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TENTATIVE ORDER OF DISCUSSION
2016 PROPOSED CHANGES TO THE
INTERNATIONAL RESIDENTIAL CODE –BUILDING

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

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation does not necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some RB code change proposals may not be included on this list, as they are being heard by another committee.

NUMBER NOT USED
RB16-16

ADM34-16 Part II  ADM90-16 Part II  RB15-16  RB49-16
ADM38-16  ADM91-16 Part II  ADM29-16 Part II  RB50-16
ADM36-16  ADM89-16  RB17-16  RB51-16
ADM37-16  RB2-16  RB18-16  RB52-16
ADM35-16 Part IV  ADM1-16 Part IV  RB19-16  RB8-16
ADM41-16 Part II  ADM2-16 Part IV  RB20-16  RB53-16
ADM51-16 Part II  ADM5-16 Part II  RB21-16  RB54-16
ADM52-16  ADM6-16 Part II  RB22-16  RB55-16
ADM53-16  ADM7-16 Part II  RB23-16  RB56-16
ADM93-16 Part IV  RB3-16  RB24-16  RB57-16
ADM55-16 Part II  RB4-16  RB25-16  RB58-16
ADM60-16 Part IV  ADM8-8 Part II  S90-16 Part II  RB59-16
ADM61-16 Part IV  F3-16 Part II  RB26-16  RB60-16
ADM59 Part IV  ADM9-16 Part IV  RB27-16  RB61-16
ADM62-16 Part IV  ADM12-16 Part II  RB28-16  RB62-16
ADM58 Part IV  RB6-16  RB29-16  RB63-16
ADM10 Part II  RB7-16  RB30-16  RB64-16
ADM65-16 Part II  RB9-16  RB31-16  RB65-16
ADM63 Part II  RB10-16  RB32-16  RB66-16
ADM67-16 Part II  RB11-16  RB33-16  RB67-16
ADM68-16  ADM13-16 Part II  RB34-16  RB68-16
ADM64-16 Part II  G-9-16 Part II  RB35-16  RB69-16
ADM66-16 Part II  RB12-16  RB36-16  RB70-16
ADM69-16 Part II  ADM14-16 Part II  RB37-16  RB71-16
ADM72-16  CE13-16 Part III  RB38-16  RB72-16
ADM73-16 Part II  ADM15-16 Part II  RB39-16  RB374-16
ADM78-16 Part II  ADM16-16 Part II  RB40-16  RB375-16
RB1-16  G2-16 Part II  RB41-16  RB73-16
ADM74-16  RB13-16  RB42-16  RB74-16
ADM80-16 Part IV  ADM19-16 Part II  RB43-16  RB75-16
ADM88-16 Part II  ADM26-16 Part IV  RB44-16  RB76-16
ADM85-16 Part II  ADM22-16 Part III  RB45-16  RB77-16
ADM81-16  G14-16 Part IV  RB46-16  RB78-16
ADM11-16 Part II  RB14-16  RB47-16  RB79-16
ADM86-16  G19-Part II  RB48-16  RB80-16
RB287-16       RB340-16
RB288-16       RB341-16
RB289-16       RB342-16
RB290-16       RB343-16
RB291-16       S33-16 Part II
RB292-16       S8-16 Part II
RB293-16       S29-16 Part II
RB294-16       S34-16 Part II
RB295-16       RB344-16
RB296-16       RB345-16
RB297-16       RB346-16
RB298-16       RB347-16
RB299-16       RB348-16
RB300-16       RB349-16
RB301-16       RB350-16
RB302-16       S41-16 Part II
RB303-16       S42-16 Part II
RB304-16       S43-16 Part II
RB305-16       RB351-16
RB306-16       RB352-16
RB307-16       RB353-16
RB308-16       RB354-16
RB309-16       RB355-16
RE189-16 Part II RB356-16
RB310-16       S51-16 Part II
RB311-16       S5-16 Part II
S261-16 Part II RB357-16
RB312-16       RB358-16
S263-16 Part II RB359-16
RB313-16       RB360-16
RB314-16       RB361-16
RB315-16       RB362-16
RB316-16       RB363-16
RB317-16       RB364-16
RB318-16       RB365-16
RB319-16       RB366-16
RB320-16       RB367-16
RB321-16       RB368-16
RB322-16       RB369-16
RB323-16       RB370-16
RB324-16       RB371-16
RB325-16       RB372-16
RB326-16
RB327-16
RB328-16
RB329-16
RB330-16
RB331-16
RB332-16
RB333-16
RB334-16
RB335-16
RB336-16
RB337-16
RB338-16
RB339-16
RB1-16
IRC: R106.1.2.1 (New), R202 (New), R703.1.3 (New).
Proponent: Matthew Dobson, Vinyl Siding Institute, representing Vinyl Siding Institute (mdobson@vinylsiding.org)

2015 International Residential Code

Add new text as follows:

**R106.1.2.1 Maintenance Documents.** Manufacturers' product and system maintenance documents, as required by this code, shall be provided with the *Construction Documents* and included with the Certificate of Occupancy.

Add new definition as follows:

**SECTION R202 DEFINITIONS**

**MAINTENANCE DOCUMENTS.** Information that can be a part of larger documents, such as warranty, installation information and construction documents, that describe the necessary maintenance steps for a product or the system durability necessary to ensure projected service life.

Add new text as follows:

**R703.1.3 Exterior Wall Covering Maintenance.** *Maintenance Documents* are required.

**Reason:** Durability is such an important aspect of building service life, it is referenced in Section R101.3 of the IRC which explains the intent of the code includes many areas including stability. For many building materials and systems, ongoing maintenance is not only the key to the durability of that component or system, but in many cases can be the key to the durability of the entire structure.

Of course durability starts with proper installation, but in many cases notable building failures are caused by improper maintenance of the materials, including issues relating to rot and mold.

With better communication and understanding of maintenance requirements, we can help to improve to the life and durability of structures.

This simple additional step will move us in the ride direction of this issue and improve the resiliency of homes built under the IRC. According to Building Science Corporation's article, "Increasing the Durability of Constructions" (by Joseph Lstiburek – BSD-144) many building failure issues over the past few decades has to do with durability and proper building maintenance.

**Cost Impact:** Will increase the cost of construction

Change will increase the cost of construction minimally because of necessary additional information and administrative steps. This change, though, will help with longer lifetime of products and systems.
RB2-16
IRC: 0, M1305.1, M1407.4, M1503.4, M1601.1.2, M1601.4.1, M1803.3.5, M1803.4.3, M2204.2, M2301.2.1, R1001.2.1, R1003.9.2, R202, R202 (New), R301.5, R302.7, R308.4.3, R308.4.6, R308.6.1, R308.6.5, R310.5, R311.3, R807.1.
Proponent: David Collins (dcollins@preview-group.com)

2015 International Residential Code
Delete and substitute as follows:

SECTION R202- DEFINITIONS

ACCESSIBLE. Signifies access that requires the removal of an access panel or similar removable obstruction.

ACCESS (TO) That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel, door or similar obstruction.

ACCESSIBLE, READILY. Signifies access without the necessity for removing a panel or similar obstruction.

READY ACCESS (TO) That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, door or similar obstruction.

Revise as follows:

CLEANOUT. An accessible opening in the drainage system used for the removal of possible obstruction and located to allow for access.

FIXTURE FITTING.

Supply fitting. A fitting that controls the volume or directional flow or both of water and that is either attached to or accessible is accessed from a fixture or is used with an open or atmospheric discharge.

Waste fitting. A combination of components that conveys the sanitary waste from the outlet of a fixture to the connection of the sanitary drainage system.

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

<table>
<thead>
<tr>
<th>USE</th>
<th>LIVE LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninhabitable attics without storage^{b}</td>
<td>10</td>
</tr>
<tr>
<td>Uninhabitable attics with limited storage^{b,g}</td>
<td>20</td>
</tr>
<tr>
<td>Habitable attics and attics served with fixed stairs</td>
<td>30</td>
</tr>
<tr>
<td>Balconies (exterior) and decks^{e}</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Fire escapes</td>
<td>40</td>
</tr>
<tr>
<td>Guards and handrails</td>
<td>200(^h)</td>
</tr>
<tr>
<td>Guard in-fill components</td>
<td>50(^h)</td>
</tr>
<tr>
<td>Passenger vehicle garages</td>
<td>50(^a)</td>
</tr>
<tr>
<td>Rooms other than sleeping rooms</td>
<td>40</td>
</tr>
<tr>
<td>Sleeping rooms</td>
<td>30</td>
</tr>
<tr>
<td>Stairs</td>
<td>40(^c)</td>
</tr>
</tbody>
</table>

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm\(^2\), 1 pound = 4.45 N.

a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.

b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of 4 square inches, whichever produces the greater stresses.

d. A single concentrated load applied in any direction at any point along the top.

e. See Section R507.1 for decks attached to exterior walls.

f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.

g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is not greater than 42 inches, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
2. The slopes of the joists or truss bottom chords are not greater than 2 inches vertical to 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

**R302.7 Under-stair protection.** Enclosed accessible space under stairs that is accessed by a door or access panel, shall have walls, under-stair surface and any soffits protected on the enclosed side with \(\frac{1}{2}\)-inch (12.7 mm) gypsum board.

**R308.4.3 Glazing in windows.** Glazing in an individual fixed or operable panel that meets all of
the following conditions shall be considered to be a hazardous location:

1. The exposed area of an individual pane is larger than 9 square feet (0.836 m$^2$),
2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor,
3. The top edge of the glazing is more than 36 inches (914 mm) above the floor; and
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. Where glazing is adjacent to a walking surface and a horizontal 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 have a cross-sectional height of not less than $1\frac{1}{2}$ inches (38 mm).
3. Outboard panes in insulating glass units and other multiple glazed panels where 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.

R308.4.6 Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than 36 inches (914 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered to be a hazardous location.

Exceptions:

1. Where glazing is adjacent to a walking surface and a horizontal rail is installed on the accessible side(s) of the glazing at 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 have a cross-sectional height of not less than $1\frac{1}{2}$ inches (38 mm).
2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.

R308.6.2 Materials. The following types of glazing shall be permitted to be used:

1. Laminated glass with not less than a 0.015-inch (0.38 mm) polyvinyl butyral interlayer for glass panes 16 square feet (1.5 m$^2$) or less in area located such that the highest point of the glass is not more than 12 feet (3658 mm) above a walking surface or other accessible area, for higher or larger sizes, the interlayer thickness shall be not less than 0.030 inch (0.76 mm).
2. Fully tempered glass.
3. Heat-strengthened glass.
4. Wired glass.
5. Approved rigid plastics.

R308.6.5 Screens not required. Screens shall not be required where fully tempered glass is used as single glazing or the inboard pane in multiple glazing and either of the following conditions are met:
1. Glass area 16 square feet (1.49 m$^2$) or less. Highest point of glass not more than 12 feet (3658 mm) above a walking surface or other accessible area, nominal glass thickness not more than $\frac{3}{16}$ inch (4.8 mm), and (for multiple glazing only) the other pane or panes fully tempered, laminated or wired glass.

2. Glass area greater than 16 square feet (1.49 m$^2$). Glass sloped 30 degrees (0.52 rad) or less from vertical, and highest point of glass not more than 10 feet (3048 mm) above a walking surface or other accessible area.

**R310.5 Dwelling additions.** Where dwelling additions occur that contain sleeping rooms, an emergency escape and rescue opening shall be provided in each new sleeping room. Where dwelling additions occur that have basements, an emergency escape and rescue opening shall be provided in the new basement.

**Exceptions:**
1. An emergency escape and rescue opening is not required in a new basement that contains a sleeping room with an emergency escape and rescue opening.
2. An emergency escape and rescue opening is not required in a new basement where there is an emergency escape and rescue opening in an existing basement that is accessible from the new basement.

**R311.3 Floors and landings at exterior doors.** There shall be a landing or floor on each side of each exterior door. The width of each landing shall be not less than the door served. Every landing shall have a dimension of not less than 36 inches (914 mm) measured in the direction of travel. The slope at exterior landings shall not exceed $\frac{1}{4}$ unit vertical in 12 units horizontal (2 percent).

**Exception:** Exterior balconies less than 60 square feet (5.6 m$^2$) and only accessible from a door are permitted to have a landing less than 36 inches (914 mm) measured in the direction of travel.

**R807.1 Attic access.** Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that have a vertical height of 30 inches (762 mm) or greater over an area of not less than 30 square feet (2.8 m$^2$). The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall be not less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location with ready access. Where located in a wall, the opening shall be not less than 22 inches wide by 30 inches high (559 mm wide by 762 mm high). Where the access is located in a ceiling, minimum unobstructed headroom in the attic space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical equipment is located in attics.

**R1001.2.1 Ash dump cleanout.** Cleanout openings located within foundation walls below fireboxes, when provided, shall be equipped with ferrous metal or masonry doors and frames constructed to remain tightly closed except when in use. Cleanouts shall be accessible located to allow access and located so that ash removal will not create a hazard to combustible materials.

**R1003.9.2 Spark arrestors.** Where a spark arrestor is installed on a masonry chimney, the spark arrestor shall meet all of the following requirements:
1. The net free area of the arrestor shall be not less than four times the net free area of the outlet of the chimney flue it serves.

2. The arrestor screen shall have heat and corrosion resistance equivalent to 19-gage galvanized steel or 24-gage stainless steel.

3. Openings shall not permit the passage of spheres having a diameter greater than \( \frac{1}{2} \) inch (12.7 mm) nor block the passage of spheres having a diameter less than \( \frac{3}{8} \) inch (9.5 mm).

4. The spark arrestor shall be accessible located with access for cleaning and the screen or chimney cap shall be removable to allow for cleaning of the chimney flue.

M1305.1 Appliance access for inspection service, repair and replacement. Appliances shall be accessible located to allow for access for inspection, service, repair and replacement without removing permanent construction, other appliances, or any other piping or ducts not connected to the appliance being inspected, serviced, repaired or replaced. A level working space not less than 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an appliance.

M1407.4 Access. Duct heaters shall be accessible located to allow access for servicing, and clearance shall be maintained to permit adjustment, servicing and replacement of controls and heating elements.

M1503.4 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m\(^3\)/s) shall be mechanically or naturally provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with not less than one damper. Each damper shall be a gravity damper or an electrically operated damper that automatically opens when the exhaust system operates. Dampers shall be accessible located to allow access for inspection, service, repair and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired or replaced.

M1601.1.2 Underground duct systems. Underground duct systems shall be constructed of approved concrete, clay, metal or plastic. The maximum duct temperature for plastic ducts shall not be greater than 150°F (66°C). Metal ducts shall be protected from corrosion in an approved manner or shall be completely encased in concrete not less than 2 inches (51 mm) thick. Nonmetallic ducts shall be installed in accordance with the manufacturer's instructions. Plastic pipe and fitting materials shall conform to cell classification 12454-B of ASTM D 1248 or ASTM D 1784 and external loading properties of ASTM D 2412. Ducts shall slope to an accessible point for drainage that has access. Where encased in concrete, ducts shall be sealed and secured prior to any concrete being poured. Metallic ducts having an approved protective coating and nonmetallic ducts shall be installed in accordance with the manufacturer's instructions.

M1601.4.1 Joints, seams and connections. Longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards—Metal and Flexible and NAIMAFibrous Glass Duct Construction Standards. Joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes. Tapes and mastics used to seal fibrous glass ductwork shall be listed and labeled in accordance with UL 181A and shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. Tapes and mastics used to seal metallic and flexible air ducts and flexible air connectors shall
comply with UL 181B and shall be marked "181 B-FX" for pressure-sensitive tape or "181 BM" for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked 181B-C. Crimp joints for round metallic ducts shall have a contact lap of not less than 1 inch (25 mm) and shall be mechanically fastened by means of not less than three sheet-metal screws or rivets equally spaced around the joint.

Closure systems used to seal all ductwork shall be installed in accordance with the manufacturers' instructions.

Exceptions:
1. Spray polyurethane foam shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types.

M1803.3.5 Access. The entire length of a connector shall be accessible allow access for inspection, cleaning and replacement.

M1803.4.3 Connection to masonry fireplace flue. A connector shall extend from the appliance to the flue serving a masonry fireplace to convey the flue gases directly into the flue. The connector shall be accessible allow access or removable for inspection and cleaning of both the connector and the flue. Listed direct-connection devices shall be installed in accordance with their listing.

M2204.2 Shutoff valves. A readily accessible manual shutoff valve shall be installed to allow for ready access and be located between the oil supply tank and the burner. Where the shutoff valve is installed in the discharge line of an oil pump, a pressure-relief valve shall be incorporated to bypass or return surplus oil. Valves shall comply with UL 842.

M2301.2.1 Access. Solar energy collectors, controls, dampers, fans, blowers and pumps shall be accessible located to allow access for inspection, maintenance, repair and replacement.

Reason:
The intent of this proposal is for clarification of terminology. This proposal will clarify where the provisions are for access for repair, not accessibility for persons with disabilities.

The term 'accessible' is defined in the IBC and relates to elements and facilities that serve or have special accommodations for persons with mobility impairments. This term is used that way in IRC Section R320 and R321.3. The IPC, IFGC and IMC use the defined term "Access (to)" or "Ready Access" for access to equipment. Using those terms are proposed here for the IRC where applicable.

The phrase "other accessible area" has been removed from Sections R308.4.6, R308.6.2 and R308.6.5. This is confusing and not uniformly enforceable.

There is a similar proposal for the IECC, including Chapter 11 of the IRC. A similar proposal was approved for the International Plumbing Code as part of Group A - P84-15.

Cost Impact: Will not increase the cost of construction
This is a clarification of terminology that will have no change on code requirements.
2015 International Residential Code

Add new text as follows:

SECTION  R202  DEFINITIONS

ATTIC, VENTED. A non-habitable attic space located outside of the building thermal envelope under a steep-slope roof that includes openings that facilitate passive or active ventilation of the space.

Reason: The proposal adds a necessary definition for vented attics.

Cost Impact: Will not increase the cost of construction
The proposal adds no new requirements.
2015 International Residential Code

Add new definition as follows:

SECTION  R202  DEFINITIONS

BEDROOM. A room that is part of a dwelling unit in which the primary purpose is for sleeping, and contains a closet with a clothes rod and shelf within the room.

Reason: This has been a controversial definition for many cycles, and many jurisdictions have established how they define a bedroom. I feel that many rooms unfairly get treated as a bedroom, and therefore additional requirements kick in because of this. If a room is a bedroom it should be treated as a bedroom. If a room is used as a gym or game room, but has the unfortunate closet/storage area within the room to store items out of the way of the room it now becomes a bedroom.

Cost Impact: Will not increase the cost of construction
Rooms that in the past had been classified as a bedroom may not be.
2015 International Residential Code

Add new text as follows:

<table>
<thead>
<tr>
<th>SECTION</th>
<th>R202</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blocking.</strong> Two-inch nominal size lumber, utility grade minimum.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reason:</strong> No coherent definition of blocking appears in the IRC.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cost Impact:</strong> Will not increase the cost of construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarifications of the code only, no cost impact.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2015 International Residential Code

Add new definition as follows:

SECTION R202 DEFINITIONS

CRAWL SPACE. An underfloor space that is not a basement.

Reason: There is no definition for "crawl space" yet the term is used forty four times in the code. Because definitions in Merriam-Webster are not appropriate to the use of the term in the IRC, it is necessary to create a definition that is appropriate and to distinguish those spaces from "basement".

For information: BASEMENT. A story that is not a story above grade plane. (see "Story above grade plane").

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.
RB7-16
IRC: R202 (New).
Proponent: Edward Kulik, representing Building Code Action Committee (bcac@icc-safe.org)

2015 International Residential Code
Add new text as follows:

SECTION R202 DEFINITIONS

DETACHED. For the purposes of Section R101.2, a building that is not attached or fastened to an adjacent building and does not share common building elements with an adjacent building.

Reason: This IRC proposal is intended to clarify:

a) What is meant by "detached" in Section R101.2, Scope
b) What must be done when IRC dwellings are built with zero clearance to lot lines (not just between townhouse dwelling units, but also between one-family dwelling dwellings such as a row house in an urban environment)
c) What happens as townhomes and row houses age and individual units are destroyed by fire and must be replaced
d) What must be done when row houses in an urban setting are demolished and rebuilt

Note that Section R302.1 and its associated tables permit fire resistant construction requirements.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: BCAC

Cost Impact: Will not increase the cost of construction
This proposal is intended as a clarification of the current provisions of the IRC; therefore no increase in the cost of construction is expected.
2015 International Residential Code

Revise as follows:

SECTION R202 DEFINITIONS

[RB] DRAFT STOP. A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and attics.

Reason: Following is the requirement for draftstopping. It only requires draftstops in a floor/ceiling assembly, not attics. The definition also erroneously references other locations (crawl spaces, roof ceiling assemblies, and attics). R302.12 states where draft stops are required negating the need to have that language in the definition.

R302.12 Draftstopping. In combustible construction where there is usable space both above and below the concealed space of a floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m²). Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below, draftstopping shall be provided in floor/ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.

The definition 'draft stop' also appears in the IBC and IFC. This definition is scoped to the IBC Fire Safety committee.
2015 International Residential Code

Revise as follows:

SECTION R202 DEFINITIONS

[RB] DWELLING. Any building that contains one or two dwellingunits used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

Reason: The term "dwelling unit" is defined and additional commentary language in the definition of "dwelling" only serves to add confusion.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.

The definition 'dwelling' is the same as currently in IRC in IBC, IFC and IMC. This definition is scoped to the IBC General Committee in those documents.

RB9-16 : R202-[RB]
DWELLING-DAVIDSON10791
2015 International Residential Code

Revise as follows:

SECTION 202 DEFINITIONS

[RB] DWELLING. Any building that contains one or two dwelling units located on a single lot that are used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

Reason: There has been confusion regarding the separation between two dwelling units in a two-family dwelling. The code requires a one-hour fire-resistance assembly between the units. However, there is an ICC Committee interpretation (41-03) that states “An attached two-family dwelling with a property line between the two dwelling units is considered two separate buildings, located on two separate lots. Two individual dwellings must comply with the fire separation distance required in Section R302.1″. ICC seminars also support this position.

The intent of this proposal is to clarify this requirement by including the language in the definition stating that a two-family dwelling on a single lot would be constructed as a single building and the single one-hour wall would be acceptable. However, if a lot line is placed between the two dwelling units, you would have a dwelling on a separate lot and the exterior walls would need to be protected in accordance with Section 302 as separate buildings. We are just trying to make sure the code reads that way it is intended to read.

Cost Impact: Will increase the cost of construction

For jurisdictions that allow the single one-hour wall when a lot line exists, the additional cost of the two exterior walls will increase the cost of construction. For jurisdictions that enforce the ICC interpretation, there would be no change.

The definition ‘dwelling’ is the same as currently in IRC in IBC, IFC and IMC. This definition is scoped to the IBC General Committee in those documents
2015 International Residential Code

Revise as follows:

SECTION R202 DEFINITIONS

[RB] DWELLING UNIT. A single unit providing complete independent living facilities designed or intended to be used for one or more persons human habitation, including permanent provisions for living, sleeping, cooking, and sanitation or eating purposes, or any combination thereof by one or more persons.

Reason: permanent adjective -nant : lasting or continuing for a very long time or forever : not temporary or changing

What are permanent provisions for living? What regulated components of the dwelling satisfy this definition?
What are permanent provisions for sleeping? Must the bed be nailed to the floor?
What are permanent provisions for eating? Must the forks be screwed to the wall?
What are permanent provisions for cooking? Does a microwave oven constitute permanent provisions? What if it is on a counter? What if it is part of range exhaust? How does this differ from a range that is plugged in?

The current definition has indefinable conditions that serve only to cause confusion.

The following definition of "building" is currently in the IRC and is used as the basis for the proposed revision.

BUILDING. Building shall mean any one- and two-family dwelling or portion thereof, including townhouses, that is used, or designed or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, and shall include accessory structures thereto.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.

The definition 'dwelling unit' currently in the IRC is the same in IBC, IFC, IMC, IFGC, IECC and IPMC. This definition is scoped to the IBC General Committee for these documents.
2015 International Residential Code

Revise as follows:

**SECTION 202 DEFINITIONS**

**[RB] FIRE SEPARATION DISTANCE.** The distance measured from the exterior wall of a building face to one of the following:

1. To the closest interior lot line.
2. To the centerline of a street, an alley or public way.
3. To an imaginary line between two buildings on the lot.

The distance shall be measured at a right angle from the face of the wall. Where the exterior wall covering is combustible, fire separation distance shall be measured to the exterior face of the exterior wall covering.

Staff note: The definition for 'fire separation distance' currently in IRC is the same as in the IBC and IFC. The definition is scoped to the Fire Safety committee for those codes.  

**Reason:** The proposed revision to the definition for fire separation distance is to address a practical issue that arises during construction inspections where the building location is established based on the location of the foundation. The exterior wall, the framing of the exterior wall, typically constructed with its exterior side flush with the exterior side of the foundation below or inset to accommodate structural wood panels where applicable. Contractors regularly forget to include the thickness of exterior wall coverings when separating the building from a lot line or imaginary lot line when applicable. Without the proposed code change code users will not consistently apply the requirements of Section R302.1 and its associated tables. Additionally, the location of a building is established during the foundation inspection so the face of the wall has traditionally been the point of measurement under legacy codes.

Exterior wall and exterior wall covering are defined terms in the IRC. Fire separation distance to the building face is a measurement to face of the exterior wall covering. What is proposed is for the measurement to be to the face of the wall, the wall framing, when the exterior wall covering is not combustible.

Exterior wall openings such as windows may be constructed with the outer edge of their frames flush with the exterior wall coverings or the window frames may be inset. Additionally, exterior wall coverings vary in thickness from common 7/8 inch plaster top brick and stone veneers that can be inches thick. Exterior wall covered with thick exterior wall coverings typically have windows set back into the wall. Exterior doors are typically constructed with frames that flush with the exterior wall finish material and with doors that are inset from the exterior wall plane.

By limiting the exterior wall coverings to non-combustible materials when measuring from the face of the wall, the proposed code change addresses the varying possibilities for exterior wall coverings and recognizes that the glazed window or the door will be set back into the wall and as a result will comply with the intent of the code when regulating exterior wall openings.

Full scale fire tests documented in "NIST Technical Note 1600 Residential Structure Separation Fire Experiments" demonstrated the risks of fire exposure between two combustible buildings separated 6 ft apart with no fire sprinkler protection. The study focused on the ignition of exterior wall coverings from an exposing building. The report highlights the need for a more scientific basis in determining the appropriate fire separation distance. See the following link for more information http://fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf

Cost Impact: Will not increase the cost of construction
The proposed code change will not increase the cost of construction since most jurisdiction restrict through zoning regulations construction set back areas at the rear and side of a lot. Structures would be cut back to the required distance of 5 ft.
2015 International Residential Code

Revise as follows:

SECTION R202 DEFINITIONS

[RB] STAIR. A change in elevation, consisting of one or more than two risers.

Reason: If a stair is one riser and there is no minimum riser height, then there is a stair between a landing and grade, between rooms where there is a sunken living room, and between any changes in elevation (that is what the definition says). So if I have a room with a floor level that is one inch higher than an adjacent floor, I have a stair. But then what? What rules apply? Nothing. So let's match the definition to a point where it actually accomplishes something. Handrails aren't required unless there are four or more risers so that is a good starting point. Often times there will be one step outside a patio door or the door between a garage and house. Do we want to split hairs over the equality of risers for these stairs. Of course not. Tripping hazards on stairs occur when your gait is interrupted. If you are never able to establish a gait, you won't be surprised and you won't trip. Starting the rules at three or more risers is a reasonable compromise, especially for residential construction.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.

The definition 'stair' currently in the IRC is the same in IBC and IFC. This definition is scoped to the IBC Means of Egress Committee for these codes.
RB15-16
IRC: 0, R303.9.1, R310.1, R310.2.4, R311.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

SECTION R202 DEFINITIONS

[RB] TOWNHOUSE. A single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from foundation to roof and with a yard, not less than ten feet in clear width, or public way on not less than two sides.

R303.9.1 Sunroom additions. Required glazed openings shall be permitted to open into sunroom additions or patio covers that abut a street, public way, yard or court if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening, and the ceiling height of the sunroom is not less than 7 feet (2134 mm). For purposes of this section, yards or courts shall be a minimum of three feet in clear width.

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every sleeping room shall have not less than one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way. For purposes of this section, yards or courts shall be a minimum of three feet in clear width.

Exception: Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m^2).

R310.2.4 Emergency escape and rescue openings under decks and porches. Emergency escape and rescue openings shall be permitted to be installed under decks and porches provided that the location of the deck allows the emergency escape and rescue openings to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court with a minimum clear width of three feet.

R311.1 Means of egress. Dwellings shall be provided with a means of egress in accordance with this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the required egress door without requiring travel through a garage. The required egress door shall open directly into a public way or to a yard or court that opens to a public way. For purposes of this section, yards or courts shall be a minimum of three feet in clear width.

Staff note: The definition for 'townhouse' as currently in the IRC is also in the IBC and IFC. This definition is scoped the the Administrative committee for these codes.

Reason: The defined term "yard" is used in six sections in the IRC. These sections are very frequently used. The definition yields no minimum width for a "yard". The term is referenced in the definition of "townhouse" but without a dimension. It is referenced in a fire separation distance for sprinklered dwellings but requires "6 feet or more". It is referenced for sunrooms without a dimension. It is referenced for emergency escape and rescue openings twice without a dimension. And last it is referenced in the means of egress section of the code. So, the question is: How wide must a "yard" be to achieve compliance with the intent of the code? Is one foot satisfactory? How about three feet? Five feet? Ten feet?
In trying to correct this omission by adding a one size fits all dimension, it became apparent that one size does not fit all. Therefore what is proposed is to amend each of the sections where the term "yard" is used by providing a...
What is being proposed are amendments to five of the six sections where the term "yard" is used. The sixth instance does provide a distance for the term "yard" of six feet.

Of the remaining five sections, the first to use the term is the definition of "townhouse". The code says a structure meets the definition of "townhouse" when it has a yard or public way on not less than two sides. How wide must that yard be? The term public way is defined as being ten feet in width. Most of the references in the IRC equate yard to public way. This being the case, it is logical to interpret a yard as being not less than ten feet in width. Actually, it is the only defendable interpretation that can be made without venturing into one that is "arbitrary". Since logic would dictate that a yard and a public way have the same minimum width because of how the terms are paired in the code, this proposal inserts text defining a yard as being not less than ten feet in width. In order to enforce the code where an open space requirement exists, it is necessary to identify the width.

In section R303.8.1, the terms used are "street, yard or court". First, the undefined term "street" is being replaced with the defined term "public way". Then, how wide should a yard or court be? What is reasonable? With a fire separation distance of three feet unprotected openings are permitted. So, it seems reasonable to have yards or courts three feet in width to serve the required width of these sunroom addition openings because this would be the minimum permitted if a window opened into a yard that didn't front on a street or public way. Three feet is a reasonable minimum in this situation.

In section R310.1, emergency escape and rescue openings must open to a public way or a yard or court that opens to a public way. While public ways must be ten feet in width, that width is unreasonable in this case. Again, unprotected openings are permitted with a fire separation distance of three feet and again that is proposed for the yard or court width for these openings.

Section R310.2.4 addresses emergency escape and rescue openings under decks and porches. The same rationale that applied to these openings in the previous section is applied here and a minimum width of three feet is proposed.

Section R311.1 addresses the access from the required exit door to the public way. If this door happens to be a side door, ten feet is too much. Again, three feet seems adequate and unprotected openings are permitted at three feet.

For information from the IRC:

YARD. An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the lot on which a building is situated.

PUBLIC WAY. Any street, alley or other parcel of land open to the outside air leading to a public street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and that has a clear width and height of not less than 10 feet (3048 mm).

Following is the sixth section in the code where the term "yard" is used. This section is not proposed for amendment because it sets the width of a yard at 6 feet.

"a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line."

Cost Impact: Will not increase the cost of construction

This is an editorial revision that will have no impact on construction costs. The revision only provides clarifying language.
Delete and substitute as follows:

FIGURE R301.2(2)
SEISMIC DESIGN CATEGORIES—SITE CLASS D

(Existing code figure not shown for clarity)
FIGURE R301.2(2)-continued

SEISMIC DESIGN CATEGORIES

(Existing code figure not shown for clarity)
FIGURE R301.2(2)-continued
SEISMIC DESIGN CATEGORIES—SITE CLASS D

(Existing code figure not shown for clarity)
FIGURE R301.2(2)
SEISMIC DESIGN CATEGORIES

REFERENCES

SEISMIC DESIGN CATEGORIES—SITE CLASS D

(Existing code figure not shown for clarity)
FIGURE R301.2(2) - continued
SEISMIC DESIGN CATEGORIES

Explanation

Seismic Design Category

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Revise as follows:
R301.2.2.1.1 Alternate determination of seismic design category. The seismic design categories and corresponding short-period design spectral response accelerations, $S_{DS}$, shown in Figure R301.2(2) are based on soil Site Class D, used as an assumed default, as defined in Section 1613.3.2 of the International Building Code. If soil conditions are other than determined by the building official to be Site Class A, B, or D, the short-period seismic design category and short-period design spectral response accelerations, $S_{DS}$, for a site can shall be allowed to be determined in accordance with Figure R301.2(3) or Section 1613.3 of the International Building Code. The value of $S_{DS}$ determined in accordance with Section 1613.3 of the International Building Code is permitted to be used to set the seismic design category in accordance with Table R301.2.2.1.1, and to interpolate between values in Tables R602.10.3(3), R603.9.2(1) and other seismic design requirements of this code.

R301.2.2.1.2 Alternative determination of Seismic Design Category E. Buildings located in Seismic Design Category E in accordance with Figure R301.2(2), or Figure R301.2(3) where applicable, are permitted to be reclassified as being in Seismic Design Category D_2 provided that one of the following is done:

1. A more detailed evaluation of the seismic design category is made in accordance with the provisions and maps of the International Building Code. Buildings located in Seismic Design Category E in accordance with Table R301.2.2.1.1, but located in Seismic Design Category D in accordance with the International Building Code, shall be permitted to be designed using the Seismic Design Category D_2 requirements of this code.

2. Buildings located in Seismic Design Category E that conform to the following additional restrictions are permitted to be constructed in accordance with the provisions for Seismic Design Category D_2 of this code:
   2.1. All exterior shear wall lines or braced wall panels are in one plane vertically from the foundation to the uppermost story.
   2.2. Floors shall not cantilever past the exterior walls.
   2.3. The building is within the requirements of Section R301.2.2.2.5 for being considered as regular.

Add new text as follows:

FIGURE R301.2(3)
Alternate Seismic Design Categories
FIGURE R301.2(3)-continued
Alternate Seismic Design Categories

REFERENCES

FIGURE R301.2(3)-continued

Alternate Seismic Design Categories

REFERENCES


ICB Committee Action Hearings :: April, 2016
FIGURE R301.2(3)-continued
Alternate Seismic Design Categories
FIGURE R301.2(3)-continued
Alternate Seismic Design Categories

REFERENCES

**Reason:** This proposal incorporates the most current seismic design maps prepared by the U.S. Geological Survey (USGS) in collaboration with the Federal Emergency Management Agency (FEMA) and the Building Seismic Safety Council (BSSC). A separate coordinated code change updates the seismic design maps in the IBC to be consistent with these IRC maps and the maps incorporated into ASCE 7-16. In addition to incorporating updated information on...
faults and ground motion attenuation, these maps incorporate revisions to site coefficients $F_a$ and $F_v$. Technical reasons behind the revisions are documented in FEMA P-1050-1, 2015 Edition, Sections C11.4.2 (site classes), C11.4.3 (site coefficients), and C22 (seismic maps). Further documentation is provided in Seyhan and Stewart (2012, 2014) and Luco et al. (2015). As excerpted from FEMA P-1050-1, 2015 Edition, Section C11.4.3: "Motivation for the revisions to these site factors includes (Seyhan and Stewart, 2012): (1) updating the reference site condition used for the factors to match the condition on the national maps, which in $V_s=760$ m/s (2500 ft/s); (2) incorporating into the factors the substantial knowledge gains (stemming in large part from an enormous increase in available data) on site response over the past two decades."

As in past versions, the IRC seismic design maps directly indicate Seismic Design Category for a given location. Development of the maps in the past incorporated a default assumption of a Site (soil) Class D, which provided the most conservative assignment of Seismic Design Category. For this update, (1) changes made to the site coefficients resulted in Site Class D no longer being the most critical site class at all spectral response acceleration levels, and (2) spectral response accelerations and resulting Seismic Design Categories increased at a number of locations when the most critical site coefficients were used. Because of these two effects, it is proposed that two sets of maps be adopted into the IRC. The updated R301.2(2) Seismic Design Category maps will provide the most conservative assignment of Seismic Design Category and can be used with any site/soil type within the limits of current IRC provisions. The new R301.2(3) Alternate Seismic Design Category maps will provide less conservative assignments of Seismic Design Category, permitted to be used when it can be determined that Site Class A, B or D is applicable. The building official may make a determination that use of the alternate maps is permitted, provided adequate information is available to determine site class, either on a community-wide basis or site-by-site basis. As in the past, alternate determination in accordance with the IBC is still permitted.

Maps have been developed by USGS to illustrate locations where Seismic Design Categories increase and decrease when comparing the 2015 IRC maps to the R301.2(2) default maps. These are included as an attachment to this code change proposal. Seyhan and Stewart (2014) and Luco et al. (2015) provide discussion of maps changes at some specific locations, including a region near Charleston, South Carolina where Seismic Design Category increased from D$_2$ to E. This increase is due to changes in both site coefficients and mapped ground motions, the latter due to an improved earthquake source model for the Central and Eastern United States developed through a three and one-half year collaboration of approximately 35 experts (http://www.ceus-ssc.com).
Seismic Design Category Change

B →
IRC 2012 → IRC 2018

- B → C
- B → D0
Seismic Design Category Change

C →
IRC 2012 → IRC 2018

- C → D0
- C → D1
- C → D2
Seismic Design Category Change

- D0 →
- IRC 2012 → IRC 2018

Legend:
- Light pink: D0 → D1
- Dark pink: D0 → D2
- Dark red: D0 → E
Seismic Design Category Change

D1 →
IRC 2012 → IRC 2018

- D1 → D2
- D1 → E
Seismic Design Category Change
IRC 2012 → IRC 2018
D2 → E
Seismic Design Category Change
IRC 2012 → IRC 2018
B → A
Seismic Design Category Change

D1 →
IRC 2012 → IRC 2018

D1 → D0
D1 → C
Seismic Design Category Change

D2 →
IRC 2012 → IRC 2018

- D2 → D1
- D2 → D0
- D2 → C
Cost Impact: Will increase the cost of construction
This code change can result in modest increases OR decreases in construction cost depending on geographic region. Where the R301.2(2) Seismic Design Category maps are used, limited locations as illustrated by the attached USGS maps, will increase or decrease in Seismic Design Category, increasing or decreasing seismic bracing requirements and cost a modest amount. The amount of increase will vary depending on the specific change in Seismic Design Category, the wind bracing requirements, and the particulars of the dwelling and its construction. In some cases increases in Seismic Design Category and resulting cost can be reduced if not eliminated where the site soils allow the use of the Alternate Seismic Design Category maps. NIST GCR 14-917-26, Cost Analyses and Benefits for Earthquake-Resistant Construction in Memphis, Tennessee, provides one example of the magnitude of seismic design cost impact; the increment in cost for apartment building construction between design for code-
required wind loads and national seismic design provisions is on the order of one percent of construction cost.

**Analysis:** Colored images will be converted to gray scale for printed codes. Coordinated code change proposal for the IBC is S119-16.
RB18-16
IRC: R301.2, R301.2(2) (New), R301.2(3) (New).
Proponent: James Bela, representing Oregon Earthquake Awareness (sasquake@gmail.com)

2015 International Residential Code
Delete and substitute as follows:

FIGURE R301.2(2)
SEISMIC DESIGN CATEGORIES—SITE CLASS D

FIGURE R301.2(3)
LATERAL DESIGN STRENGTH (BASE SHEAR) COEFFICIENT EXPRESSED AS SEISMIC ZONES 0-4 1994/1997 UBC

Figure A7. 1994 Uniform Building Code zone map. Zones are identified by the numbers from 0 to 4. Seismic zone factors are assigned to each zone; Zone 0 = 0, Zone 1 = 0.075, Zone 2A = 0.16, Zone 2B = 0.20, Zone 3 = 0.3, and Zone 4 = 0.4. Each zone also has specific structural detailing requirements. After ICBO, 1994 (This map was redrawn from the original source, if differences occur, the original source should be used).

FIGURE R301.2(3)
LATERAL DESIGN STRENGTH (BASE SHEAR) COEFFICIENT EXPRESSED AS SEISMIC ZONES 0-4 1994/1997 UBC
Reason: Seismic Design Categories are deleted in the IBC under separate code change proposals. See Proposal Figure 1613.3.1 RISK-TARGETED MCE\textsubscript{R}. The identical lateral design strength coefficient map is to be used for both codes!

People confuse the SDCs with a static loading, like the snow load; which is fundamentally (as well as categorically) incorrect.

SDCs do not realistically reflect the Magnitudes of earthquakes that may impact said "Detached one- and two-family dwellings," nor their associated real intensities of shaking (accelerations and velocities, including pga and pgv); (2) the contour seismic hazard-model maps, upon which the assigned SDCs are determined, are (a) numerical creations without physical reality; (b) mathematically flawed and incorrect (because a dimensionless number, the probability in one year, is arbitrarily assigned dimensional terms of "per yr." or annual frequency – leading to the improperly applied notion of a so-called earthquake "return period" as the basis on assigning earthquake design loads; and (c) non-stable between iterative cycles of creations (sometimes varying 25-30% between issues; and (d) SS or Spectral Response Acceleration is both confusing, misunderstood, and most certainly incorrectly interpreted or understood by all of the vast entities (state decision makers, code officials, design professionals, contractors and probably even the preponderance of ICC Committee members as well as Hearings attendees!

For example, see TAKE ME HOME SEISMIC LOADS

Bibliography: Cost Breakdown of Nonstructural Building Elements
Performance of Nonstructural Components during the 27 February 2010 Chile Earthquake.

do:doi:http://dx.doi.org/10.1193/1.4000032
http://www.earthquakespectra.org/doi/abs/10.1193/1.4000032

Low-Cost Earthquake Solutions for Nonengineered Residential Construction in Developing Regions
Permalink: http://dx.doi.org/10.1061/(ASCE)CF.1943-5509.0000630
Cost Impact: Will increase the cost of construction

This proposal may or may not affect the cost of construction. This is (1) because detached one- and two-family dwellings must be already built to withstand the lateral forces due to wind; and (2) must include basements, "safe rooms"), or other afforded protections to protect occupants against the deadly impacts of hurricanes and tornadoes. The point is; Detached one- and two-family need to consider the maximum Magnitude of realistic scenario earthquakes that they could, in fact, experience.

And not be constructed vulnerable to earthquakes, because a flawed numerical hazard model "guesses" incorrectly as to the likelihood or possibility of earthquakes. This should remain a rational and a scientific decision based upon protecting both public safety and property. A second point is that "cost" due to structural elements is almost always less than 80% of the cost of a building!

"In general, better seismic performance is achieved through increased lateral design forces (i.e., base shear), and detailing requirements that improve structural connection strength or structural member behavior in the inelastic range of response. Requirements for seismic bracing and anchorage of nonstructural components reduce potential for nonstructural damage and loss of building (or system) functionality."*

* viii, Executive Summary, NIST GCR 14-917-26

In general, where costs might be increased, cost premiums above requirements for wind tend to fall within a range of +1-3%. For cases where seismic requirements would be now additional to what previous codes either applied/neglected/failed to enforce, estimates probably would fall within the range of 0.25 - 1%.

Analysis: See S118-16 fro IBC coordination proposal
RB19-16
IRC: R301.2.
Proponent: T. Eric Stafford, PE, representing Institute for Business and Home Safety

2015 International Residential Code
Revise as follows:

FIGURE R301.2 (5)
GROUND SNOW LOADS, P_g, FOR THE UNITED STATES (lb/ft^2)

(Code figure not shown for clarity)
For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 mile = 1.61 km.

a. In CS areas, site-specific Case Studies are required to establish ground snow loads. Extreme local variations in ground snow loads in these areas preclude mapping at this scale.

b. Numbers in parentheses represent the upper elevation limits in feet for the ground snow load values presented below. Site-specific case studies are required to establish ground snow loads at elevations not covered.

NOTES: For state tables, see Chapter 7 of ASCE 7: See Table 7.3-3 for Colorado; See Table 7.3-4 for Idaho; See Table 7.3-5 for Montana; See Table 7.3-6 for Washington; See Table 7.3-7 for New Mexico; See Table 7.3-8 For Oregon.
**Reason:** The current ASCE 7 committee has developed the 2016 edition of the standard to supplement the basic ground snow load map with an extensive database of ground snow loading data for individual cities in regions with highly variable climatic conditions associated with mountains and other factors. This data was assembled over a period of many years through the efforts of regional experts and structural engineering associations with specialized knowledge in local climatic conditions and vetted by the Committee as having followed appropriate and consistent procedures. The revised map indicates which states have supplement data within the ASCE 7-16 standard.

**Cost Impact:** Will not increase the cost of construction

The proposed changes will not impact the cost of construction. This proposal coordinates the IRC with the referenced loading standard *ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures*. ASCE 7 will be updated from the 2010 edition to the 2016 edition as an Administrative Update to the 2018 I-Codes.

As of the submission date of this code change proposal, the ASCE 7 Standards Committee has completed the committee balloting on the technical changes. The document designated *ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures* is expected to be completed, published, and available for purchase prior to the ICC Public Comment Hearing for Group B in October 2016. Any person interested in obtaining a public comment copy of ASCE 7-16 may do so by contacting James Neckel at ASCE (jneckel@asce.org).
2015 International Residential Code

Delete and substitute as follows:

**FIGURE R301.2 (7)**

COMPONENT AND CLADDING PRESSURE ZONES

*(Existing code figure not shown for clarity)*
For SI: 1 foot = 304.8 mm, 1 degree = 0.0175 rad.

Note: a = 4 feet in all cases.

Revise as follows:

TABLE R301.2 (2)
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET
LOCATED IN EXPOSURE B (ASD) (psf)\textsuperscript{a, b, c, d, e, f}

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**Gable Roof > 27 to 45 degrees**

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Hipped Roof > 27 to 45 degrees

<p>| 2e    | 10 | 6.2 | - | 12.4| - | 6.9 | - | 7.7 | - | 8.5 | - | 16.9| 9.3 | - | 10.2 | - | 20.3 | 11.1 | - | 22.1 |
|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 2e    | 20 | 5.4 | - | 6.9 | - | 6.7 | - | 7.4 | - | 15.0| 8.1 | - | 10.2 | - | 24.2 | 11.1 | - | 26.3 |
|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 2e    | 50 | 4.4 | - | 9.2 | - | 4.9 | - | 5.4 | - | 12.5| 6.5 | - | 14.0 | - | 24.2 | 16.5 | - | 29.7 |
|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 2e    | 100| 3.6 | - | 7.8 | - | 4.0 | - | 4.4 | - | 8.6 | - | 10.6| 5.3 | - | 11.6 | - | 12.7 | 6.3 | - | 13.8 |
|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 2e    | 10 | 6.2 | - | 14.8| - | 6.9 | - | 7.7 | - | 8.5 | - | 20.2| 9.3 | - | 10.2 | - | 24.2 | 11.1 | - | 26.3 |
|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 2e    | 20 | 5.4 | - | 11.7| - | 6.0 | - | 6.7 | - | 7.4 | - | 15.9| 8.1 | - | 10.2 | - | 19.1 | 9.6 | - | 20.8 |
|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 2e    | 50 | 4.4 | - | 7.3 | - | 4.9 | - | 5.4 | - | 9.0 | - | 9.9 | 6.5 | - | 10.8 | - | 11.9 | 7.7 | - | 12.9 |
|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
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|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 2r    | 100| 3.6 | - | 8.7 | - | 4.0 | - | 4.4 | - | 4.8 | - | 11.9| 5.3 | - | 5.8 | - | 14.3 | 6.3 | - | 15.5 |
|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
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**Footnotes:**

1. ICC COMMITTEE ACTION HEARINGS :: April, 2016
2. RB66
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*RB68*
For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

a. The effective wind area shall be equal to the span length multiplied by an effective width. This width shall be permitted to be not less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.

b. For effective areas between those given, the load shall be interpolated or the load associated with the lower effective area shall be used.

c. Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2(3).

d. See Figure R301.2(7) for location of zones.

e. Plus and minus signs signify pressures acting toward and away from the building surfaces.
f. Positive and negative design wind pressures shall not be less than 10 psf.
g. Where the ratio of the building mean roof height to the building length or width is less than 0.8, uplift loads are allowed to be calculated in accordance with ASCE 7.

### TABLE R301.2 (3)  
HEIGHT AND EXPOSURE ADJUSTMENT COEFFICIENTS FOR TABLE R301.2(2)

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For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.
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<tr>
<td>35</td>
<td>1.05</td>
<td>1.45</td>
<td>1.70</td>
</tr>
<tr>
<td>40</td>
<td>1.09</td>
<td>1.49</td>
<td>1.74</td>
</tr>
<tr>
<td>45</td>
<td>1.12</td>
<td>1.53</td>
<td>1.78</td>
</tr>
<tr>
<td>50</td>
<td>1.16</td>
<td>1.56</td>
<td>1.81</td>
</tr>
<tr>
<td>55</td>
<td>1.19</td>
<td>1.59</td>
<td>1.84</td>
</tr>
<tr>
<td>60</td>
<td>1.22</td>
<td>1.62</td>
<td>1.87</td>
</tr>
</tbody>
</table>

Delete and substitute as follows:

**FIGURE R301.2(4)A**

A ULTIMATE DESIGN WIND SPEEDS

*(Existing code figure not shown for clarity)*
Reason: This proposal coordinates the wind design criteria in the IRC with the soon to be published 2016 Edition of ASCE 7. As of the submission date of this code change proposal, the ASCE 7 Standards Committee has completed the committee balloting on the technical changes. The document designated ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures is expected to be completed, published, and available for purchase prior to the ICC Public Comment Hearing for Group B in October 2016. Any person interested in obtaining a public comment copy of ASCE 7-16 may do so by contacting James Neckel at ASCE (jneckel@asce.org).

There are two primary proposed changes to the IRC for coordination with the revised wind loading criteria in ASCE 7-16 - new basic wind speed map for Risk Category II buildings and revised roof component and cladding loads for buildings with mean roof heights less than or equal to 60 feet. In ASCE 7-16, wind speeds in non-hurricane prone areas of the contiguous United States have been revised using contours to better reflect regional variations in the extreme wind climate. Point values are provided to aid interpolation, in a style similar to that used in the ASCE 7 seismic hazard maps. Summaries of the data and methods used to estimate both the non-hurricane and hurricane wind speeds are provided in the commentary to Chapter 26 in ASCE 7-16. The wind speeds in the hurricane-prone region have not changed from ASCE 7-10. Revised Figure R301.2(4)A reflects the wind speed map in ASCE 7-16 for Risk Category II buildings.

The simplified component and cladding loads in Table R301.2(2) are proposed to be revised for correlation with the new roof component and cladding loads for buildings with mean roof heights less than or equal to 60 feet. The roof zones and pressure coefficients in Figure 30.4-2 (Figures 30.4-2A through 30.4-2I) have been revised based on an analysis of an extensive wind tunnel database. All source data used in the study are publicly accessible through the National Institute of Standards and Technology’s website. Compared to previous versions of ASCE 7, the pressure coefficients have been increased, and are now more consistent with coefficients for buildings higher than 60 ft. Roof zone sizes are also modified from those of earlier versions in order to minimize the increase of pressure coefficients in zones 1 and 2. The data indicate that for these low-rise buildings, the size of the roof zones depend
primarily on the building height, h. The GCp values given in Figures 30.4-2A through 30.4-2I are associated with wind tunnel tests performed in both Exposures B and C. For Figure 30.4-2A, the coefficients apply equally to Exposure B and C, based on wind tunnel data that show insignificant differences in (GCp) for Exposures B and C. Consequently, the truncation for Kz in Table 30.3-1 of ASCE 7-10 is not required for buildings below 30 ft, and the lower Kz values may be used as shown revised in Figure R301.2(3) of the IRC.

**Cost Impact:** Will increase the cost of construction

Component and cladding loads for roofs on buildings with mean roof heights less than or equal to 60 feet are higher for some roof slopes and zones than similar roof slopes and zones in Table R301.2(2) in the 2015 IRC. Construction costs will increase for roofing products and decking for some areas of the country.

As of the submission date of this code change proposal, the ASCE 7 Standards Committee has completed the committee balloting on the technical changes. The document designated ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures is expected to be completed, published, and available for purchase prior to the ICC Public Comment Hearing for Group B in October 2016. Any person interested in obtaining a public comment copy of ASCE 7-16 may do so by contacting James Neckel at ASCE (jneckel@asce.org).
### 2015 International Residential Code

#### TABLE R301.2 (1)
**CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA**

<table>
<thead>
<tr>
<th>GROUND SNOW LOAD</th>
<th>WIND DESIGN</th>
<th>SEISMIC DESIGN CATEGORY</th>
<th>SUBJECT TO DAMAGE FROM</th>
<th>WINTER DESIGN TEMPE</th>
<th>ICE BARRIER UNDERLAYMENT REQUIRED</th>
<th>FLOOD HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (mph)</td>
<td>Topographic effects</td>
<td>Special wind region</td>
<td>Weathering</td>
<td>Frost line depth</td>
<td>Termite</td>
<td>Manual J Design Criteria</td>
</tr>
<tr>
<td></td>
<td>Windborne debris zone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Elevation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Latitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Winter Heating</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Summer Cooling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outdoor Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Design Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cooling Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Heating Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Heating Temperature Difference</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.**

a. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code. The weathering column shall be filled in with the weathering index, "negligible," "moderate" or "severe" for concrete as determined from Figure R301.2(3). The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216 or C 652.

b. The frost line depth may require deeper footings than indicated in Figure R403.1(1). The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.

c. The jurisdiction shall fill in this part of the table to indicate the need for protection depending on whether there has been a history of local subterranean termite damage.
d. The jurisdiction shall fill in this part of the table with the wind speed from the basic wind speed map [Figure R301.2(4)A]. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.

e. The outdoor design dry-bulb temperature shall be selected from the columns of 97 1/2 -percent values for winter from Appendix D of the International Plumbing Code. Deviations from the Appendix D temperatures shall be permitted to reflect local climates or local weather experience as determined by the building official.

f. The jurisdiction shall fill in this part of the table with the seismic design category determined from Section R301.2.2.1.

g. The jurisdiction shall fill in this part of the table with (a) the date of the jurisdiction’s entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), (b) the date(s) of the Flood Insurance Study and (c) the panel numbers and dates of the currently effective FIRMs and FBFMs or other flood hazard map adopted by the authority having jurisdiction, as amended.

h. In accordance with Sections R905.1.2, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, the jurisdiction shall fill in this part of the table with “YES.” Otherwise, the jurisdiction shall fill in this part of the table with “NO.”

i. The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table “Air Freezing Index-USA Method (Base 32°F).”

j. The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table “Air Freezing Index-USA Method (Base 32°F).”

k. In accordance with Section R301.2.1.5, where there is local historical data documenting structural damage to buildings due to topographic wind speed-up effects, the jurisdiction shall fill in this part of the table with “YES.” Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

l. In accordance with Figure R301.2(4)A, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with “YES” and identify any specific requirements. Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

m. In accordance with Section R301.2.1.2.1, the jurisdiction shall indicate the wind-borne debris wind zone(s). Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

n. The jurisdiction shall fill in these sections of the table to establish the design criteria using Table 1a or 1b from ACCA Manual J or established criteria determined by the jurisdiction having authority.

Reason: The requirement for a manual J or an engineered equivalent has been in the code for several cycles, but we do not assist the jurisdiction nor the applicant in determining their criteria. Often when a manual J is being put together for a project the responsible party will reach out to the jurisdiction who quite often have not determined what their design criteria is. What happens is different criteria will be used for different projects within the same jurisdiction. To assist the responsible party who is attempting to meet this requirement a jurisdiction should determine these variables. A jurisdiction is given the option of using table 1a or 1b from ACCA Manual J or for the jurisdiction to determine their own criteria due to their unique circumstances. In Table 301.2(1) jurisdictions must establish other design criteria that is specific to that jurisdiction. It makes sense to add manual J criteria to the table, so that the jurisdictions are getting manual Js that are designed to the correct variables. It's not uncommon for jurisdictions to not enforce the requirement for a manual J due to the complexity of reviewing and verifying the information. I believe by removing the inconsistent variable more manual Js will be more consistently performed. This will allow for more jurisdictions to review manual J, and in turn will have more mechanical equipment installed that has been sized correctly.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost. This is to provide information on design parameters for the home. The information can be obtained from ACCA Manual J’s table 1a or 1b, or some jurisdictions have parameters established.
R301.2.2 Seismic provisions. The seismic provisions of this code shall apply as follows:

1. **Townhouses** in Seismic Design Categories C, D₀, D₁ with a lateral design strength coefficient of .15 and D₂ greater.
2. Detached one- and two-family **dwellings** in Seismic Design Categories, D₀, D₁ with a lateral design strength coefficient of .20 and D₂ greater.

R301.2.2.1 Determination of seismic lateral design category strength coefficient. Buildings shall be assigned a seismic lateral design category strength coefficient in accordance with Figure R301.2(2).

Delete without substitution:

R301.2.2.1.1 Alternate determination of seismic design category. The seismic design categories and corresponding short-period design spectral response accelerations, $S_{DS}$, shown in Figure R301.2(2) are based on soil Site Class D, as defined in Section 1613.3.2 of the International Building Code. If soil conditions are other than Site Class D, the short-period design spectral response accelerations, $S_{DS}$, for a site can be determined in accordance with Section 1613.3 of the International Building Code. The value of $S_{DS}$ determined in accordance with Section 1613.3 of the International Building Code is permitted to be used to set the seismic design category in accordance with Table R301.2.2.1.1, and to interpolate between values in Tables R602.10.3(3), R603.9.2(1) and other seismic design requirements of this code.

<table>
<thead>
<tr>
<th>Calculated $S_{DS}$</th>
<th>Seismic Design Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_{DS} \leq 0.17g$</td>
<td>A</td>
</tr>
<tr>
<td>$0.17g &lt; S_{DS} \leq 0.33g$</td>
<td>B</td>
</tr>
<tr>
<td>$0.33g &lt; S_{DS} \leq 0.50g$</td>
<td>C</td>
</tr>
<tr>
<td>$0.50g &lt; S_{DS} \leq 0.67g$</td>
<td>D₀</td>
</tr>
<tr>
<td>$0.67g &lt; S_{DS} \leq 0.83g$</td>
<td>D₁</td>
</tr>
</tbody>
</table>
R301.2.2.1.2 Alternative determination of Seismic Design Category E. Buildings located in Seismic Design Category E in accordance with Figure R301.2(2) are permitted to be reclassified as being in Seismic Design Category D₂ provided that one of the following is done:

1. A more detailed evaluation of the seismic design category is made in accordance with the provisions and maps of the International Building Code. Buildings located in Seismic Design Category E in accordance with Table R301.2.2.1.1, but located in Seismic Design Category D in accordance with the International Building Code, shall be permitted to be designed using the Seismic Design Category D₂ requirements of this code.

2. Buildings located in Seismic Design Category E that conform to the following additional restrictions are permitted to be constructed in accordance with the provisions for Seismic Design Category D₂ of this code:
   
   2.1. All exterior shear wall lines or braced wall panels are in one plane vertically from the foundation to the uppermost story.
   
   2.2. Floors shall not cantilever past the exterior walls.
   
   2.3. The building is within the requirements of Section R301.2.2.2.5 for being considered as regular.

R301.2.2.2 Seismic Design Category C. Structures assigned to Seismic Design Category C located where the lateral design strength coefficient is .15 shall conform to the requirements of this section.

**Reason:** Wood frame dwellings have always consistently performed safely (even if not well) in earthquakes for one simple reason: "they are almost always built by carpenters who never talk to engineers."

The residential seismic provisions are beyond the comprehension and understanding of even, I'm sure, the people and committees who created them. It makes much more sense to tie the earthquake provisions to the potential magnitudes of the earthquakes that can (and will) occur.

SDCs do not realistically reflect the Magnitudes of earthquakes that may impact said "Detached one- and two-family dwellings," nor their associated real intensities of shaking (accelerations and velocities, including pga and pgv); (2) the contour seismic hazard-model maps, upon which the assigned SDCs are determined, are (a) numerical creations without physical reality; (b) mathematically flawed and incorrect (because a dimensionless number, the probability in one year, is arbitrarily assigned dimensional terms of "per yr." or annual frequency – leading to the improperly applied notion of a so-called earthquake "return period" as the basis on assigning earthquake design loads; and (c) non-stable between iterative cycles of creations (sometimes varying 25-30% between issues; and (d) SS or Spectral Response Acceleration is both confusing, misunderstood, and most certainly incorrectly interpreted or understood by all of the vast entities (state decision makers, code officials, design professionals, contractors and probably even the preponderance of ICC Committee members as well as Hearings attendees!

For example, see TAKE ME HOME SEISMIC LOADS

**Cost Impact:** Will increase the cost of construction
Perhaps . . . Will not increase the cost of construction
This proposal may or may not affect the cost of construction. This is (1) because detached one- and two-family dwellings must be already built to withstand the lateral forces due to wind; and (2) must include basements, "safe rooms"), or other afforded protections to protect occupants against the deadly impacts of hurricanes and tornadoes.

The point is; Detached one- and two-family need to consider the maximum Magnitude of realistic scenario earthquakes that they could, in fact, experience.

And not be constructed vulnerable to earthquakes, because a flawed numerical hazard model "guesses" incorrectly as to the likelihood or possibility of earthquakes. This should remain a rational and a scientific decision based upon protecting both public safety and property. A second point is that "cost" due to structural elements is almost always less than 80% of the cost of a building!

"In general, better seismic performance is achieved through increased lateral design forces (i.e., base shear), and detailing requirements that improve structural connection strength or structural member behavior in the inelastic range of response. Requirements for seismic bracing and anchorage of nonstructural components reduce potential for nonstructural damage and loss of building (or system) functionality."*

* viii, Executive Summary, NIST GCR 14-917-26
NEHRP Consultants Joint Venture A partnership of the Applied Technology Council and the Consortium of Universities for Research in Earthquake Engineering.

In general, where costs might be increased, cost premiums above requirements for wind tend to fall within a range of +1-3%. For cases where seismic requirements would be now additional to what previous codes either applied/neglected/failed to enforce, estimates probably would fall within the range of 0.25 - 1%.

RB22-16 : R301.2.2-BELA13520
RB23-16

IRC: R301.2.2, R301.2.2.4.
Proponent: Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org)

2015 International Residential Code

R301.2.2 Seismic provisions. Buildings in Seismic Design Categories C, D0, D1, D2 and E shall be constructed in accordance with the requirements of this section and other seismic requirements of this code. The seismic provisions of this code shall apply as follows:

1. Townhouses in Seismic Design Categories C, D0, D1 and D2.
2. Detached one- and two-family dwellings in Seismic Design Categories, D0, D1 and D2.

R301.2.2.4 Seismic Design Category E. Buildings in Seismic Design Category E shall be designed to resist seismic loads in accordance with the International Building Code, except where the seismic design category is reclassified to a lower seismic design category in accordance with Section R301.2.2.1. Components of buildings not required to be designed to resist seismic loads shall be constructed in accordance with the provisions of this code.

Reason: The purpose of this code change is to clarify the application of the IRC for seismic design. In reviewing the organization of Section R301.2.2, it was noted that the opening paragraph of R301.2.2 tells you how the seismic provisions of the IRC apply to detached dwellings and townhouses in SDC C, D0, D1 and D2, but say nothing about SDC E. It is not until you get to R301.2.2.4 at the end of the section that you are told to go to the IBC for dwellings in SDC E, unless the alternative SDC determinations apply. This change proposes to relocate Section R301.2.2.4 to the front of Section R301.2.2 so all of the SDC's of interest are addressed in one place.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: BCAC

Cost Impact: Will not increase the cost of construction
The code change provides editorial clarifications to the application of the code in high-seismic areas. No seismic requirements are added or removed with this change, thus there should be no impact on cost.
2015 International Residential Code

Revise as follows:

R301.2.2 Seismic provisions. The
Buildings in Seismic Design Categories C, D0, D1, D2 and E shall be constructed in accordance with the requirements of this section and other seismic requirements of this code. The seismic provisions of this code shall apply as follows:

1. Townhouses in Seismic Design Categories C, D0, D1 and D2.
2. Detached one- and two-family dwellings in Seismic Design Categories, D0, D1 and D2.

R301.2.2.2.1 R301.2.2.2 Weights of materials. Average dead loads shall not exceed 15 pounds per square foot (720 Pa) for the combined roof and ceiling assemblies (on a horizontal projection) or 10 pounds per square foot (480 Pa) for floor assemblies, except as further limited by Section R301.2.2. Dead loads for walls above grade shall not exceed:

1. Fifteen pounds per square foot (720 Pa) for exterior light-frame wood walls.
2. Fourteen pounds per square foot (670 Pa) for exterior light-frame cold-formed steel walls.
3. Ten pounds per square foot (480 Pa) for interior light-frame wood walls.
4. Five pounds per square foot (240 Pa) for interior light-frame cold-formed steel walls.
5. Eighty pounds per square foot (3830 Pa) for 8-inch-thick (203 mm) masonry walls.
6. Eighty-five pounds per square foot (4070 Pa) for 6-inch-thick (152 mm) concrete walls.
7. Ten pounds per square foot (480 Pa) for SIP walls.

Exceptions:
1. Roof and ceiling dead loads not exceeding 25 pounds per square foot (1190 Pa) shall be permitted provided that the wall bracing amounts in Section R602.10.3 are increased in accordance with Table R602.10.3(4).
2. Light-frame walls with stone or masonry veneer shall be permitted in accordance with the provisions of Sections R702.1 and R703.
3. Fireplaces and chimneys shall be permitted in accordance with Chapter 10.

R301.2.2.2.2 R301.2.2.3 Stone and masonry veneer. No change to text.

R301.2.2.2.3 R301.2.2.4 Masonry construction. Masonry construction shall comply with the requirements of Section R606.12. Masonry construction in Seismic Design Categories D0 and D1 shall comply with the requirements of Section R606.12.1. Masonry construction in Seismic Design Category D2 shall comply with the requirements of Section R606.12.4.
R301.2.2.3.4 301.2.2.5 Concrete construction. Buildings with exterior above-grade concrete walls shall comply with PCA 100 or shall be designed in accordance with ACI 318.

Exception: Detached one- and two-family dwellings in Seismic Design Category C with exterior above-grade concrete walls are allowed to comply with the requirements of Section R608.

R301.2.2.6 Irregular buildings. The seismic provisions of this code shall not be used for irregular structures, or portions thereof, located in Seismic Design Categories C, D₀, D₁ and D₂ and considered to be irregular in accordance with this section. A building or portion of a building shall be considered to be irregular where one or more of the conditions defined in Sections R301.2.6.1 through R301.2.6.7 occur. Irregular structures, or irregular portions of structures, shall be designed in accordance with accepted engineering practice to the extent the irregular features affect the performance of the remaining structural system. Where the forces associated with the irregularity are resisted by a structural system designed in accordance with accepted engineering practice, design of the remainder of the building shall be permitted to be designed using the provisions of this code. A building or portion of a building shall be considered to be irregular where one or more of the following conditions occur:

1. Where exterior shear wall lines or braced wall panels are not in one plane vertically from the foundation to the uppermost story in which they are required.  
   Exception: For wood light-frame construction, floors with cantilevers or setbacks not exceeding four times the nominal depth of the wood floor joists are permitted to support braced wall panels that are out of plane with braced wall panels below provided that:
   1. Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.
   2. The ratio of the back span to the cantilever is not less than 2 to 1.
   3. Floor joists at ends of braced wall panels are doubled.
   4. For wood-frame construction, a continuous rim joist is connected to ends of cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) and 1½ inches (38 mm) wide fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and
   5. Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.
   6. Where a section of floor or roof is not laterally supported by shear walls or braced wall lines on all edges.
      Exception: Portions of floors that do not support shear walls or braced wall panels above, or roofs, shall be permitted to extend not more than 6 feet (1829 mm) beyond a shear wall or braced wall line.
   7. Where the end of a braced wall panel occurs over an opening in the wall below and ends at a horizontal distance greater than 1 foot (305 mm) from the edge of the opening. This provision is applicable to shear walls and braced wall panels offset in plane and to braced
wall panels offset out of plane as permitted by the exception to item 1.

Exception: For wood light-frame wall construction, one end of a braced wall panel shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) in width in the wall below provided that the opening includes a header in accordance with the following:

1. The building width, loading condition and framing member species limitations of Table R602.7(1) shall apply; and
2. Not less than one 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide; or
3. Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) in width; or
4. Not less than three 2 × 12 or four 2 × 10 for an opening not more than 8 feet (2438 mm) in width; and
5. The entire length of the braced wall panel does not occur over an opening in the wall below.
6. Where an opening in a floor or roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor or roof dimension.
7. Where portions of a floor level are vertically offset.

Exceptions:

1. Framing supported directly by continuous foundations at the perimeter of the building.
2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.
3. Where shear walls and braced wall lines do not occur in two perpendicular directions.
4. Where stories above gradeplane partially or completely braced by wood wall framing in accordance with Section R602 or cold-formed steel wall framing in accordance with Section R603 include masonry or concrete construction. Where this irregularity
applies, the entire story shall be designed in accordance with accepted engineering practice.

**Exception:**
Fireplaces, chimneys and masonry veneer as permitted by this code.

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**R301.2.2.6.1 Shear wall or braced wall offsets out of plane.** Where exterior shear wall lines or braced wall panels are not in one plane vertically from the foundation to the uppermost story in which they are required.

**Exception:** For wood light-frame construction, floors with cantilevers or setbacks not exceeding four times the nominal depth of the wood floor joists are permitted to support braced wall panels that are out of plane with braced wall panels below provided that:

1. Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.
2. The ratio of the back span to the cantilever is not less than 2 to 1.
3. Floor joists at ends of braced wall panels are doubled.
4. For wood-frame construction, a continuous rim joist is connected to ends of cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) and 11/2 inches (38 mm) wide fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and
5. Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.

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**R301.2.2.6.2 Lateral support of roofs and floors.** Where a section of floor or roof is not laterally supported by shear walls or braced wall lines on all edges.

**Exception:** Portions of floors that do not support shear walls or braced wall panels above, or roofs, shall be permitted to extend not more than 6 feet (1829 mm) beyond a shear wall or braced wall line.

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**R301.2.2.6.3 Shear wall or braced wall offsets in plane.** Where the end of a braced wall panel occurs over an opening in the wall below and extends more than 1 foot (305 mm) horizontally past the edge of the opening. This provision is applicable to shear walls and braced wall panels offset in plane and to braced wall panels offset out of plane as permitted by the exception to Section R301.2.2.6.1.

**Exception:** For wood light-frame wall construction, one end of a braced wall panel shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) in width in the wall below provided that the opening includes a header in accordance with the following:

1. The building width, loading condition and framing member species limitations of Table R602.7(1) shall apply; and
2. Not less than one 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide; or
3. Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) in width; or
4. Not less than three 2 × 12 or four 2 × 10 for an opening not more than 8 feet (2438 mm) in width; and
5. The entire length of the braced wall panel does not occur over an opening in the wall below.

**R301.2.2.6.4 Floor and roof openings.** Where an opening in a floor or roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor or roof dimension.

**R301.2.2.6.5 Floor level offsets.** Where portions of a floor level are vertically offset.

**Exceptions:**

1. Framing supported directly by continuous foundations at the perimeter of the building.
2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.

**R301.2.2.6.6 Perpendicular shear walls and wall bracing.** Where shear walls and braced wall lines do not occur in two perpendicular directions.

**R301.2.2.6.7 Wall bracing in stories containing masonry or concrete construction.** Where stories above grade plane partially or completely braced by wood wall framing in accordance with Section R602 or cold-formed steel wall framing in accordance with Section R603 include masonry or concrete construction. Where this irregularity applies, the entire story shall be designed in accordance with accepted engineering practice.

**Exception:** Fireplaces, chimneys and masonry veneer as permitted by this code.

**R301.2.2.3.1 R301.2.2.7 Height limitations.** Wood framed buildings shall be limited to three stories above gradeplane or the limits given in Table R602.10.3(3). Cold formed, steel framed buildings shall be limited to less than or equal to three stories above gradeplane in accordance with AISI S220.

Mezzanines as defined in Section R202 that comply with Section R325 shall not be considered as stories. Structural insulated panel buildings shall be limited to two stories above gradeplane.

**R301.2.2.3.5 R301.2.2.8 Cold-formed steel framing in Seismic Design Categories D₀, D₁ and D₂. No change to text.**

Delete without substitution:

**R301.2.2.3.3 Masonry construction.** Masonry construction in Seismic Design Categories D₀ and D₁ shall comply with the requirements of Section R606.12.1. Masonry construction in Seismic Design Category D₂ shall comply with the requirements of Section R606.12.4.

**R301.2.2.3.6 R301.2.2.9 Masonry chimneys.** Masonry chimneys in Seismic Design Categories D₀, D₁ and D₂, shall be reinforced and anchored to the building in accordance with Sections R1003.3 and R1003.4.

**R301.2.2.3.7 R301.2.2.10 Anchorage of water heaters. Water**
In Seismic Design Categories D0, D1 and D2, water heaters shall be anchored against movement and overturning in accordance with Section M1307.2.

R301.2.2.11 Seismic Design Category E. No change to text.

R301.2.2.2 Seismic Design Category C. Structures assigned to Seismic Design Category C shall conform to the requirements of this section.

R301.2.2.4 Concrete construction. Detached one- and two family dwellings with exterior above-grade concrete walls shall comply with the requirements of Section R608, PCA 100 or shall be designed in accordance with ACI 318. Townhouses with above-grade exterior concrete walls shall comply with the requirements of PCA 100 or shall be designed in accordance with ACI 318.

R301.2.2.3 Seismic Design Categories D0, D1 and D2. Structures assigned to Seismic Design Categories D0, D1 and D2 shall conform to the requirements for Seismic Design Category C and the additional requirements of this section.

R301.2.2.3.2 Stone and masonry veneer. Anchored stone and masonry veneer shall comply with the requirements of Sections R702.1 and R703.

Reason: The purpose of this code change is to reorganize the seismic provisions of Chapter 3. Builders in regions of the country where seismic design is required have expressed confusion regarding the requirements and limitations of Section R301.2.2. The key changes are as follows:

1. R301.2.2 is currently divided into requirements applicable to SDC C, then additional requirements applicable to SDC D0, D1 and D2, followed by the provision on SDC E. This change proposes to organize the provisions by type of construction or type of limitation instead of by SDC. By doing so, sections on stone and masonry veneer, masonry construction, and concrete construction that are somewhat or entirely duplicative can be combined. Also, this will promote the weight and irregularity limits up one level.

2. The irregular building provisions have been a source of confusion because they are currently provided as a number list of conditions that knock you out of the IRC, with exceptions that allow you to stay in the IRC but that themselves contain numbered lists! This code change creates new subsections for each irregularity, eliminating one set of numbered lists.

3. The height limitations are simplified. There is no need to restate for wood and cold-formed steel buildings the limit of 3 stories above grade plane, which simply reflects the IRC scope in Section R101.2. The mezzanine and SIP provisions are retained.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: BCAC

Cost Impact: Will not increase the cost of construction
The code change provides an editorial clarification and reorganization to the irregularity and material requirements and limitations in high-seismic areas. No seismic requirements are added or removed with this change, thus there should be no impact on cost.
### MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

<table>
<thead>
<tr>
<th>USE</th>
<th>LIVE LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninhabitable attics without storage(^b)</td>
<td>10</td>
</tr>
<tr>
<td>Uninhabitable attics with limited storage(^b,g)</td>
<td>20</td>
</tr>
<tr>
<td>Habitable attics and attics served with fixed stairs</td>
<td>30</td>
</tr>
<tr>
<td>Balconies (exterior) and decks(^e)</td>
<td>40</td>
</tr>
<tr>
<td>Fire escapes</td>
<td>40</td>
</tr>
<tr>
<td>Guards and handrails(^d)</td>
<td>200(^h)</td>
</tr>
<tr>
<td>Guard in-fill components(^f)</td>
<td>50(^h)</td>
</tr>
<tr>
<td>Passenger vehicle garages(^a)</td>
<td>50(^a)</td>
</tr>
<tr>
<td>Rooms other than sleeping rooms</td>
<td>40</td>
</tr>
<tr>
<td>Sleeping rooms</td>
<td>30</td>
</tr>
<tr>
<td>Stairs</td>
<td>40(^c)</td>
</tr>
</tbody>
</table>

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm\(^2\), 1 pound = 4.45 N.

- a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.
- b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.
- c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of 4 square inches, whichever produces the greater stresses.
- d. A single concentrated load applied in any direction at any point along a height of 36 inches above the top floor or walking surface.
e. See Section R507.1 for decks attached to exterior walls.

f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.

g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is not greater than 42 inches, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.

2. The slopes of the joists or truss bottom chords are not greater than 2 inches vertical to 12 units horizontal.

3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

**Reason:** The current rule requires the load on a guard be applied at the top of the guard. This is reasonable assuming the guard is 36 inches high. But what if one wishes to have a taller guard? If the 200 pound force is applied at the top of this taller guard, the reaction on the connections is multiplied in direct relation to the increased height of the guard. If one assumes that the height of the guard has some relationship to the center of gravity of a human being, the load being applied at the top of a 36 inch high guard makes sense. But as the height of the guard increases, the center of gravity of a human being does not. Supposing the guard is six feet in height. Is it possible for a human being contacting the guard to exert a 200 pound force at the top? Obviously it is not. But the guard must be designed for the load being applied at the six foot height. That is unreasonable. What is reasonable is that when constructing a guard the load should be applied at the 36 inch height regardless of the height of the guard. That is what this proposal does. A person should not be penalized for exceeding the code which is what happens in this situation. A taller guard is safer. The force exerted by a person does not change.

**Cost Impact:** Will not increase the cost of construction

This clarification should reduce construction costs due to the location where loads are applied to guards.
TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

<table>
<thead>
<tr>
<th>USE</th>
<th>LIVE LOAD</th>
</tr>
</thead>
<tbody>
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</tr>
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<tr>
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<td>40(^c)</td>
</tr>
</tbody>
</table>

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm\(^2\), 1 pound = 4.45 N.

a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.

b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an
area of 4 square inches, whichever produces the greater stresses.
d. A single concentrated load applied in any direction at any point along the top.
e. See Section R507.1 for decks attached to exterior walls.
f. Guard fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.
g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is not greater than 42 inches, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
2. The slopes of the joists or truss bottom chords are not greater than 2 inches vertical to 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.
h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

**Reason:** This proposal aligns the deck and balcony live loads in the IRC with ASCE 7 (both 2010 and 2016 versions).

Prior to the 2009 IRC, balconies and decks were on different lines in the live load table, with different live load requirements. Balconies were designed for 60 psf, and decks for 40 psf. In the 2009 IRC, through code change proposal S9-06/07, the lines were combined on the basis that they should be designed to the same load. A parallel proposal made a similar change to the IBC live load table. At the end of the process, the deck load (as opposed to the balcony load) was somewhat arbitrarily carried forward by the ICC membership in both the IBC and the IRC.

During the development process for ASCE 7-10, the parallel IBC code change was submitted to ASCE for consideration, as they are the experts in determining what the live load should be. Many comments from ASCE 7 committee members and other public commenters questioned whether designing to normal floor live loads (40 psf) was adequate, given the history of failures leading to deaths and injuries. ASCE determined through their deliberative process that the live load on these structures should be 1.5 times the live load for the area the deck or balcony serves. This more or less corresponds to the 60 psf required in the 2006 and earlier IRCs for balconies.

This proposal keeps the IRC in line with ASCE 7, which is the venue where these issues are more thoroughly vetted by experts in the subject than is able to be done through the ICC code development process.

**Cost Impact:** Will increase the cost of construction
The increase in loading is likely to result in a requirement for larger or more closely spaced supporting structure.
2015 International Residential Code

Revise as follows:

**TABLE R301.5**

MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

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<td>Uninhabitable attics with limited storage&lt;sup&gt;b,g&lt;/sup&gt;</td>
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<td>Balconies (exterior) and decks&lt;sup&gt;e&lt;/sup&gt;</td>
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<td>Fire escapes</td>
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<td>200&lt;sup&gt;h&lt;/sup&gt;</td>
</tr>
<tr>
<td>Guard in-fill components&lt;sup&gt;f&lt;/sup&gt;</td>
<td>50&lt;sup&gt;h&lt;/sup&gt;</td>
</tr>
<tr>
<td>Passenger vehicle garages&lt;sup&gt;a&lt;/sup&gt;</td>
<td>50&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>30</td>
</tr>
<tr>
<td>Stairs</td>
<td>40&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm<sup>2</sup>, 1 pound = 4.45 N.

a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.

b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an
area of 4 square inches, whichever produces the greater stresses.

d. A single concentrated load applied in any direction at any point along the top.

e. See Section R507.1 for decks attached to exterior walls.

f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.

g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is not greater than 42 inches, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.

2. The slopes of the joists or truss bottom chords are not greater than 2 inches vertical to 12 units horizontal.

3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

**Reason:** This proposal more closely aligns the IRC live load for decks and balconies with the corresponding table in ASCE 7-10 and ASCE 7-16.

The 2006 and earlier IRCs required decks to be designed for 40 psf live load, and balconies for 60 psf. The 2009 and later IRCs require both decks and balconies to be designed to 40 psf. This change and a similar change in the IBC were made through code change proposal S9-06/07, in which the argument was made that decks and balconies should be designed to the same live load. The ICC membership ultimately decided to carry the deck load forward (40 psf) rather than the balcony load.

The IBC code change was submitted to ASCE in the ASCE 7-10 development cycle, because they are the experts at determining live loads. Through their process, ASCE determined decks and balconies should be designed to 1.5 times the live load of the area they serve.

In order to simplify the requirement, we are proposing to use a straight 60 psf for deck and balcony live load design. This corresponds to 1.5 times the live load for rooms other than sleeping rooms, and coincidentally, returns the design loads for balconies to what they were prior to the 2009 IRC.

**Cost Impact:** Will increase the cost of construction

The increase in live load is likely to result in more structure being required to support it.
2015 International Residential Code

Revise as follows:

R301.6 Roof load. The roof shall be designed for the live load indicated in Table R301.6 or the snow load indicated in Table R301.2(1), whichever is greater, or in accordance with Section 1607.12 of the International Building Code.

Reason: Prefabricated truss manufacturers typically design to the Chapter 16, specifically 1607.12 for roof live loads. This proposal will allow truss manufacturers and designers an option to use the provisions of IBC 1607.12 for live load reductions not afforded to the provisions of the IRC. IBC section 1607.12 allows reductions based on formulas that extrapolate the live loads reduction for both slope and tributary area between the limits provided in Table R301.6. This code change would provide additional design flexibility not provided in the IRC.

Cost Impact: Will not increase the cost of construction
This will not increase the cost of construction as designers will have the option to use the lower live load required by either the IRC or the IBC.
RB29-16
IRC: R302.1.
Proponent: Joseph Holland (jholland@ftw.com)

2015 International Residential Code
Revise as follows:

**TABLE R302.1 (1) EXTERIOR WALLS**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>Fire-resistance rated 1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides</td>
<td></td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>≥ 5 feet</td>
</tr>
<tr>
<td>Projections</td>
<td>Not allowed</td>
<td>N/A</td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside, or Type IV construction, or fire-retardant-treated wood a, b</td>
<td>≥ 2 feet to</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>≥ 5 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td>Not allowed</td>
<td>N/A</td>
</tr>
<tr>
<td>25% maximum of wall area</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>5 feet</td>
</tr>
<tr>
<td>Penetrations</td>
<td>All</td>
<td>Comply with Section R302.4</td>
</tr>
<tr>
<td></td>
<td>None required</td>
<td>3 feet</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

**TABLE R302.1 (2)\(^{1}\)**

**EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside</td>
<td>0 feet</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet(^a)</td>
</tr>
<tr>
<td>Projections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside, or Type IV construction or fire-retardant-treated wood (^b, c)</td>
<td>2 feet(^a)</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>3 feet(^a)</td>
</tr>
<tr>
<td>Penetrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Comply with Section R302.4</td>
<td>None required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 feet(^a)</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is

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\(^{1}\) ICC COMMITTEE ACTION HEARINGS ::: April, 2016

RB93
c. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

**Reason:** The proposal will bring the IRC and the IBC into agreement. Currently, the IBC provides options while the IRC has only one method of compliance. The IBC in Section 705.2.3 permits the use of Type IV construction, fire-retardant-treated wood or 1-hr fire-resistance construction for combustible projections. The IRC in Table R302.1(1) and Table R302.1(2) only permits the 1-hr fire-resistance construction on the underside. There is no 1-hr. fire-resistance assembly listed for roof eaves. As a result, users of the International Residential Code are looking to the International Building Code for compliance with the requirement.

**Cost Impact:** Will not increase the cost of construction
The change only provides options. It does not mandate any requirements not permitted by ICC codes.
**RB30-16**
**IRC: R302.1.**
**Proponent:** Jeff Hugo, National Fire Sprinkler Association, representing National Fire Sprinkler Association (hugo@nfsa.org)

**2015 International Residential Code**

Revise as follows:

### TABLE R302.1 (1)
**EXTERIOR WALLS**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides</td>
<td></td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>≥ 5 feet</td>
</tr>
<tr>
<td>Projections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside(^a, b)</td>
<td>≥ 2 feet to</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>≥ 5 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>25% maximum of wall area</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>5 feet</td>
</tr>
<tr>
<td>Penetrations</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Comply with Section R302.4</td>
<td>None required</td>
<td>3 feet</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

---

\(^a\) Roof eave: The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.
b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave rake overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

c. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave rake overhang where fireblocking is provided that and gable vent openings are not installed.

**Reason:** This proposal provides the same application, regardless of the side of the dwelling faces the lot line. It is clearly not the intent of the IRC to provide no projection protection to the eave side that faces the lot line when the gable end vent is removed. However, a literal interpretation of the code does exactly that, which is not what RB67-13 intended.

---

**TABLE R302.1 (2)**

**EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside</td>
<td>0 feet</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Projections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside&lt;sup&gt;b, c&lt;/sup&gt;</td>
<td>2 feet&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>3 feet&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Penetrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Comply with Section R302.4</td>
<td>None required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 feet&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave rake overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

c. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave rake overhang where fireblocking is provided that and gable vent openings are not installed.
Rake and eave overhangs are clearly defined visually (Figure R804.3.2.1.2) and in the text (R804.3.4.1.2 and R905.2.8.5) of the IRC. Some areas of the country use terms rake and eave interchangeably and the terms in the IRC needs to be consistent throughout the document for uniform code enforcement. This proposal uses these terms in the appropriate context and orientation.

The proposal, to footnote "b" and "c", provides fireblocking to the gable rake, as is done on the eave side, because some gable end framing techniques use a shorter gable end truss with 2x4 outlooks to frame the rake overhang. Where this framing technique is not used, such as where the gable end wall framing and sheathing meet the roof sheathing, additional fireblocking would not be required.
**Cost Impact:** Will not increase the cost of construction

The requirement to add fireblocking already exists, this proposal clarifies the installation.
**2015 International Residential Code**

Revise as follows:

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides</td>
<td>≥ 5 feet</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>[Table R302.1 (1)]</td>
</tr>
<tr>
<td>Projections</td>
<td>Not allowed N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside&lt;sup&gt;a, b&lt;/sup&gt;</td>
<td>≥ 2 feet</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>≥ 5 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td>Not allowed N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>25% maximum of wall area</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>5 feet</td>
</tr>
<tr>
<td>Penetrations</td>
<td>All</td>
<td>Comply with Section R302.4</td>
</tr>
<tr>
<td></td>
<td>None required</td>
<td>3 feet</td>
</tr>
</tbody>
</table>
For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

c. Determination of fire resistance rating in accordance with ACI/TMS 216.1 shall not be prohibited.

### TABLE R302.1 (2)
**EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside[d]</td>
<td>0 feet</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet[a]</td>
</tr>
<tr>
<td>Projections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside[b, c]</td>
<td>2 feet[a]</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>3 feet[a]</td>
</tr>
<tr>
<td>Penetrations</td>
<td>All</td>
<td>Comply with Section R302.4</td>
</tr>
<tr>
<td></td>
<td>None required</td>
<td>3 feet[a]</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.
c. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

d. Determination of fire resistance rating in accordance with ACI/TMS 216.1 shall not be prohibited.

R302.2 Townhouses. Common walls separating townhouses shall be assigned a fire-resistance rating in accordance with Section R302.2, Item 1 or 2. The common wall shared by two townhouses shall be constructed without 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 or determined in accordance with ACI/TMS 216.1.

2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 or determined in accordance with ACI/TMS 216.1.

R302.3 Two-family dwellings. Dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E 119 or UL 263 or determined in accordance with ACI/TMS 216.1. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.

2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings and the structural framing supporting the ceiling is protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

R606.2.2 Clay or shale masonry units. Clay or shale masonry units shall conform to the following standards: ASTM C 34 for structural clay load-bearing wall tile; ASTM C 56 for structural clay nonload-bearing wall tile; ASTM C 62 for building brick (solid masonry units made from clay or shale); ASTM C 1088 for solid units of thin veneer brick; ASTM C 126 for ceramic-glazed structural clay facing tile, facing brick and solid masonry units; ASTM C 212 for structural clay facing tile; ASTM C 216 for facing brick (solid masonry units made from clay or shale); ASTM C652 for hollow brick (hollow masonry units made from clay or shale); or ASTM C1405 for glazed brick (single-fired solid brick units).

Exception: Structural clay tile for nonstructural use in fireproofing of structural members and in wall furring shall not be required to meet the compressive strength specifications. The fire-resistance rating shall be determined in accordance with ASTM E 119 or UL 263.
or determined in accordance with ACI/TMS 216.1 and shall comply with the requirements of Section R302.

**Reference standards type:** This reference standard is new to the ICC Code Books

**Add new standard(s) as follows:**

A review of the following standard(s) proposed for inclusion in the code with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

**Reference standards type:** This reference standard is new to the ICC Code Books

**Add new standard(s) as follows:**

A review of the following standard(s) proposed for inclusion in the code with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

<table>
<thead>
<tr>
<th>Standard reference number</th>
<th>Title</th>
<th>Referenced in code section number</th>
</tr>
</thead>
<tbody>
<tr>
<td>216.1-14</td>
<td>Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies</td>
<td>R302.2, R302.3, R606.2.2</td>
</tr>
</tbody>
</table>

**Reason:** The *International Building Code* (IBC) permits ACI 216.1, *Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies* to be used as an alternative to testing in accordance with ASTM E119 or UL 263 to determine the fire resistance rating of concrete and masonry. This proposal adds ACI 216.1 to the IRC as an additional compliance method and makes the IRC consistent with the IBC.

**Cost Impact:** Will not increase the cost of construction

Presently the IRC requires all assemblies to be tested to ASTM E119 or UL 263 when used for fire rated exterior wall elements, fire rated townhouse separations and fire rated dwelling unit separations. This proposal will allow the code user to use the calculation methods permitted by ACI 216.1 to determine the fire resistance for concrete and masonry assemblies as an alternative to having to expend funds to perform lab testing of these assemblies. Thus there will likely be a cost decrease.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, ACI/TMS 216.1, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
## TABLE R302.1 (1)
**EXTERIOR WALLS**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>Fire-resistance rated</td>
<td>1 hour—tested in accordance with ASTM E 119, or UL 263 or Chapter 7 of the International Building Code with exposure from both sides</td>
</tr>
<tr>
<td></td>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
</tr>
<tr>
<td>Projections</td>
<td>Not allowed</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Fire-resistance rated</td>
<td>1 hour on the underside&lt;sup&gt;a, b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
</tr>
<tr>
<td>Openings in walls</td>
<td>Not allowed</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>25% maximum of wall area</td>
<td>0 hours</td>
</tr>
<tr>
<td></td>
<td>Unlimited</td>
<td>0 hours</td>
</tr>
<tr>
<td>Penetrations</td>
<td>All</td>
<td>Comply with Section R302.4</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is
provided from the wall top plate to the underside of the roof sheathing.

b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

### TABLE R302.1 (2)
**EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>Fire-resistance rated</td>
<td>1 hour—tested in accordance with ASTM E 119 or UL 263 or Chapter 7 of the International Building Code with exposure from the outside</td>
</tr>
<tr>
<td></td>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
</tr>
<tr>
<td>Projections</td>
<td>Not allowed</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Fire-resistance rated</td>
<td>1 hour on the underside(^b,\ c)</td>
</tr>
<tr>
<td></td>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
</tr>
<tr>
<td>Openings in walls</td>
<td>Not allowed</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Unlimited</td>
<td>0 hours</td>
</tr>
<tr>
<td>Penetrations</td>
<td>All</td>
<td>Comply with Section R302.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None required</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

c. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.
R302.2 Townhouses. Common walls separating townhouses shall be assigned a fire-resistance rating in accordance with Section R302.2, Item 1 or 2. The common wall shared by two townhouses shall be constructed without 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 or Chapter 7 of the International Building Code.

2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 or Chapter 7 of the International Building Code.

R302.3 Two-family dwellings. Dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E 119 or UL 263 or Chapter 7 of the International Building Code. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.

2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings and the structural framing supporting the ceiling is protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

Reason: The IRC only permits ASTM E119 or UL 263 fire-resistance rated assemblies as written. However, Chapter 7 of the IBC has prescriptive and calculated fire assemblies that have been successfully used over the years to provide fire-resistant rated construction. It is our belief that users of the IRC should also be able to use these systems as well. Although many jurisdictions may permit the use as an alternate design, we have had building officials prohibit the use of Chapter 7 in the IBC since it is not specifically noted in the code. This proposal clearly states that a user can use the IBC fire-resistant rated assemblies.

Cost Impact: Will not increase the cost of construction
This proposal will allow more prescriptive assemblies which typically are less costly than proprietary assemblies. Therefore, this change will reduce the cost of construction.
## TABLE R302.1 (2)  EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside</td>
<td>0 feet</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet(^a)</td>
</tr>
<tr>
<td>Projections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside(^b, c)</td>
<td>2 feet(^a)</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>3 feet(^a)</td>
</tr>
<tr>
<td>Penetrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Comply with Section R302.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None required</td>
<td>3 feet(^a)</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for unrated exterior walls, not fire resistance rated and for fire resistance rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.
c. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

Reason: Editorial

Cost Impact: Will not increase the cost of construction
Editorial
IRC: R302.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and attached or detached accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout provided with an automatic sprinkler system installed in accordance with Section P2904 or NFPA13D shall comply with Table R302.1(2). Garages attached to dwellings with an automatic sprinkler system shall meet the requirements of Table R302.1(1).

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: The first part of the first sentence makes it clear that both dwellings and accessory buildings must meet the requirements of Table R302.1(1). It doesn't say whether the accessory buildings are “attached” or “detached” so the assumption must be that “all” accessory structures are bound by Table R302.1(1). To insure that is understood, language is added similar to that found in other sections of the IRC. The second part of that sentence states that “dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2)”. There is no reference to accessory structures. So the assumption is that the dwelling would be constructed to one of the tables and an attached accessory structure or garage would be constructed to a different table. That is easy to misunderstand. Users of the code do not pick up on the subtle language and assume that the garage, even though unsprinklered, gets the same treatment as the dwelling. This amendment makes it clear that it does not. Next, as it is currently written, only dwellings having a sprinkler system installed in accordance with P2904 are given the reduced clearance to property lines. It is believed that this is an inadvertent omission and a reference to NFPA 13D is added. Last, the word “throughout” is deleted and replaced with the word “provided”. The word “throughout” when applied to sprinkler systems has specific meanings that are not intended here. The term “throughout” is replaced with the word “provided”.

