify a minimum size for drain tile therefore a minimum size of 4 inches interior diameter has been provided. Three inches may be acceptable for some smaller dwellings with short distances to the point of collection but the cost difference is minimal and 4 inches is more effective.

Drains should not have sharp rises or falls that provide for collection points for fine material leading to clodding of the drains over time, therefore a provision for providing a level or positive slope has been added. Section R405.2.1 has been modified to clarify that to drain the porous layer below the base drains complying the R405.1 are required and they shall be installed around the perimeter of the space and below the base layer. Drainage system R405.3. Current Section R405.2.3 only applies to wood foundations. R405.1 only requires that the drains from the protected area discharge to an approved location without clarifying the process. It is inconsistent for wood foundations to be very specific regarding the sump and drainage of the porous layer and have no clarity for concrete and masonry foundations. R405.3 includes the old language in R405.1 for drainage by gravity or mechanical means and adds clarification that for gravity drains the termination point should be such that it could be cleaned of any accumulated debris at the termination from the house to the termination point.

Cost Impact: There may be a slight increase in the initial cost of construction if a jurisdiction did not previously require that perforated drains or crushed gravel drains be protected with an approved filter membrane or provide a means of draining the base layer under basement floors.

ICCFILENAME: JORGENSEN-RB-1-R405.1

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal adds many difficult provisions that appear to be arbitrary. Bringing the wood foundation drainage in is not appropriate. There is no justification to increase the drain to 4 inches. Changing vapor retarder to moisture barrier adds confusion and will cause a conflict within 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:

James Jorgensen, PE, City of Lenexa, KS, representing Kansas City Metropolitan Chapter ICC, requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R405.1 Concrete or masonry foundations. Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below grade. Drainage tiles, gravel or crushed stone drains, perforated pipe or other approved systems or materials shall be installed at or below the area to be protected and shall discharge by gravity or mechanical means into an approved drainage

system. Gravel or crushed stone drains shall extend at least 1 foot (305 mm) beyond the outside edge of the footing and 6 inches (152 mm) above the top of the footing and be covered with an approved filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper. Perforated drains shall be surrounded with an approved filter membrane or the filter membrane shall cover the washed gravel or crushed rock covering the drain. ~~and the d~~Drainage tiles or perforated pipe shall be placed on a minimum of 2 inches (51 mm) of washed gravel or crushed rock at least one sieve size larger than the tile joint opening or perforation and covered with not less than 6 inches (152 mm) of the same material.

Exception: A drainage system is not required when the foundation is installed on well-drained ground or sand-gravel mixture soils according to the Unified Soil Classification System, Group I Soils, as detailed in Table R405.1.

Commenter's Reason: The code is silent on the methods for protection of openings in perforated foundation pipes. A filter membrane is required over crushed stone drains and strips of building paper are required over drain tile joint opening; however, the code does not specifically require protection of the perforations in perforated foundation drains. Since the perforations surround perforated drains a statement has been added to require protection around perforated drains with an approved filter membrane. As an option the filter membrane may be placed over the gravel or crushed stone cover over the perforated drains.

Final Action: AS AM AMPC____ D

RB84-09/10
R501.3 (New), Chapter 44 (New)

Proposed Change as Submitted

Proponent: Jeff Hugo, CBO, National Fire Sprinkler Association

1. Add new text as follows:

R501.3 Fire Protection. All new one and two family dwellings using floor framing components or systems composed of prefabricated I joists, trusses, and cold formed steel shall be fire sprinklered throughout according to NFPA 13, NFPA 13R, NFPA 13D or Section P2904.1.

2. Add new standard to Chapter 44 as follows:

NFPA
13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height

Reason: Lightweight construction consisting of prefabricated I joists, trusses, and cold formed steel are excellent materials in many ways. They save labor, time, natural resources, and call backs. However, widespread fire experience shows that floors framed out of these materials do not have the same durability in the event of a fire as solid sawn lumber and are not only hazardous to the occupants evacuating the home, but especially to responding emergency personnel, such as fire fighters.

Several research studies have been performed showing the potential failures of these flooring assemblies during fires and the potential for floor collapse during fire fighter operations. Additional research has shown the ability of fire sprinklers to prevent the fire from reaching the point where it could cause the same kind of damage. This research shows that with fire sprinkler systems in the home, the prefabricated I joists, trusses and cold formed steel materials are safe to use. But without fire sprinklers, these materials could fail catastrophically during a fire.

This requirement is important to put into the IRC even if the requirement for sprinklers is maintained because there are many jurisdictions that will not accept the blanket requirement for sprinklers, but will maintain this option for using sprinklers with this specific type of construction.

Bibliography:
Tyco Fire Suppression & Building Products. A Technical Analysis: The Performance of Composite Wood Joists Under Realistic Fire Conditions. 2008

Su, J.Z., N.; Bawaly, A.C.; Lougheed, G.D.; Taber, B.C.; Leroux, P.; Proulx, G.; Kashef, A.; McCarthey, C.; Thomas, J.R. Fire Performance of Houses, Phase I. Study of Unprotected Floor Assemblies in Basement Fire Scenarios, Summary Report. 12/15/2008

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

Analysis: The proposed new standard, NFPA 13R, is currently referenced in the *International Building Code.*

ICCFILENAME: HUGO-RB-1-R501.3

Public Hearing Results

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

Committee Action: **Disapproved**

Committee Reason: Sprinklers are a code requirement and this section is not needed. The committee recognizes some jurisdictions will amend out the sprinklers, but we cannot add requirements based on "what ifs". This proposal does not address light-frame construction and gives no option if there are no sprinklers.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jeff Hugo, CBO, National Fire Sprinkler Association, requests Disapproval.

Commenter's Reason: I disagree with the committee's statement. The codes are full of "what ifs", and it is the building official's job to contemplate these situations to protect the citizens in their communities.

This proposal does address light frame construction; note the section it is quoted in - IRC Section R503.1. No other proponent or proposal could clearly identify or prove by the referenced testing that other than fire sprinklers can adequately protect the light framing construction for the citizens and those who need to enter the structure. According to the referenced testing, the best that could be done is 30 minutes without sprinklers. 30 minutes until collapse, but what is often missed are the reports stating that the minimum live loading is lost in much less time (20 minute range). Response times of fire departments, time to setup and gather information, identify the location of those trapped…is less than 30 minutes the best we can do for our fire fighters?

We know by several years of debating in the IBC and IFC that no vertical or horizontal fire resistive barrier can be effective without proper penetration protection. If covering over light weight construction is preferred over sprinklers, no protection of penetrations is required, leaving the building official, home owner, and fire fighter with a false sense of security. Building officials knowing the IBC will have wide ranging interpretations thus affecting the home builders from jurisdiction to jurisdiction to guess, again. This was not the point of creating a single code.

Lighting, duct openings, vent/drain piping, stairs to name a few, will allow fire to spread through the concealed spaces very quickly. If a covering is preferred, then the IRC debates for years to come will have attempts to draftstop, protect penetrations with listed material, etc., which will add costs beyond the sprinkler system installed to protect the light weight framing.

Final Action: AS AM AMPC____ D

RB85-09/10
R501.3 (New), Chapter 44 (New)

Proposed Change as Submitted

Proponent: Larry Wainright, Qualtim, Inc., representing the Structural Building Components Association

1. Add new text as follows:

R501.3 Fire Protection of Floors: Floors within dwelling units shall be protected on the underside by a minimum of 1/2" gypsum board applied in accordance with Section R702.3.

Exceptions:

1. Crawl spaces where the maximum clear height from the underside of the subfloor to the void space floor is 3 feet or less and is not intended for mechanical equipment use or storage.
2. The building is protected with an automatic sprinkler system designed to NFPA 13, 13D, 13R, or Section P2904 of this code.
3. Floors of any material or combination of materials achieving a 30-minute fire-resistance rating in accordance with ASTM E 119 or UL 263.
4. Floors that are protected by a material or combination of materials in accordance with the test procedures of ASTM E 84 or UL 723 that exhibits a flame spread index not exceeding 25, no evidence of progressive combustion and a flame front that does not progress more than 10 ½ feet (3200 mm) beyond the centerline of the burner at any time during an extended 30 minute test.

2. Add new standard to Chapter 44 as follows:

NFPA
13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height

Reason: This proposal would require the underside of floors to be protected, providing a greater level of fire protection than unprotected floors. This would apply to all construction types, thereby creating no competitive advantage for specific building types.

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

Analysis: The proposed new standard, NFPA 13R, is currently referenced in the *International Building Code*.

ICCFILENAME: WAINRIGHT-RB-8-R501.3

Public Hearing Results

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

Committee Action: **Disapproved**

Committee Reason: Based on the committee's previous action on RB31-09/10. ASTM E84 is not the appropriate test for structural integrity. The floor furnace test is more appropriate. The proponent should work with the proponent of RB86-09/10 through RB88-09/10 to bring back a solution that protects the fire fighters and the occupants.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Larry Wainright, Qualtim, Inc, representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch (12.7 mm) gypsum wallboard membrane, 5/8 inch (15.9 mm) wood structural panel membrane, or equivalent on the underside of light frame construction, steel bar joists and wood chord / metal web joists and shall be draftstopped in accordance with Section R302.12.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, NFPA 13R or NFPA 13.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies shall not require protection when complying with the following:
   - 3.1 The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   - 3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.

Add new standard to Chapter 44 as follows:

NFPA 13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height.

Commenter's Reason: RB 85-09/10 merely proposes to require a minimum of ½" gypsum wallboard, or equivalent on all unprotected floor assemblies with exceptions for sprinklered buildings, certain crawlspaces and other limited areas that would otherwise be difficult to cover due to obstructions. SBCA's position on this subject is to provide a requirement that applies equally to all building component types and does not provide a competitive advantage to specific types of construction where they would be exempt from the requirements.

The following link shows statistics of firefighter deaths. It is a global report that shows all firefighter deaths and their causes from 1980-2008. This report shows that less than 5% of all firefighter deaths occur from injuries sustained in structural collapses.
http://www.sbcindustry.com/images/fire/firefatalstats.pdf

The following spreadsheet is a list of NIOSH reports showing firefighter fatalities that involved a structural collapse. Of those reports, 11 involved firefighter deaths from the collapse of solid sawn lightweight construction and 9 (with potentially 2 more) involved I-joists, MPC wood trusses, and steel trusses combined. This shows that there is no compelling evidence to suggest that engineered products are any more dangerous than solid sawn materials in real fire situations.
Links to the full NIOSH reports are included for more details.

NIOSH Report date	Construction	SBCs	State	Fatality #	Familiar name	NIOSH Report # (link)
4/4/2008	Solid Sawn 2x10- Floor collapse		OH	2	Collerain	F2008-09
7/5/2008	Brick parapet wall collapse		TX	1		F2008-21
7/22/2008	Solid Sawn - Floor collapse		IL	1		F2008-26
1/26/2007		I-Joist- Floor collapse	TN			F2007-07
2/4/2007	Canopy collapse on garage - traditional wooden construction		PA	2		F2007-08
2/21/2006	Wall collapse-ordinary construction		AL	2		F2006-07
6/25/2006		I-Joist Floor collapse	IN	1		F2006-24
8/13/2006		I-Joist/Floor trusses - Floor collapse	WI	1	Green Bay	F2006-26
12/30/2006	Collapsed awning- 2x4 framing lumber		TX	1		F2007-01
2/19/2005	Solid Sawn roof collapse (wood framed building		TX	1		F2005-09
1/9/2004	Solid sawn - floor collapse		PA	1		F2004-05
4/8/2004	Brick façade collapse		TN	1		F2004-37
1/20/2003	Crushed by concealed chimney - balloon frame		PA	1		F2003-04
6/15/2003		Open web steel truss- roof collapse	TN	2		F2003-18
2/11/2002	Brick veneer collapsed. Wood frame platform construction		TX	1		F2002-07
3/4/2002	Wood frame w/masonry veneer - floor collapse		NC	1		F2002-11
3/7/2002		LW Pre-engineered trusses w plywood sheathing & various floor coverings	NY	2		F2002-06
7/4/2002	Duplex -twin frame of a balloon frame - roof collapse		NJ	3		F2002-32
9/14/2002	Balloon frame- roof collapse		IA	1		F2002-40
9/30/2002	Parapet wall collapse		IN	1		F2002-44
11/1/2002	Exterior wall collapse- balloon frame		PA	1		F2002-49
11/25/2002	2x10s heavy timber roof - collapse		OR	3		F2002-50
2/25/2001	Wall collapse-ordinary construction		WI	1		F2001-09
3/8/2001		MPC wood trusses - floor collapse	OH	1		F2001-16
3/18/2001	2nd floor collapse - unspecified construction		MO	2		F2001-15
6/16/2001		MPC roof trusses-roof collapse	SC	1		F2001-27
2/14/2000		MPC roof trusses-roof collapse - McDonalds	TX	2		F2000-13
4/20/2000		MPC floor trusses- floor collapse	AL	1		F2000-26
12/28/2000		MPC roof trusses-roof collapse	AR	4 injured		F2001-03
1/10/1999	Balloon frame- roof collapse (singled our balloon framing in notes of action)		CA	1		99-F03
1/19/1999	Chimney Collapse - fire investigator		NY	1		99-F06
3/8/1998		Wooden truss roof collapse (unsure if SBC)	CA	1		98-F07

NIOSH Report date	Construction	SBCs	State	Fatality #	Familiar name	NIOSH Report # (link)
6/5/1998	2nd level collapse - wood frame		NY	2 and 4 seriously injured		98-F17
6/11/1998	Roof porch collapse - tin roofing supported by 4 colums		VA	1		98-F18
9/5/1998	Parapet wall collapse - heavy wood truss construction		VT	1		98-F20
8/29/1998	2x10s roof - collapse		MS	2		98-F21
12/31/1998	Balloon frame walls & heavy wood gabled roof - roof collapse		GA	1		99-F04
2/17/1997	Wood framing - floor collapse		KY	1		97-04
3/18/1996		Roof trusses 2x6 collapse - not sure if SBCs	VA	2		96-17
Total:	11	9 (with potential 2 more)				

Public Comment 2:

Jonathan Humble, representing American Iron & Steel Institute and the Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R302.7 Floor separation. Floor assemblies within dwelling units shall have a minimum of ½ inch (12.7 mm) gypsum board applied to the underside of the framing members in accordance with R702.3, when not required elsewhere in this code. This provision shall not supersede Sections R302.3, R302.4 or R302.5 where fire resistance ratings or greater thicknesses of gypsum board are required. Penetrations through the gypsum board shall be allowed for stairways, ducting, piping, and electrical and telecommunications outlet boxes, wiring and conduits.

Exceptions:

1. Floor assemblies located over crawl spaces, where the crawl space does not contain mechanical equipment or water heater(s).
2. Dwellings protected with an automatic sprinkler system designed and installed in accordance with NFPA 13D or in accordance with Section P2904.

(Renumber remaining sections)

Commenter's Reason: We propose to modify the original proposal with a product and provision neutral approach to code enforcement. At the 2009 code hearings there were five (5) proposals on the same subject. Each had their own spin on the approach to a design which would accomplish the goal of providing the fire service with some separation of spaces from spaces where framing members that are normally exposed in dwellings today. In this case that separation is gypsum board, not unlike the protection outlined in IRC Section R302.6. Unfortunately, it was the number of variations and subsequent opinions of preference which convinced the code development committee to recommend disapproval for all five of those proposals (e.g. RB31, RB85, RB86, RB87, and RB88).

The modification acts on the following aspects:

Title:

The title chosen is "floor separation" which more appropriately describes the intent.

Neutral Approach:

The modification before you attempts to neutralize those original opinions by focusing on the basic applications necessary for that separation. The modification is product neutral, meaning it applies to all light frame constructions without exception. In addition, the provision is proposed for inclusion into Chapter 3 which further retains that neutrality.

Coordination:

The modification coordinates the other provisions which require gypsum board by referencing the specific sections and the priority, in the second sentence.

Penetrations:

The modification also addresses the impact of stairs, ducting, piping and electrical wiring and conduit penetrating the gypsum board ceiling, in the third sentence.

Exceptions

The modification includes only those exceptions that were found to be a common theme amongst the five original proposals, and practical for this application.

Final Action: AS AM AMPC____ D

RB86-09/10
R501.3 (New)

Proposed Change as Submitted

Proponent: Sal DiCristina, representing Code Solutions, Inc.

Add new text as follows:

R501.3 Fire floor protection: Floors within dwelling units utilizing light-frame construction shall be protected on the underside by a minimum of 5/8" gypsum board applied in accordance with Section R702.3.

Exceptions:

1. Crawl spaces where the maximum clear height from the underside of the subfloor to the void space floor is 3 feet or less and is not intended for mechanical equipment use or storage.
2. The building is protected with an automatic sprinkler system designed to NFPA 13D or Section P2904 of this code.
3. Floors in which the exposed materials are protected by materials achieving a 30-minute fire-resistance rating in accordance with ASTM E 119 or UL 263.
4. Floors in which the exposed materials on the underside are protected by a fire-retardant coating that shall have, when tested in accordance with ASTM E 84 or UL 723 in the form in which it is applied, a listed flame spread index of 25 with no evidence of significant progressive combustion when the test is continued for an additional 20 minute period. In addition, the flame front shall not progress more than 10 ½ feet (3200 mm) beyond the centerline of the burners at any time the test.

Reason: This proposal is essentially the same as a proposal submitted by Battalion Chief Sean DeCrane of the Cleveland Fire Department with the addition of an exception number 4. We support Chief DeCrane's objectives, however, we believe additional flexibility is needed to provide the required level of protection in the vast array of construction configurations that may be encountered in the field.

The purpose of this additional method of protection is to provide an economical method to protect the underside of a floor without the need to apply a covering membrane that would restrict access. This would be important for unfinished basement and lower levels, or crawl spaces that do not meet exception 1.

It is important to note that the parameters required in proposed Exception 4 prevents the underside of the floor from ignited for a period of at least 30 minutes which matches the level of protection Mr. DeCrane seeks in Section R501.3.

ASTM 84 and UL 723 are already utilized in the IRC in Section R302 Fire Resistant Construction, however, the parameters above exceed those in R302 to ensure that a minimum of 30 minutes of protection is provided to the underside of the floors.

Of greater note is that material meeting the requirements of exception 4 meet or exceed the level of protection provided by fire-retardant treated wood (FRTW) that is permitted by Sections R802.1 and R802.1.3 of the IRC for protected roof framing.

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

ICCFILENAME: DICRISTINA-RB-1-R501.3

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based on the proponent's request and the committee's previous action on RB85-09/10.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jonathan Humble, American Iron & Steel Institute, representing The Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R302.7 Floor separation. Floor assemblies within dwelling units shall have a minimum of ½ inch (12.7 mm) gypsum board applied to the underside of the framing members in accordance with R702.3, when not required elsewhere in this code. This provision shall not supersede Sections R302.3,

R302.4 or R302.5 where fire resistance ratings or greater thicknesses of gypsum board are required. Penetrations through the gypsum board shall be allowed for stairways, ducting, piping, and electrical and telecommunications outlet boxes, wiring and conduits.

Exceptions:

1. Floor assemblies located over crawl spaces, where the crawl space does not contain mechanical equipment or water heater(s).
2. Dwellings protected with an automatic sprinkler system designed and installed in accordance with NFPA 13D or in accordance with Section P2904.