Following are examples where the terms “attached and/or detached” are used:

R316.5.6 Foam-filled garage doors. Foam-filled garage doors in attached or detached garages are exempt from the requirements of Sections R316.3 and R316.4.

E3901.9 Basements, garages and accessory buildings. Not less than one receptacle outlet, in addition to any provided for specific equipment, shall be installed in each separate unfinished portion of a basement, in each attached garage, and in each detached garage or accessory building that is provided with electrical power. The branch circuit supplying the receptacle(s) in a garage shall not supply outlets outside of the garage and not less than one receptacle outlet shall be installed for each motor vehicle space.

E3903.3 Additional locations. At least one wall-switch-controlled lighting outlet shall be installed in hallways, stairways, attached garages, and detached garages with electric power. At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each outdoor egress door having grade level access, including outdoor egress doors for attached garages and detached garages with electric power.
A vehicle door in a garage shall not be considered as an outdoor egress door. Where one or more lighting outlets are installed for interior stairways, there shall be a wall switch at each floor level and landing level that includes an entryway to control the lighting outlets where the stairway between floor levels has six or more risers. [210.70(A)(2)]

AJ501.5.3.4 Lighting outlets. Not less than one lighting outlet shall be provided in every bathroom, hallway, stairway, attached garage and detached garage with electric power to illuminate outdoor entrances and exits, and in utility rooms and basements where these spaces are used for storage or contain equipment requiring service.

Cost Impact: Will not increase the cost of construction
This proposal is intended to provide clarifying language and should have no impact on construction costs.
**2015 International Residential Code**

**R302.1 Exterior walls.** Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

**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.

Projections shall have not less than one-hour fire-resistive construction on the underside.

**Reason:** In recent years energy performance demands have driven the market place to the application of increased use of exterior insulation especially foam insulation applications. This in turn has permitted the use of products that support rapid vertical flame spread. In some recent tests conducted at Underwriters Laboratories, a small exterior fire transitioned into the attic space at the 1:51 mark. This rapid flame spread with an unprotected attic soffit permitted an exterior fire to transition into the attic of a living space well before the fire department can respond and deploy suppression resources. These scenarios do place fire fighters at risk but more importanlly they also increase the risk to the occupants as these attics spaces are not protected with smoke detection or sprinkler protection. The goal of this code change proposal is to require the point of entry for many exterior fires to be protected against the rapid transition of fire from the outside to thge inside. This does not impact or question the current listed systems protecting dwellings from the lateral transfer of fire. These listed systems are designed and tested to ensure they protect the living space from the rapid transition of an exterior fire horizontally through the wall to the interior. This code change proposal w ould seek to better protect the whole envelope.

There is no doubt energy performance requirements will continue to challenge the industry to meet the goals of reducing energy costs. The fire service is cognizant of the importance of energy conservation our only interest is to protect that exterior fire from transitioning to the interior or to delay transition until our suppression resources can effect on scene deployment. These are not only property loss events as we have lost fire fighters, and experienced injuries, in dwellings that began with an exterior fire that rapidly transitioned into the interior.

**Bibliography:** Fire Service Summary Report: Study of Residential Attic Fire Mitigation Tactics and Exterior Fire Spread Hazards on Firefighter Safety, Underwriters Laboratories Firefighter Safety Research Institute, Kerber, Zevotek 2015
Cost Impact: Will increase the cost of construction
This proposal will add to the cost of construction by requiring additional protection in the soffit to resist fire transition.
2015 International Residential Code

Add new text as follows:

**R302.1.1 Exterior Wall Covering.** Unprotected exterior wall coverings shall not project more than 4 inches (102 mm) into the minimum fire separation distance.

**Reason:** Table R302.1(1) and R302.1(2) establish the required minimum fire separation rating of exterior wall elements based on fire separation distance. The difference is Table R302.1(1) deals with dwellings without sprinklers and Table R302.1(2) is for buildings with sprinklers. The definition of “fire separation distance” requires the setback measurement to be taken from the building face. This requires that the building placement is determined by the exterior wall covering. This could create conflict if a designed product is not available or a design change causes a thicker system to be installed. For example; changing from a three coat Portland cement plaster to an EIFS system, or adding a stone veneer. By code the dwelling is no longer code compliant. This will allow flexibility in the design, without putting a hardship on the construction. Also, by definition, exterior wall covering includes “architectural trim and embellishments”.

The intent of this proposal is not to change any of the required setbacks, but to clarify and simplify the building placement and verification of fire separation distance, by making it similar to the IBC, which allows architectural projections, pop outs, and other features to protrude into the fire separation distance, under certain conditions.

**Cost Impact:** Will not increase the cost of construction

This will allow flexibility in the design, without putting a hardship on the construction.
2015 International Residential Code

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(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings individual dwelling units and their 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: Current language could be misinterpreted to allow the placement of structures accessory to other dwelling units adjacent to another unit without regard to fire separation distances.

Cost Impact: Will not increase the cost of construction
This proposal is to provide clarity to an existing code section. No additional cost is associated with this proposal.
RB38-16
IRC: R302.2.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R302.2 Townhouses. Common walls separating townhouses shall be assigned a fire-resistance rating in accordance with Section R302.2, Item 1 or 2. The common wall shared by two townhouses shall be constructed without 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.

Reason: This proposal deletes the second exception in the section. Where does it say in the IRC that you can build townhouses without sprinkler systems? Then why does R302.2 reference townhouses being built without sprinkler systems. You are regulating something that is not permitted to occur. Does that make any sense at all? Of course not. If the argument is that so many jurisdictions are amending sprinklers out of their codes what makes you think they won’t amend this as well. The local adoption process can result in all sorts of local amendments. You can’t be putting text in the code to address all of those possibilities.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.
## TABLE R302.1 (2)
**EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside</td>
<td>0 feet</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet(^a)</td>
</tr>
<tr>
<td>Projections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside(^b, c)</td>
<td>2 feet(^a)</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>3 feet(^a)</td>
</tr>
<tr>
<td>Penetrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Comply with Section R302.4</td>
<td>None required</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

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\(^a\) For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section R204, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

\(^b\) The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

\(^c\) The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

For SI: 1 foot = 304.8 mm.
a. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

Delete without substitution:

R309.5 Fire sprinklers. Private garages shall be protected by fire sprinklers where the garage wall has been designed based on Table R302.1(2), Footnote a. Sprinklers in garages shall be connected to an automatic sprinkler system that complies with Section P2904. Garage sprinklers shall be residential sprinklers or quick-response sprinklers, designed to provide a density of 0.05 gpm/ft². Garage doors shall not be considered obstructions with respect to sprinkler placement.

Reason: This has to be one of the most conflicted and contrary code requirements of all times as well as flying in the face of long standing code philosophy. There are undefined terms. There is no method to regulate. There is no control over adjoining property. The section is unenforceable.

Let's take a look at the problems.

The footnote uses the term "subdivision". "Subdivision" is not defined in the IRC. What is a subdivision? It is defined in the International Zoning Code and we can use that definition. The IZC says a subdivision consists of two or more lots. So if we have two lots, this section will permit unprotected construction to a lot line. The text doesn't limit the unprotected construction just to lot lines within the subdivision but any lot line. We can do anything we want as far as setbacks if our house is sprinklered. And those houses in the adjoining subdivision, they may not have sprinklers and there would be no way to require them. There is nothing in the text to limit the application between homes in the same subdivision. If a home is in a "subdivision" where the homes are sprinklered, they can use this exemption even on lot lines abutting other "subdivisions". Heck, homes adjoining this "subdivision" might even be in a different jurisdiction!

From the IZC SUBDIVISION. The division of a tract, lot or parcel of land into two or more lots, plats, sites or other divisions of land.

The term "open setback" is used. What does that mean? Does it mean no dwellings? What about garages or sheds? What about decks or other projections? What about fences? Can an owner construct a fence to his lot line right next to the dwelling next door? It is his property. How do you prevent it? What if this blocks light or ventilation?

This is a classic case of "who gets there first" because the first one to build to a lot line theoretically prohibits the adjoining property owner from doing the same thing. Then the adjoining property is required to maintain a 6 foot distance for an undermined length of the common lot line. This could happen on all of the lot lines, not just one. So how is this enforced? How is this tracked?

The following is from the IRC Commentary regarding Section R302.1:

This section provides details for issues related to building location on the property, including the fire rating of exterior walls, permitted openings and projections. Tables R302.11) and R302.1(2) provide a tabular overview of the requirements of this section.

Concerning exterior wall protection, the IRC assumes that an owner has no control over an adjoining property. Thus, the location of buildings on the owner's property relative to the property line requires regulation. In addition, Section R302.6, which lists the separation requirements for garages and carports, specifically requires garages located less than 3 feet from a dwelling unit on the same lot to have not less than ½-inch gypsum board applied to the interior side of the walls. Opening protection for these walls is regulated by Section R302.5.

Code philosophy for exterior wall protection for nearly a century has been guided by proximity of a building to a lot line because there is no way to control the actions of an adjoining property. That same philosophy is tossed aside here but it doesn't change the facts in the situation which is there is no way to encumber an adjoining property owner. You might as well toss the code book away and let them do what they want.

This code language also has the potential of reducing buildable width on an adjacent property thus decreasing value. Do you really think an adjoining property owner is going to take a kick in the pocketbook without legal action?
Since there is nothing in the rules that enables encumbering an adjoining lot, how is this enforced? How do you get the adjoining property owner to give up six feet of their lot and require them to have a rated wall and no openings in a wall that would have otherwise been unrated? Because you have essentially moved the lot line 6 feet, you have effectively taken away even more area than that if the adjoining owner wants openings, the lack of which will further decrease property values. What if the adjoining owner simply refuses to abide by this six foot open space? If he constructs his home in this six foot space, who is put into violation? How do you correct it?

Also, when this neighboring property, the one who has to give up six feet of their lot, applies for a building permit to construct a new home, how do you know what the setbacks of the adjoining lot are? The site plan requirements of R106.2 don't require that information be provided for adjoining property. And if you do require it, surveys and the like will cost more money. And if this is a unique situation, how is this monitored for adjoining properties?

**R106.2 Site plan or plot plan.** The construction documents submitted with the application for permit shall be accompanied by a site plan showing the size and location of new construction and existing structures on the site and distances from lot lines. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The building official is authorized to waive or modify the requirement for a site plan when the application for permit is for alteration or repair or when otherwise warranted.

Then when the plan for a permit is reviewed, how does the reviewer respond to questions regarding placement of emergency escape and rescue openings that must open to a yard on the same property as the building. Is it the intent that walls built to these lot lines not have emergency escape openings? Could the required egress door open into this space? What rights are given to the owner regarding maintenance of the side of the home adjacent the lot line or to walking on otherwise occupying this space for whatever reason?

**YARD.** An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the lot on which a building is situated.

**R310.1 Emergency escape and rescue required.**
Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

If I use this exception to also allow my garage, attached or detached, to be constructed adjacent a lot line, a Pandora's box is opened regarding maintenance of the system in the garage. Installing sprinklers in any garage is a problem but in colder climates they have a tendency to freeze. Even with dry systems problems can and will occur. These systems won't be maintained and if there is a problem and past experience is any indication, these garage systems will be disconnected. Open framing of garage roofs will also provide a challenge for sprinkler installation. This is one of the most ludicrous code requirements ever and will put jurisdictions in legal jeopardy if it isn't removed.

In closing, if this is a solution that designers wish to use they should pursue it as an alternate means of construction so that all of the details can be worked out.

**Cost Impact:** Will not increase the cost of construction
This proposal deletes language that is unenforceable and will therefore have no impact on construction costs.
RB40-16
IRC: R302.1, R302.2.
Proponent: Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org)

2015 International Residential Code

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

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.

Revise as follows:

R302.2 Townhouses. Townhouses shall be separated with wall assemblies complying with R302.1 or common walls complying with this section. Common walls separating townhouses shall be assigned a fire-resistance rating in accordance with Section R302.2, Item 1 or 2. The common wall shared by two townhouses shall be constructed without 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.

Reason: With the changes brought forth by RB79-13 it is being interpreted by some that common walls is the only option for separating townhouses since the reference to R302.1 has been deleted in R302.2. This was not the intent of RB79-13. As written, Section R302.2 does not require townhouses to be separated by common walls, rather, it contains requirements for common walls if that is the way the designer chooses to separate the townhouses. There is nothing prohibiting the use of two exterior walls to separate townhouses. RB79-13 is reproduced below for your information. Adding the proposed language to R302.2 will clarify this option is still available.
RB79-13
R302.2, R302.2.4

Proposed Change as Submitted

Proponent: Jeffrey M. Shapiro, representing IRC Fire Sprinkler Coalition
(jeff.shapiro@intloodecoconsultants.com)

Revise 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.

Exceptions:

1. Where a fire sprinkler system in accordance with Section P2904 is provided, a common 1-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.

2. Where a fire sprinkler system in accordance with Section P2904 is not provided, a common 2-hour fire-resistance rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses where 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.

R302.2.4 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 fire-resistance rated wall as provided in Section R302.2, Exceptions 1 or 2.

Reason: The 1-hour separation requirements in these sections were reduced from 2-hour ratings in prior editions of the IRC based on the assumption that fire sprinklers mandated by the IRC would be present in all townhouses. Because some jurisdictions are amending the IRC to remove the fire sprinkler requirement, it is essential that the IRC provide for townhouse separation fire ratings to be reduced to 2-hours if sprinklers are not provided. No justification, other than sprinklers, was ever provided for allowing a 1-hour separation, and this reduced rating is inappropriate for non-sprinklered buildings.

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

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R302.2-RB-SHAPIRO
Committee Action Hearing Results

Committee Action:
Approved as Submitted

Committee Reason: The committee approved this proposed code change because they felt that a) it takes care of an important omission in the code related to fire sprinkler systems and b) it addresses the many ways in which jurisdictions adopt the code and modify sprinkler requirements.

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, representing American Iron and Steel Institute; Wayne Jewell, Green Oak Charter Township, representing self, requests Approval as Modified by this Public Comment.

Modify the 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. Common walls separating townhouses shall be assigned a fire resistance rating in accordance with Section R302.2 item 1 or item 2. The common wall shared by two townhouses shall be constructed without 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 the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

Exceptions:

1. Where a fire sprinkler system in accordance with Section P2004 is provided, the common wall shall be not less than a 1-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.

2. Where a fire sprinkler system in accordance with Section P2004 is not provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses where 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.

R302.4 Structural Independence. Each individual townhouse shall be structurally independent.

Exceptions:

1. Foundations supporting exterior walls or common walls.
2. Structural 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 fire resistance-rated wall as provided in Section R302.2, items

Commenter’s Reason: This public comment proposes to further modify RB79-13 as follows:

Deletion of the original charging language:

When this proposal was developed there was no longer a need to retain the reference to Section R302.1 and Table R302.1 as the proposed language now covers the fire resistance requirements in R302.2. As a result, we propose to delete that language as part of this modification since it is redundant and rely on the new text to articulate the fire resistance requirements for common walls.
Addition of instructions:
We are proposing new charging language which allows the user to choose the design and construction of the common wall. This is consistent with the RB79-13 and the choice allowed in the exceptions.

Removal of duplicative language in the exceptions:
We also propose the removal of the construction limitations language from the two parts of RB79-13 as it is duplicative, and instead suggest it be relocated into the charging section, thus stating the limitations only once.

Exceptions to Parts:
We propose that the exceptions be labeled as items in order to coordinate with the other modification concerning the revised charging language where the user is allowed to choose a 1-hour or 2-hour rated wall design.

RB79-13
Final Action: AS AM AMPC D
In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: BCAC

Cost Impact: Will not increase the cost of construction
This proposal is a clarification recognizing another option for a designer to meet the separation requirements in the IRC; therefore there will be no increase in the cost of construction.
R302.2 Townhouses. Common walls separating *townhouses* shall be assigned a fire-resistance rating in accordance with Section R302.2, Item 1 or 2. The common wall shared by two *townhouses* shall be constructed without 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4 R302.4.2.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.

**Reason:** The IRC intends for *townhouses* to behave like separate buildings and it is inferred that common utilities should not be shared across the common wall separating *townhouse* dwelling units. Additionally by definition a *townhouse* is a "single-family dwelling unit constructed in a group of three or more attached units ....". Additionally, the IRC Commentary explains under Section R302.2.4 that the IRC intends that a *townhouse* owner can remove a *townhouse* unit without affecting the adjacent dwelling unit. As a result it is clear from Section R3202.2 and R302.2.4 that the IRC does not intend for *townhouses* to share utilities and systems and therefore common wiring and piping is not permitted through the wall separating *townhouse* units. The proposed code change deletes the reference to Chapter 34 through 43 since it is not necessary since the Sections do not include construction standards relevant to maintaining fire resistance addressed in Section R302.2. The IRC is one code that includes construction standards normally found in separate codes such as a building code, plumbing code, mechanical code, energy efficiency code, etc. The IRC includes a table of contents and the requirements in the struck text are not located in a separate electrical code. The revised IRC code Section reference to Section R302.4.2 more accurately reflects the text preceding the code reference that implies only membrane penetrations of the common wall are permitted and not through penetrations.

**Cost Impact:** Will not increase the cost of construction
The proposed code change is editorial and does not add requirements so the cost of construction is not impacted.
PARTY WALL. A wall located between adjacent townhouse dwellings that is used or adapted for joint service between the two townhouses and is constructed without openings.

Revise as follows:

R302.2 Townhouses. Common walls. 
Party walls separating townhouses shall be assigned a fire-resistance rating in accordance with Section R302.2, Item 1 or 2. The common wall party wall shared by two townhouses shall be constructed without plumbing or mechanical equipment, ducts or vents in the cavity of the common wall party 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls party walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall party wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall party wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.

R302.2.1 Continuity. The fire-resistance-rated wall or assembly party wall separating townhouses shall 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.

R302.2.4 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 fastened 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 wall party walls as provided in Section R302.2, Item 1 or 2.

Reason: The IRC permits Townhouse units to be separated by two one-hour fire resistance rated walls with a separation in between the walls or a common fire resistance rated wall. Due to construct ability issues, as well as cost, most designs incorporate a design utilizing a common wall. Editions of the IRC prior to the 2015 edition made clear that the common walls creates separate buildings. The IRC commentary also explains that the code intent is to allow complete burnout or demolition of one townhouse unit without impacting an adjacent townhouse unit.
Section R302.2.1 proposed changes recognize that the wall separating townhouses may be to separate walls with fire separation distance less than 3 feet or a common party wall.

As a result it appears that the common wall functions similarly to a party wall permitted in IBC Section 706.1.1. The proposed code change adds a definition for party wall in coordination with the IBC where a party wall creates separate buildings. Common wall is not defined. The code change is one of two code changes intended to clarify the application of walls separating three or more townhouse dwelling units.

**Cost Impact:** Will not increase the cost of construction
Editorial code change.
2015 International Residential Code

Add new text as follows:

**SECTION R202- DEFINITIONS**

**COMMON WALL.** Any wall located between two adjacent Townhouses, that is used or adapted for joint service between the two Townhouses and is constructed without openings.

**R302.2 Townhouses.** Common walls. Common walls separating townhouses shall be assigned a fire-resistance rating in accordance with Section R302.2, Item 1 or 2. The common wall shared by two townhouses shall be constructed without 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.

**R302.2.1 Vertical and horizontal continuity.** Common walls separating Townhouses shall comply with the vertical and horizontal continuity requirements of Sections R302.2.1.1, R302.2.1.2 and R302.2.1.3.

Revise as follows:

**R302.2.1 R302.2.1.1 Continuity Vertical Continuity.** The fire-resistance-rated wall or assembly separating townhouses shall 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.

Add new text as follows:

**R302.2.1.2 Horizontal continuity.** Common walls shall be continuous from exterior wall to exterior wall and shall extend to the interior surface of exterior walls. The fire-resistance rating shall extend the full length of the wall, including wall extensions through and separating attached enclosed accessory structures.

**R302.2.1.3 Continuity through horizontal projecting elements.** Common walls shall extend to the outer edge of horizontal projecting elements such as, but not limited to, balconies, roof overhangs, canopies, marquees that are within 4 feet (1220 mm) of the common wall.
**Reason:** The IRC intends to control fire spread from one Townhouse to another and as a result requires that a fire resistance wall assembly separate Townhouses. Additionally the IRC intends for the separation to be complete to prevent fire from transferring around the wall or over the top of the wall. However the IRC unlike the IBC is silent on projections that frequently occur on buildings such as eave overhangs extending parallel to the wall, as well as deck structures and cantilevered balconies. Additionally the IRC does not address how to protect a configuration where the upper stories of the Townhouse unit are larger than a lower story and therefore extend beyond the end of the common wall termination on the story that is smaller.

This code change addresses a significant omission in the IRC regarding the horizontal continuity of party walls separating Townhouse dwelling units. Many projects designed based on the IRC Townhouse regulations include eaves, balconies and similar exterior appendages that the IRC does not consider. The separation between Townhouses is meant to ensure that a fire in one Townhouse does not compromise an adjoining Townhouse even when the involved unit suffers complete burnout.

The separation below larger upper stories is necessary since NFPA 13D sprinkler protection is not designed to protect fires from adjacent dwelling units. Additionally, private garages are common sources of fire and one Townhouse owner can not control the actions of a neighboring Townhouse owner if the neighbor performs auto repairs or utilizes open flame equipment in his/her garage.

Townhouses are defined as a series of attached single family dwelling and are protected similarly so it stands to reason that the fire performance should be the same. Townhouse configurations incorporating separate exterior walls protected due to fire separation distances less than 3 feet will have exterior walls extending to the end of each unit and will have exterior walls below projecting elements whether they be stories above or appendages.

Four figures are attached to show application of the proposed code change and how the 2015 IRC is written:

1. Figure 1 depicts what the 2015 IRC permits as written when upper stories are larger than the story.
2. Figure 2 depicts what the proposed code change requires when upper stories are larger than the story.
3. Figure 3 depicts a solution where cantilevered balconies can be located at least 4 ft from the end of the common wall without having to extend the common wall out to a distance equal to the depth of the balcony perpendicular to the exterior wall.
4. Figure 4 depicts what the proposed code change requires when Townhouses are offset from one another. The common wall is shown in red.

**Figure 1**

Common wall in blue per 2015 IRC
Common wall in blue as proposed

Figure 2
Figure 3
Cost Impact: Will not increase the cost of construction
This requirement codifies current practice. Projecting elements can be cut back without additional cost.
2015 International Residential Code

Add new text as follows:

R302.2 Townhouses. Walls separating townhouse units shall be constructed in accordance with Section R302.2.1 or Section R302.2.2.

R302.2.1 Double Walls. Each townhouse shall be separated by two 1-hour fire-resistance rated wall assemblies tested in accordance with ASTM E119, UL 263 or Chapter 7 of the International Building Code.

Revise as follows:

R302.2 R302.2.2 Townhouses. Common Walls. Common walls separating townhouses shall be assigned a fire-resistance rating in accordance with Section R302.2 R302.2.2, Item 1 or 2. The common wall shared by two townhouses shall be constructed without 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.

2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.

R302.2.4 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 fastened 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 wall as provided in Section R302.2 R302.2.2, Item 1 or 2.

Reason: When Section 302.2 was changed between the 2012 and 2015 editions of the IRC, we lost the option of constructing two one-hour fire-resistant rated walls that have always been permitted in the IRC. We do not believe that this was the intent of the proponent of that change. The two walls has been used successfully in many townhouses across the country. So, we have proposed this language to reinstate that option. We have created a new subsection that provides the option and maintains the common wall option if the builder so chooses. We have also coordinated Section 302.2.4, exception 5 with the new section above.

Cost Impact: Will not increase the cost of construction
This is just another option to providing the separation between townhouses. It may actually reduce the cost of
construction in some cases.
2015 International Residential Code

Revise as follows:

R302.2.2 Parapets for townhouses. 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 preceding two cases where the roof covering complies with a minimum Class C rating as tested in accordance with ASTM E 108 or UL 790 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 not less than nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a distance of not less than 4 feet (1219 mm) on each side of the wall or walls and any openings or penetrations in the roof are not within 4 feet (1219 mm) of the common walls. Fire-retardant treated wood shall meet the requirements of Sections R802.1.5 and R803.2.1.2.
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: There are code sections that regulate fire-retardant-treated wood. There is no need to use the word "approved".

Cost Impact: Will not increase the cost of construction
This is an editorial revision and will have no impact on construction costs.
R302.2.2 Parapets for townhouses. 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 preceding two cases where the roof covering complies with a minimum Class C rating as tested in accordance with ASTM E 108 or UL 790 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 \( \frac{5}{8} \)-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by not less than nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a distance of not less than 4 feet (1219 mm) on each side of the wall or walls and any openings or penetrations in the roof are not within 4 feet (1219 mm) of the 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 is another provision of the IRC that both defies logic and serves no purpose. There have been several attempts at correcting this inequity in the past and for some reason there are those among us who seem intent on resisting the inevitable and want insanely restrictive and unnecessary rules.

The IRC and the IBC treat exceptions from parapets identically for the same uses and types of construction except for one item – roof openings.

Of the uses regulated by the IRC, only townhouses are so frowned upon as needing parapets and then the rules go way overboard!!!!

The IRC exempts a parapet if:

- the roof covering complies with a minimum Class C rating and;
- the roof decking or sheathing is of noncombustible materials or approved fire-retardant-treated wood for distance of 4 feet on each side of the wall or;
- one layer of \( \frac{5}{8} \)-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking for a distance of four feet on each side of the wall and;
- there are no openings or penetrations in the roof within 4 feet of the common walls.

The IBC exempts a parapet if:

- the entire building is provided with a Class C roof covering and;
- the roof sheathing or deck is constructed of approved noncombustible materials or of fire-retardant-treated wood for a distance of 4 feet or;
• the roof is protected with 0.625 inch Type X gypsum board directly beneath the underside of the roof sheathing or deck.

Note that the IBC regulates these parapets identically as the IRC except for openings. And, this applies to all R-2 and R-3 Occupancies, not just townhouses! So this exemption applies to uses that are much more intensive than a single dwelling such as apartment houses, hotels and motels, fraternities and sororities, boarding houses, and congregate living facilities. Imposing an opening restriction on single family dwelling roofs when it is not required when applied to apartment buildings is so over the top and overly restrictive that it defies any sense of logic.

Then there is the blatant inconsistency of the rule. Let's say I have roof surfaces adjacent a townhouse common wall and the difference in roof elevations is 31 inches or more. I can have unlimited openings in either roof right next to the common wall. The taller wall must be of 1-hour fire-resistive construction but may have a wood finish (IBC table 720.1(2)).

But if the higher roof is 30 inches above the lower roof I can't have any openings in the same location and I must use a class C roof and either fire retardant treated plywood or gypsum board under the plywood. That makes absolutely no sense.

Furthermore, as shown in the accompanying photo, I can have multiple applications of this rule within feet of each other on the same roof of the same building! I could have a skylight or a gaping hole in the roof right next to a wall but I can't have any openings where the roofs are at the same elevation. Does it seem more likely that a fire could spread up a wall adjacent the party wall or across a flat roof surface. The answer is obvious.

All townhouses must have sprinkler systems. The code got more restrictive with sprinklers at the same time it got more restrictive with roof construction. That is inexplicable.

And if that wasn't enough, I can build garages or single- or two-family dwellings of unlimited size next to a lot line and I don't need a parapet at all. None of this makes any rational sense.

Following are the sections from the IBC that regulate exterior walls and parapets and the sections identifying various occupancies to support the argument that there is a huge inconsistency between the rules and that the IRC is overly restrictive when it comes to this issue.

SECTION 705
EXTERIOR WALLS
**705.1 General.** Exterior walls shall comply with this section.

**705.11 Parapets.** Parapets shall be provided on exterior walls of buildings.

Exceptions: A parapet need not be provided on an exterior wall when any of the following conditions exist:

1. The wall is not required to be fire-resistance rated in accordance with Table 602 because of fire separation distance.
2. The building has an area of not more than 1,000 square feet (93 m²) on any floor.
3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck or slab and supporting construction, is constructed entirely of noncombustible materials.
4. One-hour fire-resistance-rated exterior walls that terminate at the underside of the roof sheathing, deck or slab, provided:
   4.1. Where the roof/ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction for a width of 4 feet (1220 mm) for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.
   4.2. Where roof/ceiling framing elements are not parallel to the wall, the entire span of such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction.
   4.3. Openings in the roof shall not be located within 5 feet (1524 mm) of the 1-hour fire resistance-rated exterior wall for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.
   4.4. The entire building shall be provided with not less than a Class B roof covering.

5. In Groups R-2 and R-3 where the entire building is provided with a Class C roof covering, the exterior wall shall be permitted to terminate at the underside of the roof sheathing or deck in Type III, IV and V construction, provided:

   5.1. The roof sheathing or deck is constructed of approved noncombustible materials or of fire-retardant-treated wood for a distance of 4 feet (1220 mm); or
   5.2. The roof is protected with 0.625-inch (16 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, 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 (1220 mm).

6. Where the wall is permitted to have at least 25 percent of the exterior wall areas containing unprotected openings based on fire separation distance as determined in accordance with Section 705.8.

**310.4 Residential Group R-2.** Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including:

- Apartment houses
- Boarding houses (nontransient) with more than 16 occupants
- Congregate living facilities (nontransient) with more than 16 occupants
- Convents
- Dormitories
- Fraternities and sororities
- Hotels (nontransient)
- Live/work units
- Monasteries
- Motels (nontransient)
- Vacation timeshare properties

**310.5 Residential Group R-3.** Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

- Buildings that do not contain more than two dwelling units
- Boarding houses (nontransient) with 16 or fewer occupants
- Boarding houses (transient) with 10 or fewer occupants
- Care facilities that provide accommodations for five or fewer persons receiving care
- Congregate living facilities (nontransient) with 16 or fewer occupants
- Congregate living facilities (transient) with 10 or fewer Occupants
- Lodging houses with five or fewer guest rooms

**Cost Impact:** Will not increase the cost of construction

This proposal will reduce construction costs if approved.
RB47-16
IRC: R302.2.2.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Delete without substitution:

R302.2.2 Parapets for townhouses. 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 preceding two cases where the roof covering complies with a minimum Class C rating as tested in accordance with ASTM E 108 or UL 790 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 not less than nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a distance of not less than 4 feet (1219 mm) on each side of the wall or walls and any openings or penetrations in the roof are not within 4 feet (1219 mm) of the 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: Perhaps one of the most glaring and obvious inconsistencies in the IRC is the requirement of parapets for townhouses. This requirement for an extension of the property line fire wall is out of date and provides no benefit. It was conceived at a time when sprinklers weren’t required. Now all townhouses must have sprinklers. But they still must have parapets. The parapet requirement for dwellings and garages went away a decade and a half ago. It is time to eliminate the requirement for townhouses as well.

The requirement is inconsistent with other code sections. If I build a single family dwelling to a lot line, I don’t need a parapet and I can build the dwelling of unlimited size on lot after lot after lot. What makes a townhouse more dangerous?

I can build a garage full of vehicles of unlimited size next to a lot where there is a townhouse. The townhouse may only be 6 or 8 hundred square feet but it needs a parapet. The garage does not. There is no logical argument for this inconsistency.

I can build a series of two-family dwellings to lot lines for miles and no parapets are required!

If it serves a purpose then the purpose should apply to all structures built under the IRC. If it serves no purpose for dwellings and garages, then it serves no purpose for townhouses.

And remember, this wall can be reduced to one hour because of sprinkler requirements. Why have a parapet? No code has ever required a parapet for a one hour wall. There was no requirement for a parapet for two family dwellings when a one hour wall was required.
Cost Impact: Will not increase the cost of construction
This proposal will not increase construction costs because it will allow the elimination of costly parapet construction. Parapets require extension of walls above the roof line and include additional framing, fire protection sheathing, exterior wall coverings, flashings, copings, and related labor, which can be eliminated.


**RB48-16**

**IRC: R302.2.4.**

Proponent: Richard Davidson, representing Self

**2015 International Residential Code**

Delete without substitution:

**R302.2.4 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 fastened 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 wall as provided in Section R302.2, Item 1 or 2.

**Reason:** If I have two one-hour walls I need structural independence. But, I can have a common foundation wall.

If I opt for the alternate and use a common two-hour wall, I don't need independence.

So what benefit is provided by structural independence and what purposes is served?

Even where structural independence is required there are three exceptions that allow components to be connected from one dwelling to the other. Isn't it about time that we come to the realization that structural independence is a moot point for townhouses? That horse left the barn when the code was changed to allow townhouses to be built like apartment buildings.

**Cost Impact:** Will not increase the cost of construction

This proposal should reduce costs if approved by reducing regulation.
2015 International Residential Code

R302.2 Townhouses. Common walls. Common walls separating townhouses shall be assigned a fire-resistance rating in accordance with Section R302.2, Item 1 or 2. The common wall shared by two townhouses shall be constructed without 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 in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263.

Revise as follows:

R302.2.4 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 fastened 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 wall as provided in Section R302.2, Item 1 or 2.

Add new text as follows:

R302.2.5 Common wall stability. Common walls shall be designed and constructed to allow collapse of the Townhouse dwelling unit on either side without collapse of the party wall under fire conditions.

Reason: The IRC commentary clarifies that the intent of the Townhouse requirements is for each Townhouse, defined as an attached single family dwelling, to function independently of other Townhouse units. For example the sprinkler system required is NFPA 13-D and not NFPA 13-R which is common for multi-unit buildings under the IBC. Additionally the IRC does not intend for utilities to be shared across walls separating Townhouse dwelling units whether separated with a common wall or two separate fire resistance rated walls. The IRC also intends for the units to be structurally independent to allow demolition or alteration of Townhouse without affecting an adjacent one. The code provides for exceptions to the structural independence due to specific elements such as extending roof coverings, using common foundations, allowing sheathing on both sides of the common wall to be attached to the common studs, and allowing flashing to extend across the common wall between the Townhouse units. The code additionally exempts designs utilizing a common wall from structural independence which seems to encourage the use of common walls due to the structural benefits.

It is unusual in the ICC family of codes for an exception that is a part of a series of exceptions to completely eliminate
a requirement as is the case with exception 5 and structural independence. Additionally lack of structural independence may have a negative impact on structural behavior under fire where structural framing members may extend into a neighboring unit or where the lateral force resisting system may be shared thereby rendering the adjoining Townhouse unit under fire structurally unstable during or after a fire event. Exception 5 contradicts the intent of the code.

We believe that the common wall separation was proposed to act similarly to a fire wall and that due to the prescriptive nature of the IRC requirements, many of the performance based rules were simplified when compared to the IBC. However with the wide adoption of the IRC it is clear that there are significant differences in requirements between the IBC Group R-3 and R-2 occupancies and residential uses regulated under the IRC. Many developers are choosing Townhouse designs under the IRC rather the IBC due to less restrictive fire separation and means of egress requirements among-st other reasons. So this anomaly of exception 5 is becoming a more frequent issue in establishing the applicable code to enforce and the occupancy classification.

We believe that the common wall requirements as proposed in the IRC will accomplish the intent of the fire separation requirements and as a collateral benefit will result in the level of structural independence intended.

Townhouses prior to the 2009 IRC did not require fire sprinklers and were separated with two one-hour walls or a common 2 hour wall. After adoption of the sprinkler requirements into the IRC the fire resistance of the separation in either configuration was changed to one-hour. In the 2015 IRC Townhouses separated with two independent one hour walls offer a level of structural independence not provided with the common wall option. Generally when the code provides options the two options should provide equivalent results. However, exception 5 will not result in building performance to Townhouses separated with two independent one hour walls constructed per Section R302.1.

**Cost Impact:** Will increase the cost of construction

The proposed code change will not allow the sharing of structural elements and systems, however when the loads resisted are divided by 1/2 due to a lack of load sharing it is expected that the quantity of additional materials will not double as a consequence of applying the code change to a project. The IRC has many prescriptive solutions and does not intend for beams to be used without a structural design. Additionally braced wall panel requirements allow for wall bracing utilizing narrow panels.
RB50-16
IRC: R302.3.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R302.3 Two-family dwellings. Dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E 119 or UL 263. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:
1. A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.
2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings and the structural framing supporting the ceiling is protected by not less than 5/8-inch (12.7 mm) gypsum board or equivalent.

Where an attic occurs above dwelling units, an attic draft stop constructed as specified in Section R302.12.1 shall be provided above and along the wall assembly separating the dwelling units.

Reason: All two family dwellings are required to be sprinklered. The exception is now the rule and the code should be written that way. The section assumes that sprinklers will be installed. In other words the building will be built to code. This proposal is recognition of current code language.

Cost Impact: Will not increase the cost of construction
This is an editorial revision and should have no impact on construction costs.
2015 International Residential Code

Revise as follows:

R302.3 Two-family dwellings. Dwelling units in two-family dwellings shall extend from foundation to roof, be provided with a yard or public way on not less than three sides and shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E 119 or UL 263. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and exterior wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. A fire-resistance rating of $\frac{1}{2}$-hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.

2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than $\frac{5}{8}$-inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings and the structural framing supporting the ceiling is protected by not less than $\frac{1}{2}$-inch (12.7 mm) gypsum board or equivalent.

Exceptions:

1. A fire-resistance rating of $\frac{1}{2}$-hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904.

2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than $\frac{5}{8}$-inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings and the structural framing supporting the ceiling is protected by not less than $\frac{1}{2}$-inch (12.7 mm) gypsum board or equivalent.

3. Dwelling units in two-family dwellings shall be permitted to be vertically stacked where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 and the dwelling units are separated by a floor assembly having a 1/2-hour fire-resistance rating where tested in accordance with ASTM E 119 or UL 263.

Reason: Most people envision duplexes as side-by-side dwellings. Where duplexes are stacked they can potentially involve a one-story home with an occupiable attic over a 2-story home, i.e. from a firefighting and rescue perspective, a 4-story structure. Although the code intends to require sprinklers in all new homes, 16 states legislatively prohibit enacting this requirement at the state or local level. It is a well-established fact that fires spread much more quickly in a vertical direction than a horizontal direction, and when the fire breaches a window or door, flames will quickly envelop occupied spaces and attics above. This proposal addresses the concern by limiting
stacked duplexes such that they would only be allowed when sprinklers are provided and allows reduction of the required separation to 1/2 hour based on Section P2904 compliant sprinkler systems.

**Cost Impact:** Will not increase the cost of construction
Since the IRC already requires sprinklers in all dwellings, this proposal does not increase the cost of constructing a two-family dwelling in accordance with the model code.
2015 International Residential Code

Revise as follows:

R302.3 Two-family dwellings. Dwelling units in two-family dwellings located on a single lot shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E 119 or UL 263 or Chapter 7 of the International Building Code. Dwelling units in two-family dwellings divided by a lot line shall be separated by two 1-hour fire resistance rated wall assemblies tested in accordance with ASTM E119, UL 263 or Chapter 7 of the International Building Code. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. A fire-resistance rating of $\frac{1}{2}$ hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.
2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than $\frac{5}{8}$-inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings and the structural framing supporting the ceiling is protected by not less than $\frac{1}{2}$-inch (12.7 mm) gypsum board or equivalent.

Reason: There has been confusion regarding the separation between two dwelling units in a two-family dwelling. The code requires a one-hour fire-resistance assembly between the units. However, there is an ICC Committee interpretation (41-03) that states "An attached two-family dwelling with a property line between the two dwelling units is considered two separate buildings, located on two separate lots. Two individual dwellings must comply with the fire separation distance required in Section R302.1." ICC seminars also support this position. The intent of this proposal is to clarify this requirement by including the language to clarify that a two-family dwelling on a single lot would be constructed as a single building and the single one-hour wall would be acceptable. However, if a lot line is placed between the two dwelling units, you would have a dwelling on a separate lot and the exterior walls would need to be protected in accordance with Section 302 as separate buildings. We are just trying to make sure the code reads the way it is intended to read.

Cost Impact: Will increase the cost of construction
This may increase the cost in jurisdictions that have only been requiring a single one-hour wall between the dwelling units.

RB52-16 : R302.3-
THOMAS12605
2015 International Residential Code

Revise as follows:

R302.4 Dwelling unit rated penetrations. Penetrations of wall or floor-ceiling assemblies required to be fire-resistance rated in accordance with Section R302.2 or R302.3 shall be protected in accordance with this section.

**Exception:** Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313.

**Reason:** Following this reason statement is text from NFPA 13D. Note that the purpose of the system is that it aids in the detection and control of residential fires and is expected to prevent flashover. Penetration protection is intended to prevent fire from penetrating the fire-resistive membrane of rated assemblies. With the requirement for sprinklers, fires are intended to be controlled thus preventing their spread into these rated assemblies. This makes this penetration protection redundant and unnecessarily expensive. You are protecting against something that should never occur. Additionally, any cost savings from this exception will help to offset the cost of sprinkler installations.

1.1* Scope.

1.1.1 This standard shall cover the design, installation, and maintenance of automatic sprinkler systems for protection against the fire hazards in one- and two-family dwellings and manufactured homes.

1.1.2 This standard assumes that the sprinkler system is designed to protect against a fire originating from a single ignition location.

1.2* Purpose.

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.

A.1.1 NFPA13D is appropriate for protection against fire hazards only in one- and two-family dwellings and manufactured homes. Residential portions of any other type of building or occupancy should be protected with residential sprinklers in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, or in accordance with NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and including Four Stories in Height. Other portions of such buildings should be protected in accordance with NFPA 13 or NFPA 13R as appropriate for areas outside the dwelling unit.

The criteria in this standard are based on full-scale fire tests of rooms containing typical furnishings found in residential living rooms, kitchens, and bedrooms. The furnishings were arranged as typically found in dwelling units in a manner similar to that shown in Figure A.1.1(a), Figure A.1.1(b), and Figure A.1.1(c). Sixty full-scale fire tests were conducted in a two-story dwelling in Los Angeles, California, and 16 tests were conducted in a 14 ft (4.3 m) wide mobile home in Charlotte, North Carolina.

Sprinkler systems designed and installed according to this standard are expected to prevent flashover within the compartment of origin where sprinklers are installed in the compartment. A sprinkler system designed and installed according to this standard cannot, however, be expected to completely control a fire involving fuel loads that are significantly higher than average for dwelling units [10 lb/ft² (49 kg/m²)] and where the interior finish has an unusually high flame spread index (greater than 225) when tested in accordance with ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, or ANSI/UL 723, Standard for Test for Surface Burning Characteristics of Building Materials. (For protection of multifamily dwellings, see NFPA 13 or NFPA 13R.)

A.1.2 While the purpose of this standard is to provide improved protection against injury and loss of life, the use of these systems has demonstrated an ability to provide improved protection against property damage. Various levels of fire safety are available to dwelling occupants to provide life safety and property protection.

This standard recommends, but does not require, sprinklering of all areas in a dwelling; it permits sprinklers to be omitted in certain areas. These areas have been proved by NFPA statistics [see Table A.1.2(a) and Table...
A.1.2(b)] to be those where the incidence of life loss from fires in dwellings is low. Such an approach provides a reasonable degree of fire safety. Greater protection to both life and property is achieved by sprinkling all areas.

Guidance for the installation of smoke detectors and fire detection systems is found in NFPA 72, National Fire Alarm and Signaling Code.

**Cost Impact:** Will not increase the cost of construction
This proposal will reduce costs if approved by lessening regulations.
2015 International Residential Code

Revise as follows:

R302.4.2 Membrane penetrations. Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.

Exceptions:

1. Membrane penetrations of not more than 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m²) in area provided that the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m²) in any 100 square feet (9.29 m²) of wall area. The annular space between the wall membrane and the box shall not exceed \(\frac{1}{8}\) inch (3.1 mm). Such boxes on opposite sides of the wall shall be separated by one of the following:
   1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities.
   1.2. By a horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation.
   1.3. By solid fireblocking in accordance with Section R302.11.
   1.4. By protecting both boxes with listed putty pads.
   1.5. By other listed materials and methods.

2. Membrane penetrations by listed electrical boxes of any materials provided that the boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The annular space between the wall membrane and the box shall not exceed \(\frac{1}{8}\) inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall shall be separated by one of the following:
   2.1. By the horizontal distance specified in the listing of the electrical boxes.
   2.2. By solid fireblocking in accordance with Section R302.11.
   2.3. By protecting both boxes with listed putty pads.
   2.4. By other listed materials and methods.

3. The annular space created by the penetration of a fire sprinkler provided that it is covered by a metal escutcheon plate.

4. Ceiling membrane penetrations by listed luminaires or by luminaires protected with listed materials, that have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing.

Reason: This proposal is intended to bring consistency between the International Residential Code and the International Building Code. A similar proposal, FS 67-15, submitted under the Group A code cycle, was Approved as Submitted by the committee and received no public comments.
The proposal adds an additional exception which recognizes the listings of recessed incandescent and fluorescent can lights, or enclosure materials which protect recessed can lights or troffer light fixtures, which have been tested as a ceiling membrane penetration of fire-resistance-rated horizontal assemblies. There are currently twenty-six UL listed can lights which incorporate integral fire protection which have evaluated for use in fire-resistance-rated horizontal assemblies. Similarly there are eleven UL listed enclosure materials which have been evaluated for their ability to protect penetrations in ceiling membranes by non fire rated can lights or troffer light fixtures.

**Cost Impact:** Will not increase the cost of construction
This code change proposal will not increase the cost of construction. These products are already in use within the construction industry.
RB55-16
IRC: R302.5.1.
Proponent: William Miller, Senior Inspector, County of Warren, VA, representing County of Warren, VA (wmiller@warrencountyva.net)

2015 International Residential Code

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 a solid wood doors, door and frame assembly not less than 1\(\frac{3}{8}\) inches (35 mm) in thickness, solid or honeycomb-core steel doors, door and frame assembly not less than 1\(\frac{3}{8}\) inches (35 mm) thick, or 20-minute fire-rated doors, door and frame assembly, equipped with a self-closing device.

Reason: Frame should be included as part of the fire protection as an assembly. Door alone is compromised by not including the frame.

Cost Impact: Will increase the cost of construction
Minimal additional cost
RB56-16
IRC: R302.5.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

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 1 3/8 inches (35 mm) in thickness, solid or honeycomb-core steel doors not less than 1 3/8 inches (35 mm) thick, or 20-minute fire-rated doors, equipped with a self-closing device.

Reason: Merely providing a door with a self-closing device provides no benefit. The text doesn't require the door to latch.

The IBC contains specific language on the operation of a door closing device and a latch. This being absent in the IRC can only mean that you must provide a device but the door is not required to latch. In fact, there is no requirement for a latch on this door at all.

From the IBC:

406.3.4 Separation. Separations shall comply with the following:
• The private garage shall be separated from the dwelling unit and its attic areas by means of gypsum board, not less than ½ inch in thickness, applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than a 5/8-inch Type X gypsum board or equivalent and ½-inch gypsum board applied to structures supporting the separation from habitable rooms above the garage. Door openings between a private garage and the dwelling shall be equipped with either solid wood doors or solid or honeycomb core steel doors not less than 1 3/8 inches in thickness, or doors in compliance with Section 716.5.3 with a fire protection rating of not less than 20 minutes. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Doors shall be self-closing and self-latching.

716.5.9 Door closing. Fire doors shall be self- or automatic-closing in accordance with this section. Self-closing chute intake doors shall not fail in the "door open" position in the event of a closer failure.
716.5.9.1 Latch required. Unless otherwise specifically permitted, single fire doors and both leaves of pairs of side-hinged swinging fire doors shall be provided with an active latch bolt that will secure the door when it is closed.

Let's look at this realistically. What is the risk in the garage? We don't even require a full blown rated separation or a rated door. All we require is a membrane. What in the garage is a hazard? How often do cars catch fire all by themselves? When they do it is an extremely rare occurrence cause by an engineering defect. I've read comments against proposals like this in the past where there have been suggestions of carbon monoxide, fumes from burning kids toys, and a host of other off the wall excuses. The facts are that garage fires are a rare occurrence and a fire penetrating a home through an open door is even rarer. Certainly in a minimum code this requirement is an overreach.

Put this in perspective. There are 6100 garage fires a year. There are 15,600 domestic dryer fires a year. Should dryers be in a fire separated room with a solid door with a closer and a latch? There are 30 deaths a year attributed to garage fires. 20 people die from dog bites each year. 54 people die from lightning strikes each year. 53 people die from bee stings. 37 children died in 2011 from TV sets that toppled over on them! We could save more lives by securing TV sets to a wall. We really don't need to regulate everything to the point where the expectation is that every hazard has been eliminated. This is a minimum standard code.

Cost Impact: Will not increase the cost of construction
If approved this proposal will reduce regulation and costs.
RB57-16

IRC: R302.6.
Proponent: Wayne Richardson, representing Town of Bedford NH (wrichardson@bedfordnh.org)

2015 International Residential Code
Revise as follows:

R302.6 Dwelling-garage Dwelling/habitable space-garage fire separation. No change to text.

<table>
<thead>
<tr>
<th>SEPARATION</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>From the residence and attics</td>
<td>Not less than $\frac{1}{2}$-inch gypsum board or equivalent applied to the garage side</td>
</tr>
<tr>
<td>From habitable rooms above the garage</td>
<td>Not less than $\frac{5}{8}$-inch Type X gypsum board or equivalent</td>
</tr>
<tr>
<td>Structure(s) supporting floor/ceiling assemblies used for separation required by this section</td>
<td>Not less than $\frac{1}{2}$-inch gypsum board or equivalent</td>
</tr>
<tr>
<td>Garages located less than 3 feet from a dwelling unit on the same lot</td>
<td>Not less than $\frac{1}{2}$-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area</td>
</tr>
</tbody>
</table>

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

Reason: Since the IRC is intended for the end user to be able to understand code requirements to label these sections specifically Dwelling-garage separations potentially misleads end users into believing this separation requirement is only applicable to a garage that is attached to a dwelling unit. Since the intent of the IRC is to be applicable to accessory structures as well this change only clarifies this intent for those users not possessing overall familiarity with codes such as a home owner/do-it-yourselfer. This clarification makes it clear to the uninitiated what is required for a detached garage with habitable rooms such as home offices, family entertainment/recreation/media centers, or other similar functions on the level above the garage area.

Cost Impact: Will not increase the cost of construction
There should be no cost impact since these intended separations are part of the existing code.
2015 International Residential Code

R302.5 Dwelling-garage opening and penetration protection. Openings and penetrations through the walls or ceilings separating the dwelling from the garage shall be in accordance with Sections R302.5.1 through R302.5.3.

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 $1\frac{3}{8}$ inches (35 mm) in thickness, solid or honeycomb-core steel doors not less than $1\frac{3}{8}$ inches (35 mm) thick, or 20-minute fire-rated doors, equipped with a self-closing device or an automatic-closing device that is actuated by smoke detection or heat detection.

Reason: The purpose of this modification is to provide an option to use an automatic-closing device that is activated by smoke detection or heat detection on a door opening between the garage and the residence. The option is intended to increase inclusion of the door closer requirement when states and local jurisdictions adopt the International Residential Code. Presently some states and jurisdictions delete this requirement upon adoption. The option is also intended to increase reliability of door closure by allowing options that occupants are comfortable with, preventing disabling and/or removal of the door closers by the occupants due to the inconvenience and difficulties they pose in everyday use.

The proposed code language would allow for multiple solutions currently available on the market, it is not a proprietary product requirement. It will also allow for the application of new technology.

Increased adoption and increased reliability of door closure requirements is an important goal. Studies by Underwriters Laboratories have documented the increased fuel loads in modern buildings, http://newscience.ul.com/articles/modern-residential-fires, and the importance of interrupting the flow path of a developing fire, http://newscience.ul.com/articles/interrupting-the-flow-path. Providing for additional compliance options addresses this goal.

Numerous examples exist where closed doors limited the spread and impact of residential fires.

http://fox6now.com/2015/12/26/greenfield-house-fire-causes-minimal-damage-officials-credit-family-for-containing-blaze/

"They found the bedroom door had been closed. They do that periodically because of the dog they have. When the crews entered the house they found that because the door had been closed, it contained the fire to the room of origin which was that bedroom," said Krueger.

Cost Impact: Will not increase the cost of construction

This proposal will not increase the cost of construction because the net effect is to offer additional methods of compliance for an existing requirement.
RB59-16
IRC: R302.6.
Proponent: Barry Reid, Georgia-Pacific Gypsum LLC, representing Georgia-Pacific Gypsum LLC (bsreid@gapac.com)

2015 International Residential Code
Revise as follows:

<table>
<thead>
<tr>
<th>SEPARATION</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>From the residence and attics</td>
<td>Not less than 1/2-inch Type X gypsum board or equivalent applied to the garage side</td>
</tr>
<tr>
<td>From habitable rooms above the garage</td>
<td>Not less than 5/8-inch Type X gypsum board or equivalent</td>
</tr>
<tr>
<td>Structure(s) supporting floor/ceiling assemblies used for separation required by this section</td>
<td>Not less than 1/2-inch Type X gypsum board or equivalent</td>
</tr>
<tr>
<td>Garages located less than 3 feet from a dwelling unit on the same lot</td>
<td>Not less than 1/2-inch Type X gypsum board or equivalent applied to the interior side of exterior walls that are within this area</td>
</tr>
</tbody>
</table>

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

Reason: Garages often contain flammable materials, liquids, paints, various chemicals, new spapers and other stored items in addition to vehicles. Additionally, many garages are used for storage or converted to living spaces such as bedrooms and dens. When garages are converted for use as occupied spaces, they may not be fitted with smoke alarms or heat sensors. According to FEMA Topical Fire Report Series Volume 14, Issue 12/ November 2013, Residential Building Garage Fires (2009-2011), an estimated 6600 residential building garage fires were reported annually in the US with 93% of these fires occurring in one-and two family residential buildings. This proposal would incrementally increase the fire resistance within the garage without changing the method of construction or dimensions of prescriptive gypsum panels used in garages as listed in table 302.6. When substituting 1/2" gypsum board with 1/2" Type X gypsum board, the fire protection time assigned to the gypsum membrane increases by 10 minutes, per IBC table 722.6.2(1).

We urge your support for this code proposal.

No new standards referenced. Standard specification for gypsum board; ASTM C1396, as listed in IRC R702.3


Cost Impact: Will increase the cost of construction
The substitution of $\frac{1}{2}''$ gypsum board with $\frac{1}{2}''$ Type X gypsum board will have an incremental material cost increase on the overall cost of construction for a residential garage space. For a standard 20'x20' two-car garage with uninhabited space or attic above, the average cost impact for gypsum board for walls and ceilings is estimated to be between $13-15$ per unit. The incremental cost increase for the $\frac{1}{2}''$ Type X gypsum board would result in a ten minute fire protection time increase as assigned to wallboard membranes. $\frac{1}{2}''$ Type X gypsum board is readily available nationwide in standard widths and lengths and can also be used in other areas of residential construction where $1/2''$ gypsum board is used.
2015 International Residential Code

Revise as follows:

R302.7 Under-stair protection. Enclosed accessible space under stairs shall have walls, under-stair surface and any soffits protected on the enclosed side with $\frac{1}{2}$-inch (12.7 mm) gypsum board.

**Exception:** Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313.

**Reason:** With the requirement for sprinklers in the home, the need for these passive systems becomes less important. It is time to eliminate this unnecessary expense. This area is required to have sprinkler protection by NFPA 13D. There are no exemptions in NFPA 13D section 8.6 for sprinklers in these under stair areas.

**Cost Impact:** Will not increase the cost of construction
This proposal will lessen regulation and reduce costs.
2015 International Residential Code

Revising as follows:

R302.9 Flame spread index and smoke-developed index for wall and ceiling finishes. Flame spread and smoke developed indexes for wall and ceiling finishes shall be in accordance with Sections R302.9.1 through R302.9.4.

Exception: Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313.

Reason: Following this reason statement is text from NFPA 13D. Note that the purpose of the system is that it aids in the detection and control of residential fires and is expected to prevent flashover. Flame spread and smoke-developed ratings are significantly less important in sprinklered buildings. The IBC permits the reduction of one class with a fire sprinkler installation which serves as a precedent for this code change. With the requirement for sprinklers, fires are intended to be controlled thus preventing them attaining a level where flame spread is an issue. You are protecting against something that should never occur. Additionally, any cost savings from this exception will help to offset the cost of sprinkler installations.

1.1* Scope.
1.1.1 This standard shall cover the design, installation, and maintenance of automatic sprinkler systems for protection against the fire hazards in one- and two-family dwellings and manufactured homes.
1.1.2 This standard assumes that the sprinkler system is designed to protect against a fire originating from a single ignition location.

1.2* Purpose.
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.

A.1.1 NFPA 13D is appropriate for protection against fire hazards only in one- and two-family dwellings and manufactured homes. Residential portions of any other type of building or occupancy should be protected with residential sprinklers in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, or in accordance with NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height. Other portions of such buildings should be protected in accordance with NFPA 13 or NFPA 13R as appropriate for areas outside the dwelling unit.

The criteria in this standard are based on full-scale fire tests of rooms containing typical furnishings found in residential living rooms, kitchens, and bedrooms. The furnishings were arranged as typically found in dwelling units in a manner similar to that shown in Figure A.1.1(a), Figure A.1.1(b), and Figure A.1.1(c). Sixty full-scale fire tests were conducted in a two-story dwelling in Los Angeles, California, and 16 tests were conducted in a 14 ft (4.3 m) wide mobile home in Charlotte, North Carolina.

Sprinkler systems designed and installed according to this standard are expected to prevent flashover within the compartment of origin where sprinklers are installed in the compartment. A sprinkler system designed and installed according to this standard cannot, however, be expected to completely control a fire involving fuel loads that are significantly higher than average for dwelling units [10 lb/ft² (49 kg/m²)] and where the interior finish has an unusually high flame spread index (greater than 225) when tested in accordance with ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, or ANSI/UL 723, Standard for Test for Surface Burning Characteristics of Building Materials. (For protection of multifamily dwellings, see NFPA 13 or NFPA 13R.)

A.1.2 While the purpose of this standard is to provide improved protection against injury and loss of life, the use of these systems has demonstrated an ability to provide improved protection against property damage. Various levels of fire safety are available to dwelling occupants to provide life safety and property protection. This standard recommends, but does not require, sprinklering of all areas in a dwelling; it permits sprinklers to
be omitted in certain areas. These areas have been proved by NFPA statistics [see Table A.1.2(a) and Table A.1.2(b)] to be those where the incidence of life loss from fires in dwellings is low. Such an approach provides a reasonable degree of fire safety. Greater protection to both life and property is achieved by sprinkling all areas.

Guidance for the installation of smoke detectors and fire detection systems is found in NFPA 72, National Fire Alarm and Signaling Code.

**Cost Impact:** Will not increase the cost of construction
This proposal will lessen regulation and reduce costs.
2015 International Residential Code

Revise as follows:

R302.10.1 Insulation. Insulating materials, including facings, such as vapor retarders and vapor-permeable membranes installed within floor-ceiling assemblies, roof-ceiling assemblies, wall assemblies, crawl spaces and attics shall comply with the requirements of this section. They shall exhibit a flame spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 where tested in accordance with ASTM E 84 or UL 723. Insulating materials, where tested in accordance with the requirements of this section, shall include facings, where used, such as vapor retarders, vapor permeable membranes and similar coverings.

Exceptions:

1. Where such materials are installed in concealed spaces, the flame spread index and smoke-developed index limitations do not apply to the facings, provided that the facing is installed in substantial contact with the unexposed surface of the ceiling, floor or wall finish.
2. Cellulose fiber loose-fill insulation, that is not spray applied, complying with the requirements of Section R302.10.3, shall not be required to meet the smoke-developed index of not more than 450 and shall be required to meet a smoke-developed index of not more than 450 where tested in accordance with CAN/ULC S102.2.
3. Foam plastic insulation shall comply with Section R316.

Reason: The IBC approved FS123 at the committee hearings (as amended) and the key issue was the clarification that the section 720.1 (equivalent to this one) was unclear. Rationale was: "This is simple clarification and language cleanup. Section 720.1 is intended to apply to all insulating materials but the sentence as is causes confusion because it refers to two types of insulation materials, namely (1) facings such as vapor retarders and vapor-permeable membranes and similar coverings and (2) all layers of single and multilayer reflective foil insulations. Therefore it is better if they are shown in a separate sentence at the end of the section that way the sentence is clearer."

Since the IRC does not have any information on reflective insulation, this proposed change does not include them, so that it is a primarily editorial change.

Cost Impact: Will not increase the cost of construction
Change is primarily editorial.
2015 International Residential Code

Revise as follows:

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

Fireblocking shall be provided in wood-framed 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 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.

**Exception** Dwellings provided with an automatic fire sprinkler system in accordance with Section R313 shall not be required to comply with this section.

**Reason:** Following this reason statement is text from NFPA 13D. Note that the purpose of the system is that it aids in the detection and control of residential fires and is expected to prevent flashover. Fireblocking by definition is intended to prevent the spread of fire through concealed areas of the building. But, if the fire is controlled by sprinklers before it can enter into these concealed areas, the issue becomes moot. You are protecting against something that should never occur. Additionally, any cost savings from this exception will help to offset the cost of sprinkler installations.

1.1* Scope.
   1.1.1 This standard shall cover the design, installation, and maintenance of automatic sprinkler systems for protection against the fire hazards in one- and two-family dwellings and manufactured homes.
   1.1.2 This standard assumes that the sprinkler system is designed to protect against a fire originating from a single ignition location.

1.2* Purpose.
   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.

A.1.1 NFPA 13D is appropriate for protection against fire hazards only in one- and two-family dwellings and manufactured homes. Residential portions of any other type of building or occupancy should be protected with residential sprinklers in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, or in accordance with NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height. Other portions of such buildings should be protected in accordance
with NFPA 13 or NFPA 13R as appropriate for areas outside the dwelling unit.

The criteria in this standard are based on full-scale fire tests of rooms containing typical furnishings found in residential living rooms, kitchens, and bedrooms. The furnishings were arranged as typically found in dwelling units in a manner similar to that shown in Figure A.1.1(a), Figure A.1.1(b), and Figure A.1.1(c). Sixty full-scale fire tests were conducted in a two-story dwelling in Los Angeles, California, and 16 tests were conducted in a 14 ft (4.3 m) wide mobile home in Charlotte, North Carolina.

Sprinkler systems designed and installed according to this standard are expected to prevent flashover within the compartment of origin where sprinklers are installed in the compartment. A sprinkler system designed and installed according to this standard cannot, however, be expected to completely control a fire involving fuel loads that are significantly higher than average for dwelling units [10 lb/ft² (49 kg/m²)] and where the interior finish has an unusually high flame spread index (greater than 225) when tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or ANSI/UL 723, Standard for Test for Surface Burning Characteristics of Building Materials. (For protection of multifamily dwellings, see NFPA 13 or NFPA 13R.)

A.1.2 While the purpose of this standard is to provide improved protection against injury and loss of life, the use of these systems has demonstrated an ability to provide improved protection against property damage. Various levels of fire safety are available to dwelling occupants to provide life safety and property protection. This standard recommends, but does not require, sprinkling of all areas in a dwelling; it permits sprinklers to be omitted in certain areas. These areas have been proved by NFPA statistics [see Table A.1.2(a) and Table A.1.2(b)] to be those where the incidence of life loss from fires in dwellings is low. Such an approach provides a reasonable degree of fire safety. Greater protection to both life and property is achieved by sprinkling all areas.

Guidance for the installation of smoke detectors and fire detection systems is found in NFPA 72, National Fire Alarm and Signaling Code.

Cost Impact: Will not increase the cost of construction
This proposal will lessen costs by reducing regulations.
SECTION R202 DEFINITIONS

[RB] DRAFT STOP. A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and attics.

R302.12 - Draftstopping. In combustible construction where there is usable space both above and below the concealed space of a floor-ceiling assembly, draftstopping shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m²). Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below, draftstopping shall be provided in floor-ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

R302.12.1 - Materials. Draftstopping materials shall be not less than \( \frac{1}{2} \)-inch (12.7 mm) gypsum board, \( \frac{3}{8} \)-inch (9.5 mm) wood structural panels or other approved materials adequately supported. Draftstopping shall be installed parallel to the floor framing members unless otherwise approved by the building official. The integrity of the draftstopping shall be maintained.

R502.12 - Draftstopping required. Draftstopping shall be provided in accordance with Section R302.12.

Reason: The IRC requires draft stops in floors of dwellings where the concealed space exceeds 1000 square feet. The IBC does not require draft stops in floor assemblies of dwellings whether sprinkler systems exist or not (IBC section 718.3.2). Why is the IRC more restrictive? The existence or lack thereof of sprinkler systems is irrelevant. Installing effective draft stops in residential floor assemblies is problematic. They are filled with ductwork, lighting, wiring, speakers, and other devices. Yet these spaces are rarely the source of residential fires if statistics are accurate. The purpose of draft stops is to restrict movement of air. While this may be legitimate in large structures, it is much less important in the average home. In homes with basements, it is a rare occurrence that the entire basement ceiling will have a lid. There are often utility spaces that don’t have ceiling coverings. Without a full lid the space is not concealed and a draft stop is not required. The code now requires that homes have sprinklers which are intended to eliminate residential fires.

With a sprinkler system, the fire should never get into this floor space. Eliminating the draft stops can help offset the cost of the sprinkler system.

Cost Impact: Will not increase the cost of construction
This proposal will lessen costs by eliminating regulations.
RB65-16
IRC: R302.13.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R302.13 Fire protection of floors. Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a $\frac{1}{2}$-inch (12.7 mm) gypsum wallboard membrane, $\frac{5}{8}$-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor and stair framing members. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.

Exceptions:
1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system R313.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies shall be permitted to be unprotected where complying with the following:
   3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m$^2$) per story
   3.2. Fireblocking in accordance with Section R302.11.1 is 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 (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.
5. Decks, balconies, and porches.

Reason: Does anyone know of any other approved sprinkler systems besides P2904 or NFPA 13D which are found in section R313? I rest my case.
Regarding decks, porches, etc., wouldn't it be blatantly obvious to the fire service if there is a fire under one of these structures and wouldn't they take the proper precautions? There are serious issues with putting a lid on the underside of a floor system that is porous.

Cost Impact: Will not increase the cost of construction
This proposal will lessen costs by reducing regulations.
R302.13 Fire protection of floors. Floor assemblies and stairs that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a $1/2$-inch (12.7 mm) gypsum wallboard membrane, $5/8$-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member members or stair framing. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.

Exceptions:
1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, 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 shall be permitted to be unprotected where complying with the following:
   3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m$^2$) per story
   3.2. Fireblocking in accordance with Section R302.11.1 is 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 (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Reason: It seems inconsistent to require a floor to be protected but not the stair that may be needed to access it. Stair jacks are typically cut so that the remaining portion of the jack is about 4 inches in depth. If this were a floor it would be required to be protected. Stair treads are at most 1 ½ inches in depth. Shouldn't stairs be protected to the same extent that the floors are?

Cost Impact: Will increase the cost of construction
This proposal may increase costs where stair design intended that no gypsum board protection be provided under the stair.
RB67-16
IRC: R302.13.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R302.13 Fire protection of floors.

Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, or 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted. Walls, columns, or other members supporting assemblies required to be protected by this section shall be provided with protection equivalent to that provided for the floor.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section R2904, NFPA 13D, or other approved equivalent sprinkler system.

2. Floor assemblies located directly over a crawl space not intended for storage required to be protected by Sections R302.3, R302.6, or fuel-fired appliances.

3. Portions of floor assemblies shall be permitted to be unprotected where complying with the following:
   3.1. A maximum of 150 square feet of floor assembly in each story is allowed be unprotected. The unprotected assembly must be separated from the protected assembly by a layer of 1/2-inch gypsum board, 5/8-inch structural panel sheathing, or solid sawn lumber blocking applied around the perimeter of the unprotected area.
   3.2. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m²) per story.
   3.3. Floor assemblies or landings where the underfloor space is enclosed on all sides and a means to access such underfloor space is not provided.
   3.4. Floor assemblies where the underfloor space is exposed to the exterior or is not within surrounding foundation walls of the dwelling such as, but not limited to decks, porches, or dwellings constructed on piers.
   3.5. Floor assemblies of additions to existing dwellings.
   3.6. Fireblocking in accordance with Section R302.11.1 is installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
   3.7. Floor assemblies in detached accessory structures.

4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.
**Reason:** This revision involves a little language cleanup for clarity, readability, and reasonability. The first paragraph has largely editorial revisions. A new sentence has been added that addresses protection of structural members supporting the fire protected floor assembly. There are numerous examples in the IRC consistent with this language including protection of walls in a garage when the ceiling is part of the garage/dwelling separation. Remember, the garage separation is not an assembly either, just a membrane. This change also acknowledges the possibility that load bearing walls may be steel studs that could fail long before the floor does. There needs to be some consistency in the thought process.

In exception #1, the reference to other approved systems is deleted. If other systems are known to exist, they should be noted. Otherwise the code already allows consideration of equivalencies.

The second exception is proposed for deletion. Crawl spaces aren’t required to have sprinkler protection. Crawl spaces will be used for storage if there is access provided. Let’s not kid ourselves. Let’s simplify the process because you cannot plan check or inspect “not intended for”. The builder/owner can decide to either add sprinkler protection, provide the membrane protection, or seal the area off completely.

A new second exception is added that specifically identifies the three locations in the code where floor assemblies must have a fire-resistant membrane. No more guessing.

The first two subsections of the third exception are combined into one exception as both parts must be used together to make sense. As currently written, one can take them as two different exceptions because that is how it is written. This can cause confusion and a lack of uniformity. Furthermore, the exception has been amended to increase the size of the unprotected space from 80 square feet to 150 square feet. Furnace/mechanical/laundry rooms are the most problematic places for compliance when with pipes, ducts, vents, etc., making a ceiling installation difficult. Most of these spaces exceed 80 square feet (which is an arbitrary limit) so again we are faced with boxing out small portions of the ceiling to meet the 80 square foot limit. 150 square feet is a more workable size. The exception is further revised to address the perimeter separation. The term “fire blocking” is inappropriate for this application as many methods do not lend themselves to this environment and fire blocking by definition is intended for concealed spaces.

Additional means to allow unprotected portions of floor assemblies are addressed with several new items.

An exception is provided for landings and floor assemblies that are completely enclosed and not provided with a means to access such space thereby preventing fires from spreading to those areas.

An exception is provided for floors open to the exterior (decks, porches). It should be readily identifiable to the fire service if the space under such areas is on fire.

An exception is added for additions to existing dwellings. It makes little sense to require the basement ceiling of a 12 X 12 addition to an existing 2000 square foot house to be protected when the rest of the ceiling is unprotected. The rule has to have some semblance of reasonableness. Homes that have sprinkler protection will already be covered.

The last exception excludes protection for floors for detached accessory structures. This might be an attic storage space in a detached garage or the second floor of a small children’s play house. There should be no need for entry of the fire service into these areas as they are not habitable space.

Exception number four is proposed for deletion for several reasons. New homes and additions are occasionally constructed with a mix of different size floor framing members. This can result in a patchwork of floor systems that require protection mixed with some that don’t. No one believes that such a system serves any purpose.

And, recent studies show there is little difference in the performance of various structural floor systems in fire conditions. We need to do what many folks said at the hearings when this proposal was approved and “level the playing field”, “protect them all”. Is a floor of 2X8’s 12” o.c. less resistant to collapse from a fire than 2X10’s at 24” o.c.? I doubt it. Let’s eliminate the confusion and “level the playing field”. Protect them all.

**Cost Impact:** Will not increase the cost of construction

This proposal should reduce costs by lessening regulations.
2015 International Residential Code

Revise as follows:

**R302.13 Fire protection of floors.** Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a $\frac{1}{2}$-inch (12.7 mm) gypsum wallboard membrane, $\frac{5}{8}$-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.

**Exceptions:**

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, 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 shall be permitted to be unprotected where complying with the following:
   3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m$^2$) per story
   3.2. Fireblocking in accordance with Section R302.11.1 is 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 (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

**Reason:** The requirement for installing protection on the underside of a floor assembly over a crawl space where a fuel-fired appliances is installed in the crawl space first appeared in Section 501.3 of the 2012 edition of the IRC. The text came in during the final action hearings of RB31-09/10, when three public comments were combined into the final text. In the 2015 edition, the text was moved into Section R302.13.

Looking at the public comments associated with RB31-09/10, there is no substantiation or technical justification for including fuel-fired appliances. Listed gas-fired appliances are tested to the ANSI Z21/83 standards that are recognized and used not only in the United States but also Canada and other countries. Gas appliances are required to undergo testing that measures the temperatures on surrounding construction while the appliance is in an "over-fired" condition. All listed gas appliances are required to state the necessary clearance to combustible construction in the installation instructions.

Singling out fuel-fired appliances as a trigger for protecting the underside of a floor assembly over a crawl space is not justified. This provision imposes an unfair burden on gas appliances and provides an incentive for builders to install electric appliances instead, even though those appliances also produce heat and may contribute to elevated temperatures in their surroundings.

Acceptable but less desirable alternatives to this proposal would be to limit the requirement for protection when unlisted fuel-burning appliances are installed in the crawl space. This would recognize the fact that the temperatures on surrounding construction for unlisted appliances may not be known. Another alternative would be to include any heat-producing appliance that may be installed in the crawl space. Doing so would then address the presumed issue of concern (elevated temperatures) in a manner that does not discriminate based on the energy source.
source for the appliance.

Cost Impact: Will not increase the cost of construction. This proposal will reduce the cost of construction by removing a requirement from the code for certain installations.
2015 International Residential Code

Revise as follows:

R302.13 Fire protection of floors. Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, 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 shall be permitted to be unprotected where complying with the following:
   3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m²) per story
   3.2. Fireblocking in accordance with Section R302.11.1 is 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 (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Reason:

1. In general, the law states the purpose of a building code is to establish minimum requirements to safeguard the public health, safety, and general welfare, and to provide safety to firefighters and emergency responders during emergency operations. (See 3 Intent).
2. Underwriters Laboratory (UL) echoed the intent of the law on page 3 of their test report, Improving Fire Safety by Understanding the Fire Performance of Engineered Floor Systems and Providing the Fire Service with Information for Tactical Decision Making, stating, "The main objective of this study was to improve firefighter safety by increasing the level of knowledge on the response of residential flooring systems to fire. Several types (or series) of experiments were conducted and analyzed to expand the body of knowledge on the impact of fire on residential flooring systems."
3. UL concludes on page 69 of their test report, "This research study provides data to substantiate the need to protect dimensional lumber floor systems to improve firefighter safety."
4. The Structural Building Components Association (SBCA) recently undertook testing at NGC Testing Services (NGC), an International Accreditation Service (ICC-IAS) accredited ISO/IEC 17025 ASTM E119 fire testing facility. SBCA chose to test at NGC versus UL so that the SBCA ASTM E119 test procedure and the resulting test data would be an independent verification of floor assembly performance. SBCA testing shows 2x10 floor assembly performance was 10:35 minutes. This result confirms UL testing results (Table 1).
# UL and SBCA ASTM E119 100% Design Load

Fire Test Data is Aligned – Says Protect Everything

## UL ASTM E119, Unprotected Floor Assembly, 100% Design Load Fire Endurance Performance Benchmark Tests

<table>
<thead>
<tr>
<th>Test Member Recent UL Test Data</th>
<th>UL Test [% design load]</th>
<th>Time of Total Structural Failure</th>
<th>Time of Failure Load Bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x10 Dimension Lumber</td>
<td>UL Data [100%]</td>
<td>7:04 (min:sec)</td>
<td>7:04 (min:sec)</td>
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<tr>
<td>9-1/2&quot; I-Joist</td>
<td>UL Data [100%]</td>
<td>2:20 (min:sec)</td>
<td>2:20 (min:sec)</td>
</tr>
</tbody>
</table>

## SBCA ASTM E119, Unprotected Floor Assembly, 100% Design Load Fire Endurance Performance Benchmark Tests

<table>
<thead>
<tr>
<th>Test Member March 2016 SBCA Test Data</th>
<th>NGC Test [% design load]</th>
<th>Total Applied Load (psf)</th>
<th>Time to Failure (min:sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x10 Southern Pine (18&quot; o.c.)</td>
<td>NGC FC-853 [100%]</td>
<td>42.0</td>
<td>10:35 (min:sec)</td>
</tr>
<tr>
<td>12&quot; Trusses no SPs (24&quot; o.c.) (1)</td>
<td>NGC FC-858 [100%]</td>
<td>48.5</td>
<td>6:54 (min:sec)</td>
</tr>
<tr>
<td>9-1/2&quot; Flak Jacket I-joist (19.2&quot; o.c.) (3)</td>
<td>NGC FC-855 [100%]</td>
<td>84.0</td>
<td>6:37 (min:sec)</td>
</tr>
<tr>
<td>12&quot; Trusses no SP (24&quot; o.c.) (2)</td>
<td>NGC FC-854 [100%]</td>
<td>48.5</td>
<td>6:02 (min:sec)</td>
</tr>
<tr>
<td>9-1/2&quot; I-Joist (19.2&quot; o.c.) (4)</td>
<td>NGC FC-855 [100%]</td>
<td>84.0</td>
<td>4:25 (min:sec)</td>
</tr>
<tr>
<td>12&quot; Trusses w/SPs (24&quot; o.c.) (2)</td>
<td>NGC FC-856 [100%]</td>
<td>52.3</td>
<td>3:33 (min:sec)</td>
</tr>
</tbody>
</table>

Notes on this table: (1) SP=splice joint & this test had strong-back to bearing; (2) SP=splice joint & this test had strong-back but NOT to bearing. (3) Flak Jacket was ICC-ES ESR-1153 approved 2013 product from market to be sold inventory. ICC-ES approved design values and holes were incorporated. (4) ICC-ES approved design values and holes were incorporated.

### Table 1– ASTM E119 Unprotected Floor Assembly Testing at 100% Design Load

5. For more information and details on the reasons that exception 4 should be immediately deleted in any jurisdiction that has adopted this language please visit [www.sbcindustry.com/fireprotectionfloors](http://www.sbcindustry.com/fireprotectionfloors).

**Cost Impact:** Will increase the cost of construction

This proposal will increase the cost of construction when materials falling under the current exception #4 language are used by requiring a minimum 1/2" gypsum wallboard to be installed.
RB70-16
IRC: R303.3.
Proponent: Anthony Floyd, Energy Code Specialist, City of Scottsdale, representing City of Scottsdale
(afloyd@scottsdaleaz.gov)

2015 International Residential Code

Revise as follows:

R303.3 Bathrooms. Bathrooms, water closet compartments and other similar rooms shall be provided with aggregate glazing area in windows of not less than 3 square feet (0.3 m$^2$), one-half of which must be openable. A local exhaust system shall be provided in accordance with Section M1507. Exhaust air from the space shall be discharged directly to the outdoors.

**Exception:** The glazed areas shall not be required where artificial light and a local exhaust system are provided. The minimum local exhaust rates shall be determined in accordance with Section M1507. Exhaust air from the space shall be exhausted directly to the outdoors.

**Reason:** Both intermittent and continuous bathroom exhaust systems reduce the risk of mold growth which is a significant health concern in homes. They are far more effective at removing moisture and odor than an operable window that is usually left closed during the winter and summer months of the year. During a bath or shower, the humidity level in a bathroom can be a perfect breeding ground for mold, mildew and microorganisms that can impact health. Excess moisture has tremendous potential for damaging a home. It cracks and peels paint, ruins gypsum wallboard, causes exterior paint failure, warps doors and rusts cabinets and fixtures. Without control, it can even cause deterioration of joists and framing. As it condenses on windows, walls, ceilings and cabinets, it attracts dirt. It encourages mildew on tile grout and generally provides an environment for increased bacterial growth that is unsanitary and unhealthy for occupants. Bathroom exhaust fans are therefore an essential means for removing excess moisture and odor.

**Bibliography:** Home Ventilating Institute - http://www.hvi.org/publications/How_MuchVent.cfm


**Cost Impact:** Will increase the cost of construction
Exhaust fan costs range from $14 for a basic 50 cfm unit to $128 for a 80 cfm unit with integrated light, humidity sensor control, adjustable speed, and quiet sound rating. The minimum cost for a roof vent kit with flex duct is $23. Bathroom exhaust fans minimize the potential for building damage, saving the cost of making repairs to correct problems that could have been easily avoided.
RB71-16
IRC: R303.4.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R303.4 Mechanical ventilation. Where the air infiltration rate of a dwelling unit is 5 air changes per hour or less where tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3.

Exception: Existing dwelling units undergoing additions, alterations, or repairs.

Reason: The current rule appears to apply to existing homes and this can cause a disincentive to maintain a property due to the cost of this mechanical ventilation system.

Cost Impact: Will not increase the cost of construction
This revision should reduce costs by lessening regulations.
2015 International Residential Code

Revise as follows:

**R303.4 Mechanical ventilation.** Where the air infiltration rate of a *dwelling unit* is 5 air changes per hour or less where tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the *dwelling unit* shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3 of the code.

**Exception:** Mechanical ventilation is not required for dwelling units where at least one of the following conditions is met:

1. The building does not have mechanical cooling and it is in Climate Zone 1 or 2
2. The building is intended to be thermally conditioned for less than 876 hours per year.

**Reason: Summary**

Based on data from a recent study by Lawrence Berkeley National Laboratory\(^1\), homes built after 2000 are generally too tight to provide adequate ventilation air through infiltration (i.e., 0.35 natural air changes per hour cannot be met with homes as leaky as 8 ACH\(_{50}\); see chart below). Since that time, homes have become even tighter, with greater attention given by codes and industry to improve air sealing, save energy, and improve occupant comfort. Over 90% of new single family starts are now required to follow the prescriptive air sealing requirements of the 2009 IECC or later, which easily results in an air tightness level of 5 ACH\(_{50}\) or lower (e.g., an average of < 0.2 natural air changes per hour across 8 climate zones for a typical 2 story house), yet about 70% of these homes have no requirement for mechanical ventilation.\(^2\) Tight homes are clearly standard practice at this point in time, regardless of whether or not a blower door test is conducted. The requirement for mechanical ventilation should also be standard practice, especially because studies have shown that occupants do not open windows frequently enough to provide minimum indoor air quality, largely due to concerns for security and/or comfort.\(^3\,4\) The total incremental cost for adding mechanical ventilation is as low as $70 based on retail equipment pricing for an ENERGY STAR exhaust fan. This is very small cost when compared to the estimated $300 billion annual cost of negative health effects from poor residential IAQ.\(^5\,6\,7\,8\,9\)
Experience from decades of work with builders confirms that achieving a home air tightness of less than 5 \( \text{ACH}_{50} \) is not difficult if the builder just addresses the “big holes” during construction – those mandated by the 2009 air sealing provisions of the IECC and applicable to over 90% of new construction.\textsuperscript{10} Similarly, feedback from building officials and HERS raters have confirmed that following the 2009 IECC air sealing checklist is all that is necessary to achieve building tightness below 5 \( \text{ACH}_{50} \) (and regularly below 3 \( \text{ACH}_{50} \)). Following are some examples of this testimony from internet threads, studies, and personal communications:

- Parker, CO: From 2013-2014, only three of the first 424 air tightness tests conducted on single family homes built by production builders in Parker, CO, failed to achieve 3 \( \text{ACH}_{50} \), with an average score of 2.3 \( \text{ACH}_{50} \). According to the building official, this level of tightness was achieved by simply following the same air tightness checklist that was in the 2009 IECC.\textsuperscript{11}
- California homes built from 2002-2004: Testing of a random sample of 102 tract homes built in California between 2002-2004 (well before the detailed air sealing requirements of the 2009 IECC were developed) showed a median air tightness of 4.8 \( \text{ACH}_{50} \).\textsuperscript{3}
- HERS rater in Illinois: “In my experience with testing homes in new construction, the 5 \( \text{ACH}_{50} \) is too easy to achieve. I find that the builders don’t have to try very hard to get under 5 \( \text{ACH}_{50} \). What I find most disheartening is that they can pass code (5 \( \text{ACH}_{50} \) in Illinois) with a blower door test and not do any attic air sealing or properly seal rim joists - which would be my top priorities in most homes. I had a recent test where I walked away shaking my head. There were the usual suspects that I find with a leaky attic floor - no top plates sealed, leaky recessed lights, unsealed electrical penetrations, etc. Yet, they easily achieve the 5 \( \text{ACH}_{50} \).”\textsuperscript{12}
- Largest HERS Rater in Colorado: “Colorado has had good success in achieving 3 or less \( \text{ACH}_{50} \)
Building Tight without Mechanically Ventilating Can Have Huge Health Impacts

Building tight (e.g., 5 ACH50 and below) has become the new standard practice across 90% of the single family starts across the country, regardless of whether or not a builder confirms the tightness with a blower door test. Of course, the one potential problem with building tight is the negative impact it has on indoor air quality if mechanical ventilation is not provided. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as particulate matter (which can be transmitted to the circulatory system and organs after being introduced to the lungs), radon (the second leading cause of lung cancer), chloroform, formaldehyde, acetaldehyde, and other VOCs that have negative health impacts.

We spend 90% of our time indoors, so it's no wonder that health impacts associated with poor indoor air quality include increased risk or exacerbation of asthma, stroke, neurotoxicity, and cancer, among others. Many indoor air pollutants originate from building materials and finishes. Recent studies have shown that air pollution levels in dwelling units that are not mechanically ventilated can exceed outdoor national air quality standards for CO and NO2 in 7-8% and 55-70% of homes, respectively, during a typical week. Other sources point to the increase in flame retardants in building materials and finishes driven by codes and standards as contributing to the presence of these chemicals in indoor dust and air and ultimately in the bodies of people (33 different flame retardants products have now been discovered in people's bodies; health effects of many of these are still largely unknown). Estimates for the cost of poor indoor air quality are staggering. The cost of asthma triggered by dampness and mold in U.S. residences has been estimated at $3.5 billion annually, and asthma now affects one in five Americans. Even when you exclude radon and second hand smoke from the list of indoor pollutants, poor indoor air quality in U.S. residences is estimated to account for 14% of all years of life lost and years of disability associated with "noncommunicable and nonpsychiatric diseases." Other studies estimate that the total costs associated with negative health effects of poor indoor air quality in U.S. residences exceeds $300 billion annually, which is over 10% of our nation's annual health care costs.
Bibliography:
2. States/jurisdictions that do not have a mechanical ventilation requirement include all of those that are currently enforcing the 2009 IECC. Percentages of new starts in states/jurisdictions that have adopted the 2009 IECC and the 2012 IECC were developed from the following sources:
   - Jurisdictional data: Building department websites of various jurisdictions.
11. Email communication with Gil Rossmiller, Chief Building Official, Parker, CO. Dec 8, 2014.
15. Comment from John Nicholas, HERS Rater with The Energy Guy. Posted on LinkedIn's RESNET.US Group discussion, "How Tough is it to Hit 5 ACH50?" Dec 9, 2014.
17. Comment from Bruce Chyka, Owner at Performance Plus Homes. Posted on LinkedIn's RESNET.US Group discussion, "How Tough is it to Hit 5 ACH50?" Dec 9, 2014.
18. Comment from Nathan Wiltse, Policy Program Manager / Building Economist at Cold Climate Housing Research Center. Posted on LinkedIn's RESNET.US Group discussion, "How Tough is it to Hit 5 ACH50?" Dec 10, 2014.


Cost Impact: Will increase the cost of construction
The incremental cost increase is estimated at ~$70. Costs associated with poor residential indoor air quality in the U.S. are estimated at over $300 billion annually.\textsuperscript{5,6,7,8,9}
2015 International Residential Code

Delete without substitution:

SECTION R304 MINIMUM ROOM AREAS

R304.1 Minimum area. Habitable rooms shall have a floor area of not less than 70 square feet (6.5 m²).

Exception: Kitchens.

R304.2 Minimum dimensions. Habitable rooms shall be not less than 7 feet (2134 mm) in any horizontal dimension.

Exception: Kitchens.

R304.3 Height effect on room area. Portions of a room with a sloping ceiling measuring less than 5 feet (1524 mm) or a furred ceiling measuring less than 7 feet (2134 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required habitable area for that room.

Reason: This is another code section that is argued to be necessary but in the real world this is self-regulating. It is something the market will regulate and there is no need for government regulation. The current room sizes are arbitrary. They have no basis in health and safety but revert to standards adopted in the tenement laws more than a century ago. There is no record of injury, death, or illness that can be mitigated by room sizes. It is simply a convenience factor.

The code allows 7 foot ceilings. How many new homes are built with 7 foot ceilings? Without the rule, would builders build houses with 6 foot ceilings? I doubt it.

The code doesn't even regulate the width of interior doors. Is this a problem? Of course not.

Room areas are just another in a long line of unnecessary regulations cluttering up the IRC.

Cost Impact: Will not increase the cost of construction
This proposal should reduce costs by lessening regulations.
RB74-16
IRC: R305.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R305.1 Minimum height. Habitable space, hallways and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exceptions:
1. For rooms with sloped ceilings, the required floor area of the room shall have a ceiling height of not less than 5 feet (1524 mm) and not less than 50 percent of the required floor area shall have a ceiling height of not less than 7 feet (2134 mm).
2. The ceiling height above bathroom and toilet room 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 ceiling height of not less than 6 feet 8 inches (2032 mm) above an area of not less than 30 inches (762 mm) by 30 inches (762 mm) at the showerhead. The ceiling height above all other bathroom and toilet room fixtures is permitted to be of any height.
3. Beams, girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor.

Reason: Place yourself in the shoes of a code enforcement person receiving a call from a contractor or homeowner requesting an opinion on what constitutes compliance with "The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose." What do you tell them? If they ask specifically for the height below which they would receive a correction notice, what do you tell them? Suppose you conduct an inspection of a fixture installation and you feel the fixture isn't useable. What if your boss approved the height via a plan review? What if the homeowner says they can use it? Do you relent and approve it? If you don't relent, how much do you tell the homeowner to raise the ceiling to be compliant? Do you start a complaint with your city attorney if the correction is not made? When your city attorney asks what the height requirement should be and how do you justify it, what do you tell them? The facts are that there is no ceiling height requirement over these fixtures. The current text is unenforceable and only serves to denigrate the code. Let's cut out the baloney and all agree that we won't regulate the heights above these fixtures. It is more noble to do that than to try baffle someone with bureaucratic jargon.

Cost Impact: Will not increase the cost of construction
This proposal should reduce costs by eliminating confusion and the lack of uniformity caused by the current language.
2015 International Residential Code

Revise as follows:

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located not less than 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, and plumbing vents, streets, alleys, parking lots and loading docks.

For the purpose of this section, the exhaust from dwelling unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

Exceptions:

1. The 10-foot (3048 mm) separation is not required where the intake opening is located 3 feet (914 mm) or greater below the contaminant source.
2. Vents and chimneys serving fuel-burning appliances shall be terminated in accordance with the applicable provisions of Chapters 18 and 24.
3. Clothes dryer exhaust ducts shall be terminated in accordance with Section M1502.3.

Reason: What makes a street or alley the source of a "hazardous or noxious contaminant"? Nothing does. An occasional passing vehicle does not create a hazardous or noxious contaminant. This is particularly puzzling when the exhaust from a toilet room is not considered noxious. How frequently do we see dwellings constructed adjacent to a parking lot or a loading dock? This would be such a rare occurrence that it doesn't rise to the level of needing regulation.

Cost Impact: Will not increase the cost of construction
This proposal should lessen costs by reducing regulations.
RB76-16
IRC: R305.1, R305.1.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R305.1 Minimum height. Habitable space, hallways and portions of _basements_ containing these spaces_ shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exceptions:
1. For rooms with sloped ceilings, the required floor area of the room shall have a ceiling height of not less than 5 feet (1524 mm) and not less than 50 percent of the required floor area shall have a ceiling height of not less than 7 feet (2134 mm).
2. The ceiling height above bathroom and toilet room 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 ceiling height of not less than 6 feet 8 inches (2032 mm) above an area of not less than 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.
3. Beams, girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor.

Delete without substitution:

R305.1.1 Basements. Portions of _basements_ that do not contain habitable space or hallways shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exception: At beams, girders, ducts or other obstructions, the ceiling height shall be not less than 6 feet 4 inches (1931 mm) from the finished floor.

Reason: Basements create a unique situation that dictates a unique resolution. Typically no other space in a home is left unfinished with the potential to be finished at a later day except for basements. They are often unfinished when the home is built and many go unfinished for years. But when the finishing does occur, a home that was built in full compliance with ceiling heights for basements is now a problem. A home can be built with a basement ceiling height of 6'8". Then when the owner wishes to finish the space we say the ceiling height is not adequate? If we don't put any habitable space in the basement it is fine, but a habitable room is "dangerous"? How ridiculous.

Now we may have an owner who didn't build the house be faced with this situation and he is going to expect an explanation from the building department why it was allowed to occur. The argument will be made, and perhaps rightly so, that the building department should have known that the space would be finished eventually. Don't put building departments in this position.

To eliminate the confusion and conflict, just delete this section and allow the basic ceiling height requirements to apply. That simplifies the rules and eliminates the double standard. The ceiling height requirements for habitable rooms should be the same regardless the location of the room.

But what if I never intend to finish the basement you say, what then? If I were to construct an unfinished addition to my home, perhaps calling it storage, what would the ceiling height requirement be? For the most part this will be self-regulating.
Cost Impact: Will not increase the cost of construction
This proposal should have no impact on construction costs because it acknowledges existing construction practice and should reduce costs for future basement remodeling.
2015 International Residential Code

Revise as follows:

R306.2 Kitchen. Each *dwelling* unit shall be provided with a kitchen area and every kitchen area shall be provided with a sink.

**Reason:** What is a “kitchen area”? If I choose to put my kitchen sink in my living room and wash my dishes there, why is that a problem? Are we trying too hard to regulate something that doesn't need regulation? Why don't we just say what fixtures are required and let the owner decide where she wants to put them?

**Cost Impact:** Will not increase the cost of construction

This is an editorial revision and should have no impact on construction costs.
RB78-16
IRC: R308.4.2.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R308.4.2 Glazing adjacent to doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered to be a hazardous location where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface and it meets either of the following conditions:

1. Where the glazing is within 24 inches (610 mm) of either side of the door in the plane of the door in a closed position.
2. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within 24 inches (610 mm) of the hinge side of an in-swinging door.

Exceptions:

1. Where the glazing is within 24 inches (610 mm) of either side of the door in the plane of the door in a closed position.
2. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within 24 inches (610 mm) of the hinge side of an in-swinging door.

   Exceptions:
   1. Decorative glazing.
   2. Where there is an intervening wall or other permanent barrier between the door and the glazing.
   3. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with Section R308.4.3.
   4. Glazing that is adjacent to the fixed panel of patio doors.

Reason: Item #2, when approaching a door are you more likely to come in contact with glass on the latch side or the hinge side when the door is shut? Obviously it is the latch side. You don't reach for the hinges, you reach for the latch. If two young boys are running to a door and collide with glazing adjacent a door, is it more likely to occur on the hinge side or the latch side? Obviously it is the latch side. Glazing here should be protected. Exception #2, if there is an intervening wall between the glazing and the door, it isn't adjacent a door, is it? It would seem that this glazing might be in a room other than the room where the door is and safety glazing is a moot point. The current text is only confusing and conflicting.

Exception #3, the method of approach to a closet door is not predicated on the depth of the closet on the other side. What difference would there be in the approach to a closet that is 35 inches deep versus one that is 37 inches deep? How do slight variations in the depth of a closet impact the danger of glazed adjacent an interior door that provides access to that closet? It doesn't. Why do you know, when walking towards a closet door, how deep the closet is? The rule is over the top and should be deleted.

Cost Impact: Will not increase the cost of construction
This is a clarification of existing language and should have no cost impacts.
2015 International Residential Code

Revise as follows:

R308.4.2 Glazing adjacent to doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered to be a hazardous location where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface and it meets either of the following conditions:

1. Where the glazing is within 24 inches (610 mm) of either side of the door in the plane of the door in a closed position.
2. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within 24 inches (610 mm) of the hinge side of an in-swinging door.

Exceptions:

1. Decorative glazing.
2. Where there is an intervening wall or other permanent barrier between the door and the glazing.
3. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with Section R308.4.3.
4. Glazing that is adjacent to the fixed panel of patio doors.

Reason: The current language creates the potential of creating a condition where safety glazing is required if the requirements are read literally. The way that the section is written, it only applies to glass that is within the same plane as the door and perpendicular to plane of the door. If it is anything other than those two locations, it is unclear what is required. For example if the glazing is in a wall that is 45º from the face of the door, neither requirement would apply. This proposal attempts to clear up this confusion. It changes the perpendicular wall to any wall not in the same plane as the door. Therefore, the example discussed above would require that it comply with item #2.

Cost Impact: Will not increase the cost of construction
This proposal is a clarification and therefore would not change the cost of construction.
2015 International Residential Code

Delete without substitution:

**R308.4.3 - Glazing in windows.** Glazing in an individual fixed or operable panel that meets all of the following conditions shall be considered to be a hazardous location:

1. The exposed area of an individual pane is larger than 9 square feet (0.836 m²),
2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor,
3. The top edge of the glazing is more than 36 inches (914 mm) above the floor; and
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. Where a horizontal 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 have a cross-sectional height of not less than 1 1/2 inches (38 mm).
3. Outboard panes in insulating glass units and other multiple glazed panels where 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.

**Reason:** The fallacy of this complicated rule is that a huge piece of glass is dangerous if it is less than 18 inches off the floor in combination with several other conditions but it isn't dangerous if it is 18 inches or more above the floor regardless of how big it is! If an adult were to fall into this glass, how would their injuries differ if the glass is 17 inches or 18 inches off the floor? I would argue that there would be absolutely no difference. Glazing next to a walking surface is always subject to contact in a fall unless the bottom of the glazing is further above the floor than what would be contacted by an individual falling. While these are called walking surfaces, they aren't dangerous walking surfaces such as stairs and landings are. Walking across a room is not a location where tripping often occurs. And most rooms with large windows don't have open floor space next to them. They have furniture, lamps, tables, and other decorative items. It is justifiable to eliminate this requirement from the code because people don't make contact with a living room window in the same manner as they would a landing at the bottom of a stair. An alternative would be to require all large glazed panels to be safety glazed. This proposal deletes the requirement.

**Cost Impact:** Will not increase the cost of construction
This proposal will reduce costs by reducing regulations.
R308.4.4.1 Structural glass baluster panels. Guards with structural glass baluster panels shall be installed with an attached top rail or handrail. The top rail or handrail shall be supported by a minimum of three glass baluster panels, or shall be otherwise supported to remain in place should one glass baluster panel fail.

Exception: An attached top rail or handrail is not required where the glass baluster panels are laminated glass with two or more glass plies of equal thickness and of the same glass type.

Reason: This proposal will clarify and align the IRC and IBC requirements for glass panels that are used as a structural component in a guard. Imperfections in glass can cause it to fail at loads that are well below its nominal resistance value. We believe the intent of the IBC requirements is to have something (a top rail or a handrail at stairs) to provide some additional fall protection for a person leaning on the guard, should a glass panel fail. Having a handrail attached to at least 3 panels also provides some backup support if a panel fails while someone is grabbing the handrail to prevent a fall. However, there is an exception that allows glass-only guards (without an attached top rail or handrail) if the balusters are laminated glass. The laminated glass provides some backup against total panel failure, but note that the entire glass baluster still has to be designed to be able to support the full loads for guards, as specified in Table R301.5, including using a factor of safety of 4 found in footnote "h". We believe the IRC should also have these critical safety requirements, which it currently does not.

The proposed code text is consistent with, but not identical to the IBC text (Section 2407.1.2). However, we believe this more clearly states the requirements, and have submitted a parallel amendment for the IBC.

Cost Impact: Will not increase the cost of construction

This change creates consistency with the IBC for glass guards only and allows for more safety and flexibility in design. There should be no increase in the cost.
RB82-16
IRC: R308.4.7.
Proponent: Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org)

2015 International Residential Code

R308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches (914 mm) above the landing and within a 60-inch (1524 mm) horizontal arc less than 180 degrees from the bottom tread nosing shall be considered to be a hazardous location.

Exception: The glazing is protected by a guard complying with Section R312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

Revise as follows:

FIGURE R308.4.7
PROHIBITED HAZARDOUS GLAZING LOCATIONS AT BOTTOM STAIR LANDINGS
**Reason:** This proposal is intended to provide information on the figure with two callouts that describe the meaning of the figure, consistent with the text of Section R308.4.7. In addition, as figure titles are not enforceable, an editorial change is proposed to the title of the figure to more accurately reflect the meaning. Lastly, we have adjusted the 60 inch dimension at the landing for clarity.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: [BCAC](#)

**Cost Impact:** Will not increase the cost of construction

This proposal will not increase the cost of construction as it proposes to revise the figure to align with the existing text requirements of the code.
2015 International Residential Code

Revise as follows:

R308.1 Identification. Except as indicated in Section R308.1.1 each pane of glazing installed in hazardous locations as defined in Section R308.4 shall be provided with a manufacturer's designation specifying who applied the designation, designating the type of glass and the safety glazing standard with which it complies, which is visible in the final installation. The designation shall be acid etched, sandblasted, ceramic-fired, laser etched, embossed, or be of a type that once applied cannot be removed without being destroyed. A label shall be permitted in lieu of the manufacturer's designation.

Exceptions:
1. For other than tempered glass, manufacturer's designations are not required provided that the building official approves the use of a certificate, affidavit or other evidence confirming compliance with this code.
2. Tempered spandrel glass is permitted to be identified by the manufacturer with a removable paper designation.

Reason: The code goes to great lengths to identify the means by which safety glazing must be identified. Then it throws all that out the window and says you can use a label. Look at the definitions for label and designation. What happens when the label is peeled off before an inspection? Counterfeit labels have been used. The only way to prevent this is to require all labels to be etched.

For information: LABEL. An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an approved agency and that indicates that the representative sample of the product or material has been tested and evaluated by an approved agency. (See also "Manufacturer's designation" and "Mark.")

Cost Impact: Will not increase the cost of construction
This proposal acknowledges current practices and should have no cost implications.
2015 International Residential Code

Revise as follows:

R309.1 Floor surface. Garage and carport floor surfaces shall be of approved noncombustible material. The area of floor used for parking of automobiles or other vehicles shall not be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway prohibited at ground level.

R309.2 Carports. Carports shall be open on not less than two sides. Carport floor surfaces shall be of approved noncombustible material. Carports not open on two or more sides shall be considered to be a garage and shall comply with the provisions of this section for garages.

Exception: Asphalt surfaces shall be permitted at ground level in carports.

The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

Reason: For years this code requirement has provided no direction to enforcement or builders because there has been no prescriptive requirement for the slope required and confusion over the use of asphalt. What this proposal does is combine and substitute the floor surface requirements for garages and carports into one section and uses the IBC requirements for public parking garages as guidance for floor surfaces and slope. It would seem that a building that would house only a handful of vehicles would not need more restrictive rules than those that could house hundreds of motor vehicles but that is the case. The IBC allows asphalt to be used for ground level parking in all parking facilities. And the IBC exempts the need to have a sloped surface for S-2 parking garages by exception 2 below.

The rules should be no more restrictive for private garages. This proposal corrects that fault.

From the IBC:

406.4.5 Floor surface. Parking surfaces shall be of concrete or similar noncombustible and nonabsorbent materials. The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

Exceptions:
1. Asphalt parking surfaces shall be permitted at ground level.
2. Floors of Group S-2 parking garages shall not be required to have a sloped surface.

Group S-2 occupancies are:

311.3 Low-hazard storage, Group S-2. Includes, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic trim, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

Asbestos
Beverages up to and including 16-percent alcohol in metal, glass or ceramic containers
Cement in bags
Chalk and crayons
Dairy products in nonwaxed coated paper containers
Dry cell batteries
Electrical coils
Electrical motors
Empty cans
Food products
Foods in noncombustible containers
Fresh fruits and vegetables in nonplastic trays or containers
Frozen foods
Glass
Glass bottles, empty or filled with noncombustible liquids
Gypsum board
Inert pigments
Ivory
Meats
Metal cabinets
Metal desks with plastic tops and trim
Metal parts
Metals
Mirrors
Oil-filled and other types of distribution transformers

**Parking garages, open or enclosed**
Porcelain and pottery
Stoves
Talc and soapstones
Washers and dryers

**Cost Impact:** Will not increase the cost of construction
This proposal will reduce costs by reducing regulations.
RB85-16
IRC: R309.4.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Delete without substitution:

R309.4 Automatic garage door openers. Automatic garage door openers, if provided, shall be listed and labeled in accordance with UL 325.

Reason: This code requirement, which regulates an appliance, has outlived its usefulness. This is a product regulatory function and not a building code function. You can't buy garage door openers that don't have the required safety devices. This code section doesn't require that the operator be properly installed but only properly listed and labeled. For that reason alone the section provides little benefit. But beyond that the incidence of injuries and deaths from garage operators has fallen to the point where the government no longer tracks that information. The injuries and deaths that are occurring now are mostly a result of broken springs. The door is propped up because of a broken spring with a 2X4 and a child knocks the prop lose resulting in the door falling on them. Furthermore, the ability to regulate these appliances implies permits and inspections. The cost to administer the section just to check the listing and labeling can approach the cost of the operator. Would it be a surprise if it were stated that the IBC has no such requirement for either private or public garages? This is true. This code section needs to be deleted.

Cost Impact: Will not increase the cost of construction
This proposal will reduce costs by eliminating unnecessary regulation.
RB86-16
IRC: R310.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every habitable sleeping room shall have not less than one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exception: Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m²).

Reason: What makes a habitable attic any more dangerous than a 2nd or 3rd floor? Think about it. I can build a three story house and not have any egress windows on the third floor but if I build a one story house with a habitable attic I need to put an egress window in the attic. What sense does that make? None. We have smoke alarms. We have protected floors. We have sprinkler systems. Regarding basements, why have an egress window for an unfinished underfloor space? According to arguments by sprinkler advocates, fire deaths should be virtually eliminated in homes with sprinklers. That makes this basement egress window unnecessary. For those of you who have been around for a few decades you will remember that the reason why basement egress windows were made a requirement was to save future costs when a basement might be finished. That should shock everyone. Using that argument one could require an egress window in a living room because at some time in the future the living room might become a bedroom – ridiculous. Rules should be applied based on the plans submitted. A basement might never be finished and then the rule becomes an extreme case of unnecessary and over the top regulation. And last, basement windows provide an ideal access for burglars, murderers, rapists, and thieves. They are often out of site. They are designed to be large enough to allow a person to enter. Crime statistics show that you are much more likely to be accosted in your home than to be impacted by a fire. This is a significant safety issue and needs to be remedied.

Cost Impact: Will not increase the cost of construction
This proposal will not increase construction costs because it reduces the number of expensive emergency escape and rescue openings required.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every sleeping room shall have not less than one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way. When basements are provided with emergency escape and rescue openings, the separation distance from the center of the base of an emergency escape and rescue opening to the center of the base of the stairs serving the basement measured in a straight line shall be not less than one-third of the length of the maximum overall diagonal dimension of the basement.

Exception: Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m²).

Reason: Remoteness of exits when two or more are required is critical to making their existence effective. Having both means of exiting occur side by side invites the possibility that both will be blocked by the same event. It is not uncommon and perfectly legal for homes to be built with an egress window at the base of the only stair from a basement, particularly in townhomes that may have but one exterior basement wall. This defies basic premises of the codes. The IBC requires remoteness of exits. The IRC should as well or requiring them is senseless. This proposal takes text from the IBC to avert potential tragedies from occurring due to improper separation of exit paths.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction. It only provides direction on the location of openings that are already required.
2015 International Residential Code

Delete without substitution:

**R310.1 Emergency escape and rescue opening required.** Basements, habitable attics and every sleeping room shall have not less than one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

**Exception:** Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m²).

**Reason:** The requirement and reliability of residential sprinklers makes the matter of emergency escape and rescue openings moot. Eliminating the requirement also helps to offset the cost of sprinklers. Now there are some that would argue that these openings might be used for purposes other than escape from fire. What would those purposes be? Anyone have any news stories about someone escaping from a bedroom through one of these openings at an event other than a fire? How frequently does that happen? We have all seen the pictures of a firefighter going through one of these windows to save a child during a fire. We have heard repeatedly that the reason for the size of the window is to allow a firefighter to get through the window. If the window serves another purpose, it is so far down the list that it no longer meets the scoping requirements of the code. We now have fire protected floors, we have smoke alarms, and we have CO alarms. It is time to provide some relief from the cost of the many other requirements put in the code. It is time to add this exception. Following is text from NFPA 13D. Note that one of its primary purposes is "to improve the chance for occupants to escape..." Statistics indicate that in almost all residential fires with sprinklers that a single head controls any fire. The result is that it doesn't spread to other areas impeding exiting from a dwelling. These windows are expensive to install and are unnecessary. You will no doubt hear from the window industry that these windows are still important. There are no valid arguments to support such a claim.

At the IBC hearings at Long Beach, the membership approved a code change (E145-15) that opens the door to a similar change in the IRC.

**1.1* Scope.**

1.1.1 This standard shall cover the design, installation, and maintenance of automatic sprinkler systems for protection against the fire hazards in one- and two-family dwellings and manufactured homes.

1.1.2 This standard assumes that the sprinkler system is designed to protect against a fire originating from a single ignition location.

**1.2* Purpose.**

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.

A.1.1 NFPA 13D is appropriate for protection against fire hazards only in one- and two-family dwellings and manufactured homes. Residential portions of any other type of building or occupancy should be protected with residential sprinklers in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, or in accordance with NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height. Other portions of such buildings should be protected in accordance with NFPA 13 or NFPA 13R as appropriate for areas outside the dwelling unit.

The criteria in this standard are based on full-scale fire tests of rooms containing typical furnishings found in residential living rooms, kitchens, and bedrooms. The furnishings were arranged as typically found in dwelling units in a manner similar to that shown in Figure A.1.1(a), Figure A.1.1(b), and Figure A.1.1(c). Sixty full-scale fire tests were conducted in a two-story dwelling in Los Angeles, California, and 16 tests were conducted in
a 14 ft (4.3 m) wide mobile home in Charlotte, North Carolina.

Sprinkler systems designed and installed according to this standard are expected to prevent flashover within the compartment of origin where sprinklers are installed in the compartment. A sprinkler system designed and installed according to this standard cannot, however, be expected to completely control a fire involving fuel loads that are significantly higher than average for dwelling units [10 lb/ft² (49 kg/m²)] and where the interior finish has an unusually high flame spread index (greater than 225) when tested in accordance with ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, or ANSI/UL 723, Standard for Test for Surface Burning Characteristics of Building Materials. (For protection of multifamily dwellings, see NFPA 13 or NFPA 13R.)

A.1.2 While the purpose of this standard is to provide improved protection against injury and loss of life, the use of these systems has demonstrated an ability to provide improved protection against property damage. Various levels of fire safety are available to dwelling occupants to provide life safety and property protection. This standard recommends, but does not require, sprinklering of all areas in a dwelling; it permits sprinklers to be omitted in certain areas. These areas have been proved by NFPA statistics [see Table A.1.2(a) and Table A.1.2(b)] to be those where the incidence of life loss from fires in dwellings is low. Such an approach provides a reasonable degree of fire safety. Greater protection to both life and property is achieved by sprinklering all areas.

Guidance for the installation of smoke detectors and fire detection systems is found in NFPA 72, National Fire Alarm and Signaling Code.

Cost Impact: Will not increase the cost of construction
This proposal reduces construction costs by eliminating currently required emergency escape and rescue openings.
Revised as follows:

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every sleeping room shall have not less than one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

**Exception**

1. Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m²).

2. Where the dwelling or townhouse is equipped with an automatic sprinkler system installed in accordance with Section P2904, sleeping rooms in basements shall not be required to have emergency escape and rescue openings provided that the basement has one of the following:
   2.1. One means of egress complying with Section R311 and one emergency escape and rescue opening.
   2.2. Two means of egress complying with Section R311.

**Reason:** This proposal was approved in the Group A cycle for inclusion in 2018 IBC Section 1030.1, applying to Group R-3 and R-4 dwelling units (as well as R-2). Approval by the IBC Means of Egress Committee was by a margin of 13-1, and the proposal survived 3 public comments from industry groups seeking disapproval. It is inconceivable that the IRC would not want to accept the same proposal, given that rejection of this proposal would make the IRC more restrictive on means of escape from dwelling units than the IBC.

It is of interest to note that the IBC also allows Group R-1 and all Group I occupancies to have sleeping rooms in basements of a sprinkler buildings without any emergency escape and rescue openings in the basement. Nevertheless, rather than seeking full equivalency with these higher risk occupancies when sprinklers are provided, this proposal and the companion proposal already approved for the IBC only seek a reduction in the number of basement escape openings. Under the proposal, a minimum of one basement escape window or door plus a means of egress will still be required. Plus, it is important to remember that both sprinklers and hard-wired interconnected smoke alarms installed throughout the dwelling will be required to qualify for the proposed exception. This combination of sprinklers and smoke alarms is well established by the NFPA 101 - Life Safety Code as a basis for eliminating all required means of escape openings from sprinklered one- and two-family dwellings, hotels, motels, apartments and similar uses.

As further justification, note that the states of New Hampshire and Virginia have amended their statewide code adoptions by eliminating all requirement for means of escape openings when sprinklers are provided. Minnesota adopted a similar amendment, but the allowance was limited to exempting all basement escape windows, and the State of Washington just adopted this proposal as a statewide IRC amendment.

From a technical perspective, there is less value to a basement means of escape because the dynamics of a basement fire differ from fires above grade. In a nonsprinklered fire event, it might be possible for an occupant to be rescued or escape using an above-grade window because the lower portion of the window may initially draw fresh air. However, a basement window will quickly and entirely fill with smoke and heated gases if there's an uncontrolled fire in the basement, and the importance of having fire sprinklers in providing extra egress time in such cases cannot be overstated. Likewise, by the time firefighters arrive, rescuing an occupant from a developed basement fire through a means of escape window or using such window as an escape route for a firefighter.
would be highly unlikely. Firefighter and occupant safety is far better assured by sprinklers.

Looking at the value of this incentive, the cost savings associated with eliminating even one basement escape window and the associated ladder and window well can be significant. Combine this with the benefit of eliminating leakage and maintenance issues and tripping/fall hazards that may be associated with window wells, and the incentive grows. Finally, recognize the enormous benefit that this change will offer for builders, who will now be allowed to locate sleeping rooms in lot-constrained below-grade areas of walk-out basements, and to homebuyers, who will gain the option of finishing an unfinished basement without the constraint of having to locate sleeping rooms based on existing window locations or having to add windows to an existing basement (which might lead to avoiding the issue by doing unpermitted work using an unlicensed contractor).

Considering that a number of states have legislatively preempted adoption of the IRC's residential sprinkler requirements for one- and two-family dwellings, it is important to provide reasonable incentives to strongly encourage the installation of sprinkler systems. It is also fair to offer the same incentives to builders and homebuyers in states and jurisdictions where sprinklers are required. This single incentive might be valuable enough to encourage voluntary sprinkler installations, and still, the level of safety will equal or exceed what is required by the IBC for residential and institutional occupancies and by NFPA 101 Life Safety Code, which entirely deletes the requirement for ANY escape or rescue openings from one- and two-family dwellings that are equipped with NFPA 13D sprinkler systems [NFPA 101, Section 24.2.2.1.2(2)]

Cost Impact: Will not increase the cost of construction
The proposal adds an option to the code. There is no requirement to utilize this option; however, if it is used, the cost of construction may decrease.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM C518, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2015.
RB90-16
IRC: R310.1.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R310.1.1 Operational constraints and opening control devices. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge. Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows serving as a required emergency escape and rescue opening. Hardware necessary to operate emergency escape and rescue openings shall not be located more than 48 inches above the floor and shall be operable with one hand. The force required to activate operable parts shall not be more than 5.0 pounds.

Reason: The IRC goes to great lengths to regulate the size and location of emergency escape and rescue openings except for the location of operational hardware. There is nothing in the code to prevent operational hardware from being 6 feet above the floor. One of the purposes of the window is to permit emergency escape. But how do people of small stature escape through one of these openings if they cannot reach the operational hardware? This proposal places a modest and reasonable requirement in the code that operational hardware be located within 48 inches of the floor. This would apply to locks and operators. This is consistent with hardware requirements for windows required to be accessible by ANSI A117.1.

The lock location for some typical windows is about 68 inches above the floor. Physiological studies indicate that an average child would need to be at least 9 years old and 4 feet 6 inches in height to operate hardware at that height.

The proposal also includes language from ANSI A117.1 regarding the operation of the window. Difficulty in reaching and operating window hardware can prevent children, the elderly, those of short stature, and the disabled from escaping a fire. A window that can't be opened serves no purpose. The code should contain rules to help safeguard our children and others just as it has other members of society.

This should pose no hardship on window manufacturers as they are already required to produce such windows for accessibility purposes.

Cost Impact: Will not increase the cost of construction
This proposal will not increase construction costs but may have an impact on manufacturing costs where manufacturers need to modify window operation. Where they already manufacture windows meeting accessibility standards there will not be cost increases.
2015 International Residential Code

Revise as follows:

R310.1.1 Operational constraints and opening control devices. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge. Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows serving as a required emergency escape and rescue opening.

Reason: In July/2014 the ICC Board decided to sunset the activities of the Code Technology Committee (CTC). This is being accomplished by re-assigning many of the CTC Areas of Study to the applicable Code Action Committee (CAC). This proposal falls under the CTC Area of Study entitled Child Window Safety. Information on the CTC, including: the sunset plan; meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the CTC website.

This public proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 13 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes and the public comments. Related documentation and reports are posted on the BCAC website at: http://www.iccsafe.org/cs/BCAC/Pages/default.aspx.

The term "special knowledge" relative to the application of the emergency escape and rescue opening provisions has led to inconsistent enforcement due to wide ranging interpretations. With the new devices complying with ASTM F2090, this situation may become exacerbated. IBC Section 1030.4 does not include provisions for "special knowledge" however IRC Section R310.1.1 includes the provision. Delete "special knowledge" in IRC Section R310.1.1 for consistency with IBC 1030.4.

2015 IBC for reference:

1030.4 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 1030.2 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 emergency escape and rescue opening. Where such bars, grilles, grates or similar devices are installed in existing buildings, smoke alarms shall be installed in accordance with Section 907.2.11 regardless of the valuation of the alteration.

Cost Impact: Will not increase the cost of construction
No technical changes intended. Terminology revisions for consistency with the IBC.
RB92-16
IRC: R310.2.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R310.2.1 Minimum opening area. Emergency and escape rescue openings shall have a net clear opening of not less than 5.7 square feet (0.530 m²). The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. The net clear height opening shall be not less than 24 inches (610 mm) and the net clear width shall be not less than 20 inches (508 mm). A manufacturer's designation shall be provided on windows used to meet this requirement. The manufacturer's designation shall indicate compliance with this section of the code.

Exception: Grade floor or below grade openings shall have a net clear opening of not less than 5 square feet (0.465 m²).

Reason: Isn't it about time that the labeling of windows used for egress purposes makes it into the 21st century? Everything is labeled these days, even individual pieces of composite decking. But not egress windows. This amendment simply requires that windows intended to be used for purposes of emergency escape or rescue be labeled by the manufacturer as meeting R310.2.1. That information is already published in their catalogs. There is no hardship incurred by placing a label on the window any more than it is to etch safety glazing or label a fire door. The label could be an inexpensive paper label or the information could be included on the labels already printed and applied to the window.

For information:
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.")

Cost Impact: Will not increase the cost of construction
Any increase in the cost of this proposal will be limited to a small removable paper label containing information already in manufacturer's sales literature.
2015 International Residential Code

Add new definition as follows:

SECTION R202 DEFINITIONS

MEANS OF ESCAPE. A way out of a building or structure that does not conform to the strict definition of means of egress but does provide an alternate way out. A means of escape consists of a door, stairway, passage or hall providing a way of unobstructed travel to the outside at street or ground level. It may also consist of a passage through an adjacent nonlockable space, independent of and remotely located from the means of egress, to any approved exit.

Add new text as follows:

R310.5 Hurricane protection devices The temporary installation or closure of storm shutters, panels, and other approved hurricane protection devices shall be permitted on emergency escape and rescue openings during the threat of a storm. Such devices shall not be required to comply with the operational constraints of Section R310.1.1. While such protection is provided, at least one means of escape from the dwelling or dwelling unit shall be provided. The means of escape shall be within the first floor of the dwelling or dwelling unit and shall not be located within a garage without a side-hinged door leading directly to the exterior.

Reason: In Wind-borne Debris Regions, the code requires glazed openings (whether windows or glazing in exterior doors and garage doors) to be protected from impact due to wind-borne debris. Protection options include impact-resistant glazing and impact protective systems such as shutters that cover the glazing. When a hurricane or other tropical storm is approaching, window openings that serve as emergency escape and rescue openings are often protected from flying debris by shutters installed on the outside of a building. While a fire situation is possible at any time, the greatest risk during a hurricane is damage or failure of the building due to flying debris. However, some other way out the building should be provided. Currently, the code does not address this situation. While such opening protection is in place at least one means of escape, as defined in Section R202, located on the first floor of the dwelling or dwelling unit and not passing through a garage without a side-hinged door leading directly to the exterior would be required. Means of escape is defined as a way out of a building not meeting the strict definition of a means of egress and may consist of impact rated entry doors, sliding glass doors, or window s operable from the inside of the building, side-hinged doors in garages, or hurricane protection applied to the exterior of a door which may be opened from the inside without the use of keys, tools, or special knowledge.

For most single-family dwellings and townhomes, this requirement would have minimal to no effect. If impact-resistant glazing is used in the emergency escape and rescue opening, then this proposal would have no effect. If the egress door required by Section R311.2 does not contain any glazing or if contains glazing but is impact resistant, then the egress door could serve as the means of escape. Any other side-hinged door to the exterior without glazing could serve as the means of escape.

However, this proposal will require this situation to be specifically considered during the design or planning phase. For example, consider a home that was provided with electrically operated impact resistant shutters that cover all windows and doors when activated. If power is lost during a hurricane, the occupants may not have a way to get out of the building if a fire occurs. Another example would be where shutter panels are installed from the outside over all doors and windows and the occupants use the overhead garage door for entry and exit. This proposal does not permit an overhead garage door to be used as a means of escape as these doors can be difficult to open when power is lost and could become dislodged in the tracks due to wind loading and/or wind-borne debris. There would be several options to deal with this scenario such as having a side-hinged door leading to the exterior without glazing installed somewhere within the dwelling.
**Cost Impact:** Will increase the cost of construction
May impact cost. The worst case would be that an additional side-hinged door without glazing would be required to be located somewhere in the building.
RB94-16
IRC: R310.2.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R310.2.1 Minimum opening area. Emergency and escape rescue openings shall have a net clear opening of not less than 5.75 square feet (0.530 0.465 m²). The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. The net clear height opening shall be not less than 24 inches (610 mm) and the net clear width shall be not less than 20 inches (508 mm).

Exception: Grade floor or below grade openings shall have a net clear opening of not less than 5 square feet (0.465 m²).

Reason: If 5 square feet is good at one location, then it is good at all locations. The size of people and firefighters doesn't change depending on where they are in the home. It makes no difference to fire departments most of the time because they don't use them because the window will be closed. They will use an ax. This opens the door to a much wider variety of windows to comply. It makes replacement window application easier. Many windows have been ordered replaced that met the 5 square foot rule of years ago because code officials weren't aware of the previous rules and the fact that the existing 5 square foot window was compliant. Some may make the argument that interp manuals state that "the San Diego Fire Department conducted exhaustive tests....." This is bogus. There were never any such tests or studies done. The San Diego Fire Department does not have any record of such tests nor is there a recollection of such test by staff members that would have been there during the time the supposed tests were done. There are no copies of any such studies available from ICC and there are no staff members who will vouch that any such studies ever existed.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction because it permits lesser sized windows to be used.
Add new text as follows:

**R310.2.3.3 Window well fall protection.** Window wells with a vertical depth greater than 30 inches shall have guards on all sides. The guards shall be provided in accordance with Section R312.1. Window well grates are not allowed. Where gates are installed for exit at window wells and the depth of the window well is greater than 30 inches, gates shall be installed with a permanent lock to prevent access by unauthorized persons. The gates shall be equipped to accommodate a locking device. The gates shall open outward away from the well, and shall be self-closing and have a self-latching device. Where the release mechanism of the self-latching device is located less than 54 inches from the bottom of the gate, the release mechanism shall be located on the well side of the gate not less than 3 inches below the top of the gate. The gate and guards shall have no opening larger than ½ inch within 18 inches of the release mechanism. Openings, in other parts of gates, shall comply with Section R312.1.3. Access ladders shall comply with Section R310.2.3.1 and shall extend from the bottom of the well to the top of the guard.

**Reason:** This new proposal is needed to prevent any accidental falls into the window wells. The 30-inch provision is taken from Section R312.1.1. Placements of grates on top of window wells are not allowed since it is shown, over time, that either boxes can be stored on top of the grates or even a car can be parked on the grates. Also the weight of the grate can be a factor in removing it in case of an emergency. Installation of gates is not mandatory. However, when the gates are used certain safety provisions are introduced. These provisions are immulated from Section 305 of 2015 ISPSC.

**Cost Impact:** Will increase the cost of construction

The increase will vary depending on the size and number of window wells and whether they choose to install gate(s).
2015 International Residential Code

Revise as follows:

R310.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be permitted to be a side-hinged door or a slider. Where the opening is below the adjacent ground elevation grade, it shall be provided with a bulkhead enclosure an area well.

Delete and substitute as follows:

R310.3.2 Bulkhead enclosures Area Wells. Bulkhead enclosures shall provide direct access from the basement. The bulkhead enclosure shall provide the minimum net clear opening equal to the door in the fully open position. Area wells shall have a width of not less than 36 inches (914 mm). The area of the area well shall allow the emergency escape and rescue door to be fully opened.

Add new text as follows:

R310.3.2.1 Ladder and steps. Area wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the door in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of not less than 12 inches (305 mm), shall project not less than 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center vertically for the full height of the exterior stairwell.

Revise as follows:

R310.3.2.2 Drainage. Bulkhead enclosures Area wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R405.1 or by an approved alternative method.

Exception: A drainage system for bulkhead enclosures area wells is not required where the foundation is on well-drained soil or sand-gravel mixture soils in accordance with the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

Reason: The language "bulkhead enclosure" has caused confusion for the users of the IRC. There are too many different definitions of what they are. The common use of the term enclosure can be interpreted that the bulkhead must be covered similar to bulkhead enclosures used for storm shelters. We do not believe this was the original intent. The purpose of this change is to clarify the intent of the code and remove the reference to the bulkhead enclosure. We have removed the term and replaced it with area well. The access requirements for an emergency escape and rescue door should not be any different than emergency escape and rescue windows. So, we have duplicated the requirements from the window section to the door section. They are used for the same purpose and should have identical requirements.

Cost Impact: Will not increase the cost of construction
This change will actually reduce the cost of construction since the actual enclosure over the bulkhead would not be required.
RB97-16
IRC: R311, R311.1, R311.2.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

SECTION R311 MEANS OF EGRESS AND PATHS OF TRAVEL

R311.1 Means of egress and paths of travel. Dwellings shall be provided with a means of egress and paths of travel in accordance with this section. There shall be at least one means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the required egress door without requiring travel through a garage. The required garage. All components of a means of egress door or path of travel shall open directly into comply with the requirements of this section. Components shall include, but not be limited to, hallways, interior stairs, exterior stairs, ramps, doors, and landings serving a public way dwelling or to a yard or court that opens to a public way accessory structure.

R311.2 Egress door. Not less than one exterior egress door shall be provided for each dwelling unit. The egress door shall be side-hinged, and shall provide a clear width of not less than 32 inches (813 mm) where measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). The clear height of the door opening shall be not less than 78 inches (1981 mm) in height measured from the top of the threshold to the bottom of the stop. Other doors shall not be required to comply with these minimum dimensions. Egress doors shall be readily openable from inside the dwelling without the use of a key or special knowledge or effort. The required egress door shall open directly into a public way or to a yard or court that opens to a public way.

Reason: It was interesting to read that the IRC Committee has taken a position that Section R311 only pertains to those components that are part of the means of egress. The Committee Reason for their disapproval of RB129-13 in the last code cycle which would have regulated all stairs reads as follows: “The committee disapproved this code change proposal because they felt that, in proposed Exception 3, “stairs that serve spaces for children used as play areas” is not defined. This is the means of egress section and stairs are included in the proposal in this section that are not part of the means of egress.” This reason is published on page 284 of the 2013 Report of the Committee Action Hearing Results.

If this is the case, then there are a significant number of changes that are necessary in R311 in order to prevent these rules from being applied to building components not part of the means of egress. Or, the current text has to be
modified to make it clear that these rules apply to components of paths of travel throughout a dwelling that may not be part of the means of egress. The Committee needs to pick a horse and ride it.

Two proposals are being submitted to address this conflict. This one expands the language to apply to all paths of travel in a building or structure.

This is necessary because the published statement of the IRC Committee leaves in doubt code applicability to travel components in a dwelling that are not part of a means of egress. Some examples include:

- Doors other than the required egress door may have landings. Should these landings be regulated?
- There may be provide two stairways in a dwelling serving the same floors or stairs serving an exterior door other than the required egress door or it may serve a deck or accessory structure. Should these stairs be regulated if not part of the means of egress?
- Ramps may serve areas of the dwelling other than the required egress door. Are these ramps regulated?

The message sent to the code enforcement community is that these referenced components are not regulated unless they are a part of the single means of egress required from the building. Obviously this could create some hazardous situations.

This proposal intends to regulate all travel paths in a building whether or not they are part of a means of egress.

**Cost Impact:** Will not increase the cost of construction

This proposal will not increase the cost of construction. It only provides clarification and direction for rules already in the code.
IR: R311.3.  
Proponent: Richard Davidson, representing Self 

2015 International Residential Code  
Revise as follows: 

R311.3 Floors and landings at exterior doors. There shall be a landing or floor on each side of each exterior door. The width of each landing shall be not less than the door served. Every landing shall have a dimension of not less than 36 inches (914 mm) measured in the direction of travel. The slope at exterior landings shall not exceed $\frac{1}{4}$ unit vertical in 12 units horizontal (2 percent). 

**Exception:** Exterior floors and landings including balconies less than 60 square feet (5.6 m²) and only accessible from a door that are permitted to have a landing less than 36 inches (914 mm) measured in not part of the direction means of travel egress. 

**Reason:** The title of the section is "Floors and landings at exterior doors". The exception is about exterior balconies. The primary reason for the exception should be for what is primarily regulated. Why limit this application to "exterior" balconies when the same design could occur in interior locations? There is no reason to continue these arbitrary limitations on balconies that are not part of a means of egress. What purpose is served with a 60 square foot area limit? Why can they only be accessible from a door? The illustration shows a balcony accessible only from a window. What is so harmful about having a window opening to such a landing? The proposal puts the exception more in sync with the charging language and eliminates unnecessary language. 

**Cost Impact:** Will not increase the cost of construction  
This proposal will have no impact on costs as it imposes no additional regulation.
RB99-16

IRC: R311.6.

Proponent: Richard Davidson, representing Self

2015 International Residential Code

Delete without substitution:

R311.6 Hallways. The width of a hallway shall be not less than 3 feet (914 mm).

Reason: The code does not regulate the width of a ramp serving the main egress door or any ramp for that matter. The code does not regulate the width of stairs when handrails aren't required (really!). It only provides a minimum width below the handrail height when handrails are required which occurs when there are four or more risers. Even when handrails are required the width can be as narrow as 27 inches. The code does not regulate the width of any doors in a dwelling except for the main egress door. Then we get all bent out of shape regulating the width of a hallway! If this is such a big deal then the width of stairs should be 36 inches clear always and doors into rooms should be the same width as the required egress door. What happens to the human body that it gets wider after it passes through an unregulated bedroom door to a hallway or main egress door? Does it magically expand? Of course not. This hallway requirement is an unnecessary requirement that is self-regulating and needs to be deleted from the code. Either that or the code needs to be amended to require minimum 36 inch wide paths throughout a dwelling.

R311.7.1 Width. Stairways shall be not less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 41/2 inches (114 mm) on either side of the stairway and the clear width of the stairway at and below the handrail height, including treads and landings, shall be not less than 311/2 inches (787 mm) where a handrail is installed on one side and 27 inches (698 mm) where handrails are provided on both sides.

Cost Impact: Will not increase the cost of construction

This proposal will not increase cost of construction because it reduces regulations.
RB100-16
IRC: R311.7.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R311.7 Stairways. All stairways shall comply with this section.

Exceptions:

1. Stairs serving attics or crawl spaces.
2. Stairs that provide access only to plumbing, mechanical, or electrical equipment.

Reason: Everyone is familiar with the folding drop down stairs available everywhere. Everyone is aware that using a folding stair that is secured to the structure is safer than standing on top of a step ladder. It is obvious that you cannot construct a code compliant stair to access those locations in the proposed exceptions because you cannot maintain required headroom and proper landings. These are areas that are infrequently accessed. They aren't accessed by visitors and guests. Currently text requires "The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the required egress door without requiring travel through a garage." If you believe that an attic, crawl space or similar area is a "portion(s) of the building", then it must be provided with a means of egress and stairs must comply. If you don't believe that those spaces are a portion of the building, then you may not be required to provide a means of egress but there are no exemptions for stairs not a part of a means of egress. All stairs must meet the requirements of R311.7. This is similar to the discussion that occurred a few cycles back regarding guards. The code required all guards to meet height and opening requirements whether the guard was required or not. The Committee and the Membership voted to insert the word "required" in the section to clarify that only required guards meet requirements. Before that amendment occurred, one solution to a non-compliant guard was removal. It was argued that in most cases a non-compliant guard increased the level of safety even when it wasn't required and the code should not encourage removal of non-required guards. The same logic applies to stairs. If a homeowner installs a ships ladder or fold down ladder, one solution is complete removal which will require the homeowner to access these spaces with a step ladder. Is there any logic to that solution? Obviously there is not. It is not possible to simply add the word "required" to the title of this section. That is because even non-required stairs should meet the code if they will be used to travel between normally occupied spaces. This proposal reiterates the requirement that all stairs must comply and then creates two exceptions for the locations indicated.

R311.1 Means of egress. Dwellings shall be provided with a means of egress in accordance with this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the required egress door without requiring travel through a garage. The required egress door shall open directly into a public way or to a yard or court that opens to a public way.

Cost Impact: Will not increase the cost of construction
Because this code change reduces regulation costs will also be reduced.
RB101-16
IRC: R311.7.1, R311.7.8.2 (New).
Proponent: David Cooper, Stair Design and Manufacturing Consultants, representing Stairbuilders and Manufacturers Association (coderep@stairways.org)

2015 International Residential Code

Revise as follows:

R311.7.1 Width. Stairways shall be not less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than $4\frac{1}{2}$ inches (114 mm) on either side of the stairway and the clear width of the stairway at and below the handrail height, including treads and landings, shall be not less than $31\frac{1}{2}$ inches (787 mm) where a handrail is installed on one side and 27 inches (698 mm) where handrails are provided on both sides.

Exception: The width of spiral stairways shall be in accordance with Section R311.7.10.1.

Add new text as follows:

R311.7.8.2 Handrail Projection Handrails shall not project more than $4\frac{1}{2}$ inches (114 mm) on either side of the stairway.

Exception: Where nosings of landings, floors, or passing flights project into the stairway reducing the required clearance at passing handrails, the handrail shall project not more than $6\frac{1}{2}$ inches (165 mm) into the stairway, provided the required stair width and required handrail clearance are not reduced.

Reason:
Change to stair width section:
The requirement for handrail projection currently included under R311.7.1, Width, is often overlooked. Moving the requirement to the handrail section of the code will provide for better understanding and compliance without changing the requirements for stair width.

New section - Handrail Projection:
This new section provides the needed information related to handrail projection within the handrail section to enable clear recognition of the requirement, compliant design of handrails and improved enforcement of the code. The requirement for handrail projections previously under R311.7.1 has been moved without change. In addition a new requirement adds needed regulation for specific instances where handrails pass the projection of landing tread nosings and tread return nosings that project into the stairway. Typically at dogleg/switchback stairs the skirt-board and tread return of the flight above project into the stair below approximately 2 inches (51 mm) reducing the required clearance of passing handrails. A similar condition occurs where landing tread and fascia at floors or landings project into the stairway where handrails pass. The exception provides a maximum limit of the handrail projection to provide the required minimum handrail clearance and assures the required stair width is not reduced.

This proposal provides a comprehensive solution that can be consistently enforced. The new section and new requirement provides needed improvement of the code, easy recognition of the handrail projection requirements within the handrail section and clearly addresses specific issues frequently subject to varied interpretation. It further provides additional options for placement of the required handrail that enable optimizing stairway designs for safety such as locating handrails for the dominant hand of the user in descent, or more importantly it will often enable the installation of code compliant handrails on both sides of the stairway as is recommended for our aging population.
**Cost Impact:** Will not increase the cost of construction

This proposal will not impact construction cost. In some cases it will allow the application of the required handrail on either side of the stair. This choice can be a cost advantage.
R311.7.1 Width. Stairways shall be not less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4 1/2 inches (114 mm) on either side of the stairway and the minimum clear width of the stairway at and below the permitted handrail height, including treads and landings, shall be not less than 31 ½ inches (787 mm) where a handrail is installed on one side and 27 inches (698 mm) where handrails are provided on both sides. Handrail projections into the 27 inch required width shall not be permitted.

Exception: The width of spiral stairways shall be in accordance with Section R311.7.10.1.

Reason: Stairways not required to have handrails (see Stair A below) have no minimum width requirements below the permitted handrail height. Stairs with one or two handrails must be 31 ½ or 27 inches wide respectively (Stairs B and C). Why is there a need to have such differing stair requirements for a residential stairs? Furthermore, removing or adding a handrail changes compliance on a stair! If my stair has one rail and is to narrow, I may be able to bring it into compliance by adding another rail making it narrower yet! That makes absolutely no sense.

The solution is to use the minimum stair width permitted and restrict projections into this minimum width. This proposal does just that.

Q: What is the minimum stair width for a stair not requiring handrails?
A: Above the handrail height the minimum width is 36”. Below the handrail height there is no requirement.

Q: If I have a stair with a handrail on one side and it is only 30 inches wide below the rail, can I put a handrail on the other side and bring the stair into compliance if the rail doesn't project more than 3 inches?
A: Yes. You could bring the stair into compliance by adding a handrail.

Q: If I have a stair with handrails on both sides and a width below the rails of 27 inches and I remove one of the handrails, have I put the stairs into a noncompliant situation?
A: Yes, the stair is now in violation of the width requirements.
**Cost Impact:** Will not increase the cost of construction
This proposal reduces regulation and will not increase the cost of construction.
RB103-16

IRC: R311.7.3.

Proponent: Kevin McOsker, representing Southern Nevada Chapter of ICC (ktm@ClarkCountyNV.gov)

2015 International Residential Code

Revise as follows:

R311.7.3 Vertical rise. A flight of stairs shall not have a vertical rise larger than 147 inches (3734 mm) between floor levels or landings.

Reason: Many custom and larger tract homes desire a 10 foot ceiling height and use 24 inch floor trusses. With actual wall framing height of approximately 10 foot 1 inch, using nominal dimensioned lumber, and a sub floor thickness of 1-2 inches. This does not allow for any variation in thickness for premium floor finishes, nor construction tolerances, which could put the stairs out of compliance and require a landing. By giving some additional tolerance in the dimension the construction will have the same look and feel without creating an inconvenience to the home builder.

The 2015 IRC modified this from the previous 144 inches (3658 mm) to allow 147 inches (3734 mm); under code proposal RB132-13.

This proposal would allow more flexibility and tolerance, without an increase in hazard. The increased floor to floor height would require 20 risers to not exceed the 7-3/4 inch maximum riser height. But the additional riser would reduce the riser height to 7-1/2 inches, thus reducing the overall slope of the stair run.

Cost Impact: Will not increase the cost of construction

This would most likely reduce construction costs, by not requiring a landing to be incorporated into the stair design, and reducing the footprint of the stairway.

RB103-16 : R311.7.3-MCOSKER12177
RB104-16

IRC: R311.7.4.
Proponent: David Cooper, representing Stairbuilders and Manufacturers Association (coderep@stairways.org)

2015 International Residential Code

Revise as follows:

R311.7.4 Walkline. The walkline across winder treads and landings shall be concentric to the curved turn and parallel to the direction of travel through entering and exiting the turn and . The walkline shall be located 12 inches (305 mm) from the side where inside of the winders are narrower turn. The 12-inch (305 mm) dimension shall be measured from the widest point of the clear stair width at the walking surface of the winder. Where winders are adjacent within the a flight, the point of the widest clear stair width of the adjacent winders shall be used.

Reason: This proposal provides needed clarification of the code for compliant design, construction and enforcement of winder and landing regulations that reference the walkline.

Landings have been added because R311.7.6 Landings for stairways regulates landing "depth at the w alkline" however R311.7.4 Walkline only references winders.

We have added the language approved for inclusion in the 2018 IBC "concentric to the turn and parallel to the direction of travel entering and exiting the turn".

Winder treads extend beyond the corner of the turn. Because winders must have a minimum tread depth of 6 inches (152 mm) at any point, they cannot all meet at the corner but must extend around the corner, beyond the arc of the users turn. This straight extension of the walkline across winders always occurs unless the corner is rounded throughout the turn, as with curved stairs, at great expense. Figure A shows the most simple arrangement of two winders but winder sections wrapping a corner will have two or more winders with a walkline that is both curved and straight or entirely straight as in the entry and exit winders of Figure B.

The current code does not accurately describe how the walkline should be demarcated to measure the winder tread depth. This change provides the needed correction.

The current 2015 IRC language requires correction. The word concentric by definition refers to circles or arcs having the same center and is not applicable to the straight portions of the walkline that are parallel to the direction of travel. The new text is more appropriate because it states "the walkline shall be concentric to the turn..."not the direction of travel that is sometimes a straight line. The turn is an arc, it has a center-point around which the turning person revolves, and use of the term concentric is applicable. This change further clarifies with the separate statement; "...and parallel to the direction of travel entering and exiting the turn."

These modifications accurately describe the users path that the walkline emulates and provide the exacting location necessary to determine the winder tread depth by describing the curved and straight sections independently.

The changes simplify and offer text that is easy to understand, and uses well understood terms to provide language that is enforceable across the infinite array of winding stairway designs both simple and complex. This change would provide correlation with the 2018 IBC

Remainder of Changes:

"Inside of the turn" is suggested to replace "from the side w here the winders are narrower" as it also applies to the the walkline at the landing w here there are no winders. Finally the substitution of "Where" for "If" and "a" for "the" are intended to be better code language.
Cost Impact: Will not increase the cost of construction
This change will not affect the cost of construction because it does not add any material or labor but only provides needed clarification for design, construction, and enforcement.
RB105-16

IRC: R311.7.5.3.

Proponent: David Cooper, representing Stairbuilders and Manufacturers Association (coderep@stairways.org)

2015 International Residential Code

Revise as follows:

R311.7.5.3 Nosings. The nosings at treads, landings and floors of stairways shall have a radius of curvature at the nosing shall be not greater than $\frac{9}{16}$ inch (14 mm) or a bevel not exceeding $\frac{1}{2}$ inch (12.7 mm). A nosing projection not less than $\frac{3}{4}$ inch (19 mm) and not more than $1\frac{1}{4}$ 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 $\frac{3}{8}$ inch (9.5 mm) between two stories, including the nosing at the level of floors and landings within a stairway. Beveling of nosings shall not exceed $\frac{1}{2}$ inch (12.7 mm).

Exception: A nosing projection is not required where the tread depth is not less than 11 inches (279 mm).

Reason: This change clearly describes and emphasizes the intent of the requirement to provide consistent nosings and nosing projections at every walking surface throughout the stairway. It combines the maximum rounding and beveling requirements in one sentence and eliminates unnecessary text that is now redundant.

Cost Impact: Will not increase the cost of construction

This change does not affect the cost of construction but only clarifies without changing the existing requirement.
2015 International Residential Code

Revise as follows:

R311.7.6 Landings for and doors at stairways. There shall be a floor or landing at the top and bottom of each stairway. The 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 that 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. Where the stairway has a straight run, the depth in the direction of travel shall be not less than 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 that a door does not swing over the stairs.

Where the required stairway landing is separated from the stairs by a door at the top of an interior flight of stairs, including stairs in an enclosed garage, such door shall not swing over the stairs. Where the door is subject to Sections R311.3.1 or R311.3.2 the required landing or floor shall be located in accordance with these sections.

Reason: The current text implies to some users of the code that no landing or floor is required at all if an appropriate door is provided. To most persons reading the code this would describe a stair to nowhere and creates confusion. It also excludes the required nosing projection matching the stair treads to prevent creating a hazardously "oversized" top step. This change simply rewords the text to more aptly describe the conditions of the exception without change to the intent. Further clarity is established by direct reference to sections R311.3 through R311.3.1 to assure the landing provided is regulated without conflict to these sections related to exterior doors which could be at the top of an interior stairway. We have deliberately referenced these sections and not used the term "exterior door" as some might confuse the interior use of a door panel intended for exterior use, e.g. an insulated door, for a door used in an exterior application. Although changes to this exception have been hotly debated in prior cycles we believe this is a worthy change that meets the concerns of all parties, improves stairway safety, and will improve understanding and consistent application of the code.

Cost Impact: Will not increase the cost of construction
This proposal does not change the requirement or scope of the exception. No additional landings are required nor are any deleted and therefore the cost of construction is not affected.
2015 International Residential Code

Revise as follows:

R311.7.8 Handrails. Handrails shall be provided on not less than one side of each continuous run of treads or flight with four or more risers.

Reason: The deleted phrase "continuous run of treads" predates the code definition of the term "flight", and is redundant. Flight is defined as: A continuous run of rectangular treads or winders or combination thereof from one landing to another. The deletion of the text simplifies the code by sole use of the defined term "flight".

Cost Impact: Will not increase the cost of construction
This change only clarifies the code language, makes no change to the requirement and therefore does not affect the cost of construction.
Add new text as follows:

**R311.7.8.2 Handrail Clearance**  Handrails adjacent to a wall shall have a space of not less than 1½ inches (38 mm) between the wall and the handrails.

Revise as follows:

**R311.7.8.3 Continuity.**  Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inches (38 mm) between the wall and the handrails.

**Exceptions:**

1. Handrail continuity shall be permitted to be interrupted by a newel post at a turn in a flight with winders, at a landing or over the turn lowest tread.
2. The use of a volute, turnout, or starting easing or starting newel shall not be allowed over the lowest tread.

**Reason:**

1. The term stairway is defined to include flights and landings however handrails are only required at flights of stairs and ramps. The words "for stairways" have been deleted to clarify.
2. The title of the requirement is Continuity using this term in the first exception clarifies the intent of the exception.
3. The text of the IBC states "...at a turn or landing". This was clarified in the 2009 edition adding "or landing". This change will allow technical coordination of the codes.
4. Starting newel has been deleted from exception 2 but has been included in exception one.

The original intent of the word turn was to apply it at the turn in a flight with winders or a turn in a stairway at a landing which is the most common interpretation of exception one. This change clarifies and allows the needed use of newels where rails in different planes and different elevations can be securely and cost effectively attached to a post as was the original intent.

**Cost Impact:** Will not increase the cost of construction

This proposal only moves the unchanged text to a new section and therefore does not affect the cost of construction.
2015 International Residential Code

Revise as follows:

**R311.7.8.2 Continuity.** Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than $1\frac{1}{2}$ inches (38 mm) between the wall and the handrails.

**Exceptions:**

1. Handrails **handrail continuity** shall be permitted **allowed** to be interrupted by a newel post at the turn or landing.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.

**Reason:** The title of the requirement is **Continuity.** Using this term in the first exception clarifies the intent of the exception.

Although this section begins "Handrails for stairways", since the addition of the definitions of "flight" and "stairway" many years ago, analysis of the text of this section has produced recent interpretations that have drifted from the original intent to provide an exception for posts in the turn of a stairway. Stairways by definition include landings that are used primarily to change the direction of, or turn the stairway. The text of the IBC was clarified in the 2009 edition adding "or landing" however the IRC needs to catch up. The language of the second exception has been changed to match the first.

**Cost Impact:** Will not increase the cost of construction

This proposal only clarifies the code adding no additional materials or labor. Where current interpretations do not allow newels to interrupt continuity at the landing, additional space within the stair opening or more complex handrail systems are required to comply with the code. In these situations a significant savings in the cost of construction will be realized.
**RB110-16**

**IRC: R312.1.2.**

**Proponent:** David Cooper, representing Stairbuilders and Manufacturers Association (coderep@stairways.org)

**2015 International Residential Code**

Revise as follows:

**R312.1.2 Height.** Required guards at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches (914 mm) in height as measured vertically above the adjacent walking surface or the line connecting the leading edges of the treads nosings.

**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 nosings.

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

**Reason:** Nosing is a defined term in both the IRC and IBC and is the term recognized and used throughout the trade. Use of terms defined by both the code and the trade allow for consistent interpretation by all. The code definition is:

*Nosing.* The leading edge of treads of stairs and of landings at the top of stairway flights.

The current text only references a line connecting the treads. Use of the defined term "Nosings", in this proposal, corrects the omission of the landing nosing, the essential point at the top of a flight on the line connecting the nosings, from which stair guard height is measured. An especially important point at the highest extent of the stair guard system that should not be omitted.

The term nosing is also used in the similar regulation of handrail height. The two sections referencing the same point should use the same term.

**Cost Impact:** Will not increase the cost of construction

This proposal corrects and clarifies but does not change the required resources to comply. It will not affect the cost of construction.
2015 International Residential Code

Revise as follows:

R311.7.11 Alternating tread devices. Alternating tread devices shall not be used as an element of a means of egress. Alternating tread devices shall be permitted provided that the required means of egress:

1. Where a stairway complying with Sections R311.7 or a ramp complying with R311.8 serves the same space at each adjoining level or where as a means of egress is not required.
2. To serve crawl spaces, storage sheds, attics, play houses, and similar uses and structures.

The clear width at and below the handrails shall be not less than 20 inches (508 mm).

R311.7.12 Ships ladders. Ships ladders shall not be used as an element of a means of egress. Ships ladders shall be permitted provided that:

1. Where a required means of egress stairway complying with Section R311.7 or a ramp complying with Section R311.8 serves the same space at each adjoining level or where as a means of egress is not required.
2. To serve crawl spaces, storage sheds, attics, play houses, and similar uses and structures.

The clear width at and below the handrails shall be not less than 20 inches.

Reason: There is a very confusing conflict between Section R311.1 and these sections. R311.1 states that there shall be a means of egress from "all portions of the dwelling to the required egress door without requiring travel through a garage".

R311.1 Means of egress. Dwellings shall be provided with a means of egress in accordance with this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the required egress door without requiring travel through a garage. The required egress door shall open directly into a public way or to a yard or court that opens to a public way.

Then these sections say you can use an alternating tread device or a ships ladder where a means of egress is not required! So R311.1 requires a means of egress from all portions of the dwelling and these sections say you can use these devices where a means of egress is not required! Where can an alternating tread device or a ships ladder be used? Is it intended that these devices only be used in accessory structures? If that was the intent why not say so because it doesn't look like you can use them anywhere in a dwelling? Let's try get this cleaned up so that it is understandable.

Cost Impact: Will not increase the cost of construction
This is an editorial revision resulting in no increase in the cost of construction.
R311.7.11 Alternating tread devices. Alternating tread devices shall not be used as an element of a means of egress. Alternating tread devices shall be permitted provided that the required means of egress stairway or ramp serves the same space at each adjoining level or where a means of egress is not required. The clear width at and below the handrails shall be not less than 20 inches (508 mm).

**Exception:** Alternating tread devices are allowed to be used as an element of a means of egress for lofts, mezzanines, and similar areas of 200 gross square feet or less and not providing exclusive access to a kitchen or bathroom.

R311.7.12 Ships ladders. Ships ladders shall not be used as an element of a means of egress. Ships ladders shall be permitted provided that a required means of egress stairway or ramp serves the same space at each adjoining level or where a means of egress is not required. The clear width at and below the handrails shall be not less than 20 inches.

**Exception:** Ships ladders are allowed to be used as an element of a means of egress for lofts, mezzanines, and similar areas of 200 gross square feet or less and not providing exclusive access to a kitchen or bathroom.

**Reason:** It is not uncommon to see small lofts or mezzanines in single family dwelling units. Providing a full stairway to these areas is onerous because the required floor area for the stairway may significantly reduce the usable square footage in the house. There is a growing popularity for so-called tiny houses and other smaller residences. This code change would provide a legal and safe way to access a small loft area typically provided for these homes. The proposal includes an exclusion for kitchens and bathrooms where the only access is via the alternating tread device or ships ladder. This is done to ensure that access to and egress from these facilities will be via a normal stair or from the main floor of the dwelling unit.

**Cost Impact:** Will not increase the cost of construction

If this code change is approved it will lower the cost of construction and save space within the dwelling unit.
RB113-16

IRC: R311.7.13 (New), R311.8.4 (New).

Proponent: Ali Fattah, City of San Diego Development Services Department, representing City of San Diego Development Services Department

2015 International Residential Code

Add new text as follows:

R311.7.13 Location on lot Exterior stairways serving the primary exit on habitable levels of a dwelling, including habitable attics, shall have a minimum fire separation distance of 5 feet measured at right angles from the exterior edge of the stairway, including landings, to:

1. Adjacent lot lines.
2. Other buildings on the same lot not accessory to the dwelling.

Exception: Exterior stairways fully supported on grade or stairways serving habitable levels located not more than 30 inches above adjacent grade shall not be required to comply with this section.

R311.8.4 Location on lot Exterior ramps providing serving the primary exit on habitable levels of a dwelling, including habitable attics, shall have a minimum fire separation distance of 5 feet measured at right angles from the exterior edge of the ramp, including landings, to:

1. Adjacent lot lines.
2. Other buildings on the same lot not accessory to the dwelling.

Exception: Exterior ramps fully supported on grade or stairways serving habitable levels located not more than 30 inches above adjacent grade shall not be required to comply with this section.

Reason: The IRC includes limited guidance for the application of fire separation distance when determining the location of exterior ramps and stairways providing egress from habitable spaces. This code change seeks to add a clarification based on existing requirements to require a fire separation distance of 5 ft. Exterior stairways and ramps are located exterior to the building envelope and as such are not protected with fire sprinklers. The new proposed requirements apply to exterior stairways whether or not they are required to comply with Section R311.4.

The proposed code change is being added to the IRC for consistency with the action taken by the Means of Egress Committee when they approved code change E 126-15 to require a fire separation distance of 5 ft when exterior stairways and ramps are associated with Group R-3 occupancies. The code change also exempted exterior exit stairways and ramps from being separated from the building they were associated with in Group R-3. This code change is to correlate the IRC with modifications approved in Section 1027.5 of the IBC.

Cost Impact: Will not increase the cost of construction
The cost of construction will not be increased since stairways will be located beyond zoning set backs required by most jurisdictions. Exterior stairways and ramps are not protected with fire sprinklers.
Add new text as follows:

**R311.8.1 Width.** Ramps, including landings, shall be not less than 36 inches in clear width at all points above the permitted handrail height. Handrails shall not project more than 4-1/2 inches on either side of the ramp and the clear width of the ramp at and below the handrail height shall not be less than 31-1/2 inches where the handrail is installed on one side and 27 inches where handrails are provided on both sides.

Reason:

**WHAT:** This code change proposal provides prescriptive language for minimum ramp widths.

**WHY:** The current code specifies stair width (R311.7.1) and specifies stair landing width (R311.7.6) but does not specify the minimum width for ramps and ramp landings. While ramp slope (R311.7.8.1) is important, it is not the only critical dimension for ramps.

We have always been interpreting the code to infer that ramps and ramp landings should follow the width of stairs, and this proposed code change prescriptively codifies our assumptions.

Cost Impact: Will not increase the cost of construction

There should not be any increase in the cost of ramps because the width has always been accepted to be 36 inches.
RB115-16

IRC: R311.8.1, R311.8.2, R311.8.3, R311.8.3.1, R311.8.3.2, R311.8.3.3, R311.8.4 (New), R311.8.5 (New), R311.8.6 (New).

Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R311.8.1 Maximum slope. Ramps serving the egress door required by Section R311.2 shall have a slope of not more than 1 unit vertical in 12 units horizontal (8.3-percent slope). All other ramps shall have a maximum slope of 1 unit vertical in 8 units horizontal (12.5 percent).

   Exception: Where it is technically infeasible to comply because of site constraints, ramps shall have a slope of not more than 1 unit vertical in 12 units horizontal (8.3 percent).

R311.8.2 Landings required. There shall be a floor or landing at the top and bottom of each ramp, where doors open onto ramps, and where ramps change directions. The width Landings on ramps serving the egress door required by Section R311.2 shall be a minimum of 5-feet by 5-feet in size. Landings serving the egress door required by Section R311.2 shall extend at least 18 inches beyond the latch side of a door and shall be 1/2" maximum in height below the level of the landing perpendicular to the ramp slope door threshold. Landings serving all other ramps shall have landings not less than 36 inches (914 mm) 3-feet by 3-feet in size.

R311.8.3 Handrails required. Handrails shall be provided on not less than one side of ramps exceeding, with a slope of one unit vertical in 12 units horizontal (8.33-percent slope) or steeper and on both sides of ramps serving the exit door required by Section R311.2.

R311.8.3.1 Height. Handrail height, measured above the finished surface of the ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

R311.8.3.2 Grip size. Handrails on ramps shall comply with Section R311.7.8.3.

R311.8.3.3 Continuity. Handrails where required on ramps shall be continuous for the full length of the ramp. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1 1/2 inches (38 mm) between the wall and the handrails.

Add new text as follows:

R311.8.4 Clear width. Ramps serving the egress door required by Section R311.2 shall have a clear width of not less than 36 inches. Handrails shall not reduce the required width.

R311.8.5 Floor surfaces. Floor surfaces of landings and ramps serving the egress door required by Section R311.2 shall be stable, firm, and slip resistant.

R311.8.6 Edge protection. Ramps serving the egress door required by Section R311.2 shall have curbs or barriers not less than 4 inches in height along the edges of ramps and landings.

Reason: The reduction in slope of residential ramps a few years back was supposed to provide a solution to allow people to stay in their homes by requiring ramps built at their homes to meet the same slope requirement as accessible ramps even though there was nothing to prohibit them from doing this under the previous rules. But the current text is an example of an idea that wasn't thought through.
First, there is no requirement that the landing outside the door and at the top of the ramp be at the same elevation as the threshold of the door so theoretically a ramp could be built to aid someone with a handicap and the landing could be built 7 ¾ inches below the threshold. Why would someone build a ramp with a landing so far below the threshold? For the same reason they wouldn't voluntarily build a ramp with a flatter slope. This change is needed to insure compliance with minimum accessibility requirements.

Second, there is no requirement that the landings for a ramp will allow access into the home since landings are currently only required to be 3 feet in length with no minimum width and are not required to extend beyond the latch side of the door. There needs to be sufficient space to park a wheel chair, access the latch and open the door. This proposal requires landings at least five feet by five feet and requires the landing to extend a minimum of 18 inches past the latch side of a door.

Third, people with disabilities need the help that having handrails on both sides of the ramp will bring. The code doesn't even require a handrail on a ramp with a 1 to 12 slope.

Fourth, there is no minimum required width for a ramp. Thirty six inches is consistent with accessibility requirements.

Fifth, there are no requirements addressing the hazards of slippery ramp surfaces. The proposed language comes right from the accessibility rules.

And sixth, there is nothing to prevent a wheel chair from slipping off the edge of a landing or ramp or from a cane or crutch tip from slipping off the edge causing injury. The proposed language comes from the accessibility rules.

**Cost Impact:** Will increase the cost of construction
This proposal will increase construction costs because new regulations are proposed for ramps to be useable by the intended users.
2015 International Residential Code

Revise as follows:

R312.1.1 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) 6 feet horizontally to the edge of the open side. Insect screening shall not be considered as a *guard*.

**Reason:** Momentum plays a role in a person falling from an elevated walk way. That momentum can vary depending on whether the person missteps on the edge of a walking surface, is pushed, or is walking. The greater the momentum of the person when they start their fall, the further from the walking surface they will land. Additionally, center of gravity of the person comes into play. If a precipitous cliff existed exactly 36 inches from the edge of a walking surface 30 inches high, the momentum of a fall and the center of gravity of the person would likely carry them over the edge of the cliff. 36 inches is not sufficient to allow someone to maintain their balance when falling from an elevated surface and they will likely tumble further and over the cliff. Therefore 36 inches is insufficient to maintain a minimum level of safety. Testimony given when the code was changed to require the height measurement of the walking surface be measured at other than the base of the walking surface contained comments about walking surfaces that had elevation changes in the hundreds of feet just inches from the walking surface. As an experiment, stand blindfolded on the edge of your dining room table. Have someone push you from the table such that you are not able to anticipate the fall. Can you contain yourself to an area within 36 inches of the base of the walking surface? Likely not. And if the elevation change beyond 36 inches is significant, the potential for serious injury or death exists. Therefore, given the current measurement that triggers the guard requirement does not provide a minimum degree of safety, this proposal extends that distance to a more reliable measurement of safety, that being 6 feet.

**Cost Impact:** Will increase the cost of construction

This proposal will increase costs because it will require guards for some locations that were previously exempt.
2015 International Residential Code

Revise as follows:

**R312.1.1 Where required.** Guards shall be located along provided for those portions of 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.

**Reason:** There are two schools of thought about guards when the walking surface is adjacent to a sloping grade. One group says that a guard is only required for that portion of the walking surface that is more than 30 inches above grade. The other group says that if a portion of the walking surface is more than 30 inches above grade the entire walking surface must be provided with a guard. In some circumstances the builder/designer of the walking surface may choose to place the guard all the way around such walking surface for aesthetic reasons. But if the building department is of the opinion that the code regulates the entire guard, correction notices could conceivably be written, for example, for improper spacing within a guard that is only 12 inches above grade. Because the code is not entirely clear and because some code officials interpret the text as applying to the entire walking surface, this amendment is proposed to clarify that guards are only required for those portions of the walking surface that pose a hazard.

**Cost Impact:** Will not increase the cost of construction
This is an editorial revision that should have no impact on costs.
RB118-16

IRC: R312.1.1.

Proponent: Wayne Richardson, NHBOA, representing New Hampshire Building Officials Association (wrichardson@bedfordnh.org)

2015 International Residential Code

Revise as follows:

R312.1.1 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. Guard system support posts shall comply with Section R407.3.

Reason: Currently the IRC does not contain prescriptive specifications for guardrail post support for guard systems other than the requirement of "being with able to withstand a 200 pound load applied in any direction along the top." For an inspector and the code user this language does not provide clear direction as where a rapid evaluation may be found to determine if a particular proposed design will meet this requirement. It is frequently based upon common practice or sometimes a structural evaluation may be provided. The first method is not fact based and carries a significant liability for code enforcement and the builder. The second method while possessing fact based certainty is only available for added cost. Based upon code opinions I have received from ICC one would use section R407.3 Structural requirements for columns as being the section that is most applicable presuming one views the posts as a column. This proposal is being submitted to provide clear direction to the end user for correct project costing and clearly providing a prescriptive method for code compliance.

Cost Impact: Will not increase the cost of construction

This change is only to make the code more user friendly and provides clear concise direction to the requirements. It should not increase the costs since these requirements are being enforced currently.
2015 International Residential Code

Revise as follows:

R311.7.10.1 Spiral stairways. Spiral stairways are permitted, provided that the clear width at and below the handrail is not less than 26 inches (660 mm) and the walkline radius is not greater than $24\frac{1}{2}$ inches (622 mm). Each tread shall have a depth of not less than $6\frac{3}{4}$ inches (171 mm) at the walkline. All treads shall be identical, and the rise shall be not more than $9\frac{1}{2}$ inches (241 mm). Open risers shall not be prohibited. Headroom shall be not less than 6 feet 6 inches (1982 mm).

Reason: The added text aids in understanding that open risers are permitted for Spiral Stairways as cited in: 311.7.5.1 Risers. (text of requirement omitted)

Exception 1. The opening between adjacent treads is not limited on spiral stairways.

Cost Impact: Will not increase the cost of construction
The change does not add material or labor to fabrication or construction.
RB120-16
IRC: R312.1.3.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R312.1.3 Opening limitations. Required guards, including the triangular openings at the open sides of stairs formed by the riser, tread, and bottom rail of a guard and guards on the open sides of stairs, shall not have openings from the walking surface to the required guard height that allow passage of a sphere 4 inches (102 mm) in diameter.

Exceptions:
1. The triangular openings at the open side of stair, formed by the riser, tread and bottom rail of a guard, shall not allow passage of a sphere 6 inches (152 mm) in diameter.
2. Guards on the open side of stairs shall not have openings that allow passage of a sphere \(\frac{4}{3}\) inches (111 mm) in diameter.

Reason: I have had my last discussion with a homeowner or contractor why there are three different safety limits to prevent children from falling from a stair, landing, floor, or other walking surface. All three of the current opening limitations can occur within inches of each other. Try to explain to a homeowner why that inconsistency exists. Some have said that children don't play in stairs and that justifies the differences. Two problems with that idea. First, if ever you were a child, had children or grandchildren, or watched someone else's children, you know that children love to investigate and play in stairs from the time they are able to crawl. Second, if we don't have children playing in stairs why have any spacing requirement at all or at least expand it to 12 inches? Let's have some sensible consistency in the code. This proposal standardizes the opening requirements so they are all the same. Having three different standards that are all expected to correct the same set of circumstances is absolutely idiotic.

Cost Impact: Will increase the cost of construction
This proposal may increase construction costs for portions of guards that previously would have permitted larger openings. This will be stairs and landings.
2015 International Residential Code

Add new text as follows:

**R312.1.5 Cable guards** Cable guard rail systems shall have not less than one-eighth inch diameter cables spaced at not more than three inches on center. Required guard openings shall be in accordance with Section R312.1.3 under inspection loading. Inspection loading shall consist of suspending a 50 pound weight from a cable at the central point between supporting structures. Supporting structures shall not deflect during tensioning or inspection load testing. The cables shall have a tamper resistant system that allows for tension to be added to cables.

*Reason:* Cable rail system use has increased due to homeowner’s desire to minimize the visual impact of a rail system from their decks and porches.

Existing Section **R312.1.3, Opening Limitations**, does not detail load being placed on the sphere during inspection. A 4” sphere can easily pass through an under-tensioned cable rail system. The intent of the 4” sphere test was to approximate the size of a child’s head and to prevent entrapment and suffocation.

Adding this section provides for a standard means to perform an inspection of these systems.

**Cost Impact:** Will increase the cost of construction

Currently, cable rail systems are permitted to have cable spacing and cable size which do not allow the passage of a 4” sphere (under no loading or pressure) per Section R312.1.3, Opening Limitations. Under loading these existing cable systems can deflect to allow for passage of a 4” sphere.

With approval of this new code section, the rail systems may require additional cables, heavier gauge cables, and additional support structures.
RB122-16
IRC: R312.2, R312.2.1, R312.2.2.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R312.2 Window fall protection. Window fall protection shall be provided in accordance with Sections R312.2.1, R312.2 and R312.2.2. R312.2.1 wherever the interior finished floor level below an operable window is more than 30 inches, as measured vertically, to an exterior floor or grade below at any point within 36 inches of the window opening. Insect screening shall not be considered window fall protection.

Exceptions:

1. Windows openings that do not allow a 4-inch diameter sphere to pass through the opening where the window is in its largest opened position.
2. Openings that are provided with window fall prevention devices that comply with ASTM F 2090.
3. Windows that are provided with window opening control devices that comply with Section R312.2.1.
4. Windows where the lowest part of the window opening is 36 inches or more above the interior finished floor.

R312.2.2 R312.2.1 Window opening control devices. No change to text.

Delete without substitution:

R312.2.1 Window sills. In dwelling units, where the top of the sill of an operable window opening is located less than 24 inches (610 mm) above the finished floor and greater than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, the operable window shall comply with one of the following:

1. Operable windows with openings that will not allow a 4 inch diameter (102 mm) sphere to pass through the opening where the opening is in its largest opened position.
2. Operable windows that are provided with window fall prevention devices that comply with ASTM F 2090.
3. Operable windows that are provided with window opening control devices that comply with Section R312.2.2.

Reason: It has been clearly established by the membership that the height above which protection from falling requires a guard is 30 inches and that the measurement is taken 36 inches from the edge of the walking surface. Falling from a window is no less dangerous than falling from a deck or other walking surface. Therefore the need for consistency and uniformity dictates that window fall protection rules are consistent with rules attempting to prevent falls from other locations. I don't know how you can come to a more consistent conclusion than what this proposal does unless you just don't care about consistency. If that is the case, we might just as well consider each and every sentence in the code in a vacuum. Approving this proposal will put all fall protection rules on the same footing and the playing field will be level. The IBC sets the standard for window sills at 36 inches just as this proposal does so there will be uniformity between the two codes and a dwelling built under the IBC will have the same rules as one built under the IRC.

Cost Impact: Will increase the cost of construction
This proposal will increase the cost of construction because it requires window fall protection to apply for window
sill heights that were previously exempt.
RB123-16
IRC: R312.2.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R312.2.1 Window sills. In dwelling units, where the top of the sill of an operable window opening is located less than 24 inches (610 mm) above the finished floor and greater than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, the operable window shall comply with one of the following:

1. Operable windows with openings that will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening where the opening is in its largest opened position.
2. Operable windows that are provided with window fall prevention devices that comply with ASTM F 2090.
3. Operable windows that are provided with window opening control devices that comply with Section R312.2.2.

Windows shall meet the requirements of this section where the top of the sill of an operable window opening is located less than 24 inches above the finished floor and opens onto a roof where the lowest portion of the roof is greater than 72 inches above the finished grade or other surface below.

Exception: Roofs provided with a guard that complies with Section R312.1 shall not be required to comply with this section.

Reason: Often times windows open onto a roof. The code provides no direction on how to handle these situations. This proposal will require windows to comply with fall protection requirements if the window opens onto a roof that is more than 72 inches above grade or surface below.

Cost Impact: Will not increase the cost of construction
This proposal is a clarification of the code and should not increase construction costs.

RB123-16 : R312.2.1-
DAVIDSON10852
RB124-16
IRC: R313.1, R313.1.1, R313.2, R313.2.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R313.1 Townhouse automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in townhouses, including throughout townhouses where additions occur.

Exception: An automatic residential fire sprinkler system shall not be required where additions or alterations are made to existing townhouses that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R313.2 One- and two-family dwellings automatic fire systems. An automatic residential fire sprinkler system shall be installed in one- and two-family dwellings, including throughout one- and two-family dwellings where additions occur.

Exception: An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential sprinkler system.

R313.2.1 Design and installation. Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

Reason: At some point the tragic and senseless loss of human life that occurs with fires in existing homes has to come to an end. While not extending sprinkler requirements to all existing dwellings, this proposal will require that those dwellings that are expanded must have sprinkler systems installed. Based on testimony and reports that have occurred in the discussion of residential sprinkler it has been made clear that older buildings lack many of the safety requirements of new dwellings. They may be of balloon framing, lack fire blocking and other passive fire protection, lack hardwired smoke and CO alarms, and lack adequate exit facilities thus necessitating the sprinkler requirement. This is a long needed amendment and attacks the problems that have been so eloquently framed by the fire service each and every time that a fire death occurs in an existing dwelling. That is that fire deaths occur in older homes and that those residents deserve the same level of protection as new home owners. It is rare to listen to a new’s report of a home fire that does not include comments by the local fire chief that the dwelling did not have a fire sprinkler system and that deaths could have been prevented if such a system had been in place. The fire service should not have to endure combing through the ashes of a home looking for the remains of fire victims while builders and realtors look on nonchalantly. This can be the beginning of an effort to require sprinklers in all dwellings thereby reducing the need for expensive fire protection services and the taxes associated therewith.

Cost Impact: Will increase the cost of construction
While this proposal will significantly increase construction costs, lives will be saved both by residents of these structures and by the many first responders who die in these fires. There will also be insurance savings, rebuild savings, and tax savings from less time spent at fire scenes.
RB125-16
IRC: R313.1, R313.1.1, R313.2, R313.2.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R313.1 Townhouse automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in townhouses.

Exception: Exceptions:

1. An automatic residential fire sprinkler system shall not be required where additions or alterations are made to existing townhouses that do not have an automatic residential fire sprinkler system installed.
2. Townhouses meeting the requirements of the International Building Code for Type II-A or Type V-A construction.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R313.2 One- and two-family dwellings automatic fire systems. An automatic residential fire sprinkler system shall be installed in one- and two-family dwellings.

Exception: Exceptions:

1. An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential sprinkler system.
2. One- and two-family dwellings meeting the requirements of the International Building Code for Type II-A or Type V-A construction.

R313.2.1 Design and installation. Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

Reason: For many decades the building code has allowed the installation of an NFPA 13 sprinkler system as a substitute for 1-hour fire-resistant construction. That changed in the past code cycle because there have been so many tradeoffs put in the code for sprinkler systems that there got to be an interpretation issue with the code application. But that does not invalidate the equivalency that stood for those decades. The membership has resisted some tradeoffs in the past but the IRC still has numerous reductions in fire resistive requirements when an NFPA 13D system is provided. Townhouse party walls, walls separating two family dwellings, underfloor fire protection, and exterior walls are just some of the components that get special treatment in sprinklered dwellings. The IRC only requires an NFPA 13D system. An NFPA 13 sprinkler system provides more protection than an NFPA 13D system. So, if an NFPA 13 system is equal to or better than 1-hour fire-resistant construction, then it stands to reason that 1-hour fire-resistant construction will be better than or equal to an NFPA 13D system. A clear precedent has been established. Because adequate water supplies are a problem in some locales and are becoming more problematic with time, alternate construction methods are necessary to meet code requirements. The use of 1-hour fire-resistive construction as equivalent to an NFPA 13 sprinkler system is well documented and the passive construction will always exist to provide fire protection unlike sprinkler systems which can be disabled. Having alternate methods in the code are always a good thing and this proposal provides another means to meet the scoping requirements that is tried and true.

Cost Impact: Will not increase the cost of construction
This proposal will have no impact on construction costs but provides another method of code compliance.
ordinate to move the residential sprinkler requirements to the appendix. Many of you may remember that sprinkler requirements were put into the 2006 IRC appendix as a compromise with sprinkler advocates to allow jurisdictions to adopt sprinkler requirements if they wished. But, as you will also recall, sprinkler advocates quickly submitted new proposals to move sprinklers to the main body of the code arguing that no one was adopting the appendix. However, these new submittals occurred shortly after the publication of the 2006 IRC and before anyone would even have had a chance to adopt the new code! So that brings us to today. Let's quit ignoring the elephant in the room folks. Never in the history of modern codes has a code requirement been such an absolute failure. Never before have state legislatures reacted to a code requirement like they have with sprinklers. Something like 48 of the 50 states have legislatively or otherwise prohibited mandatory sprinklers in new homes.

The Fire Sprinkler Initiative is a project of the National Fire Protection Association - See more at: http://www.firesprinklerinitiative.org/legislation/anti-sprinkler-legislation.aspx#sthash.ZPxgn2h9.dpuf. This is only one of a plethora of websites trotting out the same old talking points. The latest emphasis is on the danger to firefighters. That is like creating a law that no bad guys can have guns so the police are safe. http://www.firesprinklerinitiative.org/

The Fire Sprinkler Initiative even dedicates a part of the website to monitor the ever increasing number of states that have legislated sprinklers from being adopted. Given that only a handful of states are still able to adopt the IRC with sprinkler requirements, it is much more appropriate to face reality and move the sprinkler requirements to the appendix so that the vast majority of those jurisdictions that don't want sprinklers don't have to go to the effort of amending them out. It is much easier for the few cities that do want them to just adopt the appendix. To do otherwise is a disservice to your member cities.

The issue has become so large that dozens of code changes have been put in the code just to address all of those jurisdictions that don't adopt the sprinkler requirements and in some cases making the code more restrictive than it was before the sprinkler mandate. That is unprecedented. Let's face it; the country doesn't want residential sprinklers. The actions of the vast majority of state legislators clearly indicate that fire sprinkler advocates don't represent the citizens. It's time for sprinkler advocates and the fire service to swallow the fact that they lost. Perhaps if support for sprinklers had been enlisted before the unethical shenanigans occurred they would have been more successful.

Furthermore, the fire service has inexplicably opposed tradeoffs to reduce the costs of sprinklers, including before this body, which puts to the question whether or not advocates truly believe in sprinkler reliability.

And there are the arguments that the use of certain building materials or furnishings used today makes homes less safe. But if I build a home using all dimension lumber, are their exceptions to exclude sprinklers? No! Why not? If I use furnishings that are all either non combustible or limited combustible can I exclude sprinklers? No! Why not? And really, FURNISHINGS ARE NOT THE FAULT OF THE DWELLING FOLKS! Perhaps the manufacturers of home furnishings should face the brunt of regulations and not the home building industry. Then there was the argument about large homes being built of combustible construction and they taxed local fire services ability to fight fires in these buildings. But were there size exceptions put in the code? No! Why not? The reason why not is that all of
these reasons are just excuses. As one sprinkler advocate told me after the Minneapolis hearings even garden sheds would have sprinklers if she had her way. There is no interest in addressing or offsetting costs.

And then there seems to be this "us vs. them" attitude towards the building industry. We are supposed to believe home builders are the enemy. Home builders pass regulatory costs onto the buyers folks. The cost of regulation is born by home buyers, many of them first time buyers. Is that who sprinkler advocates really think are the enemy or don't they understand the ramifications? Who really gets hurt by overregulation? And it is overregulation based on the actions of the many state legislators who are elected to represent the people.

Look at the sprinkler initiative.org website for cities in states where adoption is voluntary. Note the few cities. Alaska for example lists two cities – Kanai and Ketchikan. It is time to put this issue to bed once and for all.

**Cost Impact:** Will not increase the cost of construction
This proposal will reduce costs by reducing regulation.
RB127-16
IRC: R313.2.
Proponent: Brian Johnson, representing self

2015 International Residential Code
Delete without substitution:

R313.2 One- and two-family dwellings automatic fire systems. An automatic residential fire sprinkler system shall be installed in one- and two-family dwellings.

Exception: An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential sprinkler system.

Reason: The original proposal to add fire suppression sprinklers indicated the cost involved was on the order of $5,000 averaged throughout the county. First, in all circumstances the author is aware of, municipalities either did not adopt the 2009 IRC where this amendment first appeared, or deleted it specifically in their amendments. The code provision has not advanced life safety. Second, R313.2.1 Design and Installation indicates section P2904 and NFPA 13D are acceptable for the design of the systems. These engineering documents (more properly referenced standards) are inappropriate for the untrained and unskilled to use as design documents and (for NFPA 13D) are the domain of registered design professionals (Fire Protection Engineers, most reasonably). To permit such a design be performed without requiring appropriately skilled persons perform the work in responsible charge is inappropriate and, in fact, dangerous as the systems may be inadequately designed. NOTE: No prescriptive sprinkler sizing provisions appear in the International Building Code. Not requiring a registered design professional perform the sprinkler system design also conflicts with or circumvents statutory requirements regulating the practice of engineering and/or architecture in dozens of states. There is no evidence the prescriptive provisions in P2904 were reviewed by or developed by a professional fire protection engineer or other similarly skilled individual, or that they received any peer review.

Until such time the provision can be properly reconstructed, including requirements for appropriately skilled registered design professionals or other equivalently skilled designers and submitted for reapproval with appropriate cost impact (including, this time, the appropriate engineering and/or design fees) the entire idea should be scuttled. A more realistic provision similar to the one not yet adopted in Minnesota (where lower cost / smaller square footage houses are exempt) is advocated, but this must be with the realization that the cost of the system must be weighed not only against the overall economic impact, and the the hostile effect on affordable housing, but also to the occupancy served, as is done in the International Building Code. Larger houses need not have larger occupant loads. If the intent is to protect life-safety, then this provision should be keyed to the maximum planned occupant load (i.e. number of bedrooms), and not the size of the proposed structure.

As this code provision is deeply entangled in the code, no effort is made here to enumerate all code sections affected by the proposed deletion. That is the job of the International Code Council, which is an organization, after all, and who should bear responsibility for appropriately extracting the residential sprinkler requirement for single-family dwellings without removing previous 2006 and prior IRC requirements for sprinklers elsewhere in the code.

Cost Impact: Will not increase the cost of construction
Deleting the provision would decrease the cost of construction, if were being adopted and enforced. The author is not aware of any jurisdiction currently enforcing the provisions on all single family dwellings. So there is no cost impact.
2015 International Residential Code

Revise as follows:

R313.2 One- and two-family Two-family dwellings automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in one- and two-family dwellings.

**Exception:** An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential sprinkler system.

**Reason:** Alternate to the proposal to delete the provision in its entirety. Objection that the design of sprinkler systems require a registered design professional remain.

**Cost Impact:** Will not increase the cost of construction
No cost impact or reduce cost of construction, if any jurisdiction actually adopted and enforced the provision, which the author is unaware of.
2015 International Residential Code

Revise as follows:

SECTION R313 APPENDIX X AUTOMATIC FIRE SPRINKLER SYSTEMS
(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION X101 AUTOMATIC FIRE SPRINKLER SYSTEMS

**R313.1 X101.1** Townhouse automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in townhouses.

**Exception:** An automatic residential fire sprinkler system shall not be required where additions or alterations are made to existing townhouses that do not have an automatic residential fire sprinkler system installed.

**R313.1.1 X101.1.1** Design and installation. *No change to text.*

**R313.2 X101.2** One- and two-family dwellings dwelling automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in one- and two-family dwellings.

**Exception:** An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential sprinkler system.

**R313.2.1 X101.2.1** Design and installation. *No change to text.*

**Reason:** Since so many states have removed or edited the residential fire sprinklers, a great deal of effort is required to edit the IRC each time it is adopted. Moving the residential sprinkler requirement back to the appendix allows jurisdictions to adopt the IRC without editing on a case by case basis. Those few jurisdictions that wish to adopt the fire sprinklers can simply adopt the appropriate appendix number.

**Cost Impact:** Will not increase the cost of construction

Residential fire sprinklers are already required by the IRC. Moving the requirement back to the appendix does not require construction costs that are not required by the code.
RB130-16
IRC: R314.2.2, R315.2.2.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R314.2.2 Alterations, repairs and additions. Where alterations, repairs or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings where alterations, repairs or additions requiring a permit occur or where one or more sleeping rooms are added or created.

Exceptions:
1. Work involving the exterior surfaces of dwellings, such as replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of a porch or deck, is exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

R315.2.2 Alterations, repairs and additions. Where alterations, repairs or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with carbon monoxide alarms located as required for new dwellings where alterations, repairs, or additions requiring a permit occur or where one or more sleeping rooms are added or created.

Exceptions:
1. Work involving the exterior surfaces of dwellings, such as replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, is exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Reason: Both of these sections are poorly worded. Both sections contain text that reads "in existing dwellings". It is often argued that work must be within the confines of the existing dwelling because of the word "in". But then there are references to porches or decks which are obviously exterior work. The intent is not clear. It isn't clear which terms modify which nouns. The proposal simplifies the language and eliminates the confusion. The exception takes the "commentary language" and separates it into a separate sentence. All too often users of the code take this commentary language as rule. They will take the "such as..." statements and interpret them as all inclusive. The revision makes it clear that those situations cited are examples. You may recall that the 2000 IRC simply stated that "work involving exterior surfaces..." was exempt from smoke alarms. Because that term was not descriptive enough, commentary language was added to clarify what was intended by "exterior surfaces". Additional clarification is still necessary.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.
2015 International Residential Code

Revise as follows:

R314.4 Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section R314.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception: Interconnection of smoke alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available that could provide access for interconnection without the removal of interior finishes.

Reason: With the inclusion of wireless alarms in the IRC, there is little justification on not providing the added life and safety benefits offered by interconnection. While there is a cost increase to the total cost of the project, the benefits offered by interconnected alarms far exceeds the cost increase.

Cost Impact: Will increase the cost of construction
By eliminating the exception, wireless alarms would be required in those locations where hardwired interconnectivity would not have occurred. This would result in a negligible increase in cost resulting in a huge life safety benefit.
RB132-16
IRC: R314.2.2.
Proponent: Kevin McOsker, representing Southern Nevada Chapter of ICC (ktm@ClarkCountyNV.gov)

2015 International Residential Code

Revise as follows:

R314.2.2 Alterations, repairs and additions. Where alterations, repairs or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings.

Exceptions:
1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Reason: This code change makes minor modifications to unnecessary language that currently exists in this code section. Adding or creating a sleeping room would require a permit, which makes the second part of the first sentence redundant. The phrases “is/are exempt from the requirement of this section” are also redundant as the language is located within an exception.

Cost Impact: Will not increase the cost of construction
This code change deletes unnecessary language.
2015 International Residential Code

Revise as follows:

R314.3 Location. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story of the dwelling, including basements and habitable attics and not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. In attached garages, where ambient conditions prohibit the use of a smoke detector, a heat detector is allowed to be installed.
5. Smoke alarms shall be installed not less than 3 feet (914 mm) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by Section R314.3.

Reason: The requirement for separating the garage from the dwelling allows for a fire in the garage to go undetected until it breaches the separation or the smoke from the fire sets off the closest smoke detector in the dwelling.

Bibliography:
- Garage fires: [http://www.thestar.com/life/homes/2013/06/07/fire_safety_measures_hit_close_to_home_at_mackenzie_ridge.html](http://www.thestar.com/life/homes/2013/06/07/fire_safety_measures_hit_close_to_home_at_mackenzie_ridge.html)

Cost Impact: Will increase the cost of construction
The cost would depend on whether or not it is new construction or existing. The cost for new construction would be roughly $125.00 to install a 120VAC heat detector interconnected with the house smoke detectors.
In existing construction the cost would be approximately $300 - $325 since the wire run would be more difficult.
2015 International Residential Code

Revise as follows:

R314.3 Location. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story of the dwelling, in the vicinity of the top and bottom of all stairs, including basements and habitable attics and not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. Smoke alarms shall be installed not less than 3 feet (914 mm) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by Section R314.3.

Reason: Stairways are the funnels of smoke and a primary place to pick it up.

Cost Impact: Will not increase the cost of construction
no cost only re-locating
2015 International Residential Code

Delete without substitution:

R314.4 Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section R314.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception: Interconnection of smoke alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available that could provide access for interconnection without the removal of interior finishes.

Revise as follows:

R314.6 Power source. Smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and, where primary power is interrupted, shall receive power or from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Smoke alarms shall be permitted to be battery operated where installed in buildings without commercial power.
2. Smoke alarms installed in accordance with Section R314.2.2 shall be permitted to be battery powered.

Smoke alarms receiving primary power from the building wiring shall be equipped with a battery back-up.

Reason: This is another of a long list of code requirements containing a double standard. Here is the intent of the code:

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

For smoke alarms, when it comes to power source and interconnection we have two minimum standards that are not equivalent. If a battery powered detector that is not interconnected with other detectors is considered safe in some circumstances, it is safe in all circumstances. This is just following the intent of the code. This will significantly reduce costs with no reduction in safety. Fire departments install battery powered detectors in homes all the time. If they aren't safe, why do they do it? And remember, we don't require CO alarms to be interconnected. Why are smoke alarms different?

Think about this. We allow battery powered detectors in structures not served by commercial power. Would this be allowed if the conventional wisdom was that it wasn't safe? Of course not. We believe that those detectors meet a minimum standard. We require that hard wired detectors have a battery backup! This sends a strong message that we have more faith in battery powered detectors than we do hard wired detectors. If a power failure occurs, a battery powered alarm will always be there.
We already allow battery powered detectors for homes without commercial power and in remodeled homes! We know they are safe. Why jack up the price of homes by requiring this redundancy? Since smoke alarms became required, other areas of the code have been made more restrictive. Homes must have sprinkler systems, fire protected floors, better fire-blocking, draftstops, and CO detectors. It is time to cut the public some slack and allow some lessor cost alternatives to serve the same function as the more expensive route.

Cost Impact: Will not increase the cost of construction
This proposal will not increase costs because it is a lessening of requirements that apply to smoke alarms.
2015 International Residential Code

R314.5 Residential Sprinkler Monitoring Where a residential sprinkler system is installed, a sprinkler waterflow alarm-initiating device shall not be prohibited to be connected to the multiple-station alarm or household fire alarm system to activate an alarm signal.

Reason: This language is currently in NFPA 72-2016, 29.7.7.7.3. The purpose is to clarify the permission to connect a sprinkler waterflow device to the smoke alarms or household fire alarm system to provide notification of waterflow activation to the occupants. If a sprinkler activates in another part of the dwelling unit, this will provide earlier warning of the fire situation and allow additional time to leave the premises. Since the time to escape has reduced significantly in recent years, this will improve fire safety for the occupants. Although waterflow devices are not required by code, this option should be made clearer to allow the interconnection.

Cost Impact: Will increase the cost of construction
This would only increase the cost of construction if the owner voluntarily elects to have a waterflow device installed and connected to smoke alarms. It will not increase the cost of the required fire sprinkler system.
2015 International Residential Code

Delete without substitution:

R314.7.3 Permanent fixture. Where a household fire alarm system is installed, it shall become a permanent fixture of the occupancy, owned by the homeowner.

Reason: It is obvious what is trying to be accomplished here but this is the wrong code to put it in. The IRC doesn't regulate the ownership of systems in existing homes. How is the fire alarm system different than the kitchen sink or the toilet or the light fixtures? How is it anticipated that the building department would regulate this? There is no means for the building department to act on this. Let's assume that Mr. Smith sells his house, moves to some other part of the country, and takes his alarm system with him. How would the building department be aware of this? Who would the building department charge for a violation and how would they go about it? You would charge the current owner since that is who the code makes responsible. If you were going to charge the previous owner, how would you find out where they lived? How much staff time do you want to commit to this with no revenue stream? How many city attorneys would even touch this? How would the building department know which "homeowner" might have removed the system? What will happen is that the current owner will need to comply with alarm requirements. They will be on the hook. It will create a civil matter between the new owner and the previous owner but the new owner is going to expect building departments to go after the previous owner. That is not practical. Grammatically, the sentence is a mess. There are too many commas. It uses the term "permanent". How long is "permanent"? It is called a "fixture", then a "system", and then a "fixture". Fixtures are typically thought of in the plumbing world and are so defined in the IRC. If it is "owned by the homeowner", can't the "homeowner" do with the fixture (system) as he pleases? Does this mean it is permanent only as long as a certain homeowner owns the dwelling? Again, how would one expect the building department to successfully enforce this code section?

Unless you want to be barraged by code changes making every fixture and system "a permanent fixture of the occupancy, owned by the homeowner", this section has to go.

Cost impact: Will not increase the cost of construction
This proposal eliminates regulation and will reduce construction costs.
RB138-16
IRC: R315.2.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R315.2.1 New construction. For new construction, carbon monoxide alarms shall be provided in dwelling units where either or both of the following conditions exist.

1. The **dwelling unit** contains a fuel-fired **appliance**.
   **Exceptions:**
   1. Where fuel-fired appliances are direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
   2. Where the fuel fired appliance is a clothes dryer or a domestic kitchen cooking appliance.