(Renumber remaining sections)

Commenter's Reason: We propose to modify the original proposal with a product and provision neutral approach to code enforcement. At the 2009 code hearings there were five (5) proposals on the same subject. Each had their own spin on the approach to a design which would accomplish the goal of providing the fire service with some separation of spaces from spaces where framing members that are normally exposed in dwellings today. In this case that separation is gypsum board, not unlike the protection outlined in IRC Section R302.6. Unfortunately, it was the number of variations and subsequent opinions of preference which convinced the code development committee to recommend disapproval for all five of those proposals (e.g. RB31, RB85, RB86, RB87, and RB88).

The modification acts on the following aspects:

Title:

The title chosen is "floor separation" which more appropriately describes the intent.

Neutral Approach:

The modification before you attempts to neutralize those original opinions by focusing on the basic applications necessary for that separation. The modification is product neutral, meaning it applies to all light frame constructions without exception. In addition, the provision is proposed for inclusion into Chapter 3 which further retains that neutrality.

Coordination:

The modification coordinates the other provisions which require gypsum board by referencing the specific sections and the priority, in the second sentence.

Penetrations:

The modification also addresses the impact of stairs, ducting, piping and electrical wiring and conduit penetrating the gypsum board ceiling, in the third sentence.

Exceptions

The modification includes only those exceptions that were found to be a common theme amongst the five original proposals, and practical for this application.

Final Action: AS AM AMPC____ D

RB87-09/10
R501.3 (New)

Proposed Change as Submitted

Proponent: Sean DeCrane, Cleveland, OH Fire Department, representing the International Association of Fire Fighters

Add new text as follows:

R501.3 Fire floor protection. Floors within dwelling units utilizing light-frame construction shall be protected on the underside by a minimum of 5/8" gypsum board applied in accordance with Section R702.3.

Exceptions:

1. Crawl spaces where the maximum clear height from the underside of the subfloor to the void space floor is 3 feet or less and is not intended for mechanical equipment use or storage.
2. The building is protected with an automatic sprinkler system designed to NFPA 13D or Section P2904 of this code.
3. Floors in which the exposed materials are protected by materials achieving a 30-minute fire-resistance rating in accordance with ASTM E 119 or UL 263.

Reason: On August 13, 2006 a Wisconsin fire fighter was killed, and a second fire fighter injured, when the floor they were operating on collapsed sending them into the basement. One fire fighter fell directly into the room of origin and was killed, the second fire fighter landed on the opposite side of a block wall and survived by shielding herself and making an escape through a rear window. They checked the floor to ensure it was safe and solid, just prior to collapse they heard a loud crack. T

The floor they were operating on was unprotected lightweight construction that collapsed without warning. In the ensuing investigation, the National Institute for Occupational Safety and Health released report F2006-26[1]. One of the recommendations is to "modify current building codes to require that lightweight trusses be protected with a fire barrier". This should not only pertain to truss construction. There are additional forms of construction that can be determined to be lightweight, cold form steel, bar joists, wooden engineered I-beam, etc., the recent trend in residential construction is to use products that are financially beneficial. It is the belief of many of us in the fire service that as the industry engineers products to a more finite point we are losing our safety factors.

In their report 2007-12 released May 16, 2008, NIOSH[2] recommended "Ensure fire fighters are trained for extreme conditions such as high winds and rapid fire progression associated with lightweight construction". They further stated, "In this era of new lightweight construction, training procedures covering strategy and tactics in extreme operations conditions, such as high winds and lightweight building construction (i.e. materials and design) are needed for all levels of fire fighters. Lightweight constructed buildings fail rapidly with little warning, complicating rescue efforts. The potential for fire fighters to become trapped or involved in a collapse may be increased. There are twenty-nine actions for fire fighters can take to protect themselves when confronted with buildings utilizing lightweight building components as structural members. They range from looking for signs or indicators that these materials are used in buildings (such as, newer structures, large unsupported spans, and heavy black smoke being generated) to getting involved in newer building code development".

On September 27, 2007 NIOSH released report 2006-24[3] The first recommendation of the report read "Ensure that fire fighters and incident commanders are aware unprotected pre-engineered I-joist floor systems may fail at a faster rate than solid wood joists when exposed to direct fire impingement, and they should plan interior operations accordingly". The discussion of the recommendation is quite lengthy but identifies the advantages of the construction industry using this type of construction but also relates the dangers to fire fighters, "The Illinois Fire Service Institute, at the University of Illinois, conducted tests to help determine the structural stability of sample floor systems. These studies suggest that engineered wooden I-beams can fail in as little as 4 minutes and 40 seconds under controlled test conditions". The report also states that weakened floors are difficult to detect from above as the floor surface may appear intact.

On November 16, 2007, NIOSH released report F2007-07[4]. In this Fire Fighter Death in the Line-of-Duty report, NIOSH recommends "building code officials and local authorities having jurisdiction should consider modifying the current codes to require that lightweight trusses are protected with a fire barrier on both the top and the bottom". The report further states "In this incident, the floor trusses for the first floor did not have any protection on the bottom cord, which immediately exposed the trusses to fire in the basement. Unfinished basements are very common throughout the country. Basements typically house additional fire exposures such as alternative heating sources, hot water heaters, clothes dryers, etc.. It is critical for trusses and lightweight engineered wood I-beams that are used in a load-bearing assembly to be protected with a thermal barrier such as gypsum wallboard. The function of the thermal barrier is a critical factor in the fire performance of the assembly".

In April, 2005, NIOSH released their report "Preventing Injuries and Deaths of Fire Fighters due to Truss System Failures"[5.] In their release they recommended the placement of a labeling system on buildings to indicate the type of construction. While this recommendation will probably not be acceptable to residents of a one or two family home, we can mandate that they increase the protection of the construction type to provide increased safety to the residents and the responding fire fighters.

In fact, NIOSH has been concerned enough with the performance of lightweight floors in fire conditions they released a Workplace Solutions report in February, 2009, *Preventing Deaths and Injuries of Fire Fighters Working Above Fire-Damaged Floor*[6]. Authors of the report recommend; "Builders, contractors, and owners should consider protecting all floor systems, including engineered wood I-joists, by covering the underside with fire-resistant materials".

Many of the opponents of this requirement have made claims that the fire service has failed to provide technical data to support our real world experiences with the lightweight products. Since the previous ICC code cycle there have been three specific reports released by three separate test groups performing tests for different reasons. I have included their results below.

The National Research Council Canada performed a series of tests in creating their report Fire Performance of Houses, Phase I: Study of Unprotected Floor Assemblies in Basement Fire Scenarios, released December 18, 2008. The goal of the report was "With the advent of new materials and innovative construction products and systems for use in construction of houses, there is a need to understand what impacts these materials and products will have on occupant life safety under fire conditions and a need to develop a technical basis for the evaluation of their fire performance".[7] These tests were not intentionally conducted for fire fighter safety but rather to identify the dangers to the civilian occupants and their ability to self evacuate. The report states "With the relatively severe fire scenarios used in the experiments, the times to reach structural failure for the wood I-joist, steel C-joist, metal plate and metal wood truss assemblies were 35-60% shorter than that for the solid wood joist assembly". Additionally, "For the solid wood joist assemblies, the structural failure occurred after deflection of the floor, mainly in the form of OSB subfloor failure (burn through). For all other floor assemblies, after deflection of the floor, the structural failure occurred either in the form of complete collapse into the basement or in the form of a "V" shaped collapse due to joist or truss failure". In keeping with the intent of occupant safety the report also found "One engineered floor assembly, which gave the shortest time to reach structural failure in the open basement scenario, failed structurally in the closed basement doorway scenario before the tenability limits were reached for healthy adults of average susceptibility". This calls into question, if it can not give the occupant time to self evacuate how will it perform when a fire fighter is performing Search and Rescue for that specific occupant. In summarizing the various test results the report found "The time gap between the onset of untenable conditions and the structural failure of the floor assembly was smaller for the engineered floor assemblies than for the solid wood joist assembly used in the experiments". This is very serious for the responding fire fighter performing life saving Search and Rescue for occupants who have lost consciousness due to the untenable conditions. These victims may still be savable but, the performances of the lightweight assemblies indicate that, savable victims may not be reached due to floor compromise.

In 2008 Tyco Fire Suppression & Building Products performed a series of fire tests. The intent of these tests was to demonstrate the impact residential sprinklers will have in improving fire safety in one and two-family occupancies when lightweight construction is present. The results of these tests were released in 2008 as A Technical Analysis: The Performance of Composite Wood Joists Under Realistic Fire Conditions.[8] In the introduction of the report the author states, "One example of the difference in fire performance of a lightweight structural member compared to solid sawn lumber is the behavior of composite wood joists. When a composite wood joist is exposed to fire, the thin oriented strand board used as the web in the joist is quickly consumed, which results in an inability of the joist to carry the load and ultimately a failure of the supported floor assembly". Later in the introduction the report continues "Due to the greater mass per unit of surface area of the solid wood joist, it will support the floor assembly for much longer than its lightweight alternative when exposed to equivalent fire conditions". The first test involving an unsprinklered room fire led to flashover in 7:09 from ignition and floor assembly collapse at the 11:30 mark from ignition. That is roughly four minutes from flashover we had a collapse of almost the entire 16' x 16' floor area. The second test results reached flashover in only 5:15 from ignition, collapse in this test occurred at 8:34 from ignition, a stunning three minutes after flashover. This would be the time the fire fighters are entering the structure for suppression and Search and Rescue efforts.