4. The **dwelling unit** has an attached garage with an opening that communicates with the dwelling unit.
   **Exceptions:**
   1. Carbon monoxide alarms shall not be required where doors between the dwelling and garage are gasketed, weatherstripped, or sealed on all four edges
   2. Where the garage has one side open to the exterior or does not have a garage door.
   3. Where an exterior wall of the garage is provided with at least two openings, one commencing within 12 inches of the bottom and one commencing within 12 inches of the top of the wall or be located in the roof. The openings shall communicate directly with the outdoors. Each openings shall have a minimum free area of 1 square foot. Multiple openings are allowed to be used provided the cumulative area is not less than one square foot. Openings shall be protected in accordance with Section R303.6.

**Reason:** We have some extreme overkill going on with carbon monoxide alarm requirements. Setting aside the fact that CO poisoning related to household appliances is extremely rare, that auto exhaust in new vehicles is far from lethal, and that number of CO deaths continue to fall, we still have to deal with the insistence to have some rules. So be it.

What is proposed here are some alternate methods of meeting minimum safety requirements expected by the IRC. Besides an editorial revision, there are a series of exceptions or alternates proposed to mitigate the potential risks posed by carbon monoxide.

The editorial revision deletes the words "or both". This is redundant language.

Next comes two exceptions to address dwellings containing fuel-fired appliances. The first exception exempts CO alarms when direct vent appliances are used. There is no history of these types of appliances contributing to any CO fatalities or problems. Dislodged or deteriorated vents are the typical culprit when appliances contribute to a CO incident. Direct vent appliances largely eliminate that risk.

The second exception deletes clothes dryers and domestic cooking appliances from triggering the need for CO alarms. These appliances only run for short periods of time and historically have not created a CO issue. Exempting them is not much different than the current exemption for wood burning fireplaces. Just to be clear, wood burning fireplaces do not fall under the definition of the term "appliance" which triggers the use of CO alarms. A wood burning fireplace does not trigger any requirements for CO alarms because it is not an appliance.

Then there are three exceptions to address the matter of attached garages. The current text only requires that a CO
alarm be provided when there is an opening between the dwelling and garage. If there are no openings, the garage by itself would not trigger the CO alarm mandate. The opening(s) is the culprit.

So let's deal with the openings. Windows are excluded because they aren't permitted. Doors do occur and they are addressed in the first exception. Gasketed doors have been effective in preventing the movement of smoke and products of combustion in smoke separations required in the IBC. This exception mimics that philosophy and uses language from Chapter 11 to address terms already used to provide an effective barrier to movement of air between the dwelling and garage. Doors already are required to be solid without louvers or glazing as part of the fire separation required in Section R302.5.1. There might be other openings such as ducts, pipes, wires, etc. But keep in mind that Section R302.5.2 requires that ducts be a minimum of 26 gage, Section N1103.3.2 requires that all ducts be sealed so carbon monoxide cannot enter the dwelling through ducts, and ducts and all other penetrations must be firestopped in accordance with Section R302.11, item 4. If the door is sealed, how will CO get into the dwelling to ever pose any sort of risk? Given the current requirements, it won't.

The next exception applies if the garage has one wall open to the exterior. The common perception is that a garage is a tightly sealed structure with a door. A carport does not trigger CO alarm requirements. A carport can be enclosed on two sides. Once the structure is enclosed on three sides it becomes a garage. There is nothing in the code that requires the garage be enclosed on four sides or that it have a vehicle entrance door. If the garage is open on one side it would seem that carbon monoxide gas would not accumulate enough to pose a hazard to the occupants of the dwelling.

The third exception exempts CO alarms if the garage has openings in the exterior walls as specified. It is not uncommon in parts of the country to ventilate garages in this way. This is similar to the combustion air requirements for some fuel burning appliances in enclosures. If it works there it should work in a garage. With high/low openings, heat from an operating engine will rise and create a movement of air through the garage. The heated exhaust gases will also rise and be carried through the upper opening like a thermal column.

This proposal recognizes that many of the techniques used in modern home construction mitigate the need for CO alarms. When these techniques are used, the scoping and purpose requirements of the IRC have been met. CO alarms at that point serve no purpose.

**Cost Impact:** Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.
2015 International Residential Code

Revise as follows:

R315.2.2 Alterations, repairs and additions. Where alterations, repairs or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with carbon monoxide alarms located as required for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, is exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Reason: This code change makes minor modifications to unnecessary language that currently exists in this code section. Adding or creating a sleeping room would require a permit, which makes the second part of the first sentence redundant. The phrases "is/are exempt from the requirement of this section" are also redundant as the language is located within an exception.

Cost Impact: Will not increase the cost of construction
This code change deletes unnecessary language.
RB140-16
IRC: R315.2.2.
Proponent : Kevin McOsker, representing Southern Nevada Chapter of ICC (ktm@ClarkCountyNV.gov)

2015 International Residential Code

R315.2.2 Alterations, repairs and additions. Where alterations, repairs or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with carbon monoxide alarms located as required for new dwellings.

Exceptions:
1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, is exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems not involving a fuel fired appliance are exempt from the requirements of this section.
3. Replacement of fuel fired mechanical systems with an input rating not greater than the original mechanical system.

Reason: The code appears to have been changed to match the verbiage of section R314.2.2 Smoke Alarms, without taking into account the differences. Common sources of Carbon Monoxide in a residence includes furnaces or boilers, gas stoves and ovens, fireplaces, both gas and wood burning, water heaters, clothes, wood stoves, power generators, motor vehicles (attached garages), etc. To exempt the installation, alteration or repair of those items from the requirements of the code appears counterproductive to the intent of the base code. The replacement of a fuel fired mechanical systems of the same or lower input rating is exempted in this proposal due to the additional language in Exception 2. When larger fuel fired mechanical systems are replaced, this would be the code trigger to require Carbon Monoxide Alarms.

Cost Impact: Will increase the cost of construction
The cost is relatively minor requiring the installation of Carbon Monoxide Alarms.
2015 International Residential Code

Revise as follows:

R315.3 Location. Carbon monoxide alarms in dwelling units shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where an unvented fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

Reason: This appears to be a "sky is falling" code requirement that assumes incidents that won't occur. Review the following sections of the IRC regarding locations of appliances. That text doesn't justify the need for CO alarms in sleeping rooms. Even the unvented appliances that would still trigger the requirement are small and have specific safety controls. Let's not continue to add cost to home construction and remodeling where no benefit is achieved.

M2005.2 Prohibited locations. Fuel-fired water heaters shall not be installed in a room used as a storage closet. Water heaters located in a bedroom or bathroom shall be installed in a sealed enclosure so that combustion air will not be taken from the living space. Installation of direct-vent water heaters within an enclosure is not required.

M2005.2.1 Water heater access. Access to water heaters that are located in an attic or underfloor crawl space is permitted to be through a closet located in a sleeping room or bathroom where ventilation of those spaces is in accordance with this code.

G2406.2 (303.3) Prohibited locations. Appliances shall not be located in sleeping rooms, bathrooms, toilet rooms, storage closets or surgical rooms, or in a space that opens only into such rooms or spaces, except where the installation complies with one of the following:
1. The appliance is a direct-vent appliance installed in accordance with the conditions of the listing and the manufacturer's instructions.
2. Vented room heaters, wall furnaces, vented decorative appliances, vented gas fireplaces, vented gas fireplace heaters and decorative appliances for installation in vented solid fuel-burning fireplaces are installed in rooms that meet the required volume criteria of Section G2407.5. 
3. A single wall-mounted unvented room heater is installed in a bathroom and such unvented room heater is equipped as specified in Section G2445.6 and has an input rating not greater than 6,000 Btu/h (1.76 kW). The bathroom shall meet the required volume criteria of Section G2407.5.
4. A single wall-mounted unvented room heater is installed in a bedroom and such unvented room heater is equipped as specified in Section G2445.6 and has an input rating not greater than 10,000 Btu/h (2.93 kW). The bedroom shall meet the required volume criteria of Section G2407.5.
5. The appliance is installed in a room or space that opens only into a bedroom or bathroom, and such room or space is used for no other purpose and is provided with a solid weather-stripped door equipped with an approved self-closing device. All combustion air shall be taken directly from the outdoors in accordance with Section G2407.6.

Cost Impact: Will not increase the cost of construction
This proposal will reduce the cost of construction by reducing the number of CO alarms required.
2015 International Residential Code

R315.3 Location. Carbon monoxide alarms in dwelling units shall be installed outside in the following locations:
1. Outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where
2. On each story of the dwelling, including basements and habitable attics and not including crawl spaces and uninhabitable attics.
3. In bedrooms where a fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

Reason: Carbon monoxide alarms need to be installed on each level of a dwelling. This is recommended by the manufacturers, as CO is slightly heavier than air, making an alarm on every level a more effective method of detecting this highly poisonous gas. This amendment makes CO alarm location consistent with smoke alarm location. Combination smoke/CO alarms are the most commonly installed type.

Cost Impact: Will not increase the cost of construction. Location of CO alarms is already specified by the manufacturer and consistent with the location of required smoke alarms. No additional costs for alarm installation will be required.
2015 International Residential Code

Revise as follows:

**R315.5 Power source.** Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and, where primary power is interrupted, shall receive power or from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

**Exceptions:**
1. Carbon monoxide alarms shall be permitted to be battery operated where installed in buildings without commercial power.
2. Carbon monoxide alarms installed in accordance with Section R315.2.2 shall be permitted to be battery powered.

Carbon monoxide alarms receiving primary power from the building wiring shall be equipped with a battery back-up.

**Reason:** This is another of a long list of code requirements containing a double standard. Here is the intent of the code:

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

For CO alarms, when it comes to power source we have two minimum standards that are not equivalent. If a battery powered alarm is considered safe in some circumstances, it is safe in all circumstances. This is just following the intent of the code. This will significantly reduce costs with no reduction in safety.

Think about this. We allow battery powered alarms in structures not served by commercial power. Would this be allowed if the conventional wisdom was that it wasn't safe? Of course not. We require that hard wired alarms have a battery backup! This sends a strong message that we have more faith in battery powered alarms than we do hard wired ones. If a power failure occurs, a battery powered alarm will always be there.

We already allow battery powered alarms for homes without commercial power and in remodeled homes! We know they are safe. Why jack up the price of homes by requiring this redundancy? Since CO alarms became required, other areas of the code have been made more restrictive. Homes must have sprinkler systems, fire protected floors, better fire-blocking, draftstops, and CO detectors. It is time to cut the public some slack and allow some lessor cost alternatives to serve the same function as the more expensive route.

**Cost Impact:** Will not increase the cost of construction
This proposal will reduce construction costs by eliminating regulation.
2015 International Residential Code
Add new text as follows:

R315.5 Interconnectivity Where more than one carbon monoxide alarm is required to be installed within an individual dwelling unit in accordance with Section R315.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit. Physical interconnection of carbon monoxide alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception: Interconnection of carbon monoxide alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available that could provide access for interconnection without the removal of interior finishes.

Reason: The code does not currently contain a provision to require interconnection of carbon monoxide alarms as required for smoke alarms. This code language is added to require interconnectivity of carbon monoxide alarms in a manner similar to the smoke alarm requirements. Where one carbon monoxide alarm is activated, the other locations in the residence will receive early notification of carbon monoxide and allow for early evacuation of the residence and enhance a level of life safety to the occupants.

Cost Impact: Will increase the cost of construction
Interconnectivity of the Carbon Monoxide Alarms will increase the cost of construction.
**RB145-16**

**IRC: R315.6.3.**

**Proponent:** Richard Davidson, representing Self

**2015 International Residential Code**

Delete without substitution:

**R315.6.3 Permanent fixture.** Where a household carbon monoxide detection system is installed, it shall become a permanent fixture of the occupancy and owned by the homeowner.

**Reason:** It is obvious what is trying to be accomplished here but this is the wrong code to put it in. The IRC doesn’t regulate the ownership of systems in existing homes. How is the fire alarm system different than the kitchen sink or the toilet or the light fixtures? How is it anticipated that the building department would regulate this? There is no means for the building department to act on this. Let’s assume that Mr. Smith sells his house, moves to some other part of the country, and takes his alarm system with him. Who would the building department charge and how would they go about it? How many city attorneys would even touch this? How would the building department know which “homeowner” might have removed the system?

Grammatically, the sentence is a mess. There are too many commas. It uses the term “permanent”. How long is “permanent”? It is called a “fixture”, then a “system”, and then a “fixture”. Fixtures are typically thought of in the plumbing world and are so defined in the IRC. If it is “owned by the homeowner”, can’t the “homeowner” do with the fixture (system) as he pleases? Does this mean it is permanent only as long as a certain homeowner owns the dwelling? Again, how would one expect the building department to successfully enforce this code section?

Unless you want to be barraged by code changes making every fixture and system “a permanent fixture of the occupancy, owned by the homeowner”, this section has to go.

**Cost Impact:** Will not increase the cost of construction

This proposal will reduce costs by eliminating regulations.
RB146-16
IRC: R316.3.
Proponent: Jonathan Roberts (jonathan.roberts@ul.com)

2015 International Residential Code
Revise as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in Section R316.5, foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness and density intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exception: Foam plastic insulation more than 4 inches (102 mm) thick shall have a flame spread index of not more than 75 and a smoke-developed index of not more than 450 where tested at a thickness of not more than 4 inches (102 mm), provided that the end use is approved in accordance with Section R316.6 using the thickness and density intended for use.

Reason: This proposal is editorial in nature and is intended to clarify that foam plastic used in applications other than as a component in manufactured assemblies does require a flame spread index of not more than 75 and a smoke-developed index of not more than 450 when tested in the maximum thickness and density intended for use in accordance with ASTM E84 or UL 723. As written, Section R316.3 is being interpreted by some that it applies only to foamed plastic used as a component in manufactured assemblies.

Cost Impact: Will not increase the cost of construction
The change is editorial in nature and aligns with what most code officials are already requiring.
RB147-16

IRC: R316.4.

Proponent: Marcelo Hirschler, representing GBH International (gbhint@aol.com)

2015 International Residential Code

Revise as follows:

**R316.4 Thermal barrier.** Unless otherwise allowed in Section R316.5, foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of not less than $\frac{1}{2}$-inch (12.7 mm) gypsum wallboard, $\frac{23}{32}$-inch (18.2 mm) wood structural panel, heavy timber in accordance with Section 602.4 of the *International Building Code* or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

**Reason:** Thermal barriers are materials that comply with NFPA 275. In order to comply with NFPA 275 thermal barrier materials (in combination with the foam plastic insulation they are supposed to protect) are supposed to resist flashover after exposure to a room-corner test (using a test specimen that covers 3 walls and the ceiling of an 8 ft. by 12 ft. by 8 ft. room) such as NFPA 286, as well as comply with a number of other requirements (peak heat release rate of no more than 800 kW, flames that don't reach the extremities of the test specimen, total smoke release of no more than 1,000 m$^2$).

As an alternative to testing to NFPA 286 the thermal barriers are allowed to be tested to FM 4880, UL 1040 or UL 1715, all severe large scale tests.

Beyond the test just mentioned, thermal barriers must also be able to pass a fire resistance test using a time-temperature curve like the one in ASTM E119 for 15 minutes.

It is clear (and fire test data have shown this) that thin wood panels materials will not comply with these requirements, because if a thin wood panel, covering a foam plastic insulation material, is exposed to the fire source in NFPA 286, it will reach flashover well before the end of the 15 minute test period.

Wood is a combustible material and its thickness is critical in determining its ease of ignition and capability to transmit heat. Just like it is easy to ignite kindling in a camp fire but difficult to ignite heavy logs, heavy timber can be assumed to be equivalent to a thermal barrier.

Discussions held during the IRC hearings for the 2015 edition addressed the interest by some proponents that a wood material be permitted to be used as a thermal barrier without testing and that led to the present IRC code language. The 2015 IBC consent agenda includes the addition of heavy timber as a thermal barrier material in that code (from accepted proposal FS172-15) and, therefore, this proposal suggests that heavy timber is a wood material that could safely be used as a thermal barrier, while thin wood panels would not be appropriate.

**Cost Impact:** Will not increase the cost of construction

It is likely that heavy timber will be more costly than thin plywood, if used as a thermal barrier. However, the alternate thermal barrier materials, including 1/2 inch gypsum board, are still acceptable and thus the cost of thermal barriers will not need to change.
RB148-16
IRC: R316.5.3.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Delete without substitution:

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. Attic access is required by Section R807.1.
2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation has been tested in accordance with Section R316.6 or the foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
   3.1. one (1)\(^{\frac{3}{8}}\)\(-\frac{1}{2}\)\)-inch-thick (38 mm) mineral fiber insulation.
   3.2. one/four (\(\frac{1}{4}\)\)-inch thick (6.4 mm) wood structural panels.
   3.3. three/four (\(\frac{3}{8}\)\)-inch (9.5 mm) particleboard.
   3.4. one/four (\(\frac{1}{4}\)\)-inch (6.4 mm) hardboard.
   3.5. three/eight (\(\frac{3}{8}\)\)-inch (9.5 mm) gypsum board.
   3.6. Corrosion resistant steel having a base metal thickness of 0.016 inch (0.406 mm).
   3.7. one (1)\(^{\frac{1}{2}}\)-inch thick (38 mm) cellulose insulation; or
   3.8. one/four (\(\frac{1}{4}\)\)-inch (6.4 mm) fiber-cement panel, soffit or backer board.

The ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

Reason: An attic is about as close to being exterior as you can get. There is ample ventilation. Between a dwelling and a dwelling attic there will be insulation and some type of ceiling lid. What benefit does covering the foam provide other than to drive up the cost? If there is a fire, the roof burns off. What is left? It is self-venting? Where will the bad stuff go? What will ignite the foam? Won't that same ignition source ignite the wood framing or sheathing? It appears that because someone might go into the attic to repair a furnace and put an ignition source in contact with the foam that it must be covered. But what if there is no appliance, only piping etc. What are the chances that someone would go up there with an ignition source in the exact location as the foam plastic? And if that did occur, wouldn't the person exit the attic and alert the occupants? If the path to the attic access is blocked, the exposed foam is the least of his worries. Can anyone point to an occurrence where this installation posed any sort of risk? The current requirement is not based on any semblance of reality.

Cost Impact: Will not increase the cost of construction
This proposal will reduce construction costs by eliminating regulations.
2015 International Residential Code

Revise as follows:

R316.5.4 Crawl spaces. The thermal barrier specified in Section R316.4 is not required where the crawl space does not contain openings to the interior of the dwelling, or where all of the following apply:

1. Crawl space access is required by Section R408.4
2. Entry is made only for purposes of repairs or maintenance.
3. The foam plastic insulation has been tested in accordance with Section R316.6 or the foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
   3.1. one (1)\(\frac{1}{2}\)\)-inch-thick (38 mm) mineral fiber insulation;
   3.2. one/four (\(\frac{1}{4}\))\)-inch-thick (6.4 mm) wood structural panels;
   3.3. three/eight (\(\frac{3}{8}\))\)-inch (9.5 mm) particleboard;
   3.4. one/four (\(\frac{1}{4}\))\)-inch (6.4 mm) hardboard;
   3.5. three/eight (\(\frac{3}{8}\))\)-inch (9.5 mm) gypsum board; or
   3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm).

Reason: What is the hazard if the foam is in a ventilated crawl space with no openings to the dwelling? Whether it be for energy conservation or protection against radon, openings between the crawl space and the interior of the dwelling are well sealed. Besides, who would put some of these materials over foam plastic that may come in contact with the ground: mineral fiber insulation, wood panels, particle board, hard board, and gypsum board. Has anyone ever seen foam sheathing protected with mineral fiber insulation? Really?

Cost Impact: Will not increase the cost of construction

This proposal will reduce the cost of construction by eliminating regulation.
2015 International Residential Code

Add new text as follows:

R316.5.4 Crawl spaces. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. Crawl space access is required by Section R408.4
2. Entry is made only for purposes of repairs or maintenance.
3. The foam plastic insulation has been tested in accordance with Section R316.6 or the foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
   3.1. one (1)\frac{1}{2}-inch-thick (38 mm) mineral fiber insulation;
   3.2. one/four (\frac{1}{4})-inch-thick (6.4 mm) wood structural panels;
   3.3. three/eight (\frac{3}{8})-inch (9.5 mm) particleboard;
   3.4. one/four (\frac{1}{4})-inch (6.4 mm) hardboard;
   3.5. three/eight (\frac{3}{8})-inch (9.5 mm) gypsum board; or
   3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm).
   3.7. one/four (\frac{1}{4})-inch (6.4 mm) fiber-cement panel, soffit or backer board.

Reason: During the previous IRC code cycle (INTERNATIONAL CODE COUNCIL 2012 - 2014 CODE DEVELOPMENT CYCLE Group B (2013)) RB168-13 was approved and thereby added "1/4-inch fiber-cement panels" to the 2015 IRC R316.5.3 subsection 3.8 as an approved ignition barrier material (used in attics). In further support, the 2015 IBC Section 2603.5.7 includes ¼-inch thick fiber-cement as an ignition barrier over foam plastic sheathing. By definition, ¼-inch fiber-cement panel complying with ASTM C1186, Type A, or ASTM C1288, or ISO 8336, Category C, has a flame spread of 0 and smoke developed index of 5 or less. In addition, the IBC (Sec. 1405.16) Fiber-cement siding ASTM C1186, Type A or ISO 8336, Category C shall be permitted on exterior walls of Type I, II, III, IV and V construction.

Lastly attached are two test reports (Sw RI Project number 01.16924.01.219a & 01.12924.01.219b[1]) originally submitted as substantiating data the supported the approval of RB168-13 (Group B 2013) and FS128-12 (Group A 2013). Both reports conclude that the wall assemblies did not exhibit sustained flaming, thus meeting the acceptance criteria described in NFPA 268, Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source.

**Cost Impact:** Will not increase the cost of construction

The cost figures below were extracted on January 14th, 2015 from Home Depot's website for Store Number 1013. Zinc-Plated 26-Gauge Sheet Metal is priced at $3.62 per square foot of coverage. (as reference in the 2015 IRC Section R316.5.4 subsection 3.6)

1/4-inch thick fiber-cement backer board is priced at $0.76 per square foot of coverage.

Installation labor for each of these materials is approximately the same. Both of these materials are attached with self-tapping or self-drilling screws. Each product can be cut to size using common hand or power tools sourced from local hardware stores. When cutting fiber-cement panels a scoring knife, razor knife, power shears or saw are commonly used. In the case of sheet metal tin snips, power nibblers, or saw are commonly used.

Therefore, since the material cost for ¼-inch thick fiber-cement is significantly lower than the already accepted method using 26 gauge corrosion resistant steel and the comparative installation labor sheet metal versus fiber-cement panel is not expected to be substantially different, the cost of this code change will not increase the cost of construction.
2015 International Residential Code

Revise as follows:

R316.5.11 Sill plates, headers, and headers perimeter joist spaces. Foam plastic, either rigid or spray applied, shall be permitted to be spray applied to sill plates and headers or installed in the perimeter joist space without the thermal barrier specified in Section R316.4 subject to all of the following:

1. The thickness of the foam plastic shall be not more than $3\frac{3}{4}$ inches (83 mm).
2. The density of the foam plastic shall be in the range of 0.5 to 2.0 pounds per cubic foot (8 to 32 kg/m$^3$).
3. The foam plastic shall have a flame spread index of 25 or less and an accompanying smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723.

Reason: Homeowners want to use rigid foam and don't want to cover it. They don't have the ability to use spray foam. Covering it only drives up cost and provides no benefit. Joist spaces are separated and there is often a ceiling to protect it. The building has a fire sprinkler system. What difference does it make in what form the foam plastic arrives at the site if it meets the appropriate requirements.

Cost Impact: Will not increase the cost of construction
This proposal will reduce costs by eliminating regulations.
RB152-16
IRC: R316.5.14 (New).

Proponent: Avery Lindeman, Green Science Policy Institute, representing Green Science Policy Institute (avery@greensciencepolicy.org); Marjorie Smith, representing Siegel & Strain Architects (msmith@siegelstrain.com); Tom Neltner, Environmental Defense Fund, representing Environmental Defense Fund (tneltner@edf.org); Veena Singla, representing Natural Resources Defense Council (vsingla@nrdc.org); Tom Lent, Healthy Building Network, representing Healthy Building Network (tlent@healthybuilding.net); Suzanne Drake, Perkins+Will, representing Perkins+Will (suzanne.drake@perkinswill.com); Donald Lucas, representing Lawrence Berkeley National Laboratory (d_lucas@lbl.gov); Tony Stefani, representing San Francisco Firefighters Cancer Prevention Foundation (stefanit@sbcglobal.net); Dennis Murphy, representing USGBC California (dennis@usgbc-california.org); Jen Jackson, representing TBD (cynthia.jackson@sfgov.org); Jonathan Wilson, representing National Center for Healthy Housing (jwilson@nchh.org); Andrea Traber, representing Integral Group (atraber@integralgroup.com); Martin Hammer, Martin Hammer, Architect, representing Martin Hammer, Architect (mhhammer@pacbell.net); Russ Pitkin, SERA Architects, representing SERA Architects, Inc (russp@serapdx.com); Stacia Miller, International Living Future Institute, representing International Living Future Institute (advocacy@living-future.org); David Eisenberg, Development Center for Appropriate Technology, representing Development Center for Appropriate Technology; Jan Willemse, representing Zimmer Gunsul Frasca Architects LLP

2015 International Residential Code

Add new text as follows:

R316.5.14 Below grade use. Foam plastic insulation shall not be required to meet the flame spread index and smoke-developed index criteria of Section R316.3 and shall not be subject to oxygen index limits provided that it is marked for below grade use only and is installed in accordance with one of the following:

1. The insulation is located between a concrete slab on grade and its subgrade.
2. The insulation is separated from the building interior by a masonry or concrete wall or foundation. Such insulation installed vertically shall be not less than 6 inches (152 mm) below finished exterior grade. Where installed horizontally, it shall be protected in accordance with Section R403.3.2.

Reason: This proposal creates a new sub-section in R316.5 which enables the voluntary use of foam plastic insulation that is not subject to flame spread, smoke-developed, and oxygen index requirements in certain installations below grade. This proposed code section creates an option whereby foam plastic insulation without flame retardants can be safely used below grade; it does not mandate any alteration to current building practice. It maintains the same level of fire safety provided under the current code and increases consumer choice of insulation products for unexposed or buried applications. Figures 1 and 2 depict examples of installations where the proposed code section could be applied. These include insulation between a concrete slab on grade and its subgrade and exterior insulation for basement and foundation walls and frost-protected shallow foundations.
Figure 1: UNDER-SLAB BELOW-GRADE INSULATION
Proposed Code Section R316.5.14
The proposed code section maintains fire safety in the following ways:

Figure 2: EXTERIOR BELOW-GRADE INSULATION
Proposed Code Section R316.5.14
Insulation installed in accordance with this proposed code change is completely separated from the building interior.

Insulation installed in accordance with this proposal has no exposure to a realistic source of ignition. It is protected either by a concrete slab having a minimum thickness of 3.5 inches (89 mm) as specified in IRC Section R506 Concrete Floors (On Ground); or by a minimum of 6 inches of soil for exterior vertical insulation; or by a minimum of 12 inches of soil for horizontal exterior insulation unless additionally protected by concrete or asphalt as described in IRC Section R403.3.2 Protection of horizontal insulation below ground. These proposed protection requirements are based on existing code requirements for insulation protection and ensure that insulation covered by this proposal would not become exposed during the course of use. Table 1 provides further details and references for proposed protection requirements.

Insulation installed in accordance with this proposal does not have access to adequate oxygen to sustain a fire, as demonstrated by results from fire tests of below-grade foam plastic insulation. Fire testing is not regularly conducted on materials which are limited to buried applications only; however, the proponents conducted tests to address comments on similar proposals from the 2015 IBC-Fire Safety code committee that no fire test data had been submitted. These tests are described below.

**Description of Tests:** There is no established fire test method for the configurations covered by this proposed code section. The co-proponents are unaware of data on flame spread or smoke-developed between concrete and sub-grade material for foams of various material properties. Therefore, in response to requests for fire test data of relevant assemblies, Dr. David Rich at Reax Engineering Inc., and Dr. Donald Lucas (Lawrence Berkeley National Laboratory) and Avery Lindeman (Green Science Policy Institute), conducted tests to evaluate how different foam plastic insulation materials installed below grade would react when subjected to a range of fire spread scenarios.

The insulation materials were sandwiched between concrete pavers (2 inches thick) and earth or other non-combustible surface. Tests were conducted with and without an externally applied radiant heat flux comparable to a post-flashover fire condition. Two types of insulation were tested: one that complied with the requirements of International Residential Code (IRC) Section 316.3 Surface burning characteristics; and a similar below-grade insulation material that did not comply with Section 316.3 requirements. Ignition was achieved at an opening in the pavers to observe fire spread beneath the simulated concrete slab. This was necessary because when there were no openings between the pavers, neither sample of foam plastic insulation ignited, even at conditions where melting occurred. When there were significant openings (16 square inches) or gaps (2.5 inches) between the concrete pavers, and insulation was subjected to an open flame ignition source and an external heat flux, both samples ignited and burned comparably; however, without an external heat flux, ignition of insulation was followed by limited flame spread, and flames self-extinguished due to restricted access to oxygen as the flame burned away from the opening in the pavers.

Insulation installed in accordance with this proposed code change is still subject to the labeling and identification requirements of Section R316.2 Labeling and identification which ensures that foam plastic insulation is labeled with the product identification and sufficient information to determine that the end use complies with code requirements. This proposal would additionally require that materials for use in the allowed below-grade applications be clearly labeled for below grade use only as specified in the proposed Section R316.5.14.

Table 1: Comparison of existing codes and standards with proposed provisions for insulation protection.

<table>
<thead>
<tr>
<th>Existing Code Section</th>
<th>Description of Protection Requirements</th>
<th>Relevance for Proposed Section</th>
</tr>
</thead>
</table>

ICC COMMITTEE ACTION HEARINGS :: April, 2016 RB283
IECC Section C303.2.1

"Insulation applied to the exterior of basement walls, crawlspace walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (153 mm) below grade."

IECC Section C303.2.1 Protection

weather-resistant protective covering" for exterior sources of deterioration. At depths greater than 6 code section remains protected throughout the cc

IRC Section R403.3.2

"Horizontal insulation placed less than 12 inches (305 mm) below the ground surface or that portion of horizontal insulation extending outward more than 24 inches (610 mm) from the foundation edge shall be protected against damage by use of a concrete slab or asphalt paving on the ground surface directly above the insulation or by cementitious board, plywood rated for below-ground use, or other approved materials placed below ground, directly above the top surface of the insulation."

According to the 2015 IRC Co purposes)."

Thus, the proposed protection of insulation as through the course of use.

Oxygen index is not currently limited in Chapter 3 of the IRC. However, testing to ASTM C578, which limits the permitted oxygen index of polystyrene insulation materials, is required by Section R403.3 Frost-protected shallow foundations for materials used below grade for the purpose of insulating footings against frost. In addition, the acceptance criteria for certain types of foam plastic insulation (AC12: Acceptance Criteria for Foam Plastic Insulation) require testing to ASTM C578. The purpose of this index is to measure the percent of oxygen in air needed to sustain combustion in a candle-like fire. As described in the standard:

"The values obtained by the oxygen index test...do not necessarily indicate or describe the fire risk of the materials and are used in this specification primarily to distinguish between insulations formulated with flame retardants and those not so formulated." (ASTM C578-14)

Oxygen index is not indicative of actual fire performance or safety of these materials. In the below grade applications covered by this proposal, the oxygen index of insulation materials is irrelevant. The proposed code section therefore does not limit the permitted oxygen index for insulation installed as specified.

The proponents are aware of concerns that this proposed code change may increase the fire hazard of foam plastic insulation materials during the transportation, storage, and installation stages of the product lifecycle. It is important to note that foam plastics are currently manufactured, transported, stored, and used safely in large quantities without added flame retardants in many other applications. In addition, current practices will maintain fire safety throughout these stages as described below:

- **Transportation:** The U.S. Department of Transportation does regulate the transportation of foam plastics. Special safety measures are not required for the bulk shipment of foam plastics, including food-grade materials and other foam plastics with varying material properties. Approval of the proposed code section will not create a new transportation fire hazard or increase the transportation fire hazards for foam plastic insulation materials.

- **Storage and Installation:** As stated in a 2003 Technical Bulletin from the Alliance for the Polyurethanes Industry, "All organic foam insulations, regardless of whether they contain fire retardants, should be considered combustible and handled accordingly. Certain precautions must be taken to minimize any potential for fire through accidental ignition in handling, storage, and use." The surface burning characteristics required in Section R316.3 are not sufficient to provide fire safety. Approval of the proposed code section will not create new storage and installation fire hazards, and the following practices – which pertain to any combustible or flammable material, not just foam plastics – should be followed regardless of the flame spread index and smoke-developed index of insulation materials on the job site:
  - In accordance with OSHA Regulations for Occupational Safety and Health and Construction, workplace storage of foam plastics and other flammable materials should be done safely and in a way that does not block exits. The Alliance for the Polyurethanes Industry recommends that foam boardstock be stored "in limited quantities, in an accessible location, and free from ignition hazards."
  - OSHA regulations also require that hot work adhere to NFPA 51B, which stipulates that activities
like welding and cutting should only be performed when appropriate precautions are taken. These include removal or proper protection from sparks, heat, or hot metal of any flammable materials in the vicinity of the work.

The proposed code section is similar in scope to two code change proposals submitted during the 2015 Code Development Cycle (designated FS 170-15 and FS 171-15) that were disapproved by the 2015 IBC-Fire Safety code committee. The proponents have addressed that committee's reasons for disapproval as discussed below:

1. **Committee Reason for disapproval of FS 170-15 and FS 171-15:** Hazards can increase based on misuse of products on the jobsite and during storage and handling of the material to get it manufactured, stored, and delivered to the jobsite.

   **Response:** This proposal explicitly requires insulation materials manufactured for use under the proposed code section to be labeled for below grade use only. This will enable inspectors and workers to identify foam plastic insulation materials for use with this code section and prevent the accidental installation or misuse of such materials in other, unapproved applications. Furthermore, as discussed above, existing specifications for the safe storage and handling of foam plastics do not differentiate between materials with and without flame retardant chemicals. Flame retardants used in foam plastic insulation may provide only a limited benefit against a narrow range of possible ignition sources. Once ignited, foam plastics with and without flame retardants behave similarly.

2. **Committee Reason for disapproval of FS 170-15 and FS 171-15:** No fire test data has been submitted on the product used in this application – fire can get below ground and protection by the slab or by masonry or concrete wall or foundation may not always be enough.

   **Response:** This reason statement provides fire test data for the proposed applications. It is important to note that there is no established fire test method for insulation in the configurations covered by this proposed code section. There is also no fire loss history to indicate that these configurations pose a particular fire hazard. As stated in the code commentary for the 2015 IRC Section R316.5.13 Floors, "...in the event of an interior fire, the floor is typically the last building element to be significantly exposed by the fire." Nevertheless, fire tests were conducted and the results confirmed that protection of insulation by a concrete slab or by a masonry or concrete wall or foundation is more than sufficient to provide fire safety for inhabitants and first responders. The results further demonstrated that insulation installed as allowed by this proposed code section behaved comparably with and without added flame retardants, confirming that current levels of fire safety will be maintained.

3. **Committee Reason for disapproval of FS 170-15 and FS 171-15:** Proposed provision for insulation depth is arbitrary and may allow insulation to become exposed after occupancy, which could then increase flame spread to other portions of the exterior of the building.

   **Response:** This proposal provides references for the proposed insulation protection requirements. Depths below grade and additional protection requirements are based on existing standards for protection of below-grade insulation which have already been approved and incorporated into the IRC as adequate for protecting insulation throughout the course of use.

4. **Committee Reason for disapproval of FS 170-15 and FS 171-15:** Proponents raised a perceived toxicity problem with fire retardant-treated foam plastic but provided no data showing the health risks of fire retardant-treated products.

   **Response:** This proposal does not ask the code committee to evaluate or to make a decision based on possible health risks of fire retardant-treated products. Rather, it describes specific installation conditions for below-grade foam plastic insulation where fire retardants are not needed to provide fire safety. Because there is no fire safety benefit from the use of flame retardants in insulation in these applications, the code should allow for a choice of insulation materials without flame retardants that can be used safely. The proposed code section does not prohibit the use of foam plastic insulation that meets the requirements of Section R316.3, nor does it prohibit the use of foam plastic insulation that contains flame retardants. It does not mandate any change to current building practice. Instead, it describes specific applications below-grade where foam plastic insulation that does not contain flame retardants, and therefore does not meet the requirements of Section R316.3, can be safely used if desired. This proposed code section would maintain current levels of fire safety.

**Cost Impact:** Will not increase the cost of construction
The proposed code change will not require any action that increases construction costs since it does not mandate any change from current practice. Utilizing the proposed code change would be optional: it would not require any alteration to design or construction practices. The proposed change would enable voluntary manufacture and use of alternative foam plastic insulation products that do not contain flame retardant chemicals. The cost of using these alternative insulation products may be higher, lower, or the same as the cost of using currently available insulation depending on formulation costs, production volumes, consumer demand, and level of competition.
2015 International Residential Code

Add new text as follows:

**R316.6 Exterior Walls.** Foam plastic in thicknesses of ½-inch (12.7 mm) or greater on exterior walls shall be separated from the exterior of a building by:

1. An approved thermal barrier complying Section R316.4, or
2. One of the following exterior coverings complying with Section R703 with a thickness of not less than 1/2-inch (12.7 mm):

   Concrete, stone or masonry veneer,
   Fiber cement siding,
   Hardboard siding,
   Particle board,
   Wood siding or
   Wood structural panel.

**Reason:** Historically the IRC required foam plastic insulation to be protected from the interior by a thermal barrier, such as ½ in. gypsum wallboard (R316.4). This provided an acceptable level of fire performance from a fire originating within the home. There are no requirements to provide a thermal barrier to protect the insulation from an exterior fire because foam plastic insulation in the wall cavity would typically be protected by a ½ in. OSB attached to the exterior of the wall studs to serve as a shear wall.

Energy efficiency requirements now require exterior walls to include higher R-values, which is often provided by continuous insulation in the form of foam board stock attached on the outside of the shear wall. The only covering provided over the insulation is typically a thin water barrier and exterior siding, such as vinyl siding.

Fire test experiments conducted by UL [http://www.youtube.com/watch?v=K8pGUULE3Xc](http://www.youtube.com/watch?v=K8pGUULE3Xc) (a compelling seven minute video) compare the fire performance between traditional residential exterior wall constructions with no continuous insulation outside of the exterior ½ in. OSB shear wall, versus two constructions with ½ in. and 1 in. polystyrene foam continuous insulation with vinyl exterior wall covering. When subjected to a small exterior fire, similar to that produced by a gas grill, the two wall constructions with exterior continuous insulation performed badly. In one case the fire extended up the wall and into the attic vents in 1:51 minutes, and in the other case the fire fully involved the exterior wall and the roofing became involved in just over two minutes. In a real life fire, the home would be totally involved before the first responding engine company could be expected to arrive, assuming they were notified when the fire first impinged on the wall.

This proposal requires foam insulation on exterior walls in thickness of 1/2 in. or greater (the same min. thickness in the fire experiments) to be protected from the exterior of the building by a thermal barrier with the same properties as that required in Section R316.4, or with selected wall coverings from Section 703 that should provide a reasonable level of protection from an external fire impinging on the exterior of the wall. The 1/2 in. minimum thickness of the wall coverings corresponds with the thickness of the OSB shear wall used in the UL experiments.

**Bibliography:** UL Fire Test Video:
Cost Impact: Will increase the cost of construction
The proposal is not likely to increase the cost of construction if one of the exterior sidings described in the proposal is used. The cost of construction is likely to increase if a siding not described in the proposal is used, and an additional thermal barrier is required under that siding.
R317.1 Location required. Protection of wood and wood-based products from decay shall be provided in the following locations by the use of naturally durable wood or wood that is preservative-treated in accordance with AWPA U1 for the species, product, preservative and end use. Preservatives shall be listed in Section 4 of AWPA U1.

1. Wood joists or the bottom of a wood structural floor when closer than 18 inches (457 mm) or wood girders when closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. Wood framing members that rest on concrete or masonry exterior foundation walls and are less than 8 inches (203 mm) from the exposed ground.
3. Sills and sleepers on a concrete or masonry slab that is in direct contact with the ground unless separated from such slab by an impervious moisture barrier.
4. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than $\frac{1}{2}$ inch (12.7 mm) on tops, sides and ends.
5. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than 6 inches (152 mm) from the ground or less than 2 inches (51 mm) measured vertically from concrete steps, porch slabs, patio slabs and similar horizontal surfaces exposed to the weather.
6. Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.
7. Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below grade except where an approved vapor retarder is applied between the wall and the furring strips or framing members.

R402.1.2 Wood treatment. All lumber and plywood shall be pressure-preservative treated and dried after treatment in accordance with AWPA U1 (Commodity Specification A, Use Category 4B and Section 5.2 Special Requirement 4.2), and shall bear the label of an accredited agency. Where lumber and/or plywood is cut or drilled after treatment, the treated surface shall be field treated with copper naphthenate, the concentration of which shall contain a minimum of 2-percent copper metal, by repeated brushing, dipping or soaking until the wood absorbs no more preservative.

R504.3 Materials. Framing materials, including sleepers, joists, blocking and plywood subflooring, shall be pressure-preservative treated and dried after treatment in accordance with AWPA U1 (Commodity Specification A, Use Category 4B and Section 5.2 Special Requirement 4.2), and shall bear the label of an accredited agency.

### TABLE R905.8.5

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>MINIMUM GRADES</th>
<th>APPLICABLE GRADING RULES</th>
</tr>
</thead>
</table>

ICC COMMITTEE ACTION HEARINGS :: April, 2016
<table>
<thead>
<tr>
<th>Material Description</th>
<th>Category</th>
<th>Certification Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood shakes of naturally durable wood</td>
<td>1</td>
<td>Cedar Shake and Shingle Bureau</td>
</tr>
<tr>
<td>Tapersawn shakes of naturally durable wood</td>
<td>1 or 2</td>
<td>Cedar Shake and Shingle Bureau</td>
</tr>
<tr>
<td>Preservative-treated shakes and shingles of naturally durable wood</td>
<td>1</td>
<td>Cedar Shake and Shingle Bureau</td>
</tr>
<tr>
<td>Fire-retardant-treated shakes and shingles of naturally durable wood</td>
<td>1</td>
<td>Cedar Shake and Shingle Bureau</td>
</tr>
<tr>
<td>Preservative-treated tapersawn shakes of Southern pine treated in accordance with AWPA Standard U1 (Commodity Specification A, Special Requirement 4.6, Use Category 3B and Section 5.6)</td>
<td>1 or 2</td>
<td>Forest Products Laboratory of the Texas Forest Services</td>
</tr>
</tbody>
</table>

**Reason:** The existing text was outdated, requiring clarification and updates to current AWPA section numbering.

**Cost Impact:** Will not increase the cost of construction

These changes merely clarify and update the existing text without any impact on the required specifications for materials used.
RB155-16
IRC: R317.1.5.
Proponent: Edward Keith, representing APA-The Engineered Wood Association (ed.keith@apawood.org)

2015 International Residential Code
Revise as follows:

R317.1.5 Exposed glued-laminated timbers wood members. The portions of glued-laminated timbers wood members that form the structural supports of a building or other structure and are exposed to weather and not properly protected by a roof, eave or similar covering shall be pressure treated with preservative, or be manufactured from naturally durable or preservative-treated wood.

Reason: The requirements in Section R317.1.5 should be applied to all exposed wood members, and not limited to laminated timbers. Therefore, it is proposed that this section be revised as suggested.

Cost Impact: Will not increase the cost of construction
This code change will not increase the cost of construction as it simply recognizes the general intent of using preservative treated wood under exposed conditions.
RB156-16
IRC: R320, R320.1, R320.1.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Delete without substitution:

SECTION R320 ACCESSIBILITY

R320.1 Scope. Where there are four or more dwelling units or sleeping units in a single structure, the provisions of Chapter 11 of the International Building Code for Group R-3 shall apply.

R320.1.1 Guestrooms. A dwelling with guestrooms shall comply with the provisions of Chapter 11 of the International Building Code for Group R-3. For the purpose of applying the requirements of Chapter 11 of the International Building Code, guestrooms shall be considered to be sleeping units.

Exception: Owner-occupied lodging houses with five or fewer guestrooms constructed in accordance with the International Residential Code are not required to be accessible.

Reason: This section has severe technical problems that make enforcement impossible. It appears it is placed in the wrong code. The scope states that accessibility rules apply if there are "four or more dwelling units or sleeping units in a single structure". The scope of the IRC only applies to single- and two-family dwellings and townhouses. By rule, each townhouse is considered a separate building.

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.

Therefore there will never be four or more dwelling units in a structure built under the IRC. If building departments enforce this the way it is written, they won't be enforcing anything. If they enforce it the way they think might have been intended, they run the risk of being sued.

It also requires compliance if there are four or more "sleeping units". That term is not defined in the IRC except by reference to Chapter 11 where it can't be found. So what is a sleeping unit? When would such a building be built under the IRC? It appears that this is an R-2 occupancy in the IBC. There is a definition in the IBC for "sleeping unit" and it flies in the face of the text in the IRC:

From the IBC: SLEEPING UNIT. A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

The last section addresses "guestrooms". What is a "guestroom"? It is defined as:

GUESTROOM. Any room or rooms used or intended to be used by one or more guests for living or sleeping purposes.

If I build my new home with a spare bedroom to be used for an occasional visitor, it appears that I have a guestroom. How does the building department know when I submit my plans how my bedrooms will be used? How is this going to be enforced? Then we are back to the unenforceable language referencing "owner-occupied" lodging houses. Besides adding another term "lodging houses" to the mix, you have the issue of what constitutes an "owner-occupied" lodging house. Must this building be my primary residence? Must I sleep there a certain number of nights? If someone asks how they comply with the term "owner-occupied", what should they be told?

Cost Impact: Will not increase the cost of construction
This proposal will reduce costs by eliminating regulation.
2015 International Residential Code

Revise as follows:

R301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with Section R322. Buildings and structures that are located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area. Buildings and structures located in whole or in part in identified floodways, coastal high hazard areas, and Coastal A Zones shall be designed and constructed in accordance with ASCE 24.

R301.2.4.1 Alternative provisions. As an alternative to the requirements in Section R322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas, including A or V Zones and Coastal A Zones, as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures that are located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area. Buildings and structures located in whole or in part in identified floodways, coastal high hazard areas, and Coastal A Zones shall be designed and constructed in accordance with ASCE 24.

R322.1.1 Alternative provisions. As an alternative to the requirements in Section R322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

R322.3 Coastal high-hazard areas (including V Zones and Coastal A Zones, where designated). Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave action or wave-induced erosion shall be designated as coastal high-hazard areas. Flood hazard areas that have been designated as subject to wave heights between $1\frac{1}{2}$ feet (457 mm) and 3 feet (914 mm) or otherwise designated by the jurisdiction shall be designated as Coastal A Zones. Buildings and structures constructed in whole or in part in coastal high-hazard areas and coastal A Zones, where designated, shall be designed and constructed in accordance with Sections R322.3.1 through R322.3.7 the applicable requirements of R322.1, ASCE 24, and this section.

Delete without substitution:

R322.3.1 Location and site preparation:

1. New buildings and buildings that are determined to be substantially improved pursuant to Section R105.3.1.1 shall be located landward of the reach of mean high tide.

2. For any alteration of sand dunes and mangrove stands, the building official shall
require submission of an engineering analysis that demonstrates that the proposed
alteration will not increase the potential for flood damage.

R322.3.2 Elevation requirements.

1. Buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.
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.
5. 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 and Coastal A Zones shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4. 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. 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. 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 foundations are designed to resist the additional flood load.

Exception: In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided the foundations are designed to account for wave action, debris impact, erosion and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

R322.3.4 Walls below design flood elevation. Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or
other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a resistance of not less than 10 (479 Pa) and not more than 20 pounds per square foot (958 Pa) as determined using allowable stress design; or

4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), as determined using allowable stress design, the construction documents shall include documentation prepared and sealed by a registered design professional that:
   4.1. The walls and partitions below the design flood elevation have been designed to collapse from a water load less than that which would occur during the base flood.
   4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on structural and nonstructural building components. Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code.

5. Walls intended to break away under flood loads as specified in Item 3 or 4 have flood openings that meet the criteria in Section R322.2.2, Item 2.

R322.3.5 Enclosed areas below design flood elevation. No change to text.

R322.3.5.1 Protection of building envelope. No change to text.

Revise as follows:

R322.3.6 Construction documents. The construction documents shall include documentation that is prepared and sealed by a registered design professional that the design and methods of construction to be used meet the applicable criteria of this section ASCE 24.

R322.3.7 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.3.2 ASCE 24. Where elevated on platforms, the platforms shall be cantilevered from or knee braced to the building or shall be supported on foundations that conform to the requirements of Section R322.3 ASCE 24.

Reason: The IRC Section R322.3.6 requires documentation signed and sealed by registered design professionals that dwellings in coastal high hazard areas (Zone V) and Coastal A Zones (if the Limit of Moderate Wave Action is delineated on the Flood Insurance Rate Map or otherwise designed by the community) meet the applicable criteria. ASCE 24 Flood Resistant Design and Construction is the standard of practice for construction in flood hazard areas. ASCE 24 already is a referenced standard in the IRC. Section R301.2.4.1 and R322.1.1 permit use of ASCE 24 as an alternative to the prescriptive provisions of R322, and Section R322.3.3 requires spread footings, mats, rafts, or other foundation that support columns to be designed in accordance with ASCE 24.

The IRC requires engineering design or prescriptive engineering-based referenced standards for other high-hazard areas such as some high wind regions and areas where seismic design category E is identified. This proposal is similar in that it replaces the specific design requirements of R322.3 with reference to ASCE 24. A side-by-side comparison of the two sets of requirements was prepared, with the conclusion the differences are not substantive, in large part because several changes approved for the 2015 IRC were based on consistency with the 2014 edition of ASCE 24. One clear difference is ASCE 24 specifies shear walls, which are not permitted by Section R322.3.3 but may be appropriate for some townhomes to resist lateral loads in areas with seismic or high wind conditions.

Two subsections are proposed to be retained -- and renumbered (renumbering not shown in proposal). Section R322.3.6 Construction documents (renumber to R322.3.2) is retained to meet the NFIP requirement that dwellings in coastal high hazard areas be designed and sealed by registered design professionals (renumber to R322.3.1). Section R322.3.7 Tanks (renumber to R322.3.3), is retained because it has the an option to cantilever or knee-brace platforms to the building is not explicit in ASCE 24 (nor it is precluded).

NOTE: six sections are proposed to be deleted without substitution; however, those sections have notes "No
Cost Impact: Will not increase the cost of construction
The IRC already requires dwellings in coastal high hazard areas and Coastal A Zones to be prepared by registered design professionals. ASCE 24 provides more flexibility in design and that flexibility may result in some cost savings for some dwellings.
2015 International Residential Code

Revise as follows:

**R301.2.4 Alternative provisions.** As an alternative to the requirements in Section R322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein. ASCE 24 is permitted as an alternative in alluvial fan flooding areas, as defined in ASCE 24.

**R322.1.1 Alternative provisions.** As an alternative to the requirements in Section R322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein. ASCE 24 is permitted as an alternative in alluvial fan flooding areas, as defined in ASCE 24.

**Reason:** This proposal clarifies a specific situation in which both communities and applicants may want to use ASCE 24 instead of the prescriptive provisions of Section R322 because alluvial fan flooding areas are considered especially high risk areas.

Alluvial fans are fan-shaped deposits of sediment eroded from steep slopes and watersheds and deposited on valley floors. Flooding on alluvial fans typically does not have a well-defined flow path, typically has rapid onset, usually has high velocity flows, and is usually accompanied with large amounts of sediment and debris. Most alluvial fans are found along the base of mountain fronts in the western states where infrequent but intense storms typical of arid and semi-arid climates combine with abrupt changes in topography to create formation of alluvial fans. Areas subject to alluvial fan flooding are hazardous, especially when the processes that form alluvial fans are active. On Flood Insurance Rate Maps, areas subject to alluvial fan flooding are identified as Zone AO and both anticipated depth of water and velocity are specified.

ASCE 24 Section 3.2 allows construction in portions areas subject to alluvial fan flooding that are not at the apex of alluvial fans, not in the active meandering flow path, and not where there is evidence of active processes, including braided channels, erratic flow paths, and sediment transport. ASCE 24 commentary notes other characteristics of active processes and indicates active areas are identified by reviewing physical features, topographic data, aerial photography, historical event data, personal observations, and the experience and knowledge of local officials.

In areas where construction is allowed, in addition to the requirements of ASCE 24 Chapter 1 and Chapter 2, ASCE 24 Section 3.2 requires foundations to be designed and constructed to resist all flood loads, including the effects of scour based on the higher of the velocity identified on the flood hazard map or five feet per second. Because of high velocity, scour, and sediment and debris load, it is appropriate that foundations in these high-risk areas be designed to account for site-specific conditions.

**Cost Impact:** Will increase the cost of construction

The increased cost is balanced by reduction in vulnerability to future alluvial fan flooding, shifting supporting soils, and heavy sediment loads. Design of foundations requires the services of a registered design professional to determine site-specific conditions and to account for those conditions in the design. Designed foundations likely have deeper footings and more robust foundation walls than if prescriptive foundation specifications are allowed. Some cost savings may be gained by use of piers with deep footings, rather than perimeter walls. Pier foundations have the added benefit of avoiding build-up of transported sediment against perimeter walls.
2015 International Residential Code

Revise as follows:

R322.3.3 Foundations. Buildings and structures erected in coastal high-hazard areas and Coastal A Zones shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns and comply with the following:
1. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4.
2. 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 and pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design
3. Columns and installation their supporting foundations shall be certified in accordance with Section R322.3.6 designed to resist combined wave and wind loads (lateral and uplift) and shall include consideration of decreased capacity caused by scour of soil strata surrounding the column. 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.
4. Flood and wave loads shall be those associated with the design flood. Wind loads shall be those required by this code.
5. Foundation designs and construction documents shall be prepared and sealed in accordance with Section R322.3.6.
6. 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 foundations are designed to resist the additional flood load.

Exception: In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided the foundations are designed to account for wave action, debris impact, erosion and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

Reason: Section R322.3.3 allows the use of pilings or columns, but specific requirements are identified only for pilings, without equivalent specificity for columns. The primary object of this proposal is to provide that specificity. Second, the current text is long, so the proposal breaks it into distinct numbered items which makes it easier to
read.

**Cost Impact:** Will not increase the cost of construction

No cost impact associated with the added text for columns because the text is clarifying only and column foundations already are required to be designed by registered design professionals.
2015 International Residential Code

Revise as follows:

**R322.3.3 Foundations.** Buildings and structures erected in coastal high-hazard areas and Coastal A Zones shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4. 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. 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. 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 foundations are designed to resist the additional flood load.

**Exception:** In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided the foundations are designed to account for wave action, debris impact, erosion and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

Add new text as follows:

**R322.3.4 Concrete slabs** Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located beneath or immediately adjacent to structures shall be designed and constructed in accordance with one of the following:

1. **To be structurally independent of the foundation system of the structure, to not transfer flood loads to the main structure, and to be frangible and break away under flood conditions prior to base flood conditions.** Reinforcing of concrete slabs, including welded wire reinforcement, shall not be used so as to minimize the potential for concrete slabs being a source of debris. Slabs shall not have turned down edges and slab thickness shall be not more than 4 inches.

2. **To be self-supporting, structural slabs capable of remaining intact and functional under base flood conditions, including expected erosion and local scour, and the main structure shall be capable of resisting any added flood loads and effects of local scour due to the presence of the slabs.**

**Reason:** Coastal high hazard areas (Zone V) and Coastal A Zones are portions of flood hazard areas along open
shorelines where wave action will occur. Concrete slabs beneath or immediately adjacent to dwellings are affected by flooding, erosion and local scour. The presence of concrete slabs can increase damage to elevated buildings, in part by shifting such that added loads or increased scour occurs on the building foundation. In the 2015 cycle when a similar proposal was submitted, it was noted that specifications for concrete slabs may be appropriate for Zone V. The IRC now treats Coastal A Zones, if delineated or designated, like Zone V.

This proposal helps clarify what is intended by the requirement in R322.3.3 that the area below elevated buildings shall be free of obstructions. It is based on the requirements of referenced standard ASCE 24-14, Flood Resistant Design and Construction, and best practices documented in several publications issued by the Federal Emergency Management Agency (especially Technical Bulletin 5, Free-of-Obstruction Requirements). The proposed text has two alternatives. One requires concrete slabs in coastal high hazard areas and Coastal A Zones to be frangible (means "easily broken") and to break away under flood conditions. The expectation is this will minimize the size of debris and thus minimize the likelihood of causing significant damage to structures. For many years, many local floodplain management ordinances adopted by coastal communities have used the term "frangible."

The limitation on turned-down edges is based on FEMA’s post-disaster field experience that identified damage to foundations when slabs intended to break away have turned-down edges which inhibit the slabs from cleanly breaking away when undermined by wave scour or erosion. In Zone V and Coastal A Zones concrete slabs are not permitted to be used as structural foundation elements, thus it is not problematic to limit turned-down edges and thickness for nonstructural slabs used for the stated purposes.

The proposal includes an alternative, also based on ASCE 24-14, to have slabs not intended to break away provided the slabs and the adjacent building are designed to resist flood loads.

[Note on format – renumber subsequent sections]

**Cost Impact:** Will not increase the cost of construction

The free of obstruction requirement has been enforced by communities that participate in the National Flood Insurance Program and FEMA guidance has long advised the requirement can be satisfied by requiring concrete slabs to meet the proposed specifications.
2015 International Residential Code

Add new text as follows:

R322.3.6 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Section R322.3.2 shall comply with at least one of the following:

1. Be designed and constructed to resist flood loads and minimize transfer of flood loads to the building or structure, including foundation; or
2. Break away during design flood conditions without causing damage to the building or structure, including foundation; or
3. Be retractable, or able to be raised to or above the lowest floor elevation, provided the ability to be retracted or raised prior to the onset of flooding is not contrary to the means of egress requirements of the code.

Reason: Coastal high hazard areas (Zone V) and Coastal A Zones are portions of flood hazard areas along open shorelines where wave action will occur. Stairways and ramps for dwellings are affected by flooding, erosion and scour and the presence of stairways and ramps can increase damage to elevated buildings. In the 2015 cycle when a similar proposal was submitted, it was noted that specifications for stairways and ramps may be appropriate for Zone V. The IRC now treats Coastal A Zones, if delineated or designated, like Zone V. This proposal helps clarify what is intended by the requirement in R322.3.3 that the area below elevated buildings shall be free of obstructions. It is based on the requirements of referenced standard ASCE 24-14, Flood Resistant Design and Construction and best practices documented in several publications issued by the Federal Emergency Management Agency (especially Technical Bulletin 5, Free-of-Obstruction Requirements). Post-disaster investigations reveal stairways do break away; if properly detailed, they can break away with no significant damage to the remaining building.

ASCE 24 commentary and FEMA guidance advises satisfying the requirement to resist flood-related loads can be best achieved by using railings and treads that are open to the extent allowed by code to facilitate the passage of floodwater. Massive stairs, especially masonry stairs, do not meet the requirement in R322.3.3 that the area below elevated buildings is free of obstruction (obstructions divert waves onto the foundation or adjacent buildings and can exacerbate scour). Ramps should be positioned to avoid alignment with approaching waves, which would allow floodwater to surge up the ramps perhaps even higher than the peak flood elevation, thus flowing into buildings.

Stairways and ramps must be designed to carry normal loads required by the IRC, which must be considered when evaluating the alternative to provide stairways and ramps that are designed to break away under flood loads.

Cost Impact: Will not increase the cost of construction

The requirement to avoid obstructions and to have elements below elevated buildings break away has been enforced by communities that participate in the NFIP, whether by enforcement of the IRC or local floodplain management regulations. FEMA guidance has long advised the requirement can be satisfied by requiring stairways and ramps to meet the proposed specifications.
RB162-16

IRC: R322.3.6 (New).
Proponent: Gregory Wilson (gregory.wilson2@fema.dhs.gov); Rebecca Quinn, representing Federal Emergency Management Agency (rcquinn@earthlink.net)

2015 International Residential Code

Add new text as follows:

**R322.3.6 Decks and porches.** Attached decks and porches shall meet the elevation requirements of Section R322.3.2 and shall either meet the foundation requirements of this section or shall be cantilevered from or knee braced to the building or structure. Self-supporting decks and porches that are below the elevation required in Section R322.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Self-supporting decks and porches shall be designed and constructed to remain in place during base flood conditions or shall be frangible and break away under base flood conditions.

**Reason:** Coastal high hazard areas (Zone V) and Coastal A Zones are portions of flood hazard areas along open shorelines where wave action will occur. Decks and porches attached to or adjacent to dwellings are affected by flooding, erosion and scour. The presence of decks and porches can increase damage to elevated buildings unless they are constructed in ways intended to minimize damage. In the 2015 cycle when a similar proposal was submitted, it was noted that specifications for decks and porches may be appropriate for Zone V. The IRC now treats Coastal A Zones, if delineated or designated, like Zone V.

This proposal clarifies how decks and porches are treated and is based on the requirements of referenced standard ASCE 24-14, Flood Resistant Design and Construction and best practices documented in several publications issued by the Federal Emergency Management Agency (especially Technical Bulletin 5, Free-of-Obstruction Requirements). Attached decks must be at or above the same elevation as dwellings because they are, in effect, extensions of the dwellings. Also, if attached and lower than the elevation of a dwelling, a deck or porch would be an obstruction and thus not permitted by the free-of-obstruction requirement in R322.3.3.

Self-supporting decks and porches are separate structures. If permitted below the elevation required for dwellings, they must not be enclosed by walls because decks enclosed with walls are buildings that must meet all requirements for buildings in flood hazard areas. Whether self-supporting decks and porches are elevated or below the require elevation, they must either be designed to resist flood loads or to break away under flood and wave conditions associated with the base flood. The term frangible means “easily broken,” the expectation is this will minimize the size of debris and thus minimize the likelihood of causing significant damage to structures by the presence of water-borne debris. For many years, many local floodplain management ordinances adopted by coastal communities have used the term “frangible.”

**Cost Impact:** Will not increase the cost of construction

The elevation requirement and free of obstruction requirement have been enforced by communities that participate in the National Flood Insurance Program and FEMA guidance has long advised the requirement can be satisfied by requiring decks and porches to meet the proposed specifications.
2015 International Residential Code

Revise as follows:

SECTION R323-

APPENDIX X

STORM SHELTERS

R323.1 AX101.1 General. No change to text.

Reason: The intent of this proposal is to move this code section to the appendix.
This section provides a one size fits all requirement for storm shelters even though huge portions of the country will never experience weather events that would dictate the stoutness required by these rules. Storm shelters exist for wind events, tornados or hurricanes.
We know where hurricanes impact the US.
And yes, there have been tornados in every state in the Union. But a third of the tornados that occur every year do so in Texas, Oklahoma, Kansas, and Nebraska. In most states, tornados and other high wind events are rare.
But, lessor events do occur and folks may wish to construct a storm shelter that better fits the needs of the area they are in. Currently, if they say they want to build a storm shelter they must follow these very expensive rules.
Wouldn't it be better to allow those handful of states to adopt these rules from the appendix if they feel it is necessary rather that impose them on all areas of the country? Of course it is.
Move these rules to the appendix. That will allow someone to build their saferoom to standards they desire if they aren't in a high wind hazard area. They can always use the appendix chapter as a guideline.
And, if we really wanted to make people safe, wouldn't storm shelters be mandatory in all dwellings, not just a voluntary effort?

Cost Impact: Will not increase the cost of construction
This proposal reduces costs by eliminating regulations.
2015 International Residential Code

Revise as follows:

R324.3 Photovoltaic systems. Photovoltaic systems shall be designed and installed in accordance with Sections R324.3.1 through R324.6.1 and R324.5.2.5, NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction manufacturers installation instructions.

R324.3.1 Equipment listings. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

R324.4 Rooftop-mounted photovoltaic systems. Rooftop-mounted photovoltaic panel systems installed on or above the roof covering shall be designed and installed in accordance with Section R907 this section.

R909.2 R324.4.1 Structural requirements. Rooftop-mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof upon which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

R324.4.1 R324.4.1.1 Roof live load. No change to text.

R907.2 R324.4.1.2 Wind resistance. No change to text.

R907.3 R324.4.2 Fire classification. Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.

R909.3 R324.4.3 Installation Roof penetrations. Rooftop mounted photovoltaic systems shall be installed in accordance with the manufacturer’s instructions. Roof penetrations shall be flashed and sealed in accordance with this chapter Chapter 9.

R324.5 Building-integrated photovoltaic systems. Building-integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section R905.

R324.5.1 Photovoltaic shingles. Photovoltaic shingles shall comply with Section R905.16.

Add new text as follows:

R324.5.2 Fire classification. Building-integrated photovoltaic systems shall have a fire classification in accordance with Section 902.3.

SECTION R907 ROOFTOP-MOUNTED PHOTOVOLTAIC PANEL SYSTEMS

Revise as follows:
R907.1 Rooftop-mounted photovoltaic panel systems. Rooftop-mounted photovoltaic panels or modules shall be designed and installed in accordance with this section, Section R324 and NFPA 70.

Delete without substitution:

R907.4 Installation. Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer’s instructions.

R907.5 Photovoltaic panels and modules. Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer’s printed instructions.

SECTION R909 ROOFTOP-MOUNTED PHOTOVOLTAIC PANEL SYSTEMS

R909.1 General. The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with this section, Section R324 and NFPA 70.

Reason: Proposal RM98-13 established R324, which was intended to consolidate and organize all the requirements, with necessary section revisions and section additions, in an easily-used format that assists the user to find all the applicable requirements—fire, electrical, structural, plumbing, and mechanical—related to solar thermal and photovoltaic systems. The intent of this proposal is to address redundant code requirements and consolidate/reorganize requirements that were also included in Chapter 9 during the last code cycle. These changes will help to address any confusion regarding the installation of photovoltaic systems.

The following explains the changes proposed:

1. Load requirements for rooftop mounted photovoltaic system installations are partially covered in R907.2 and R324.4.1. Relocating R907.2 to be a subsection of R324.4 consolidates the load requirements. The structural requirements (Section R909.2) are relocated to be a subsection of R324.4.
2. Fire classification requirements (Section R907.3) are for rooftop mounted photovoltaic systems, not rooftop mounted photovoltaic panels and modules, and are referenced in Section R324.4.2. The fire classification requirements for building-integrated photovoltaic systems are not linked in Section R324 or R905.16 (see new Section R324.5.2).
3. Installation in accordance with the manufacturer’s installation instructions (Sections R907.4 and R907.5 and R909.3) are consolidated into Section R324.3.
4. Listed and labeled rooftop mounted panels and modules (Section 907.5) is already required by Section R324.3.1.
5. Two separate sections (Section 907 and 909) are not needed for rooftop-mounted photovoltaic panel systems.
6. Flashing of roof penetrations for rooftop-mounted photovoltaic systems (Section R909.3) is addressed in Section R324.4.3.
7. Equipment listing requirements relocated from Section R324.3 to R324.3.1 to consolidate in one location these requirements.

Cost Impact: Will not increase the cost of construction

The proposal clarifies the applicable requirements for photovoltaic systems. The ICC Building Code Action Committee (BCAC) is a co-proponent of this proposal. BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: BCAC
RB165-16
IRC: R324.4.1.
Proponent : Jonathan Siu, City of Seattle Department of Construction & Inspections, representing Washington Association of Building Officials Technical Code Development Committee (jon.siu@seattle.gov)

2015 International Residential Code
Delete and substitute as follows:

R324.4.1 Roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the areas covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for live load, LR, for the load case where the photovoltaic panel system is not present. Portions of roof structures not covered with photovoltaic panel systems shall be designed for dead loads and roof loads in accordance with Sections R301.4 and R301.6. Portions of roof structures covered with photovoltaic panel systems shall be designed for the following load cases:

1. Dead load (including photovoltaic panel weight) plus snow load in accordance with Table R301.2(1).
2. Dead load (excluding photovoltaic panel weight) plus roof live load or snow load, whichever is greater, in accordance with Section R301.6.

Reason: This proposal is intended to clarify and correct the requirements for design loads for roofs with PV panels. The current code text is confusing, incomplete, and technically incorrect.

- The text is confusing because the fourth sentence appears to contradict the second sentence. In addition, the term LR is not used in the IRC so it is unclear how this is to be applied.
- The text is incomplete because it does not appear to include snow load on top of the PV panels as a load case for roof design.
- The text is technically incorrect because it implies the PV panels themselves would be considered as live load. This is inconsistent with how ASCE 7 and other portions of the IRC treat fixed equipment (see Section R301.4 and the definition of "Dead Load" in Section R202).

We believe the proposed code change more clearly and completely states the intended requirement.

It is to be noted that Section R324.4 does not contain the wind load requirement for PV panels, although it references Section R907, which does. A separate code change proposal will move Section 907.2 to this section so the requirement will not get missed.

Cost Impact: Will not increase the cost of construction
This proposal merely clarifies how loads are to be applied to the roof structure. Properly-designed roof structures should have been using the load cases in this proposal, so no change in cost or construction is anticipated.
SECTION 202 DEFINITIONS

[RB] ATTIC, HABITABLE. A finished or unfinished area, not considered a story, complying with all of the following requirements:

1. The occupiable floor area is not less than 70 square feet (17 m²), in accordance with Section R304.
2. The occupiable floor area has a ceiling height in accordance with Section R305.
3. The occupiable space is enclosed by the roof assembly above, knee walls (if applicable) on the sides and the floor-ceiling assembly below.

Habitable space within an attic.

R325.1 General. Mezzanines shall comply with Section R325 through R325.5. Habitable attics shall comply with Section R325.6.

R325.6 Habitable attic. A habitable attic shall not be considered a story when complying with all of the following requirements:

1. The occupiable floor area is not less than 70 square feet (17 m²), in accordance with Section R304.
2. The occupiable floor area has a ceiling height in accordance with Section R305.
3. The occupiable space is enclosed by the roof assembly above, knee walls (if applicable) on the sides and the floor-ceiling assembly below, and
4. The floor of the occupiable space shall not extend beyond the exterior walls of the floor below.

Reason: The definition of habitable attic is revised to shorten it and remove technical criteria which should be located in the body of the code. The criteria removed from the definition in R202 are relocated in a new section, R325.6, addressing Habit able Attics. The first three provisions of the new Section 325.6 are identical to the provisions in the 2015 IRC. The fourth item is added to allow such roof elements as dormers to occur to provide additional habitable attic space, but also to prevent "gaming" of this concept to create large attic areas extending beyond floors below which should actually be considered to be "stories' and not habitable attics.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: BCAC

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction as it clarifies the limitations on the area of an attic as it relates to the floor below.
RB167-16
IRC: R325.3.
Proponent: Maureen Traxler, representing City of Seattle Dept of Construction & Inspections
(maureen.traxler@seattle.gov)

2015 International Residential Code

Revise as follows:

R325.3 Area limitation. The aggregate area of a mezzanine or mezzanines shall be not greater than one-third of the floor area of the room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the mezzanine is located.

Exception: The aggregate area of a mezzanine located within a dwelling unit equipped with a fire sprinkler system in accordance with Section P2904 shall not be greater than one-half of the floor area of the room, provided:

1. Except for enclosed closets and bathrooms, the mezzanine shall be open to the room in which such mezzanine is located;
2. The opening to the room shall be unobstructed except for walls not more than 42 inches (1067 mm) in height, columns and posts, and
3. The exceptions to Section R325.5 are not applied.

Reason: This exception was added to the IBC in Group A by proposal G 138-15. (As of the code change submittal date, the proposal was subject to online governmental consensus vote.) The rationale for that proposal was to provide design flexibility without impacting safety. The exception trades the ability to enclose the mezzanine for a slight increase in floor area. The openness of the mezzanine gives occupants increased awareness of hazardous conditions developing in the dwelling unit. This rationale applies equally to IRC buildings.

Cost Impact: Will not increase the cost of construction
This proposal has potential to reduce the cost of construction by allowing larger mezzanines in dwellings.
Add new definition as follows:

**SECTION R202 DEFINITIONS**

**Loft.** A room or space directly under the roof of a small house that is open to the floor below and is used for accommodations or storage.

**SECTION R202 DEFINITIONS**

**Small house.** A building containing one dwelling unit and having a floor area, excluding lofts, of not more than 500 square feet.

Add new text as follows:

**SECTION R327 SMALL HOUSES**

**R327.1 General.** Small houses shall comply with the requirements of this code except as follows:

1. Access to basements, underfloor spaces, and lofts shall be by means of alternating tread devices, ladders or any means that complies with Section R311.
2. The minimum floor areas of Section R304 shall not apply.
3. The minimum ceiling height requirements of Section R305 shall not apply.
4. Lofts used as sleeping areas shall not be required to comply with Section R310 provided that the loft opens to a floor containing an emergency escape and rescue opening.
5. Basements and underfloor areas shall not be required to comply with Section R310 provided that the basement or underfloor area does not contain sleeping rooms.
6. The minimum door sizes of Section R311.2 shall not apply.
7. The hallway width requirements of Section R311.6 shall not apply.
8. The guard Requirements of Section R312 shall not apply to lofts.
9. The automatic fire sprinkler requirements of Section R313 shall not apply.

Reason: From Wikipedia:

In the United States the average size of new single family homes grew from 1,780 square feet in 1978 to 2,479 square feet in 2007 and to 2,662 square feet in 2013, despite a decrease in the size of the average family. Reasons for this include increased material wealth and prestige. The small house movement is a return to houses of less than 1,000 square feet. Frequently the distinction is made between small (between 400 square feet and 1,000 square feet), and tiny houses (less than 400 square feet, with some as small as 80 square feet. Sarah Susanka has been credited with starting the recent countermovement toward smaller houses when she published The Not So Big House (1997). Earlier pioneers include Lloyd Kahn, author of Shelter (1973). Henry David Thoreau, and the publication of his book "Walden" is also quoted as early inspiration.

Tiny houses on wheels were popularized by Jay Shafer who designed and lived in a 96 sq ft house and later went on to offer the first plans for tiny houses on wheels, initially founding Tumbleweed Tiny House Company, and then Four Lights Tiny House Company (September 6, 2012).

In 2005, after Hurricane Katrina, Marianne Cusato developed Katrina Cottages that start at 308 square feet as an alternative to FEMA trailers. Though these were created to provide a pleasant solution to a disaster
zone, Cusato received wider interest in her design from developers of resorts, for example.

With the financial crisis of 2007–08, the small house movement attracted more attention as it offers housing that is more affordable and ecologically friendly. Overall, however, it represents a very small part of real estate transactions. Thus only 1% of home buyers acquire houses of 1,000 square feet or less. Small houses are also used as accessory dwelling units (or ADUs), to serve as additional on-property housing for aging relatives or returning children, as a home office, or as a guest house. Typical costs are about $20,000 to $50,000 as of 2012.

In Oakland, California, Gregory Kloehn builds small houses out of found materials, for an estimated cost of $40.

Small and tiny houses have received increasing media coverage including a television show, Tiny House Nation, in 2014 and Tiny House Hunters. The possibility of building one's own home has fueled the movement, particularly for tiny houses on wheels. However, tiny houses are built to last as long as traditional homes. They use traditional building techniques and materials and they are aesthetically similar to larger homes.

This increase in popularity of tiny houses, and particularly the rapid increase in the number of both amateur and professional builders, has led to concerns regarding safety among tiny house professionals. In 2013, an Alliance of tiny house builders was formed to promote ethical business practices and offer guidelines for construction of tiny houses on wheels. This effort was carried on in 2015 by the American Tiny House Association. In 2015, the nonprofit American Tiny House Association was formed to promote the tiny house as a viable, formally acceptable dwelling option and to work with local government agencies to discuss zoning and coding regulations that can reduce the obstacles to tiny living.

One of the biggest obstacles to growth of the tiny house movement is the difficulty in finding a place to live in one. Zoning regulations typically specify minimum square footage for new construction on a foundation, and for tiny houses on wheels, parking on one's own land may be prohibited by local regulations against "camping." In addition, RV parks do not always welcome tiny houses. DIYers may be turned away, as many RV parks require RVs be manufactured by a member of the Recreational Vehicle Industry Association "(RVIA)".

Tiny houses on wheels are considered RVs and not suitable for permanent residence, according to the RVIA. From RVBusiness, "The RVIA will continue to shy away from allowing members who produce products that are referred to as 'tiny houses' or 'tiny homes. (However, the RVIA does allow "tiny home" builders to join as long as their units are built to park model RV standards.)"

In 2014, the first "tiny house friendly town" was declared in Spur, Texas, however it was later clarified that a tiny house may not be on wheels but must be secured to a foundation.

The IRC needs to catch up with the latest and hottest trend in residential construction, small houses. Smaller homes are less expensive than larger ones in terms of taxes and building, heating, maintenance, and repair costs. The typical size of a small home seldom exceeds 500 square feet. Small houses emphasize design over size, utilize dual purpose features and multi-functional furniture, and incorporate technological advances of space saving equipment and appliances. Vertical space optimization is also a common feature of small houses and apartments.

While people interested in building a small home may face opposition from local zoning ordinances and neighborhood groups, that opposition should not be used as a reason to ignore the need for regulating the construction of these structures where they are permitted. Whether small houses are permitted or not should be left to local jurisdictions and should not be part of the discussion for construction code debate.

It can be argued that small houses can be built with current building regulations and that is partly true. However, it can also be argued that the size of a structure makes certain requirements more or less important and the smaller size of small houses makes occupants more familiar with their surroundings giving credence to reducing the need for certain requirements.

This proposal limits the size of a small house to 500 square feet. It permits a loft with access by as little as a ladder to save space and does not require a guard similar to an oversized bunk bed. Because these homes are often occupied by one or two people and furniture often consists of built-ins, floor areas, hallway widths, and ceiling heights are less important. And, since these are often built as a single room with a loft and separate bathroom, lofts opening into the main room should not be required to have an emergency escape and rescue opening if the room it opens to contains such an opening. Because of the small size of basements or under floor spaces, they are less likely to be used in the same way that traditional basements may be used and should not be required to have emergency escape and rescue openings unless the space is used for a sleeping room(s).
While small houses may typically be thought of as a primary residence, they may also be used as a lake cabin, hunting cabin, or other recreational use that should be regulated but are often exempted from permitting because of the problems of applying current rules to these small structures.

There have been no reports that small houses are unsafe in any way. It is time that the IRC catches up with this new building design.
**Cost Impact:** Will not increase the cost of construction

This proposal will not increase the cost of construction as it will provide direction and relief from current codes for small houses.
SECTION R327  Installation of stationary generators not required by code

R327.1  General  The installation of stationary generators not required by code shall comply with the applicable requirements of the International Fire Code and NFPA 37.

Reference standards type: This is an update to reference standard(s) already in the ICC Code Books

Add new standard(s) as follows:
NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines (2015) - Already referenced in IMC and IFGC.

Reason:
The IRC has no information about the installation of generators not required by code outside of residences and they can be a serious fire hazard. Generators are often installed to provide power to residences and they are usually installed very close to the residence, a potential fire problem. A parallel proposal has been made to the IFC to address this issue.

The IFC also lacks the information an authority having jurisdiction needs to either provide for the location of generators not required by code or to assess the validity of any reports provided by a generator manufacturer seeking to place engines close to combustible walls. The IMC and the IFGC contain references to NFPA 37 (section 915. of the IMC and section 616 of the IFGC) but the IFC does not. NFPA 37 requires that generators installed outdoors not be placed closer than 5 ft from combustible walls. It does not, however, provide good guidance on exceptions, which are essential because most generators placed outdoors tend to be placed much closer than 5 ft from the walls. In particular, there are no criteria for how to demonstrate that an engine fire will not ignite a combustible wall or for how close to the wall the engine can be placed. The language proposed to the IFC (and which this would link to if both are approved) provides that information without being a detailed test protocol and without ruling out the use of alternative means and methods as a tool.

1. In view of the close proximity between buildings which could install engines or generators to ensure uninterrupted electrical supply, clear criteria for engine placement are essential to permit adequate enforcement. Neither the IFC nor the IRC contain enforceable criteria.
2. The proposal to the IFC ensures that it does not specify details of the full scale fire test procedure to be used for determining acceptable separation distances. This is reflected in the proposed wording.
3. This proposal to the IFC does not include wording that would require specific test protocols but simply proposes wording that ensures a minimal level of safety, after full scale fire tests have been conducted.
4. Research conducted by the proponent has demonstrated that, if a generator burns it can cause the ignition of nearby combustible walls. Whether ignition of combustible walls occurs will depend primarily on three factors: (a) the amount and fire performance of the combustible materials in the generator and the engineering design of the generator and its enclosure, (b) the materials contained in the combustible walls present and (c) the distance between the generator and the combustible walls.
5. Fire tests have demonstrated that fire tests with some generators can be more severe when the generator is not operating because the associated cooling fan in the generator can result in the extinguishment of the fire when the generator is operating but not when the generator is idle. This has been shown for at least two generator designs. (a) Jason Huczek (Southwest Research Institute) ["Custom Fire Testing of Power Generators for NFPA 37 Compliance", at the NFPA 2010 Annual Meeting, Session T68, June 9, 2010] and (b) Marcelo Hirschler ["Testing of Residential Electrical Generators", Fire and Materials Conf., San Francisco, CA, Jan. 31-Feb. 2, 2011, pp. 71-81, Interscience Communications, London, UK]. Both publications are attached for information to the committee: one deals with full scale tests (like the ones recommended in this proposal) and one deals with small scale tests. The results demonstrate that it is important that full scale tests be conducted.
6. There can be no assurance that every generator will be provided with an adequate fan. Therefore, full scale fire
tests or calculations should ideally be conducted with both the generator operating and the generator idle. However, that requirement is not included here, to allow maximum flexibility for the fire test.

7. The full scale fire tests or calculations leading to the determination of the safe location distance need to be conducted in such a way that there is complete consumption of the combustible materials in the generator to ensure that the full scale fire tests actually address the fire hazard.

8. If the full scale fire tests or calculations do not result in complete consumption of the combustible materials in the generator there can be no assurance that the results are fully representative of the actual fire hazard.

9. There are different types of combustible wall materials that are in common use and the full scale fire tests need to be conducted using either the wall materials to be used in the actual installation or the combustible wall materials with the poorest fire performance. Fire tests have demonstrated that polypropylene siding is a more combustible wall material than either wood siding or vinyl (PVC) siding. Peak heat release rate data for polypropylene, wood and PVC siding materials are shown below.

10. The distance between the generator and the combustible walls should provide be a reasonable margin of safety so that if the tests are conducted at a distance of, for example 1 ft., the generator should not be permitted to be placed closer than 1.5 ft. (i.e. a 50% margin of safety). Such added fire safety requirement is not included in the proposal to the IFC.

11. The proposal to the IFC does not discuss the composition of the generators because the key issue is ensuring that a fire that destroys all combustible materials does not cause wall ignition, irrespective of the materials used to construct the generator.

Heat release rate of siding materials (calorimeter testing)
Vinyl (PVC): 187 kW/m²
Wood (Cedar): 309 kW/m²
Polypropylene: 546 kW/m²

BIBLIOGRAPHY

Cost Impact: Will increase the cost of construction
There are no requirements at present for potentially unsafe installation of generators.
2015 International Residential Code

SECTION 202- DEFINITIONS

VEHICULAR GATE. A gate that is intended for use at a vehicular entrance or exit to the lot of a one- or two- family dwelling and that is not intended for use by pedestrian traffic.

SECTION R327  AUTOMATIC VEHICULAR GATES

R327.1 General. Automatic vehicular gates shall comply with the requirements of Sections R327.2 and R327.3.

R327.2 Vehicular gates intended for automation. Vehicular gates intended for automation shall be designed, constructed and installed to comply with the requirements of ASTM F 2200.

R327.3 Vehicular gate openers. Vehicular gate openers shall be listed in accordance with UL 325.

Reference standards type: This is an update to reference standard(s) already in the ICC Code Books

Add new standard(s) as follows:
To be added to Chapter 43, Referenced Standards:
ASTM F2200-14, Standard Specification for Automated Vehicular Gate Construction
and
UL 325-2013, Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems

Reason: We are proposing that the current provisions as contained in Appendix O be moved into the main body of the code. The language continues to not require the use of automated vehicular gates, but where gates intended for automation are provided sets necessary and appropriate minimum safety requirements as established in the applicable consensus standards.

The provisions belong in the main body of the code for consistency with similar provisions contained in the main body of both the International Building Code (Section 3110) and the International Fire Code (Sections 503.5 and 503.6.) Automated vehicular gate safety is important in all applications; therefore one- and two-family dwellings should be covered by this requirement and not be an option for jurisdictions adopting the IRC.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: BCAC

Cost Impact: Will increase the cost of construction
This proposal may increase the cost of construction as it would mandate minimum standards for the design, construction and installation of vehicular gates only where they are provided. This would not increase the cost of construction where vehicular gates currently meet these standards.
2015 International Residential Code

Add new definition as follows:

SECTION R201 DEFINITIONS
BATTERY SYSTEM, STATIONARY STORAGE. A rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls, and associated electrical equipment designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.

Add new text as follows:

CHAPTER PART R327 — STATIONARY STORAGE BATTERY SYSTEMS
R327.1 General. Stationary storage battery systems, where provided, shall comply with the provisions of this section.

R327.2 Equipment listings. Stationary storage battery systems shall be listed and labeled for residential use in accordance with UL 9540.

Exceptions:

1. Where approved, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached sheds located a minimum five feet (1524 mm) from exterior walls, property lines and public ways.
2. Battery systems that are an integral part of an electric vehicle are allowed provided the installation complies with Section 625.48 of NFPA 70.
3. Battery systems less than 1 KWh (3.6 Mega joules).

R327.3 Installation. Stationary storage battery systems shall be installed in accordance with the manufacturer's instructions and their listing, if applicable, and shall not be installed within a dwelling unit.

R327.4 Electrical installation. Stationary storage battery systems shall be installed in accordance with NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741 or provided as part of the UL 9540 listing. Systems connected to the utility grid shall use inverters listed for utility interaction.

R327.5 Ventilation. Indoor installations of stationary storage battery systems that include batteries that produce hydrogen or other flammable gases during charging shall be provided with ventilation in accordance with Section M1307.4.

R327.6 Protection from impact. Stationary storage battery systems installed in a location subject to vehicle damage shall be protected by approved barriers.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
A review of the standard(s) proposed for inclusion in the code, UL 9470-2014, *Outline of Investigation for Energy Storage Systems and Equipment*, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

**Reason:** An increased number of electrical energy storage systems (ESS) utilizing stationary storage batteries are appearing on the market to help meet the energy needs of society. This proposal does not mandate that ESS or stationary battery storage systems be provided, but includes basic safety requirements that should be applied if such systems are provided.

**Comments on specific requirements:**

The definition provides the code user with information on battery storage systems, and is identical to a definition being proposed for the IFC/IBC.

The UL 9540, *Outline of Investigation for Energy Storage Systems and Equipment* provides construction and performance requirements for investigating and listing stationary storage battery systems. This standard evaluates their ability to operate under both normal operating conditions and under certain fault conditions.

Since ESS is a new, evolving technology, exceptions to R327.2 are provided to allow for installations of repurposed, nonlisted ESS from electric vehicles. However, a five foot separation distance from exterior walls, the property line and public ways to mitigate the performance of the equipment under fault conditions, which was not determined as part of a listing investigation. Installations that utilize ESS provided integral to electric vehicles are also allowed, provided they comply with NFPA 70 requirements that specifically cover such installations.

A final exception exempts battery systems under 1 KWh, which is slightly greater than two 12V, 40 A-H batteries. This exempts common household standby power systems for tools, alarm systems, and other appliances from having to comply with this section.

The R327.4 electrical installation requirements are based on R324.3, but include an option for inverters included as part of an ESS UL 9540 listing.

R327.5 includes ventilation requirements that must be provided for indoor installations of ESS technologies, such as those including lead-acid batteries that are capable of producing hydrogen gas during charging.

The R327.6 vehicle protection requirements are based on Section M1307.3.1.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: [BCAC](http://www.iccsafe.org). The ICC Fire Code Action Committee (FCAC) also supports this proposal.

**Cost Impact:** Will increase the cost of construction

Any cost increases for code compliant installations will be minimal, provide the equipment is installed per NFPA 70 which will require an inverter and other code mandated criteria. Listed ESS units are currently available and the proposal allows for nonlisted ESS installations also.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, UL 9570, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
2015 International Residential Code

Add new definition as follows:

SECTION R202 DEFINITIONS

COLLAPSIBLE SOILS. Soils that exhibit volumetric reduction in response to partial or full wetting under load.

SECTION R202 DEFINITIONS

COMPRESSIBLE SOILS. Soils that exhibit volumetric reduction in response to the application of load even in the absence of wetting or drying.

SECTION R202 DEFINITIONS

EXPANSIVE SOILS. Soils that exhibit volumetric increase or decrease (swelling or shrinking) in response to partial or full wetting or drying under load.

Revise as follows:

R401.4 Soil tests. Where quantifiable data created by accepted soil science methodologies indicate expansive soils, compressible soils, shifting or other questionable soil characteristics are likely to be present, the building official shall determine whether to require a soil test to determine the soil's characteristics at a particular location. This test shall be done by an approved agency using an approved method.

R801.3 Roof drainage. In areas where expansive soils or collapsible soils are known to exist, all dwellings shall have a controlled method of water disposal from roofs that will collect and discharge roof drainage to the ground surface not less than 5 feet (1524 mm) from foundation walls or to an approved drainage system.

Reason: Click here to view the members of the GeoCoalition who developed this proposal.

There is currently no definition for collapsible soils to provide guidance to design professionals and building officials on identification and design procedures to address these soils. These terms are used in IRC Section R401.4 and R801.3.

Cost Impact: Will not increase the cost of construction

The change is for clarification so there is not change to construction requirements.
RB173-16
IRC: R401.2.
Proponent: Paul Helderman, Superior Walls of America, representing Superior Walls of America (ehelderman@superiorwalls.com)

2015 International Residential Code
Revise as follows:

R401.2 Requirements. Foundation construction shall be capable of accommodating all loads in accordance with Section R301 and of transmitting the resulting loads to the supporting soil. Fill soils that support footings and foundations shall be designed, installed and tested in accordance with accepted engineering practice. Gravel fill used as footings for wood and precast concrete foundations shall comply with Section R403.

Reason: The recommendation is to eliminate the last sentence from Section R401.2 for the following reasons:
1. It is superfluous to say that something used for footings must comply with the Section on Footings.
2. The term "Gravel fill" is not used to describe footings for precast concrete foundations.
3. Fill is fill and footings are footings; it is confusing to interchange the terms.
4. Per Section R403.3.1 crushed stone footings for precast concrete foundations are to be "angular" in nature and meet ASTM C33; "gravel" does not meet this requirement.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction because it merely seeks to provide clarification and eliminates superfluous language without changing the technical requirements of the code.
2015 International Residential Code

Revise as follows:

R401.3 Drainage. Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection that does not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3048 mm).

**Exception:** Where lot lines, walls, slopes or other physical barriers prohibit 6 inches (152 mm) of fall within 10 feet (3048 mm), drains or swales shall be constructed to ensure drainage away from the structure. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of 2 percent away from the building.

**Reason:** If we provide positive drainage around the house for at least ten feet that should be sufficient. What is wrong with just allowing it to seep in the ground at that point? What does "does not create a hazard" mean? If the water drains to a drainage pond where kids can drown, is it a hazard? Could one argue that the building official allowed drainage to a point of collection that was a hazard? Is a catch basin a hazard? Once it is ten feet from the building, which is the requirement, why do we care? The reference to a "storm sewer conveyance or other approved point of collection" isn't a prescriptive solution but a performance standard and an undefined one at that. This should be part of a grading ordinance. We don't concern ourselves with exiting other than to get outside the building and to the ground. Why do we place more importance on drainage than we do exiting? Our priorities are screwed up!

**Cost Impact:** Will not increase the cost of construction

This is an editorial revision that will not impact construction costs.
IRC: R401.3
Proponent: Kevin McOsker, representing Southern Nevada Chapter of ICC (ktm@ClarkCountyNV.gov)

2015 International Residential Code

Revise as follows:

R401.3 Drainage. Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection that does not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3048 mm).

Exception: Where lot lines, walls, slopes or other physical barriers prohibit 6 inches (152 mm) of fall within 10 feet (3048 mm), drains or swales shall be constructed to ensure drainage away from the structure. Impervious Drains or swales used for this purpose shall be sloped a minimum of 1% along the flow line when located within 10 feet (3048 mm) of the building foundation. Low expansive, low collapsible, low soluble soil conditions or impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of 2 percent away from the building.

Reason: A minimum 1% slope of the swale in the direction of flow will provide positive drainage away from the building in location where a full 10’ of slope in a perpendicular direction away from the foundation is not provided. Soil conditions not affected by the presence of water are added to the allowance for a reduced slope that is currently allowed for impervious surfaces. These soils are not negatively impacted by the presence of water and therefore a reduced slope (from 5% to 2%) can be justified.

Cost Impact: Will not increase the cost of construction
The minimum slope on the swale may slightly increase costs, however, the additional conditions where the reduced slope is allowed would decrease costs.
RB176-16
IRC: R403.1.1.
Proponent: Paul Helderman, Superior Walls of America, representing Superior Walls of America (ehelderman@superiorwalls.com)

2015 International Residential Code

Revise as follows:

R403.1.1 Minimum size. The minimum width, W, and thickness, T, for concrete footings shall be in accordance with Tables R403.1(1) through R403.1(3) and Figure R403.1(1) or R403.1.3, as applicable. The footing width shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. Footing projections, P, shall be not less than 2 inches (51 mm) and shall not exceed the thickness of the footing. Footing thickness and projection for fireplaces shall be in accordance with Section R1001.2. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3). Footings for precast foundations shall be in accordance with the details set forth in Section R403.4, Table R403.4, and Figures R403.4(1) and R403.4(2).

Reason: A previous proposal (RB211-13) changed the language of Section R403.1.1 and replaced Table R403.1 with 3 new tables, which appeared in the 2015 IRC code. Because of that code change, the previous reference and association to precast was eliminated from that table heading in Table R403.1, but this section still needs to point the reader to section R403.4 for instructions for constructing footings for precast foundations. This proposal simply adds one sentence to section R403.1.1 that points the reader to the precast footing section (Section R403.4) for instructions on constructing footings for precast.

To conform with existing code language, the new sentence about constructing footings for precast is modeled exactly the same as other language in this paragraph that points the reader to Section R403.2 about constructing footings for wood foundations.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction because it only seeks to provide clarification by restoring a reference to precast footings that was lost in a previous code change. This proposal is not changing the technical requirements of the code.
2015 International Residential Code

Revise as follows:

R403.1.6 Foundation anchorage. Wood sill plates and wood walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Cold-formed steel framing shall be anchored directly to the foundation or fastened to wood sill plates anchored to the foundation in accordance with Section R505.3.1 or R603.3.1, as applicable. Anchorage of cold-formed steel framing and wood sill plates supporting cold-formed steel framing shall be anchored to the foundation in accordance with this section and Section R505.3.3 or R603.3.1.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with minimum 1/2-inch-diameter (12.7 mm) 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 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. The bolts shall be located in the middle third of the width of the plate. 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 foundation 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.

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 Item 9 of Table R602.3(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 Item 9 of Table R602.3(1).

Reason: This proposed revision is an editorial change intended to clarify the anchorage requirements for cold-formed steel wall assemblies. The referenced sections (R505.3.1 and R603.3.1) cover the anchorage requirements for cold-formed steel directly to the foundation or to the wood sill plate. The connection of the wood sill plate (that supports the CFS) to the foundation is intended to conform to this section.

Cost Impact: Will not increase the cost of construction
This is simply a proposed editorial change that does not effect the intended prescribed construction requirements.
**RB178-16**

**IRC: R403.4.**

**Proponent:** Paul Helderman, Superior Walls of America, representing Superior Walls of America (ehelderman@superiorwalls.com)

**2015 International Residential Code**

Revise as follows:

### TABLE R403.4

**MINIMUM DEPTH AND WIDTH OF CRUSHED STONE FOOTINGS** *(D AND W), (inches)*

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**Conventional light-frame construction**

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**4-inch brick veneer over light-frame or 8-inch hollow concrete masonry**

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**8-inch solid or fully grouted masonry**

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**ICC COMMITTEE ACTION HEARINGS :::: April, 2016**

RB327
<table>
<thead>
<tr>
<th>Story</th>
<th>Footing Type</th>
<th>D</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-story</td>
<td>2000 plf</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>2-story</td>
<td>3600 plf</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>3-story</td>
<td>5300 plf</td>
<td>32</td>
<td>43</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 plf = 14.6 N/m, 1 pound per square foot = 47.9 N/m².

a. Linear interpolation of stone depth between wall widths is permitted within each Load-Bearing Value of Soil (psf).

b. Crushed stone must be consolidated in 8" lifts with a plate vibrator.

**Reason:** This proposal changes this table to include both the depth (D) and width (W) as is already shown in figure R403.4(1).

This table (Table R403.4 Minimum Depth of Crushed Stone Footings) only provides the Depth (D) in inches of crushed stone footings for precast, but the Width (W) is also needed to fully describe a crushed stone footing and how it spreads the load of the precast concrete wall into the soil. The table has never contained any references to the footing width, but it has always been included in its companion drawing [Figure R403.4(1)], so it is important that this information be included in the table also.

To fall in line with the concrete footing tables R403.1(1), R403.1(2) and R403.1(3), which are referred to in section R403.1.1, two additional soil PSF categories have also been added to Table R403.4.

Footnote b. was added at the bottom of the table to reinforce the necessity to compact crushed stone footings in lifts of 8" as is stated in the text of Section R403.4.1 Crushed stone footings.

**Cost Impact:** Will not increase the cost of construction

This proposal will not increase the cost of construction because the changes to this table do not increase the average amount of crushed stone that is typically used for footings to support precast foundations. It is already standard practice for builders and precast foundation manufacturers to include crushed stone footing widths (W) wider than the maximum widths (W) that are required in the table. Stone depths and widths in the table are minimums and in the field, these depths and widths are usually over estimated to assure minimums are easily met. The width dimension (W) has been added to the table to prevent anyone from overlooking this important minimum dimension of a crushed stone footing.

When recalculating all of the depths for the table, some of the crushed stone footing depths (D) also change by 1 inch, some increased and some decreased, but the changes are negligible and it will not increase the cost of construction.
RB179-16
IRC: R403.3.
Proponent: John Woestman, Kellen, representing Extruded Polystyrene Foam Association (jwoestman@kellencompany.com)

2015 International Residential Code
Revise as follows:

### TABLE R403.3 (1)
MINIMUM FOOTING DEPTH AND INSULATION REQUIREMENTS FOR FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS

<table>
<thead>
<tr>
<th>AIR FREEZING INDEX (°F-days)</th>
<th>MINIMUM FOOTING DEPTH, D (inches)</th>
<th>VERTICAL INSULATION R-VALUE</th>
<th>HORIZONTAL INSULATION R-VALUE</th>
<th>HORIZONTAL INSULATION DIMENSIONS PER FIGURE R403.3(1) (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ALONG WALLS</td>
<td>AT CORNERS</td>
</tr>
<tr>
<td>1,500 or less</td>
<td>12</td>
<td>4.5</td>
<td>Not required</td>
<td>Not required</td>
</tr>
<tr>
<td>2,000</td>
<td>14</td>
<td>5.6</td>
<td>Not required</td>
<td>Not required</td>
</tr>
<tr>
<td>2,500</td>
<td>16</td>
<td>6.7</td>
<td>1.7</td>
<td>4.9</td>
</tr>
<tr>
<td>3,000</td>
<td>16</td>
<td>7.8</td>
<td>6.5</td>
<td>8.6</td>
</tr>
<tr>
<td>3,500</td>
<td>16</td>
<td>9.0</td>
<td>8.0</td>
<td>11.2</td>
</tr>
<tr>
<td>4,000</td>
<td>16</td>
<td>10.1</td>
<td>10.5</td>
<td>13.1</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, °C = [(°F) - 32]/1.8.

a. Insulation requirements are for protection against frost damage in heated buildings. Greater values may be required to meet energy conservation standards.

b. See Figure R403.3(2) or Table R403.3(2) for Air Freezing Index values.

c. Insulation materials shall provide the stated minimum R-values. R-values shall be used to determine insulation thicknesses required for this application: Type II expanded polystyrene-2.4 R-polystyrene (EPS)-3.2R per inch; Type IV extruded polystyrene-4.5 R for vertical insulation and 2.6 R per inch; Type VI extruded polystyrene-4.5 R per inch for horizontal insulation; Type IX expanded polystyrene-3.2 R-polystyrene (EPS)-3.4R per inch for vertical insulation and 2.8 R per inch for horizontal insulation; Type IV, V, VI, VII, VIII, and X extruded polystyrene-4.5 R-polystyrene (XPS)-4.5R per inch for vertical insulation and 4.0 R per inch for horizontal insulation.

d. Vertical insulation shall be expanded polystyrene insulation or extruded polystyrene insulation.

e. Horizontal insulation shall be expanded polystyrene insulation or extruded polystyrene insulation.
**Reason:** This proposal updates the IRC to be consistent with the latest published design values for insulation materials used on frost-protected shallow foundations (FPSF), per ASCE 32-01 Design and Construction of Frost-Protected Shallow Foundations; and to be consistent with the current requirements in the IBC.

The IBC in Section 1809.5, requires foundations to be protected from frost by one or more methods, with item 2 of 1809.5 stating: "Constructing in accordance with ASCE 32." ASCE 32-01 is identified in Chapter 35 Reference Standards of the IBC.

Copied below is information from mandatory Appendix A of ASCE 32-01:

<table>
<thead>
<tr>
<th>Insulation Type per ASTM</th>
<th>Minimum Insulation Density per ASTM C578 (pcf)</th>
<th>Effective Resistivity, $r_{\text{eff}}^{1}$ (R per Inch)</th>
<th>Nominal Resistivity per ASTM C578 (R per inch)</th>
<th>Allowable Bearing Capacity $^{2}$ (psf)</th>
<th>Minimum Insulation Thickness (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type II</td>
<td>1.35</td>
<td>3.2</td>
<td>2.6</td>
<td>4.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Type IX</td>
<td>1.8</td>
<td>3.4</td>
<td>2.8</td>
<td>4.2</td>
<td>1.200</td>
</tr>
<tr>
<td>Type X</td>
<td>1.35</td>
<td>4.5</td>
<td>4.0</td>
<td>5.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Type IV</td>
<td>1.6</td>
<td>4.5</td>
<td>4.0</td>
<td>5.0</td>
<td>1.200</td>
</tr>
<tr>
<td>Type VI</td>
<td>1.8</td>
<td>4.5</td>
<td>4.0</td>
<td>5.0</td>
<td>1.920</td>
</tr>
<tr>
<td>Type VII</td>
<td>2.2</td>
<td>4.5</td>
<td>4.0</td>
<td>5.0</td>
<td>2.880</td>
</tr>
<tr>
<td>Type V</td>
<td>3.0</td>
<td>4.5</td>
<td>4.0</td>
<td>5.0</td>
<td>4.800</td>
</tr>
</tbody>
</table>

1 Effective resistivity is based on tests from laboratory and field studies of insulation products under long-term exposure to moist, below-ground conditions. "Vertical" effective resistivity shall be used for insulation placed vertically on exterior foundation walls. "Horizontal" effective resistivity shall be used for insulation placed horizontally, below ground.

2 Allowable bearing capacity is based on ASTM C578 compressive strength at 10% deformation divided by a safety factor of 3.0 for conditions without cyclic loading (i.e., highway vehicle loading).

'N/A' prohibits use where structural foundation loads are supported (i.e., insulation below footings).

**Cost Impact:** Will increase the cost of construction

Depending on the project's design, this proposal may increase the cost of construction, as the design values for below-grade EPS and XPS are revised by this proposal. For most vertical applications, slightly less EPS or XPS will be needed to achieve the required thermal performance. For most horizontal applications, slightly more EPS or XPS will be needed.
RB180-16
IRC: R403.4.
Proponent: Paul Helderman, Superior Walls of America, representing Superior Walls of America (ehelderman@superiorwalls.com)

2015 International Residential Code
Revise as follows:

FIGURE R403.4 (1)
BASEMENT OR CRAWL SPACE WITH PRECAST FOUNDATION WALL BEARING ON CRUSHED STONE
Reason: Figure R403.4(1) is depicting a (non-descript) precast foundation sitting on a crushed stone footing, but the drawing is inaccurate in the sense that it does not depict a typical sill plate connection to a precast foundation wall. While there are many possible methods of connecting a sill plate to a precast concrete foundation wall panel this is not one that is commonly used if it is ever used at all. A more accurate representation is needed. This new drawing of Figure R403.4(1) more accurately represents one type of sill plate connection to a precast concrete foundation wall that is commonly used in the precast industry, while it still remains non-proprietary in nature.
This change does not require any more space in the code book but simply improves an existing illustration so it is more accurate.

**Cost Impact:** Will not increase the cost of construction
This proposal will not increase the cost of construction.
This proposal is NOT changing the technical requirements of the code, it is just clarifying the code by representing a more realistic sill plate connection for a precast foundation.
2015 International Residential Code

Revise as follows:

FIGURE R403.4 (2)
BASEMENT OR CRAWL SPACE WITH PRECAST FOUNDATION WALL ON SPREAD FOOTING
Reason: Figure R403.4(2) is depicting a (non-descript) precast foundation sitting on a concrete spread footing. To fall in step with section R403.1.1, which describes the minimum size requirements for concrete footings, dimension T for "footing thickness" needs to be added to Figure R403.4(2) so dimension T is correctly illustrated. The corrected illustration adds the T dimension to Figure R403.4(2).

Figure R403.4(2) is also inaccurate in the sense that it does not depict a typical sill plate connection to a precast foundation wall. While there are many possible methods of connecting a sill plate to a precast concrete foundation wall panel this is not one that is commonly used if it is ever used at all. A more accurate representation is needed. This new drawing of Figure R403.4(2) also more accurately represents one type of sill plate connection to a
precast concrete foundation wall that is commonly used in the precast industry, while it still remains non-proprietary in nature.

This change does not require any more space in the code book but simply improves an existing illustration so it is more accurate.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction.
This proposal is NOT changing the technical requirements of the code, it is just clarifying the code by representing a more realistic sill plate connection for a precast foundation and it is adding the thickness (T) dimension, which is currently missing from the figure 403.4(2). Concrete footing requirements remain the same.
RB182-16

IRC: R404.1.1.1 (New).

Proponent: Josh O'Connor, I am submitting this proposal representing myself, representing Self (joshoc@aol.com)

2015 International Residential Code

Add new text as follows:

R404.1.1.1 Wall pass-through The opening in a concrete or masonry foundation wall through which the HVAC unit supply and return air ducts pass shall have a minimum width of 42 inches.

Reason: I have seen national home builders making this width only 32 inches. This is not wide enough for the supply and return flex ducts to come off of the back of the HVAC unit without having to veer in sharply to enter the foundation opening. This causes pinching which restricts airflow. HVAC manufacturers make the openings/ports on the back of the units far apart (see measurements below), and the units are forced to sit very close to the house. The supply and return air ducts need a straight run off of the unit into the foundation opening, and the opening has to be wide enough to allow this. At a relative’s house, I saw the inside of a supply duct pinched to half of its normal diameter because of having to veer off of the unit into a foundation opening that was only 32 inches wide. After I saw this problem, I looked at a lot of houses under construction by national home builders and they are all doing only 32 inches. Maybe they think the width of two cinder blocks is enough, but it’s not. The foundation opening shouldn’t be based on the width of the air ducts themselves; it should be based on the fact that HVAC manufacturers make the supply and return ports on the back of the units far apart. I don’t think the foundation opening should ever be allowed to be made less than 42 inches wide given the measurements below from all the major HVAC unit manufacturers. I don’t think inspectors can be relied on to make sure the foundation opening is wide enough without an actual code requirement being in place. Custom/high end home builders make the opening wide enough from what I have seen because they pay attention to details, but the national home builders are not and there needs to be a code in place to set this minimum width.

Following are the distances between the outside edge of the supply opening and the outside edge of the return opening on the backside of a 2 1/2 ton HVAC unit from each of these common manufacturers:

- Carrier 41"
- Bryant 41"
- Lennox 39"
- Rheem 39"
- American Standard 38.5"
- Trane 38.5"
- Goodman 37.5"

These measurements were obtained from spec sheets from each manufacturer.

I also want to add that an HVAC contractor in the Nashville, TN area says this:

"When asked about the size a package unit opening should be, my reply is a minimum of 42" wide by 24" high. This size allows for the connections from the unit to the trunklines are not restricted..."

From what I have seen the national home builders are getting the height right; my proposal addresses the width.

My statements come from what I have personally seen and the HVAC unit measurements come from spec sheets from the manufacturers.

Cost Impact: Will not increase the cost of construction

None. The vice president of operations of a local home builder has told me there is no additional cost in making the foundation opening 42 inches wide. See attached pdf of email.
From: Daryl Walny <dwalny@carbinecompany.com>
To: joshoo <joshoo@aol.com>
Subject: RE: Building code proposal I am submitting
Date: Fri, Jul 10, 2015 4:28 pm

None

Daryl Walny
Carbine and Associates, LLC
V.P. of Operations, Partner

(615) 620-7166 Work
(615) 207-5804 Mobile
dwalny@carbinecompany.com
621 Bradley Ct.
Franklin, TN 37067
From: joshoc@aol.com [mailto:joshoc@aol.com]

Sent: Friday, July 10, 2015 3:52 PM

To: Daryl Walny

Subject: Re: Building code proposal I am submitting

Thanks. Would you be able to say whether making the opening 42 inches wide would add any additional cost to the home builder? If so, roughly what that additional cost would be? Thanks again.
2015 International Residential Code

Revise as follows:

R405.1 Concrete or masonry, and precast foundations. Drains Drainage tiles, gravel, or crushed stone drains, or perforated pipe shall be provided around 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 be not less than 1 foot in depth and extend not less than 1 foot (305 mm) beyond the outside edge of the footing and 6 inches (152 mm) above the top of the footing. The top of the drain shall be not less than 4 inches and not more than 8 inches 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. Except where otherwise recommended by the drain manufacturer, 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. Drainage tiles or perforated pipe used as a component of the drain shall be placed on a minimum of 2 inches (51 mm) of washed gravel or crushed rock not less than 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 where 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.

Precast concrete foundations that rest on crushed stone footings shall have a perforated pipe installed below the wall on either the interior or exterior side of the wall, not less than 1 foot beyond the edge of the wall. The top of open joints of drain tiles shall be protected with strips of building paper. Perforated pipe shall be surrounded with an approved filter membrane when on the exterior of a foundation wall. Drains shall discharge by gravity, into a sump provided with a sump pump, or by mechanical means into an approve drainage system or to daylight.

**Exception:** A drainage system is not required where 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.

Delete without substitution:

R405.1.1 Precast concrete foundation. Precast concrete walls that retain earth and enclose habitable or useable space located below grade that rest on crushed stone footings shall have a perforated drainage pipe installed below the base of the wall on either the interior or exterior side of the wall, not less than 1 foot (305 mm) beyond the edge of the wall. If the exterior drainage pipe is used, an approved filter membrane material shall cover the pipe. The drainage system shall discharge into an approved sewer system or to daylight.
Revise as follows:

**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.

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

**R405.2.3 Drainage system.** In other than Group I soils, a sump shall be provided to drain the porous layer and footings. The sump shall be not less than 24 inches (610 mm) in diameter or 20 inches square (0.0129 m²) and shall extend not less than 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 by gravity, by means of a sump pump, or by mechanical means into an approved sewer, approved drainage system or to daylight.

**Reason:** If I construct a wood foundation, the code (R405.2.3) will tell me that I need a “sump” to drain the foundation. The text gives specific size and location requirements for the “sump”. The text requires that the sump be capable of “positive gravity or mechanical drainage”. The code doesn’t define or describe what is meant by “mechanical drainage”. The term “sump” when defined in Chapter 2 of the code does not include the sumps referenced in this section. The defined term “sump” is one that receives sewage or waste. The code does provide a definition for “sump pump”. But now here in the code is the term used! What purpose is served by defining a term that isn’t used? None! So let’s put it in the code.

Would a “sump pump” be the “mechanical drainage” referenced in R405.2.3? Let’s at least give better direction on what options are available for draining this “sump” by adding the term “sump pump”.

A further amendment deletes the last sentence in R405.2.1. This issue is addressed in R405.2.3 so the sentence is redundant. It also uses the term “automatic draining” which leaves much to the imagination.

**SUM P.** A tank or pit that receives sewage or waste, located below the normal grade of the gravity system and that must be emptied by mechanical means.

This definition is not used in the code: **SUM P PUMP.** A pump installed to empty a sump. These pumps are used for removing storm water only. The pump is selected for the specific head and volume of the load and is usually operated by level controllers.

Another definition in the code for information: **SEWAGE PUMP.** A permanently installed mechanical device for removing sewage or liquid waste from a sump.

With that issue being solved let us jump back to the foundation drainage requirements for concrete and masonry foundations and for precast foundation systems. Now the less informed among us might wonder why the drainage requirements for what seems to be two similar foundation systems is different. Concrete and masonry foundations must have the drain on the outside. Precast foundations can have the drain on either the inside or outside. That can be explained by the text which says it is regulating precast foundations on a crushed stone footing. That resolves one inconsistency.

Then we have two different methods of draining the foundation. Why can’t they be the same? For concrete and masonry foundations the code reads:

**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 not less than 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. Except where otherwise recommended by the drain manufacturer, 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. Drainage tiles or perforated pipe shall be placed on a minimum of 2 inches (51 mm) of washed gravel or crushed rock not less than 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.**
For precast concrete footings we have the following:

...footings shall have a perforated drainage pipe installed below the base of the wall on either the interior or exterior side of the wall, not less than 1 foot (305 mm) beyond the edge of the wall. If the exterior drainage pipe is used, an approved filter membrane material shall cover the pipe. The drainage system shall discharge into an approved sewer system or to daylight.

So if you have a precast concrete footing, you must use a "perforated drainage pipe". If you have a concrete or masonry foundation you must use "drainage tiles, gravel or crushed stone drains, perforated pipe or other approved systems or materials". Why can't the rules be the same? For simplicity and ease of interpretation, couldn't the sections either be combined or use the same text for both? What is proposed is to simplify the text by using the same techniques for draining water for both types of foundations. It is believed that the water will not know the difference.

So the proposal doesn't change anything. It places the text in a more logical sequence and fills in some of the blanks such as the depth of the crushed stone drain. This should be a non-controversial editorial revision that will make applying and understanding this section of the code easier.

**Cost Impact:** Will not increase the cost of construction
This proposal will not increase construction costs because it is an editorial revision.
RB184-16
IRC: R405.1.
Proponent: William Miller, Senior Building Inspector, County of Warren, representing County of Warren, VA (wmiller@warrencountyva.net)

2015 International Residential Code

R405.1 Concrete or masonry foundations. Drains shall be provided around 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 top of the footing or below the bottom of the slab and shall discharge by gravity or mechanical means into an approved drainage system. Gravel or crushed stone drains shall extend not less than 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. Except where otherwise recommended by the drain manufacturer, 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. Drainage tiles or perforated pipe shall be placed on a minimum of 2 inches (51 mm) of washed gravel or crushed rock not less than 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 where 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.

Reason: "area to be protected" is unclear and should be specified in the code. Placing drain tile too high is a primary cause of leaking basements.

Cost Impact: Will not increase the cost of construction
There is no cost increase. Material & labor should be the same.
RB185-16
IRC: R408.3.
Proponent: Wayne Pimental, representing Town of East Greenwich
(wpimental@eastgreenwichri.com)

2015 International Residential Code

R408.3 Unvented crawl space. Ventilation openings in under-floor spaces specified in Sections R408.1 and R408.2 shall not be required where the following items are provided:

1. Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall or insulation.

2. One of the following is provided for the under-floor space:
   2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of crawl space floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11 of this code.
   2.2. Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11 of this code.
   2.3. Plenum in existing structures complying with Section M1601.5, if under-floor space is used as a plenum.
   2.4. Minimum 2’x3” opening between the existing non-conditioned basement and the new crawl space.

Reason: Here in the Northeast, it is not practical to require exterior ventilation openings under the under floor space of small additions to an existing house where that addition may typically be a small bathroom or single room addition with only a crawl space installed to meet the frost depth requirements. The majority of these additions with crawl spaces are typically attached to the existing basement with access via a 2’x 3’ or larger opening provided between the existing and new crawl space. Most existing full basements are usually not finished, nor are they conditioned or have exhaust ventilation, so to require a small crawl space attached to this type of space to be either conditioned or have exhaust ventilation is counter-productive to the space that they are connected to. The only other option is to require these small type of additions to have vented openings between the bottom of the floor joist and the earth under the building. Here in the northeast and any other cold area of the region, this is not a good practice to allow cold air under conditioned space, especially if it contains water and sewer piping. Additions attached to an existing non-conditioned or unventilated basement shall be allowed provided a minimum of an 2’ x 3” access opening is provided between the two spaces.

So I would propose a fourth option R408.3.2, which would not require under floor ventilation as long as a 2’ x 3’ access opening is provided. The exposed earth would still be required to be covered with a continuous Class I vapor retarder per R408.3.1.

Cost Impact: Will not increase the cost of construction
There would be no additional cost impact as access is already required.
Add new text as follows:

R408.3  **Vented crawl space insulation**  Vented crawl spaces in Climate Zones 1A, 2a and 3A shall include a layer of insulation separating the underside of the floor and floor framing from the vented crawl space. The insulation shall be a minimum of R3. The insulation shall be a vapor retarder Class I or II, or shall include a Class I or II vapor retarder coating or covering in direct contact with the underside of the insulation. Joints in the continuous insulation shall be taped or sealed.

**Reason:** Ventilation is intended to remove moisture in crawl spaces. However, in hot humid climates the summer outside air can carry substantial moisture, more that the crawl space air. Hot outside air is cooled due to the cooler ground temperature and the air-conditioner cooled floor, such that the crawl space air temperature can be lowered below the dew point. Bring in moist hot air, cooling below the dew point is a recipe for loading the crawl space with water. Wood subfloor and framing can be damaged. Mold grows. Vented crawl spaces can be made usable by protecting the wood subfloor and framing that would be damaged by moisture with a minimum insulation and a moisture barrier.

As the graphic shows, the high dew point temperatures are a characteristic of the southeastern climate zones. The southwest is much dryer, so vented crawl spaces work better there.
Bibliography: Recent research by Advanced Energy and others shows that unvented crawlspaces provide greatly improved moisture control and significant energy savings. Advanced Energy. updated in 2014
Home Innovation Research Labs has a technical note on closed crawl spaces, published 2013

Cost Impact: Will increase the cost of construction
The least cost approach will often be to go to an unvented crawl space as defined in IRC Section 408.3. The unvented crawl space will provide better performance and significantly lower energy operating costs. Unvented crawl spaces might add a small incremental first cost, with some costs increasing and some decreasing. "With changes to the new building code, the only thing that separates a closed from a vented crawl space is the liner on the walls and absence of vents. Whether you are doing a closed [unvented] or vented crawl space, the new code requires a ... vapor retarder ... on the ground" says Green Horizon. Web site last updated in 2015. Insulation R-values are less for crawl space walls compared to floors over crawl spaces per IRC Table N1102.1.2, which is a cost reduction. There would also be a cost for providing ventilation air into the crawl space per R408.3.
R408.3 Unvented crawl space. Ventilation openings in under-floor spaces specified in Sections R408.1 and R408.2 shall not be required where the following items are provided:

1. Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall or insulation.

2. One of the following is provided for the under-floor space:
   2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m$^2$) of crawl space floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11 of this code.
   2.2. Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m$^2$) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11 of this code.
   2.3. Plenum in existing structures complying with Section M1601.5, if under-floor space is used as a plenum.
   2.4. Dehumidification sized to provide 70 pints (33 liters) of moisture removal per day for every 1,000 ft$^2$ (93 m$^2$) of crawl space floor area.

Reason: Unvented crawl spaces are required by Section R408.3 to provide a method for moisture control. Typical conditioning measures involve supplying conditioned air from the occupied (conditioned) space of the building or exhausting air from the crawl space with make up air provided from the occupied (conditioned) space of the building. This code change allows another means of conditioning and controlling moisture, specifically dehumidification. Dehumidification is a proven technology.

I am the original proponent of the existing code language for unvented crawl spaces. The existing language is based on a work done in the 1990's under the U.S. Department of Energy Building America Program. The work also examined dehumidification approaches. I had always intended to add dehumidification to the prescriptive part of the code 20 years ago but never got around to it. This change fixes that omission.

Cost Impact: Will not increase the cost of construction
This is a no cost change. This is an option. It allows another approach to conditioning crawl spaces that is equal to or less cost compared to providing supply and return air or an exhaust ventilation approach.
RB188-16
IRC: R408.4.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R408.4 Access. Access shall be provided to all under-floor spaces. Access openings through the floor shall be a minimum of 18 inches by 24 inches (457 mm by 610 mm). Openings through a perimeter wall shall be not less than 16 22 inches by 24 30 inches (407 mm by 610 mm). Where any portion of the through-wall access is below grade, an areaway not less than 16 36 inches by 24 36 inches (407 mm by 610 mm) shall be provided. The bottom of the areaway shall be below the threshold of the access opening. Through wall access openings shall not be located under a door to the residence. See Section M1305.1.4 for access requirements where mechanical equipment is located under floors.

Reason: Here we go again with two minimum standards to serve the same purpose. You could have a floor access with an attic access directly above and the size requirements are different! Why? Then there are different size requirements depending on the location of the opening – wall or floor!

Attic access requirements are the same for wall or ceiling locations. Why is crawl space access different?

Also, the size requirement for the areaway is increased to the same size as a window well. A 16x24 inch areaway, if far enough below grade, will not permit a person of average size to enter the crawl space.

This proposal inserts the same opening requirements for crawl spaces as is required for attics. Let’s not clutter up the minds of code enforcement personnel with three different size requirements for access to these spaces. We need the extra mind capacity for more important things.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will not increase the cost of construction.
Proponent: Edward Keith, representing APA-The Engineered Wood Association (ed.keith@apawood.org)

2015 International Residential Code

Revise as follows:

R502.1.3 Structural glued laminated timbers. Glued laminated timbers shall be manufactured and identified as required in ANSI/AITC A190.1, ANSI 117, and ASTM D 3737.

R602.1.3 Structural glued laminated timbers. Glued-laminated timbers shall be manufactured and identified as required in ANSI/AITC A190.1, ANSI 117, and ASTM D 3737.

R802.1.2 Structural glued laminated timbers. Glued laminated timbers shall be manufactured and identified as required in ANSI/AITC A190.1, ANSI 117, and ASTM D 3737.

Reference standards type: This reference standard is new to the ICC Code Books

Add new standard(s) as follows:

ANSI 117-2015 Standard Specifications for Structural Glued Laminated Timber of Softwood Species

Reason: ANSI A190.1 and ANSI 117 are national consensus standards, previously known as ANSI/AITC A190.1 and AITC 117, respectively. In 2013, ANSI/AITC A190.1 and AITC 117 were renamed as ANSI A190.1 and ANSI 117 with the approval by ANSI. The new name for ANSI A190.1 found its way into Chapter 44 during the 2015 code cycle, but this change corrects references in code chapters.

ANSI 117 contains design and manufacturing requirements for structural glued laminated timber (glulam), which has been in use and recognized by the code (e.g., Section 2306.1 and Chapter 35 of the 2015 IBC) for more than 20 years. This change updates the standards reference in Sections R502.1.3, R602.1.3, and R802.1.2, and in Chapter 44 of the IRC. Note that APA is the standard developer accredited by ANSI for this national consensus standard and it is therefore placed under APA in Chapter 44. ANSI 117 is available for free download from the APA website (http://www.apawood.org/download_pdf.ashx?pubid=f1f1ce6d-9390-46cd-b8f9-339ad36743df).

Cost Impact: Will not increase the cost of construction

This code change will not increase the cost of construction. It simply changes the entity responsible for the maintenance of these standards from the now defunct AITC to APA-The Engineered Wood Association.

Analysis: A review of the standard(s) proposed for inclusion in the code, ANSI 117-2015, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
2015 International Residential Code
Revise as follows:

<table>
<thead>
<tr>
<th>USE</th>
<th>LIVE LOAD</th>
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<tbody>
<tr>
<td>Uninhabitable attics without storage</td>
<td>10</td>
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<tr>
<td>Uninhabitable attics with limited storage</td>
<td>20</td>
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<tr>
<td>Habitable attics and attics served with fixed stairs</td>
<td>30</td>
</tr>
<tr>
<td>Balconies (exterior) and decks</td>
<td>40</td>
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<tr>
<td>Fire escapes</td>
<td>40</td>
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<tr>
<td>Guards and handrails</td>
<td>200</td>
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<td>Guard in-fill components</td>
<td>50</td>
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<tr>
<td>Passenger vehicle garages</td>
<td>50</td>
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<tr>
<td>Rooms other than sleeping rooms</td>
<td>40</td>
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<tr>
<td>Sleeping rooms</td>
<td>30</td>
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<tr>
<td>Stairs</td>
<td>40</td>
</tr>
</tbody>
</table>

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm², 1 pound = 4.45 N.

a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.

b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42
inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of 4 square inches, whichever produces the greater stresses.

d. A single concentrated load applied in any direction at any point along the top.

e. See Section R507.1 for decks attached to exterior walls.

f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.

g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is not greater than 42 inches, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.

2. The slopes of the joists or truss bottom chords are not greater than 2 inches vertical to 12 units horizontal.

3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

Reason: For historical context, the 2006 IBC and 2005 ASCE 7-05 contained similar language in that balconies and decks were treated as different uses and had different uniform loading criteria. Then the IBC diverged from matching ASCE 7 in 2006 under S9-06/07 when the IBC combined the separate occupancy categories balconies and decks into one item, with the uniform loading set as the "Same as occupancy served" force level. ASCE 7-10 followed suit in combining balconies and decks as a single item, however the uniform loading was set at 1.5 times the live load for the area served, with an upper bound not required to be greater than 100 psf. To harmonize the ASCE and IBC and IRC live loading requirements, this proposal is using the ASCE 7 load requirements for the baseline minimum live loads on balconies and decks.

Cost Impact: Will increase the cost of construction
For an ASCE 7 compliant design there is no increase in loading and thus no change in construction cost. For an IBC/IRC compliant design the loading of balconies and decks will increase possibly increasing the cost of structural framing for the support of these structures.
RB191-16
IRC: R301.5, R502.3.1, R502.3.2.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

<table>
<thead>
<tr>
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<th>LIVE LOAD</th>
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<tbody>
<tr>
<td>Uninhabitable attics without storage b</td>
<td>10</td>
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<tr>
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<td>20</td>
</tr>
<tr>
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<td>30 a,b,c</td>
</tr>
<tr>
<td>Balconies (exterior) and decks e</td>
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<td>40</td>
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<tr>
<td>Guards and handrails d</td>
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<tr>
<td>Guard in-fill components f</td>
<td>50 h</td>
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<tr>
<td>Passenger vehicle garages a</td>
<td>50 a</td>
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<tr>
<td>Rooms other than sleeping rooms</td>
<td>40</td>
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<tr>
<td>Sleeping rooms</td>
<td>30</td>
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<tr>
<td>Attics served by stairs complying with Section R311.7</td>
<td></td>
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<tr>
<td>Stairs</td>
<td>40 c</td>
</tr>
</tbody>
</table>

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e.  See Section R507.1 for decks attached to exterior walls.

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**R502.3.1 Sleeping areas and attic Attic joists.** Table R502.3.1(1) shall be used to determine the maximum allowable span of floor joists that support sleeping areas and attics that are accessed by means of a fixed stairway in accordance with Section R311.7 provided that the design live load does not exceed 30 pounds per square foot (1.44 kPa) and the design dead load does not exceed 20 pounds per square foot (0.96 kPa). The allowable span of ceiling joists that support attics used for limited storage or no storage shall be determined in accordance with Section R802.4.

**TABLE R502.3.1 (1)**

FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES (Residential sleeping areas Attics, live load = 30 psf, L/Δ = 360)\(^a\)

<table>
<thead>
<tr>
<th>JOIST SPACING  (inches)</th>
<th>SPECIES AND GRADE</th>
<th>DEAD LOAD = 10 psf</th>
<th>DEAD LOAD = 20 psf</th>
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<td>2 x 6</td>
<td>Douglas fir-larch</td>
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<td>JOIST SPACING (inches)</td>
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<td>12-10</td>
</tr>
<tr>
<td>#1</td>
<td>9-4</td>
<td>12-4</td>
<td>14-8</td>
</tr>
<tr>
<td>#2</td>
<td>8-6</td>
<td>10-10</td>
<td>12-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>pine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern</td>
<td>#3</td>
<td>6-5</td>
<td>8-2</td>
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<tr>
<td>pine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spruce-pine-fir</td>
<td>SS</td>
<td>9-2</td>
<td>12-1</td>
</tr>
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<td>#2</td>
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</tr>
<tr>
<td>Spruce-pine-fir</td>
<td>#3</td>
<td>6-10</td>
<td>8-8</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

**Note:** Check sources for availability of lumber in lengths greater than 20 feet.

**a.** Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub> shall be determined in accordance with Section R301.2.2.2.1.

**R502.3.2 Other floor joists.** Table R502.3.1(2) shall be used to determine the maximum allowable span of floor joists that support other areas of the building, other than sleeping rooms and attics, provided that the design live load does not exceed 40 pounds per square foot (1.92 kPa) and the design dead load does not exceed 20 pounds per square foot (0.96 kPa).

**Reason:** This proposal addresses several issues.

First, Table R301.5 is amended so that habitable attics meet the 40 pound live load requirement. The term is "habitable" attic. There is no reason to suspect that the loads in this habitable space are any different than any other habitable space. The uses that occur in a habitable attic are not going to be any different than those occurring on the first floor. The design should reflect that.

Second, reference to "fixed stairs" is being deleted. The term is undefined and it is assumed that all required stairs are "fixed". A stair is required to serve this space and it must comply with R311.7. It isn't necessary to state the obvious.

Third, a new line is added to address attics that are provided with code compliant stairs. These are the attics that are not intended to be occupied but may be used for storage, mechanical equipment or other uses but are provided with stairs which increases the likelihood that these other uses will occur and that the floor needs to be designed to support greater loads yet not the full loads of other occupied space.

Fourth, the reduction in design loads for sleeping rooms is being eliminated. If there ever was a legitimate reason for having a different design live load for sleeping areas than other rooms it has long since disappeared. Homes aren't constructed with rooms in nice little squares where all of the area of a room can be contained on the span of certain joists with no other uses impinging on those joists. Rooms get multi-purposed. Joists support more than one room. Is it realistic to think that a contractor will switch joist size and spacing where a sleeping area occurs? Absolutely not. They will take the worst case scenario and use the same size and spacing throughout. No one takes advantage of this reduction. It won't be missed.

Fifth, Sections R502.3.1 and R502.3.2 are amended consistent with the first four items.

And sixth, Table R502.3.1(1) is amended to reflect that it only applies to attics served by code compliant stairs.
**Cost Impact:** Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.
RB192-16
IRC: R502.6.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R502.6 Bearing. The ends of each joist, beam or girder shall have not less than $1\frac{1}{2}$ inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on masonry or concrete except where ... Alternatively, the ends of joists shall be supported on a 1-inch by 4-inch (25 mm by 102 mm) ribbon strip and shall be nailed to the adjacent stud or fastened by means of approved joist hangers. Alternatively, the ends of beams and girders shall be supported on approved connectors. The bearing on masonry or concrete shall be direct, or a sill plate of 2-inch-minimum (51 mm) nominal thickness shall be provided under the joist, beam or girder. The sill plate shall provide a minimum nominal bearing area of 48 square inches (30 865 square mm).

Reason: Can you really support a beam or girder on a 1x4 ribbon strip or with a joist hanger? I don't think so. But that is what the code permits.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that should have no impact on costs.
2015 International Residential Code

Revise as follows:

**R502.11.2 Bracing.** Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with accepted industry practices, such as practice. Construction documents required by Section R106 shall provide details identifying the SBCA Building Component Safety Information (BCSI) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses placement, size, and attachment requirements for all bracing required by this section.

**R802.10.3 Bracing.** Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents for the building and on the individual truss design drawings. In the absence of specific bracing requirements, trusses shall be braced in accordance with accepted industry practice such as . Construction documents required by Section R106 shall identify the SBCA Building Component Safety Information (BCSI) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses placement, size, and attachment requirements for all bracing required by this section.

**Reason:** When asking for bracing requirements the buck gets passed back and forth between the truss designer, the draftsman, and the contractor. There often aren't building designers, just draftsmen. Put the responsibility somewhere. Make it a requirement of the plan submittal.

**Cost Impact:** Will not increase the cost of construction

This is an administrative amendment that will have no impact on construction costs.
RB194-16
IRC: R502.11.4.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R502.11.4 Truss design drawings. Truss design drawings, prepared in compliance with Section R502.11.1, shall be submitted to the building official and approved prior to installation. Truss design drawings shall be provided with construction documents required by Section R106. Truss design drawings shall include, at a minimum, the information specified as follows:

1. Slope or depth, span and spacing.
2. Location of all joints.
3. Required bearing widths.
4. Design loads as applicable:
   4.1. Top chord live load.
   4.2. Top chord dead load.
   4.3. Bottom chord live load.
   4.4. Bottom chord dead load.
   4.5. Concentrated loads and their points of application.
   4.6. Controlling wind and earthquake loads.
5. Adjustments to lumber and joint connector design values for conditions of use.
6. Each reaction force and direction.
7. Joint connector type and description, such as size, thickness or gage, and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface.
8. Lumber size, species and grade for each member.
9. Connection requirements for:
   9.2. Truss ply-to-ply.
   9.3. Field splices.
10. Calculated deflection ratio and/or maximum description for live and total load.
11. Maximum axial compression forces in the truss members to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss drawing or on supplemental documents.
12. Required permanent truss member bracing location.

Reason: Too many people take this text to mean that the truss design drawings can be submitted to the building official minutes before an inspection is scheduled. In fact, there is no way to conduct a proper plan review without having the truss design drawings. Everything from footing size and location to load path details depend on having a full and complete set of plans. Regarding including roof truss design drawings with the truss shipment, this is unenforceable text. If they aren't provided with the truss delivery, who do you cite for the failure, the truck driver? By providing the truss drawings at plan review, an approved copy will go to the job site and having them delivered with the trusses is a moot point.

Cost Impact: Will not increase the cost of construction
This is an editorial revision and should have no impact on construction costs.
Revise as follows:

R505.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192 mm) in width parallel to the joist span and less than or equal to three stories above grade plane. Cold-formed steel floor framing constructed in accordance with the provisions of this section shall be limited to sites where the ultimate design wind speed is less than 139 140 miles per hour (62 63 m/s), Exposure Category B or C, and the ground snow load is less than or equal to 70 pounds per square foot (3.35 kPa).

R505.1.3 Floor trusses. Cold-formed steel trusses shall be designed, braced and installed in accordance with AISI S100, Section D4 S240. In the absence of specific bracing requirements, trusses shall be braced in accordance with accepted industry practices, such as the SBCA Cold-Formed Steel Building Component Safety Information (CFSBCSI), Guide to Good Practice for Handling, Installing & Bracing of Cold-Formed Steel Trusses. Truss members shall not be notched, cut or altered in any manner without an approved design.

R505.2.6.2 Web hole reinforcing. Reinforcement of web holes in floor joists not conforming to the requirements of Section R505.2.6.1 shall be permitted if the hole is located fully within the center 40 percent of the span and the depth and length of the hole does not exceed 65 percent of the flat width of the web. The reinforcing shall be a steel plate or C-shape section with a hole that does not exceed the web hole size limitations of Section R505.2.6.1 for the member being reinforced. The steel reinforcing shall be the same of minimum thickness as the receiving member and shall extend not less than 1 inch (25 mm) beyond all edges of the hole. The steel reinforcing shall be fastened to the web of the receiving member with No. 8 screws spaced not more than 1 inch (25 mm) center-to-center along the edges of the patch with minimum edge distance of $\frac{1}{2}$ inch (12.7 mm).

### TABLE R505.3.2

**ALLOWABLE SPANS FOR COLD-FORMED STEEL JOISTS—SINGLE OR CONTINUOUS SPANS**

<table>
<thead>
<tr>
<th>JOIST DESIGNATION</th>
<th>30 PSF LIVE LOAD</th>
<th>40 PSF LIVE LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spacing (inches)</td>
<td>Spacing (inches)</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>550S162-33</td>
<td>11'-7&quot;</td>
<td>11'-0&quot;</td>
</tr>
<tr>
<td>550S162-43</td>
<td>12'-0&quot;</td>
<td>11'-6&quot;</td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 mil = 0.0254 mm.

a. Deflection criteria: \( L/480 \) for live loads, \( L/240 \) for total loads.

b. Floor dead load = 10 psf.

c. Table provides the maximum clear span in feet and inches.

d. Bearing stiffeners are to be installed at all support points and concentrated loads.

e. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thickness. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thickness.

f. Table is not applicable for 800S162-33 and 1000S162-43 continuous joist members.

R505.3.7 Splicing. Joists and other structural members shall not be spliced without an approved design. Splicing of tracks shall conform to Figure R505.3.7.

Reference standards type: This reference standard is new to the ICC Code Books

Add new standard(s) as follows:

AISI S240-15, North American Standard for Cold-Formed Steel Structural Framing (2015)

Standards Available for free download at www.aisistandards.org

Reason: This proposal is one in a series intended to update the content of the Cold-Formed Steel (CFS) light-framed construction provisions of the IRC. The proposed revisions align the IRC with the provisions of AISI S230-15, Standard for Cold-Formed Steel Framing - Prescriptive Method for One- and Two-Family Dwellings. Further
explanation for each section follows:

Applicability Limits - This proposal adjusts the upper limit of the ultimate design wind speed from less than 139 miles per hour (mph) to less than 140 mph. The previous upper limit was based on a conversion of the wind speed from a nominal speed to an ultimate speed. For which, the conversion of the 110 mph nominal wind speed resulted in a rounded value of 139 mph ultimate wind speed upper limit (ie. less than 139 mph). This is detailed in the last cycle code change proposal RB258-13. Since the wind speeds now listed in this section are actual ultimate wind speeds, as derived from the ultimate wind speed maps, this section is now applicable for ultimate wind speeds up to 140 mph.

Section R505.1.3 Floor Trusses - Previously this section referenced AISI S100, Section D for floor truss design. Section D of AISI S100 directed the user to AISI S214 - North American Standard for Cold-Formed Steel Framing - Truss Design. However, the new standard AISI S240, North American Standard for Cold-Formed Steel Structural Framing, addresses requirements for construction with cold-formed steel structural framing that are common to prescriptive and engineered light frame construction. This comprehensive standard was formed by merging the following AISI standards:

- AISI S200, North American Standard for Cold-Formed Steel Framing-General Provisions
- AISI S210, North American Standard for Cold-Formed Steel Framing–Floor and Roof System Design
- AISI S211, North American Standard for Cold-Formed Steel Framing–Wall Stud Design
- AISI S212, North American Standard for Cold-Formed Steel Framing–Header Design
- AISI S213, North American Standard for Cold-Formed Steel Framing–Lateral Design
- AISI S214, North American Standard for Cold-Formed Steel Framing–Truss Design

Consequently, AISI S240 supersedes all previous editions of the above mentioned individual AISI standards and is the correct reference for this application.

Section R505.2.6.2 Web Reinforcing - This is a correction to the language for web reinforcing. Holes in CFS members are permitted to be reinforced with steel of the same or greater thickness per AISI S230.

Table R505.3.2 Allowable Spans for CFS Joists - The listed allowable spans are updated to correspond to AISI S230-15.

Section R505.3.7 Splicing - Splicing of CFS members is permitted with approved design per AISI S230.

The AISI Standards are available for free download at www.aisistandards.org

Cost Impact: Will increase the cost of construction
The proposed changes to this section will not increase the cost of construction in general. While the overwhelming majority of the prescribed members have not changed or are reduced in size, there may be conditions for which the minimum member size will increase.

Analysis: A review of the standard(s) proposed for inclusion in the code, AISI 240-15, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
RB196-16
IRC: R506.2.3.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R506.2.3 Vapor retarder. A 6-mil (0.006 inch; 152 µm) polyethylene or approved vapor retarder with joints lapped not less than 6 inches (152 mm) shall be placed between the concrete floor slab and the base course or the prepared subgrade where no base course exists in basements of dwellings where the basement floor is below the adjacent grade plane.

**Exception:** The vapor retarder is not required for the following:

1. Garages, utility buildings and other unheated accessory structures.
2. For unheated storage rooms having an area of less than 70 square feet (6.5 m²) and carports.
3. Driveways, walks, patios and other flatwork not likely to be enclosed and heated at a later date.
4. Where approved by the building official, based on local site conditions.

**Reason:** On grade slabs are not the problem. Basements below grade are the problem.

Item 1 Garage and carport floors can be dirt. What makes concrete so special that you need a vapor retarder in a heated structure? What purpose is served?

Item 2 Where would this unheated storage room be? Who would think you would consider a retarder under a carport floor. These floors can be dirt or gravel. They can be open on four sides. What purpose is served by the retarder?

Item 3 How likely is a driveway to be enclosed and heated at a later date. Is this one of those once every thousand year’s occurrences?

Item 4 Addressed in the modifications section of the code.

This proposal tells you where you need a vapor retarder and not where you don’t.

**Cost Impact:** Will not increase the cost of construction

This proposal reduces regulations and will not increase code requirements.
2015 International Residential Code

R506.2.3 Vapor retarder. A 6-mil 10-mil (0.006 0.010 inch; 152 254 µm) polyethylene or approved vapor retarder conforming to ASTM E1745 with joints lapped not less than 6 inches (152 mm) shall be placed between the concrete floor slab and the base course or the prepared subgrade where no base course exists.

Exception: The vapor retarder is not required for the following:
1. Garages, utility buildings and other unheated accessory structures.
2. For unheated storage rooms having an area of less than 70 square feet (6.5 m²) and carports.
3. Driveways, walks, patios and other flatwork not likely to be enclosed and heated at a later date.
4. Where approved by the building official, based on local site conditions.

Reason: ACI 302.1R-04 "Guide for Concrete Floors and Slab Construction" highly recommends 10 mil vapor retarder in compliance with ASTM E1745 for concrete floors and slabs on grade (reference Chapter 3 Section 3.2.3). Where moisture sensitive flooring (carpet, wood, linoleum, etc...) will be installed over the concrete, a vapor retarder minimizes the transmission of moisture through the slab to the floor. The increased thickness provides additional resiliency during construction and increases the resistance to moisture transmission for the life of the building. The current exemption addresses situations where moisture sensitive flooring is unlikely to be installed.

Cost Impact: Will increase the cost of construction
The change in cost would be related to the required specification of the material and the thickness of the vapor retarder.
2015 International Residential Code

Revise as follows:

SECTION R507 EXTERIOR DECKS

R507.1 Decks. Wood-framed decks shall be in accordance with this section or Section R301 for For decks using materials and conditions not prescribed herein. Where supported by attachment in this section, refer to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads Section R301. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members connections to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

R507.3 R507.2 Plastic composite deck boards, stair treads, guards, or handrails. Plastic composite exterior deck boards, stair treads, guards and handrails shall comply with the requirements of ASTM D 7032 and the requirements of Section 507.3 507.2.

R507.3.1 R507.2.1 Labeling. Plastic composite deck boards and stair treads, or their packaging, shall bear a label that indicates compliance to ASTM D 7032 and includes the allowable load and maximum allowable span determined in accordance with ASTM D 7032. Plastic or composite handrails and guards, or their packaging, shall bear a label that indicates compliance to ASTM D 7032 and includes the maximum allowable span determined in accordance with ASTM D 7032.

R507.3.2 R507.2.2 Flame spread index. Plastic composite deck boards, stair treads, guards, and handrails shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E 84 or UL 723 with the test specimen remaining in place during the test.

Exception: Plastic composites determined to be noncombustible.

R507.3.3 R507.2.3 Decay resistance. Plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be decay resistant in accordance with ASTM D 7032.

R507.3.4 R507.2.4 Termite resistance. Where required by Section 318, plastic composite deck
boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be termite resistant in accordance with ASTM D 7032.

507.3.5 R507.2.5 Installation of plastic composites. Plastic composite deck boards, stair treads, guards and handrails shall be installed in accordance with this code and the manufacturer's instructions.

R507.3 Deck footings. Deck footings shall be sized to carry the imposed loads from the deck structure to the ground as shown in Figure R507.3. The footing depth shall be in accordance with Section R403.1.4.

R507.8 R507.4 Deck posts. For single-level wood-framed decks with beams sized in accordance with Table R507.6 R507.5, deck post size shall be in accordance with Table R507.8 R507.4.

<table>
<thead>
<tr>
<th>DECK POST SIZE</th>
<th>MAXIMUM HEIGHT(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 × 4</td>
<td>8 ft</td>
</tr>
<tr>
<td>4 × 6</td>
<td>8 ft</td>
</tr>
<tr>
<td>6 × 6</td>
<td>14 ft</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

\(^a\) Measured to the underside of the beam.
**R507.8.1** **R507.4.1** **Deck post to deck footing.** Posts shall bear on footings in accordance with Section R403 and Figure R507.8.1 **R507.3.** Posts shall be restrained to prevent lateral displacement at the bottom support. Such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers’ instructions or a minimum post embedment of 12 inches (305 mm) in surrounding soils or concrete piers.

**R507.6** **R507.5** **Deck Beams.** Maximum allowable spans for wood deck beams, as shown in Figure **R507.6** **R507.5,** shall be in accordance with Table **R507.6** **R507.5.** Beam plies shall be fastened with two rows of 10d (3-inch × 0.128-inch) nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Splices of multispans beams shall be located at interior post locations.

---

**TABLE R507.6** **R507.5**

**DECK BEAM SPAN LENGTHS** \(^a, b\) (ft. - in.)

<table>
<thead>
<tr>
<th>SPECIES (^c)</th>
<th>SIZE (^d)</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Southern pine</strong></td>
<td>2 – 2 × 6</td>
<td>6-11</td>
<td>5-11</td>
<td>5-4</td>
<td>4-10</td>
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<tr>
<td></td>
<td>2 – 2 × 8</td>
<td>8-9</td>
<td>7-7</td>
<td>6-9</td>
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<td>5-9</td>
<td>5-4</td>
<td>5-0</td>
</tr>
<tr>
<td></td>
<td>2 – 2 × 10</td>
<td>10-4</td>
<td>9-0</td>
<td>8-0</td>
<td>7-4</td>
<td>6-9</td>
<td>6-4</td>
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<tr>
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<td>2 – 2 × 12</td>
<td>12-2</td>
<td>10-7</td>
<td>9-5</td>
<td>8-7</td>
<td>8-0</td>
<td>7-6</td>
<td>7-0</td>
</tr>
<tr>
<td></td>
<td>3 – 2 × 6</td>
<td>8-2</td>
<td>7-5</td>
<td>6-8</td>
<td>6-1</td>
<td>5-8</td>
<td>5-3</td>
<td>5-0</td>
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<tr>
<td></td>
<td>3 – 2 × 8</td>
<td>10-10</td>
<td>9-6</td>
<td>8-6</td>
<td>7-9</td>
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<td>3 – 2 × 10</td>
<td>13-0</td>
<td>11-3</td>
<td>10-0</td>
<td>9-2</td>
<td>8-6</td>
<td>7-11</td>
<td>7-6</td>
</tr>
<tr>
<td></td>
<td>3 – 2 × 12</td>
<td>15-3</td>
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<td>11-10</td>
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<td>10-0</td>
<td>9-4</td>
<td>8-10</td>
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<tr>
<td></td>
<td>3 × 6 or 2 – 2 × 6</td>
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<td>4-2</td>
<td>3-10</td>
<td>3-6</td>
<td>3-1</td>
<td>2-9</td>
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<tr>
<td></td>
<td>3 × 8 or 2 – 2 × 8</td>
<td>6-10</td>
<td>5-11</td>
<td>5-4</td>
<td>4-10</td>
<td>4-6</td>
<td>4-1</td>
<td>3-8</td>
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<td></td>
<td>3 × 10 or 2 – 2 × 10</td>
<td>8-4</td>
<td>7-3</td>
<td>6-6</td>
<td>5-11</td>
<td>5-6</td>
<td>5-1</td>
<td>4-8</td>
</tr>
<tr>
<td></td>
<td>3 × 12 or 2 – 2 ×</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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\(^a\) Maximum allowable spans for wood deck beams, as shown in Figure R507.6 R507.5, shall be in accordance with Table R507.6 R507.5. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Splices of multispans beams shall be located at interior post locations.

\(^b\) Maximum allowable spans for wood deck beams, as shown in Figure R507.6 R507.5, shall be in accordance with Table R507.6 R507.5. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Splices of multispans beams shall be located at interior post locations.
<table>
<thead>
<tr>
<th></th>
<th>12</th>
<th>9-8</th>
<th>8-5</th>
<th>7-6</th>
<th>6-10</th>
<th>6-4</th>
<th>5-11</th>
<th>5-7</th>
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<tbody>
<tr>
<td>Douglas fir-larch, hem-fir, spruce-pine-fir, redwood, western cedars, ponderosa pine, red pine.</td>
<td>4 x 6</td>
<td>6-5</td>
<td>5-6</td>
<td>4-11</td>
<td>4-6</td>
<td>4-2</td>
<td>3-11</td>
<td>3-8</td>
</tr>
<tr>
<td></td>
<td>4 x 8</td>
<td>8-5</td>
<td>7-3</td>
<td>6-6</td>
<td>5-11</td>
<td>5-6</td>
<td>5-2</td>
<td>4-10</td>
</tr>
<tr>
<td></td>
<td>4 x 10</td>
<td>9-11</td>
<td>8-7</td>
<td>7-8</td>
<td>7-0</td>
<td>6-6</td>
<td>6-1</td>
<td>5-8</td>
</tr>
<tr>
<td></td>
<td>4 x 12</td>
<td>11-5</td>
<td>9-11</td>
<td>8-10</td>
<td>8-1</td>
<td>7-6</td>
<td>7-0</td>
<td>6-7</td>
</tr>
<tr>
<td></td>
<td>3 - 2 x 6</td>
<td>7-4</td>
<td>6-8</td>
<td>6-0</td>
<td>5-6</td>
<td>5-1</td>
<td>4-9</td>
<td>4-6</td>
</tr>
<tr>
<td></td>
<td>3 - 2 x 8</td>
<td>9-8</td>
<td>8-6</td>
<td>7-7</td>
<td>6-11</td>
<td>6-5</td>
<td>6-0</td>
<td>5-8</td>
</tr>
<tr>
<td></td>
<td>3 - 2 x 10</td>
<td>12-0</td>
<td>10-5</td>
<td>9-4</td>
<td>8-6</td>
<td>7-10</td>
<td>7-4</td>
<td>6-11</td>
</tr>
<tr>
<td></td>
<td>3 - 2 x 12</td>
<td>13-11</td>
<td>12-1</td>
<td>10-9</td>
<td>9-10</td>
<td>9-1</td>
<td>8-6</td>
<td>8-1</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.
b. Beams supporting deck joists from one side only.
c. No. 2 grade, wet service factor.
d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
e. Includes incising factor.
f. Northern species. Incising factor not included.

**FIGURE R507.6 R507.5**

**TYPICAL DECK BEAM SPANS**

**R507.7.1 R507.5.1 Deck post to deck beam.** Deck beams shall be attached to deck posts in accordance with Figure R507.7.1 R507.5.1 or by other equivalent means capable to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.

**Exception:** Where deck beams bear directly on footings in accordance with Section

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ICC COMMITTEE ACTION HEARINGS :: April, 2016

RB372
**R507.5 R507.6** Deck joists. Maximum allowable spans for wood deck joists, as shown in Figure R507.5 R507.6, shall be in accordance with Table R507.5 R507.6. Maximum allowable spacing for joists shall be limited by the decking material in accordance with Table R507.7. Deck joists shall be permitted to cantilever not greater than one-fourth of the actual, adjacent joist span.

**R507.5.1 R507.6.1** Lateral restraint at supports. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not less than (3) 10d (3-inch × 0.128-inch) nails or (3) No. 10 × 3-inch (76 mm) long wood screws.

**R507.7 R507.6.2** Deck joist and deck beam bearing. The ends of each joist and beam shall have not less than $1\frac{1}{2}$ inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Joists bearing on a beam shall be connected to the beam to resist lateral displacement.

**TABLE R507.5 R507.6**

DECK JOIST SPANS FOR COMMON LUMBER SPECIES\(^{f}\) (ft. - in.)

<table>
<thead>
<tr>
<th>SPECIES(^a)</th>
<th>SIZE</th>
<th>SPACING OF DECK JOISTS WITH NO CANTILEVER (^b) (inches)</th>
<th>SPACING OF DECK JOISTS WITH CANTILEVERS (^c, f) (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Southern pine</td>
<td>2 × 6</td>
<td>9-11</td>
<td>9-0</td>
</tr>
<tr>
<td></td>
<td>2 × 8</td>
<td>13-1</td>
<td>11-10</td>
</tr>
<tr>
<td></td>
<td>2 × 10</td>
<td>16-2</td>
<td>14-0</td>
</tr>
<tr>
<td></td>
<td>2 × 12</td>
<td>18-0</td>
<td>16-6</td>
</tr>
<tr>
<td>Douglas fir-larch(^d), hem-fir(^d), spruce-pine-fir(^d)</td>
<td>2 × 6</td>
<td>9-6</td>
<td>8-8</td>
</tr>
<tr>
<td></td>
<td>2 × 8</td>
<td>12-6</td>
<td>11-1</td>
</tr>
<tr>
<td></td>
<td>2 × 10</td>
<td>15-8</td>
<td>13-7</td>
</tr>
</tbody>
</table>

\(^{a}\) See Table R507.7 for joist hanger sizes.

\(^{b}\) Joists shall be supported by approved joist hangers.

\(^{c}\) Joists shall be supported by approved joist hangers.

\(^{d}\) See Table R507.7 for joist hanger sizes.

\(^{f}\) Joists shall be supported by approved joist hangers.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. No. 2 grade with wet service factor.
b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied to end.
d. Includes incising factor.
e. Northern species with no incising factor.
f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

R507.4 R507.7 Decking.
Maximum allowable spacing for joists supporting decking shall be in accordance with Table R507.4 R507.7. Wood decking shall be attached to each supporting member with not less than (2) 8d threaded nails or (2) No. 8 wood screws.

TABLE R507.4 R507.7
MAXIMUM JOIST SPACING

<table>
<thead>
<tr>
<th>MATERIAL TYPE AND NOMINAL SIZE</th>
<th>MAXIMUM ON-CENTER JOIST SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perpendicular to joist</td>
</tr>
<tr>
<td>1 1/4 -inch-thick wood</td>
<td>16 inches</td>
</tr>
<tr>
<td>2-inch-thick wood</td>
<td>24 inches</td>
</tr>
<tr>
<td>Plastic composite</td>
<td>In accordance with Section R507.2</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.
a. Maximum angle of 45 degrees from perpendicular for wood deck boards

R507.8 Vertical and lateral supports Where supported by attachment to an exterior wall,
decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. For decks with cantilevered framing members, connection to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting.

**R507.8.1 Vertical supports.** Vertical loads shall be transferred to band joists with ledgers in accordance with this section.

**R507.2.1 R507.8.1.1 Ledger details.** Deck ledgers installed in accordance with Section R507.2 shall be a minimum 2-inch by 8-inch (51 mm by 203 mm) nominal, pressure-preservative-treated southern pine, incised pressure-preservative-treated Hem-fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers installed in accordance with Section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

**R507.2.2 R507.8.1.2 Band joist details.** Band joists attached by a ledger in accordance with Section R507.2 shall be a minimum 2-inch-nominal (51 mm), solid-sawn, spruce-pine-fir lumber or a minimum 1-inch by 9\(\frac{1}{2}\)-inch (25 mm × 241 mm) dimensional, Douglas fir, laminated veneer lumber. Band joists attached by a ledger in accordance with Section R507.2 shall be fully supported by a wall or sill plate below.

**R507.2.3 R507.8.1.3 Ledger to band joist fastener details.** Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2 and Figures R507.2.1 and R507.8.1.3.

**R507.2.4 R507.8.2 Deck lateral load connection.** The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.3(1) or R507.2.3(2). Where the lateral load connection is provided in accordance with Figure R507.2.3(1), hold-down tension devices shall be installed in not less than two locations per deck, within 24 inches of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds (6672 N).

Where the lateral load connections are provided in accordance with Figure R507.2.3(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

**TABLE R507.2 R507.8.1.3(1)**

<table>
<thead>
<tr>
<th>JOIST SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
### TABLE R507.2.1 R507.8.1.3(2)

**PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS**

<table>
<thead>
<tr>
<th>CONNECTION DETAILS</th>
<th>6’ and less</th>
<th>6’1” to 8’</th>
<th>8’1” to 10’</th>
<th>10’1” to 12’</th>
<th>12’1” to 14’</th>
<th>14’1” to 16’</th>
<th>16’1” to 18’</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On-center spacing of fasteners</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2-inch diameter lag screw with 1/2-inch maximum sheathing c, d</td>
<td>30</td>
<td>23</td>
<td>18</td>
<td>15</td>
<td>13</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>1/2-inch diameter bolt with 1/2-inch maximum sheathing d</td>
<td>36</td>
<td>36</td>
<td>34</td>
<td>29</td>
<td>24</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>1/2-inch diameter bolt with 1-inch maximum sheathing e</td>
<td>36</td>
<td>36</td>
<td>29</td>
<td>24</td>
<td>21</td>
<td>18</td>
<td>16</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.

b. Snow load shall not be assumed to act concurrently with live load.

c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

d. Sheathing shall be wood structural panel or solid sawn lumber.

e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

### TABLE R507.8.1.3(2)

**MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS**

<table>
<thead>
<tr>
<th></th>
<th>TOP EDGE</th>
<th>BOTTOM EDGE</th>
<th>ENDS</th>
<th>ROW SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ledger a</td>
<td>2 inches</td>
<td>3/4 inch</td>
<td>2 inches</td>
<td>1 5/8 inches</td>
</tr>
<tr>
<td>Band Joist c</td>
<td>3/4 inch</td>
<td>2 inches</td>
<td>2 inches</td>
<td>1 5/8 inches</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.

a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1). R507.8.1.3(1).

b. Maximum 5 inches.
c. For engineered rim joists, the manufacturer's recommendations shall govern.

d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.8.1.3(1).

For SI: 1 inch = 25.4 mm.

(Portions of figure not shown remain unchanged)
FIGURE R507.2.3(2) R507.8.2(2)  
DECK ATTACHMENT FOR LATERAL LOADS  

(Portions of figure not shown remain unchanged)

FIGURE R507.2.3(1) R507.8.2(1)  
DECK ATTACHMENT FOR LATERAL LOADS  

(Portions of figure not shown remain unchanged)

Reason:  
WHAT: The entire section is reorganized without any technical changes, based on similar organization in the IRC, namely, starting at the footings and working upward.

WHY: The Deck Code Coalition (DCC) recognized that R507 was created in the 2012 IRC. Related pieces were plucked from the 2012 IRC and tacked on the end of 2015 R507 without any consideration of organization. Hence lateral connections precede decking which precedes deck joists, etc. This proposal sets the framework for the other code changes by the DCC and will make it easier for everyone to follow the deck construction sequentially.

This is how the pieces are relocated:
<table>
<thead>
<tr>
<th>New Section</th>
<th>Old Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>R507.1</td>
<td>Decks</td>
</tr>
<tr>
<td>R507.2</td>
<td>Plastic composite deck boards, stair treads, guards, or handrails. Renumbering</td>
</tr>
<tr>
<td>R507.2.1</td>
<td>Labeling</td>
</tr>
<tr>
<td>R507.2.2</td>
<td>Flame spread index. Renumbering</td>
</tr>
<tr>
<td>R507.2.3</td>
<td>Decay resistance Renumbering</td>
</tr>
<tr>
<td>R507.2.4</td>
<td>Tensile resistance Renumbering</td>
</tr>
<tr>
<td>R507.2.5</td>
<td>Installation of plastic composites Renumbering</td>
</tr>
<tr>
<td>R507.3</td>
<td>Deck footings new changing language</td>
</tr>
<tr>
<td>R507.4</td>
<td>Deck posts Renumbering</td>
</tr>
<tr>
<td>R507.5</td>
<td>Deck beams Renumbering</td>
</tr>
<tr>
<td>R507.5.1</td>
<td>Deck post to deck beam Renumbering</td>
</tr>
<tr>
<td>R507.6</td>
<td>Deck joists Renumbering and non technical cross reference added</td>
</tr>
<tr>
<td>R507.7</td>
<td>Decking Renumbering</td>
</tr>
<tr>
<td>R507.8</td>
<td>Vertical and lateral supports Renumbering and relocated parts of this section</td>
</tr>
<tr>
<td>R507.8.1</td>
<td>Vertical supports. New changing language</td>
</tr>
<tr>
<td>R507.8.1.1</td>
<td>Ledger details Renumbering and merge sections</td>
</tr>
<tr>
<td>R507.8.1.2</td>
<td>Band joint details Renumbering</td>
</tr>
<tr>
<td>R507.8.1.3</td>
<td>Ledger to band joint fastener details Renumbering</td>
</tr>
<tr>
<td>R507.8.2</td>
<td>Lateral connections Renumbering</td>
</tr>
<tr>
<td>R507.8.3</td>
<td>Plastic composite deck boards, stair treads, guards, or handrails.</td>
</tr>
<tr>
<td>R507.8.4</td>
<td>Deck post to deck footing Renumbering</td>
</tr>
<tr>
<td>R507.8.5</td>
<td>Deck beams Renumbering</td>
</tr>
<tr>
<td>R507.8.6</td>
<td>Deck post to deck beam Renumbering</td>
</tr>
<tr>
<td>R507.8.7</td>
<td>Deck joists Renumbering and non technical cross reference added</td>
</tr>
<tr>
<td>R507.8.8</td>
<td>Decking Renumbering</td>
</tr>
<tr>
<td>R507.8.9</td>
<td>Vertical and lateral supports Renumbering and relocated parts of this section</td>
</tr>
<tr>
<td>R507.8.10</td>
<td>Vertical supports. New changing language</td>
</tr>
<tr>
<td>R507.8.1.1</td>
<td>Ledger details Renumbering and merge sections</td>
</tr>
<tr>
<td>R507.8.1.2</td>
<td>Band joint details Renumbering</td>
</tr>
<tr>
<td>R507.8.1.3</td>
<td>Ledger to band joint fastener details Renumbering</td>
</tr>
<tr>
<td>R507.8.2</td>
<td>Lateral connections Renumbering</td>
</tr>
</tbody>
</table>
Cost Impact: Will not increase the cost of construction
There should be no cost impact, as this is purely a non-technical code change.
R507.1 Decks. Wood-framed
Light-framed decks shall be constructed in accordance with this section or designed in accordance with Section R301 for materials and conditions not prescribed herein. Where supported by attachment to an exterior wall joists or beams are cantilevered, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered supporting framing members connections to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

R507.1.1 Freestanding decks. Freestanding decks shall be self-supporting and constructed to provide a complete load path to transfer both vertical and lateral loads to their foundation. The lateral resistance shall be permitted to be provided in accordance with accepted engineering practice.

R507.1.2 Decks attached to a structure. Decks which are not freestanding shall be attached to a structure that provides a complete load path for both vertical and lateral loads in accordance with Section R507.9. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where connections to the supporting structure, as required in Section R507.9, cannot be verified, decks shall be freestanding in accordance with Section R507.1.1.

R507.2 Materials. Materials used for the construction of decks shall comply with this section.

R507.2.1 Wood materials. All wood materials shall be No.2 grade or better lumber.
preservative-treated in accordance with Section R317 or approved, naturally durable lumber, and 
termite protected where required in accordance with Section R318. Where design in accordance 
with Section R301 is provided, all wood structural members shall be designed using the wet 
service factor defined in AWC NDS. All cuts, notches, and drilled holes of preservative-treated 
wood members shall be treated in accordance with Section R317.1.1. All preservative-treated 
wood products in contact with the ground shall be labeled for such usage.

R507.2.1.1 Engineered wood products. Engineered wood products shall be in accordance with 
Section R502.

R507.3 Plastic composite deck boards, stair treads, guards, or handrails. Plastic 
composite exterior deck boards, stair treads, guards and handrails shall comply with the 
requirements of ASTM D 7032 and the requirements of Section 507.3.

R507.3.1 Labeling. Plastic composite deck boards and stair treads, or their 
packaging, shall bear a label that indicates compliance to ASTM D 7032 and includes the 
allowable load and maximum allowable span determined in accordance with ASTM D 7032. 
Plastic or composite handrails and guards, or their packaging, shall bear a label that indicates 
compliance to ASTM D 7032 and includes the maximum allowable span determined in 
accordance with ASTM D 7032.

R507.3.2 Flame spread index. Plastic composite deck boards, stair treads, guards, 
and handrails shall exhibit a flame spread index not exceeding 200 when tested in accordance 
with ASTM E 84 or UL 723 with the test specimen remaining in place during the test.

Exception: Plastic composites determined to be noncombustible.

R507.3.3 Decay resistance. Plastic composite deck boards, stair treads, guards and 
handrails containing wood, cellulosic or other biodegradable materials shall be decay resistant in 
accordance with ASTM D 7032.

R507.3.4 Termite resistance. Where required by Section 318, plastic composite 
deck boards, stair treads, guards and handrails containing wood, cellulosic or other 
biodegradable materials shall be termite resistant in accordance with ASTM D 7032.

507.3.5 Installation of plastic composites. Plastic composite deck boards, stair 
treads, guards and handrails shall be installed in accordance with this code and the 
manufacturer's instructions.

R507.2.3 Fasteners and connectors Metal fasteners and connectors used for all decks shall 
be in accordance with Section R317.3 and Table R507.2.3
<table>
<thead>
<tr>
<th>ITEM</th>
<th>BASIC FASTENER REQUIREMENTS</th>
<th>ALTERNATE MATERIALS, COATINGS, AND FINISHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nails and timber rivets</td>
<td>In accordance with ASTM F1667</td>
<td>Stainless steel, silicon bronze, or copper</td>
</tr>
<tr>
<td>Bolts <strong>c</strong> and lag screws <strong>d</strong> (including nuts and washers)</td>
<td>In accordance with ASTM A307 (bolts), ASTM A563 (nuts), ASTM F844 (washers)</td>
<td>Stainless steel, silicon bronze, or copper</td>
</tr>
<tr>
<td>Metal connectors</td>
<td>Per manufacturer's specifications</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>

### Notes:
- **a,b**
- **c**
- **d**
**R507.2.4 Flashing.** Flashing shall be corrosion-resistant metal of minimum nominal 0.019 – inch thickness or approved non-metallic material that is compatible with the substrate of the structure and the decking materials.

**R507.2.5 Alternate materials.** Alternative materials, including glass and metals shall be permitted.

**R507.3 Footings.** Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads according to Section R301.

**R507.3.1 Minimum size.** The minimum size of concrete footings shall be in accordance with Table R507.3.1, based on the tributary area and allowable soil bearing pressure in accordance with Table R401.4.1.

**R507.3.2 Minimum depth.** Deck footings shall extend below the frost line specified in Table R301.2(1) in accordance with Section R403.1.4.1.

**Exceptions:**
1. Freestanding decks need not be provided with footings that extend below the frost line.
2. Freestanding decks consisting of joists directly supported on grade over their entire length.
3. Freestanding decks that meet all of the following criteria:
   a. The joists bear directly on precast concrete pier blocks at grade without support by beams or posts.
   b. The area of the deck does not exceed 200 square feet (18.9 m²).
   c. The walking surface is not more than 20 inches (616 mm) above grade at any point within 36 inches (914 mm) measured horizontally from the edge.

---

**TABLE R507.3.1**
**MINIMUM FOOTING SIZE FOR DECKS**

<table>
<thead>
<tr>
<th>MINIMUM FOOTING SIZE FOR DECKS</th>
<th>a,c,d (sqft)</th>
</tr>
</thead>
</table>

---

a. Alternative materials, coatings and finishes shall be permitted.
b. Fasteners and connectors exposed to salt water or located within 300 feet of a salt water shoreline shall be stainless steel.
c. Holes for bolts shall be drilled a minimum 1/32" and a maximum 1/16" larger than the bolt.
d. Lag screws ½" and larger shall be predrilled to avoid wood splitting per National Design Specification (NDS) for Wood Construction.
e. Stainless steel driven fasteners shall be in accordance with ASTM F 1667.
<table>
<thead>
<tr>
<th>LIVE OR GROUND SNOW LOAD b (psf)</th>
<th>TRIBUTARY AREA (sq ft)</th>
<th>1500 Diameter of a square footing (in)</th>
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<th>2000 Diameter of a round footing (in)</th>
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</table>

ICC COMMITTEE ACTION HEARINGS :: April, 2016

RB385
a. Interpolation permitted, extrapolation not permitted
b. Based on highest load case: Dead + Live or Dead + Snow
c. Assumes minimum square footing to be 12" x 12" x 6" for 6x6 post.
d. If the support is a brick or cmu pier, the footing shall have a minimum 2" projection on all sides.
e. Area, in square feet, of deck surface supported by post and footing.

R507.8 R507.4 Deck posts. For single-level wood-framed decks with beams sized in accordance with Table R507.6, deck post size shall be in accordance with Table R507.8 R507.4.

R507.8.1 R507.4.1 Deck post to deck footing connection. Posts shall bear on footings in accordance with Section R403 and Figure R507.8.1. Posts shall be restrained to prevent lateral displacement at the bottom support. Such Where posts bear on concrete footings in accordance with Section R403 and Figure R507.4.1, such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers’ instructions or a minimum post embedment of 12 inches (305 mm) in surrounding soils or concrete piers. Other footing systems shall be permitted. Exception: Where expansive, compressible, shifting or other questionable soils are present, surrounding soils shall not be relied upon for lateral support.

FIGURE R507.8.4 R507.4.1
TYPICAL DECK POSTS TO DECK FOOTINGS

(Existing code figure not shown for clarity)
**TABLE R507.8 R507.4**

**DECK POST HEIGHT**

<table>
<thead>
<tr>
<th>DECK POST SIZE</th>
<th>MAXIMUM HEIGHT a, b</th>
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<tbody>
<tr>
<td>4 × 4</td>
<td>6'-9&quot; c</td>
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<tr>
<td>4 × 6</td>
<td>8'</td>
</tr>
<tr>
<td>6 × 6</td>
<td>14'</td>
</tr>
<tr>
<td>8 × 8</td>
<td>14'</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

a. — Measured to the underside of the beam.

b. Based on 40 psf live load.

c. Maximum permitted height is 8' for one-ply and two-ply beams. 6'-9" is the maximum permitted
**R507.6 R507.5 Deck Beams beams.** Maximum allowable spans for wood deck beams, as shown in Figure R507.6 R507.5, shall be in accordance with Table R507.6 R507.5. Beam plies shall be fastened with two rows of 10d (3-inch × 0.128-inch) nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual adjacent beam span. Splices Deck beams of multispans beams other materials shall be located at interior post locations permitted when designed in accordance with accepted engineering practice.

### TABLE R507.6 R507.5
**DECK BEAM SPAN LENGTHSa, b, g (ft. - in.)**

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<thead>
<tr>
<th>SPECIESc</th>
<th>SIZEd</th>
<th>DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)</th>
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a. 

b. 

g.
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<th>2 x 8 or 3 x 8</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11-5</td>
<td>9-11</td>
<td>8-10</td>
<td>8-1</td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.

b. Beams supporting deck joists from one side only.

c. No. 2 grade, wet service factor.

d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

e. Includes incising factor.

f. Northern species. Incising factor not included.

g. Beam cantilevers are limited to adjacent beam span divided by 4.

**FIGURE R507.6 R507.5**

TYPICAL DECK BEAM SPANS

*(Existing code figure not shown for clarity)*
**R507.7 R507.5.1 Deck joist and deck beam bearing.** The ends of each joist and beam shall have not less than $1\frac{1}{2}$ inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Joists Where multispans beams bear on intermediate posts, each ply must have full bearing on a beam shall be connected to the beam to resist lateral displacement post in accordance with Figures R507.5.1(1) and R507.5.1(2).

**R507.7.1 R507.5.2 Deck post to deck beam connection.** Deck beams shall be attached to wood deck posts in a manner capable of resisting vertical and horizontal applied loads. Connections shall be accordance with Figure R507.7.1 or by other equivalent means capable to resist lateral displacement Figures R507.5.1 (1) and R507.5.1 (2). Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.

*Exception:* Where deck beams bear directly on footings in accordance with Section R507.8.1.

Deck beams shall be attached to concrete or masonry piers in a manner capable of resisting
vertical and horizontal applied loads. Other attachment methods shall be permitted.

**FIGURE R507.7.1 R507.5.1(1)**

**TYPICAL DECK BEAM TO DECK POST CONNECTION**

(Existing code figure not shown for clarity)

For SI: 1 inch = 25.4 mm.

**FIGURE R507.5.1(2)**

**NOTCHED POST-TO-BEAM CONNECTION**
R507.5 R507.6 Deck joists. Maximum allowable spans for wood deck joists, as shown in Figure R507.5 R507.6, shall be in accordance with Table R507.5 R507.6. The maximum joist spacing shall be permitted to be limited by the decking material in accordance with Table R507.7. The maximum joist cantilever not greater than one-fourth of shall be limited to the actual adjacent joist span divided by 4 or the maximum cantilever length specified in Table R507.6, whichever is less.

R507.6.1 Deck joist bearing. The ends of joists shall have not less than $1\frac{1}{2}$ inches (38mm) of bearing on wood or metal and not less than 3 inches on concrete or masonry over its entire width. Joists bearing on top of a multi-ply beam or ledger shall be fastened in accordance with Table R602.3(1). Joists bearing on top of a single ply beam or ledger shall be attached by a mechanical connector. Joist framing into the side of a beam or ledger board shall be supported by approved joist hangers.

R507.5.1 R507.6.2 Lateral restraint at supports Deck joist lateral support. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint
is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not less than (3) 10d (3-inch × 0.128-inch) nails or (3) No. 10 × 3-inch (76 mm) long wood screws.

### TABLE R507.5 R507.6
**DECK JOIST SPANS FOR COMMON LUMBER SPECIES**

<table>
<thead>
<tr>
<th>SPECIES&lt;sup&gt;a&lt;/sup&gt;</th>
<th>SIZE</th>
<th>MAXIMUM SPACING OF DECK JOISTS WITH NO CANTILEVER&lt;sup&gt;b, c&lt;/sup&gt; (inches)</th>
<th>MAXIMUM SPACING OF DECK JOISTS WITH CANTILEVERS&lt;sup&gt;f&lt;/sup&gt; (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td><strong>Southern pine</strong></td>
<td>2 × 6</td>
<td>9-11</td>
<td>9-0</td>
</tr>
<tr>
<td></td>
<td>2 × 8</td>
<td>13-1</td>
<td>11-10</td>
</tr>
<tr>
<td></td>
<td>2 × 10</td>
<td>16-2</td>
<td>14-0</td>
</tr>
<tr>
<td></td>
<td>2 × 12</td>
<td>18-0</td>
<td>16-6</td>
</tr>
<tr>
<td><strong>Douglas fir</strong>, hem-&lt;sup&gt;d&lt;/sup&gt;, hem-fir&lt;sup&gt;d&lt;/sup&gt;, spruce-&lt;sup&gt;d&lt;/sup&gt;, pine-fir&lt;sup&gt;d&lt;/sup&gt;</td>
<td>2 × 6</td>
<td>9-6</td>
<td>8-8</td>
</tr>
<tr>
<td></td>
<td>2 × 8</td>
<td>12-6</td>
<td>11-1</td>
</tr>
<tr>
<td></td>
<td>2 × 10</td>
<td>15-8</td>
<td>13-7</td>
</tr>
<tr>
<td></td>
<td>2 × 12</td>
<td>18-0</td>
<td>15-9</td>
</tr>
<tr>
<td><strong>Redwood, western cedars, ponderosa pine&lt;sup&gt;e&lt;/sup&gt;, red pine&lt;sup&gt;e&lt;/sup&gt;</strong></td>
<td>2 × 6</td>
<td>8-10</td>
<td>8-0</td>
</tr>
<tr>
<td></td>
<td>2 × 8</td>
<td>11-8</td>
<td>10-7</td>
</tr>
<tr>
<td></td>
<td>2 × 10</td>
<td>14-11</td>
<td>13-0</td>
</tr>
<tr>
<td></td>
<td>2 × 12</td>
<td>17-5</td>
<td>15-1</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. No. 2 grade with wet service factor.

b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied to end.

d. Includes incising factor.

e. Northern species with no incising factor

f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

FIGURE R507.5 R507.6
TYPICAL DECK JOIST SPANS

(Existing code figure not shown for clarity)

R507.4 R507.7 Decking. Maximum allowable spacing for joists supporting decking shall be in accordance with Table R507.4 R507.7. Wood decking shall be attached to each supporting member with not less than (2) 8d threaded nails or (2) No. 8 wood screws. Other types of decking or fastener systems shall be permitted in accordance with manufacturer's installation requirements.

TABLE R507.4 R507.7
MAXIMUM JOIST SPACING FOR DECKING
<table>
<thead>
<tr>
<th>MATERIAL TYPE AND NOMINAL SIZE</th>
<th>MAXIMUM ON-CENTER JOIST SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perpendicular to joist</td>
</tr>
<tr>
<td>1 1/4 -inch-thick wood</td>
<td>16 inches</td>
</tr>
<tr>
<td>2-inch-thick wood</td>
<td>24 inches</td>
</tr>
<tr>
<td>Plastic composite</td>
<td>In accordance with Section R507.3</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

a. Maximum angle of 45 degrees from perpendicular for wood deck boards

**R507.8 Guards.** Guards shall comply with Section R312.1.

**R507.8.1 Guard systems.** Guards shall be constructed to meet the requirements of Table R301.5.

**R507.8.1.1 Guard post attachment.** Guard post attachment shall be permitted to be constructed in accordance with Figure R507.8.1.1 (1) - R507.8.1.1(5) or in accordance with approved manufacturer's installation instructions.

**R507.8.1.2 Other guard systems.** Other approved guard systems installed in accordance with manufacturer's instructions shall be permitted.
FIGURE R507.8.1.2(2)
INTERIOR MOUNTED GUARD POSTS

36" TALL GUARD,
b. MINIMUM 2X8 DECK FRAMING.
c. JOISTS @ 16" O.C. MAX SPACING.
d. DECKING 1-1/2" MAX THICKNESS.
e. ALL WOOD HEM-FIR (SG=0.43) OR GREATER, EXCEPT DECKING.
f. ALL NAILS ARE COMMON NAILS.
g. SCREWS OF EQUAL OR GREATER CAPACITY MAY REPLACE NAILS.
h. LAG SCREWS ON FACE OF RIM BOARD, BEAM OR RIM JOIST MAY BE COUNTERSUNK SUCH THAT HEADS MAY BE FLUSH WITH WOOD MEMBER.
i. PRE-DRILL LAG SCREWS PER NDS.

RIM DETAIL

SIDE WITH WOOD POST

CORNER

RIM WITH POST BETWEEN JOISTS (BEAM - SIMILAR)

RIM WITH POST AT JOISTS (BEAM - SIMILAR)
FIGURE R507.8.1.2(3)
EXTERIOR MOUNTED GUARD POSTS WITH HARDWARE

CORNER FACING RIM OR BEAM

SIDE

CORNER

RIM WITH POST BETWEEN JOISTS (BEAM - SIMILAR)

RIM WITH POST AT JOIST (BEAM - SIMILAR)

FOOTNOTES:
a. DETAILS ARE BASED ON 36" TALL GUARD.
b. MINIMUM 2x8 DECK FRAMING.
c. JOISTS @ 16" O.C. MAX SPACING.
d. DECKING 1-1/2" MAX THICKNESS.
e. ALL WOOD HEM-FIR (SG<0.43) OR GREATER, EXCEPT DECKING.
f. ALL NAILS ARE COMMON NAILS.
g. SCREWS OF EQUAL OR GREATER CAPACITY MAY REPLACE NAILS.
h. LAG SCREWS ON FACE OF RIM BOARD, BEAM OR RIM JOIST MAY BE COUNTERSUNK SUCH THAT HEADS MAY BE FLUSH WITH WOOD MEMBER.
i. PRE-DRILL LAG SCREWS PER NDS.

RB398
FIGURE R507.8.1.2(4)
INTERIOR MOUNTED GUARD POSTS WITH HARDWARE

1. MINIMUM 4x4 WOOD GUARD POST WITH NO NOTCHES, ATTACHED TO JOIST OR RIM

ICC COMMITTEE ACTION HEARINGS ::: April, 2016
RB399
WITH (2) 3/4" DIAMETER THROUGH BOLTS AND 2" DIA. FENDER WASHERS, OR EQUIVALENT MANUFACTURED POST AND ATTACHMENT HARDWARE

2x VERTICAL BLOCKING, FULL DEPTH

(1) 3/8" DIA LAG SCREW AND (5) 16d NAILS 
(OR 20d NAILS THRU 2-PLY BEAM INTO JOIST), MINIMUM 2-1/2" EMBEDMENT FOR LAG SCREW

HOLD-DOWN WITH 1800# ALLOWABLE CAPACITY
(MANUFACTURER'S FASTENERS NOT SHOWN)

X INDICATES THE NUMBER OF 10d NAILS

FOOTNOTES:

a. DETAILS ARE BASED ON 36" TALL GUARD,
b. MINIMUM 2X8 DECK FRAMING,
c. JOISTS @ 16" O.C. MAX SPACING,
d. DECKING 1-1/2" MAX THICKNESS,
e. ALL WOOD HEM-FIR (SG=0.43) OR GREATER, EXCEPT DECKING,
f. ALL NAILS ARE COMMON NAILS,
g. SCREWS OF EQUAL OR GREATER CAPACITY MAY REPLACE NAILS,
h. LAG SCREWS ON FACE OF RIM BOARD, BEAM OR RIM JOIST MAY BE COUNTERSUNK SUCH THAT HEADS MAY BE FLUSH WITH WOOD MEMBER,
i. PRE-DRILL LAG SCREWS PER NDS.

NOTE: GUARD POST CAN BE MOUNTED ANYWHERE BETWEEN JOISTS
FIGURE R507.8.1.2(5)
TOP MOUNTED GUARD POSTS

NOTE:
MANUFACTURER'S
BASE FASTENER MUST ENGAGE
FULL DEPTH OF BLOCKS WITH
MIN 1/4" DIA BOLTS AND
2" DIAMETER WASHERS

1. TOP MOUNTED GUARD
POST INSTALLED PER
MANUFACTURER'S
INSTRUCTIONS.
MOUNTED TO DECK
FRAMING TYPICAL

2. (2) 2x6 FLAT (SHOWN) or (2)
4x4 FLAT SIDE BY SIDE OR (1)
4x8 FLAT BLOCKING,

3. 2x VERTICAL BLOCKING,
FULL DEPTH

4. (1) 3/8" DIA LAG SCREW
AND (5) 16d NAILS
(OR 20d NAILS THRU 2-PLY
BEAM INTO JOIST), MINIMUM
2-1/2" EMBEDMENT FOR LAG
SCREW

5. (4) 10d NAILS
FOR ATTACHING DECKING
TO BLOCKING AT POST
CONNECTION

X INDICATES THE NUMBER
OF 16d NAILS THROUGH
1-PLY RIM, JOIST OR
BLOCKING (OR 20d NAILS
THROUGH 2-PLY BEAM)

FOOTNOTES:
a. DETAILS ARE BASED ON
36" TALL GUARD.
b. MINIMUM 2X8 DECK FRAMING.
c. JOISTS @ 16" O.C. MAX SPACING.
d. DECKING 1-1/2" MAX THICKNESS.
e. ALL WOOD HEM-FIR (SG=0.43)
OR GREATER, EXCEPT DECKING
f. ALL NAILS ARE COMMON NAILS

Screws of equal or greater
capacity may replace nails.
h. LAG SCREWS ON FACE OF RIM
BOARD, BEAM OR RIM JOIST
MAY BE COUNTERSUNK SUCH
THAT HEADS MAY BE FLUSH
WITH WOOD MEMBER.
i. PRE-DRILL LAG SCREWS PER
NDS
j. INCREASE BLOCKING DEPTH TO
ACCOMMODATE FULL
EMBEDMENT OF
MANUFACTURER'S REQUIRED
CONNECTION HARDWARE.
k. MANUFACTURER'S FASTENER
SHALL ENGAGE BLOCKING OR
FRAMING MEMBERS FOR
PULLOUT.
R507.2 Deck ledger connection to Vertical and lateral supports at band joist. Deck ledger connections to band joists shall be in accordance with this section, Tables R507.2 and R507.2.1, and Figures R507.2.1(1) and R507.2.1(2). For other grades, species, connection details and loading conditions, deck ledger connections shall be designed in accordance with Section R301.

R507.9.1 Vertical supports. Vertical loads shall be transferred to the band joists with ledgers in accordance with this section.

R507.2.1 Ledger details. Deck ledgers installed in accordance with Section R507.2 shall be a minimum 2-inch by 8-inch (51 mm by 203 mm) nominal, pressure-preservative-treated southern pine, incised pressure-preservative-treated Hem-fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers installed in accordance with Section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

R507.2.2 Band joist details. Band joists attached by supporting a ledger in accordance with Section R507.2 shall be a minimum 2-inch-nominal (51 mm), solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch by 9 1/2-inch (25 mm × 241 mm) dimensional, Douglas fir, laminated veneer or better lumber. Band joists attached by a ledger in accordance with Section R507.2 shall be bear fully supported by a wall or sill plate below on the primary structure capable of supporting all required loads.

R507.2.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2.1 and Figures R507.2.1(1) and R507.2.1(2).

R507.9.1.4 Alternate ledger details. Alternate framing configurations supporting a ledger constructed to meet the load requirements of Section R301.5 shall be permitted.

**TABLE R507.2 R507.9.1.3(1)**

DECK LEDGER CONNECTION TO BAND JOISTa, b (Deck live load = 40 psf, deck dead load = 10 psf, snow load ≤ 40 psf)

<table>
<thead>
<tr>
<th>CONNECTION DETAILS</th>
<th>JOIST SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6' and less</td>
</tr>
</tbody>
</table>

ICC COMMITTEE ACTION HEARINGS ::: April, 2016  
RB402
On-center spacing of fasteners

<table>
<thead>
<tr>
<th>1/2-inch diameter lag screw with 1/2-inch maximum sheathing (c, d)</th>
<th>30</th>
<th>23</th>
<th>18</th>
<th>15</th>
<th>13</th>
<th>11</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2-inch diameter bolt with 1/2-inch maximum sheathing (d)</td>
<td>36</td>
<td>36</td>
<td>34</td>
<td>29</td>
<td>24</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>1/2-inch diameter bolt with 1-inch maximum sheathing (e)</td>
<td>36</td>
<td>36</td>
<td>29</td>
<td>24</td>
<td>21</td>
<td>18</td>
<td>16</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.

b. Snow load shall not be assumed to act concurrently with live load.

c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

d. Sheathing shall be wood structural panel or solid sawn lumber.

e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

### TABLE R507.2.1 R507.9.1.3(2)

**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 \(a\) | 2 inches \(d\) | 3/4 inch | 2 inches \(b\) | 1 5/8 inches \(b\) |
| Band Joist \(c\) | 3/4 inch | 2 inches | 2 inches \(b\) | 1 5/8 inches \(b\) |

For SI: 1 inch = 25.4 mm.

a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).

b. Maximum 5 inches.

c. For engineered rim joists, the manufacturer’s recommendations shall govern.

d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.2.1(1).
**R507.2.4 R507.2.4** Deck lateral load Lateral connection. The lateral load connection required by Section R507.1

Lateral loads shall be permitted transferred to be in accordance with Figure R507.2.3(1) the ground or R507.2.3(2) to a structure capable of transmitting them to the ground.

Where the lateral load connection is provided in accordance with Figure R507.2.3(1) R507.9.2(1), hold-down tension devices shall be installed in not less than two locations per deck, within 24 inches of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds (6672 N). Where the lateral load connections are provided in accordance with Figure R507.2.3(2) R507.9.2(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

**FIGURE R507.2.3(1) R507.9.2(1)**
DECK ATTACHMENT FOR LATERAL LOADS

*(Portions of figure not shown remain unchanged)*

For SI: 1 inch = 25.4 mm.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
ASTM A563-15 Standard Specification for Carbon and Alloy Steel Nuts
ASTM F844-07a Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use

Reason:
WHAT: This code change implements all of the code changes that the Deck Code Coalition (DCC) has proposed. If this proposals gets approved, the DCC will request that the other fifteen proposals be denied.

WHY: The Deck Code Coalition (DCC) has worked diligently over the past three years trying to get a complete, prescriptive deck section into the IRC.

The first thing the committee wanted to do was reorganize the section from "bottom up", i.e. from the footings up to the guard posts, similar to the way other parts of the IRC are organized.

The second thing the DCC wanted to do was be sure that the parts of Section R507 made engineering sense and provided a degree of safety that in the past was unworthy of the confidence.

We attempted to offer flexibility by allowing new and innovative products for both the homeowner as well as the custom deck designer.

The DCC has put this code change together so the building officials, homeowners and the contractor can build a safe and lasting deck.

The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country.

Our goals are threefold:

1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.
2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.
3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.
4.
**Cost Impact:** Will not increase the cost of construction
This code change is not intended to raise the cost of deck construction.
While some aspects may appear to be adding time and materials to the deck construction, the DCC believes that the perception is based on construction techniques and materials that were not capable of meeting the loads from R301.5.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, ASTM A123-15, ASTM A563.15 and ASTM F844-07a, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
RB200-16

IRC: R507, R507.5.1(2) (New), R507.6, R507.7, R507.7.1.

Proponent: Charles Bajnai, representing Deck Code Coalition and Chesterfield County, VA; and North American Deck and Railing Association (NADRA) (bajnaic@chesterfield.gov)

2015 International Residential Code

SECTION R507 EXTERIOR DECKS

R507.6 R507.5 Deck Beams. Maximum allowable spans for wood deck beams, as shown in Figure R507.6 R507.5, shall be in accordance with Table R507.6 R507.5. Beam plies shall be fastened with two rows of 10d (3-inch × 0.128-inch) nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual adjacent beam span. Splices of multi-span beams other materials shall be located at interior post locations permitted when designed in accordance with accepted engineering practice.

R507.7 R507.5.1 Deck joist and deck beam bearing. The ends of each joist and beam shall have not less than 1 1/2 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Joists Where multispans beam bear on intermediate posts, each ply must have full bearing on a beam shall be connected to the beam to resist lateral displacement post in accordance with Figures R507.5.1(1) and R507.5.1(2).