These reports are still not enough for some critics so I am referencing a third report. Underwriters Laboratories, The Chicago Fire Department and the International Association of Fire Chiefs received a grant from the Department of Homeland Security to conduct a number of tests on various topics but the main issue was to conduct tests, and report the findings, to evaluate the performance of lightweight structural components when exposed to fire and if the components can be protected. They recently issued the subsequent report *Structural Stability of Engineered Lumber in Fire Conditions*.[9] Tests assemblies were subjected to the standards of the ASTM E119 Test Standard. Two assemblies did not include a ceiling, six of the assemblies included a ceiling consisting of ½ inch thick gypsum board and one assembly included a ¾ inch plaster ceiling. A load of 40 psf was placed along two of the four edges and two 300 lb fire fighter mannequins were applied to the floor assembly. Results from the tests indicated that unprotected 12" wooden I-joist reached structural failure at the 5:58 mark in the tests. The resulting failure covered a large area of the floor. The unprotected 2" x 10" wooden I-beams reached structural collapse at the 18:45 mark in the test, a difference of over twelve minutes. These twelve minutes are critical in Search and Rescue. Further tests demonstrated that when ½ inch gypsum was placed on the 12" I-joists the collapse did not occur until the 26:45 mark in the test. Just a simple ½ covering extended the collapse time approximately twenty minutes. When the ½ inch covering was applied to the wooden I-beams the collapse time was extended to 44:45 mark in the test. One important factor to point out regarding these tests is that the fire fighters are a dead load and not a live load. Would a simulated live load of fire fighters transferring additional psi with each step

or crawl have contributed to an earlier collapse? When we review the Wisconsin fire where Engineer Arnie Wolf was killed, the fire fighters stated the floor felt solid but suffered a catastrophic collapse when they began their search pattern. These tests clearly outline the performances of the various construction practices and the dangers these performances present to fire fighters. Underwriters Laboratories and the Chicago Fire Department followed these tests with an online educational program, to view go to http://www.uluniversity.us/home.aspx, in an attempt to educate the nation's fire service on the hazards of operating in these environments.

This code change proposal is an attempt to provide a responsible means on residential construction. I have provided examples of fire fighters being killed in occupancies utilizing lightweight construction practices and the subsequent reports detailing the need to protect lightweight construction. I have also provided two reports generated by a neutral governmental agency recommending protection requirements for lightweight construction. These incidents, and others like them, have produced great hardships on the people involved, they have created widows, fatherless children, injured fire fighters and many who bear the pain of fatalities that could have been prevented. I strongly urge your support for this proposed code change.

1. National Institute for Occupational Safety and Health Report F206-26. July, 2007.
2. National Institute for Occupational Safety and Health Report F2007-12, May, 2008.
3. National Institute for Occupational Safety and Health Report F206-24, September, 2007.
4. National Institute for Occupational Safety and Health Report F2007-07, November, 2007.
5. National Institute for Occupational Safety and Health Alert, "Preventing Injuries and Deaths of Fire Fighters due to Truss System Failures".
6. National Institute for Occupational Safety and Health Workplace Solutions, *Preventing Deaths and Injuries of Fire Fighters Working Above Fire-Damaged Floors*, February, 2009.
7. National Research of Canada, Institute for Research in Construction; Fire performance of Houses, Phase I, Study of Unprotected Floor Assemblies in Basement Fire Scenarios, December, 2008.
8. Tyco Industries, *A Technical Analysis: The Performance of Composite Wood Joists Under Realistic Fire Conditions*, September 2008.
9. Underwriters Laboratories, *Structural Stability of Engineered Lumber in Fire Conditions*, September 30, 2008

Floor assembly where Fire Engineer Arnie Wolf was killed

Residential use of cold form steel with penetrations and 24" on center

Even lighterweight materials – Georgia Pacific XJ-85

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

ICCFILENAME: DECRANE-RB-1-R501.3

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based on the proponent's request and the committee's previous action on RB85-09/10.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Sean DeCrane, Cleveland, OH, Fire Department, representing the International Association of Fire Fighters; Azarang (Ozzie) Mirkhah, Las Vegas, NV, Fire & Rescue, representing Fire & Life Safety Section of the International Association of Fire Chiefs); Steven Orlowski, National Association of Home Builders, Dennis Pitts American Wood Council, American Forest & Paper Association, requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch gypsum wallboard membrane, 5/8 inch wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   - 3.1 The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   - 3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Commenter's Reason: This public comment was developed in response to the IRC Code Development Committee's comments regarding RB31, RB85, RB86, RB87 and RB88.

Public Comment 2:

Jonathan Humble, American Iron and Steel Institute, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R302.7 Floor separation. Floor assemblies within dwelling units shall have a minimum of ½ inch (12.7 mm) gypsum board applied to the underside of the framing members in accordance with R702.3, when not required elsewhere in this code. This provision shall not supersede Sections R302.3, R302.4 or R302.5 where fire resistance ratings or greater thicknesses of gypsum board are required. Penetrations through the gypsum board shall be allowed for stairways, ducting, piping, and electrical and telecommunications outlet boxes, wiring and conduits.

Exceptions:

1. Floor assemblies located over crawl spaces, where the crawl space does not contain mechanical equipment or water heater(s).
2. Dwellings protected with an automatic sprinkler system designed and installed in accordance with NFPA 13D or in accordance with Section P2904.

(Renumber remaining sections)

Commenter's Reason: We propose to modify the original proposal with a product and provision neutral approach to code enforcement. At the 2009 code hearings there were five (5) proposals on the same subject. Each had their own spin on the approach to a design which would accomplish the goal of providing the fire service with some separation of spaces from spaces where framing members that are normally exposed in dwellings today. In this case that separation is gypsum board, not unlike the protection outlined in IRC Section R302.6. Unfortunately, it was the number of variations and subsequent opinions of preference which convinced the code development committee to recommend disapproval for all five of those proposals (e.g. RB31, RB85, RB86, RB87, and RB88).

The modification acts on the following aspects:

Title:
The title chosen is "floor separation" which more appropriately describes the intent.

Neutral Approach:
The modification before you attempts to neutralize those original opinions by focusing on the basic applications necessary for that separation. The modification is product neutral, meaning it applies to all light frame constructions without exception. In addition, the provision is proposed for inclusion into Chapter 3 which further retains that neutrality.

Coordination:
The modification coordinates the other provisions which require gypsum board by referencing the specific sections and the priority, in the second sentence.

Penetrations:
The modification also addresses the impact of stairs, ducting, piping and electrical wiring and conduit penetrating the gypsum board ceiling, in the third sentence.

Exceptions
The modification includes only those exceptions that were found to be a common theme amongst the five original proposals, and practical for this application.

Public Comment 3:

Larry Wainright, Qualtim, Inc, representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch (12.7 mm) gypsum wallboard membrane, 5/8 inch (15.9 mm) wood structural panel membrane, or equivalent on the underside of light frame construction, steel bar joists and wood chord/steel web joists.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, NFPA 13R or NFPA 13.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   3.1 The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.

NFPA 13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height.

Commenter's Reason: This Public Comment merely proposes to require a minimum of ½" gypsum wallboard, or equivalent, on the underside of light frame construction, steel bar joists and wood chord/steel web joists with exceptions for limited areas, sprinklered buildings and certain crawlspaces. SBCA's position on this subject is to provide a requirement that applies equally to all building component types and does not provide a competitive advantage to specific types of construction where they would be exempt from the requirements. However, if that cannot be achieved, this public comment is one of several that will allow the membership to choose which items they believe need protection.

The following link shows statistics of firefighter deaths. It is a global report that shows all firefighter deaths and their causes from 1980-2008. This report shows that less than 5% of all firefighter deaths occur from injuries sustained in structural collapses.
http://www.sbcindustry.com/images/fire/firefatalstats.pdf

Public Comment 4:

Larry Wainright, Qualtim, Inc, representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch (12.7 mm) gypsum wallboard membrane, 5/8 inch (15.9 mm) wood structural panel membrane, or equivalent on the underside of light frame construction, steel bar joists and wood chord / steel web joists.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, NFPA 13R or NFPA 13.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.

NFPA 13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height.

Commenter's Reason: This Public Comment merely proposes to require a minimum of ½" gypsum wallboard, or equivalent, on all unprotected floor assemblies with exceptions for sprinklered buildings and certain crawlspaces. SBCA's position on this subject is to provide a requirement that applies equally to all building component types and does not provide a competitive advantage to specific types of construction where they would be exempt from the requirements.

The following link shows statistics of firefighter deaths. It is a global report that shows all firefighter deaths and their causes from 1980-2008. This report shows that less than 5% of all firefighter deaths occur from injuries sustained in structural collapses.
http://www.sbcindustry.com/images/fire/firefatalstats.pdf

The following spreadsheet is a list of NIOSH reports showing firefighter fatalities that involved a structural collapse. Of those reports, 11 involved firefighter deaths from the collapse of solid sawn lightweight construction and 9 (with potentially 2 more) involved I-joists, MPC wood trusses, and steel trusses combined. This shows that there is no compelling evidence to suggest that engineered products are any more dangerous than solid sawn materials in real fire situations.
Links to the full NIOSH reports are included for more details.