R507.7.1 R507.5.2 Deck post to deck beam connection. Deck beams shall be attached to wood deck posts in a manner capable of resisting vertical and horizontal applied loads. Connections shall be in accordance with Figure R507.7.1 or by other equivalent means capable to resist lateral displacement Figures R507.5.1(1) and R507.5.1(2). Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.

Exception: Where deck beams bear directly on footings in accordance with Section R507.8.1.

Deck beams shall be attached to concrete or masonry piers in a manner capable of resisting vertical and horizontal applied loads. Other attachment methods shall be permitted.

TABLE R507.6 R507.5
DECK BEAM SPAN LENGTHS a, b, c (ft. - in.)

<table>
<thead>
<tr>
<th>SPECIES c</th>
<th>SIZE d</th>
<th>DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>1- 2 x 6</td>
<td>4-11</td>
<td>4-0</td>
</tr>
<tr>
<td>1- 2 x 8</td>
<td>5-11</td>
<td>5-1</td>
</tr>
<tr>
<td>Southern pine</td>
<td>1-2 x 10</td>
<td>7-0</td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>-----</td>
</tr>
<tr>
<td>1-2 x 12</td>
<td>8-3</td>
<td>7-1</td>
</tr>
<tr>
<td>2-2 x 6</td>
<td>6-11</td>
<td>5-11</td>
</tr>
<tr>
<td>2-2 x 8</td>
<td>8-9</td>
<td>7-7</td>
</tr>
<tr>
<td>2-2 x 10</td>
<td>10-4</td>
<td>9-0</td>
</tr>
<tr>
<td>2-2 x 12</td>
<td>12-2</td>
<td>10-7</td>
</tr>
<tr>
<td>3-2 x 6</td>
<td>8-2</td>
<td>7-5</td>
</tr>
<tr>
<td>3-2 x 8</td>
<td>10-10</td>
<td>9-6</td>
</tr>
<tr>
<td>3-2 x 10</td>
<td>13-0</td>
<td>11-3</td>
</tr>
<tr>
<td>3-2 x 12</td>
<td>15-3</td>
<td>13-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Douglas fir-larch§, hem-fir§, spruce-pine-fir§, redwood, western cedars, ponderosa pine¶, red pinef</th>
<th>3 x 6 or 2-2 x 6</th>
<th>5-5</th>
<th>4-8</th>
<th>4-2</th>
<th>3-10</th>
<th>3-6</th>
<th>3-1</th>
<th>2-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 x 8 or 2-2 x 8</td>
<td>6-10</td>
<td>5-11</td>
<td>5-4</td>
<td>4-10</td>
<td>4-6</td>
<td>4-1</td>
<td>3-8</td>
<td></td>
</tr>
<tr>
<td>3 x 10 or 2-2 x 10</td>
<td>8-4</td>
<td>7-3</td>
<td>6-6</td>
<td>5-11</td>
<td>5-6</td>
<td>5-1</td>
<td>4-8</td>
<td></td>
</tr>
<tr>
<td>3 x 12 or 2-2 x 12</td>
<td>9-8</td>
<td>8-5</td>
<td>7-6</td>
<td>6-10</td>
<td>6-4</td>
<td>5-11</td>
<td>5-7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Douglas fir-larch§, hem-fir§, spruce-pine-fir§, redwood, western cedars, ponderosa pine¶, red pinef</th>
<th>4 x 6</th>
<th>6-5</th>
<th>5-6</th>
<th>4-11</th>
<th>4-6</th>
<th>4-2</th>
<th>3-11</th>
<th>3-8</th>
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<tbody>
<tr>
<td>4 x 8</td>
<td>8-5</td>
<td>7-3</td>
<td>6-6</td>
<td>5-11</td>
<td>5-6</td>
<td>5-2</td>
<td>4-10</td>
<td></td>
</tr>
<tr>
<td>4 x 10</td>
<td>9-11</td>
<td>8-7</td>
<td>7-8</td>
<td>7-0</td>
<td>6-6</td>
<td>6-1</td>
<td>5-8</td>
<td></td>
</tr>
<tr>
<td>4 x 12</td>
<td>11-5</td>
<td>9-11</td>
<td>8-10</td>
<td>8-1</td>
<td>7-6</td>
<td>7-0</td>
<td>6-7</td>
<td></td>
</tr>
</tbody>
</table>

| Douglas fir-larch§, hem-fir§, spruce-pine-fir§, redwood, western cedars, ponderosa pine¶, red pinef | 3-2 x 6 | 7-4 | 6-8 | 6-0 | 5-6  | 5-1 | 4-9 | 4-6 |

ICC COMMITTEE ACTION HEARINGS :::: April, 2016
RB409
3 – 2 × 8 | 9-8 | 8-6 | 7-7 | 6-11 | 6-5 | 6-0 | 5-8  
3 – 2 × 10 | 12-0 | 10-5 | 9-4 | 8-6 | 7-10 | 7-4 | 6-11  
3 – 2 × 12 | 13-11 | 12-1 | 10-9 | 9-10 | 9-1 | 8-6 | 8-1  

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.

b. Beams supporting deck joists from one side only.

c. No. 2 grade, wet service factor.

d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

e. Includes incising factor.

f. Northern species. Incising factor not included.

g. Beam cantilevers are limited to adjacent beam span divided by 4.
For SI: 1 inch = 25.4 mm.
FIGURE R507.5.1(2)
NOTCHED POST-TO-BEAM CONNECTION

MINIMUM 2"

SINGLE PLY BEAM

MINIMUM 2 1/2"

MULTIPLY BEAM

(2) 3/8" DIAMETER THROUGH-BOLTS OR APPROVED EQUIVALENT CONNECTOR

POST NOTCH FOR FULL BEAM BEARING

BEAM SPLICE

≥ 2"

< 5"

≥ 2 1/4"

≥ 3/4"

≥ 2 1/2" MIN.
FIGURE R507.6 R507.5
TYPICAL DECK BEAM SPANS

DROPPED BEAM

FLUSH BEAM
Reason:

WHAT: This code proposal amends these things:

1. It moves together sections R507.6, R507.7 and R507.1 into a new section BEAMS,
2. It provides better figures to show how beam splices are to occur over posts,
3. It revises the beam span figure by showing a beam spanning multiple deck posts.
4. And the beam table was expanded to cover single ply beams used for small decks, porches or landings.

WHY: The Deck Code Coalition (DCC) thought the current wording needed improvement. Also the figures needed refinement to reflect the wording changes and cover more options. The committee wanted to add flexibility to the beam table and allow for single ply beams.

The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country.

Our goals are threefold:

1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.
2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.
3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

Cost Impact: Will not increase the cost of construction
There is no cost impact. It may even save a few dollars by allowing single ply beams.
2015 International Residential Code
SECTION R507 EXTERIOR DECKS

R507.1 Decks. Wood-framed
Light-framed decks shall be constructed in accordance with this section or designed in accordance with Section R301 for materials and conditions not prescribed herein. Where supported by attachment to an exterior wall, joists or beams are cantilevered, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads.

Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered supporting framing members connections to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full live load loads specified in Table R301.5 acting on the cantilevered portion of the deck.

R507.1.1 Freestanding decks. Freestanding decks shall be self-supporting and constructed to provide a complete load path to transfer both vertical and lateral loads to their foundation. The lateral resistance shall be permitted to be designed in accordance with accepted engineering practice.

R507.1.2 Decks attached to another structure. Decks which are not freestanding shall be attached to a structure that provides a complete load path for both vertical and lateral loads in accordance with Section R507.9. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where connections to the supporting structure cannot be verified, decks shall be freestanding in accordance with Section R507.1.1.

R507.5 Deck joists.

Maximum allowable spans for wood deck joists, as shown in Figure R507.5, shall be in accordance with Table R507.5. Deck joists shall be permitted to cantilever not greater than one-fourth of the actual, adjacent joist span.
**Reason:**

**WHAT:** This code proposal offers new language to specifically allow freestanding decks. This code proposal establishes a differentiation between freestanding and ledgered decks.

**WHY:** Freestanding decks are popular across the country for lots of different applications, yet there has never been any design considerations provided in the IRC. The Deck Code Coalition (DCC) realized that in the absence of prescriptive specifications, many jurisdictions have deferred to DCA-6 – but DCA-6 only handles "ledgered decks". This code change provides prescriptive design requirements for freestanding decks.
The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country.

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3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

Cost Impact: Will not increase the cost of construction
There is no cost impact by offering freestanding decks which have been built for millenium.
2015 International Residential Code

SECTION R507 EXTERIOR DECKS

R507.2 Materials Materials used for the construction of decks shall comply with this section.

R507.2.1 Wood materials. All wood materials shall be No.2 grade or better lumber, preservative-treated in accordance with Section R317 or approved, naturally durable lumber, and termite protected where required in accordance with Section R318. Where design in accordance with Section R301 is provided, all wood structural members shall be designed using the wet service factor defined in AWC NDS. All cuts, notches, and drilled holes of preservative treated wood members shall be treated in accordance with Section R317.1.1. All preservative-treated wood products in contact with the ground shall be labeled for such usage.

R507.2.1.1 Engineered wood products. Engineered wood products shall be in accordance with Section R502.

R507.3 Plastic composite deck boards, stair treads, guards, or handrails. Plastic composite exterior deck boards, stair treads, guards and handrails shall comply with the requirements of ASTM D 7032 and the requirements of Section 507.3.

R507.3.1 Labeling. Plastic composite deck boards and stair treads, or their packaging, shall bear a label that indicates compliance to ASTM D 7032 and includes the allowable load and maximum allowable span determined in accordance with ASTM D 7032. Plastic or composite handrails and guards, or their packaging, shall bear a label that indicates compliance to ASTM D 7032 and includes the maximum allowable span determined in accordance with ASTM D 7032.

R507.3.2 Flame spread index. Plastic composite deck boards, stair treads, guards, and handrails shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E 84 or UL 723 with the test specimen remaining in place during the test.

Exception: Plastic composites determined to be noncombustible.

R507.3.3 Decay resistance. Plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be decay resistant in accordance with ASTM D 7032.
**R507.3.4** **R507.2.2.4 Termite resistance.** Where required by Section 318, plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be termite resistant in accordance with ASTM D 7032.

**R507.2.2.5** **Installation of plastic composites.** Plastic composite deck boards, stair treads, guards and handrails shall be installed in accordance with this code and the manufacturer’s instructions.

**R507.2.3** **Fasteners and connectors.** Metal fasteners and connectors used for all decks shall be in accordance with Section R317.3 and Table R507.2.3.

**TABLE R507.2.3**

**FASTENER AND CONNECTOR SPECIFICATIONS FOR DECKS**<sup>a,b</sup>

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MATERIAL</th>
<th>MINIMUM FINISH/COATING</th>
<th>ALTERNATE FINISH/COATING&lt;sup&gt;e&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nails and timber rivets</td>
<td>In accordance with ASTM F1667</td>
<td>Hot-dipped galvanized per ASTM A 153</td>
<td>Stainless steel; silicon bronze, or copper</td>
</tr>
<tr>
<td>Bolts&lt;sup&gt;c&lt;/sup&gt;</td>
<td>In accordance with ASTM A 307 (bolts), ASTM A 563 (nuts), ASTM F 844 (washers)</td>
<td>Hot-dipped galvanized per ASTM A153 Class C (Class D for 3/8” diameter and less) or Mechanically galvanized per ASTM B 695, Class 55 or 410 stainless steel</td>
<td>Stainless steel; silicon bronze, or copper</td>
</tr>
<tr>
<td>Lag screws&lt;sup&gt;d&lt;/sup&gt; (including nuts and washers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal connectors</td>
<td>Per manufacturer’s specification</td>
<td>ASTM A 653 type G185 zinc coated galvanized steel or Post hot-dipped galvanized per ASTM A 123 providing a minimum average coating weight of 2.0 oz./ft² (total both sides)</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>

**NOTES**

a. Alternate materials, coatings and finishes shall be permitted.
b. Fasteners and connectors exposed to salt water or located within 300 feet of a salt water shoreline shall be stainless steel.
c. Holes for bolts shall be drilled a minimum 1/32" and a maximum 1/16" larger than the bolt.
d. Lag screws ½" and larger shall be predrilled to avoid wood splitting per National Design Specification (NDS) for Wood Construction.
e. Stainless steel driven fasteners shall be in accordance with ASTM F 1667.

**R507.2.4 Flashing.** Flashing shall be corrosion-resistant metal of minimum nominal 0.019 inch thickness or approved non-metallic material that is compatible with the substrate of the structure and the decking materials.

**R507.2.5 Alternate materials.** Alternate materials, including glass and metals shall be permitted.

---

**Reason:**

**WHAT:** This code change proposal provides design specifications for deck construction materials frequently found in deck construction.

**WHY:** The Deck Code Coalition (DCC) realized that the only materials specifically described in R507 was for plastic composite materials. They thought it was important to include design specifications for wood, fasteners and other materials.

Footnote b reflects the requirement from FEMA Technical bulletin 8.
Alternative materials, including glass and metals, shall be permitted.
The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country.

Our goals are threefold:

1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.
2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.
3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

Cost Impact: Will not increase the cost of construction
There is no cost impact. These materials are already required by other sections of the IRC for connecting members outdoors.
PROPOSED LANGUAGE

SECTION R507 EXTERIOR DECKS

R507.2 Deck ledger connection to Vertical and lateral supports at band joist. Deck ledger connections to band joists shall be in accordance with this section, Tables R507.2 and R507.2.1, and Figures R507.2.1(1) and R507.2.1(2). For other grades, species, connection details and loading conditions, deck ledger connections shall be designed in accordance with Section R301.

R507.9 Vertical supports. Vertical loads shall be transferred to the band joists with ledgers in accordance with this section.

R507.9.1 Ledger details. Deck ledgers installed in accordance with Section R507.2 shall be a minimum 2-inch by 8-inch (51 mm by 203 mm) nominal, pressure-preservative-treated southern pine, incised pressure-preservative-treated Hem-fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers installed in accordance with Section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

R507.9.1.1 Band joist details. Band joists attached by supporting a ledger in accordance with Section R507.2 shall be a minimum 2-inch nominal (51 mm), solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch by 9 1/2-inch (25 mm × 241 mm) dimensional, Douglas fir or better lumber, laminated veneer lumber. Band joists attached by a ledger in accordance with Section R507.2 shall be fully supported by a wall or sill plate below on the primary structure capable of supporting all required loads.

R507.9.1.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 R507.9.1.3(1) shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2.1 R507.9.1.3(2) and Figures R507.2.1(1) R507.9.1.3(1) and R507.2.1(2) R507.9.1.3(2).

R507.9.1.4 Alternate ledger details. Alternate framing configurations supporting a ledger constructed to meet the load requirements of Section R301.5 shall be permitted.
TABLE R507.2 R507.9.1.3(1)
DECK LEDGER CONNECTION TO BAND JOIST\textsuperscript{a, b} (Deck live load = 40 psf, deck dead load = 10 psf, snow load ≤ 40 psf)

(\textit{Portions of table not shown remain unchanged})

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

\begin{itemize}
\item[a.] Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
\item[b.] Snow load shall not be assumed to act concurrently with live load.
\item[c.] The tip of the lag screw shall fully extend beyond the inside face of the band joist.
\item[d.] Sheathing shall be wood structural panel or solid sawn lumber.
\item[e.] Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to \(1/2\)-inch thickness of stacked washers shall be permitted to substitute for up to \(1/2\) inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.
\end{itemize}

TABLE R507.2.1 R507.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

(\textit{Portions of table not shown remain unchanged})

For SI: 1 inch = 25.4 mm.

\begin{itemize}
\item[a.] Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).
\item[b.] Maximum 5 inches.
\item[c.] For engineered rim joists, the manufacturer's recommendations shall govern.
\item[d.] The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.2.1(1).
\end{itemize}

R507.2.4 R507.9.2 Deck lateral load Lateral connection. The lateral load connection required by Section R507.1
Lateral loads shall be permitted transferred to be in accordance with Figure R507.2.3(1) the
ground or R507.2.3(2) to a structure capable of transmitting them to the ground.

Where the lateral load connection is provided in accordance with Figure R507.2.3(1) R507.9.2(1), hold-down tension devices shall be installed in not less than two locations per deck, within 24 inches of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds (6672 N).

Where the lateral load connections are provided in accordance with Figure R507.2.3(2) R507.9.2(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

**FIGURE R507.2.1(1) R507.9.1.3(1)**
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

*(Portions of figure not shown remain unchanged)*

For SI: 1 inch = 25.4 mm.

**FIGURE R507.2.1(2) R507.9.1.3(2)**
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS

*(Portions of figure not shown remain unchanged)*

**FIGURE R507.2.3(1) R507.9.2(1)**
DECK ATTACHMENT FOR LATERAL LOADS

*(Portions of figure not shown remain unchanged)*

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

**FIGURE R507.2.3(2) R507.9.2(2)**
DECK ATTACHMENT FOR LATERAL LOADS

*(Portions of figure not shown remain unchanged)*

**Reason:**

**WHAT:** This code change moves the deck ledger attachment and lateral resistance details from Section R507.2 to the end of the section.
**WHY:** The Deck Code Coalition (DCC) thought that the organization of the section would make more sense if it followed the same logical organization as the IRC in whole, namely from the ground up. We moved the ledger attachment details to the end of the section similar to the way wall bracing in R602.10 has supports at the end of the section.

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Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements

---

**Cost Impact:** Will not increase the cost of construction.

There is no cost impact. This is a non-technical code change - it only moved the requirements from R507.2 to the end of the section.
2015 International Residential Code

Revise as follows:

R507.2.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel or equivalent and shall be installed in accordance with Table R507.2.1 and Figures R507.2.1(1) and R507.2.1(2).

Reason: There is a new ICC approved acceptance criteria, AC 257, which is a new method to evaluate alternate corrosion resistance mechanisms for fasteners used in wood construction where hot dipped galvanized is used as a benchmark performance. These alternate coatings that pass testing for the appropriate conditions should be allowed to be used in lieu of hot dip galvanized or stainless steel.

Cost Impact: Will not increase the cost of construction

This proposal is to allow new ICC approved acceptance criteria for alternate corrosion resistance in addition to the existing hot dipped galvanized or stainless steel used for fasteners.
**R507.3 Footings.** Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads according to Section R301.

**R507.3.1 Minimum size.** The minimum size of concrete footings shall be in based on the tributary area and allowable soil bearing pressure in accordance with Table R401.4.1.

**R507.3.2 Minimum depth.** Deck footings shall extend below the frost line specified in Table R301.2(1) in accordance with Section R403.1.4.1.

**Exception:**
Freestanding decks consisting of joists directly supported on grade over their entire length

---

**Reason:**

**WHAT:** This code change provides an exception for "freestanding wood patios" from having to comply with the requirement in R403 footings below frost line. It will allow a freestanding deck to be totally supported on the ground without any footings.

**WHY:** The Deck Code Coalition (DCC) did not foresee any safety concerns and thought it was reasonable to add language to affirm that freestanding wood patios do not need to have footings below the frost line. The code change complies with the requirement of R403.1.4.1, Exception #3: "Decks not supported by a dwelling need not be provided with footings that extend below the frost line."
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3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

**Cost Impact:** Will not increase the cost of construction

There is no cost impact. The code already provides an exception for footings below the frost line in Section R403.1.4.1 for freestanding decks.
RB206-16

IRC: R507, R507.3 (New), R507.3.1 (New), R507.3.2 (New).

Proponent: Charles Bajnai, representing Deck Code Coalition and Chesterfield County, VA; and North American Deck and Railing Association (NADRA) (bajnaic@chesterfield.gov)

2015 International Residential Code

SECTION R507 EXTERIOR DECKS

R507.3 Footings. Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads according to Section R301.

R507.3.1 Minimum size. The minimum size of concrete footings shall be based on the tributary area and allowable soil bearing pressure in accordance with Table R401.4.1.

R507.3.2 Minimum depth. Deck footings shall extend below the frost line specified in Table R301.2 in accordance with Section R403.1.4.1.

Exceptions:
Freestanding decks that meet all of the following criteria:
- a. The joists bear directly on precast concrete pier blocks at grade without support by beams or posts,
- b. The area of the deck does not exceed 200 square feet (18.9 m²),
- c. The walking surface is not more than 20 inches (616 mm) above grade at any point within 36 inches (914 mm) measured horizontally from the edge.

Reason:
WHAT: This code change provides the specifications for when a freestanding deck can be constructed on precast concrete pier blocks at grade.

WHY: The Deck Code Coalition (DCC) thought it was reasonable to add language to affirm that freestanding decks constructed on precast concrete pier blocks should be allowed. These types of blocks are popular because they are low cost, easy to use and readily available at home improvement stores around the country. The committee did not foresee any safety concerns based on the limitations specified.
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Cost Impact: Will not increase the cost of construction
There is no cost impact. The builder was always required to provide deck footings in accordance with Section 4. In fact it might actually reduce the cost by giving prescriptive acceptance for footings on concrete pier blocks.
2015 International Residential Code

SECTION R507 EXTERIOR DECKS

R507.3 FOOTINGS. Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads according to Section R301.

R507.3.1 Minimum size. The minimum size of concrete footings shall be in accordance with Table R507.3.1, based on the tributary area and allowable soil bearing pressure in accordance with Table R401.4.1.

R507.3.2 Minimum depth. Deck footings shall extend below the frost line specified in Table R301.2(1) in accordance with Section R403.1.4.1.

<table>
<thead>
<tr>
<th>TRIBUTARY AREA (sq ft)</th>
<th>1500</th>
<th>2000</th>
<th>2500</th>
<th>≥3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIVE OR GROUND SNOW LOAD (psf)</td>
<td>Diameter of a round footing (in)</td>
<td>Thickness of a round footing (in)</td>
<td>Diameter of a square footing (in)</td>
<td>Thickness of a square footing (in)</td>
</tr>
<tr>
<td>20</td>
<td>12</td>
<td>14</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>40</td>
<td>14</td>
<td>16</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>60</td>
<td>17</td>
<td>19</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
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<td>21</td>
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<td>140</td>
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<td>120</td>
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<td>12</td>
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<tr>
<td></td>
<td>140</td>
<td>33</td>
<td>37</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>35</td>
<td>40</td>
<td>15</td>
</tr>
</tbody>
</table>

a. Interpolation permitted, extrapolation not permitted  
b. Based on highest load case: Dead + Live or Dead + Snow  
c. Assumes minimum square footing to be 12" x 12" x 6" for 6x6 post.  
d. If the support is a brick or cmu pier, the footing shall have a minimum 2" projection on all sides.  
e. Area, in square feet, of deck surface supported by post and footing.
**Reason:**

**WHAT:** This code change provides prescriptive language and a table for determining the minimum size and depth of deck footings based on tributary area, live load and soil bearing pressure. It provides the size based on either square or cylindrical footings.

**WHY:** The current code does not address footing size and depth. The information has to be gleaned out of Chapters 3 and 4. The Deck Code Coalition (DCC) thought a prescriptive table would be easier for deck builders – especially for homeowners who would not know how to calculate the size based on live load and soil's load bearing pressure.

**Example:**

Based on a typical 12’x 12” deck with two posts away from the house and a 40 psf live/snow load, and 2000 psf soil bearing pressure:

- Tributary area = \( \frac{1}{4} \times 12' \times 12' = 36 \text{ sqft.} @ 2000 \text{ psf} \)
- Table says footing to be 12” x 12” x 6” (square) or 14” diameter (cylinder)

The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country.

Our goals are threefold:

1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.
2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.
3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.
<table>
<thead>
<tr>
<th>LIVE or GROUND GROUP LOAD (psf)</th>
<th>MINIMUM FOOTING SIZE for DECKS (sqft)</th>
<th>BEARING CAPACITY (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPICAL AREA (sqft)</td>
<td>2000</td>
<td>5000</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cost Impact: Will not increase the cost of construction
If deck footings were correctly sized in the past, there will not be a cost increase based on this table.
2015 International Residential Code

SECTION R507 EXTERIOR DECKS

R507.3 Footings. Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads according to Section R301.

R507.3.1 Minimum size. The minimum size of concrete footings shall be in based on the tributary area and allowable soil bearing pressure in accordance with Table R401.4.1.

R507.3.2 Minimum depth. Deck footings shall extend below the frost line specified in Table R301.2(1) in accordance with Section R403.1.4.1.

Exception: Freestanding decks need not be provided with footings that extend below the frost line.

Reason:

WHAT: This code change provides prescriptive language for where the minimum size and depth of deck footings can be found, namely in Chapter 4.

It also copies an exception from R403.1.4, that says freestanding decks, i.e. "Decks not supported by a dwelling" do not require the footings to be below the frost line.

WHY: The Deck Code Coalition (DCC) thought the deck builder should know where to look for footing size and depth information. The DCC thought it was important to have all of the deck related information in R507.

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2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.
3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.
**Cost Impact:** Will not increase the cost of construction

There will not be a cost impact. This code change does not alter the way deck footings have been sized under the current code.
RB209-16
IRC: R507, R507.4.
Proponent: Charles Bajnai, representing Deck Code Coalition and Chesterfield County, VA; and North American Deck and Railing Association (NADRA) (bajnaic@chesterfield.gov)

2015 International Residential Code
SECTION R507 EXTERIOR DECKS

R507.4 R507.7 Decking. Maximum allowable spacing for joists supporting decking shall be in accordance with Table R507.4 R507.7. Wood decking shall be attached to each supporting member with not less than (2) 8d threaded nails or (2) No. 8 wood screws. Other types of decking or fastener systems shall be permitted in accordance with manufacturer's installation requirements.

**TABLE R507.4 R507.7**
MAXIMUM JOIST SPACING FOR DECKING

<table>
<thead>
<tr>
<th>DECKING MATERIAL TYPE AND NOMINAL SIZE</th>
<th>MAXIMUM ON-CENTER JOIST SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Decking perpendicular to joist</td>
</tr>
<tr>
<td>1 1/4 -inch-thick wood</td>
<td>16 inches</td>
</tr>
<tr>
<td>2-inch-thick wood</td>
<td>24 inches</td>
</tr>
<tr>
<td>Plastic composite</td>
<td>In accordance with Section R507.3</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 305.8 mm, 1 degree = 0.01745 rad.

<sup>a</sup> Maximum angle of 45 degrees from perpendicular for wood deck boards

**Reason:**
**WHAT:** This code change modifies the decking text to permit custom decking materials and custom fasteners.

**WHY:** The Deck Code Coalition (DCC) thought it was imperative to permit all of the new decking materials being developed over the past few years. Also the market has seen many new fasteners and fastening systems being developed.
The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country.

Our goals are threefold:

1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.

2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.

3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

Cost Impact: Will not increase the cost of construction
There is no cost impact. It may even save a bit by allowing proprietary fastening systems.

RB209-16 : R507.4-
BAJN/A11690
**2015 International Residential Code**

**SECTION R507 EXTERIOR DECKS**

**R507.5** *Deck joists.* Maximum allowable spans for wood deck joists, as shown in Figure **R507.5 R507.6,** shall be in accordance with Table **R507.5 R507.6.** Deck joists. The maximum joist spacing shall be permitted to be limited by the decking material in accordance with Table **R507.4.** The maximum joist cantilever not greater than one-fourth of shall be limited to the actual, adjacent joist span divided by 4 or the maximum cantilever length specified in Table **R507.6,** whichever is less.

**R507.7** *Deck joist and deck beam bearing.* The ends of each joist and beam shall have not less than $1\frac{1}{2}$ inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the over its entire width. Joists bearing on top of the a multi-ply beam or ledger shall be fastened in accordance with Table **R602.3(1).** Joists bearing on top of a single ply beam or ledger shall be attached by a mechanical connector. Joist framing into the side of a beam or ledger board or beam shall be supported by approved joist hangers. Joists bearing on a beam shall be connected to the beam to resist lateral displacement.

**R507.5.1** *Lateral Deck joist lateral restraint at supports.* Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not less than (3) 10d (3-inch × 0.128-inch) nails or (3) No. 10 × 3-inch (76 mm) long wood screws.

### TABLE R507.5 R507.6

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>SIZE</th>
<th>ALLOWABLE JOIST SPAN</th>
<th>MAXIMUM CANTILEVER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(inches)</td>
<td>(inches)</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

**icc COMMITTEE ACTION HEARINGS :::: April, 2016**
<table>
<thead>
<tr>
<th></th>
<th>2 × 6</th>
<th>9-11</th>
<th>9-0</th>
<th>7-7</th>
<th>1-3</th>
<th>1-4</th>
<th>1-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern pine</td>
<td>2 × 6</td>
<td>2 × 8</td>
<td>13-1</td>
<td>11-10</td>
<td>9-8</td>
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<td>2-3</td>
</tr>
<tr>
<td></td>
<td>2 × 10</td>
<td>16-2</td>
<td>14-0</td>
<td>11-5</td>
<td>3-4</td>
<td>3-6</td>
<td>2-10</td>
</tr>
<tr>
<td></td>
<td>2 × 12</td>
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<td>16-6</td>
<td>13-6</td>
<td>4-6</td>
<td>4-2</td>
<td>3-4</td>
</tr>
<tr>
<td>Douglas fir-,</td>
<td>2 × 6</td>
<td>2 × 8</td>
<td>9-6</td>
<td>8-8</td>
<td>7-2</td>
<td>1-2</td>
<td>1-3</td>
</tr>
<tr>
<td>larch&lt;sup&gt;d&lt;/sup&gt;, hem-fir&lt;sup&gt;d&lt;/sup&gt;</td>
<td>2 × 10</td>
<td>12-6</td>
<td>11-1</td>
<td>9-1</td>
<td>1-11</td>
<td>2-1</td>
<td>2-3</td>
</tr>
<tr>
<td>spruce-pine-fir&lt;sup&gt;d&lt;/sup&gt;</td>
<td>2 × 10</td>
<td>15-8</td>
<td>13-7</td>
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<td>15-9</td>
<td>12-10</td>
<td>4-6</td>
<td>3-11</td>
<td>3-3</td>
</tr>
<tr>
<td>Redwood,</td>
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<td>2 × 8</td>
<td>8-10</td>
<td>8-0</td>
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<td>1-0</td>
<td>1-1</td>
</tr>
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<td>western cedars,</td>
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<td>2 × 10</td>
<td>11-8</td>
<td>10-7</td>
<td>8-8</td>
<td>1-8</td>
<td>1-10</td>
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<tr>
<td>ponderosa</td>
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<td>13-0</td>
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<td>2-10</td>
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<tr>
<td>pine&lt;sup&gt;e&lt;/sup&gt;, red pine&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>17-5</td>
<td>15-1</td>
<td>12-4</td>
<td>3-10</td>
<td>3-9</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. No. 2 grade with wet service factor.
b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied to end.
d. Includes incising factor.
e. Northern species with no incising factor
f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

**FIGURE R507.5 R507.6**
**TYPICAL DECK JOIST SPANS**
Reason:

**WHAT:** This code change
1. Modifies the joist text, and
2. Replaces the figure, and
3. Amends the table.

**WHY:** The Deck Code Coalition (DCC) wanted to make several changes to this part of the code. They include:
1. The way cantilever lengths were displayed in the table. The current table is difficult to understand, and this revision more clearly explains the two limitations, namely cantilevers are limited to joist span divided by 4 or the
lengths in the table, whichever is the lessor.

2. The figure was changed because the committee thought it was worthwhile to include freestanding decks in the picture, and show lateral support over the beams.

3. Splitting the beam and joist text that currently are in the same paragraph (R507.7.) regarding support and lateral restraint. The beam part of this was done by a different code submittal; this code change is for the joists.

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3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.
Cost Impact: Will not increase the cost of construction
There is no cost impact. It could allow for longer cantilevers in some situations.
2015 International Residential Code

**R507.8 Guards.** Guards shall comply with Section R312.1

**R507.8.1 Guard systems.** Guards shall be constructed to meet the requirements of Table R301.5.

**R507.8.1.1 Guard post attachment.** Guard post attachment shall be permitted to be constructed in accordance with Figure R507.8.1.1 (1) through R507.8.1.1(5) or in accordance with approved manufacturer's installation instructions.

**R507.8.1.2 Other guard systems.** Other approved guard systems installed in accordance with manufacturer's instructions shall be permitted.
MINIMUM 4x4 WOOD GUARD POST WITH NO NOTCHES, ATTACHED TO JOIST OR RI WITH (2) ²" DIAMETER THROUGH BOLTS AND 2" DIA. FENDER WASHERS, OR EQUIVALENT MANUFACTURED POST AN ATTACHMENT HARDWARE

4x4 BLOCKING, MINIMUM

2x VERTICAL BLOCKING, FULL DEPTH

(1) 3/8" DIA LAG SCREW AND (5) 16d NAILS (OR 26d NAILS THRU 2-Ply BEAM INTO JOIST), MINIMUM 2-1/2" EMBEDMENT FOR LAG SCREW

X INDICATES THE NUMBER OF 16d NAILS

FOOTNOTES:

a. DETAILS ARE BASED ON 36" TALL GUARD.
b. MINIMUM 2x8 DECK FRAMING.
c. JOISTS @ 16" O.C. MAX SPACING
d. DECKING 1-1/2" MAX THICKNESS
e. ALL WOOD HEM-FIR (SO=0.43) OR GREATER, EXCEPT DECKING
f. ALL NAILS ARE COMMON NAILS,
g. SCREWS OF EQUAL OR GREATER CAPACITY MAY REPLACE NAILS,
h. LAG SCREWS ON FACE OF RIM BOARD, BEAM OR RIM JOIST MAY BE COUNTERSUNK SUCH THAT HEADS MAY BE FLUSH WITH WOOD MEMBER.
i. PRE-DRILL LAG SCREWS PER NDS.
FIGURE R507.8.1.1(2)
INTERIOR MOUNTED GUARD POSTS

RIM AND SIDE DETAIL

CORNER FACING SIDE JOIST

CORNER FACING RIM OR BEAM

SIDE

1. MINIMUM 4x4 WOOD GUARD POST WITH NO NOTCHES, ATTACHED TO JOIST OR RIM WITH (2) 3/8" DIAMETER THROUGH BOLTS AND 2" DIA. FENDER WASHERS, OR EQUIVALENT MANUFACTURED POST AND ATTACHMENT HARDWARE

2. 4x4 BLOCKING, MINIMUM

3. 2x VERTICAL BLOCKING, FULL DEPTH

4. (1) 3/8" DIA LAG SCREW AND (5) 16d NAILS (OR 20d NAILS THRU 2-Ply BEAM INTO JOIST), MINIMUM 2-1/2" EMBEDMENT FOR LAG SCREW

5. HOLD-DOWN WITH 1800# ALLOWABLE CAPACITY (MANUFACTURER'S FASTENERS NOT SHOWN)

X INDICATES THE NUMBER OF 16d NAILS THROUGH 1-Ply RIM

X INDICATES THE NUMBER OF 10d NAILS

FOOTNOTES:

a. DETAILS ARE BASED ON 36" TALL GUARD.
b. MINIMUM 2X8 DECK FRAMING.
c. JOISTS @ 16" O.C. MAX SPACING.
d. DECKING 1-1/2" MAX THICKNESS.
e. ALL WOOD HEM-FIR (SG=0.43) OR GREATER, EXCEPT DECKING.
f. ALL NAILS ARE COMMON NAILS.
g. SCREWS OF EQUAL OR GREATER CAPACITY MAY REPLACE NAILS.
h. LAG SCREWS ON FACE OF RIM BOARD, BEAM OR RIM JOIST MAY BE COUNTERSUNK SUCH THAT HEADS MAY BE FLUSH WITH WOOD MEMBER.
i. PRE-DRILL LAG SCREWS PER NDS.

NOTE: GUARD POST CAN BE MOUNTED ANYWHERE BETWEEN JOISTS
FIGURE R507.8.1.1(3)
EXTERIOR MOUNTED GUARD POSTS WITH HARDWARE

RIM AND SIDE DETAIL

CORNER FACING SIDE JOIST

OPTIONAL RIM DETAIL

SIDE

MINIMUM 4x4 WOOD GUARD POST WITH NO NOTCHES, ATTACHED TO JOIST OR RIM WITH (2) 3/8" DIAMETER THROUGH BOLTS AND 2" DIA. FENDER WASHERS, OR EQUIVALENT MANUFACTURED POST AND ATTACHMENT HARDWARE

2x VERTICAL BLOCKING, FULL DEPTH

(1) 3/8" DIA LAG SCREW AND (5) 16d NAILS (OR 20G NAILS THRU 2-PLY BEAM INTO JOIST), MINIMUM 2-1/2" EMBEDMENT FOR LAG SCREW

HOLD-DOWN WITH 1800# ALLOWABLE CAPACITY (FASTENERS NOT SHOWN)

FOOTNOTES:

a. DETAILS ARE BASED ON 36" TALL GUARD,
b. MINIMUM 2X8 DECK FRAMING,
c. JOISTS @ 16" O.C. MAX SPACING,
d. DECKING 1-1/2" MAX THICKNESS,
e. ALL WOOD HEM-FIR (SG=0.43) OR GREATER, EXCEPT DECKING
f. ALL NAILS ARE COMMON NAIL;
g. SCREWS OF EQUAL OR GREATER CAPACITY MAY REPLACE NAIL
h. LAG SCREWS ON FACE OF RIM BOARD, BEAM OR RIM JOIST MAY BE COUNTERSUNK SUCH THAT HEADS MAY BE FLUSH WITH WOOD MEMBER
i. PRE-DRILL LAG SCREWS PER NDS.

NOTE: GUARD POST CAN BE MOUNTED ANYWHERE BETWEEN JOISTS

RIM WITH POST BETWEEN JOISTS (BEAM - SIMILAR)

RIM WITH POST AT JOIST (BEAM - SIMILAR)
FIGURE R507.8.1.1(4)
INTERIOR MOUNTED GUARD POSTS WITH HARDWARE

MINIMUM 4x4 WOOD GUARD POST WITH NO NOTCHES, ATTACHED TO JOIST OR RIM WITH (2) 3/8" DIAMETER THROUGH BOLTS AND 2" DIA. FENDER WASHERS, OR EQUIVALENT MANUFACTURED POST AND ATTACHMENT HARDWARE

2x VERTICAL BLOCKING, FULL DEPTH

(1) 3/8" DIA LAG SCREW AND (5) 16d NAILS (OR 20d NAILS THRU 2-Ply BEAM INTO JOIST). MINIMUM 2-1/2" EMBEDMENT FOR LAG SCREW

HOLD-DOWN WITH 1800# ALLOWABLE CAPACITY (MANUFACTURER'S FASTENERS NOT SHOWN)

X INDICATES THE NUMBER OF 10d NAILS

FOOTNOTES:
a. DETAILS ARE BASED ON 36" TALL GUARD,
b. MINIMUM 2X8 DECK FRAMING,
c. JOISTS @ 16" O.C. MAX SPACING,
d. DECKING 1-1/2" MAX THICKNESS,
e. ALL WOOD HEM-FIR (SG=0.43) OR GREATER, EXCEPT DECKING,
f. ALL NAILS ARE COMMON NAILS,
g. SCREWS OF EQUAL OR GREATER CAPACITY MAY REPLACE NAILS,
h. LAG SCREWS ON FACE OF RIM BOARD, BEAM OR RIM JOIST MAY BE COUNTERSUNK SUCH THAT HEADS MAY BE FLUSH WITH WOOD MEMBER,
i. PRE-DRILL LAG SCREWS PER NDS.

NOTE: GUARD POST CAN BE MOUNTED ANYWHERE BETWEEN JOISTS
FIGURE R507.8.1.1(5)
TOP MOUNTED GUARD POSTS ON RIM

NOTE:
MANUFACTURER'S BASE FASTENER MUST ENGAGE FULL DEPTH OF BLOCKS WITH MIN 1/4" DIA BOLTS AND 2" DIAMETER WASHERS

1. TOP MOUNTED GUARD POST INSTALLED PER MANUFACTURER'S INSTRUCTIONS. MOUNTED TO DECK FRAMING TYPICAL

2. (2) 2x8 FLAT (SHOWN) OR (2) 4x4 FLAT SIDE BY SIDE OR (1) 4x8 FLAT BLOCKING,

3. 2x VERTICAL BLOCKING, FULL DEPTH

4. (1) 3/8" DIA LAG SCREW AND (3) 16D NAILS (OR 20D NAILS THRU 2-PLY BEAM INTO JOIST), MINIMUM 2-1/2" EMBEDMENT FOR LAG SCREW

5. 10D NAILS FOR ATTACHING DECKING TO BLOCKING AT POST CONNECTION

X INDICATES THE NUMBER OF 16D NAILS THROUGH 1-PLY RIM, JOIST OR BLOCKING (OR 20D NAILS THROUGH 2-PLY BEAM)

FOOTNOTES:
a. DETAILS ARE BASED ON 36" TALL GUARD.
b. MINIMUM 2X8 DECK FRAMING,
c. JOISTS @ 16" O.C. MAX SPACING
D. DECKING 1-1/2" MAX THICKNESS
  e. ALL WOOD HEM-FIR (SG=0.43) OR GREATER, EXCEPT DECKING
f. ALL NAILS ARE COMMON NAILS
  g. SCREWS OF EQUAL OR GREATER CAPACITY MAY REPLACE NAILS
h. LAG SCREWS ON FACE OF RIM BOARD, BEAM OR RIM-JOIST MAY BE COUNTERSUNK SUCH THAT HEADS MAY BE FLUSH WITH WOOD MEMBER.
i. PRE-DRILL LAG SCREWS PER NDS
j. INCREASE BLOCKING DEPTH TO ACCOMMODATE FULL EMBEDMENT OF MANUFACTURER'S REQUIRED CONNECTION HARDWARE
k. MANUFACTURER'S FASTENER SHALL ENGAGE BLOCKING OR FRAMING MEMBERS FOR
Reason:

**WHAT:** This code change provides prescriptive details how guards can be attached to the deck and meet the intent of live load provisions as allowed by:

- **ICC ES AC273** Acceptance Criteria for Handrails and Guards,
- **ICC ES AC174** Acceptance Criteria for Deck Board Span Rating and Guardrail Systems, and

Five new drawings are presented:

1. Wood post with wood blocking connections - exterior of the rim,
2. Wood post with wood blocking connections - interior of the rim,
3. Wood post with mechanical connectors - exterior of the rim,
4. Wood post with mechanical connectors - interior of the rim,
5. Proprietary post – top mounted

Each of the details provides solutions for posts mounted on the side of the deck, the corner of the deck and the front of the deck.

**WHY:** The Deck Code Coalition (DCC) recognized that one of the biggest oversights on deck safety dealt with guard post attachment.

- NADRA members and folks in the composite lumber industry helped provide feedback on our proposals. In particular, they wanted flexibility in providing custom designs and innovative new products.
- To accomplish this we had to strengthen the deck structure. It did not make sense to have the world's strongest deck guard system installed on a poorly constructed deck. We created these details so that anyone's system should work without concern that the deck structure is the weak link.
- We created our prescriptive designs based on all-wood options and mechanical hold-down options. Proprietary solutions are available, so the committee did not want to reproduce them in the code. The engineering analysis is available as an attachment to this proposal.
The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country.

Our goals are threefold:

1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.
2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.
3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

Cost Impact: Will increase the cost of construction

For those contractors who are meeting the current code, there will be a minimal cost impact - for they are already doing most of this work already.

For those contractors who are not meeting the current code, there will be a cost increase to bring up their construction standards up to code.

- It would be conceivable that this proposal could cost over $200 per deck in both time and materials.
- However, if decks are to conform to the requirements of R301.5, an engineered solution should be required on almost every deck built.
- A financial analysis would say this is a good investment: The cost of the engineering analysis, plus the cost of consumer protection will more than offset the cost of time and materials for a code compliant deck.
**R507.8 R507.4 Deck posts.** For single-level wood-framed decks with beams sized in accordance with Table R507.6, deck post size shall be in accordance with Table R507.8 R507.4.

<table>
<thead>
<tr>
<th>DECK POST SIZE</th>
<th>MAXIMUM HEIGHT a, b</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 × 4</td>
<td>6' - 9&quot; c</td>
</tr>
<tr>
<td>4 × 6</td>
<td>8'</td>
</tr>
<tr>
<td>6 × 6</td>
<td>14'</td>
</tr>
<tr>
<td>8 × 8</td>
<td>14'</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

a. Measured to the underside of the beam.

b. Based on 40 psf live load.

c. The maximum permitted height is 8'-0" for one-ply and two-ply beams. 6'-9" is the maximum permitted height for three-ply beams on post cap.

**R507.8.1 R507.4.1 Deck post to deck footing connection.** Posts shall bear on footings in accordance with Section R403 and Figure R507.8.1 R507.4.1. Posts shall be restrained to prevent lateral displacement at the bottom support. Such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers' instructions or a minimum post embedment of 12 inches (305 mm) in surrounding soils or concrete piers.

**FIGURE R507.8.1 R507.4.1**
TYPICAL DECK POSTS TO DECK FOOTINGS
Reaso n:

WHAT: This code proposal relocates the deck post section. Also, it adds 8x8 posts to the table.

WHY: The Deck Code Coalition (DCC) thought it was necessary to add 8x8 posts to the table because three ply beams cannot be supported by notched 6x6 posts – that is, they require 2 1/2” wide support leg which can only be achieved with a 8x8 post.

The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country.

Our goals are threefold:

1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.
2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of
existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.

3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

Cost Impact: Will not increase the cost of construction
There is no cost impact. This proposal adds more options to the table.
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**R507.8 R507.4 Deck posts.** For single-level wood-framed decks with beams sized in accordance with Table R507.6, deck post size shall be in accordance with Table R507.8 R507.4.

<table>
<thead>
<tr>
<th>DECK POST SIZE</th>
<th>MAXIMUM HEIGHT(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x 4</td>
<td>8'</td>
</tr>
<tr>
<td>4 x 6</td>
<td>8'</td>
</tr>
<tr>
<td>6 x 6</td>
<td>14'</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

\(a\). Measured to the underside of the beam.

**R507.8.1 R507.4.1 Deck post to deck footing.** Posts shall bear on footings in accordance with Section R403 and Figure R507.8.1 R507.4.1. Posts shall be restrained to prevent lateral displacement at the bottom support. Such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers’ instructions or a minimum post embedment of 12 inches (305 mm) in surrounding soils or concrete piers. Exception: Where expansive, compressible, shifting or other questionable soils are present, surrounding soils shall not be relied upon for lateral support.

**FIGURE R507.8.1 R507.4.1**

*(Typical deck posts to deck footings)*

*(Existing code figure not shown for clarity)*
Reason:

WHAT:
1. This code proposal relocates the deck post section.
2. It also adds an exception that says deck posts cannot use embedded soil for lateral support if the surrounding soils are problematic.
3. The figure was changed to better reflect how the connection between the deck post and the footing is supposed to be.

WHY:
1. Based on the Deck Code Coalition's experience, they did not think that embedding posts 12" in surrounding soil would adequately prevent lateral displacement of the deck post for all situations. The exception was added to cover deck posts in problematic soils.
2. The committee did not think that the existing figure was accurate or depicted how the connection between the post and the footing was supposed to work. The first two existing figures show posts just sitting on a concrete pier without any lateral restraint - connector.

The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country. Our goals are threefold:
1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.
2. Create realistic, fact-based, prescriptive solutions to fill critical gaps in the current deck code. Many parts of existing deck code rely on subjective interpretations by the reader leading to an inconsistent approach to meeting minimum code.
3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

Cost Impact: Will not increase the cost of construction
There is no cost impact. The code already requires lateral restraint at the bottom of the footings.
IRC: R507, R507.8, R507.8.1.

Proponent: Charles Bajnai, representing Deck Code Coalition and Chesterfield County, VA; and North American Deck and Railing Association (NADRA) (bajnaic@chesterfield.gov)

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SECTION R507 EXTERIOR DECKS

**R507.8 R507.4 Deck posts.** For single-level wood-framed decks with beams sized in accordance with Table R507.6, deck post size shall be in accordance with Table R507.8 R507.4.

<table>
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<th>MAXIMUM HEIGHT(^a)</th>
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<tbody>
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<td>8'</td>
</tr>
<tr>
<td>6 × 6</td>
<td>14'</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

a. Measured to the underside of the beam.

**R507.8.1 R507.4.1 Deck post to deck footing connection.** Posts shall bear on footings in accordance with Section R403 and Figure R507.8.1. Posts shall be restrained to prevent lateral displacement at the bottom support. Such Where posts bear on concrete footings in accordance with Section R403 and Figure R507.4.1, such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers’ instructions or a minimum post embedment of 12 inches (305 mm) in surrounding soils or concrete piers. Other footing systems shall be permitted.

**FIGURE R507.8.1 R507.4.1**

TYPICAL DECK POSTS TO DECK FOOTINGS Deck post to deck footing connection.
**Reason:**

**WHAT:**

1. This code change eliminates the wording that posts have to bear on footings. The new wording specifically allows new proprietary footing systems which may or may not have footing per se.
2. This code change also provides a better drawing of how posts are to be attached to footings.

**WHY:**
1. The Deck Code Coalition (DCC) thought the current deck post to footing figure did not adequately depict how the lateral restraint at the bottom of the post was achieved.

2. The DCC also thought that the wording was too restrictive in that it required all deck posts to bear on concrete footings. The committee did not want to limit options on how to support a deck post; there are new methods, such as helical piers and other new products that can do the job as well.
The Deck Code Coalition (DCC) is a diverse group of stakeholders, including building officials, industry associations, product manufacturers, design professionals, and academia who have worked since the 2012 IRC code development cycle in an effort to consolidate and improve deck construction methods from across the country. Our goals are threefold:

1. Consolidate existing code scattered throughout the IRC under the newly expanded Section R507. Being able to easily locate all deck related code provisions in one section equally serves the builder, code official and design professional to a safer, code-conforming deck.
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3. Maintain and promote a safer deck structure without unduly burdening the builder. In all cases the DCC want to offer safe minimum requirements without stifling the creativity of the design professional or builder.

Cost Impact: Will not increase the cost of construction

There is no cost impact. The code already requires lateral restraint at the bottom of the footings. It may actually reduce the cost by allowing optional proprietary footing systems.
RB215-16
IRC: R507.8.1.
Proponent: Gregory Thorpe, representing Rock Island County (gthorpe@co.rock-island.il.us)

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R507.8.1 Deck post to deck footing. Posts shall bear on footings in accordance with Section R403 and Figure R507.8.1. Posts shall be restrained to prevent lateral displacement at the bottom support. Such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers' instructions or a minimum post embedment of 12 inches (305 mm) in surrounding soils or concrete piers.

Delete and substitute as follows:

**FIGURE R507.8.1**
**TYPICAL DECK POSTS TO DECK FOOTINGS**

*(Existing code figure not shown for clarity)*

**Reason:** The current Figure R508.7.1 includes an embedment detail at the far right end that leads users of the code to believe that all types of wood posts can be embedded without consideration for drainage at the bottom of the post. When the embedded wood naturally shrinks, water will enter at the top of the pier and accumulate at the base of the post which could violate other code requirements associated with decay prevention. AWPA does not test a preservative that is approved for embedment in concrete.

**Cost Impact:** Will not increase the cost of construction
This change should not increase the cost of construction as it is merely reflecting what is already required by another section of the code.
RB216-16
IRC: R601.2.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Delete without substitution:

R601.2.1 Compressible floor-covering materials. Compressible floor-covering materials that compress more than $\frac{1}{32}$-inch (0.8 mm) when subjected to 50 pounds (23 kg) applied over 1 inch square (645 mm) of material and are greater than $\frac{1}{8}$-inch (3.2 mm) in thickness in the uncompressed state shall not extend beneath walls, partitions or columns, which are fastened to the floor.

Reason: We can assume this issue will only arise with a remodel. We can also assume that these partitions will almost always be non-bearing partitions. So what is the issue? How does one prove that a floor covering meets these requirements in the field by a homeowner? Is it really that big a deal? Lumber shrinks, even lengthwise. This requirement takes up unnecessary space in the code.

Cost Impact: Will not increase the cost of construction
This proposal will not increase costs because it reduces regulations.
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Add new text as follows:

**R602.1.11  Structural insulated panels.** Structural insulated panels shall be manufactured and identified in accordance with ANSI/APA PRS 610.1

Revise as follows:

**R610.2 Applicability limits.** The provisions of this section shall control the construction of exterior structural insulated panel walls and interior load-bearing structural insulated panel walls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall not greater than 10 feet (3048 mm) high. Exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Structural insulated panel walls constructed in accordance with the provisions of this section shall be limited to sites where the ultimate design wind speed ($V_{ult}$) is not greater than 155 miles per hour (69 m/s), Exposure B or 140 miles per hour (63 m/s) Exposure C, the ground snow load is not greater than 70 pounds per square foot (3.35 kPa), and the seismic design category is A, B or C.

**R610.3.1  MINIMUM PROPERTIES FOR POLYURETHANE INSULATION USED AS SIPS CORE**

For SI: 1 pound per cubic foot = 16.02 kg/m$^3$, 1 pound per square inch = 6.895 kPa, °C = [(°F) - 32] / 1.8.

Delete without substitution:

**R610.3.2  Facing.** Facing materials for SIPs shall be wood structural panels conforming to DOC PS-1 or DOC PS-2, each having a minimum nominal thickness of $7/16$ inch (11 mm) and shall meet the additional minimum properties specified in Table R610.3.2. Facing shall be identified by a grade mark or certificate of inspection issued by an approved agency.

**R610.3.2  MINIMUM PROPERTIES$^a$ FOR ORIENTED STRAND BOARD FACER MATERIAL IN SIP WALLS**

For SI: 1 inch = 25.4 mm, 1 lbf -in$^2$/ft$^2$ = 9.415 × 10$^{-6}$ kPa/m, 1 lbf -in/ft = 3.707 × 10$^{-4}$ kN/m, 1 lbf/ft = 0.0146 N/mm, 1 pound per cubic foot = 16.018 kg/m$^3$.

a—Values listed in Table R610.3.2 are qualification test values and are not to be used for design purposes.

b—Mean test value shall be in accordance with Section 7.6 of DOC PS-2.

c—Characteristic test value (5th percent with 75% confidence).

d—Density shall be based on oven-dry weight and oven-dry volume.

**R610.3.3  Adhesive.** Adhesives used to structurally laminate the foam plastic insulation core material to the structural wood facers shall conform to ASTM D-2559 or approved alternative specifically intended for use as an adhesive used in the lamination of structural insulated panels. Each container of adhesive shall bear a label with the adhesive manufacturer's name, adhesive
name and type and the name of the quality assurance agency.

R610.3.4 R610.3.2 Lumber. No change to text.

Revise as follows:

R610.3.5 R610.3.3 SIP screws. No change to text.

R610.3.6 R610.3.4 Nails. No change to text.

R610.4 SIP wall panels. SIPs shall comply with Figure R610.4 and shall have minimum panel thickness in accordance with Tables R610.5(1) and R610.5(2) for above-grade walls. SIPs shall be identified by grade mark or certificate of inspection issued by an approved agency in accordance with ANSI/APA PRS 610.1.

Delete without substitution:

R610.4.1 Labeling. Panels shall be identified by grade mark or certificate of inspection issued by an approved agency. Each (SIP) shall bear a stamp or label with the following minimum information:

1. Manufacturer name/logo.
2. Identification of the assembly.
3. Quality-assurance agency.

Delete and substitute as follows:

FIGURE R610.5 (1)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS
FIGURE R610.5 (2)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS
Figure R610.5 (4)
SIP WALL-TO-WALL PLATFORM FRAME CONNECTION

For SI: 1 inch = 25.4 mm.

Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2) as appropriate.
Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2), as appropriate.

FIGURE R610.5 (5)
SIP WALL-TO-WALL BALLOON HANGING FLOOR FRAME CONNECTION (I-Joist floor shown for Illustration only)
SIP WALL

CONTINUOUS SEALANT EACH SIDE

2x SOLE PLATE MATCHING THE SIP CORE THICKNESS

8d NAILS AT 6 IN. O.C. EACH SIDE

8d NAILS AT 6 IN. O.C. EACH SIDE

CONTINUOUS SEALANT EACH SIDE

SOLE PLATE CONNECTION IN ACCORDANCE WITH TABLE R602.3(1)

CAP PLATE TO PLATE

FLOOR SHEATHING AND FRAMING IN ACCORDANCE WITH SECTION R502

FLOOR JOIST
FIGURE R610.5.1
SIP WALL FRAMING CONFIGURATION
For SI: 1 inch = 25.4 mm.

Notes:
1. Top plates shall be continuous over header.
2. Lower 2x top plate shall have a width equal to the SIP core width and shall be recessed into the top edge of the panel. Cap plate shall be placed over the recessed top plate and shall have a width equal to the SIPs width.
3. SIP facing surfaces shall be nailed to framing and cripples with 8d common or galvanized box nails spaced 6 inches on center.

4. Galvanized nails shall be hot-dipped or tumbled. Framing shall be attached in accordance to Section R602.3(1) unless otherwise provided for in Section R610.

*FIGURE R610.5.2*

SIP WALL TO CONCRETE SLAB FOR FOUNDATION WALL ATTACHMENT
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Add new text as follows:

**R610.5.3 Panel to panel connection.** SIPS shall be connected at vertical in-plane joints in accordance with Figure R610.8 or by other approved methods.

**R610.5.4 Corner framing.** Corner framing of SIP walls shall be constructed in accordance with Figure R610.9.

Revise as follows:

**R610.5.5 Wall bracing.** SIP walls shall be braced in accordance with Section R602.10. SIP walls shall be considered continuous wood structural panel sheathing (bracing Method CS-WSP) for purposes of computing required bracing. SIP walls shall meet the requirements of Section R602.10.4.2 except that SIP corners shall be fabricated as shown in Figure R610.9. Where SIP walls are used for wall bracing, the SIP bottom plate shall be attached...
to wood framing below in accordance with Table R602.3(1).

Add new text as follows:

**R610.5.6 Thermal barrier.** SIP walls shall be separated from the interior of a building by an approved thermal barrier in accordance with Section R316.4.

Delete without substitution:

**R610.8 Connection.** SIPs shall be connected at vertical in-plane joints in accordance with Figure R610.8 or by other approved methods.

Revise as follows:

**R610.10 R610.8 Headers.** SIP headers shall be designed and constructed in accordance with Table R610.10 R610.8 and Figure R610.5.1. SIP headers shall be continuous sections without splines. Headers shall be not less than $11\frac{7}{8}$ inches (302 mm) deep. Headers longer than 4 feet (1219 mm) shall be constructed in accordance with Section R602.7. The strength axis of the facers on the header shall be oriented horizontally.

Delete and substitute as follows:

**FIGURE R610.8**

TYPICAL SIP WALL PANEL-TO-PANEL CONNECTION DETAILS FOR VERTICAL IN-PLANE JOINTS
TABLE R610.10  R610.8
MAXIMUM SPANS FOR 11 7/8-INCH-DEEP 1 INCH OR DEEPER SIP HEADERS (feet)\textsuperscript{a}

<table>
<thead>
<tr>
<th>BUILDING width (feet)</th>
<th></th>
</tr>
</thead>
</table>

For SI: 1 inch = 25.4 mm.
<table>
<thead>
<tr>
<th>LOAD CONDITION</th>
<th>SNOW LOAD (psf)</th>
<th>24</th>
<th>28</th>
<th>32</th>
<th>36</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supporting roof only</td>
<td>20</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
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<td>2</td>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>Supporting roof and one-story</td>
<td>20</td>
<td>2</td>
<td>2</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>2</td>
<td>2</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>2</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

N/A = Not Applicable.

- a. Design assumptions:

Maximum deflection criterion: \( L/360 \leq 240 \).

Maximum roof dead load: 10 psf.

Maximum ceiling load: 5 psf.

Maximum ceiling live load: 20 psf.

Maximum second-floor live load: 30 psf.

Maximum second-floor dead load: 10 psf.

Maximum second-floor dead load from walls: 10 psf.

Maximum first floor dead load: 10 psf.

Wind loads based on Table R301.2(2).

Strength axis of facing material applied horizontally.

DR = Design Required

b. Building width is in the direction of horizontal framing members supported by the header.

c. The table provides for roof slopes between 3:12 and 12:12.

d. The maximum roof overhang is 24 inches (610 mm).

Delete without substitution:

**R610.9 - Corner framing.** Corner framing of SIP walls shall be constructed in accordance with Figure R610.9.

Delete and substitute as follows:

FIGURE R610.9
For SI: 1 inch = 25.4 mm.

Delete without substitution:

R610.3.1 Core. The core material shall be composed of foam plastic insulation meeting one of the following requirements:

1. ASTM C 578 and have a minimum density of 0.90 pounds per cubic feet (14.4 kg/m³).
2. Polyurethane meeting the physical properties shown in Table R610.3.1.
3. An approved alternative.

All cores shall meet the requirements of Section R316.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
Reason: The proposal is a minor reorganization and clarification of the Structural Insulated Panels (SIPs) section. The intention is to add clarity to the proposal as it is currently written. The original SIP language was based on the HUD document Prescriptive Method for Structural Insulated Panels (SIPs) Used in Wall Systems in Residential Construction. Since the inclusion of SIPs in the IRC, there have been several changes that have revised the SIP
requirements. However, in some instances, the changes do not match the language used in other materials (wood, cold formed steel, etc.). Proposed changes are intended to bring the SIPs provisions more in line with the other sections of the IRC.

In addition, ANSI/APA PRS 610.1, Standard for Performance-Rated Structural Insulated Panels in Wall Applications, a consensus-based document is proposed for addition to the 2018 IRC. As a result, much of the detailed information currently in the IRC with respect to SIP core, facers and adhesive requirements may now be taken out of the IRC. (Free downloads of this new standard are available at http://www.apawood.org/registrationpop?pubID=f0e25ef1-d7fe-42e0-9e08-0291b94efb04)

To summarize the changes:

- **Section R610.2** – added "square" to the snow load such that it reads "pounds per square foot". The SI conversion is correct as shown.
- **Section R610.3.1** – Removes SIPs core details from the body of the code and references ANSI/APA PRS 610.1.
- **Section R610.3.2** – Removes SIPs facer details from the body of the code and references ANSI/APA PRS 610.1.
- **Section R610.3.3** – Removes SIPs adhesive details from the body of the code and references ANSI/APA PRS 610.1.
- **New Section R610.3.4** - Adds thermal barrier requirements from the HUD document into Section R610. These requirements are in line with the IRC Section R316.4.
- **Section R610.4.1** – The inspection and labeling requirements have been specified in ANSI/APA PRS 610.1, this section deleted.
- **Sections R610.5.3 and R610.5.4** - Moved from current location in Section R610.8 and R610.9 respectively to proposed location. This puts all of the connection details in one place. No technical changes made.
- **Section R610.5.5** – Renumbered wall bracing provisions to accommodate proposed new locations for R610.5.3 and R610.5.4. Also added reference to bracing method CS-WSP to clarify bracing equivalence.
- **Section R610.8** – Renumbered section and referenced tables and sections. No technical changes. Added a requirement that the strong axis of the header facers shall be placed in a horizontal orientation.
- **Table R610.8** – Renumbered table and added clarifying language and additional footnotes to simplify use of the table. Corrected deflection criteria in footnotes.
- **Figure R610.5(1)** – Added reference to bottom wall connection for clarity.
- **Figure R610.5(2)** – Added reference to bottom wall connection for clarity. Clarified foundation annotation and corrected "FIRST STORY" annotation.
- **Figure R610.5(3)** – Removed gusset plate and reference. Modified callout for roof framing to include trusses and conventional roof framing. Added roof sheathing callout. Added cap-plate-to-top-plate connection requirement. Made adjustments to arrowheads to more clearly identify referenced portion.
- **Figure R610.5(4)** – Added "SIP Wall" callout to first story wall, and added an additional "Continuous Sealant" arrow at upper wall. Made adjustments to arrowheads to more clearly identify referenced portion.
- **Figure R610.5(5)** – Some editorial changes were made to callouts, arrowheads repositioned slightly to better indicate referenced portions. Title of figure changed to more accurately reflect figure.
- **Figure R610.5.1** – Footnote 4 was removed as it is a duplicate of the requirements in the text. "TOP PLATE" arrow moved to better identify recessed top plate.
- **Figure R610.5.2** – Sealant added and referenced in new figure. Capillary break more clearly shown and anchor bolt requirement deleted and reference to Section R403.1.6 added.
- **Figure R610.5.8** – Sealant was added to figure and a minimum splice plate size was provided. The figure title was changed to better describe figure and the term "connection" was removed from the figure sub-headings.
- **Figure R610.5.9** – Additional arrows were added to the "Continuous Sealant" callout.

All figures have been redrawn and reformatted to provide a cleaner, more easily understood IRC.

Note that many of the changes requested above were placed before the committee last cycle. Some concerns about the minimum foam requirements were raised by the foam industry and subsequently the whole change was denied. The foam requirements as well as the material requirements for the wood structural panel and adhesive have all been included in the national consensus-based ANSI/APA PRS 610.1 standard. Just the editorial/clarification portions of the original proposal remain in this proposal.

We encourage the code body to accept this code change proposal providing requisite clarity.

**Cost Impact:** Will not increase the cost of construction

This proposal reorganizes the existing provisions, corrects typo errors in text and figures, and recognizes new consensus standards.
R602.3.1 Stud size, height and spacing. The size, height and spacing of studs shall be in accordance with Table R602.3.(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches (406 mm) on center, shall not support more than a roof and ceiling, and shall not exceed 8 feet (2438 mm) in height for exterior walls and load-bearing walls or 10 feet (3048 mm) for interior nonload-bearing walls.

2. Where snow loads are less than or equal to 25 pounds per square foot (1.2 kPa), and the ultimate design wind speed is less than or equal to 130 mph (58.1 m/s), 2-inch by 6-inch (38 mm by 14 mm) studs supporting a roof load with not more than 6 feet (1829 mm) of tributary length shall have a maximum height of 18 feet (5486 mm) where spaced at 16 inches (406 mm) on center, or 20 feet (6096 mm) where spaced at 12 inches (304.8 mm) on center. Studs shall be minimum No. 2 grade lumber.

3. Exterior load-bearing studs not exceeding 12 feet (3658 mm) in height provided in accordance with Table R602.3(6). The minimum number of full-height studs adjacent to openings shall be in accordance with Section R602.7.5. The building shall be located in Exposure B, the roof live load shall not exceed 20 psf (0.96 kPa), and the ground snow load shall not exceed 30 psf (1.4 kPa). Studs and plates shall be #2 grade lumber or better.

**TABLE R602.3(6)**

<table>
<thead>
<tr>
<th>Stud Height</th>
<th>Supporting</th>
<th>Stud Spacing</th>
<th>Ultimate Design Wind Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>115 mph</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a</td>
<td>Roof/Floor Span</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12 ft.</td>
</tr>
<tr>
<td>11 ft.</td>
<td>Roof Only</td>
<td>12 in.</td>
<td>2x4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 in.</td>
<td>2x4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 in.</td>
<td>2x6</td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s
DR = Design Required

<table>
<thead>
<tr>
<th></th>
<th>12 in</th>
<th>2x4</th>
<th>2x6</th>
<th>2x4</th>
<th>2x6</th>
<th>2x4</th>
<th>2x6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof and One Floor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 ft.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof Only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 ft.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 ft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof and One Floor</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 ft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Wall studs not exceeding 16 in. on center shall be sheathed with minimum 1/2” (12.7 mm) gypsum board on the interior and 3/8” (9 mm) wood structural panel sheathing on the exterior. Wood structural panel sheathing shall be attached with 8d (2.5” x 0.131”) nails spaced a maximum of 6” on center along panel edges and 12” on center at intermediate supports, and all panel joints shall occur over studs or blocking.
b. Where the ultimate design wind speed exceeds 115 mph, studs shall be attached to top and bottom plates with connectors having a minimum 300 pound (136 kg) capacity.

**Reason:** The purpose of this code change is to introduce a new table for load-bearing studs over 10 feet in height but not exceeding 12 feet in height. Previous to the 2015 edition, the IRC provided Table R602.3.1 allowing exterior load-bearing studs up to 20 feet in height for a limited set of conditions. In the 2015 IRC, the table was removed and converted into Exception #2 under Section R602.3.1.

One of the main reasons the table was removed was that builders and building officials did not understand where the table applied based on the limitations. Also, the allowable stud sizes in the table dated back to the CABO code, when there were actually three tables which were subsequently combined into Table R602.3.1 in the 2000 IRC. No technical substantiation for the allowable stud sizes in the old table could be located.

This table was constructed using the exterior wall stud bending stresses and exterior wall stud compression stresses from Tables 2.9A and 2.9B of the 2012 Wood Frame Construction Manual. Combined bending and axial load calculations in accordance with Section 3.9 of the 2012 AWC National Design Specification for Wood Construction. Bearing perpendicular to grain was checked for top and bottom plates per Section 3.10.2 of the NDS. Connection capacities from Table R602.3(1) were checked against the connection loads from Table 2.1 of the WFCM.

This new table provides additional flexibility beyond the old Table R602.3.1 and Exception #2 under Section R602.3.1 which replaced it. The new table covers framing spans of both 12 feet and 24 feet. In addition to 2-story foyers, small great rooms and gable end conditions, the new table would also apply to conditions such as an attached garage where studs over 10 feet may be required due to a sloped site or where additional headroom for a van may be desired. The table also works for a somewhat higher ground snow load (30 psf versus 25 psf) and in all areas outside the region where wind design is required per Figure R301.2(4)B. The table can also be used for walls with large openings, provided the number of additional king studs required by Section R602.7.5 are furnished on each side of the openings.
Cost Impact: Will not increase the cost of construction

The code change will actually save builders the cost of hiring an engineer to design the portion of the building falling outside the limits of Table R602.3(5) or Exception #2 of Section R602.3.1. The minimum cost to retain an engineer to design the limited area of tall studs is estimated to be $400 to $800. The code change will also allow 2x4 studs to be used in cases where 2x6 studs would have been needed previously, for a modest savings in material costs (about $3-4 per stud).
**Proponent**: Paul Coats, PE CBO, American Wood Council, representing American Wood Council (pcoats@awc.org)

**2015 International Residential Code**
Revise as follows:

**TABLE R602.3(1) FASTENING SCHEDULE**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a, b, c&lt;/sup&gt;</th>
<th>SPACING AND LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Roof</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Blocking between ceiling joists or rafters to top plate</td>
<td>4-8d box ((2^{1/2} \times 0.113')) or 3-8d common ((2^{1/2} \times 0.131')); or 3-10d box ((3'' \times 0.128')); or 3-3'' \times 0.131'' nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td>2</td>
<td>Ceiling joists to top plate</td>
<td>4-8d box ((2^{1/2} \times 0.113')); or 3-8d common ((2^{1/2} \times 0.131')); or 3-10d box ((3'' \times 0.128')); or 3-3'' \times 0.131'' nails</td>
<td>Per joist, toe nail</td>
</tr>
<tr>
<td>3</td>
<td>Ceiling joist not attached to parallel rafter, laps over partitions [see Sections R802.3.1, R802.3.2 and Table R802.5.1(9)]</td>
<td>4-10d box ((3'' \times 0.128')); or 3-16d common ((3^{1/2} / 2'' \times 0.162')); or 4-3'' \times 0.131'' nails</td>
<td>Face nail</td>
</tr>
<tr>
<td>4</td>
<td>Ceiling joist attached to parallel rafter (heel joint) [see Sections R802.3.1 and R802.3.2 and Table R802.5.1(9)]</td>
<td>Table R802.5.1(9)</td>
<td>Face nail</td>
</tr>
<tr>
<td>5</td>
<td>Collar tie to rafter, face nail or (1^{1/4} / 2'' \times 20) ga. ridge strap to rafter</td>
<td>4-10d box ((3'' \times 0.128')); or 3-10d common ((3'' \times 0.148')); or 4-3'' \times 0.131'' nails</td>
<td>Face nail each rafter</td>
</tr>
<tr>
<td>6</td>
<td>Rafter or roof truss to plate</td>
<td>3-16d box nails ((3^{1/2} / 2'' \times 0.135')); or 3-10d common nails ((3'' \times 0.148')); or 4-10d box ((3'' \times 0.128')); or 4-3'' \times 0.131'' nails</td>
<td>2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>7</td>
<td>Roof rafters to ridge, valley or hip rafters or roof rafter to minimum 2'' ridge beam</td>
<td>4-16d ((3^{1/2} / 2'' \times 0.135')); or 3-10d common ((3'' \times 0.148')); or 4-10d box ((3'' \times 0.128')); or 4-3'' \times 0.131'' nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td><strong>Wall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Stud to stud (not at braced wall panels)</td>
<td>16d common ((3^{1/2} / 2'' \times 0.162'))</td>
<td>24'' o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10d box ((3'' \times 0.128')); or 3'' \times 0.131'' nails</td>
<td>16'' o.c. face nail</td>
</tr>
<tr>
<td>9</td>
<td>Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)</td>
<td>16d box ((3^{1/2} / 2'' \times 0.135')); or 3'' \times 0.131'' nails</td>
<td>12'' o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d common ((3^{1/2} / 2'' \times 0.162'))</td>
<td>16'' o.c. face nail</td>
</tr>
<tr>
<td>10</td>
<td>Built-up header (2'' to 2'' header with (1^{1/2} / 2'') spacer)</td>
<td>16d common ((3^{1/2} / 2'' \times 0.162'))</td>
<td>16'' o.c. each edge face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d box ((3^{1/2} / 2'' \times 0.135'))</td>
<td>12'' o.c. each edge face nail</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION OF BUILDING ELEMENTS</td>
<td>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a&lt;/sup&gt;,&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;c&lt;/sup&gt;</td>
<td>SPACING AND LOCATION</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------</td>
<td>-------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>14</td>
<td>Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)</td>
<td>16d common $(3\frac{1}{2} / 2 &quot; \times 0.162&quot;)$</td>
<td>16&quot; o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d box $(3\frac{1}{2} / 2 &quot; \times 0.135&quot;)$; or $3&quot; \times 0.131&quot;$ nails</td>
<td>12&quot; o.c. face nail</td>
</tr>
<tr>
<td>15</td>
<td>Bottom plate to joist, rim joist, band joist or blocking (at braced wall panel)</td>
<td>3-16d box $(3\frac{1}{2} / 2 &quot; \times 0.135&quot;)$; or 2-16d common $(3\frac{1}{2} / 2 &quot; \times 0.162&quot;)$; or 4-3&quot; × 0.131&quot; nails</td>
<td>3 each 16&quot; o.c. face nail 2 each 16&quot; o.c. face nail 4 each 16&quot; o.c. face nail</td>
</tr>
<tr>
<td>16</td>
<td>Top or bottom plate to stud</td>
<td>4-8d box $(2\frac{1}{2} / 2 &quot; \times 0.113&quot;)$; or 3-16d box $(3\frac{1}{2} / 2 &quot; \times 0.135&quot;)$; or 4-8d common $(2\frac{1}{2} / 2 &quot; \times 0.131&quot;)$; or 4-10d box $(3&quot; \times 0.128&quot;)$; or 4-3&quot; × 0.131&quot; nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-16d box $(3\frac{1}{2} / 2 &quot; \times 0.135&quot;)$; or 2-16d common $(3\frac{1}{2} / 2 &quot; \times 0.162&quot;)$; or 3-10d box $(3&quot; \times 0.128&quot;)$; or 3-3&quot; × 0.131&quot; nails</td>
<td>End nail</td>
</tr>
<tr>
<td>17</td>
<td>Top plates, laps at corners and intersections</td>
<td>3-10d box $(3&quot; \times 0.128&quot;)$; or 2-16d common $(3\frac{1}{2} / 2 &quot; \times 0.162&quot;)$; or 3-3&quot; × 0.131&quot; nails</td>
<td>Face nail</td>
</tr>
<tr>
<td>18</td>
<td>1&quot; brace to each stud and plate</td>
<td>3-8d box $(2\frac{1}{2} / 2 &quot; \times 0.113&quot;)$; or 2-8d common $(2\frac{1}{2} / 2 &quot; \times 0.131&quot;)$; or 2-10d box $(3&quot; \times 0.128&quot;)$; or 2 staples $1\frac{3}{4} / 2 &quot;$</td>
<td>Face nail</td>
</tr>
<tr>
<td>19</td>
<td>1&quot; × 6&quot; sheathing to each bearing</td>
<td>3-8d box $(2\frac{1}{2} / 2 &quot; \times 0.113&quot;)$; or 2-8d common $(2\frac{1}{2} / 2 &quot; \times 0.131&quot;)$; or 2-10d box $(3&quot; \times 0.128&quot;)$; or 2 staples, 1&quot; crown, 16 ga., $1\frac{3}{4} / 2 &quot;$ long</td>
<td>Face nail</td>
</tr>
<tr>
<td>20</td>
<td>1&quot; × 8&quot; and wider sheathing to each bearing</td>
<td>3-8d box $(2\frac{1}{2} / 2 &quot; \times 0.113&quot;)$; or 3-8d common $(2\frac{1}{2} / 2 &quot; \times 0.131&quot;)$; or 3-10d box $(3&quot; \times 0.128&quot;)$; or 3 staples, 1&quot; crown, 16 ga., $1\frac{3}{4} / 2 &quot;$ long</td>
<td>Wider than 1&quot; × 8&quot; 4-8d box $(2\frac{1}{2} / 2 &quot; \times 0.113&quot;)$; or 3-8d common $(2\frac{1}{2} / 2 &quot; \times 0.131&quot;)$; or 3-10d box $(3&quot; \times 0.128&quot;)$; or 4 staples, 1&quot; crown, 16 ga., $1\frac{3}{4} / 2 &quot;$ long</td>
</tr>
</tbody>
</table>

Wider than 1" × 8"
4-8d box $(2\frac{1}{2} / 2 " \times 0.113")$; or 3-8d common $(2\frac{1}{2} / 2 " \times 0.131")$; or 3-10d box $(3" \times 0.128")$; or 4 staples, 1" crown, 16 ga., $1\frac{3}{4} / 2 "$ long
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER</th>
<th>SPACING AND LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Joist to sill, top plate or girder</td>
<td>4-8d box (2 1/2 &quot; × 0.113&quot;); or 3-8d common (2 1/2 &quot; × 0.131&quot;); or 3-10d box (3&quot; × 0.128&quot;); or 3-3&quot; × 0.131&quot; nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td>22</td>
<td>Rim joist, band joist or blocking to sill or top plate (roof applications also)</td>
<td>8d box (2 1/2 &quot; × 0.113&quot;)</td>
<td>4&quot; o.c. toe nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8d common (2 1/2 &quot; × 0.131&quot;); or 10d box (3&quot; × 0.128&quot;); or 3&quot; × 0.131&quot; nails</td>
<td>6&quot; o.c. toe nail</td>
</tr>
<tr>
<td>23</td>
<td>1&quot; × 6&quot; subfloor or less to each joist</td>
<td>3-8d box (2 1/2 &quot; × 0.113&quot;); or 2-8d common (2 1/2&quot; × 0.131&quot;); or 3-10d box (3&quot; × 0.128&quot;); or 2 staples, 1&quot; crown, 16 ga., 1 3/4&quot; long</td>
<td>Face nail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER</th>
<th>SPACING OF FASTENERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Edges (inches)</td>
</tr>
<tr>
<td>24</td>
<td>2&quot; subfloor to joist or girder</td>
<td>3-16d box (3 1/2 &quot; × 0.135&quot;); or 2-16d common (3 1/2 &quot; × 0.162&quot;)</td>
<td>Blind and face nail</td>
</tr>
<tr>
<td>25</td>
<td>2&quot; planks (plank &amp; beam—floor &amp; roof)</td>
<td>3-16d box (3 1/2 &quot; × 0.135&quot;); or 2-16d common (3 1/2 &quot; × 0.162&quot;)</td>
<td>At each bearing, face nail</td>
</tr>
<tr>
<td>26</td>
<td>Band or rim joist to joist</td>
<td>3-16d common (3 1/2 &quot; × 0.162&quot;) 4-10 box (3&quot; × 0.128&quot;); or 4-3&quot; × 0.131&quot; nails; or 4-3&quot; × 14 ga. staples, 7/16&quot; crown</td>
<td>End nail</td>
</tr>
<tr>
<td>27</td>
<td>Built-up girders and beams, 2-inch lumber layers</td>
<td>20d common (4&quot; × 0.192&quot;); or 10d box (3&quot; × 0.128&quot;); or 3&quot; × 0.131&quot; nails</td>
<td>Nail each layer as follows: 32° o.c. at top and bottom and staggered.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>And: 2-20d common (4&quot; × 0.192&quot;); or 3-10d box (3&quot; × 0.128&quot;); or 3-3&quot; × 0.131&quot; nails</td>
<td>24° o.c. face nail at top and bottom staggered on opposite sides</td>
</tr>
<tr>
<td>28</td>
<td>Ledger strip supporting joists or rafters</td>
<td>4-16d box (3 1/2 &quot; × 0.135&quot;); or 3-16d common (3 1/2 &quot; × 0.162&quot;); or 4-10d box (3&quot; × 0.128&quot;); or 4-3&quot; × 0.131&quot; nails</td>
<td>At each joist or rafter, face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-10d box (3&quot; × 0.128&quot;); or 2-8d common (2-1/2&quot; × 0.131&quot;; or 2-3&quot; × 0.131&quot; nails</td>
<td>Each end, toe nail</td>
</tr>
</tbody>
</table>

Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing [see Table R602.3(3) for wood structural panel exterior wall sheathing to wall framing]
<p>| | | | | | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>30</td>
<td>$3/8&quot; - 1/2&quot;$</td>
<td>(subfloor, wall)8d common ($2\frac{1}{2}&quot; \times 0.131&quot;$) nail (roof)</td>
<td>6</td>
<td>12</td>
<td>31</td>
<td>$19/32&quot; - 1&quot;$</td>
</tr>
<tr>
<td>32</td>
<td>$1\frac{1}{8}&quot; - 1\frac{1}{4}&quot;$</td>
<td>10d common ($3&quot; \times 0.148&quot;$) nail; or 8d ($2\frac{1}{2}&quot; \times 0.131&quot;$) deformed nail</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other wall sheathing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>$\frac{1}{2}&quot;$ structural cellulosic fiberboard sheathing</td>
<td>$1\frac{1}{2}&quot;$ galvanized roofing nail, $\frac{7}{16}&quot;$ head diameter, or 16 ga. staple $1\frac{1}{4}&quot;$ long 16 ga. staple with $\frac{7}{16}&quot;$ or $1&quot;$ crown</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>$2\frac{5}{32}&quot;$ structural cellulosic fiberboard sheathing</td>
<td>$1\frac{3}{4}&quot;$ galvanized roofing nail, $\frac{7}{16}&quot;$ head diameter, or 16 ga. staple $1\frac{1}{2}&quot;$ long 16 ga. staple with $\frac{7}{16}&quot;$ or $1&quot;$ crown</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>$\frac{1}{2}&quot;$ gypsum sheathing</td>
<td>$1\frac{1}{2}&quot;$ galvanized roofing nail; staple galvanized, $1\frac{1}{2}&quot;$ long; $1\frac{1}{4}&quot;$ screws, Type W or S</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>$\frac{5}{8}&quot;$ gypsum sheathing</td>
<td>$1\frac{3}{4}&quot;$ galvanized roofing nail; staple galvanized, $1\frac{5}{8}&quot;$ long; $1\frac{5}{8}&quot;$ screws, Type W or S</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wood structural panels, combination subfloor underlayment to framing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>$3/4&quot;$ and less</td>
<td>6d deformed ($2&quot; \times 0.120&quot;)$ nail; or 8d common ($2\frac{1}{2}&quot; \times 0.131&quot;$) nail</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>$7/8&quot; - 1&quot;$</td>
<td>8d common ($2\frac{1}{2}&quot; \times 0.131&quot;$) nail; or 8d deformed ($2\frac{1}{2}&quot; \times 0.120&quot;$) nail</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>$1\frac{1}{8}&quot; - 1\frac{1}{4}&quot;$</td>
<td>10d common ($3&quot; \times 0.148&quot;$) nail; or 8d deformed ($2\frac{1}{2}&quot; \times 0.120&quot;$) nail</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 ksi = 6.895 MPa.

a. Nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.

b. Staples are 16 gage wire and have a minimum $\frac{7}{16}"$-inch on diameter crown width.
c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. Where the ultimate design wind speed is 130 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. Where the ultimate design wind speed is greater than 130 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.

g. Gypsum sheathing shall conform to ASTM C1396 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to ASTM C208.

h. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.

i. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

### TABLE R602.10.3 (4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON:</th>
<th>STORY</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR&lt;sup&gt;a, b&lt;/sup&gt;</th>
<th>APPLICABLE METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Story height (Section 301.3)</td>
<td>Any story</td>
<td>≤ 10 feet</td>
<td>1.0</td>
<td>All methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 10 feet and ≤ 12 feet</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Braced wall line spacing, townhouses in SDC C</td>
<td>Any story</td>
<td>≤ 35 feet</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 35 feet and ≤ 50 feet</td>
<td>1.43</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Braced wall line spacing, in SDC D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Any story</td>
<td>&gt; 25 feet and ≤ 30 feet</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 30 feet and ≤ 35 feet</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 8 psf and &lt; 15</td>
<td></td>
<td>All methods</td>
</tr>
</tbody>
</table>

<sup>a</sup> Multiply length from Table R602.10.3(3) by this factor.

<sup>b</sup> Division 1.0.

<sup>c</sup> SDC D<sub>1</sub> and D<sub>2</sub> in SDCs D<sub>0</sub> and D<sub>1</sub> are applicable to buildings with braced wall line spacing.
<table>
<thead>
<tr>
<th></th>
<th>Wall dead load</th>
<th>Any story</th>
<th>psf</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Wall dead load</td>
<td>Any story</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>psf</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 8 psf</td>
<td></td>
<td>0.85</td>
<td></td>
</tr>
</tbody>
</table>

| 5 | Roof/ceiling dead load for wall supporting | 1-, 2- or 3-story building | ≤15 psf | 1.0 |
|   |                                             | 2- or 3-story building     | > 15 psf and ≤ 25 psf | 1.1 |
|   |                                             | 1-story building           | > 15 psf and ≤ 25 psf | 1.2 |

| 6 | Walls with stone or masonry veneer, townhouses in SDC C<sup>d</sup>, e |   | 1.0 |   |
|   |                                                                             |   | 1.5 | All methods |
|   |                                                                             |   | 1.5 |   |

| 7 | Walls with stone or masonry veneer, detached one- and two-family dwellings in SDC D<sub>0</sub> – D<sub>2</sub><sup>d</sup>, f | Any story | See Table R602.10.6.5 | BV-WSP |

| 8 | Interior gypsum board finish (or equivalent) | Any story | Omitted from inside face of braced wall panels | 1.5 |
|   |                                             |           |                                               |   |

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

c. The length-to-width ratio for the floor/roof diaphragm shall not exceed 3:1. The top plate lap splice nailing shall be in accordance with Table R602.3(1), Item 13.

d. Applies to stone or masonry veneer exceeding the first story height.

e. The adjustment factor for stone or masonry veneer shall be applied to all exterior braced wall lines and all braced wall lines on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

f. See Section R602.10.6.5 for requirements where stone or masonry veneer does not exceed the first-story height.
Reason: ITEM 7: The correct length of the 10d common nail is 3", not 3-1/2". 10d common is correctly shown as 3" long elsewhere in the table. This is considered to be an editorial change as a 10d common nail is 3" long per ASTM F1667 and correctly shown as 3" long elsewhere in the table.

ITEM 13: Multiple changes to the top plate splice nailing were approved in the previous code change cycle. One change, RB272-13, increased the nailing of the top plate splice to bring it in line with the 2015 IBC as well as to include nailing schedules that are of roughly equivalent lateral resistance. A second change, RB274-13, specified increased top plate splice nailing only for higher SDCs and where braced wall line spacing is greater than 25'. The combination of both proposals produced line 13 of the 2015 IRC in which the same double top plate splice nailing is shown for wall line spacing <25' and ≥25' (i.e. 12-16d (3-1/2" x 0.135" box nails). To simplify presentation of the top plate nailing schedule to the singular nailing pattern intended by RB272-13, it is proposed to delete language associated with triggering different nailing based on SDC or wall line spacing. The special reference from footnote c of Table R602.10.3(4) that addresses applicable top plate nailing is also no longer necessary with the proposed revision to a single nail schedule and is proposed to be deleted. Related: prior cycle RB272-13, RB274-13, Rb278-13.

ITEM 23: The equivalent nailing to the 8d common case is (2) 10d box versus (3) 10d box. 2 nails is consistent with item 24 in IBC Table 2304.10.1.

ITEM 29: The "bridging to joist" case was added during the previous code change cycle but included only the 10d (3" x 0.128") nail option. The 10d is clarified as a box nail size in this change. Other equivalent nail options are added and "or blocking" is added to the description to pick up the commonly used term for the application being described.

ITEMS 33 and 34: 7/16" crown was inadvertently excluded from change proposal RB278-13 which reorganized the fastening table to create a more consistent format between the IBC and IRC prescriptive fastening tables. This change restores the 7/16" crown. It also increases the staple length for 25/32" sheathing thickness which was previously proposed and approved (S75-06/07 Part II) but not picked up in publication.

Revision to Footnote c in Table R602.10.3(4): See the explanation in Item 13 above, and the last sentence.