NIOSH Report date	Construction	SBCs	State	Fatality #	Familiar name	NIOSH Report # (link)
4/4/2008	Solid Sawn 2x10- Floor collapse		OH	2	Collerain	F2008-09
7/5/2008	Brick parapet wall collapse		TX	1		F2008-21
7/22/2008	Solid Sawn - Floor collapse		IL	1		F2008-26
1/26/2007		I-Joist- Floor collapse	TN			F2007-07
2/4/2007	Canapy collapse on garage - traditional wooden construction		PA	2		F2007-08
2/21/2006	Wall collapse-ordinary construction		AL	2		F2006-07
6/25/2006		I-Joist Floor collapse	IN	1		F2006-24
8/13/2006		I-Joist/Floor trusses - Floor collapse	WI	1	Green Bay	F2006-26
12/30/2006	Collapsed awning- 2x4 framing lumber		TX	1		F2007-01
2/19/2005	Solid Sawn roof collapse (wood framed building		TX	1		F2005-09
1/9/2004	Solid sawn - floor collapse		PA	1		F2004-05
4/8/2004	Brick façade collapse		TN	1		F2004-37
1/20/2003	Crushed by concealed chimney - balloon frame		PA	1		F2003-04
6/15/2003		Open web steel truss- roof collapse	TN	2		F2003-18
2/11/2002	Brick veneer collapsed. Wood frame platform construction		TX	1		F2002-07

NIOSH Report date	Construction	SBCs	State	Fatality #	Familiar name	NIOSH Report # (link)
3/4/2002	Wood frame w/masonry veneer - floor collapse		NC	1		F2002-11
3/7/2002		LW Pre-engineered trusses w plywood sheathing & various floor coverings	NY	2		F2002-06
7/4/2002	Duplex -twin frame of a balloon frame - roof collapse		NJ	3		F2002-32
9/14/2002	Balloon frame- roof collapse		IA	1		F2002-40
9/30/2002	Parapet wall collapse		IN	1		F2002-44
11/1/2002	Exterior wall collapse- balloon frame		PA	1		F2002-49
11/25/2002	2x10s heavy timber roof - collapse		OR	3		F2002-50
2/25/2001	Wall collapse-ordinary construction		WI	1		F2001-09
3/8/2001		MPC wood trusses - floor collapse	OH	1		F2001-16
3/18/2001	2nd floor collapse - unspecified construction		MO	2		F2001-15
6/16/2001		MPC roof trusses-roof collapse	SC	1		F2001-27
2/14/2000		MPC roof trusses-roof collapse - McDonalds	TX	2		F2000-13
4/20/2000		MPC floor trusses- floor collapse	AL	1		F2000-26
12/28/2000		MPC roof trusses-roof collapse	AR	4 injured		F2001-03
1/10/1999	Balloon frame- roof collapse (singled our balloon framing in notes of action)		CA	1		99-F03
1/19/1999	Chimney Collapse - fire investigator		NY	1		99-F06
3/8/1998		Wooden truss roof collapse (unsure if SBC)	CA	1		98-F07
6/5/1998	2nd level collapse - wood frame		NY	2 and 4 seriously injured		98-F17
6/11/1998	Roof porch collapse - tin roofing supported by 4 colums		VA	1		98-F18
9/5/1998	Parapet wall collapse - heavy wood truss construction		VT	1		98-F20
8/29/1998	2x10s roof - collapse		MS	2		98-F21
12/31/1998	Balloon frame walls & heavy wood gabled roof - roof collapse		GA	1		99-F04
2/17/1997	Wood framing - floor collapse		KY	1		97-04
3/18/1996		Roof trusses 2x6 collapse - not sure if SBCs	VA	2		96-17
Total:	11	9 (with potential 2 more)				

Public Comment 5:

Larry Wainright, Qualtim, Inc, representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch (12.7 mm) gypsum wallboard membrane, 5/8 inch (15.9 mm) wood structural panel membrane, or equivalent on the underside of light frame construction, steel bar joists and wood chord/steel web joists.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, NFPA 13R or NFPA 13.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   - 3.1 The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   - 3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Solid sawn wood joists of at least 2x10 nominal.
5. Metal Plate Connected Wood trusses.

NFPA 13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height

Commenter's Reason: This public comment merely proposes to require a minimum of ½" gypsum wallboard, or equivalent on all unprotected floor assemblies with exceptions for sprinklered buildings, certain crawlspaces and other limited areas that would otherwise be difficult to cover due to obstructions. In addition, solid sawn 2x10 lumber and MPC Wood Trusses are exempted. SBCA's position on this subject is to provide a requirement that applies equally to all building component types and does not provide a competitive advantage to specific types of construction where they would be exempt from the requirements. Recognizing that this may not be possible, this comment offers a compromise where those products that survive the longest in fires are exempted.

The following link shows statistics of firefighter deaths. It is a global report that shows all firefighter deaths and their causes from 1980-2008. This report shows that less than 5% of all firefighter deaths occur from injuries sustained in structural collapses. http://www.sbcindustry.com/images/fire/firefatalstats.pdf.

Public Comment 6:

Larry Wainright, Qualtim, Inc, representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch (12.7 mm) gypsum wallboard membrane, 5/8 inch (15.9 mm) wood structural panel membrane, or equivalent on the underside of light frame construction, steel bar joists and wood chord/steel web joists.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, NFPA 13R or NFPA 13.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   - 3.1 The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   - 3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Solid sawn wood joists of at least 2x10 nominal.
5. Metal Plate Connected Wood trusses
6. Cold formed steel trusses.

NFPA 13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height.

Commenter's Reason: This public comment merely proposes to require a minimum of ½" gypsum wallboard, or equivalent on all unprotected floor assemblies with exceptions for sprinklered buildings, certain crawlspaces and other limited areas that would otherwise be difficult to cover due to obstructions. In addition, solid sawn 2x10 lumber, MPC Wood Trusses and Cold Formed Steel Trusses are exempted. SBCA's position on this subject is to provide a requirement that applies equally to all building component types and does not provide a competitive advantage to specific types of construction where they would be exempt from the requirements. Recognizing that this may not be possible, this comment offers a compromise where those products that survive the longest in fires are exempted.

The following link shows statistics of firefighter deaths. It is a global report that shows all firefighter deaths and their causes from 1980-2008. This report shows that less than 5% of all firefighter deaths occur from injuries sustained in structural collapses. http://www.sbcindustry.com/images/fire/firefatalstats.pdf

Public Comment 7:

Larry Wainright, Qualtim, Inc, representing Structural Building Components Association (SBCA), requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R501.3 Fire Protection of Floors: Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall have a minimum fire resistance of 15 minutes, determined from any of the following options or the sum from any combination thereof:

1. Time assigned to framing members, supporting not less than 50% of the full design load, when tested in accordance with ASTM E119 or UL 263, or determined in accordance with International Building Code Section 721.
2. Time assigned to a ceiling membrane or membranes in Table 501.3.
3. Finish rating time for a ceiling membrane not listed in Table 501.3.
4.

Table R501.3
Time Assigned to Ceiling Membranes

Description of Finish	Time (minutes)[1]
3/8" gypsum board	10
½" gypsum board	15
3/8" wood structural panel	5
½" wood structural panel	10
5/8" wood structural panel	15

[1] Times for individual membranes are additive.

Exceptions:

1. Floor assemblies located directly over a crawl space not intended as a habitable or a storage space and that does not contain fuel-fired appliances.
2. Floor assemblies located directly over a space protected with a sprinkler system designed to NFPA 13, 13D, 13R, or Section R313.
3. A portion of a floor assembly area not greater than 80 square feet per story provided that draft stopping is installed at the perimeter of the unconcealed portion of the floor to separate the concealed spaces from the unconcealed spaces.

NFPA 13R—07 Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in height.

Commenter's Reason: This public comment merely proposes to require a minimum of a 15 minute fire resistance rating for all floor assemblies not elsewhere required to be fire resistance rated. This can be achieved through ASTM E119 or UL 263 testing and/or the addition of ceiling membranes. This comment would give the building designer flexibility in deciding how to achieve the desired result and would provide the means for creative solutions.

Final Action: AS AM AMPC____ D

RB88-09/10
R502.14 (New), Chapter 44 (New)

Proposed Change as Submitted

Proponent: Joseph Fleming, representing the Boston Fire Department

1. Add new text as follows:

R502.14 Fire floor protection. Floors within dwelling units utilizing light-frame construction shall be protected on the underside by a minimum of 5/8" gypsum board applied in accordance with Section R702.3
Exceptions:

1. Crawl spaces where the maximum clear height is 3 feet or less and is not intended for use or storage.
2. The building is protected with an automatic sprinkler system designed to NFPA 13D or Section P2904 of this code.
3. Floors in which the exposed materials on the underside are protected by a Class A Fire-Retardant Coating as defined by NFPA 703.

2. Add new standard to Chapter 44 as follows:

NFPA

703-09 Fire-Retardant Treated Wood and Fire-Retardant Coatings for Building Materials

Reason: When the Building Codes in the US transitioned to lightweight components in order to provide the same structural support at lower costs it was a well intentioned idea. However, it has had tragic unintended consequences in many circumstances. The lightweight components, which provided equivalent performance, at lower cost of construction, to the previously used "heavier components" during normal use, did not provided equivalent performance during structural fires. It may have been assumed that the lighter weight components would survive long enough to let occupants escape but what about occupants who are elderly, handicapped, or trapped because of ineffective smoke alarms. In these cases, firefighters have to conduct search and rescue operations. Often firefighters arrive in the middle of the night with no information about the occupants and must assume that someone needs to be rescued. In these circumstances firefighter's lives, as well as the occupants they are searching for are being put at an unreasonable risk.

The lightweight construction was considered to provide the same "safety factor" as the older heavier construction because it performed in a similar manner under specific tests designed to measure its ability to support a load during normal conditions. However, it is important to keep in mind that these tests measured only one aspect, albeit a critical aspect, of the material's safety. (A design with little flexibility due to conservative or incomplete assumptions has little "*robustness*". A design with a lot of flexibility due to liberal and complete assumptions has a lot of "*robustness"*.) The older heavier construction was extremely "robust," in that it performed for a long time under fire conditions in the same manner that it performed under non-fire conditions. The same cannot be said for light weight construction. The lighter weight construction is not equivalent to the heavier constriction unless it is as "robust" as the heavier construction.

To correct mistakes of the past and to provide better assurance that the light weight construction is equivalent to and as "robust" as the older heavier construction we must provide extra protection to allow it to perform under fire and non-fire conditions in the same manner that heavier construction material performs.

Specific examples where fire fighters have died, or been injured, due to, structural collapse during fire because of the use of this "less expensive" design have been documented by NIOSH Firefighter Fatality Reports.

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

Analysis: The proposed new standard, NFPA 703, is currently referenced in the *International Fire Code*.

ICCFILENAME: FLEMING-RB-2-R502.14

Public Hearing Results

Note: The following analysis was not in the Code Change monograph but was published on the ICC website at http://www.iccsafe.org/cs/codes/Documents/2009-10cycle/ProposedChanges/Standards-Analysis.pdf :

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

Committee Action: **Disapproved**

Committee Reason: Based on the proponent's request and the committee's previous action on RB85-09/10.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Jonathan Humble, American Iron & Steel Institute, representing The Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Replace proposal as follows:

R302.7 Floor separation. Floor assemblies within dwelling units shall have a minimum of ½ inch (12.7 mm) gypsum board applied to the underside of the framing members in accordance with R702.3, when not required elsewhere in this code. This provision shall not supersede Sections R302.3, R302.4 or R302.5 where fire resistance ratings or greater thicknesses of gypsum board are required. Penetrations through the gypsum board shall be allowed for stairways, ducting, piping, and electrical and telecommunications outlet boxes, wiring and conduits.

Exceptions:

1. Floor assemblies located over crawl spaces, where the crawl space does not contain mechanical equipment or water heater(s).
2. Dwellings protected with an automatic sprinkler system designed and installed in accordance with NFPA 13D or in accordance with Section P2904.

(Renumber remaining sections)

Commenter's Reason: We propose to modify the original proposal with a product and provision neutral approach to code enforcement. At the 2009 code hearings there were five (5) proposals on the same subject. Each had their own spin on the approach to a design which would accomplish the goal of providing the fire service with some separation of spaces from spaces where framing members that are normally exposed in dwellings today. In this case that separation is gypsum board, not unlike the protection outlined in IRC Section R302.6. Unfortunately, it was the number of variations and subsequent opinions of preference which convinced the code development committee to recommend disapproval for all five of those proposals (e.g. RB31, RB85, RB86, RB87, and RB88).

The modification acts on the following aspects:

Title:
The title chosen is "floor separation" which more appropriately describes the intent.

Neutral Approach:
The modification before you attempts to neutralize those original opinions by focusing on the basic applications necessary for that separation. The modification is product neutral, meaning it applies to all light frame constructions without exception. In addition, the provision is proposed for inclusion into Chapter 3 which further retains that neutrality.

Coordination:
The modification coordinates the other provisions which require gypsum board by referencing the specific sections and the priority, in the second sentence.

Penetrations:
The modification also addresses the impact of stairs, ducting, piping and electrical wiring and conduit penetrating the gypsum board ceiling, in the third sentence.

Exceptions
The modification includes only those exceptions that were found to be a common theme amongst the five original proposals, and practical for this application.

Final Action: AS AM AMPC____ D

RB91-09/10

R202 (New), R502.1.8 (New), R602.1.4 (New), R802.1.6 (New), Chapter 44 (New)

Proposed Change as Submitted

Proponent: Edward L. Keith, PE, APA-The Engineered Wood Association

1. Add new definition as follows:

STRUCTURAL COMPOSITE LUMBER. Structural members manufactured using wood elements bonded together with exterior adhesives. Examples of structural composite lumber are:

Laminated veneer lumber (LVL). A composite of wood veneer elements with wood fibers primarily oriented along the length of the member. Veneer thickness shall not exceed 0.25 in. (6.4 mm).

Parallel strand lumber (PSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member. The least dimension of the strands shall not exceed 0.25 in. (6.4 mm) and the average length shall be a minimum of 300 times the least dimension.

Laminated strand lumber (LSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member. The least dimension of the strands shall not exceed 0.10 in. (2.54 mm) and the average length shall be a minimum of 150 times the least dimension.

Oriented strand lumber (OSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member. The least dimension of the strands shall not exceed 0.10 in. (2.54 mm) and the average length shall be a minimum of 75 times the least dimension.

2. Add new text as follows:

R502.1.8 Structural composite lumber. Structural capacities for structural composite lumber shall be established and monitored in accordance with ASTM D5456.

R602.1.4 Structural composite lumber. Structural capacities for structural composite lumber shall be established and monitored in accordance with ASTM D5456.

R802.1.6 Structural composite lumber. Structural capacities for structural composite lumber shall be established and monitored in accordance with ASTM D5456.

3. Add new standard to Chapter 44 as follows:

ASTM
D5456-09 Standard Specification for Evaluation of Structural Composite Lumber Products

Reason: ASTM Standard D5456 09 is the standard by which structural composite lumber is evaluated. Structural composite lumber and this standard are already recognized in the 2006 IBC. Products manufactured to this standard are increasingly available in the market place and being used in residential construction even though not specifically recognized by the IRC. These products are being used as beams, headers, long length studs, floor and roof framing; and other applications where high strength, long length, and/or dimensional stability make sawn lumber unacceptable.

Recognition of the appropriate code-recognized standard on the identification marks required by the IRC will provide the designer, builder, plans examiner and building inspector with the assurance that structural composite lumber products are being manufactured with the appropriate quality control systems in place and that the design properties of the product are properly derived and maintained during production.

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

Analysis: The proposed new standard, ASTM D 5456, is currently referenced in the *International Building Code*.

ICCFILENAME: KEITH-RB-6-R202-R502.1.8-CH 44

Public Hearing Results

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

Committee Action: **Approved as Submitted**

Committee Reason: This change adds a much needed definition and standard for structural composite lumber as stated in the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Edward L. Keith, APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

STRUCTURAL COMPOSITE LUMBER. Structural members manufactured using wood elements bonded together with exterior adhesives. Examples of structural composite lumber are:

Laminated veneer lumber (LVL). A composite of wood veneer elements with wood fibers primarily oriented along the length of the member~~.~~, where the veneer element ~~Veneer~~ thickness~~es are~~ ~~shall not exceed~~ 0.25 inches (6.4 mm) or less.

Parallel strand lumber (PSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member~~. The~~, where the least dimension of the wood strand~~s shall not exceed~~ elements is 0.25 in. (6.4 mm) or less and ~~the~~ their average length~~s shall be a minimum~~ are a minimum of 300 times the least dimension of the wood strand elements.

Laminated strand lumber (LSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member~~. The~~, where the least dimension of the wood strand~~s shall not exceed~~ elements is 0.10 in. (2.54 mm) or less and ~~the~~ their average length~~s shall be a minimum~~ are a minimum of 150 times the least dimension of the wood strand elements.

Oriented strand lumber (OSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member~~. The~~, where the least dimension of the wood strand~~s shall not exceed~~ elements is 0.10 in. (2.54 mm) or less and ~~the~~ their average length~~s shall be a minimum~~ are a minimum of 75 times and less than 150 times the least dimension ~~or more~~ of the wood strand elements.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: While these provisions were approved by the Committee as proposed, it was suggested by the Committee that the Public Comment process be used to eliminate mandatory language from the definitions for consistency with the format of other definitions in the code. The

above modification does so. With one exception the changes above in this Public Comment are non-technical. In the definition for OSL the further limitation "and less than 150 times" was returned to the definition. It was inadvertently left out of the original proposal but is a part of the definition in the standard. It is a necessary part of the definition to distinguish OSL from LSL.

Final Action: AS AM AMPC____ D

RB93-09/10
R502.2.2.1.1

Proposed Change as Submitted

Proponent: Dennis Pitts, American Forest & Paper Association

Revise as follows:

R502.2.2.1.1 Placement of lag screws or bolts in deck ledgers. The lag screws or bolts shall be placed not less than 2 inches (51 mm)in from the top of the deck ledger, ¾ inches (19 mm) from the bottom of the deck ledger, 2 inches (51 mm) from the bottom of rimboard, bottom or top of the deck ledgers and between 2 and 5 inches (51 and 127 mm) in from the ends of the deck ledger. The lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger.

Reason: Placement provisions for lag screws and bolts in deck ledgers were added to the IRC last cycle; however, questions arose when designers compared the placement requirements with 2005 *National Design Specification*® (*NDS*®) *for Wood Construction* requirements for similar connections. The proposed changes bring the placement requirements into agreement with the minimum requirements in the 2005 *NDS*.

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

ICCFILENAME: PITTS-RB4-R502.2.2.1.1

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels the placement description is too confusing and should be presented in tabular form.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

Dennis Pitts, representing American Wood Council and American Forest & Paper Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R502.2.2.1.1 Placement of lag screws or bolts in deck ledgers and band joists. The lag screws or bolts in deck ledgers and band joists shall be placed ~~not less than 2 inches (51 mm)in from the top of the deck ledger, ¾ inches (19 mm) from the bottom of the deck ledger, 2 inches (51 mm) from the bottom of rimboard, bottom or top of the deck ledgers and between 2 and 5 inches (51 and 127 mm) in from the ends of the deck ledger. The lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger~~ in accordance with Table R502.2.1.1 and Figures R502.2.2.1.(1) and R502.2.2.1.(2).

TABLE R502.2.2.1.1
PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

	MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS			
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger [1]	2 inches [4]	¾ inch	2 inches [2]	1-5/8 inch [2]
Band Joist [3]	¾ inch	2 inches	2 inches [2]	1-5/8 inch [2]

For SI: 1 inch = 2.54 mm
Notes:

1. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Fig. R502.2.2.1.(1).
2. Maximum 5 inches (127 mm).
3. For engineered rim joists, the manufacturer's recommendations shall govern.
4. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Fig. R502.2.2.1.(1).