Cost Impact: Will not increase the cost of construction
Because these are mostly editorial corrections and correlations, it is not anticipated that the cost of construction will increase. For rows where the nailing changes slightly, current alternatives are also retained.
### Table R602.3 (1)
#### Fastening Schedule

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Description of Building Elements</th>
<th>Number and Type of Fastener&lt;sup&gt;a, b, c&lt;/sup&gt;</th>
<th>Spacing and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blocking between ceiling joists or rafters to top plate</td>
<td>4-8d box (2 1/2 ″ × 0.113&quot;) or 3-8d common (2 1/2 ″ × 0.131&quot;); or 3-10d box (3″ × 0.128&quot;); or 3-3″ × 0.131″ nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td>2</td>
<td>Ceiling joists to top plate</td>
<td>4-8d box (2 1/2 ″ × 0.113&quot;) or 3-8d common (2 1/2 ″ × 0.131&quot;); or 3-10d box (3″ × 0.128&quot;); or 3-3″ × 0.131″ nails</td>
<td>Per joist, toe nail</td>
</tr>
<tr>
<td>3</td>
<td>Ceiling joist not attached to parallel rafter, laps over partitions [see Sections R802.3.1, R802.3.2 and Table R802.5.1(9)]</td>
<td>4-10d box (3″ × 0.128&quot;); or 3-16d common (3 1/2 ″ × 0.162&quot;); or 4-3″ × 0.131″ nails</td>
<td>Face nail</td>
</tr>
<tr>
<td>4</td>
<td>Ceiling joist attached to parallel rafter (heel joint) [see Sections R802.3.1 and R802.3.2 and Table R802.5.1(9)]</td>
<td>Table R802.5.1(9)</td>
<td>Face nail</td>
</tr>
<tr>
<td>5</td>
<td>Collar tie to rafter, face nail or 1 1/4 ″ × 20 ga. ridge strap to rafter</td>
<td>4-10d box (3″ × 0.128&quot;); or 3-10d common (3″ × 0.148&quot;); or 4-3″ × 0.131″ nails</td>
<td>Face nail each rafter</td>
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<tr>
<td>6</td>
<td>Rafter or roof truss to plate</td>
<td>3-16d box nails (3(\frac{1}{2}) &quot; × 0.135&quot;); or 3-10d common nails (3&quot; × 0.148&quot;); or 4-10d box (3&quot; × 0.128&quot;); or 4-3&quot; × 0.131&quot; nails</td>
<td>2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss</td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>Roof rafters to ridge, valley or hip rafters or roof rafter to minimum 2&quot; ridge beam</td>
<td>4-16d (3(\frac{1}{2}) &quot; × 0.135&quot;); or 3-10d common (3(\frac{1}{2}) &quot; × 0.148&quot;); or 4-10d box (3&quot; × 0.128&quot;); or 4-3&quot; × 0.131&quot; nails</td>
<td>Toe nail</td>
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</tr>
<tr>
<td>Wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Stud to stud (not at braced wall panels)</td>
<td>16d common (3(\frac{1}{2}) &quot; × 0.162&quot;)</td>
<td>24&quot; o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10d box (3&quot; × 0.128&quot;); or 3&quot; × 0.131&quot; nails</td>
<td>16&quot; o.c. face nail</td>
</tr>
<tr>
<td>9</td>
<td>Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)</td>
<td>16d box (3(\frac{1}{2}) &quot; × 0.135&quot;); or 3&quot; × 0.131&quot; nails</td>
<td>12&quot; o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d common (3(\frac{1}{2}) &quot; × 0.162&quot;)</td>
<td>16&quot; o.c. face nail</td>
</tr>
<tr>
<td>10</td>
<td>Built-up header (2&quot; to 2&quot; header with 1(\frac{1}{2}) &quot; spacer)</td>
<td>16d common (3(\frac{1}{2}) &quot; × 0.162&quot;)</td>
<td>16&quot; o.c. each edge face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d box (3(\frac{1}{2}) &quot; × 0.135&quot;)</td>
<td>12&quot; o.c. each edge face nail</td>
</tr>
<tr>
<td>11</td>
<td>Continuous header to stud</td>
<td>5-8d box (2(\frac{1}{2}) &quot; × 0.113&quot;); or 4-8d common (2(\frac{1}{2}) &quot; × 0.131&quot;); or 4-10d box (3&quot; × 0.128&quot;)</td>
<td>Toe nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d common (3(\frac{1}{2}) &quot; × 0.162&quot;)</td>
<td>16&quot; o.c. face nail</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION OF BUILDING ELEMENTS</td>
<td>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a, b, c&lt;/sup&gt;</td>
<td>SPACING AND LOCATION</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------</td>
<td>---------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>12</td>
<td>Top plate to top plate</td>
<td>10d box (3&quot; × 0.128&quot;); or 3&quot; × 0.131&quot; nails</td>
<td>12&quot; o.c. face nail</td>
</tr>
<tr>
<td></td>
<td>Double top plate splice for SDCs A-D2 with seismic braced wall line spacing</td>
<td>8-16d common (3^1/2&quot; × 0.162&quot;); or 12-16d box (3^1/2&quot; × 0.135&quot;); or 12-10d box (3&quot; × 0.128&quot;); or 12-3&quot; × 0.131&quot; nails</td>
<td>Face nail on each side of end joint (minimum 24&quot; lap splice length each side of end joint)</td>
</tr>
<tr>
<td>13</td>
<td>Double top plate splice SDCs D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, or D&lt;sub&gt;2&lt;/sub&gt;; and braced wall line spacing ≥ 25'</td>
<td>12-16d (3^1/2&quot; × 0.135&quot;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)</td>
<td>16d common (3^1/2&quot; × 0.162&quot;)</td>
<td>16&quot; o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d box (3^1/2&quot; × 0.135&quot;); or 3&quot; × 0.131&quot; nails</td>
<td>12&quot; o.c. face nail</td>
</tr>
<tr>
<td>15</td>
<td>Bottom plate to joist, rim joist, band joist or blocking (at braced wall panel)</td>
<td>3-16d box (3^1/2&quot; × 0.135&quot;); or 2-16d common (3^1/2&quot; × 0.162&quot;); or 4-3&quot; × 0.131&quot; nails</td>
<td>3 each 16&quot; o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 each 16&quot; o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 each 16&quot; o.c. face nail</td>
</tr>
<tr>
<td>16</td>
<td>Top or bottom plate to stud</td>
<td>4-8d box (2^{1/2}&quot; × 0.113&quot;); or 3-16d box (3^{1/2}&quot; × 0.135&quot;); or 4-8d common (2^{1/2}&quot; × 0.131&quot;); or 4-10d box (3&quot; × 0.128&quot;); or 4-3&quot; × 0.131&quot; nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-16d box (3^{1/2}&quot; × 0.135&quot;); or 2-16d common (3^{1/2}&quot; × 0.162&quot;); or 3-10d box (3&quot; × 0.128&quot;); or 3-3&quot; × 0.131&quot; nails</td>
<td>End nail</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Fasteners</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------</td>
<td>----------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>17</td>
<td>Top plates, laps at corners and intersections</td>
<td>3-10d box (3&quot; × 0.128&quot;); or 2-16d common (3(\frac{1}{2}) &quot; × 0.162&quot;); or 3-3&quot; × 0.131&quot; nails</td>
<td>Face nail</td>
</tr>
<tr>
<td>18</td>
<td>1&quot; brace to each stud and plate</td>
<td>3-8d box (2(\frac{1}{2}) &quot; × 0.113&quot;); or 2-8d common (2(\frac{1}{2}) &quot; × 0.131&quot;); or 2-10d box (3&quot; × 0.128&quot;); or 2 staples 1(\frac{3}{4}) &quot;</td>
<td>Face nail</td>
</tr>
<tr>
<td>19</td>
<td>1&quot; × 6&quot; sheathing to each bearing</td>
<td>3-8d box (2(\frac{1}{2}) &quot; × 0.113&quot;); or 2-8d common (2(\frac{1}{2}) &quot; × 0.131&quot;); or 2-10d box (3&quot; × 0.128&quot;); or 2 staples, 1&quot; crown, 16 ga., 1(\frac{3}{4}) &quot; long</td>
<td>Face nail</td>
</tr>
<tr>
<td>20</td>
<td>1&quot; × 8&quot; and wider sheathing to each bearing</td>
<td>3-8d box (2(\frac{1}{2}) &quot; × 0.113&quot;); or 3-8d common (2(\frac{1}{2}) &quot; × 0.131&quot;); or 3-10d box (3&quot; × 0.128&quot;); or 3 staples, 1&quot; crown, 16 ga., 1(\frac{3}{4}) &quot; long</td>
<td>Face nail</td>
</tr>
</tbody>
</table>

**Floor**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Fasteners</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Joist to sill, top plate or girder</td>
<td>4-8d box (2(\frac{1}{2}) &quot; × 0.113&quot;); or 3-8d common (2(\frac{1}{2}) &quot; × 0.131&quot;); or 3-10d box (3&quot; × 0.128&quot;); or 3-3&quot; × 0.131&quot; nails</td>
<td>Toe nail</td>
</tr>
</tbody>
</table>

<p>|   |                                                     | 8d box (2(\frac{1}{2}) &quot; × 0.113&quot;) | 4&quot; o.c. toe nail |</p>
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENERa, b, c</th>
<th>SPACING AND LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Rim joist, band joist or blocking to sill or top plate (roof applications also)</td>
<td>8d common ($2^{1/2} \times 0.131$&quot;); or 10d box ($3'' \times 0.128$&quot;; or $3'' \times 0.131$&quot; nails</td>
<td>6&quot; o.c. toe nail</td>
</tr>
<tr>
<td>23</td>
<td>$1'' \times 6''$ subfloor or less to each joist</td>
<td>3-8d box ($2^{1/2} \times 0.113$&quot;); or 2-8d common ($2^{1/2} \times 0.131$&quot;); or 3-10d box ($3'' \times 0.128$&quot;; or 2 staples, 1&quot; crown, 16 ga., $1^{3/4}''$ long</td>
<td>Face nail</td>
</tr>
<tr>
<td>24</td>
<td>2&quot; subfloor to joist or girder</td>
<td>3-16d box ($3^{1/2} \times 0.135$&quot;; or 2-16d common ($3^{1/2} \times 0.162$&quot;)</td>
<td>Blind and face nail</td>
</tr>
<tr>
<td>25</td>
<td>2&quot; planks (plank &amp; beam—floor &amp; roof)</td>
<td>3-16d box ($3^{1/2} \times 0.135$&quot;; or 2-16d common ($3^{1/2} \times 0.162$&quot;)</td>
<td>At each bearing, face nail</td>
</tr>
<tr>
<td>26</td>
<td>Band or rim joist to joist</td>
<td>3-16d common ($3^{1/2} \times 0.162$&quot;) 4-10 box ($3'' \times 0.128$&quot;), or 4-3&quot;× 0.131&quot;nails; or 4-3&quot;× 14 ga. staples, $7/16''$ crown</td>
<td>End nail</td>
</tr>
<tr>
<td>27</td>
<td>Built-up girders and beams, 2-inch lumber layers</td>
<td>20d common ($4'' \times 0.192$&quot;; or 10d box ($3'' \times 0.128$&quot;; or $3'' \times 0.131$&quot;nails</td>
<td>Nail each layer as follows: 32&quot;o.c. at top and bottom and staggered. 24&quot;o.c. face nail at top and bottom staggered on opposite sides</td>
</tr>
</tbody>
</table>

**ITEM**

**DESCRIPTION OF BUILDING ELEMENTS**

**NUMBER AND TYPE OF FASTENERa, b, c**

**SPACING AND LOCATION**
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a&lt;/sup&gt;,&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;c&lt;/sup&gt;</th>
<th>SPACING OF FASTENERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6d common (2&quot;× 0.113&quot;) nail</td>
<td>Edges (inches)&lt;sup&gt;h&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(subfloor, wall)8d common (2&lt;sup&gt;1&lt;/sup&gt;/2 &quot;× 0.131&quot;) nail (roof); or RSRS-01 (2-3/8&quot; x 0.113&quot;) nail (roof)&lt;sup&gt;i&lt;/sup&gt;</td>
<td>6</td>
</tr>
<tr>
<td>30</td>
<td>3&lt;sup&gt;/8&lt;/sup&gt; &quot; – 1&lt;sup&gt;/2&lt;/sup&gt; &quot;</td>
<td>8d common nail (2&lt;sup&gt;1&lt;/sup&gt;/2 &quot;× 0.131&quot;)&lt;sup&gt;j&lt;/sup&gt;; or RSRS-01 (2 3/8&quot; x 0.113&quot;) nail (roof)&lt;sup&gt;i&lt;/sup&gt;</td>
<td>6</td>
</tr>
<tr>
<td>31</td>
<td>19&lt;sup&gt;/32&lt;/sup&gt; &quot; – 1&quot;</td>
<td>10d common (3&quot;× 0.148&quot;) nail; or 8d (21&lt;sup&gt;/2&lt;/sup&gt; &quot;× 0.131&quot;) deformed nail</td>
<td>6</td>
</tr>
<tr>
<td>32</td>
<td>11&lt;sup&gt;/8&lt;/sup&gt; &quot; –11&lt;sup&gt;/4&lt;/sup&gt; &quot;</td>
<td>1&lt;sup&gt;/2&lt;/sup&gt; &quot;structural cellulosec&quot;</td>
<td>Other wall sheathing&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>1&lt;sup&gt;/2&lt;/sup&gt; &quot;galvanized roofing nail&quot;&lt;sup&gt;7&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing

[see Table R602.3(3) for wood structural panel exterior wall sheathing to wall framing]
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Nail Type</th>
<th>Drive Length</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>fiberboard sheathing</td>
<td>1/16&quot; head diameter, or 1&quot; crown staple 16 ga., 1 1/4&quot; long</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>34</td>
<td>25/32&quot; structural cellulosic fiberboard sheathing</td>
<td>3/4&quot; galvanized roofing nail, 7/16&quot; head diameter, or 1&quot; crown staple 16 ga., 1 1/4&quot; long</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>35</td>
<td>1/2&quot; gypsum sheathing</td>
<td>1 1/2&quot; galvanized roofing nail; staple galvanized, 1 1/2&quot; long; 1 1/4&quot; screws, Type W or S</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>36</td>
<td>5/8&quot; gypsum sheathing</td>
<td>3/4&quot; galvanized roofing nail; staple galvanized, 1 5/8&quot; long; 1 5/8&quot; screws, Type W or S</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

**Wood structural panels, combination subfloor underlayment to framing**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Nail Type</th>
<th>Drive Length</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>3/4&quot; and less</td>
<td>6d deformed (2&quot;× 0.120&quot;) nail; or 8d common (2 1/2 &quot;× 0.131&quot;) nail</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>38</td>
<td>7/8&quot; – 1&quot;</td>
<td>8d common (2 1/2 &quot;× 0.131&quot;) nail; or 8d deformed (2 1/2 &quot;× 0.120&quot;) nail</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>39</td>
<td>1 1/8&quot; – 1 1/4&quot;</td>
<td>10d common (3&quot;× 0.148&quot;) nail; or 8d deformed (2 1/2 &quot;× 0.120&quot;) nail</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 ksi = 6.895 MPa.

a. Nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.

b. Staples are 16 gage wire and have a minimum 7/16-inch on diameter crown width.

c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.
d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. Where the ultimate design wind speed is 130 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. Where the ultimate design wind speed is greater than 130 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.

g. Gypsum sheathing shall conform to ASTM C 1396 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to ASTM C 208.

h. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.

i. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

j. RSRS-01 is a Roof Sheathing Ring Shank nail meeting the specifications in ASTM F1667.

**Reason:** This change adds a new standardized roof sheathing ring shank (RSRS) nail for roof sheathing applications. The RSRS nail has been standardized in ASTM F1667 and added in this proposal as equivalent to the 8d common nail to resist uplift of roof sheathing. This standard ring shank nail provides improved withdrawal resistance relative to the 8d common smooth shank nail. A head size of 0.281" diameter is specified for the RSRS-01 in ASTM F1667 which is equivalent to the head diameter of the 8d common nail. The slightly larger net area under the head (i.e. area of head minus area of shank) is considered to provide slightly improved head pull through performance.

**Cost Impact:** Will not increase the cost of construction
An alternative nail is being added only, so there is no increase in cost since the current nailing alternatives may still be used.
### TABLE R602.3 (1)
**FASTENING SCHEDULE**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a, b, c&lt;/sup&gt;</th>
<th>SPACING AND LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Roof</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Blocking between ceiling joists or rafters to top plate</td>
<td>4-8d box (2\frac{1}{2} \times \frac{1}{2} \times 0.113) or 3-8d common (2\frac{1}{2} \times \frac{1}{2} \times 0.131); or 3-10d box (3\times 0.128); or 3-3&quot; × 0.131&quot; nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td>2</td>
<td>Ceiling joists to top plate</td>
<td>4-8d box (2\frac{1}{2} \times \frac{1}{2} \times 0.113); or 3-8d common (2\frac{1}{2} \times \frac{1}{2} \times 0.131); or 3-10d box (3\times 0.128); or 3-3&quot; × 0.131&quot; nails</td>
<td>Per joist, toe nail</td>
</tr>
<tr>
<td>3</td>
<td>Ceiling joist not attached to parallel rafter, laps over partitions [see Sections R802.3.1, R802.3.2 and Table R802.5.1(9)]</td>
<td>4-10d box (3\times 0.128); or 3-16d common (3\frac{1}{2} \times 0.162); or 4-3&quot; × 0.131&quot; nails</td>
<td>Face nail</td>
</tr>
<tr>
<td>4</td>
<td>Ceiling joist attached to parallel rafter (heel joint) [see Sections R802.3.1 and R802.3.2 and Table R802.5.1(9)]</td>
<td>Table R802.5.1(9)</td>
<td>Face nail</td>
</tr>
<tr>
<td>5</td>
<td>Collar tie to rafter, face nail or 1\frac{1}{4} \times 20 ga. ridge strap to rafter</td>
<td>4-10d box (3\times 0.128); or 3-10d common (3\times 0.148); or 4-3&quot; × 0.131&quot; nails</td>
<td>Face nail each rafter</td>
</tr>
<tr>
<td></td>
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<tr>
<td>---</td>
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<td>---</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>Rafter or roof truss to plate</strong></td>
<td>3-16d box nails ($3^{1/2} \times 0.135$); or 3-10d common nails ($3'' \times 0.148$); or 4-10d box ($3'' \times 0.128$); or 4-3'' × 0.131'' nails 2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss^1</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Roof rafters to ridge, valley or hip rafters or roof rafter to minimum 2'' ridge beam</strong></td>
<td>4-16d ($3^{1/2} \times 0.135$); or 3-10d common ($3^{1/2} \times 0.148$); or 4-10d box ($3'' \times 0.128$); or 4-3'' × 0.131'' nails Toe nail</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-16d box $3^{1/2} \times 0.135$; or 2-16d common ($3^{1/2} \times 0.162$); or 3-10d box ($3'' \times 0.128$); or 3-3'' × 0.131'' nails End nail</td>
<td></td>
</tr>
</tbody>
</table>

### Wall

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td><strong>Stud to stud (not at braced wall panels)</strong></td>
<td>16d common ($3^{1/2} \times 0.162$) 24'' o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10d box ($3'' \times 0.128$); or 3'' × 0.131'' nails 16'' o.c. face nail</td>
</tr>
<tr>
<td>9</td>
<td><strong>Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)</strong></td>
<td>16d box ($3^{1/2} \times 0.135$); or 3'' × 0.131'' nails 12'' o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d common ($3^{1/2} \times 0.162$) 16'' o.c. face nail</td>
</tr>
<tr>
<td>10</td>
<td><strong>Built-up header (2'' to 2'' header with 1/2 '' spacer)</strong></td>
<td>16d common ($3^{1/2} \times 0.162$) 16'' o.c. each edge face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d box ($3^{1/2} \times 0.135$) 12'' o.c. each edge face nail</td>
</tr>
<tr>
<td>11</td>
<td><strong>Continuous header to stud</strong></td>
<td>5-8d box ($2^{1/2} \times 0.113$); or 4-8d common ($2^{1/2} \times 0.131$); or 4-10d box ($3'' \times 0.128$) Toe nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d common ($3^{1/2} \times 0.162$) 16'' o.c. face nail</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION OF BUILDING ELEMENTS</td>
<td>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a, b, c&lt;/sup&gt;</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>12</td>
<td>Top plate to top plate</td>
<td>10d box (3&quot; × 0.128”); or 3&quot; × 0.131” nails</td>
</tr>
<tr>
<td>13</td>
<td>Double top plate splice for SDCs A-D2 with seismic braced wall line spacing</td>
<td>8-16d common (3¹/₂ “ × 0.162”); or 12-16d box (3¹/₂ “ × 0.135”); or 12-10d box (3” × 0.128”); or 12-3” × 0.131” nails</td>
</tr>
<tr>
<td></td>
<td>Double top plate splice SDCs D₀, D₁, or D₂; and braced wall line spacing ≥ 25’</td>
<td>12-16d (3¹/₂ “ × 0.135”)</td>
</tr>
<tr>
<td>14</td>
<td>Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)</td>
<td>16d common (3¹/₂ “ × 0.162”)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d box (3¹/₂ “ × 0.135”); or 3” × 0.131” nails</td>
</tr>
<tr>
<td>15</td>
<td>Bottom plate to joist, rim joist, band joist or blocking (at braced wall panel)</td>
<td>3-16d box (3¹/₂ “ × 0.135”); or 2-16d common (3¹/₂ “ × 0.162”); or 4-3” × 0.131” nails</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Top or bottom plate to stud</td>
<td>4-8d box (2¹/₂ “ × 0.113”); or 3-16d box (3¹/₂ “ × 0.135”); or 4-8d common (2¹/₂ “ × 0.131”); or 4-10d box (3” × 0.128”); or 4-3” × 0.131” nails</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-16d box (3¹/₂ “ × 0.135”); or 2-16d common (3¹/₂ “ × 0.162”); or 3-10d box (3” × 0.128”); or 3-3” × 0.131” nails</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Nail Specification</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>17</td>
<td>Top plates, laps at corners and intersections</td>
<td>3-10d box ($3'' \times 0.128''$); or 2-16d common ($3\frac{1}{2}'' \times 0.162''$); or 3-3'' x 0.131'' nails</td>
</tr>
<tr>
<td>18</td>
<td>1'' brace to each stud and plate</td>
<td>3-8d box ($2\frac{1}{2}'' \times 0.113''$); or 2-8d common ($2\frac{1}{2}'' \times 0.131''$); or 2-10d box ($3'' \times 0.128''$); or 2 staples $1\frac{3}{4}''$</td>
</tr>
<tr>
<td>19</td>
<td>1'' x 6'' sheathing to each bearing</td>
<td>3-8d box ($2\frac{1}{2}'' \times 0.113''$); or 2-8d common ($2\frac{1}{2}'' \times 0.131''$); or 2-10d box ($3'' \times 0.128''$); or 2 staples, 1'' crown, 16 ga., $1\frac{3}{4}''$ long</td>
</tr>
</tbody>
</table>
| 20| 1'' x 8'' and wider sheathing to each bearing   | Wider than 1'' x 8''
4-8d box ($2\frac{1}{2}'' \times 0.113''$); or 3-8d common ($2\frac{1}{2}'' \times 0.131''$); or 3-10d box ($3'' \times 0.128''$); or 4 staples, 1'' crown, 16 ga., $1\frac{3}{4}''$ long | Face nail  |
<p>|   | Floor                                           |                                                                                   |             |
| 21| Joist to sill, top plate or girder              | 4-8d box ($2\frac{1}{2}'' \times 0.113''$); or 3-8d common ($2\frac{1}{2}'' \times 0.131''$); or 3-10d box ($3'' \times 0.128''$); or 3-3'' x 0.131'' nails | Toe nail    |
|   |                                                  | 8d box ($2\frac{1}{2}'' \times 0.113''$)                                           |             |
|   |                                                  | 4'' o.c. toe nail                                                                  |             |</p>
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER$^a$, b, c</th>
<th>SPACING AND LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Rim joist, band joist or blocking to sill or top plate (roof applications also)</td>
<td>8d common ($2\frac{1}{2}'' \times 0.131''$); or 10d box ($3'' \times 0.128''$); or $3'' \times 0.131''$ nails</td>
<td>6&quot; o.c. toe nail</td>
</tr>
<tr>
<td>23</td>
<td>1&quot; × 6&quot; subfloor or less to each joist</td>
<td>3-8d box ($2\frac{1}{2}'' \times 0.113''$); or 2-8d common ($2\frac{1}{2}'' \times 0.131''$); or 3-10d box ($3'' \times 0.128''$); or 2 staples, 1&quot; crown, 16 ga., $1\frac{3}{4}''$ long</td>
<td>Face nail</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER$^a$, b, c</th>
<th>SPACING AND LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>2&quot;subfloor to joist or girder</td>
<td>3-16d box ($3\frac{1}{2}'' /2'' \times 0.135''$); or 2-16d common ($3\frac{1}{2}'' /2'' \times 0.162''$)</td>
<td>Blind and face nail</td>
</tr>
<tr>
<td>25</td>
<td>2&quot;planks (plank &amp; beam—floor &amp; roof)</td>
<td>3-16d box ($3\frac{1}{2}'' /2'' \times 0.135''$); or 2-16d common ($3\frac{1}{2}'' /2'' \times 0.162''$)</td>
<td>At each bearing, face nail</td>
</tr>
<tr>
<td>26</td>
<td>Band or rim joist to joist</td>
<td>3-16d common ($3\frac{1}{2}'' /2'' \times 0.162''$) 4-10 box ($3'' \times 0.128''$), or 4-3&quot;×0.131&quot;nails; or</td>
<td>End nail</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION OF BUILDING ELEMENTS</td>
<td>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a, b&lt;/sup&gt;</td>
<td>SPACING OF FASTENERS</td>
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<td>Panel Edges&lt;sup&gt;h&lt;/sup&gt;, Intermediate supports&lt;sup&gt;c, e&lt;/sup&gt; (inches)&lt;sup&gt;h&lt;/sup&gt;</td>
</tr>
<tr>
<td>27</td>
<td>Built-up girders and beams, 2-inch lumber layers</td>
<td>20d common (4&quot;× 0.192&quot;); or 10d box (3&quot;× 0.128&quot;); or 3&quot;× 0.131&quot;nails</td>
<td>Nail each layer as follows: 32&quot;o.c. at top and bottom and staggered. 24&quot;o.c. face nail at top and bottom staggered on opposite sides. Face nail at ends and at each splice.</td>
</tr>
<tr>
<td>28</td>
<td>Ledger strip supporting joists or rafters</td>
<td>4-16d box (3&lt;sup&gt;1/2&lt;/sup&gt; &quot;× 0.135&quot;); or 3-16d common (3&lt;sup&gt;1/2&lt;/sup&gt; &quot;× 0.162&quot;); or 4-10d box (3&quot;× 0.128&quot;); or 4-3&quot;× 0.131&quot;nails</td>
<td>At each joist or rafter, face nail. Bridging to joist 2-10d (3&quot;× 0.128&quot;) Each end, toe nail.</td>
</tr>
</tbody>
</table>

Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing

[see Table R602.3(3) for wood structural panel exterior wall sheathing to wall framing]
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<td>30</td>
<td>3/8 &quot; - 1/2 &quot;</td>
<td>6d common (2&quot;× 0.113&quot;) nail (subfloor, wall)</td>
<td>8d common (2 1/2 &quot;× 0.131&quot;) nail (roof)</td>
<td>6</td>
<td>12 1/2</td>
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<td>32</td>
<td>11/8 &quot; - 11/4 &quot;</td>
<td>10d common (3&quot;× 0.148&quot;) nail; or 8d (2 1/2 &quot;× 0.131&quot;) deformed nail</td>
<td>6</td>
<td>12</td>
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<td>Other wall sheathing g</td>
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<td>33</td>
<td>1/2 &quot;structural cellulosic fiberboard sheathing</td>
<td>1 1/2 &quot;galvanized roofing nail, 7/16 &quot; head diameter, or 1 &quot;crown staple 16 ga., 1 1/4 &quot; long</td>
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<td>34</td>
<td>25/32 &quot;structural cellulosic fiberboard sheathing</td>
<td>1 3/4 &quot;galvanized roofing nail, 7/16 &quot; head diameter, or 1 &quot;crown staple 16 ga., 1 1/4 &quot; long</td>
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<td>35</td>
<td>$\frac{1}{2}$ &quot;gy psum sheathing&quot;</td>
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<td>galvanized roofing nail; staple</td>
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<td>galvanized, $1\frac{1}{2}$ &quot;long; $1\frac{1}{4}$ &quot; screws, Type W or S</td>
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<td>36</td>
<td>$\frac{5}{8}$ &quot;gy psum sheathing&quot;</td>
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<td>$1\frac{3}{4}$ &quot;galvanized roofing nail; staple</td>
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<td>galvanized, $1\frac{5}{8}$ &quot; long; $1\frac{5}{8}$ &quot; screws, Type W or S</td>
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<td></td>
<td>Wood structural panels, combination subfloor underlayment to framing</td>
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<td>37</td>
<td>$\frac{3}{4}$ &quot; and less</td>
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<td>6d deformed (2&quot;× 0.120&quot;) nail; or 8d common (2$\frac{1}{2}$ &quot;× 0.131&quot;) nail</td>
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<td>38</td>
<td>$\frac{7}{8}$ &quot;– 1&quot;</td>
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<td></td>
<td>8d common (2$\frac{1}{2}$ &quot;× 0.131&quot;) nail; or 8d deformed (2$\frac{1}{2}$ &quot;× 0.120&quot;) nail</td>
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<td>39</td>
<td>$\frac{1}{8}$ &quot;– $\frac{1}{4}$ &quot;</td>
<td>6</td>
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<td></td>
<td>10d common (3&quot;× 0.148&quot;) nail; or 8d deformed (2$\frac{1}{2}$ &quot;× 0.120&quot;) nail</td>
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</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 ksi = 6.895 MPa.

a. Nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for Shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.

b. Staples are 16 gage wire and have a minimum \( \frac{7}{16} \) -inch on diameter crown width.

c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. Where the ultimate design wind speed is 130 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. Where the ultimate design wind speed is greater than 130 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for a minimum 48 inch distance from ridges, eaves, and gable end walls; and 4 inches on center to gable end wall framing.

g. For wood structural panel roof sheathing attached to gable end roof framing and to intermediate supports within 48" of roof end zones, eaves, and ridges, nails shall be spaced at 6 inches on center where the ultimate design wind speed is less than 130 mph and shall be spaced 4 inches on center where the ultimate design wind speed is 130 mph or greater but less than 140 mph.

h. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.

i. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

**R803.2.3 Installation.** Wood structural panel used as roof sheathing shall be installed with joints staggered or not staggered in accordance with Table R602.3(1), APA E30 for wood roof framing or with Table R804.3 for cold-formed steel roof framing. **Wood structural panel roof sheathing shall not cantilever more than 9 inches beyond the gable end wall unless supported by gable overhang framing.**

**Reason:** Nailing requirements provided in the IRC Table 602.3(1) were reviewed using loads from ASCE 7-10 Minimum Design Loads for Buildings and Other Structures. Nailing requirements for common species of roof framing with specific gravities of 0.42 or greater (e.g. SPF, Hem-Fir) were analyzed and it was found that the nail spacing requirements in footnote "f" needed to be slightly modified to clarify that nail spacing for all sheathing to framing attached to intermediate supports within 48" of roof end zones, eaves, and ridges must be reduced, not just at the gable end roof framing. For ultimate wind speeds of 130 mph and greater, the threshold for reducing the nail spacing from 6" to 4" in the 48" end zone areas was slightly modified while clarifying that ultimate wind speeds of 140 mph or greater are outside the scope of the IRC structural provisions. The language in footnote "f" was revised to clarify the intent of this footnote. A sentence was also added to R803.2.3 to clarify the appropriate limit on the distance unsupported sheathing can cantilever past the gable end roof framing. Tabulated calculation results based on ASCE 7-10 are provided below: (insert attachment here)
### Cost Impact:
Will not increase the cost of construction.

The change to footnote "f" is a clarification of the current footnote "f" intent. The 9" limit on gable overhang is not really an increase in requirement, but a limitation to allow more efficient nailing patterns.
## 2015 International Residential Code

**TABLE R602.3 (1)**

**FASTENING SCHEDULE**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a, b, c&lt;/sup&gt;</th>
<th>SPACING AND LOCATION</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Roof</td>
<td></td>
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<tr>
<td>1</td>
<td>Blocking between ceiling joists or rafters to top plate</td>
<td>4-8d box (2 1/2 &quot; × 0.113&quot;) or 3-8d common (2 1/2 &quot; × 0.131&quot;); or 3-10d box (3&quot; × 0.128&quot;); or 3-3&quot; × 0.131&quot; nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td>2</td>
<td>Ceiling joists to top plate</td>
<td>4-8d box (2 1/2 &quot; × 0.113&quot;) or 3-8d common (2 1/2 &quot; × 0.131&quot;); or 3-10d box (3&quot; × 0.128&quot;); or 3-3&quot; × 0.131&quot; nails</td>
<td>Per joist, toe nail</td>
</tr>
<tr>
<td>3</td>
<td>Ceiling joist not attached to parallel rafter, laps over partitions [see Sections R802.3.1, R802.3.2 and Table R802.5.1(9)]</td>
<td>4-10d box (3&quot; × 0.128&quot;); or 3-16d common (3 1/2 &quot; × 0.162&quot;); or 4-3&quot; × 0.131&quot; nails</td>
<td>Face nail</td>
</tr>
<tr>
<td>4</td>
<td>Ceiling joist attached to parallel rafter (heel joint) [see Sections R802.3.1 and R802.3.2 and Table R802.5.1(9)]</td>
<td>Table R802.5.1(9)</td>
<td>Face nail</td>
</tr>
<tr>
<td>5</td>
<td>Collar tie to rafter, face nail or 1 1/4 &quot; × 20 ga. ridge strap to rafter</td>
<td>4-10d box (3&quot; × 0.128&quot;); or 3-10d common (3&quot; × 0.148&quot;); or 4-3&quot; × 0.131&quot; nails</td>
<td>Face nail each rafter</td>
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<td></td>
<td>Rafter or roof truss to plate</td>
<td>3-16d box nails ((3^{1/2} \times 0.135)); or 3-10d common nails ((3'' \times 0.148)); or 4-10d box ((3'' \times 0.128)); or 4-3'' \times 0.131'' nails</td>
<td>2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss</td>
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<td></td>
<td>Roof rafters to ridge, valley or hip rafters or roof rafter to minimum 2'' ridge beam</td>
<td>4-16d ((3^{1/2} \times 0.135)); or 3-10d common ((3^{1/2} \times 0.148)); or 4-10d box ((3'' \times 0.128)); or 4-3'' \times 0.131'' nails</td>
<td>Toe nail</td>
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<td>3-16d box (3^{1/2} \times 0.135); or 2-16d common (3^{1/2} \times 0.162); or 3-10d box (3'' \times 0.128); or 3-3'' \times 0.131'' nails</td>
<td>End nail</td>
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<td>Wall</td>
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<td>Stud to stud (not at braced wall panels)</td>
<td>16d common ((3^{1/2} \times 0.162))</td>
<td>24'' o.c. face nail</td>
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<tr>
<td></td>
<td></td>
<td>10d box ((3'' \times 0.128)); or 3'' \times 0.131'' nails</td>
<td>16'' o.c. face nail</td>
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<tr>
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<td>Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)</td>
<td>16d box ((3^{1/2} \times 0.135)); or 3'' \times 0.131'' nails</td>
<td>12'' o.c. face nail</td>
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<td></td>
<td></td>
<td>16d common ((3^{1/2} \times 0.162))</td>
<td>16'' o.c. face nail</td>
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<td>Built-up header (2'' to 2'' header with (1/2'') spacer)</td>
<td>16d common ((3^{1/2} \times 0.162))</td>
<td>16'' o.c. each edge face nail</td>
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<td></td>
<td></td>
<td>16d box ((3^{1/2} \times 0.135))</td>
<td>12'' o.c. each edge face nail</td>
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<td></td>
<td>Continuous header to stud</td>
<td>5-8d box ((2^{1/2} \times 0.113)); or 4-8d common ((2^{1/2} \times 0.131)); or 4-10d box ((3'' \times 0.128))</td>
<td>Toe nail</td>
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<tr>
<td></td>
<td></td>
<td>16d common ((3^{1/2} \times 0.162))</td>
<td>16'' o.c. face nail</td>
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<tr>
<td>ITEM</td>
<td>DESCRIPTION OF BUILDING ELEMENTS</td>
<td>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a, b, c&lt;/sup&gt;</td>
<td>SPACING AND LOCATION</td>
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<tr>
<td>12</td>
<td>Top plate to top plate</td>
<td>10d box (3” × 0.128”); or 3” × 0.131” nails</td>
<td>12” o.c. face nail</td>
</tr>
<tr>
<td>13</td>
<td>Double top plate splice for SDCs A-D2 with seismic braced wall line spacing</td>
<td>8-16d common (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.162”); or 12-16d box (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.135”); or 12-10d box (3” × 0.128”); or 12-3” × 0.131” nails</td>
<td>Face nail on each side of end joint (minimum 24” lap splice length each side of end joint)</td>
</tr>
<tr>
<td></td>
<td>Double top plate splice SDCs D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, or D&lt;sub&gt;2&lt;/sub&gt;; and braced wall line spacing ≥ 25’</td>
<td>12-16d (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.135”)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)</td>
<td>16d common (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.162”)</td>
<td>16” o.c. face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d box (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.135”); or 3” × 0.131” nails</td>
<td>12” o.c. face nail</td>
</tr>
<tr>
<td>15</td>
<td>Bottom plate to joist, rim joist, band joist or blocking (at braced wall panel)</td>
<td>3-16d box (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.135”); or 2-16d common (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.162”); or 4-3” × 0.131” nails</td>
<td>3 each 16” o.c. face nail, 2 each 16” o.c. face nail, 4 each 16” o.c. face nail</td>
</tr>
<tr>
<td>16</td>
<td>Top or bottom plate to stud</td>
<td>4-8d box (2&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.113”; or 3-16d box (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.135”); or 4-8d common (2&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.131”); or 4-10d box (3” × 0.128”); or 4-3” × 0.131” nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-16d box (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.135”); or 2-16d common (3&lt;sup&gt;1&lt;/sup&gt;/&lt;sub&gt;2&lt;/sub&gt; ” × 0.162”); or 3-10d box (3” × 0.128”); or 3-3” × 0.131” nails</td>
<td>End nail</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Nails/Bracing Options</td>
<td>Fixing Method</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>17</td>
<td>Top plates, laps at corners and intersections</td>
<td>3-10d box (3” × 0.128”); or 2-16d common (3¹/₂” × 0.162”); or 3-3” × 0.131” nails</td>
<td>Face nail</td>
</tr>
<tr>
<td>18</td>
<td>1” brace to each stud and plate</td>
<td>3-8d box (2¹/₂” × 0.113”); or 2-8d common (2¹/₂” × 0.131”); or 2-10d box (3” × 0.128”); or 2 staples 1³/₄”</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>1” × 6” sheathing to each bearing</td>
<td>3-8d box (2¹/₂” × 0.113”); or 2-8d common (2¹/₂” × 0.131”); or 2-10d box (3” × 0.128”); or 2 staples, 1” crown, 16 ga., 1³/₄” long</td>
<td>Face nail</td>
</tr>
<tr>
<td>20</td>
<td>1” × 8” and wider sheathing to each bearing</td>
<td>Wider than 1” × 8”</td>
<td>Face nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-8d box (2¹/₂” × 0.113”); or 3-8d common (2¹/₂” × 0.131”); or 3-10d box (3” × 0.128”); or 3 staples, 1” crown, 16 ga., 1³/₄” long</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 staples, 1” crown, 16 ga., 1³/₄” long</td>
<td></td>
</tr>
</tbody>
</table>

**Floor**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Nails/Bracing Options</th>
<th>Fixing Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Joist to sill, top plate or girder</td>
<td>4-8d box (2¹/₂” × 0.113”); or 3-8d common (2¹/₂” × 0.131”); or 3-10d box (3” × 0.128”); or 3-3” × 0.131” nails</td>
<td>Toe nail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8d box (2¹/₂” × 0.113”)</td>
<td>4” o.c. toe nail</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION OF BUILDING ELEMENTS</td>
<td>NUMBER AND TYPE OF FASTENER\textsuperscript{a, b, c}</td>
<td>SPACING AND LOCATION</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------</td>
<td>---------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>22</td>
<td>Rim joist, band joist or blocking to sill or top plate (roof applications also)</td>
<td>8d common ((2^{1/2} \times 0.131)); or 10d box ((3'' \times 0.128)); or 3'' \times 0.131'' nails</td>
<td>6'' o.c. toe nail</td>
</tr>
<tr>
<td>23</td>
<td>1'' \times 6'' subfloor or less to each joist</td>
<td>3-8d box ((2^{1/2} \times 0.113)); or 2-8d common ((2^{1/2} \times 0.131)); or 3-10d box ((3'' \times 0.128)); or 2 staples, 1'' crown, 16 ga., (1^{3/4}'') long</td>
<td>Face nail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER\textsuperscript{a, b, c}</th>
<th>SPACING AND LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>2'' subfloor to joist or girder</td>
<td>3-16d box ((3^{1/2} / 2 \times 0.135)); or 2-16d common ((3^{1/2} / 2 \times 0.162))</td>
<td>Blind and face nail</td>
</tr>
<tr>
<td>25</td>
<td>2'' planks (plank &amp; beam—floor &amp; roof)</td>
<td>3-16d box ((3^{1/2} / 2 \times 0.135)); or 2-16d common ((3^{1/2} / 2 \times 0.162))</td>
<td>At each bearing, face nail</td>
</tr>
<tr>
<td>26</td>
<td>Band or rim joist to joist</td>
<td>3-16d common ((3^{1/2} / 2 \times 0.162)) 4-10 box ((3'' \times 0.128)), or 4-3'' \times 0.131'' nails; or</td>
<td>End nail</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION OF BUILDING ELEMENTS</td>
<td>NUMBER AND TYPE OF FASTENER&lt;sup&gt;a&lt;/sup&gt;,&lt;sup&gt;b&lt;/sup&gt;,&lt;sup&gt;c&lt;/sup&gt;</td>
<td>SPACING OF FASTENERS</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------</td>
<td>-----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>27</td>
<td>Built-up girders and beams, 2-inch lumber layers</td>
<td>4-3” x 14 ga. staples, 7/16” crown</td>
<td>Nail each layer as follows: 32”o.c. at top and bottom and staggered.</td>
</tr>
<tr>
<td></td>
<td>20d common (4” x 0.192”); or</td>
<td>10d box (3” x 0.128”); or 3” x 0.131” nails</td>
<td>24”o.c. face nail at top and bottom staggered on opposite sides</td>
</tr>
<tr>
<td></td>
<td>And: 2-20d common (4” x 0.192”); or 3-10d box (3” x 0.128”); or 3-3” x 0.131” nails</td>
<td></td>
<td>Face nail at ends and at each splice</td>
</tr>
<tr>
<td>28</td>
<td>Ledger strip supporting joists or rafters</td>
<td>4-16d box (3 1/2” x 0.135”); or 3-16d common (3 1/2” x 0.162”); or 4-10d box (3” x 0.128”); or 4-3” x 0.131” nails</td>
<td>At each joist or rafter, face nail</td>
</tr>
<tr>
<td>29</td>
<td>Bridging to joist</td>
<td>2-10d (3” x 0.128”); or</td>
<td>Each end, toe nail</td>
</tr>
</tbody>
</table>

Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing
[see Table R602.3(3) for wood structural panel exterior wall sheathing to wall framing]
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>6d common nail (2&quot; × 0.113&quot;)</th>
<th>19/32&quot; × 0.131&quot;</th>
<th>8d common nail (2 1/2&quot; × 0.131&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>3/8&quot; − 1/2&quot;</td>
<td>6d common nail (subfloor, wall)</td>
<td>19/32&quot; × 0.131&quot;</td>
<td>8d common nail (roof)</td>
</tr>
<tr>
<td>32</td>
<td>11/8&quot; − 11/4&quot;</td>
<td>10d common nail (3&quot; × 0.148&quot;)</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

**Other wall sheathing**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>1 1/2&quot; structural cellulosic fiberboard sheathing</th>
<th>1 1/2&quot; galvanized roofing nail, 7/16&quot; head diameter, or 1&quot; crown staple 16 ga., 1 1/4&quot; long</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>1 1/2&quot;</td>
<td>1 1/2&quot; galvanized roofing nail, 7/16&quot; head diameter, or 1&quot; crown staple 16 ga., 1 1/4&quot; long</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>25/32&quot;</td>
<td>1 3/4&quot; galvanized roofing nail, 7/16&quot; head diameter, or 1&quot; crown staple 16 ga., 1 1/4&quot; long</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>1 1/2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>1 1/2&quot;</td>
<td>6</td>
</tr>
<tr>
<td>34</td>
<td>1 1/2&quot;</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>35</td>
<td>1/2 &quot;gypsum sheathing&lt;sup&gt;d&lt;/sup&gt;</td>
<td>&quot;galvanized roofing nail; staple galvanized, 1 1/2 &quot;long; 1 1/4 &quot; screws, Type W or S</td>
</tr>
<tr>
<td>36</td>
<td>5/8 &quot;gypsum sheathing&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1 3/4 &quot; galvanized roofing nail; staple galvanized, 1 5/8 &quot; long; 1 1/8 &quot; screws, Type W or S</td>
</tr>
</tbody>
</table>

**Wood structural panels, combination subfloor underlayment to framing**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>3/4 &quot; and less</td>
<td>6d deformed (2&quot;× 0.120&quot;) nail; or 8d common (2 1/2 × 0.131&quot;) nail</td>
<td>6</td>
</tr>
<tr>
<td>38</td>
<td>7/8 &quot; - 1&quot;</td>
<td>8d common (2 1/2 × 0.131&quot;) nail; or 8d deformed (2 1/2 × 0.120&quot;) nail</td>
<td>6</td>
</tr>
<tr>
<td>39</td>
<td>1 1/8 &quot; - 1 1/4 &quot;</td>
<td>10d common (3&quot;× 0.148&quot;) nail; or 8d deformed (2 1/2 × 0.120&quot;) nail</td>
<td>6</td>
</tr>
</tbody>
</table>
a. Nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.

b. Staples are 16 gage wire and have a minimum 7/16-inch diameter crown width.

c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. Where the ultimate design wind speed is 130 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. Where the ultimate design wind speed is greater than 130 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48 inch distance from ridges, eaves and gable end walls, and 4 inches on center to gable end wall framing.

g. For wood structural panel roof sheathing attached to gable end roof framing and to intermediate supports within 48” of roof end zones, eaves, and ridges, nails shall be spaced at 4” on center where the ultimate design wind speed is 120 mph or greater but less than 140 mph.

h. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.

i. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

**Revise as follows:**

R803.2.3 Installation. Wood structural panel used as roof sheathing shall be installed with joints staggered or not staggered in accordance with Table R602.3(1), APA E30 for wood roof framing or with Table R804.3 for cold-formed steel roof framing. Wood structural panel roof sheathing shall not cantilever more than 9 inches beyond the gable end wall unless supported by gable overhang framing.

**Reason:** The nailing requirements provided in IRC Table R602.3(1) were reviewed using loads from the New ASCE 7-16 Minimum Design Loads for Buildings and Other Structures. As shown in the table below, calculated wind loads on elements and fasteners with small tributary areas like roof sheathing nails have increased dramatically, almost doubling in the interior portions of the roof (Roof Zone 1).

<table>
<thead>
<tr>
<th>Roof Zone</th>
<th>ASCE 7-10</th>
<th>ASCE 7-16</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GCp</td>
<td>Gcpi</td>
<td>GCp-Gcpi</td>
</tr>
<tr>
<td>1</td>
<td>-1.0</td>
<td>-0.18</td>
<td>-1.2</td>
</tr>
<tr>
<td>2</td>
<td>-1.8</td>
<td>-0.18</td>
<td>-2.0</td>
</tr>
<tr>
<td>2 overhang</td>
<td>-2.8</td>
<td>0.00</td>
<td>-2.8</td>
</tr>
<tr>
<td>3</td>
<td>-3.0</td>
<td>-0.18</td>
<td>-3.2</td>
</tr>
<tr>
<td>3 overhang</td>
<td>-3.7</td>
<td>0.00</td>
<td>-3.7</td>
</tr>
</tbody>
</table>

To determine the impact of the new ASCE 7-16 loading provisions, nailing requirements for common species of roof framing with specific gravities of 0.42 or greater (e.g. SPF, Hem-Fir) were analyzed using ASCE 7-16 and it was found that the nail spacing requirements in Table R602.3(1) needed to be significantly modified, especially in the
interior portion of the roof. As shown in the tabulated results below, nailing at intermediate supports in the interior portions of the roof (Roof Zone 1) need to be reduced from 12" o.c. to 6" o.c. However, changes to loads in the end zone portions of the roof were less significant and required far less adjustment. In fact, the 6" o.c. spacing is appropriate for all connection in the end zone portions, except where ultimate wind speeds equal or exceed 120 mph.

The language in footnote "f" needed to be slightly modified to clarify that nail spacing for all sheathing to framing attached to gable end roof framing and intermediate supports within 48" of roof end zones, eaves and ridges must be reduced from 6" to 4" where ultimate wind speeds exceed 120 mph. Language was also added to clarify that ultimate wind speeds of 140 mph or greater is outside the scope of the IRC structural provisions. A sentence was also added to R803.2.3 to clarify the appropriate limit on the distance unsupported sheathing can cantilever past the gable end roof framing.

Cost Impact: Will increase the cost of construction

Even though much of the proposal is a clarification that should make it easier to use and thereby reduce cost, the change in fastener spacings from 12" to 6" in rows 30 and 31 of the table will increase the number of nails and the time to install, which will increase cost. This increase in cost is the direct result of compliance with the increased wind uplift loads in ASCE 7-16.
TABLE R602.3.2
SINGLE TOP-PLATE SPLICE CONNECTION DETAILS

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>TOP-PLATE SPLICE LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corners and intersecting walls</td>
</tr>
<tr>
<td></td>
<td>Splice plate size</td>
</tr>
<tr>
<td>Structures in SDC A-C; and in SDC D₀, D₁ and D₂ with braced wall line spacing less than 25 feet</td>
<td>3” × 6” × 0.036” galvanized steel plate or equivalent</td>
</tr>
<tr>
<td>Structures in SDC D₀, D₁ and D₂, with braced wall line spacing greater than or equal to 25 feet</td>
<td>3” × 8” by 0.036” galvanized steel plate or equivalent</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
**Reason:** This proposal provides a lumber splice plate option for the metal splice plate options already provided for single top plate splices. Note that the attachment details are referenced back to Table R602.3(1), Item 13. This proposal also corrects the typo made in the 2015 IRC concerning the width of the metal splice plate. Three INCHES is the appropriate width of the metal splice plate as can be seen in the column to the left in the same table.

**Cost Impact:** Will not increase the cost of construction
This change will not increase the cost of construction. It provides a lumber splice option to the metal splice options already in the IRC.
2015 International Residential Code

Add new text as follows:

R602.5 Interior nonbearing walls. Interior nonbearing walls shall be permitted to be constructed with 2-inch by 3-inch (51 mm by 76 mm) studs spaced 24 inches (610 mm) on center or, where not part of a braced wall line, 2-inch by 4-inch (51 mm by 102 mm) flat studs spaced at 16 inches (406 mm) on center. Interior nonbearing walls shall be capped with not less than a single top plate, or when part of a braced wall line shall be capped with a double top plate installed to provide overlapping at corners and intersections. Interior nonbearing walls shall be fireblocked in accordance with Section R602.8.

Reason: Interior nonbearing braced wall lines should be capped with a double top plate and overlapped at corners and intersections in the same manner as interior bearing walls. Without the double top plate connection to intersecting walls and corners the braced wall line is not functioning as it should. A braced wall line with bearing or nonbearing walls must be constructed to withstand the same lateral and shear loads.

Cost Impact: Will not increase the cost of construction
The addition of a double top plate to interior nonbearing braced walls would not increase the cost of construction. The materials would be readily available on site and would not add an increase to the amount of material ordered.
2015 International Residential Code

Revise as follows:

<table>
<thead>
<tr>
<th>SIZE</th>
<th>SUPPORTING ROOF</th>
<th>SUPPORTING FLOOR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GROUND SNOW LOAD (psf)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>DEPTH OF PORCH (feet)</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>2-2 × 6</td>
<td>7-6</td>
<td>5-8</td>
</tr>
<tr>
<td>2-2 × 8</td>
<td>10-1</td>
<td>7-7</td>
</tr>
<tr>
<td>2-2 × 10</td>
<td>12-4</td>
<td>9-4</td>
</tr>
<tr>
<td>2-2 × 12</td>
<td>14-4</td>
<td>10-10</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.
b. Tabulated values assume #2 grade lumber, wet service and incising for refractory species. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.
c. Porch depth is measured horizontally from building face to centerline of the header. For depths between those shown, spans are permitted to be interpolated.
d. Girder and Header Spans may be interpolated for ground snow load values between those listed.

Reason: Possible cost savings to all parties

Cost Impact: Will not increase the cost of construction
Will reduce cost to all parties

RB225-16: R602.7-ARMEL5688
2015 International Residential Code

Revise as follows:

### TABLE R602.7

**GIRDER SPANS** and **HEADER SPANS** for interior bearing walls (Maximum spans for Douglas fir-larch, hem-fir, southern pine, and spruce-pine-fir and required number of jack studs)**

<table>
<thead>
<tr>
<th>HEADERS AND GIRDERS SUPPORTING</th>
<th>SIZE</th>
<th>BUILDING Width (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Span</td>
</tr>
<tr>
<td>One floor only</td>
<td>2×2×4</td>
<td>3-1</td>
</tr>
<tr>
<td></td>
<td>2×2×6</td>
<td>4-6</td>
</tr>
<tr>
<td></td>
<td>2×2×8</td>
<td>5-0</td>
</tr>
<tr>
<td></td>
<td>2×2×10</td>
<td>7-0</td>
</tr>
<tr>
<td></td>
<td>2×2×12</td>
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</tr>
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</tr>
<tr>
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<td>2×2×12</td>
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</tr>
<tr>
<td></td>
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<td>7-2</td>
</tr>
<tr>
<td></td>
<td>4-2×12</td>
<td>8-4</td>
</tr>
</tbody>
</table>

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

a. Spans are given in feet and inches.

b. No. 1 or better grade lumber shall be used for southern pine. Other tabulated values assume #2 grade lumber.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

### TABLE R602.7(2)

**GIRDER SPANS** and **HEADER SPANS** for interior bearing walls (Maximum spans for Douglas fir-larch, hem-fir, southern pine, and spruce-pine-fir and required number of jack studs)**

<table>
<thead>
<tr>
<th>HEADERS AND GIRDERS SUPPORTING</th>
<th>SIZE</th>
<th>BUILDING Width (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Span</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>Njd</td>
<td>Span</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>------</td>
</tr>
<tr>
<td>One floor only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-2x4</td>
<td>4 - 1</td>
<td>1</td>
</tr>
<tr>
<td>2-2x6</td>
<td>6 - 1</td>
<td>1</td>
</tr>
<tr>
<td>2-2x8</td>
<td>7 - 9</td>
<td>1</td>
</tr>
<tr>
<td>2-2x10</td>
<td>9 - 2</td>
<td>1</td>
</tr>
<tr>
<td>2-2x12</td>
<td>10 - 9</td>
<td>1</td>
</tr>
<tr>
<td>3-2x8</td>
<td>9 - 8</td>
<td>1</td>
</tr>
<tr>
<td>3-2x10</td>
<td>11 - 5</td>
<td>1</td>
</tr>
<tr>
<td>3-2x12</td>
<td>13 - 6</td>
<td>1</td>
</tr>
<tr>
<td>4-2x8</td>
<td>11 - 2</td>
<td>1</td>
</tr>
<tr>
<td>4-2x10</td>
<td>13 - 3</td>
<td>1</td>
</tr>
<tr>
<td>4-2x12</td>
<td>15 - 7</td>
<td>1</td>
</tr>
<tr>
<td>Two floors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-2x4</td>
<td>2 - 7</td>
<td>1</td>
</tr>
<tr>
<td>2-2x6</td>
<td>3 - 11</td>
<td>1</td>
</tr>
<tr>
<td>2-2x8</td>
<td>5 - 0</td>
<td>1</td>
</tr>
<tr>
<td>2-2x10</td>
<td>5 - 11</td>
<td>2</td>
</tr>
<tr>
<td>2-2x12</td>
<td>6 - 11</td>
<td>2</td>
</tr>
<tr>
<td>3-2x8</td>
<td>6 - 3</td>
<td>1</td>
</tr>
<tr>
<td>3-2x10</td>
<td>7 - 5</td>
<td>1</td>
</tr>
<tr>
<td>3-2x12</td>
<td>8 - 8</td>
<td>2</td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas Fir-Larch, Hem-Fir, Southern Pine, and Spruce-Pine-Fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (e.g. cripple studs bearing on the header), tabulated spans for headers consisting of 2x8, 2x10, or 2x12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

Reason: The update of Table R602.7(2) Girder Spans and Header Spans for Interior Bearing Walls is proposed. Updated spans address use of Southern Pine No. 2 in lieu of Southern Pine No. 1. Footnote "e" is added to clarify that header spans are based on laterally braced assumption such as when the header is raised. For dropped headers consisting of 2x8, 2x10, or 2x12 sizes that are not laterally braced, a factor of 0.7 can be applied to determine the spans or alternatively the header or girder can be designed to include any adjustment for potential buckling. Laterally braced (raised) and not laterally braced (dropped) header conditions and building widths for which header spans are tabulated represent the same conditions used to develop header span tables in the Wood Frame Construction Manual (WFCM).

Cost Impact: Will increase the cost of construction
Increased cost may be associated with reduced spans that result from the not laterally braced condition and application of footnote e. Due to smaller building width column (12'), permissible use of Southern Pine No. 2, and the laterally
braced assumption for tabulated spans, there are also cases where this change will not increase the cost of construction and may reduce cost of construction.
Table R602.7

<table>
<thead>
<tr>
<th>Girder and header sizes</th>
<th>30</th>
<th>50</th>
<th>70</th>
</tr>
</thead>
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<td>Size</td>
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<td>36</td>
</tr>
<tr>
<td>1-2 × 8</td>
<td>4 1</td>
<td>3 10</td>
<td>2 6</td>
</tr>
<tr>
<td>1-2 × 10</td>
<td>5 1</td>
<td>4 11</td>
<td>4 4</td>
</tr>
<tr>
<td>1-2 × 12</td>
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<td>3 11</td>
<td>6 1</td>
</tr>
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<td>2-2 × 4</td>
<td>2 1</td>
<td>2 2</td>
<td>2 12</td>
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<tr>
<td>2-2 × 6</td>
<td>2 1</td>
<td>2 3</td>
<td>2 3</td>
</tr>
<tr>
<td>2-2 × 8</td>
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<td>2 3</td>
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<tr>
<td>2-2 × 10</td>
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<td>2-2 × 12</td>
<td>2 1</td>
<td>2 3</td>
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<td>3-2 × 8</td>
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<td>2 3</td>
<td>2 3</td>
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<tr>
<td>3-2 × 10</td>
<td>2 1</td>
<td>2 3</td>
<td>2 3</td>
</tr>
<tr>
<td>3-2 × 12</td>
<td>2 1</td>
<td>2 3</td>
<td>2 3</td>
</tr>
<tr>
<td>3-2 × 14</td>
<td>2 1</td>
<td>2 3</td>
<td>2 3</td>
</tr>
<tr>
<td>4-2 × 8</td>
<td>2 1</td>
<td>2 3</td>
<td>2 3</td>
</tr>
<tr>
<td>4-2 × 10</td>
<td>2 1</td>
<td>2 3</td>
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<td>4-2 × 12</td>
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<td>2 3</td>
</tr>
<tr>
<td>4-2 × 14</td>
<td>2 1</td>
<td>2 3</td>
<td>2 3</td>
</tr>
</tbody>
</table>

Proponent: David Tyree, representing American Wood Council (dtyree@awc.org)

2015 International Residential Code

Revise as follows:
<table>
<thead>
<tr>
<th>Roof, ceiling and one center-bearing floor</th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
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<th></th>
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</thead>
<tbody>
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<td>2-2× 8</td>
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<td>5-2</td>
<td>2</td>
<td>4-6</td>
<td>2</td>
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<tr>
<td>2-2× 10</td>
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<td>6-2</td>
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<td>2</td>
<td>6-1</td>
<td>2</td>
</tr>
<tr>
<td>2-2× 12</td>
<td>9-1</td>
<td>2</td>
<td>7-1</td>
<td>2</td>
<td>6-6</td>
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<td>7-4</td>
<td>2</td>
<td>6-6</td>
<td>2</td>
<td>7-6</td>
<td>2</td>
</tr>
<tr>
<td>2-2× 14</td>
<td>11-2</td>
<td>2</td>
<td>8-2</td>
<td>2</td>
<td>7-6</td>
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<td>11-1</td>
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<td>2</td>
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</tr>
<tr>
<td>2-2× 16</td>
<td>13-2</td>
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<td>9-2</td>
<td>2</td>
<td>9-6</td>
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<td>9-6</td>
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<td>9-6</td>
<td>2</td>
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GIRDERS AND HEADERS SUPPORTING

| GROUND-SNOW-LOAD-(psf) 8
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<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
<td>60</td>
<td>70</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building-width (feet)</td>
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<td>28</td>
<td>30</td>
<td>36</td>
<td>20</td>
<td>26</td>
<td>28</td>
<td>30</td>
<td>36</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
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<td>NJd</td>
<td>NJd</td>
<td>NJd</td>
<td>NJd</td>
<td>NJd</td>
<td>NJd</td>
<td>NJd</td>
<td>NJd</td>
<td>NJd</td>
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<td>NJd</td>
<td>NJd</td>
</tr>
<tr>
<td>2-2× 4</td>
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<td>2-3</td>
<td>2</td>
<td>2-0</td>
<td>2</td>
<td>2-6</td>
<td>2</td>
<td>2-2</td>
<td>2</td>
<td>1-11</td>
<td>1</td>
</tr>
<tr>
<td>2-2× 6</td>
<td>2-9</td>
<td>2</td>
<td>2-3</td>
<td>2</td>
<td>2-11</td>
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<td>3-8</td>
<td>2</td>
<td>2-2</td>
<td>2</td>
<td>2-10</td>
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<tr>
<td>2-2× 8</td>
<td>4-9</td>
<td>2</td>
<td>4-2</td>
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<td>3-9</td>
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<td>4-7</td>
<td>2</td>
<td>4-0</td>
<td>2</td>
<td>3-8</td>
<td>2</td>
</tr>
</tbody>
</table>

ICC COMMITTEE ACTION HEARINGS :: April, 2016

RB542
For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a.—Spans are given in feet and inches.
b.—No. 1 or better grade lumber shall be used for southern pine. Other tabulated values assume #2 grade lumber.
c.—Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d.—N2 = Number of jack studs required to support each end. Where the number of required jack stud equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
e.—Use 30-psf ground snow load for cases in which ground snow load is less than 30-psf and the roof live load is equal to or less than 20-psf.

### TABLE R602.7(1)

**GIRDER SPANS**\(^a\) AND **HEADER SPANS**\(^b\) FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, southern pine, and spruce-pine-fir\(^b\) and required number of jack studs)

<table>
<thead>
<tr>
<th><strong>GIRDERS</strong> AND <strong>HEADERS</strong> SUPPORTING</th>
<th><strong>GROUND SNOW LOAD (psf)</strong>(^e)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td><strong>Building width</strong> (feet)</td>
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</tr>
<tr>
<td></td>
<td>24</td>
</tr>
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<td>36</td>
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<td>12</td>
</tr>
<tr>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

\(^a\) Spans are given in feet and inches.

\(^b\) No. 1 or better grade lumber shall be used for southern pine. Other tabulated values assume #2 grade lumber.

\(^c\) Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

\(^d\) N2 = Number of jack studs required to support each end. Where the number of required jack stud equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

\(^e\) Use 30-psf ground snow load for cases in which ground snow load is less than 30-psf and the roof live load is equal to or less than 20-psf.
<table>
<thead>
<tr>
<th>Roof and ceiling</th>
<th>1-2x6</th>
<th>5-1</th>
<th>2</th>
<th>3-1</th>
<th>2</th>
<th>2-7</th>
<th>2</th>
<th>3-5</th>
<th>1</th>
<th>2-8</th>
<th>2</th>
<th>2-3</th>
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<th>3-0</th>
<th>2</th>
<th>2-4</th>
<th>2</th>
<th>2-0</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1-2x8</td>
<td></td>
<td>4-8</td>
<td>2</td>
<td>3-11</td>
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<td>5-2</td>
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<td>3-6</td>
<td>3</td>
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</tr>
<tr>
<td>1-2x10</td>
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<td>4-8</td>
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<td>3-11</td>
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<td>4-0</td>
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<td>3-6</td>
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<td></td>
</tr>
<tr>
<td>1-2x12</td>
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<td>5-5</td>
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<td>4-7</td>
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<td>4-2</td>
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<td>1</td>
<td>2-7</td>
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<td>3-10</td>
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<td>3-6</td>
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<td>3-11</td>
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<td>2-2x8</td>
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<td>5 - 2</td>
<td>2</td>
<td>4 - 1</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Roof,  | 1-       | 2 - 3     | 2 - 9     | 2 - 1     | 1 - 9     | 2 - 7     | 2 - 0     | 1 - 8     |
| ceiling| 2x8      | 2 - 11    | 2 - 1     | 2 - 3     | 2 - 5     | 3 - 3     | 2 - 6     | 2 - 2     |
| and    | 1-       | 3 - 9     | 2 - 10    | 2 - 5     | 3 - 6     | 2 - 8     | 2 - 3     | 3 - 3     |
| one    | 2x10     | 1 - 11    | 2         | 2 - 1     | 2 - 3     | 3 - 3     | 2 - 6     | 3 - 2     |
| clear  | 1-       | 4 - 5     | 3 - 5     | 2 - 10    | 3 - 4     | 4 - 10    | 3 - 9     | 3 - 0     |
| span   | 2x8      | 2 - 5     | 3 - 4     | 3 - 2     | 4 - 1     | 4 - 7     | 3 - 6     | 3 - 0     |
| floor  | 1-       | 5 - 2     | 4 - 0     | 3 - 4     | 4 - 10    | 3 - 9     | 3 - 2     | 4 - 7     |

ICC COMMITTEE ACTION HEARINGS ::: April, 2016
<table>
<thead>
<tr>
<th>Roof, ceiling and two center-bearing floors</th>
<th>1-2x6</th>
<th>1-2x8</th>
<th>1-2x10</th>
<th>1-2x12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2x6</td>
<td>2-8</td>
<td>2-4</td>
<td>2-9</td>
<td>2-10</td>
</tr>
<tr>
<td>1-2x8</td>
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<td>2-8</td>
<td>2-4</td>
<td>2-9</td>
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<tr>
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<td>4-0</td>
<td>2-3</td>
<td>2-9</td>
<td>3-10</td>
</tr>
<tr>
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<td>3-9</td>
<td>3-2</td>
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</tr>
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<td>2-8</td>
<td>3-9</td>
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<td>4-9</td>
<td>3-9</td>
<td>3-2</td>
<td>4-2</td>
</tr>
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<td>1-2</td>
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</tr>
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<td>3-2</td>
<td>2-8</td>
<td>3-9</td>
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<td>3-4</td>
<td>2-10</td>
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</tr>
<tr>
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<td>3-7</td>
<td>2-8</td>
</tr>
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<td>5-0</td>
<td>4-2</td>
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<td>2-8</td>
</tr>
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<td>6-1</td>
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</tr>
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<td>8-6</td>
<td>7-2</td>
<td>2-8</td>
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<tr>
<td>4-2x12</td>
<td>11-2</td>
<td>8-6</td>
<td>7-2</td>
<td>2-8</td>
</tr>
<tr>
<td>Width</td>
<td>Length</td>
<td>2x6</td>
<td>2x8</td>
<td>2x10</td>
</tr>
<tr>
<td>-------</td>
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<td>2</td>
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<tr>
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</table>

Roof, ceiling and two clear span floors:

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<tr>
<th>Width</th>
<th>Length</th>
<th>1x6</th>
<th>1x8</th>
<th>1x10</th>
<th>1x12</th>
<th>3x6</th>
<th>3x8</th>
<th>3x10</th>
<th>3x12</th>
<th>4x6</th>
<th>4x8</th>
<th>4x10</th>
<th>4x12</th>
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<th>5x8</th>
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<th>5x12</th>
<th>6x8</th>
<th>6x10</th>
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<tr>
<td>1x6</td>
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</tr>
<tr>
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<td>2</td>
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</tr>
<tr>
<td>2x8</td>
<td>4</td>
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<td>3</td>
<td>3</td>
<td>3</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas Fir-Larch, Hem-Fir, Southern Pine, and Spruce-Pine-Fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

f. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (e.g. cripple studs bearing on the header), tabulated spans for headers consisting of 2x8, 2x10, or 2x12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

Reason: The update of Table R602.7(1) Girder Spans and Header Spans for Exterior Bearing Walls is proposed. Updated spans address use of Southern Pine No. 2 in lieu of Southern Pine No. 1. Footnote "e" is added to clarify that
header spans are based on laterally braced assumption such as when the header is raised. For dropped headers consisting of 2x8, 2x10, or 2x12 sizes that are not laterally braced, a factor of 0.7 can be applied to determine the spans or alternatively the header or girder can be designed to include any adjustment for potential buckling. Laterally braced (raised) and not laterally braced (dropped) header conditions and building widths for which header spans are tabulated represent the same conditions used to develop header span tables in the Wood Frame Construction Manual (WFCM).

Cost Impact: Will increase the cost of construction
Increased cost may be associated with reduced spans that result from the not laterally braced condition and application of footnote f. Due to smaller building width column (12'), permissible use of Southern Pine No. 2, and the laterally braced assumption for tabulated spans, there are also cases where this change will not increase the cost of construction and may reduce cost of construction.
2015 International Residential Code

Revise as follows:

**FIGURE R602.7.2**
RIM BOARD HEADER CONSTRUCTION

- Rim board header splices are not permitted over the header span.
- Single-ply or two-ply rim board header as required.
- Joist hanger required where bearing distance is < 1\(\frac{1}{2}\) inches.
- Rim board header end or splice 6 inches past outer full-height stud.

One or more full-height studs in accordance with section R602.7.2.
**Reason:** This figure revision clarifies requirements for joist hangers in rim board header applications. Joist hangers are always required for attachment of joist to header over the header span to ensure that the load is not transferred to the unsupported portion of the top plate. Joist ends that bear on the portion of the top plate that is directly supported below by full height studs, and with a bearing length of 1.5” or greater, do not require the use of joist hangers.

**Cost Impact:** Will not increase the cost of construction
This revision corrects the illustration detail in the previous code edition, and is primarily editorial in nature. Therefore, no increased cost are associated with this change.
2015 International Residential Code

R602.7.5 Supports for headers. Headers shall be supported on each end with one or more jack studs or with approved framing anchors in accordance with Table R602.7(1) or R602.7(2). The full-height stud adjacent to each end of the header shall be end nailed to each end of the header with four-16d nails (3.5 inches × 0.135 inches). The minimum number of full-height studs at each end of a header shall be in accordance with Table R602.7.5.

### TABLE R602.7.5
MINIMUM NUMBER OF FULL HEIGHT STUDS AT EACH END OF HEADERS IN EXTERIOR WALLS

<table>
<thead>
<tr>
<th>HEADER SPAN (feet)</th>
<th>MAXIMUM STUD SPACING (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[per Table R602.3(5)]</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td>≤3′</td>
<td>1</td>
</tr>
<tr>
<td>4′</td>
<td>2</td>
</tr>
<tr>
<td>8′</td>
<td>3</td>
</tr>
<tr>
<td>12′</td>
<td>5</td>
</tr>
<tr>
<td>16′</td>
<td>6</td>
</tr>
</tbody>
</table>

### ULTIMATE DESIGN WIND SPEED AND EXPOSURE CATEGORY

<table>
<thead>
<tr>
<th>MAXIMUM HEADER SPAN (feet)</th>
<th>&lt; 140 mph, Exposure B or &lt; 130 mph, Exposure C</th>
<th>≤ 115 mph, Exposure B(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
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<td>2</td>
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<tr>
<td>14</td>
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<td>16</td>
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<td>2</td>
</tr>
<tr>
<td>18</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

a. For header spans between those given above, use the minimum number of full-height studs associated with the larger header span.

b. The tabulated minimum number of full-height studs is applicable where jack studs are provided to support the header at each end in accordance with Table R602.7.1(1). Where a framing anchor is used to support the header in lieu of a jack stud in accordance with footnote "d" of Table R602.7.1(1), the minimum number of full-height studs at each end of a header shall be in accordance with requirements for wind speed < 140 mph, Exposure B.

**Reason:** This change simplifies the full height stud (e.g. king stud) table while also removing conservatism and limited applicability of the 16" maximum stud spacing case. The number of full-height studs is based on out-of-plane wind resistance provided by the stud to plate nailing. The connection resistance has been increased from prior code editions based on RB272-13, approved last cycle. Wind loads are based on an assumption that full-height studs on either side of the opening carry 100% of the out-of-plane wind loads. Reference conditions for the calculations assume a 9' wall height and wall Zone 4 pressures for header spans greater than 6 feet and wall Zone 5 pressures for header spans less than 6 feet. The number of full height studs required by calculation is limited to the maximum number displaced by the opening. Footnote "a" clarifies that the number of full-height studs for intermediate header spans is based on the next larger header span. Footnote "b" provides a basic assumption of the tabulated requirements—that headers are supported at each end by jack studs. When jack stud support is not provided, such as when an approved anchor is used in lieu of a jack stud, the full height stud on either side of the opening is carrying both out-of-plane wind loads and gravity loads. For that case, footnote "b" indicates that the < 140 mph Exposure B column associated with the number of studs displaced by the opening is applicable. The reduced number of full-height studs associated with 115 mph Exposure B applies only in those lower wind pressure areas where jack stud support is provided to the header at each end.

**Cost Impact:** Will not increase the cost of construction.

The proposed table will require less full-height studs than are currently required in some circumstances, and will never require more than are currently required. Therefore the cost of construction will not increase.
2015 International Residential Code
SECTION R602 WOOD WALL FRAMING

### TABLE R602.10.3 (2)
WIND ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON</th>
<th>STORY/SUPPORTING</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR&lt;sup&gt;a&lt;/sup&gt; &lt;sup&gt;b&lt;/sup&gt;</th>
<th>APPLICABLE METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>One-story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1.20</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1.50</td>
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</tr>
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<td>1</td>
<td>Exposure category</td>
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<td>1.00</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
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<td>D</td>
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</tr>
<tr>
<td></td>
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<td>Three-story structure</td>
<td>B</td>
<td>1.00</td>
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<td></td>
<td></td>
<td>C</td>
<td>1.40</td>
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<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roof only</td>
<td>≤ 5 feet</td>
<td></td>
<td>0.70</td>
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<td></td>
<td></td>
<td>10 feet</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roof eave-to-ridge height</td>
<td>Roof + 1 floor</td>
<td>Roof + 2 floors</td>
<td>All methods</td>
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<td>---</td>
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<td>----------------</td>
<td>-------------</td>
<td></td>
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<tr>
<td>2</td>
<td></td>
<td>15 feet 1.30</td>
<td>≤ 5 feet 0.85</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 feet 1.60</td>
<td>10 feet 1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td>15 feet 1.15</td>
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<td>20 feet 1.30</td>
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<td>3</td>
<td>Wall height adjustment</td>
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<td></td>
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<td>9 feet 0.95</td>
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<td>10 feet 1.00</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11 feet 1.05</td>
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<td></td>
<td>12 feet 1.10</td>
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</tr>
<tr>
<td>4</td>
<td>Number of braced wall lines (per plan direction)(^c)</td>
<td>2 1.00</td>
<td>2 1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td>3 1.30</td>
<td>3 1.30</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>4 1.45</td>
<td>4 1.45</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>≥ 5 1.60</td>
<td>≥ 5 1.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Additional 800-pound hold-down device</td>
<td>Top story only</td>
<td>Fastened to the end studs of each braced wall panel and to the</td>
<td>DWB, WSP, SFB, PBS, PCP, HPS</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.48 N.

a. Linear interpolation shall be permitted.

b. The total adjustment factor is the product of all applicable adjustment factors.

c. The adjustment factor is permitted to be 1.0 when determining bracing amounts for intermediate braced wall lines provided the bracing amounts on adjacent braced wall lines are based on a spacing and number that neglects the intermediate braced wall line.

## TABLE R602.10.3 (4)

**SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING**

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON:</th>
<th>STORY</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR$^a, b$</th>
<th>APPLICABLE METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Story height (Section 301.3)</td>
<td>Any story</td>
<td>≤ 10 feet</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 10 feet and ≤ 12 feet</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>Description</td>
<td>Unit</td>
<td>Factor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All methods</td>
<td>Braced wall line spacing, townhouses in SDC C</td>
<td>Any story</td>
<td>≤ 35 feet</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>All methods</td>
<td>&gt; 35 feet and ≤ 50 feet</td>
<td>1.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Braced wall line spacing, in SDC D₀, D₁, D₂c</td>
<td>Any story</td>
<td>&gt; 25 feet and ≤ 30 feet</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>All methods</td>
<td>&gt; 30 feet and ≤ 35 feet</td>
<td>1.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wall dead load</td>
<td>Any story</td>
<td>&gt; 8 psf and &lt; 15 psf</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>All methods</td>
<td>&lt; 8 psf</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Roof/ceiling dead load for wall supporting</td>
<td>1-, 2- or 3-story building</td>
<td>≤ 15 psf</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Walls with stone or masonry veneer, townhouses in SDC C&lt;sub&gt;d, e&lt;/sub&gt;</td>
<td>Any story</td>
<td>See Table R602.10.6.5</td>
<td>BV-WSP</td>
<td></td>
</tr>
</tbody>
</table>

All methods
### R602.10.10 R602.10.4.4 Panel joints

Vertical joints of panel sheathing shall occur over, and be fastened to, common studs. Horizontal joints of panel sheathing in braced wall panels shall occur over, and be fastened to, common blocking of a minimum 1\(\frac{1}{2}\) inch (38 mm) thickness.

**Exceptions:**

1. Vertical joints of panel sheathing shall be permitted to occur over double studs, where adjoining panel edges are attached to separate studs with the required panel edge fastening schedule, and the adjacent studs are attached together with two rows of 10d box nails [3 inches by 0.128 inch (76.2 mm by 3.25 mm)] at 10 inches o.c. (254 mm). For methods WSP and CS-WSP, blocking of horizontal joints is permitted to be omitted when adjustment factor

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

c. The length-to-width ratio for the floor/roof diaphragm shall not exceed 3:1. The top plate lap splice nailing shall be in accordance with Table R602.3(1), Item 13.

d. Applies to stone or masonry veneer exceeding the first story height.

e. The adjustment factor for stone or masonry veneer shall be applied to all exterior braced wall lines and all braced wall lines on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

f. See Section R602.10.6.5 for requirements where stone or masonry veneer does not exceed the first-story height.

---

<table>
<thead>
<tr>
<th></th>
<th>dwellings in SDC D0 – D2&lt;sup&gt;d, f&lt;/sup&gt;</th>
<th></th>
<th></th>
<th>DWB, WSP, SFB, PBS, PCP, HPS, CS-WSP, CS-G, CS-SFB</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Interior gypsum board finish (or equivalent)</td>
<td>Any story</td>
<td>Omitted from inside face of braced wall panels</td>
<td>1.5</td>
</tr>
<tr>
<td>9</td>
<td>Horizontal blocking</td>
<td>Any story</td>
<td>Horizontal blocking is omitted</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>WSP, CS-WSP</td>
</tr>
</tbody>
</table>

---

**Table:**

- **dwellings in SDC D0 – D2<sup>d, f</sup>:** Any story
- **Horizontal blocking:** Any story
- **Horizontal blocking is omitted:** Any story
- **WSP, CS-WSP:** Any story
number 8 of Table R602.10.3(2) or number 9 of Table R602.3(4) is applied.

2. Blocking at horizontal joints shall not be required in wall segments that are not counted as braced wall panels.

3. Where the bracing length provided is not less than twice the minimum length required by Tables R602.10.3(1) and R602.10.3(3), blocking at horizontal joints shall not be required in braced wall panels constructed using Methods WSP, SFB, GB, PBS or HPS.

4. Where Method GB panels are installed horizontally, blocking of horizontal joints is not required.

1. For methods WSP and CS-WSP, blocking of horizontal joints is permitted to be omitted when adjustment factor number 8 of Table R602.10.3(2) or number 9 of Table R602.3(4) is applied.

2. Vertical joints of panel sheathing shall be permitted to occur over double studs, where adjoining panel edges are attached to separate studs with the required panel edge fastening schedule, and the adjacent studs are attached together with two rows of 10d box nails [3 inches by 0.128 inch (76.2 mm by 3.25 mm)] at 10 inches o.c. (254 mm).

3. Blocking at horizontal joints shall not be required in wall segments that are not counted as braced wall panels.

4. Where Method GB panels are installed horizontally, blocking of horizontal joints is not required.

Reason: WHAT: This code change proposal is intended to move requirements for construction of braced wall panels in R602.10.10 and move it to the section on construction methods for braced wall panels in R602.10.4, and move an existing bracing amount correction from R602.10.10 (exception #3) into the Adjustment Factor Tables, R602.10.3(2) for wind and R602.10.3(4) for seismic.

WHY: Several members of the past ICC Ad Hoc Wall Bracing committee discussed this issue and agreed that the existing language is confusing and that it made sense to move this this correction factor into the tables with all of the other adjustment factors. Currently this adjustment factor for horizontal blocking is virtually lost because it is near the end of the wall bracing section.

While discussing the issue, it became apparent to the members that there were some wrong materials listed in R602.10.10. Revisions of the panels that are permitted to omit horizontal blocking is based on the shear wall provisions of the AWC Special Design Provisions for Wind and Seismic (2015 SDPWS). That document is the code-referenced standard for design of shear walls, and it permits unblocked WSP shear walls only if the capacity is reduced by half. For SFB and PB shear walls, all panel edges are required to be blocked. Data was submitted to the ICC Ad Hoc Wall Bracing Committee regarding no reduction for horizontal gypsum board. Since SFB, vertical GB and HPS are not permitted to be unblocked, they were eliminated from the table.

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Cost Impact: Will not increase the cost of construction
This code should not increase the cost of construction.
Under the 2015 IRC, it is possible that if the bracing amount is doubled, then blocking could be omitted for SFB, vertical GB, or HPS. This option will not be available if this proposal is approved. But the cost of the blocking is far less than the cost of doubling the bracing amount so there should be no cost increase.
## 2015 International Residential Code
### SECTION R602 WOOD WALL FRAMING

#### TABLE R602.10.3 (2) (2)
**WIND ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING**

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON</th>
<th>STORY/SUPPORTING</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR&lt;sup&gt;a&lt;/sup&gt;,&lt;sup&gt;b&lt;/sup&gt; [multiply length from Table R602.10.3(1) by this factor]</th>
<th>APPLICABLE METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exposure category 1</td>
<td>One-story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two-story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Three-story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤ 5 feet</td>
<td></td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 feet</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Adjustment factor based on story/supporting condition

<sup>b</sup> Adjustment factor applied to length from Table R602.10.3(1)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Roof only</th>
<th>Roof + 1 floor</th>
<th>Roof + 2 floors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td>15 feet</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 feet</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤ 5 feet</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 feet</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 feet</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 feet</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤ 5 feet</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 feet</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 feet</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 feet</td>
<td>Not permitted</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>8 feet</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 feet</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 feet</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 feet</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 feet</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>2</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>1.45</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 5</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>Fastened to the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>end studs of each</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>braced wall panel</td>
</tr>
</tbody>
</table>

Wall height adjustment:
- Any story
  - 8 feet: 0.90
  - 9 feet: 0.95
  - 10 feet: 1.00
  - 11 feet: 1.05
  - 12 feet: 1.10

Number of braced wall lines (per plan direction)C:
- Any story
  - 2: 1.00
  - 3: 1.30
  - 4: 1.45
  - ≥ 5: 1.60

Additional 800-pound hold-down:
- Top story only
  - Fastened to the end studs of each braced wall panel: 0.80

ICC COMMITTEE ACTION HEARINGS :::: April, 2016

DWB, WSP, SFB, PBS, PCP,
<table>
<thead>
<tr>
<th></th>
<th>6</th>
<th>Interior gypsum board finish (or equivalent)</th>
<th>Any story</th>
<th>Omitted from inside face of braced wall panels</th>
<th>1.40</th>
<th>DWB, WSP, SFB, PBS, PCP, HPS, CS-WSP, CS-G, CS-SFB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
<td>Gypsum board fastening</td>
<td>Any story</td>
<td>4 inches o.c. at panel edges, including top and bottom plates, and all horizontal joints blocked</td>
<td>0.7</td>
<td>GB</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.48 N.

a. Linear interpolation shall be permitted.

b. The total adjustment factor is the product of all applicable adjustment factors.

c. The adjustment factor is permitted to be 1.0 when determining bracing amounts for intermediate braced wall lines provided the bracing amounts on adjacent braced wall lines are based on a spacing and number that neglects the intermediate braced wall line.

d. The same adjustment factor shall be applied to all braced wall lines on all floors of the structure, based on worst case exposure category.

Reason: ICC staff requested an unofficial interpretation from the past ICC Ad Hoc Wall Bracing Committee regarding how the adjustment factor for Exposure Category applied. The new footnote has been vetted by several of the past members and is being submitted to clarify the intent. Concurrently, icons have been added to further clarify the intention of both the exposure category and the eave-to-ridge height.
<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON</th>
<th>STORY/SUPPORTING</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR</th>
<th>APPLICABLE METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exposure category</td>
<td>One story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two-story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Three-story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1.70</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Roof eave-to-ridge height</td>
<td>Roof only</td>
<td>≤ 5 feet</td>
<td>.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 feet</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15 feet</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 feet</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roof + 1 floor</td>
<td>≤ 5 feet</td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 feet</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15 feet</td>
<td>1.15</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 feet</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roof + 2 floors</td>
<td>≤ 5 feet</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 feet</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15 feet</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 feet</td>
<td>Not permitted</td>
<td></td>
</tr>
</tbody>
</table>
**Cost Impact:** Will not increase the cost of construction

The intention has not changed from previous 2012 and 2015 versions. Therefore there is no cost implications.

**Analysis:** Icons in the table will be installed as shown in the proponent's reason statement.
2015 International Residential Code

Revise as follows:

TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED

<table>
<thead>
<tr>
<th>Ultimate Design Wind Speed (mph)</th>
<th>Story Location</th>
<th>Braced Wall Line Spacing (feet)</th>
<th>Method LIB</th>
<th>Method GB</th>
<th>Methods</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP, ABW, PH, PFC, CS-SFB</td>
<td>CS-WSP, CS-G, CS-PF</td>
</tr>
<tr>
<td>≤110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>3.5</td>
<td>3.5</td>
<td>2.0</td>
<td>1.5</td>
</tr>
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<td>6.0</td>
<td>6.0</td>
<td>3.5</td>
<td>3.0</td>
</tr>
<tr>
<td>30</td>
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<td>8.5</td>
<td>8.5</td>
<td>5.0</td>
<td>4.5</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td>11.5</td>
<td>11.5</td>
<td>6.5</td>
<td>5.5</td>
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<td>50</td>
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<td></td>
<td>14.0</td>
<td>14.0</td>
<td>8.0</td>
<td>7.0</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td>16.5</td>
<td>16.5</td>
<td>9.5</td>
<td>8.0</td>
</tr>
<tr>
<td>≤115</td>
<td></td>
<td></td>
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<td></td>
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</tr>
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<td>10</td>
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<td>NP</td>
<td>9.5</td>
<td>5.5</td>
<td>4.5</td>
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<td>NP</td>
<td>17.0</td>
<td>10.0</td>
<td>8.5</td>
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Proponent: Edward Keith, representing APA- The Engineered Wood Association (ed.keith@apawood.org)
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For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

a. Linear interpolation shall be permitted.

b. Method LIB shall have gypsum board fastened to not less than one side with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

c. Where a braced wall line has parallel braced wall lines on one or both sides of differing dimensions, the average dimension shall be permitted to be used for braced wall line spacing.

d. Methods ABW, PFH, and PFG may be used in conjunction with any bracing method permitted above and shall contribute to the amount of bracing assigned to that bracing method. When used alone in a braced wall line without any other bracing method, they shall be assigned the braced wall line lengths required for Method WSP.

**Reason:** Footnote (d) is proposed to cover the methods deleted from the table in the first part of the proposed code change. As the column headings are currently written, the table could be interpreted to mean that Methods ABW, PFH, and PFG can only be used in conjunction with the other methods listed in that column heading. This is not the intent of the code.

Methods ABW, PFH, and PFG are narrow wall bracing methods and, as described in the text of the IRC, are permitted to be used with any bracing method. They contribute bracing to the required bracing length for the primary bracing method in the braced wall line where they are used.

In addition, all three of these methods were originally evaluated using Method WSP as the standard for comparison. Thus, when used by themselves in a braced wall line (For example, a garage section with a PFH on both sides of the garage door and no other bracing in the wall line.), the required bracing length is determined from the Method WSP column in Table R602.10.3(1).

**Cost Impact:** Will not increase the cost of construction.

This code change will not increase the cost of construction. It clarifies the original intent of the code and is likely to save money in the long run as it makes misinterpreting the existing code less likely.
**RB233-16**

**IRC: R602.10.3.**

**Proponent:** Edward Keith, representing APA-The Engineered Wood Association (ed.keith@apawood.org)

**2015 International Residential Code**

Revise as follows:

**TABLE R602.10.3 (1)**

**BRACING REQUIREMENTS BASED ON WIND SPEED**

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*Notes:*
- **LIB** is a specific bracing system or method.
- **Method GB** refers to another bracing method.
- **Methods** include a variety of bracing techniques.

**ICC COMMITTEE ACTION HEARINGS ::: April, 2016**
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</table>

ICC COMMITTEE ACTION HEARINGS ::: April, 2016
### Minimum Total Length (Feet) of Braced Wall Panels Required Along Each Braced Wall Line

<table>
<thead>
<tr>
<th>Ultimate Design Wind Speed (mph)</th>
<th>Story Location</th>
<th>Braced Wall Line Spacing (feet)</th>
<th>Method LIB</th>
<th>Method GB</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP, ABW, PFH, PFG, CS-SFB&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CS-WSP, CS-G, CS-PF</td>
</tr>
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- **EXPOSURE CATEGORY B**
- **30-FOOT MEAN ROOF HEIGHT**
- **10-FOOT WALL HEIGHT**
- **2 BRACED WALL LINES**
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<td>Ultimate Design Wind Speed (mph)</td>
<td>Story Location</td>
<td>Braced Wall Line Spacing (feet)</td>
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</tr>
</tbody>
</table>

\(^a\) MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE

\(^b\) LIB

\(^c\) CS-SFB
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

<table>
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<tr>
<th></th>
<th>10</th>
<th>10.0</th>
<th>10.0</th>
<th>6.0</th>
<th>5.0</th>
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<td>75.5</td>
<td>43.0</td>
<td>36.5</td>
<td></td>
</tr>
</tbody>
</table>

(a) Linear interpolation shall be permitted.
(b) Method LIB shall have gypsum board fastened to not less than one side with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

(c) Where a braced wall line has three or more parallel braced wall lines on one or both sides of differing dimensions are present and the distances between adjacent braced wall lines are different, the average dimension shall be permitted to be used for braced wall line spacing.

**Reason:** The callout for Footnote (c) was inadvertently left off of the table. This proposal places it in the table in the appropriate location.

As Footnote (c) is currently written, it is unclear that the "differing dimensions" discussed are the distance between braced wall lines and not braced wall line lengths. In addition, for differing distances between braced wall lines to be possible, there must be at least 3 parallel braced wall lines. As such it is not possible for this to be true if the parallel braced wall line exists only on "one side". The proposed language corrects this possible point of confusion while more clearly stating the intent of the provision.

**Cost Impact:** Will not increase the cost of construction

This code changes has no impact on the cost of construction. It clarifies the original intent of the Code.
# 2015 International Residential Code

## TABLE R602.10.3 (2)
**WIND ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING**

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON</th>
<th>STORY/SUPPORTING</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR&lt;sup&gt;a&lt;/sup&gt;&lt;br&gt;×&lt;sup&gt;b&lt;/sup&gt;[multiply length from Table R602.10.3(1) by this factor]</th>
<th>APPLICABLE METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Exposure category</td>
<td>One-story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>1.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
<td>1.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Two-story structure</td>
<td>B</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>1.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
<td>1.60</td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>Three-story structure</td>
<td>B</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>1.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
<td>1.70</td>
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</tr>
<tr>
<td></td>
<td>Roof only</td>
<td>≤ 5 feet</td>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 feet</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 feet</td>
<td>1.30</td>
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<td></td>
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</tbody>
</table>

<sup>a</sup> Adjustment factor

<sup>b</sup> Multiply length from Table R602.10.3(1) by this factor
<table>
<thead>
<tr>
<th></th>
<th>Roof eave-to-ridge height</th>
<th>Roof + 1 floor</th>
<th>Roof + 2 floors</th>
<th>All methods</th>
</tr>
</thead>
<tbody>
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<td>2</td>
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<td>20 feet</td>
<td>≤ 5 feet</td>
<td>0.85</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td></td>
<td>20 feet</td>
<td>20 feet</td>
<td>1.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>≤ 5 feet</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>20 feet</td>
<td>Not permitted</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Wall Story height adjustment (R301.3)</th>
<th>Any story</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>8 feet</td>
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<td>11 feet</td>
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<td>12 feet 1 inch - 7 inches</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Number of braced wall lines (per plan direction)</th>
<th>Any story</th>
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<td>≥ 5</td>
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<table>
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<tr>
<th></th>
<th>Additional 800-pound hold-down device</th>
<th>Top story only</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>Fastened to the end studs of each braced wall panel and to the</td>
<td>0.80</td>
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<tr>
<td></td>
<td>DWB, WSP, SFB, PBS, PCP, HPS</td>
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</tbody>
</table>
Reason: In the 2015 edition of the IRC, changes were made to Section R301.3 that shifted the emphasis from wall height to story height. As a result, there is no limitation on wall height as long as the story height does not exceed 11'-7". As a result of this change, the terminology used in the wall bracing adjustment tables (Tables R602.10.3(2) and R602.10.3(4)) was reevaluated. In reviewing these tables, it was found that the seismic adjustment table (Table R602.10.3(4)) was already written in terms of "story height." However, the wind adjustment table (Table R602.10.3(2)) in item 3 shown above still referenced "wall height". The proposed change does three things. It first makes the adjustment based on story height to put it in line with the seismic adjustment table as well as Section R301.3. Secondly, it limits the story height to 11'-7" per Section R301.3 and the new corresponding adjustment factor was interpolated based on the existing values for the adjustment factors for 11 and 12 feet. The third proposed change is to format the "ADJUSTMENT BASED ON" cell as it is in the seismic adjustment table (Table R602.10.3(4)) to make the two adjustment tables more consistent and easier for the user.

It is important to note that in the development of the current bracing provisions, one of the basic principles that was adopted by the ICC Bracing Committee was that the unadjusted bracing provisions were good up to 10 feet and heights above that were to be adjusted accordingly. What was not consistent was whether the 10 feet was a wall height or story height. The above change makes the two adjustment tables identical in how to treat story height and makes the adjustment for a 10 ft story height equal to 1.00 for both wind and seismic. This should make the 2018 IRC consistent throughout with the intent of the provisions adopted during the 2015 cycle.

We ask the committee to accept these changes to make the bracing provisions consistent throughout the various sections of the IRC and less subject to incorrect interpretation.

Cost Impact: Will not increase the cost of construction
This code change will not increase the cost of construction as it clarifies the intent of the original code provisions.
### 2015 International Residential Code

#### TABLE R602.10.3 (3)

<table>
<thead>
<tr>
<th>Seismic Design Category</th>
<th>Story Location</th>
<th>Braced Wall Line Length (feet)</th>
<th>Method LIB(^d)</th>
<th>Method GB</th>
<th>Methods DWB, SFB, PBS, PCP, HPS, CS-SFB(^e)</th>
<th>Method WSP</th>
<th>Methods CS-WSP, CS-G, CS-PF</th>
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<tbody>
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<td>C (townhouses only)</td>
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<td>12.8</td>
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</tr>
</tbody>
</table>

\(^a\) Minimum total length (feet) of braced wall panels required along each braced wall line.

\(^b\) Soil Class D.

\(^c\) Wall height = 10 feet.

\(^d\) Wall line spacing ≤ 25 feet.

\(^e\) Methods DWB, SFB, PBS, PCP, HPS, CS-SFB.

\(^f\) Methods CS-WSP, CS-G, CS-PF.
<p>| | | | | |</p>
<table>
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<tr>
<th></th>
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<th></th>
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For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.
a. Linear interpolation shall be permitted.
b. Wall bracing lengths are based on a soil site class "D." Interpolation of bracing length between the $S_{ds}$ values associated with the seismic design categories shall be permitted when a site-specific $S_{ds}$ value is determined in accordance with Section 1613.3 of the *International Building Code*.

c. Where the braced wall line length is greater than 50 feet, braced wall lines shall be permitted to be divided into shorter segments having lengths of 50 feet or less, and the amount of bracing within each segment shall be in accordance with this table.

d. Method LIB shall have gypsum board fastened to not less than one side with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

e. Method CS-SFB does not apply in Seismic Design Categories D0, D1 and D2.

f. Methods ABW, PFH, and PFG may be used in conjunction with any bracing method permitted above and shall contribute to the amount of bracing assigned to that bracing method. When used alone in a braced wall line without any other bracing method, they shall be assigned the braced wall line lengths provided for Method WSP.

**Reason:** As the bracing methods added to the column heading and the proposed footnote are missing in the current Table R602.10.3(3), it could be construed that these methods are not permitted for resisting seismic forces. This is not the case, nor the intent of the existing table.

As Method CS-PF is permitted only in walls that are continuously sheathed, it is added to the right-hand most column where the other continuously sheathed methods are found.

Footnote (f) is proposed to add the remaining missing methods to the table. Methods ABW, PFH, and PFG are narrow wall bracing methods and, as described in the text of the IRC, are permitted to be used with any bracing method. They contribute bracing to the required bracing length for the primary bracing method in the braced wall line where they are used.

In addition, all three of the methods addressed in the footnote were originally evaluated using Method WSP as the standard of comparison. Thus, when used by themselves in a braced wall line (For example, a garage section with a PFH on both sides of the garage door and no other bracing in the wall line.), the required bracing length is determined from the Method WSP column in Table R602.10.3(3).

**Cost Impact:** Will not increase the cost of construction

This code change will not increase the cost of construction. It clarifies the original intent of the code and is likely to save money in the long run as it makes misinterpreting the existing code less likely.
## 2015 International Residential Code

### TABLE R602.10.3 (4)
**SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING**

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON:</th>
<th>STORY</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR&lt;sup&gt;a, b&lt;/sup&gt;</th>
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<tr>
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<td>[Multiply length from Table R602.10.3(3) by this factor]</td>
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<td>1</td>
<td>Story height (Section 301.3)</td>
<td>Any story</td>
<td>≤ 10 feet</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 10 feet and ≤ 42 feet</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11 feet - 7 inches</td>
<td>1.16</td>
</tr>
<tr>
<td>2</td>
<td>Braced wall line spacing, townhouses in SDC C</td>
<td>Any story</td>
<td>≤ 35 feet</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 35 feet and ≤ 50 feet</td>
<td>1.43</td>
</tr>
<tr>
<td>3</td>
<td>Braced wall line spacing, in SDC D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Any story</td>
<td>&gt; 25 feet and ≤ 30 feet</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 30 feet and ≤ 35 feet</td>
<td>1.4</td>
</tr>
<tr>
<td>4</td>
<td>Wall dead load</td>
<td>Any story</td>
<td>&gt; 8 psf and &lt; 15 psf</td>
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</tr>
<tr>
<td></td>
<td></td>
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<td>&lt; 8 psf</td>
<td>0.85</td>
</tr>
</tbody>
</table>

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<sup>a</sup> ICC COMMITTEE ACTION HEARINGS :: April, 2016

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<sup>b</sup> All methods
<table>
<thead>
<tr>
<th>5</th>
<th>Roof/ceiling dead load for wall supporting 2- or 3-story building</th>
<th>&gt; 15 psf and ≤ 25 psf</th>
<th>1.1</th>
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</thead>
<tbody>
<tr>
<td>6</td>
<td>Walls with stone or masonry veneer, townhouses in SDC C&lt;sup&gt;d, e&lt;/sup&gt;</td>
<td>1.0</td>
<td>All methods</td>
</tr>
<tr>
<td>7</td>
<td>Walls with stone or masonry veneer, detached one- and two-family dwellings in SDC D&lt;sub&gt;0&lt;/sub&gt; – D&lt;sub&gt;2d, f&lt;/sub&gt;</td>
<td>Any story</td>
<td>See Table R602.10.6.5</td>
</tr>
<tr>
<td>8</td>
<td>Interior gypsum board finish (or equivalent)</td>
<td>Any story</td>
<td>Omitted from inside face of braced wall panels</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

c. The length-to-width ratio for the floor/roof diaphragm shall not exceed 3:1. The top plate lap splice nailing shall be in accordance with Table R602.3(1), Item 13.

d. Applies to stone or masonry veneer exceeding the first story height.

e. The adjustment factor for stone or masonry veneer shall be applied to all exterior braced wall lines and all braced wall lines on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

f. See Section R602.10.6.5 for requirements where stone or masonry veneer does not exceed the first-story height.

**Reason:** In the 2015 edition of the IRC, changes were made to Section R301.3 that shifted the emphasis from wall
height to story height. In addition, an absolute limit on story height of 11 feet – 7 inches was established. The above proposed change alters the "Condition" column to 11 feet – 7 inches to be consistent with Section R301.3. The new Adjustment Factor was determined by interpolation.
We ask the committee to accept these changes to make the bracing provisions consistent throughout the various sections of the IRC and less subject to incorrect interpretation.