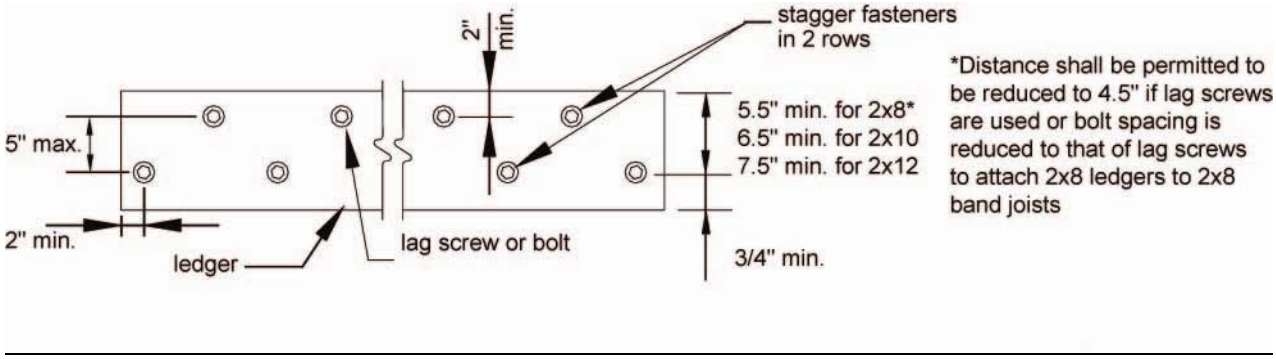


Fig. 502.2.2.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

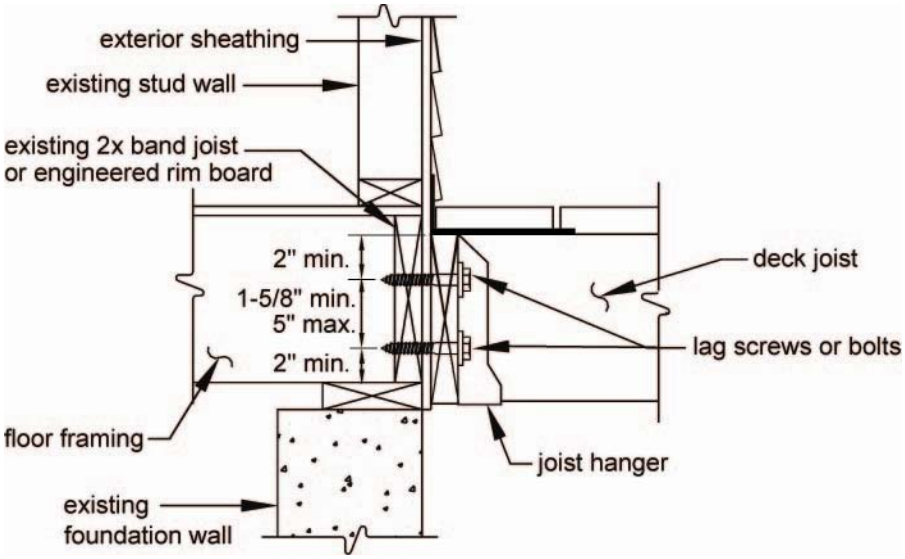


FIG.R502.2.2.1(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS

Commenter's Reason: RB93-09/10 was intended to bring the requirements for the placement of screws or bolts in deck ledgers into agreement with the minimum requirements of the NDS®. The IRC B&E Committee members felt that "…the placement description is too confusing and should be presented in tabular form." This public comment puts the existing and the proposed requirements into a table and also provides illustrations to make those provisions clearer.

Final Action: AS AM AMPC____ D

RB94-09/10
R502.2.2.3, Figure R502.2.2.3

Proposed Change as Submitted

Proponent: Diana M. Hanson, representing North American Deck and Railing Association, Inc. (NADRA)

Delete without substitution:

~~**R502.2.2.3 Deck lateral load connection.** The lateral load connection required by Section R502.2.2 shall be permitted to be in accordance with FigureR502.2.2.3. Hold-down tension devices shall be installed in not less than two~~

~~locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).~~

~~FIGURE R502.2.2.3~~
~~DECK ATTACHMENT FOR LATERAL LOADS~~

Reason: The language of R502.2.2.3 is ambiguous resulting in potential misinterpretation by builders of decks and code officials. The phrasing "may be permitted to be" when coupled with the referenced Figure R502.2.2.3, results in a misunderstanding that this *example* of how to meet the lateral load requirement of R502.2.2, is a requirement, when in fact it is not.

This section has been the cause of much confusion and misunderstanding since its adoption in 2007. The language of 502.2.2.3 and the related figure is merely a suggestion, not a prescription for the only way to achieve a compliant lateral connection, yet NADRA has had to field inquiries and hold discussions with many builders and code officials who understandably misinterpret this code section and figure.

R502.2.2.3 and related Figure R502.2.2.3 add needless complexity to the code, its enforcement, and application and is potentially prone to misinterpretation. Experience shows such figures have a propensity for taking precedent over actual code language, resulting in commonly accepted construction practices being overlooked, and onerous methods being mistakenly understood to be required by both the builder and the code official, raising the likelihood of increased costs to both materials and labor.

IRC 2009, R101.3 Purpose, states "The purpose of this code is to provide *minimum requirements* to safeguard the public safety…" [emphasis added]. The Figure 502.2.2.3 is taken directly from the FEMA 2007 publication which is specifically for seismic areas. Suggesting that good building practices should meet seismic area requirements is not in line with R101.3.

Further, the language of 502.2.2.3 stating "not less than two" hold-down tension devices makes little sense when the size of the deck being attached is not taken into account.

For the above stated reasons, we propose that Figure 502.2.2.3 and the language of R502.2.2.3 suggesting its use, be removed from the IRC.

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

ICCFILENAME: HANSON-RB-2-R502.2.2.3-F. R502.2.2.3

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that a prescriptive method should not be removed from the code but alternate methods should be added. The proponent should work with industry and bring back a solution using other methods.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment:

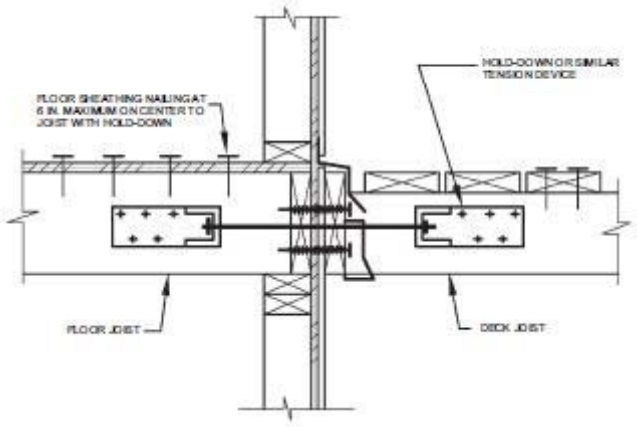
Diana Hanson, North American Deck and Railing Association, Inc. (NADRA), requests Approval as Submitted.

Commenter's Reason: This public comment is for approval of RB94 As Submitted.

When the committee disapproved RB94 it gave as its reason that a prescriptive method should not be removed from the code, but that a solution providing other methods should be brought back.

We disagree in part, and agree in part.

We agree that carefully developed code that addresses the lateral load should be worked out and included in the IRC, and that industry should work together to achieve it.
However, we do not believe that to be a good enough reason to leave something in the code that is simply bad.



For SI: 1 inch = 25.4 mm.

FIGURE 502.2.2.3
DECK ATTACHMENT FOR LATERAL LOADS

R502.2.2.3 Deck lateral load connection. The lateral load connection required by Section R502.2.2 shall be permitted to be in accordance with Figure R502.2.2.3. Hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

The above Figure 502.2.2.3 was borrowed from Figure 7-10 of the *2006 Homebuilders' Guide to Earthquake-Resistant Design and Construction* (FEMA 232), with stricter requirements added:

1. Where FEMA 232 requires attachment at 12" on center (per R602.3(1)), R502.2.2.3 indicates a fastener pattern of 6" on center; and
2. The FEMA 232 design does not designate a load requirement for its tension devices, however R502.2.2.3 requires that each tension device meet a load requirement of 1500 lbs.

What is in the code now is greater in specification than what FEMA suggested for earthquake prone areas!

Further, while the tension devices of R502.2.2.3 do provide some means to resist lateral loads applied to the ledger connection, lateral load resistance is actually not completely solved by this connection detail. To imply that it does, is misleading since it does nothing to secure the deck from swaying. Swaying can deform the plane of the deck and weaken the connections throughout the deck, as well as compromise the integrity of the supporting posts.

Moreoever, no conditions are given for the use of R502.2.2.3. Multi-level decks, decks that wrap around a corner and decks that jog in and out with creative angles or curves make it impossible to use the generic requirement for "tension devices in two locations" without reference to where those locations are. It is much too simplistic to require two such devices without considering the lateral load resistance of the specific deck.

Clearly, the method of R502.2.2.3 and the related figure is not a cure all for any and all decks. Yet, it is being misunderstood as such and is therefore dangerous. We are already seeing misguided interpretations beginning to affect our industry. As awareness of this figure grows, it is our expectation that that confusion will grow exponentially.

We hope you will vote to remove R502.2.2.3 and the related Figure 502.2.2.3 by approving RB94 as submitted.

Final Action: AS AM AMPC____ D

RB102-09/10
R202 (New), R602.3

Proposed Change as Submitted

Proponent: Jay H. Crandell, PE, d/b/a ARES Consulting, representing the Foam Sheathing Coalition

1. Add new definition as follows:

EXTERIOR WALL COVERING. A material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resistive barrier, insulation or for aesthetics, including but not limited to, veneers, siding, exterior insulation and finish systems, architectural trim and embellishments such as cornices, soffits, fascias, gutters and leaders.

2. Revise as follows:

R602.3 Design and construction. Exterior walls of wood-frame construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3.(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). When used as wall bracing in accordance with Section R602.10 or other structural framing purposes in accordance with this chapter, ~~Structural~~ wall sheathing shall be fastened directly to ~~structural~~ framing members~~. Exterior wall coverings~~ and, when placed on the exterior side of an exterior wall, shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). ~~Wood structural panel sheathing used for exterior walls shall conform to the requirements of Table R602.3(3).~~ Wall sheathing used only for exterior wall covering purposes shall comply with Section R703.

Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice.

> **Exception:** Jack studs, trimmer studs and cripple studs at openings in walls that comply with Tables R502.5(1) and R502.5(2).

Reason: The definition of "exterior wall covering" from IBC Chapter 14 is introduced to the IRC for appropriate and consistent usage regardless of building type or occupancy. The proposed revision to section R602.3 then applies this definition and, as an editorial proposal, helps to clarify requirements for sheathing installation on exterior walls. Wall sheathing that is used for structural purposes (e.g., bracing) is addressed in Chapter 6 Wall Framing while wall sheathing that is used solely for exterior wall covering purposes is appropriately addressed in Chapter 7 Wall Covering. The special reference to wood structural panels at the exclusion of listing specific requirements for other sheathing types is deleted because the requirements for applicable wall sheathing materials, including wood structural panels, are adequately addressed by reference to Tables R602.3(1) through R602.3(4). This change will help ensure consistent use of the terms "exterior wall covering" and "wall sheathing" in the IRC and better organize the code to address distinct requirements depending on the application or function of wall sheathing.

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

ICCFILENAME: CRANDELL-RB-1-R202-R602.3

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

EXTERIOR WALL COVERING. A material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resistive barrier, insulation or for aesthetics, including but not limited to, veneers, siding, exterior insulation and finish systems, architectural trim and embellishments such as cornices, soffits, and fascias~~, gutters and leaders~~.

(Portions of proposal not shown remain unchanged)
Committee Reason: The committee feels this new language will be an added improvement and will distinguish between structural wall covering and exterior wall covering. The modification deletes gutters and leaders from the definition since they are not external wall coverings.

Assembly Action: **None**

Individual Consideration Agenda

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

Public Comment 1:

Dennis Pitts, American Wood Council & American Forest & Paper Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R602.3 Design and construction. Exterior walls of wood-frame construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3.(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). ~~When used as wall bracing in accordance with Section R602.10 or other structural framing purposes in accordance with this chapter,~~ W~~w~~all sheathing shall be fastened directly to framing members and, when placed on the exterior side of an exterior wall, shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). Wood structural panel sheathing used for exterior walls shall conform to the requirements of Table R602.3(3). Wall sheathing used only for exterior wall covering purposes shall comply with Section R703.

Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice.

Exception: Jack studs, trimmer studs and cripple studs at openings in walls that comply with Tables R502.5(1).

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The proposed modifications further modify the change recommended for approval as modified by the IRC Committee. The proposal added a clause that limits the minimum fastening and resistance requirements for wall sheathing to only cases where the wall sheathing is being used as part of the wall bracing system per Section R602.10 or other undefined structural framing purposes in Chapter 6. Resisting out of plane wind forces is a major structural requirement on exterior sheathing. While the previous change did clarify some of the language in this section, it confused the issue of whether resistance of out-of-plane wind forces even need to be resisted by the exterior wall sheathing. This change clarifies that requirement while deleting an unnecessary reference to R602.10 in this section.

In addition, the previous change deleted a reference to the out-of-plane resistances provided in Table R602.3(3). This change proposed to re-insert that language while leaving the proposed language that permits exterior wall coverings to be designed per R703.

Public Comment 2:

Edward L. Keith, APA, The Engineered Wood Association, requests Disapproval.

Commenter's Reason: This code change requires only those areas of the wall that are used as bracing to be "capable of resisting wind pressures…" shown on the tables in Section R301.2.1.

The IRC bracing provisions permit distances of up to 21 feet between braced wall panels. That means that the same wind loads that are causing the lateral load on the structure and necessitating the use of braced wall panels may be ignored on these areas of the wall between the braced wall panels. This proposal provides a loop hole around the requirements of Section R301.2.1, reproduced below (important provisions are underlined for clarity):

R301.2.1 Wind limitations. *Buildings and portions thereof shall be limited by wind speed, as defined in Table R301.2(1) and construction methods in accordance with this code. Basic wind speeds shall be determined from Figure R301.2(4). Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where loads for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors are not otherwise specified, the loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors…*

The code, as quoted above, requires that all exterior surfaces of a structure be able to resist these wind loads – including windows, doors and roof coverings. This proposal will provide an exception for the walls of the structure *if they do not contain bracing panels* by prescriptively permitting the use of non-structural sheathing such as foam insulation board. It is unreasonable to assume that the wind will act only on the braced wall panel locations! Note that the wall may use let-in bracing in some situations. In such a situation no area of the opaque wall has to be designed for wind as the proposed provision limits such inconveniences to areas of wall sheathing used as bracing. This proposal is seriously flawed by ignoring the life-safety consideration mandated by the IRC, not to mentioned the increased risk for property damage.

Section R301.1 contains the statement:

Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.

The intent of this Section 301.1 is to permit methods with a proven history of adequate performance not to be required to meet the engineering requirements of the code. It is disingenuous to use these provisions to permit systems with known performance issues to be exempt from the structural requirements of the code. This is exactly what the proposed code change tries to do and what we hope to persuade you to block with this Public Comment.

Recent thunder storms in the Midwest (Evansville, Indiana and Southwest Missouri, areas of nominal 85 mph wind speed) have left countless houses stripped of siding and foam wall sheathing. In most cases the actual winds were well below the maximum design wind speeds. In some cases, only those walls sections containing the wall bracing panels provided any weather protection for the inside of the house (see photos below). Additional photos are available in the Spring and Summer issues of the 2008 Wood Design Focus.

Figure 1. – Foam and vinyl wall covering failure.
(Storm damage – Southern IN, 2005)

Figure 2. – Foam and vinyl wall covering failure while wall bracing panel remains.
(Storm damage, Springfield, MO, 2006)

Please note that the legacy codes, the ICC, as well as their corresponding product evaluation organizations have long required all structural products to meet all 3 of the following requirements:

1. They must be manufactured to proprietary or consensus based structural standards. These standards describe the minimum physical properties, testing criteria, and durability requirements that must be met by the material for its intended end use.
2. An established quality control program must be in place and supported by the manufacturer to insure that the minimum standards are being met by the production facility.
3. An approved third-party quality assurance inspection agency must be under contract to monitor the manufacturer's QC program and issue trademark stamps.

These requirements are designed to protect the public from unsafe construction. While foam insulation boards are manufactured to insulation standards, they meet none of the structural requirements specified for all other structural products. Unlike wood structural panels or structural fiberboard, foam insulation is not manufactured to any consensus-based structural product manufacturing standards. As such, the structural performance of foam sheathing is undefined and uncontrolled. Furthermore, the quality control and quality assurance programs adopted by the foam insulation manufacturers are limited to the control of insulation characteristics of the products, but not the structural performance. The use of non-structural sheathing for structural applications is a serious life-safety issue.

Sections R612.5 and R612.6 require the same level of protection for windows and doors as is required for wood structural panels and structural fiberboard products:

R612.5 Performance. *Exterior windows and doors shall be designed to resist the design wind loads specified in Table R301.2(2) adjusted for height and exposure per Table R301.2(3).*

R612.6 Testing and labeling. *Exterior windows and sliding doors shall be tested by an approved independent laboratory, and bear a label identifying manufacturer, performance characteristics and approved inspection agency to indicate compliance with AMA/WDMA/CSA 101/I.S.2/A440…*

It is interesting to note that these requirements for windows and doors will be maintained in place while the walls are prescriptively permitted to be protected only by non-structural foam insulation that has none of the historic manufacturing safeguards in place. We used to hope that our windows and doors were as strong as our walls in a storm; this proposal effectively reverses this expectation!

We understand the rush to meet the up and coming energy requirements, however the building codes cannot sacrifice the health and safety of our families and friends to do so. The only solution that we can morally and ethically support is one that provides for both the safety and energy efficiency.

We urge overturning of the committee due to the serious flaw of the proposal in ignoring the important life-safety issue.

Public Comment 3:

T. Eric Stafford, representing Institute for Business and Home Safety, requests Disapproval.

Commenter's Reason: We are requesting disapproval of RB102-09/10 due to several problems with the proposed language. The proposed language adds a new definition of exterior wall covering and attempts to discern a difference between "wall coverings" and coverings used for "structural" purposes. For wind design, all parts of the building are considered structural elements as the exterior wall covering are defined as components and cladding and have to be capable of transferring the external wind loads to the Main Wind-Force Resisting System (MWFRS). Accordingly, exterior wall coverings have to be designed for component and cladding loads.

Additionally, this table deletes the specific reference to Table R602.3(3) for attachment of wood structural panel sheathing in favor of referencing Section R703. Table R602.3(3) was added during the last code cycle to provide a prescriptive method for attaching wood structural panel sheathing to resist out-of-plane wind loads. This table was submitted by APA based on calculations of the panel and the attachment's ability to resist the applicable out-of-plane wind loads. Table R602.3(3) takes into account the panel span rating, wall stud spacing, panel nail spacing, wind speed, and exposure category – none of which is specifically considered in Table R703.4.

The proposed language is also inconsistent and will result in numerous misinterpretations. The new language states that when wall sheathing is used as bracing or other structural framing purposes, and placed on the exterior side of the wall, it has to be capable of resisting the wind pressures from Table R301.2(2) (component and cladding loads). However, if it qualifies as an exterior wall covering as proposed in the new language, attachment in accordance with Section R703 is permitted. This language is particularly inconsistent. If wall sheathing is placed on the exterior side of a wall, it should be capable of resisting the applicable wind pressures regardless of whether the sheathing is used as bracing or not. The proposed language is inconsistent and conflicting with itself. As written it could result in misinterpretations and confusion**.**

Final Action: AS AM AMPC____ D