**Cost Impact:** Will not increase the cost of construction
This code change will not increase the cost of construction as it clarifies the intent of the original code provisions.
## TABLE R602.10.3 (4)
### SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON:</th>
<th>STORY</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR&lt;sup&gt;a, b&lt;/sup&gt;</th>
<th>APPLICABLE METHODS</th>
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<tr>
<td>1</td>
<td>Story height</td>
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<td>≤ 10 feet</td>
<td>1.0</td>
<td>All methods</td>
</tr>
<tr>
<td></td>
<td>(Section 301.3)</td>
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<td>&gt; 10 feet and ≤ 12 feet</td>
<td>1.2</td>
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<td>2</td>
<td>Braced wall line spacing, townhouses in SDC C</td>
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<td>≤ 35 feet</td>
<td>1.0</td>
<td>All methods</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>&gt; 35 feet and ≤ 50 feet</td>
<td>1.43</td>
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</tr>
<tr>
<td>3</td>
<td>Braced wall line spacing, in SDC D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
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<td>&gt; 25 feet and ≤ 30 feet</td>
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<td>&gt; 30 feet and ≤ 35 feet</td>
<td>1.4</td>
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<tr>
<td>4</td>
<td>Wall dead load</td>
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<td></td>
<td>&lt; 8 psf</td>
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<td>≤ 15 psf</td>
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<td>Roof/ceiling dead load for wall supporting</td>
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<td>2- or 3-story building</td>
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<td>7</td>
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<td>Walls with stone or masonry veneer, detached one- and two-family dwellings in SDC D&lt;sub&gt;0&lt;/sub&gt; – D&lt;sub&gt;2d, f&lt;/sub&gt;</td>
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<td>See Table R602.10.6.5 BV-WSP</td>
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<td>Interior gypsum board finish (or equivalent)</td>
<td>Any story</td>
<td>Omitted from inside face of braced wall panels</td>
<td>1.5</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- **a.** Linear interpolation shall be permitted.

- **b.** The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

- **c.** The length-to-width ratio for the floor/roof diaphragm shall not exceed 3:1. The top plate lap splice nailing shall be in accordance with Table R602.3(1), Item 13.

- **d.** Applies to stone or masonry veneer exceeding the first story height.

- **e.** The adjustment factor for stone or masonry veneer shall be applied to all exterior braced wall lines and all braced wall lines on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

- **f.** See Section R602.10.6.5 for requirements where stone or masonry veneer does not exceed the first-story height.

**Reason:** The existing language was added to the IRC in previous cycles to clarify the intent of the code as to the adjustments required for various roof load and story level conditions. The existing language was changed to better...
correlate with the column heading, "STORY". In doing so, an important condition was inadvertently left out. This combination was the adjustment for the top story of a multiple story building for the condition "> 15 psf and < 25 psf". For this case, as in the 2012 IRC, the appropriate adjustment factor is the same as it is for a single story building. This proposal will correct the error resulting from the wording change at last cycle and bring the provisions back in line with the 2012 and earlier IRCs.

**Cost Impact:** Will not increase the cost of construction
This change will not increase the cost of construction as the current provisions are in error for the 2015 IRC for those jurisdictions that use the 2012 and earlier IRCs where the adjustment factor was specified correctly.
**RB238-16**

**IRC: R602.10.3.**

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

2015 International Residential Code

<table>
<thead>
<tr>
<th>Ultimate Design Wind Speed (mph)</th>
<th>Story Location</th>
<th>Braced Wall Line Spacing (feet)</th>
<th>Method LIB&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Method GB</th>
<th>Methods DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP, ABW, PFH, PFC, CS-SFB&lt;sup&gt;c&lt;/sup&gt;</th>
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ICC COMMITTEE ACTION HEARINGS :::: April, 2016
<table>
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<th>Ultimate Design Wind Speed (mph)</th>
<th>Story Location</th>
<th>Braced Wall Line Spacing (feet)</th>
<th>Method LIB(^b)</th>
<th>Method GB</th>
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<td>DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP, ABW, PFH, PFG, CS-SFB(^c)</td>
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</table>

\(^{a}\) MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE

\(^{b}\) Ultimate Design Wind Speed

\(^{c}\) Methods Include DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP, ABW, PFH, PFG, CS-SFB

- EXPOSURE CATEGORY B
- 30-FOOT MEAN ROOF HEIGHT
- 10-FOOT WALL HEIGHT
- 2 BRACED WALL LINES
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<th>≤ 120</th>
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</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

a. Linear interpolation shall be permitted.

b. Method LIB shall have gypsum board fastened to not less than one side with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

c. Where a braced wall line has parallel braced wall lines on one or both sides of differing dimensions, the average dimension shall be permitted to be used for braced wall line spacing.

d. Braced wall panel lengths were developed using the equation braced wall capacity = (fully restrained shear wall capacity) x (a net system adjustment factor). The net adjustment factor was taken as the product of a partial restraint factor and a whole-building factor, which was simplified to a value of 1.2. The design value for WSP lateral load resistance is 500 plf x 1.2 without GWB and 700 plf x 1.2 with GWB.

**Reason:** To clarify how the design values were derived in the IRC, which is explained in detail in the paper entitled "The Story Behind the 2009 IRC Wall Bracing Provisions" by Jay H. Crandell, P.E., and Zeno Martin, P.E. located at http://www.icc-es.org/Criteria_Development/1110-pre/AC269-1_attachment_No_4.pdf.

Table R602.10.3(1) shows the required bracing lengths for wind design. The bracing lengths shown in the table are based on fully restrained walls using the design values published in AWC, Wind and Seismic, Special Design Provisions for Wind and Seismic (SPDWS) with minor rounding. The tables were developed using 500 plf for wood structural panels, 200 plf for the gypsum wallboard and this 1.2 net system factor to yield a total of 840 plf as the basis of the Table for intermittently braced walls.

This code change is intended simply to alert users of the code to the basis of Table R602.10.3(1) allowing them to make an informed decision as to how the apply the bracing lengths in the Table to their own building design.

Detailed background on how the IRC wall bracing provisions were derived can be found at www.sbcindustry.com/bracedwalls including but not limited to other related research on WSP shear wall, braced wall and seismic design coefficient derivation for WSP walls.


**Cost Impact:** Will not increase the cost of construction

This proposal changes no requirements of the code and is only provided for clarity.
## 2015 International Residential Code

### TABLE R602.10.3(4)

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ADJUSTMENT BASED ON:</th>
<th>STORY</th>
<th>CONDITION</th>
<th>ADJUSTMENT FACTOR(^{a, b})</th>
<th>APPLICABLE METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Story height (Section 301.3)</td>
<td>Any story</td>
<td>≤ 10 feet</td>
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<td></td>
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<td></td>
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<td></td>
<td>&gt; 10 feet and ≤ 12 feet</td>
<td>1.2</td>
<td></td>
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<tr>
<td>2</td>
<td>Braced wall line spacing, townhouses in SDC C</td>
<td>Any story</td>
<td>≤ 35 feet</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>&gt; 35 feet and ≤ 50 feet</td>
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<td></td>
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<tr>
<td>3</td>
<td>Braced wall line spacing, in SDC D(_0), D(_1), D(_2)^{c}</td>
<td>Any story</td>
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<td>&gt; 30 feet and ≤ 35 feet</td>
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<td></td>
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<td>4</td>
<td>Wall dead load</td>
<td>Any story</td>
<td>&gt; 8 psf and &lt; 15 psf</td>
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<td></td>
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<td></td>
<td>&lt; 8 psf</td>
<td>0.85</td>
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<td>5</td>
<td>Roof/ceiling dead load</td>
<td>1-, 2- or 3-story building</td>
<td>≤ 15 psf</td>
<td>1.0</td>
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<tr>
<td></td>
<td></td>
<td>2- or 3-story</td>
<td>&gt; 15 psf and ≤ 25 psf</td>
<td>1.1</td>
<td></td>
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<tr>
<td>#</td>
<td>Description</td>
<td>Building Type</td>
<td>Adjustment Factor</td>
<td>Notes</td>
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<td>6</td>
<td>Walls with stone or masonry veneer, townhouses in SDC C&lt;sup&gt;d, e&lt;/sup&gt;</td>
<td>1-story building &gt; 15 psf and ≤ 25 psf</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Walls with stone or masonry veneer, detached one- and two-family dwellings in SDC D&lt;sub&gt;0&lt;/sub&gt; – D&lt;sub&gt;2&lt;/sub&gt;&lt;sup&gt;d, f&lt;/sup&gt;</td>
<td>Any story</td>
<td>See Table R602.10.6.5</td>
<td>BV-WSP</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Walls with stone or masonry veneer, detached one- and two-family dwellings in SDC D&lt;sub&gt;0&lt;/sub&gt; – D&lt;sub&gt;2&lt;/sub&gt;&lt;sup&gt;d, f&lt;/sup&gt;</td>
<td>First and second story of two-story dwelling</td>
<td>See R602.10.6.5</td>
<td>1.2</td>
<td>WSP, CS-WSP</td>
</tr>
<tr>
<td>9</td>
<td>Interior gypsum board finish (or equivalent)</td>
<td>Any story</td>
<td>Omitted from inside face of braced wall panels</td>
<td>1.5</td>
<td>DWB, WSP, SFB, PBS, PCP, HPS, CS-WSP, CS-G, CS-SFB</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

c. The length-to-width ratio for the floor/roof diaphragm shall not exceed 3:1. The top plate lap splice nailing shall be in accordance with Table R602.3(1), Item 13.

d. Applies to stone or masonry veneer exceeding the first story height.

e. The adjustment factor for stone or masonry veneer shall be applied to all exterior braced wall lines and all braced wall lines on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

f. See Section R602.10.6.5 for requirements where stone or masonry veneer does not exceed the first-story height.
Revise as follows:

R602.10.6.5 Wall bracing for dwellings with stone and masonry veneer in Seismic Design Categories $D_0$, $D_1$ and $D_2$. Where stone and masonry veneer are installed in accordance with Section R703.8, wall bracing on exterior braced wall lines and braced wall lines on the interior of the building, backing or perpendicular to and laterally supporting veneered walls shall comply with this section.

Where dwellings in Seismic Design Categories $D_0$, $D_1$ and $D_2$ have stone or masonry veneer installed in accordance with Section R703.8, and the veneer does not exceed the first-story height, wall bracing shall be in accordance with Section R602.10.3.

Where detached one- or two-family dwellings in Seismic Design Categories $D_0$, $D_1$ and $D_2$ have stone or masonry veneer installed in accordance with Section R703.8, and the veneer exceeds the first-story height, wall bracing at exterior braced wall lines and braced wall lines on the interior of the building shall be constructed using Method BV-WSP in accordance with this section and Figure R602.10.6.5. Cripple walls shall not be permitted, and required interior braced wall lines shall be supported on continuous foundations.

Townhouses: Where detached one- or two-family dwellings in Seismic Design Categories $D_0$, $D_1$ and $D_2$ have exterior veneer installed in accordance with Section R703.8 and are braced in accordance with methods WSP or CS-WSP, veneer shall be permitted in the second story in accordance with Items 1 or 2 below, provided the dwelling does not extend more than two stories above grade plane, the veneer does not exceed 5 inches in thickness, the height of veneer on gable-end walls does not extend more than eight feet above the bearing wall top plate elevation, and the total length of braced wall panel specified by Table R602.10.3 is multiplied by 1.2 for each first and second story braced wall line.

1. The total area of the veneer on the second-story exterior walls shall be permitted to extend up to 25 percent of the occupied second floor area, or

2. The veneer on the second-story exterior walls shall be permitted to cover one side of the dwelling, including walls on bay windows and similar appurtenances within the one dwelling side.

Townhouses in Seismic Design Categories $D_0$, $D_1$ and $D_2$ with stone or masonry veneer exceeding the first-story height shall be designed in accordance with accepted engineering practice.

Reason: In some regions with high seismicity, home builders are commonly installing a limited area of veneer on the second story of two-story dwellings, particularly on the street side of the dwelling. In Seismic Design Categories $D_0$, $D_1$ and $D_2$ when any veneer extends above the first story, the 2015 IRC requires the use of BV-WSP bracing, with a complete set of tie-downs in exterior walls over all stories. This current IRC requirement can be cost-prohibitive. The intent of this code change is to provide another alternative in which a moderate amount of second story veneer is permitted with a moderate increase in the bracing wall length, while maintaining a similar level of seismic safety.

Cost Impact: Will not increase the cost of construction
This proposal will notably reduce the cost of construction by removing the cost of most or all tie-down hardware. For one example dwelling, the cost savings is estimated to be approximately $3,500.00, including $3,000 for materials and labor to install tie-downs, and $500.00 in design costs.
**TABLE R602.10.4**

**BRACING METHODS**

<table>
<thead>
<tr>
<th>METHODS, MATERIAL</th>
<th>MINIMUM THICKNESS</th>
<th>FIGURE</th>
<th>CONNECTION CRITERIA&lt;br&gt;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   </th>
</tr>
</thead>
</table>
| LIB | Let-in-bracing | 1 × 4 wood or approved metal straps at 45° to 60° angles for maximum 16" stud spacing | ![Crossed Out](image)
| | | Wood: 2-8d common nails or 3-8d (2 1/2" long x 0.113" dia.) nails | ![Crossed Out](image)
| | | Metal strap: per manufacturer | ![Crossed Out](image)
| | | Metal: per manufacturer | ![Crossed Out](image)
| DWB | Diagonal wood boards | 3/4" (1" nominal) for maximum 24" stud spacing | ![Crossed Out](image)
| | | 2-8d (2 1/2" long x 0.113" dia.) nails or 2-1 3/4" long staples | ![Crossed Out](image)
| | | Per stud | ![Crossed Out](image)
| WSP | Wood structural panel (See Section R604) | 3/8" | ![Crossed Out](image)
| | | Exterior sheathing per Table R602.3(3) | 6" edges 12" field | ![Crossed Out](image)
| | | Interior sheathing per Table R602.3(1) or R602.3(2) | Varies by fastener | ![Crossed Out](image)
| BV-WSP | Wood structural panels with stone or masonry | 7/16" | ![Crossed Out](image)
| | | See Figure R602.10.6.5 | 8d common (2 1/2" x 0.131) nails | ![Crossed Out](image)
| | | 4" at panel edges 12" at intermediate supports 4" at braced | ![Crossed Out](image)
<table>
<thead>
<tr>
<th>Intermittent Bracing Method</th>
<th>veneer (See Section R602.10.6.5)</th>
<th>wall panel end posts</th>
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<tbody>
<tr>
<td>SFB Structural fiberboard sheathing</td>
<td>$1/2&quot;$ or $25/32&quot;$ for maximum 16&quot; stud spacing</td>
<td>$1\frac{1}{2}&quot;$ long x 0.12&quot; dia. (for $1/2&quot;$ thick sheathing) or $1\frac{3}{4}&quot;$ long x 0.12&quot; dia. (for $25/32&quot;$ thick sheathing) galvanized roofing nails or 8d common (2 1/2&quot; long x 0.131&quot; dia.) nails</td>
</tr>
<tr>
<td>GB Gypsum board</td>
<td>$1/2&quot;$</td>
<td>3&quot; edges 6&quot; field</td>
</tr>
<tr>
<td>PBS Particleboard sheathing (See Section R605)</td>
<td>$3/8&quot;$ or $1/2&quot;$ for maximum 16&quot; stud spacing</td>
<td>Nails or screws per Table R602.3(1) for exterior locations For all braced wall panel locations: 7&quot; edges (including top and bottom plates) 7&quot; field</td>
</tr>
<tr>
<td>PCP Portland cement plaster</td>
<td>See Section R703.6 for maximum 16&quot; stud spacing</td>
<td>For $3/8&quot;$, 6d common (2&quot; long x 0.113&quot; dia.) nails For $1/2&quot;$, 8d common (2 1/2&quot; long x 0.131&quot; dia.) nails</td>
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<tr>
<td>HPS Hardboard</td>
<td>$7/16&quot;$ for maximum 16&quot; stud</td>
<td>6&quot; o.c. on all framing members</td>
</tr>
</tbody>
</table>

For all braced wall panel locations:

- 7" edges (including top and bottom plates)
- 7" field

Nails or screws per Table R702.3.5 for interior locations

- 3" edges 6" field

- 6" o.c. on all framing members

- 4" edges 8" field
<table>
<thead>
<tr>
<th>METHODS, MATERIAL</th>
<th>MINIMUM THICKNESS</th>
<th>FIGURE</th>
<th>CONNECTION CRITERIA&lt;sup&gt;a&lt;/sup&gt;</th>
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<tr>
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<td>Fasteners</td>
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<td>Intermittent Bracing Methods</td>
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<td>PFH Portal frame with hold-downs</td>
<td>3/8”</td>
<td>x</td>
<td>See Section R602.10.6.2</td>
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<tr>
<td>PFG Portal frame at garage</td>
<td>7/16”</td>
<td>x</td>
<td>See Section R602.10.6.3</td>
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<tr>
<td>Continuous Sheathing Methods</td>
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<td></td>
<td></td>
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<tr>
<td>CS-WSP Continuously sheathed wood structural panel</td>
<td>3/8”</td>
<td>x</td>
<td>Exterior sheathing per Table R602.3(3)</td>
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<tr>
<td>CS-G&lt;sup&gt;b, c&lt;/sup&gt; Continuously sheathed wood structural panel adjacent to garage openings</td>
<td>3/8”</td>
<td>x</td>
<td>See Method CS-WSP</td>
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<tr>
<td>CS-PF Continuously sheathed portal frame</td>
<td>7/16”</td>
<td>x</td>
<td>See Section R602.10.6.4</td>
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</tbody>
</table>

<sup>a</sup> Connection criteria determined based on the minimum thickness specified, with additional considerations for penetration into studs, fastener spacing, and sheathing methods.

Panel siding spacing to accommodate 1 1/2” penetration into studs.
**CS-SFB**
Continuously sheathed structural fiberboard

| 1/2" or 25/32" | sheathing) or 1 3/4" long × 0.12" dia. (for 25/32" thick sheathing) galvanized roofing nails or 8d common (2 1/2" long × 0.131" dia.) nails | 3" edges 6" field |

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad, 1 pound per square foot = 47.8 N/m², 1 mile per hour = 0.447 m/s.

a. Adhesive attachment of wall sheathing, including Method GB, shall not be permitted in Seismic Design Categories C, D₀, D₁ and D₂.

b. Applies to panels next to garage door opening where supporting gable end wall or roof load only. Shall only be used on one wall of the garage. In Seismic Design Categories D₀, D₁ and D₂, roof covering dead load shall not exceed 3 psf.

c. Garage openings adjacent to a Method CS-G panel shall be provided with a header in accordance with Table R602.7(1). A full-height clear opening shall not be permitted adjacent to a Method CS-G panel.

d. Method CS-SFB does not apply in Seismic Design Categories D₀, D₁ and D₂.

e. Method applies to detached one- and two-family dwellings in Seismic Design Categories D₀ through D₂ only.

**Reason:** 8d common nails are no longer recommended for use with structural fiberboard sheathing. Removal of 8d common nails from Table R602.3(1) for attachment of structural fiberboard sheathing was the result of proposal S75-06/07 Part II. Removal of the 8d common nail aligns with the prescribed attachment for fiberboard sheathing per fastener schedule Table R602.3(1).

**Cost Impact:** Will not increase the cost of construction
Other code approved, prescriptive methods are permitted in lieu of the 8d nail size. Therefore there is no cost increase associated with this revision.
**Table R602.10.5**

**Minimum Length of Braced Wall Panels**

<table>
<thead>
<tr>
<th>Method— (See Table R602.10.4)</th>
<th>Minimum Length—a (inches)</th>
<th>Contributing Length (inches)</th>
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</thead>
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<td>8-feet</td>
<td>9-feet</td>
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<td>DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP</td>
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<td>GB</td>
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<td>48</td>
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<td>LIB</td>
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<td>62</td>
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<td>ABW</td>
<td>SDC A, B and C, ultimate design wind-speed</td>
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<tr>
<td></td>
<td>SDC D0, D1 and D2, ultimate design wind-speed</td>
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<tr>
<td>PFH</td>
<td>Supporting roof only</td>
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<td>Supporting one-story and roof</td>
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<td><strong>PFG</strong></td>
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<td><strong>CS-PF</strong></td>
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<td>SDC A, B and C</td>
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<td>SDC D&lt;sub&gt;1&lt;/sub&gt; and D&lt;sub&gt;2&lt;/sub&gt;</td>
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<td>Adjacent-clear opening height (inches)</td>
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</tr>
<tr>
<td>CS-WSP, CS-SFB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>-</td>
<td>44</td>
</tr>
<tr>
<td>104</td>
<td>-</td>
<td>49</td>
</tr>
<tr>
<td>108</td>
<td>-</td>
<td>54</td>
</tr>
<tr>
<td>112</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>116</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>METHOD</td>
<td>MINIMUM LENGTH$^b$ (inches)</td>
<td>CONTRIBUTING LENGTH (inches)</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>(See Table R602.10.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Height</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 feet</td>
<td>9 feet</td>
</tr>
<tr>
<td>DWB, WSP, SFB, PBC, PCP, HPS, BV-WSP</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>GB</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>LIB</td>
<td>55</td>
<td>62</td>
</tr>
<tr>
<td>ABW</td>
<td>SDC A, B and C Wind speed &lt; 110 mph</td>
<td>28</td>
</tr>
<tr>
<td>SDC D0, D1 and D2</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Wind speed &lt; 110 mph</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>----------------------</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>CS-G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS-WSP, CS-SFB</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Adjacent clear opening height (inches)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;64</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>68</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>72</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>76</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>80</td>
<td>32</td>
<td>30</td>
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<tr>
<td>84</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>88</td>
<td>38</td>
<td>35</td>
</tr>
<tr>
<td>92</td>
<td>43</td>
<td>37</td>
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<tr>
<td>96</td>
<td>48</td>
<td>41</td>
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<tr>
<td>100</td>
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<td>44</td>
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<td>104</td>
<td>--</td>
<td>49</td>
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<td>108</td>
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<td>54</td>
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<td>112</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>116</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Direction</td>
<td>8 feet</td>
<td>9 feet</td>
</tr>
<tr>
<td>-----------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>PFH</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Supporting roof only</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supporting one story and roof</td>
<td>24</td>
</tr>
<tr>
<td>PFG</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>CS-PF</td>
<td>SDC A, B and C</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>SDC D0, D1 and D2</td>
<td>16</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

NP = Not Permitted.
a. Linear interpolation shall be permitted.

b. Use the actual length where it is greater than or equal to the minimum length.

c. Maximum header height for PFH is 10 feet in accordance with Figure R602.10.6.2, but wall height shall be permitted to be increased to 12 feet with pony wall.

d. Maximum opening header height for PFG is 10 feet in accordance with Figure R602.10.6.3, but wall height shall be permitted to be increased to 12 feet with pony wall.

e. Maximum opening header height for CS-PF is 10 feet in accordance with Figure R602.10.6.4, but wall height shall be permitted to be increased to 12 feet with pony wall.

**Reason:** The proposed table was reorganized to place the portal frame bracing methods at the bottom of the table for clarity.
This change proposal is the results of full-scale tests conducted to determine the correct way to measure portal frame height-to-leg-length aspect ratios. It is unclear from the evolution of the IRC from 2006 through the current 2015 whether the portal frame aspect ratio is dependent on the height of the portal frame or the height of the wall. With the advent of provisions that permit pony walls up to 4-feet-tall over portal frames, the distinction becomes increasingly relevant. APA conducted full-scale tests comparing the performance of conventional 8-foot-tall portals fabricated with portal leg lengths of 16 inches for an aspect ratio (portal height/portal length) of 6:1. From this testing, baseline performance values were arrived at by using cyclic testing in accordance with ASTM E2126 and evaluated using ICC-ES Acceptance Criteria AC130. This research is contained in APA Report T2014L-39 (Copies available for free download at www.apawood.org).

APA then tested 8-foot-tall portal frames with 4-feet-tall pony walls on top of them. Two sets of specimens were tested; one set with a 6:1 aspect ratio measured using the 8 foot portal height (16” portal-leg length) like the controls. The other set of specimens was constructed with a 24-inch-long portal-leg-length providing a 6:1 aspect ratio based on the 12 foot wall height.

The results of this testing indicate that measuring the aspect ratio as the portal height over the portal leg length is the appropriate way to measure the aspect ratio when pony walls are used over the portal frames. Testing further indicated that the use of a pony wall over the portal frame actually increases slightly the overall capacity of the portal frame. As such, using the “portal height” in the portal frame height-to-leg-length aspect ratio is not only a best match for walls with pony walls when compared with normal 6:1 aspect ratio walls without pony walls, it also provides increasingly conservative performance as the pony wall increases in height.

Given the results of the testing, the portal frames were placed at the bottom of the table where the “Portal Height” is appropriate for determining minimum portal leg length, leaving the upper portions of the table dependent on the “Wall Height” as is appropriate for the traditional panel-type bracing methods.

Another change is proposed for Footnotes (d) and (e). Currently, both footnotes specify a maximum opening height of 10 feet, when the figures referenced in the footnotes clearly provide for a maximum 10-foot-header height. This change corrects contradictions existent in the present edition of the code.

**Cost Impact:** Will not increase the cost of construction
These provisions will not increase the cost of construction. It provides information based on full scale testing that will permit slightly narrower portal frame leg lengths where appropriate based on the aspect ratio of the portal height as opposed to the wall height. The elimination of the conflict with the footnotes and the table discussed above should clarify, make the code easier to use and permit narrow er panels to count toward bracing.
2015 International Residential Code

Revise as follows:

R602.10.5.2 Partial credit for intermittent bracing. No change to text.

Add new text as follows:

R602.10.5.3 Partial credit for CS-WSP. For Method CS-WSP in Seismic Design Categories A, B and C, panels between 20 and 24 inches (508 mm and 610 mm) in length shall be considered a braced wall panel and shall be permitted to partially contribute toward the required length of bracing in Tables R602.10.3(1) and R602.10.3(3), and the contributing length shall be determined from Table R602.10.5.3.

**TABLE R602.10.5.3**

PARTIAL CREDIT FOR CS-WSP LESS THAN FULL LENGTH WITH 8- AND 9-FOOT WALLS

<table>
<thead>
<tr>
<th>Wall Height (ft)</th>
<th>Length of Full Height Method CS-WSP Panel (in.)</th>
<th>Adjacent to a Clear Opening Height (in.) or less</th>
<th>Contributing Length of Braced Wall Panel (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8 or 9</strong></td>
<td>24</td>
<td>&lt;60</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>68</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>72</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>76</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
<td>14</td>
</tr>
<tr>
<td><strong>20</strong></td>
<td>&lt;60</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>68</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Linear interpolation shall be permitted.

**Reason:** In order to meet the owners' and/or designers' aesthetic requirements for homes built on narrow building lots, architects and home designers often have a difficult time placing the correct amount of bracing in the front and back sides of these structures. It is often difficult to find useable full-height segments that can be counted as bracing segments between garage doors, entrance ways, bump-outs and windows. Certainly narrow segments, shorter than required for bracing, do contribute somewhat to the strength of the walls they are a part of. For a number of years, the IRC has recognized this for segmented shear walls as can be seen in current Table R602.10.5.2, which permits narrower segments to be used at bracing for some length less than their measured length. Based on full-scale testing, these lengths are reduced to accommodate the reduced stiffness of the narrow segments and ensure that the reduced lengths work to supplement the shear resistance of those segments that do meet the prescribed height to length ratios.

APA conducted full-scale testing for continuously sheathed wood structural panels (Method CS-WSP) in a similar manner as the development of the published provisions for Method CS-WSP walls. The results of this testing is provided in the proposed new Table R602.10.5.3 above. Interested parties can download a free copy of the APA test reports covering this testing (APA Reports T2012L-16 and T2012L-30) at:


The proposed table permits continuously sheathed segments as narrow as 20 inches to be used for bracing at a reduced length. The table provides reduced lengths based on the opening size to ensure stiffness compatibility with traditional braced wall methods.

We encourage the committee to provide this additional tool for continuously-sheathed structures for the builder, designer, architect and engineer trying to prescriptively brace these difficult situations.

**Cost Impact:** Will not increase the cost of construction

The proposed change will not increase the cost of construction and may provide opportunities for builders and designers to decrease costs due to use of more efficient design and construction strategies.
RB243-16
IRC: R602.10.6.2.
Proponent: Edward Keith, representing APA- The Engineered Wood Association (ed.keith@apawood.org)

2015 International Residential Code
Revise as follows:

FIGURE R602.10.6.2
METHOD PFH—PORTAL FRAME WITH HOLD-DOWNS
*Note:* Nailing of sheathing behind the 3500 lb. strap shall not be required.

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

**FIGURE R602.10.6.2**

**METHOD: PFH-PORTAL FRAME WITH HOLD-DOWNS**

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

**Reason:** The required nailing on the 3500 lb strap provides sufficient anchorage for the wood structural panel to framing connection while prevent the potential for splitting of the framing while anchoring the strap. It also prevents the sheathing-to-framing nailing from interfering with the required strap nailing. In addition it saves time and money for the builder without compromising the effectiveness of the portal.

**Cost Impact:** Will not increase the cost of construction

This change proposal will not increase the cost of construction and may save the builder a little time and money during construction without impacting the performance of the structure.
RB244-16
IRC: R602.10.6.4.
Proponent: Edward Keith, representing APA- The Engineered Wood Association (ed.keith@apawood.org)

2015 International Residential Code

Revise as follows:

FIGURE R602.10.6.4
METHOD CS-PF—CONTINUOUSLY SHEATHED PORTAL FRAME PANEL CONSTRUCTION

OVER CONCRETE OR MASONRY BLOCK FOUNDATION

ANCHOR BOLTS PER SECTION R603.1.6
(WOOD FRAMING AND IOPS APPLIED ACROSS SHEATHING, JOINT WITH A CAPACITY OF 170 LBS IN THE HORIZONTAL AND VERTICAL DIRECTIONS)

OVER RAISED WOOD FLOOR - FRAMING ANCHOR OPTION
(WHERE PORTAL SHEATHING DOES NOT LAP OVER BAND OR RIM JOIST)

WOOD STRUCTURAL PANEL SHEATHING TO TOP OF BAND OR RIM JOIST

OVER RAISED WOOD FLOOR - OVERLAP OPTION
(WHERE PORTAL SHEATHING LAP OVER BAND OR RIM BOARD)

SECTION
Reason: This proposal corrects typographical errors that occurred when all of portal frame pictures were redrawn with a common format before the 2012 IRC was published. (Staff note that the 7/16" 3/8" change occurs in two places in the figure above!)  

Cost Impact: Will not increase the cost of construction  
This code change will not increase the cost of construction. It is proposed to clarify the building code and correct a couple of typographical errors.
RB245-16
IRC: R602.10.6.4.
Proponent: Edward Keith, representing APA- The Engineered Wood Association (ed.keith@apawood.org)

2015 International Residential Code
Revise as follows:

FIGURE R602.10.6.4
METHOD CS-PF—CONTINUOUSLY SHEATHED PORTAL FRAME PANEL CONSTRUCTION

OVER CONCRETE OR MASONRY BLOCK FOUNDATION
ANCHOR BOLTS PER SECTION R603.3.6
WOOD STRUCTURAL PANEL SHEATHING TO TOP OF BAND OR RIM JOIST
NAIL SOLE PLATE TO JOIST PER TABLE R603.3(1)
OVER RAISED WOOD FLOOR - FRAMING ANCHOR OPTION
(WHERE PORTAL SHEATHING DOES NOT LAP OVER BAND OR RIM JOIST)
WOOD STRUCTURAL PANEL SHEATHING OVER APPROVED BAND OR RIM JOIST
NAIL SOLE PLATE TO JOIST PER TABLE R603.3(1)
OVER RAISED WOOD FLOOR - OVERLAP OPTION
(WHERE PORTAL SHEATHING LAPS OVER BAND OR RIM BOARD)
FRONT ELEVATION
WOOD STRUCTURAL PANEL SHEATHING OVER APPROVED BAND OR RIM JOIST
ATTACH SHEATHING TO BAND OR RIM JOIST WITH 8D COMMON NAILS AT 3" O.C. TOP AND BOTTOM
NAIL SOLE PLATE TO JOIST PER TABLE R603.3(1)
APPROVED BAND OR RIM JOIST
SECTION
**Reason:** The proposed code change more clearly states the intent of the original language. It is important that the wall element away from the single portal be well anchored to obviate the need for the anchor strap at the base of the post-end of the single-portal. This anchorage is provided by the presence of a continuously sheathed braced wall panel meeting the minimum length requirements of Table R602.10.5. The way the current figure treats the post-end sheathing requirement, any element of a continuously sheathed braced wall line, regardless of length, could be used. Even an element less than the minimum length requirements listed in Table R602.10.5 could be permitted even though such an element would not provide the necessary anchorage. This proposal modifies the language to more clearly represent the intent of the provision.

**Cost Impact:** Will not increase the cost of construction
This change will not increase the cost of construction as it clarifies the original intent of the code provision.
R602.10.6.6 Double-opening portals using Methods CS-PF or PFG. Double openings shall be permitted using Methods CS-PF or PFG in accordance with one of the three methods provided in Figure R602.10.6.6. When Method CS-PF is used, the sheathing shall be attached to the framing using two rows of fasteners as shown in Figure R602.10.6.4. When Method PFG is used, a single row of fasteners shall be used as shown in Figure R602.10.6.3. As the double-opening portals shown each have 3 portal legs, for purposes of computing the required amount of bracing, the contributing length for a single portal leg as specified in Table R602.10.5 shall be multiplied by a factor of 3. In all cases, jack studs shall be as required in accordance with Table R602.7(1).
**Reason:** Double garage doors are very commonly found in single and duplex residential structures. A common question from the field is how double openings can be constructed using the portal frame/narrow wall bracing methods in the IRC. The APA ran a series of tests to determine the strength and stiffness of the various configurations. The results of these tests showed that any of the three configurations tested and illustrated in the proposal would provide results comparable with single or double portal frames already published in the IRC. The PFH Method was not tested at this time so is not included. Persons interested can download a free copy of APA Report T2014L-35 from APA's website – www.apawood.org.

**Cost Impact:** Will not increase the cost of construction
The proposed changes will not increase the cost of construction. It just provides a set of lab-tested options for the code user that may prevent expensive errors by the builder trying to work out such details on his/her own.
2015 International Residential Code

Revise as follows:

R602.10.10 Panel joints. Vertical joints of panel sheathing shall occur over, and be fastened to, common studs. Horizontal joints in braced wall panels shall occur over, and be fastened to, common blocking of a minimum 1\(\frac{1}{2}\) inch (38 mm) thickness.

Exceptions:

1. Vertical joints of panel sheathing shall be permitted to occur over double studs, where adjoining panel edges are attached to separate studs with the required panel edge fastening schedule, and the adjacent studs are attached together with two rows of 10d box nails [3 inches by 0.128 inch (76.2 mm by 3.25 mm)] at 10 inches o.c. (254 mm).

2. Blocking at horizontal joints shall not be required in wall segments that are not counted as braced wall panels.

3. Where the bracing length provided is not less than twice the minimum length required by Tables R602.10.3(1) and R602.10.3(3), blocking at horizontal joints shall not be required in braced wall panels constructed using Methods WSP, SFB, GB, PBS, CS-WSP, CS-SFB, or HPS.

4. Where Method GB panels are installed horizontally, blocking of horizontal joints is not required.

Reason: The existing provision provides for the elimination of blocking from panel-bracing types when two times the amount of bracing or greater is provided along a given wall line. This is based on the assumption that elimination of the blocking has an impact of about 50% or less on the effectiveness of the panel-type bracing panels. The impact on the elimination of blocking is deemed to have even equal or less impact on both of the continuously sheathed braced wall panel types (CS-WSP and CS-SFB). The increase in performance of continuously-sheathed braced wall panels is based on the sheathing of small sections of wall above and below openings, areas not normally impacted by the potential for horizontal joints. The continuously sheathed methods also gain strength by having panel sheathing present even in areas not requiring bracing as well as on all gable ends of continuously-sheathed walls. The basis of this proposal is that the continuously sheathed panel methods are inherently less impacted by the lack or horizontal joints than are the intermittent- or other panel-type bracing methods, because the strength and stiffness of the continuously sheathed methods is based on many factors other than blocked horizontal panel joints.

Cost Impact: Will not increase the cost of construction
2015 International Residential Code

Revise as follows:

**R603.1.1 Applicability limits.** The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above grade plane. Exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites where the ultimate design wind speed is less than **139 140** miles per hour (62 63 m/s), Exposure Category B or C, and the ground snow load is less than or equal to 70 pounds per square foot (3.35 kPa).

**TABLE R603.3.1**

<table>
<thead>
<tr>
<th>WALL TO FOUNDATION OR FLOOR CONNECTION REQUIREMENTS¹, ²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FRAMING CONDITION</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Wall bottom track to floor per Figure R603.3.1(1)</td>
</tr>
<tr>
<td>Wall bottom track to foundation per Figure R603.3.1(2)³</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

¹ ² ³ ⁴
Wall bottom track to wood sill per Figure R603.3.1(3)

<table>
<thead>
<tr>
<th>Stud Spacing (inches)</th>
<th>Roof Span (feet)</th>
<th>16</th>
<th>24</th>
<th>28</th>
<th>32</th>
<th>36</th>
<th>40</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
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<tr>
<td>28</td>
<td>NR</td>
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<td>NR</td>
<td>NR</td>
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<td>32</td>
<td>NR</td>
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<td>36</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>40</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm, 1 pound = 4.45 N.

a. Anchor bolts are to be located not more than 12 inches from corners or the termination of bottom tracks such as, at door openings or corners. Bolts are to extend not less than 15 inches into masonry or 7 inches into concrete.

b. All screw sizes shown are minimum.

c. NR = Uplift connector not required.

d. Foundation anchor straps are permitted in place of anchor bolts, if spaced as required to provide equivalent anchorage to the required anchor bolts and installed in accordance with manufacturer's requirements.

e. See Figure R603.3.1(4) for details.
## TABLE R603.3.1.1 (1)

**GALE ENDWALL TO FLOOR CONNECTION REQUIREMENTS**

<table>
<thead>
<tr>
<th>ULTIMATE BASIC WIND SPEED (mph)</th>
<th>WALL BOTTOM TRACK TO FLOOR JOIST OR TRACK CONNECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure Category</td>
<td>Stud height, h (feet)</td>
</tr>
<tr>
<td>B</td>
<td>10 &lt; h ≤ 14</td>
</tr>
<tr>
<td>115</td>
<td>1-No. 8 screw @ 12&quot; o.c.</td>
</tr>
<tr>
<td>126-120</td>
<td>1-No. 8 screw @ 12&quot; o.c.</td>
</tr>
<tr>
<td>≤ 139-130</td>
<td>1-No. 8 screw @ 12&quot; o.c.</td>
</tr>
<tr>
<td>&lt; 140</td>
<td>1-No. 8 screw @ 12&quot; o.c.</td>
</tr>
<tr>
<td></td>
<td>2-No. 8 screws @ 12&quot; o.c.</td>
</tr>
<tr>
<td></td>
<td>2-No. 8 screws @ 12&quot; o.c.</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm.

a. Refer to Table R603.3.1.1(2) for gable endwall bottom track to foundation connections.

b. Where attachment is not given, special design is required.

c. Stud height, h, is measured from wall bottom track to wall top track or brace connection height.

## TABLE R603.3.1.1 (2)

**GALE ENDWALL BOTTOM TRACK TO FOUNDATION CONNECTION REQUIREMENTS**

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED (mph)</th>
<th>MINIMUM SPACING FOR 1/2-INCH-DIAMETER ANCHOR BOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure Category</td>
<td>Stud height, h (feet)</td>
</tr>
<tr>
<td>B</td>
<td>10 &lt; h ≤ 14</td>
</tr>
<tr>
<td>115</td>
<td>6'- 0&quot; o.c.</td>
</tr>
<tr>
<td>126-120</td>
<td>6'- 0&quot; o.c.</td>
</tr>
<tr>
<td>≤ 139-130</td>
<td>6'- 0&quot; o.c.</td>
</tr>
<tr>
<td>&lt; 140</td>
<td>6'- 0&quot; o.c.</td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm.

a. Refer to Table R603.3.1.1(1) for gable endwall bottom track to floor joist or track connection connections.
b. Where attachment is not given, special design is required.
c. Stud height, $h$, is measured from wall bottom track to wall top track or brace connection height.
d. Foundation anchor straps are permitted in place of anchor bolts if spaced as required to provide equivalent anchorage to the required anchor bolts and installed in accordance with manufacturer's requirements.

### TABLE R603.3.2 (2)
24-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY\(^a, b, c, d\)

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>8-footer Studs</td>
</tr>
<tr>
<td>Exp. B</td>
<td>Exp. C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;130</td>
<td>135</td>
<td>4'-10&quot; - 0&quot; o.c.</td>
<td>5'-6&quot; - 0&quot; o.c.</td>
</tr>
<tr>
<td>130-140</td>
<td>126</td>
<td>4'-10&quot; - 0&quot; o.c.</td>
<td>5'-0&quot; - 6&quot; o.c.</td>
</tr>
<tr>
<td></td>
<td>130</td>
<td>5'-5&quot; - 3&quot; o.c.</td>
<td>6'-0&quot; o.c.</td>
</tr>
<tr>
<td></td>
<td>&lt;140</td>
<td>3'-0&quot; o.c.</td>
<td>3'-0&quot; o.c.</td>
</tr>
</tbody>
</table>

b. Design load assumptions:

Second-floor dead load is 10 psf.

Second-floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

**TABLE R603.3.2 (3)**

_28-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY\(^a, \, b, \, c, \, d\)_

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>8-foot Studs</td>
<td>9-foot Studs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Exp. B</td>
<td>Exp. C</td>
<td>350S162</td>
<td>16</td>
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<tr>
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<td>24</td>
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<td>115</td>
<td></td>
<td>550S162</td>
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<tr>
<td>120</td>
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<td>350S162</td>
<td>16</td>
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<td></td>
<td></td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:

Second-floor dead load is 10 psf.

Second-floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2 (4)

32-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY$^a, b, c, d$

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE</th>
<th>MEMBER</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STUD SPACING</td>
<td>8-foot Studs</td>
</tr>
<tr>
<td>&lt;139130</td>
<td>115</td>
<td>16 33 33 33 33 33 33 33 33 33 33 43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 33 33 33 33 33 33 33 33 33 33 33</td>
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<tr>
<td></td>
<td>350S162</td>
<td>16 33 33 33 33 33 33 33 33 33 33 43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 33 33 33 33 33 33 33 33 33 33 33</td>
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<tr>
<td></td>
<td>&lt;140</td>
<td>126120</td>
</tr>
<tr>
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<td>16 33 33 33 33 33 33 33 33 33 33 43</td>
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<td></td>
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<td>115</td>
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<tr>
<td></td>
<td>550S162</td>
<td>16 33 33 33 33 33 33 33 33 33 33 43</td>
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<tr>
<td></td>
<td></td>
<td>24 33 33 33 33 33 33 33 33 33 33 33</td>
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<tr>
<td></td>
<td>&lt;140</td>
<td>126120</td>
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<td></td>
<td></td>
<td>24 33 33 33 33 33 33 33 33 33 33 33</td>
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<td></td>
<td>350S162</td>
<td>16 33 33 33 33 33 33 33 33 33 33 43</td>
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<tr>
<td></td>
<td></td>
<td>24 33 33 33 33 33 33 33 33 33 33 33</td>
</tr>
<tr>
<td>CATEGORY (mph)</td>
<td>SIZE</td>
<td>(inches)</td>
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</tr>
<tr>
<td>Exp. B</td>
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<td>16</td>
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<td></td>
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<tr>
<td>Exp. C</td>
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<td>24</td>
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<tr>
<td>115</td>
<td>350S162</td>
<td>16</td>
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<td>550S162</td>
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<td>550S162</td>
<td>16</td>
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<td></td>
<td>24</td>
<td>33</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:

Second-floor dead load is 10 psf.

Second-floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.
Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2 (5)
**36-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY**

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
<th>8-foot Studs</th>
<th>9-foot Studs</th>
<th>10-foot Studs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. B</td>
<td>Exp. C</td>
<td></td>
<td></td>
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<td>43</td>
</tr>
<tr>
<td>Ground Snow Load (psf)</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>20</td>
<td>30</td>
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<td>8-foot Studs</td>
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<td>9-foot Studs</td>
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<td>10-foot Studs</td>
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<td>43</td>
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</tr>
</tbody>
</table>

b. Design load assumptions:

Second-floor dead load is 10 psf.

Second-floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2 (6)

40-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>8-foot Studs</td>
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<tr>
<td>115</td>
<td>—</td>
<td>16</td>
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<td>43</td>
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<td></td>
<td></td>
<td>54</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: \( L/240 \).

b. Design load assumptions:

Second-floor dead load is 10 psf.

Second-floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### Table R603.3.2 (7)

#### 24-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8-foot Studs</td>
<td>9-foot Studs</td>
</tr>
<tr>
<td>Exp. B</td>
<td>Exp. C</td>
<td>20</td>
</tr>
<tr>
<td>115</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>350S162</td>
<td></td>
<td>16</td>
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<tr>
<td>550S162</td>
<td></td>
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<td>16</td>
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<td>16</td>
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<tr>
<td>550S162</td>
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<td>16</td>
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<td></td>
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</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:

Second-floor dead load is 10 psf.

Second-floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2 (8)

**28-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING**

<table>
<thead>
<tr>
<th>ULTIMATE WIND</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>126</td>
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<tr>
<td>130</td>
<td>139</td>
</tr>
<tr>
<td>140</td>
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<td>54</td>
<td>43</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.
<table>
<thead>
<tr>
<th>SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>8-foot Studs</th>
<th>9-foot Studs</th>
<th>10-foot Studs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. B</td>
<td>Exp. C</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>115</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>350S162</td>
<td>16</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>43</td>
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<tr>
<td>550S162</td>
<td>24</td>
<td>43</td>
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<td>43</td>
<td>54</td>
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<tr>
<td>110</td>
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</tr>
<tr>
<td>350S162</td>
<td>16</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>43</td>
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For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: \( L/240 \).

b. Design load assumptions:

Second-floor dead load is 10 psf.
Second-floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2 (9)
32-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
<th>8-foot Studs</th>
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</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:
   - Second-floor dead load is 10 psf.
   - Second-floor live load is 30 psf.
   - Roof/ceiling dead load is 12 psf.
   - Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2 (10)
36-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. B</td>
<td>Exp. C</td>
<td>8-foot Studs</td>
<td>9-foot Studs</td>
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<td>16 33 33 33 33 43 43 33 43</td>
<td>24 43 43 54 54 54 54 54 54 54 54 54</td>
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</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.

b. Design load assumptions:

- Second-floor dead load is 10 psf.
- Second-floor live load is 30 psf.
- Roof/ceiling dead load is 12 psf.
- Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.
d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2 (11)

**40-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING**

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
<th>8-foot Studs</th>
<th>9-foot Studs</th>
<th>10-foot Studs</th>
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</thead>
<tbody>
<tr>
<td>Exp. B</td>
<td>350S162</td>
<td>16 43 43 43 43 54</td>
<td>Ground Snow Load (psf)</td>
<td>20 30 50 70</td>
<td>20 30 50 70</td>
<td>20 30 50 70</td>
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<td>Exp. C</td>
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</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: \( L/240 \).

b. Design load assumptions:

Second-floor dead load is 10 psf.
Second-floor live load is 30 psf.
Roof/ceiling dead load is 12 psf.
Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

**TABLE R603.3.2 (12)**
### Ultimate Wind Speed and Exposure Category (mph)

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
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<td>8-foot Studs</td>
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For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479
kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:
   Top- and middle-floor dead load is 10 psf.
   Top-floor live load is 30 psf.
   Middle-floor live load is 40 psf.
   Roof/ceiling dead load is 12 psf.
   Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2 (13)  
28-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING\textsuperscript{a, b, c, d}

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
<th>8-foot Studs</th>
<th>9-foot Studs</th>
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<td>Exp. B</td>
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</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:
   - Top- and middle-floor dead load is 10 psf.
   - Top-floor live load is 30 psf.
   - Middle-floor live load is 40 psf.
   - Roof/ceiling dead load is 12 psf.
   - Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2 (14)

#### 32-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING

<table>
<thead>
<tr>
<th>Ultimate Wind Speed and Exposure Category (mph)</th>
<th>Member Size</th>
<th>Stud Spacing (inches)</th>
<th>Minimum Stud Thickness (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. B</td>
<td>Exp. C</td>
<td>8-foot Studs</td>
<td>9-foot Studs</td>
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<tr>
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<td>115</td>
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<td>350S162</td>
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<tr>
<td>140</td>
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<td>550S162</td>
<td>550S162</td>
</tr>
</tbody>
</table>

Exp. B: Exposure B, Exp. C: Exposure C; 115 mph for Exposure B, 140 mph for Exposure C.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:

Top- and middle-floor dead load is 10 psf.

Top-floor live load is 30 psf.

Middle-floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2 (15)

<table>
<thead>
<tr>
<th>Ultimate Wind Speed and Exposure</th>
<th>Member</th>
<th>Stud Spacing</th>
<th>Minimum Stud Thickness (mils)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>8-foot Studs</td>
</tr>
<tr>
<td>Ground Snow Load (psf)</td>
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<td>8-foot Studs</td>
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<td>350S162</td>
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</tr>
<tr>
<td>CATEGORY (mph)</td>
<td>SIZE (inches)</td>
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<td>115</td>
<td>Exp. B</td>
<td>16</td>
<td>54</td>
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<tr>
<td></td>
<td>Exp. C</td>
<td>24</td>
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<tr>
<td>136120</td>
<td>110</td>
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<td>54</td>
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<td>Exp. B</td>
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<td>68</td>
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<tr>
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<td>Exp. C</td>
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<tr>
<td>139130</td>
<td>115</td>
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<td>54</td>
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<tr>
<td></td>
<td>Exp. B</td>
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<td>68</td>
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<tr>
<td></td>
<td>Exp. C</td>
<td>16</td>
<td>43</td>
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<tr>
<td></td>
<td></td>
<td>24</td>
<td>54</td>
</tr>
<tr>
<td>&lt;140</td>
<td>136120</td>
<td>16</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Exp. B</td>
<td>24</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Exp. C</td>
<td>16</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>54</td>
</tr>
<tr>
<td>&lt;139130</td>
<td>&lt;140</td>
<td>16</td>
<td>54</td>
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<tr>
<td></td>
<td>Exp. B</td>
<td>24</td>
<td>68</td>
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<tr>
<td></td>
<td>Exp. C</td>
<td>16</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>54</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:

Top- and middle-floor dead load is 10 psf.

Top-floor live load is 30 psf.

Middle-floor live load is 40 psf.
Roof/ceiling dead load is 12 psf.
Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.
d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2 (16)
40-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING (inches)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>8-foot Studs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Exp. B</td>
<td>Exp. C</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>115</td>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>350S162</td>
<td>16</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>130</td>
<td>120</td>
<td>550S162</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24</td>
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<tr>
<td>130</td>
<td>120</td>
<td>550S162</td>
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<tr>
<td>115</td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>550S162</td>
<td>24</td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.


b. Design load assumptions:

Top and middle floor dead load is 10 psf.

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2.1 (1)

**ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT**

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>MEMBER SIZE</th>
<th>STUD SPACING</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;140</td>
<td>350S162</td>
<td>16 54 54 54 54 54 54 54 54 54 54 54 54 54 54 54 54 54 24 68 68 68 68 68 68 68 68 68 68 68 68 68 68</td>
<td></td>
</tr>
<tr>
<td>&lt;130</td>
<td>550S162</td>
<td>16 54 54 54 54 54 43 43 54 54 54 54 54 54 54 54 54 54 24 54 54 54 68 54 54 54 54 54 54 54 54 54 54</td>
<td></td>
</tr>
<tr>
<td>&lt;140</td>
<td>350S162</td>
<td>16 54 54 54 54 54 54 54 54 54 54 54 54 54 54 54 54 54 24 68 68 68 68 68 68 68 68 68 68 68 68 68 68</td>
<td></td>
</tr>
<tr>
<td>&lt;130</td>
<td>550S162</td>
<td>16 54 54 54 54 54 43 43 54 54 54 54 54 54 54 54 54 54 24 54 54 54 68 54 54 54 54 54 54 54 54 54 54</td>
<td></td>
</tr>
</tbody>
</table>

RB641
<table>
<thead>
<tr>
<th>Exp. B</th>
<th>Exp. C</th>
<th></th>
<th>(inches)</th>
<th>8-foot Studs</th>
<th>9-foot Studs</th>
<th>10-foot Studs</th>
</tr>
</thead>
<tbody>
<tr>
<td>115</td>
<td>—</td>
<td>350S162</td>
<td>16</td>
<td>33</td>
<td>33</td>
<td>33</td>
</tr>
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<td></td>
<td></td>
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<td>24</td>
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<td>126120</td>
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<td>350S162</td>
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<td>&lt;139130</td>
<td>350S162</td>
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<td></td>
<td></td>
<td>24</td>
<td>33</td>
<td>43</td>
<td>43</td>
</tr>
</tbody>
</table>
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion \( L/240 \).

b. Design load assumptions:
   - Ground snow load is 70 psf.
   - Roof/ceiling dead load is 12 psf.
   - Floor dead load is 10 psf.
   - Floor live load is 40 psf.
   - Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.3.2.1 (2)
**ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT**

<table>
<thead>
<tr>
<th>Exp. B</th>
<th>Exp. C</th>
<th>350S162</th>
<th>550S162</th>
<th>Stud Height, ( h ) (feet)</th>
<th>MINIMUM STUD THICKNESS (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10 ( h \leq 12 )</td>
<td>12 ( h \leq 14 )</td>
</tr>
<tr>
<td>115</td>
<td></td>
<td>16 33 43</td>
<td>24 43 68</td>
<td>16 33</td>
<td>43 68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 43 68</td>
<td>— — —</td>
<td>— — —</td>
<td>— — —</td>
</tr>
<tr>
<td>350S162</td>
<td></td>
<td>16 33 43</td>
<td>24 33 54</td>
<td>16 33</td>
<td>33 43</td>
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<tr>
<td></td>
<td></td>
<td>24 33 54</td>
<td>33 43 68</td>
<td>43 54</td>
<td>68 —97</td>
</tr>
<tr>
<td>550S162</td>
<td></td>
<td>16 43 54</td>
<td>— — —</td>
<td>— — —</td>
<td>— — —</td>
</tr>
<tr>
<td>126120</td>
<td>110</td>
<td>350S162</td>
<td>24</td>
<td>54</td>
<td>97</td>
</tr>
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<td>97</td>
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<td>550S162</td>
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<td>68</td>
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<tr>
<td>130130</td>
<td>&lt;140</td>
<td>350S162</td>
<td>16</td>
<td>54</td>
<td>97</td>
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<td>24</td>
<td>97</td>
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<td>—</td>
<td>—</td>
<td>—</td>
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<td>550S162</td>
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<td>24</td>
<td>54</td>
<td>54</td>
<td>68</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion \( L/240 \).
b. Design load assumptions:

Ground snow load is 70 psf.
Roof/ceiling dead load is 12 psf.
Floor dead load is 10 psf.
Floor live load is 40 psf.
Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

R603.3.5 Splicing. Steel studs and other structural members shall not be spliced without approved design. Tracks shall be spliced in accordance with Figure R603.3.5.

R603.6 Headers. Headers shall be installed above all wall openings in exterior walls and interior load-bearing walls. Box beam headers and back-to-back headers each shall be formed from two equal sized C-shaped members in accordance with Figures R603.6(1) and R603.6(2), respectively, and Tables R603.6(1) through R603.6(6). L-shaped headers shall be permitted to be constructed in accordance with AISI S230. Alternately, headers shall be permitted to be designed and constructed in accordance with AISI S100, Section D4 S240.

### TABLE R603.7 (2)
**HEADER TO KING STUD CONNECTION REQUIREMENTS\(^{a, b, c, d}\)**

<table>
<thead>
<tr>
<th>HEADER SPAN (feet)</th>
<th>ULTIMATE WIND SPEED (mph), EXPOSURE CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>115 B</td>
</tr>
<tr>
<td>≤ 4'</td>
<td></td>
</tr>
<tr>
<td>4-No. 8 screws</td>
<td>4-No. 8 screws</td>
</tr>
<tr>
<td>&gt; 4&quot; to 8&quot;</td>
<td></td>
</tr>
<tr>
<td>4-No. 8 screws</td>
<td>4-No. 8 screws</td>
</tr>
<tr>
<td>&gt; 8&quot; to 12&quot;</td>
<td></td>
</tr>
<tr>
<td>4-No. 8 screws</td>
<td>6-No. 8 screws</td>
</tr>
<tr>
<td>&gt; 12&quot; to 16&quot;</td>
<td></td>
</tr>
<tr>
<td>4-No. 8 screws</td>
<td>6-No. 8 screws</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound = 4.448 N.

a. All screw sizes shown are minimum.

b. For headers located on the first floor of a two-story building or the first or second floor of a three-story building, the total number of screws is permitted to be reduced by 2 screws, but the total number of screws shall not be less than four.
c. For roof slopes of 6:12 or greater, the required number of screws shall be permitted to be reduced by half, but the total number of screws shall not be less than four.

d. Screws can be replaced by an uplift connector that has a capacity of the number of screws multiplied by 164 pounds.

**R603.9.4.1 Ultimate design wind speeds greater than 126 130 mph.** Where ultimate design wind speeds exceed 126 130 miles per hour (56 58 m/s), Exposure Category C walls shall be provided with direct uplift connections in accordance with AISI S230, Section E13.3, and AISI S230, Section F7-2 F8.2, as required for 139 140 miles per hour (62 63 m/s), Exposure Category C.

### TABLE R603.8
HEAD AND SILL TRACK SPAN

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE CATEGORY (mph)</th>
<th>ALLOWABLE HEAD AND SILL TRACK SPAN(^a, b, c) (feet-inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TRACK DESIGNATION(^d)</td>
</tr>
<tr>
<td>B</td>
<td>350T125-33</td>
</tr>
<tr>
<td>115</td>
<td>—</td>
</tr>
<tr>
<td>126120</td>
<td>110—</td>
</tr>
<tr>
<td>&lt;139130</td>
<td>115</td>
</tr>
<tr>
<td>—&lt;140</td>
<td>126120</td>
</tr>
<tr>
<td>—</td>
<td>&lt;139130</td>
</tr>
<tr>
<td>—</td>
<td>&lt; 140</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

a. Deflection limit: \(L/240\).

b. Head and sill track spans are based on components and cladding wind pressures and 48-inch tributary span.

c. For openings less than 4 feet in height that have both a head track and sill track, the spans are permitted to be multiplied by 1.75. For openings less than or equal to 6 feet in height that have both a head track and a sill track, the spans are permitted to be multiplied by a factor of 1.5.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

### TABLE R603.9.2 (1)
MINIMUM PERCENTAGE OF FULL-HEIGHT STRUCTURAL SHEATHING ON EXTERIOR WALLS\(^a, b\)
<table>
<thead>
<tr>
<th>WALL SUPPORTING</th>
<th>ROOF SLOPE</th>
<th>115 B</th>
<th>126120 B</th>
<th>130 B</th>
<th>&lt;140 B</th>
<th>&lt;140 &lt;130</th>
<th>&lt;140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof and ceiling only (one story or top floor of two- or three-story building).</td>
<td>3:12</td>
<td>9</td>
<td>119</td>
<td>1142</td>
<td>1346</td>
<td>1720</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>6:12</td>
<td>13</td>
<td>15</td>
<td>1720</td>
<td>2226</td>
<td>2635</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>9:12</td>
<td>23</td>
<td>2726</td>
<td>2920</td>
<td>3350</td>
<td>5353</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>12:12</td>
<td>3226</td>
<td>3926</td>
<td>40</td>
<td>4466</td>
<td>7026</td>
<td>76</td>
</tr>
<tr>
<td>One story, roof and ceiling (first floor of a two-story building or second floor of a three-story building).</td>
<td>3:12</td>
<td>2627</td>
<td>3229</td>
<td>3435</td>
<td>3969</td>
<td>5366</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>6:12</td>
<td>2728</td>
<td>3229</td>
<td>3440</td>
<td>4458</td>
<td>6174</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>9:12</td>
<td>38</td>
<td>4540</td>
<td>4665</td>
<td>6174</td>
<td>7891</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>12:12</td>
<td>4345</td>
<td>5359</td>
<td>5765</td>
<td>72100</td>
<td>106115</td>
<td>116</td>
</tr>
<tr>
<td>Two stories, roof and ceiling (first floor of a three-story building).</td>
<td>3:12</td>
<td>4345</td>
<td>5364</td>
<td>5784</td>
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</table>

For SI: 1 mph = 0.447 m/s.

a. Linear interpolation is permitted.

b. For hip-roofed homes the minimum percentage of full-height sheathing, based upon wind, is permitted to be multiplied by a factor of 0.95 for roof slopes not exceeding 7:12 and a factor of 0.9 for roof slopes greater than 7:12.

**Reference standards type:** This reference standard is new to the ICC Code Books

**Add new standard(s) as follows:**

AISI S240-15, North American Standard for Cold-Formed Steel Structural Framing (2015)

Standards are available for free download at www.aisistandards.org

**Reason:** This proposal is one in a series intended to update the content of the Cold-Formed Steel (CFS) light-framed construction provisions of the IRC. The proposed revisions align the IRC with the provisions of AISI S230-15, Standard for Cold-Formed Steel Framing - Prescriptive Method for One- and Two-Family Dwellings. The wind
loads are adjusted to conform to the provisions of the ASCE7-10 Directional Method, and the wind speed increments are modified to correlate with the increments as shown in the wind speed maps (Figures R301.2(4)A and B). Member size and connection requirement tables are modified to correspond to the adjusted wind loads per methods specified in AISI S240 and AISI S100; respectively. Minor corrections have also been made to the text where applicable. Further explanation for each section follows:

**Applicability Limits** - This proposal adjusts the upper limit of the ultimate design wind speed from less than 139 miles per hour (mph) to less than 140 mph. The previous upper limit was based on a conversion of the wind speed from a nominal speed to an ultimate speed. For which the conversion of the 110 mph nominal wind speed resulted in a rounded value of 139 mph ultimate wind speed upper limit (ie. less than 139 mph). This is detailed in the last cycle code change proposal RB258-13. Since the wind speeds now listed in this section are actual ultimate wind speeds, as derived from the ultimate wind speed maps, this section is now applicable for ultimate wind speeds up to 140 mph.

**Tables R603.3.1 and R603.3.1.1(1)** - Connection requirements are modified to accommodate corresponding wind load adjustments as previously stated.

**Table R603.3.1.1(2)** - Anchor spacing requirements are modified to accommodate corresponding wind load adjustments as previously stated.

**Table R603.3.1.2(2) through Table R603.3.1.2(16)** - Minimum stud thickness requirements are modified to accommodate corresponding wind load adjustments as previously stated.

**Table R603.3.2.1(1) and Table R603.3.2.1(2)** - Minimum stud thickness requirements are modified to accommodate corresponding wind load adjustments as previously stated.

**Section R603.3.5 Splicing** - Steel studs are permitted to be spliced with approved design per AISI S230.

**Section R603.6 Headers** - Previously this section referenced AISI S100, Section D4 for header design provisions. Section D4 of AISI S100 directed the user to AISI S212 - North American Standard for Cold-Formed Steel Framing - Header Design. However, the new standard AISI S240, North American Standard for Cold-Formed Steel Structural Framing, addresses requirements for construction with cold-formed steel structural framing that are common to prescriptive and engineered light frame construction. This comprehensive standard was formed by merging the following AISI standards:

- AISI S200, North American Standard for Cold-Formed Steel Framing-General Provisions
- AISI S210, North American Standard for Cold-Formed Steel Framing–Floor and Roof System Design
- AISI S211, North American Standard for Cold-Formed Steel Framing–Wall Stud Design
- AISI S212, North American Standard for Cold-Formed Steel Framing–Header Design
- AISI S213, North American Standard for Cold-Formed Steel Framing– Lateral Design
- AISI S214, North American Standard for Cold-Formed Steel Framing–Truss Design

Consequently, AISI S240 supersedes all previous editions of the above mentioned individual AISI standards and is the correct reference for this application.

**Table R603.8** - Head and sill track allowable spans are modified to accommodate corresponding wind load adjustments as previously stated.

**Table R603.9.2(1)** - Minimum required percentages for full height sheathing are modified to accommodate corresponding wind load adjustments as previously stated.

The AISI Standards are available for free download at www.aisistandards.org

**Cost Impact:** Will increase the cost of construction

The proposed changes to this section will not increase the cost of construction in general. While the overwhelming majority of the prescribed members have not changed or are reduced in size, there may be conditions for which the minimum member size will increase.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, AISI 240-15, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
RB249-16
IRC: R606.1.

Proponent: Jason Thompson, Masonry Alliance for Codes and Standards (MACS), representing Masonry Alliance for Codes and Standards (jthompson@ncma.org); Phillip Samblanet, representing The Masonry Society (psamblanet@masonrysociety.org)

2015 International Residential Code

Revise as follows:

R606.1 General. Masonry construction shall be designed and constructed in accordance with the provisions of this section, TMS 402, TMS 403, or in accordance with the provisions of TMS 402/ACI 530/ASCE 5 404.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
TMS 404-16 – Standard for the Design of Architectural Cast Stone
Reason: Architectural cast stone is a non-structural masonry system typically used as architectural accents such as balusters, quoins, sills, etc. While generally covered within the masonry requirements of the IRC, the vast majority of design, fabrication, and installation guidance for these systems has historically stemmed from industry-generated best practices; a gap now filled with the creation of these three new standards.
Topics covered collectively under these three new standards include:
1) Minimum requirements for reinforcement, ties, and anchors used with cast stone along with the associated corrosion protection requirements for these materials.
2) Additional requirements for cast stone materials not covered within ASTM C1364.
3) Tolerance requirements for individual cast stone elements as well as finished assemblies.
4) Information to be included in shop drawings and submittal packages.
5) Ancillary materials used during the installation of cast stone including mortar, grout, and jointing materials.
6) Minimum quality assurance requirements including testing frequency, sample panels, and inspection.
7) Installation criteria for both wet-setting (laying cast stone elements in mortar) as well as dry-setting (where cast stone units are shimmed and caulked).

Cost Impact: Will not increase the cost of construction
The addition of these new standards is an alternative to the existing IRC provisions based on existing industry best practices.
2015 International Residential Code

Add new text as follows:

SECTION R607 ADOBE MASONRY

R607.1 General. Adobe construction shall comply with Section 606 except as modified by this section.

R607.2 Unstabilized adobe. Unstabilized adobe shall comply with Sections R607.2.1 through R607.2.4.

R607.2.1 Compressive strength. Adobe units shall have an average compressive strength of 300 psi (2068 kPa) when tested in accordance with ASTM C 67. Five samples shall be tested and no individual unit is permitted to have a compressive strength of less than 250 psi (1724 kPa).

R607.2.2 Modulus of rupture. Adobe units shall have an average modulus of rupture of 50 psi (345 kPa) when tested in accordance with the following procedure. Five samples shall be tested and no individual unit shall have a modulus of rupture of less than 35 psi (241 kPa).

R607.2.2.1 Support conditions. A cured unit shall be simply supported by 2-inch-diameter (51 mm) cylindrical supports located 2 inches (51 mm) in from each end and extending the full width of the unit.

R607.2.2.2 Loading conditions. A 2-inch-diameter (51 mm) cylinder shall be placed at midspan parallel to the supports.

R607.2.2.3 Testing procedure. A vertical load shall be applied to the cylinder at the rate of 500 pounds per minute (37 N/s) until failure occurs.

R607.2.2.4 The modulus of rupture shall be determined by the equation:

$$f_r = \frac{3PLs}{2Sw (St^2)} \quad \text{(Equation R6-1)}$$

where, for the purposes of this section only:

- \(S_w\) = Width of the test specimen measured parallel to the loading cylinder, inches (mm).
- \(f_r\) = Modulus of rupture, psi (MPa).
- \(L_s\) = Distance between supports, inches (mm).
- \(S_t\) = Thickness of the test specimen measured parallel to the direction of load, inches (mm).
- \(P\) = The applied load at failure, pounds (N).

R607.2.3 Moisture content requirements. Adobe units shall have a moisture content not exceeding 4 percent by weight.

R607.2.4 Shrinkage cracks. Adobe units shall not contain more than three shrinkage cracks and any single shrinkage crack shall not exceed 3 inches (76 mm) in length or \(\frac{1}{8}\) inch (3.2 mm) in width.

R607.3 Stabilized adobe. Stabilized adobe shall comply with Section R607.2 for unstabilized adobe in addition to Sections R607.3.1 and R607.3.2.

R607.3.1 Soil requirements. Soil used for stabilized adobe units shall be chemically compatible with the stabilizing material.

R607.3.2 Absorption requirements. A 4-inch (102 mm) cube, cut from a stabilized adobe unit dried to a constant weight in a ventilated oven at 212°F to 239°F (100°C to 115°C), shall not absorb more than 2\(\frac{1}{2}\)% percent moisture by weight when placed upon a constantly water-saturated, porous surface for seven days. A minimum of five specimens shall be tested and each specimen shall be cut from a separate unit.
R607.4 Allowable stress. The allowable compressive stress based on gross cross-sectional area of adobe shall not exceed 30 psi (207 kPa).
R607.4.1 Bolts. Bolt values shall not exceed those set forth in Table R607.4.1.

**TABLE R607.4.1 ALLOWABLE SHEAR ON BOLTS IN ADOBE MASONRY**

<table>
<thead>
<tr>
<th>DIAMETER OF BOLTS (inches)</th>
<th>MINIMUM EMBEDMENT (inches)</th>
<th>SHEAR (pounds)</th>
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<tr>
<td>1</td>
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<td>500</td>
</tr>
<tr>
<td>1 1/8</td>
<td>24</td>
<td>600</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound = 4.448 N.

R607.5 Detailed requirements. Adobe construction shall comply with Sections R607.5.1 through R607.5.9.

R607.5.1 Number of stories. Adobe construction shall be limited to buildings not exceeding one story, except that two-story construction is allowed when designed by a registered design professional.

R607.5.2 Mortar. Mortar for adobe construction shall comply with Sections R607.5.2.1 and R607.5.2.2.

R607.5.2.1 General. Mortar for stabilized adobe units shall comply with this chapter or adobe soil. Adobe soil used as mortar shall comply with material requirements for stabilized adobe. Mortar for unstabilized adobe shall be Portland cement mortar.

R607.5.2.2 Mortar joints. Adobe units shall be laid with full head and bed joints and in full running bond.

R607.5.3 Parapet walls. Parapet walls constructed of adobe units shall be waterproofed.

R607.5.4 Wall thickness. The minimum thickness of exterior walls in one-story buildings shall be 10 inches (254 mm). The walls shall be laterally supported at intervals not exceeding 24 feet (7315 mm). The minimum thickness of interior load-bearing walls shall be 8 inches (203 mm). In no case shall the unsupported height of any wall constructed of adobe units exceed 10 times the thickness of such wall.

R607.5.5 Foundations. Foundations for adobe construction shall be in accordance with Sections R607.5.5.1 and R607.5.5.2.

R607.5.5.1 Foundation support. Walls and partitions constructed of adobe units shall be supported by foundations or footings that extend not less than 6 inches (152 mm) above adjacent ground surfaces and are constructed of solid masonry (excluding adobe) or concrete. Footings and foundations shall comply with Chapter 4.

R607.5.5.2 Lower course requirements. Stabilized adobe units shall be used in adobe walls for the first 4 inches (102 mm) above the finished first-floor elevation.

R607.5.6 Isolated piers or columns. Adobe units shall not be used for isolated piers or columns in a load-bearing capacity. Walls less than 24 inches (610 mm) in length shall be considered isolated piers or columns.

R607.5.7 Tie beams. Exterior walls and interior load-bearing walls constructed of adobe units shall have a continuous tie beam at the level of the floor or roof bearing and shall comply with either Section R607.5.7.1 or R607.5.7.2.

R607.5.7.1 Concrete tie beams. Concrete tie beams shall be a minimum depth of 6 inches (152 mm) and a minimum width of 10 inches (254 mm). Concrete tie beams shall be continuously...
reinforced with a minimum of two No. 4 reinforcing bars. The specified compressive strength of concrete shall be at least 2,500 psi (17.2 MPa).

R607.5.7.2 Wood tie beams. Wood tie beams shall be solid or built up of lumber having a minimum nominal thickness of 1 inch (25 mm), and shall have a minimum depth of 6 inches (152 mm) and a minimum width of 10 inches (254 mm). Joints in wood tie beams shall be spliced a minimum of 6 inches (152 mm). No splices shall be allowed within 12 inches (305 mm) of an opening. Wood used in tie beams shall be approved naturally decay-resistant or preservative-treated wood.

R607.5.8 Exterior finish. Exterior walls constructed of unstabilized adobe units shall have their exterior surface covered with a minimum of two coats of Portland cement plaster having a minimum thickness of \(\frac{3}{4}\) inch (19.1 mm) and conforming to ASTM C 926. Lathing shall comply with ASTM C 1063. Fasteners shall be spaced at 16 inches (406 mm) on center maximum. Exposed wood surfaces shall be treated with an approved wood preservative or other protective coating prior to lath application.

R607.5.9 Lintels. Lintels shall be considered structural members and shall be designed in accordance with the applicable provisions of Section R606.

Reason: This is a companion change to a separate proposal to remove the adobe design and construction requirements from Chapter 21 of the IBC. Adobe construction, while not widely used, is still used in some markets; particularly in the Southwest US. The requirements proposed here are virtually a verbatim transcription of the adobe requirements of IBC Section 2109.

Cost Impact: Will not increase the cost of construction

The change simply provides an alternative for the use of adobe through the IRC provisions.
2015 International Residential Code

R609.1 General. This section prescribes performance and construction requirements for exterior windows and doors installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written instructions. Window and door openings shall be flashed in accordance with Section R703.4. Written installation instructions shall be provided by the fenestration manufacturer for each window or door. A means shall be utilized, such as an air cavity or free-draining material located around the perimeter of the assembly inside of the nailing flange, for draining incidental moisture from the assembly to pan flashing that drains to the exterior.

Reason: Add new language to clarify the intent, and enhance the effectiveness, of proper window installation requirements. Moisture is the most significant factor in the deterioration of buildings, and window assemblies are the most vulnerable to moisture infiltration. The existing code language does not have specific, enforceable code language to require maintaining an effective drainage plane around window assemblies. For all points of moisture intrusion to be eliminated, the workmanship must be perfect. However, even a perfectly flashed and caulked window will suffer degradation over time due to environmental conditions. For this reason, it is necessary to incorporate some redundancy in the process. It is inevitable that some moisture will enter the window frame opening. This moisture must be allowed to escape from the assembly to avoid structural damage and mold growth. When the area behind the nailing flange is obstructed, the blockage itself or capillarity will restrict drainage. An air space or free draining material in a window assembly, behind the water shedding surface, is an excellent way to provide good drainage and convective air flow for drying. This can be accomplished by installing a barrier to prevent insulation or other materials from reaching the interior side of the nailing flange or installing a material that allows free draining and air movement. This air space or free draining material will be less exposed to the elements and linear expansion, allowing it to last longer than exterior caulking, etc. This method has been tested under extreme conditions and proven to be effective.

Bibliography: Research Highlights, Technical Series 03-124, CMHC
Keeping Walls Dry - Parts 1 & 2, CMHC, Dale Kerr - P. Eng.

Cost Impact: Will increase the cost of construction
Depending upon the methods used, there may be a slight increase in the cost of compliance due to labor and a small amount of materials. However, the benefits of ensuring moisture drainage and reducing the potential for structural damage and mold growth far outweigh the minor costs that may be involved.

The cost impact of this additional step to install a method to stop insulation or other material from reaching the interior side of the nailing flange, including material and labor, can be expected to add between $10 - $20 per window opening. This is contingent upon the size of the opening, but in most cases will fall into this range. This cost is a fraction of that applied to the remediation required for a system which fails.

The following are examples of remediation costs that would be avoided based on feedback from builders, remodelers, and construction experience:
Initial site visit: $200 - $500
R&R of single unit: $1,500 - $5,000
R&R of multiple units with extensive damage has ranged from thousands of dollars to exceeding the value of the structure.
Revise as follows:

R609.1 General. This section prescribes performance and construction requirements for exterior windows and doors installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written instructions or other approved methods. Window and door openings shall be flashed in accordance with Section R703.4. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Reason: The concept of “other approved methods” is used more than 60 times in the I-codes for applications including fire protection, structural matters, installation instructions, plumbing, water proofing, and many others. In addition, the need for other approved fenestration anchoring methods are recognized in Section R609.7.1 and several different approved methods of flashing are included in Section R703.4. Furthermore, window manufacturer installation instructions often require other approved methods for installation, recognize their necessity, or place responsibility for suitability of any installation method (including those in the installation instruction) on the user. Consequently, this proposal is consistent with these specific intentions and realities, makes the intent more transparent, and better enables the market to use other approved methods of installation when needed or when more appropriate for a given application.

To further justify and support the need for this proposal, the following are a few representative quotes from window manufacturer installation instructions, including some of the leading window manufacturers (names are purposely not disclosed):

“These instructions should meet or exceed window installation codes and regulations...may not be sufficient for codes in your particular area or application"

“Not all window types may be installed into every wall condition in all areas...”

“These instructions are not intended to advise on structural requirements for any given installation.”

“Actual conditions found in buildings vary greatly. There may be cases where substantial additional considerations and precautions may be required...”

“The selection of fasteners for use in the installation is the responsibility of the installer...When necessary an engineer should be consulted to ensure structural integrity...”

“Building designs, construction methods, building materials, and site conditions unique to your project may require an installation method different from these instructions and/or additional care. Determining the appropriate installation method is the responsibility of you, your architect, or construction professional”

Clearly, the intention is to rely on other approved methods in many cases and it is often a responsibility assigned to the users of the product and the code. Thus, the code should explicitly recognize use of other approved methods for window installation and this also will serve to prevent ad-hoc decisions on window installation that otherwise occur without any consideration of approved methods. There are many reputable sources available to characterize approved methods of installation including engineered designs, research/testing reports by approved sources or approved agencies, code evaluation reports, DOE Building America program guidance reports and details, ASTM E2112, and various other sources for good practice in the recognized literature.

Cost Impact: Will not increase the cost of construction
The proposal will expand legitimate options for window installation as needed.
IRC: R609.1.

Proponent: Jeff Inks, Window & Door Manufacturers Association, representing Window & Door Manufacturers Association (jinks@wdma.com)

2015 International Residential Code

R609.1 General. This section prescribes performance and construction requirements for exterior windows and doors installed in walls. Windows and doors shall be installed and flashed anchored in accordance with the fenestration manufacturer's written instructions Section R609.7. Window and door openings shall be flashed in accordance with Section R703.4. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Reason: The long standing intent of Section R609 is to provide the appropriate performance and construction requirements for window and door products, and anchoring requirements with respect to the installation of them. As the general provision for Section R609, R609.1 should make that clear and for further clarification, make clear that flashing requirements for the window and door opening are provided in Chapter 7 Wall Coverings where they belong. As currently written, the inclusion of flashing requirements in this section is not necessary and more importantly conflicts with the provisions of Section R703.4 which does not restrict builders from using other proper flashing installation methods in addition to those included in the manufacturer's instructions when those instructions may not cover a particular installation aspect/s. This proposal corrects that and brings the general provisions of R609.1 back in-line with the intent of Section R609 on the whole by clarifying anchoring must comply with Section R609.7 and flashing of the opening with Section R703.4. The requirement that manufacturers must provide installation instructions remains and more clearly reflects how installation instructions are being provided by manufacturers.

Cost Impact: Will not increase the cost of construction

This revision eliminates the conflict in flashing requirements created by the inclusion of them in Section 609.1. It does not add any new provisions and will actually reduce the cost of construction in some cases by ensuring the full range of flashing installation options are availed to builders as intended.
RB254-16
IRC: R609.2.
Proponent: Jeff Inks, representing Window & Door Manufacturers Association (jinks@wdma.com)

2015 International Residential Code

Revise as follows:

R609.2 Performance. Exterior windows and doors shall be designed to resist capable of resisting the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3) or determined in accordance with ASCE 7 using the allowable stress. For exterior windows and doors tested in accordance with Sections R609.3 and R609.5, required design load combinations of wind pressures determined from ASCE 7 are permitted to be multiplied by 0.6. Design wind loads for exterior glazing not part of a labeled assembly shall be permitted to be determined in accordance with Chapter 24 of the International Building Code.

Reason:
This proposal is intended to clarify that the use of the 0.6 conversion multiplier is allowed with respect to the determination of design wind pressures in accordance with ASCE 7 and testing of the respective assemblies in accordance with Section R609.3 or R609.5 accordingly. While that is what the existing provision allows, as currently written, that is not entirely clear and has led to confusion regarding wind load requirements. This proposed amendment expressly states that the use of 0.6 multiplier is allowed and will alleviate the confusion that currently exists benefiting all – code officials, manufacturers and builders.

Cost Impact: Will not increase the cost of construction
This is a clarification. No substantive change.
2015 International Residential Code

Revise as follows:

R609.2 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 in accordance with Table R301.2(3) or determined in accordance with ASCE 7 using the allowable stress. For exterior windows and doors tested in accordance with Sections R609.3 and R609.5, required design load combinations of wind pressures determined from ASCE 7 are permitted to be multiplied by 0.6. Design wind loads for exterior glazing not part of a labeled assembly shall be permitted to be determined in accordance with Chapter 24 of the International Building Code.

R609.3 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 AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and labeled as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or AMD 100, or comply with Section R609.5. Exterior windows and doors shall be labeled with a permanent label or marking providing traceability to the manufacturer and product. The permanent label or marking shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

Exception: Decorative glazed openings.

R609.5 Other exterior window and door assemblies. Exterior windows and door assemblies not included within the scope of Section R609.3 or R609.4 shall be tested in accordance with ASTM E 330. Glass in assemblies covered by this exception shall comply with Section R308.5. Exterior windows and doors shall be labeled with a permanent label or marking providing traceability to the manufacturer and product. The permanent label or marking shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

R609.6 Wind-borne debris protection. Protection of exterior windows and glass doors in buildings located in wind-borne debris regions shall be in accordance with Section R301.2.1.2.

R609.6.1 Fenestration assembly testing and labeling. Fenestration assemblies shall be tested by an approved independent laboratory, listed by an approved entity, and bear a label identifying manufacturer, performance characteristics, and approved inspection agency to indicate compliance with the requirements of the following specification(s):

1. ASTM E 1886 and ASTM E 1996; or
2. AAMA 506.

Fenestration assemblies shall have a permanent label or marking applied that provides traceability to the manufacturer and product. The permanent label or marking shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied,
Reason: The primary purpose of this code change is to require that windows and doors have a permanent label that provides a way for building owners, homeowners, and others to be able to determine their performance characteristics after the building has been occupied. While the code does require a label that indicates the manufacturer, performance characteristics, and inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440, this label is not required to be permanent. Often, it is applied such that code enforcement can verify the appropriate performance characteristics required by the code, but is easily removable. For products that don’t have permanent labels, it becomes nearly impossible for the owner to determine the structural wind load resistance and/or energy efficiency of the windows and doors after they’ve occupied the building. This proposal would simply require some type of permanent marking on the window or door indicating the manufacturer and model/series number so that the specific performance characteristics (wind, water infiltration, energy, etc.) could be retrieved. The criteria for a permanent label was taken from Section 1703.5.4.

The language in Section R609.6.1 pertaining to impact-resistant products is revised for clarity and consistency with the terminology used in ASCE 7-16 and ASTM E 1886 and ASTM E 1996.

For the past 10-15 years, there has been a push towards considering sustainability in the way our buildings are constructed in this country. If this goal is to be successful and building owners and occupants increasingly want more information about the sustainability of the buildings they occupy, they need to be provided with information needed to determine how critical components are expected to perform in the buildings they own and use.

Some manufacturers already include permanent labels on their products that provide traceability to the manufacturer and the product characteristics. The Florida Building Code has required this type of label since the 2007 edition and has continued to require it in subsequent editions. The following is the relevant text from the 5th Edition (2014) Florida Building Code, Residential:

R612.3 Testing and labeling. Exterior windows and doors shall be tested by an approved independent testing laboratory, and shall be labeled to indicate compliance with AAMA/ WDMA/CSA 101/I.S.2/A440 or TAS 202 (HVHZ shall comply with TAS 202). Exterior side-hinged doors shall be tested and labeled as conforming to AAMA/ WDMA/CSA 101/I.S.2/A440 or comply with Section R612.5. Exterior windows and doors shall be labeled with a permanent label, marking, or etching providing traceability to the manufacturer and product. The following shall also be required either on a permanent label or on a temporary supplemental label applied by the manufacturer: information identifying the manufacturer, the product model/series number, positive and negative design pressure rating, product maximum size, glazing thickness, impact-resistance rating if applicable, Florida Product Approval number or Miami-Dade Product Approval number, applicable test standard(s), and approved product certification agency, testing laboratory, evaluation entity or Miami-Dade Product Approval.

Another consideration is that insurance incentives are being offered in some states for homes, new and existing, that comply with specific levels of the Fortified program administered by IBHS. The Fortified program is a set of engineering and building standards designed to help strengthen new and existing homes through system-specific building upgrades to minimum building code requirements that will reduce damage from specific natural hazards. Fortified offers three different levels of designation (bronze, silver, and gold) depending on the extent of the recommended "upgrades" to the building’s wind resistance. To qualify for a designation, the home has to be inspected. Without a permanent label indicating the manufacturer and product model/series number, the performance characteristics of windows and doors often cannot be determined, and certain Fortified designations become difficult or impossible to be given.

This proposal also seeks to clarify the relationship between design wind loads calculated in accordance with ASCE 7 and the wind load testing requirements of AAMA/ WDMA/CSA 101/I.S.2/A440. When the 2012 IBC and IRC were updated to reference ASCE 7-10, the codes did not address the conversion necessary for assemblies that are tested according to standards based on the ASD-level wind loads such AAMA/ WDMA/CSA 101/I.S.2/A440. There was and continues to be much confusion in jurisdictions that have adopted the 2012 IBC and IRC. The 2015 IBC and IRC address the conversion but make a reference to the load combinations, which is not completely clear to those that are relatively unacquainted with the nuances of wind loading criteria. The 2010 Florida Codes adopted ASCE 7-10 and incorporated a specific reference to the 0.6 reduction similar to the language in this proposal. Jurisdictions that have adopted the 2012 IBC and IRC have often looked to the language in the 2010 FBC for justification of the conversion. The proposed language in Section R609.2 doesn’t result in any technical changes, but is simply a clarification consistent with the language used in the Florida Building Codes.

Windows and doors are important components of the building envelope and their performance is critical in preventing wind and water infiltration in addition to maintaining the overall structural integrity of the building. Approval of this proposal will assure, going forward, that new or replaced exterior windows and doors will be
labeled such that building owners and those considering the purchase of buildings with these products will be able to obtain information necessary for determining the expected performance of these critical components of the building envelope.

**Cost Impact:** Will increase the cost of construction
Will impact cost on some manufacturers. The code does not currently require a permanent label. However, many window and door manufacturers voluntarily apply a permanent label that provides traceability to the manufacturer and performance characteristics. There will be no cost impact to those manufacturers.
RB256-16
IRC: R609.4.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

**R609.4 Garage doors.** Garage doors shall be tested in accordance with either ASTM E 330 or ANSI/DASMA 108, and shall meet the acceptance criteria of ANSI/DASMA 108 when installed in areas where the ultimate design wind speed is 115 mph or greater.

**Reason:** There has been some suggestion that these wind resistant doors are necessary to maintain the structural integrity of a garage. That cannot be true because these doors are neither required nor must they be kept in a closed position. Vast areas of the country do not face a problem with the need to have these higher cost doors. There is no evidence in these large areas that there is a problem. This requirement was put in the code as a result of hurricane damage in Florida. Areas of the country not subject to strong winds should not have to pay the price for hurricane prone areas.

**Cost Impact:** Will not increase the cost of construction
This proposal reduces regulations and will have no impact on construction costs.
2015 International Residential Code

R609.4 Garage doors. *No change to text.*

Add new text as follows:

**R609.4.1 Garage door labeling.** Garage doors shall be labeled with a permanent label identifying the garage door manufacturer, the garage door model/series number, the positive and negative design wind pressure rating, the installation instruction drawing reference number, and the applicable test standard.

**Reason:** This proposal is one of several that are addressing labeling of critical components of the building envelope. The primary purpose of this code change is to require that garage doors have a permanent label that provides a way for building owners, homeowners, and others to be able to determine their performance characteristics after the building has been occupied. The 2015 IRC does not require any type of label for garage doors. For products that don’t have permanent labels, it becomes nearly impossible for the owner to determine the structural wind load resistance and/or energy efficiency of the garage doors after they’ve occupied the building. This proposal would simply require some type of permanent marking on the garage door indicating the manufacturer and model/series number, and performance characteristics so that the specific performance characteristics could be retrieved at a later date.

For the past 10-15 years, there has been a push towards considering sustainability in the way our buildings are constructed in this country. If this goal is to be successful and building owners and occupants increasingly want more information about the sustainability of the buildings they occupy, they need to be provided with information needed to determine how critical components are expected to perform in the buildings they use. Garage doors are important components of the building envelope and their performance is critical in preventing wind and water infiltration as well as maintaining the overall structural integrity of the building.

Some manufacturers already include permanent labels on their products that provide traceability to the manufacturer and the product characteristics. The Florida Building Code has required this type of label since the 2007 edition and has continued to require it in subsequent editions. The following is the relevant text from the 5th Edition (2014) Florida Building Code, Residential:

**R612.4.1 Garage door labeling.** Garage doors shall be labeled with a permanent label provided by the garage door manufacturer. The label shall identify the garage door manufacturer, the garage door model/series number, the positive and negative design pressure rating, indicate impact rated if applicable, the installation instruction drawing reference number, the Florida Product Approval or Miami-Dade Product Approval number if applicable, and the applicable test standards. The required garage door components for an approved garage door assembly may be indicated using a checklist form on the label. If a checklist format is used on the label, the door installer or the garage door manufacturer shall mark the selected components on the checklist that are required to assemble an approved garage door system. The installation instructions shall be provided and available on the job site.

Another consideration is that insurance incentives are now being offered in some states for homes, new and existing, that comply with certain levels of the Fortified program administered by IBHS. The Fortified program is a set of engineering and building standards designed to help strengthen new and existing homes through system-specific building upgrades to minimum building code requirements that will reduce damage from specific natural hazards. Fortified offers three different levels of designation (brass, silver, and gold) depending on the extent of the recommended "upgrades" to the building's wind resistance. To qualify for a designation, the home has to be inspected. Without a permanent label indicating the manufacturer and product model/series number, the performance characteristics often cannot be determined, and certain Fortified designations become difficult or impossible to be given.

Approval of this proposal will assure, going forward, that new or replaced garage doors will be labeled such that building owners and those considering the purchase of buildings with these products will be able to obtain information necessary for determining the expected performance of these critical components of the building envelope.
Cost Impact: Will increase the cost of construction
Will impact cost on some manufacturers. The code does not currently require a permanent label. However, some garage door manufacturers voluntarily apply a permanent label that identifies the critical performance characteristics. There will be no cost impact to those manufacturers.
2015 International Residential Code

Add new text as follows:

R609.5 Other exterior window and door assemblies. Exterior windows and door assemblies not included within the scope of Section R609.3 or R609.4 shall be tested in accordance with ASTM E 330 and shall pass criteria contained within AAMA/WDMA/CSA 101/I.S.2/A-440. Glass in assemblies covered by this exception shall comply with Section R308.5.

Reason: ASTM E330 is just a test method. There is no criteria contained within the test method as to what constitutes "passing" or "failing" a test. At best the current language is ambiguous. Strictly interpreted, the language only requires that testing be done; since no criteria is given any test result meets the Code requirement. The North American Fenestration Standard is already a referenced standard and it makes sense that the criteria contained within it regarding ASTM E330 testing be adopted for this section. It is imperfect, perhaps, but it is consistent with other Sections.

Cost Impact: Will not increase the cost of construction
There should be no increase in the cost of construction as this is simply a clarification.
SECTION R202 DEFINITIONS

Impact Protective System Construction that has been shown by testing to withstand the impact of test missiles and that is applied, attached, or locked over exterior glazing.

Revise as follows:

R609.6 Wind-borne debris protection. Protection of exterior windows and glass doors, and doors with glass in buildings located in wind-borne debris regions shall be in accordance with Section R301.2.1.2.

R609.6.1 Fenestration testing and labeling. Fenestration shall be tested by an approved independent laboratory, listed by an approved entity, and bear a label identifying manufacturer, performance characteristics, and approved inspection agency to indicate compliance with the requirements of the following specification(s):

1. ASTM E 1886 and ASTM E 1996; or
2. AAMA 506.

Add new text as follows:

R609.6.2 Impact protective systems testing and labeling. Impact protective systems shall be tested for impact resistance by an approved independent laboratory for compliance with ASTM E 1886 and ASTM E 1996. Impact protective systems shall also be tested for design wind pressure by an approved independent laboratory for compliance with ASTM E 330. Required design wind pressures shall be determined in accordance with Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3) or determined in accordance with ASCE 7. For the purposes of this section, design wind pressures determined in accordance with ASCE 7 are permitted to be multiplied by 0.6.

Impact protective systems bear a label identifying the manufacturer, performance characteristics, and approved inspection agency. Impact protective systems shall have a permanent label providing traceability to the manufacturer, product designation, and performance characteristics. The permanent label shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

Reason: This proposal is one of several that are addressing labeling of critical components of the building envelope. The primary purpose of this code change is to require that impact protective systems (hurricane shutters) have a permanent label that provides a way for building owners, homeowners, and others to be able to determine their performance characteristics after the building has been occupied. The 2015 IRC does not require any type of label for impact protective systems. For products that don't have permanent labels, it becomes nearly impossible for the owner to determine the structural wind load resistance and impact resistance of the products after they've occupied the building. This proposal would simply require some type of permanent marking on the impact protective system indicating the manufacturer and model/series number, and performance characteristics so that the specific performance characteristics could be retrieved at a later date. The permanent label would only need to provide traceability to the product. However, it could provide all the required information. If the relevant information is not
provided on a permanent label, a temporary removable label is required to be applied so that local code officials can verify that the appropriate impact protective system was provided. For the past 10-15 years, there has been a push towards considering sustainability in the way our buildings are constructed in this country. If this goal is to be successful and building owners and occupants increasingly want more information about the sustainability of the buildings they occupy, they need to be provided ways to be able to determine how critical components are expected to perform in the buildings they use. Impact protective systems are important components of the building envelope and their performance is critical to maintaining the overall structural integrity of the building.

Some manufacturers already include permanent labels on their products that provide traceability to the manufacture and the product characteristics. The Florida Building Code has required a permanent label since the 2007 edition and has continued to require it in subsequent editions. The following is the relevant text from the 5th Edition (2014) Florida Building Code, Residential:

\[\text{R615.1} \text{ Impact resistant coverings shall be tested at 1.5 times the design pressure (positive or negative) expressed in pounds per square feet as determined by the Florida Building Code, Building Section 1609 for which the specimen is to be tested. The design pressures, as determined from Section 1609 of the Florida Building Code, Building or ASCE 7, are permitted to be multiplied by 0.6.}\]

\[\text{R615.1.1} \text{ Impact resistant coverings shall be labeled in accordance with the provisions of Section R615.}\]

\[\text{R615.2 Labels.} \text{ A permanent label shall be provided by the product approval holder on all impact resistant coverings.}\]

Another consideration is that insurance incentives are now being offered in several states for homes, new and existing, that comply with certain levels of the Fortified program administered by IBHS. The Fortified program is a set of engineering and building standards designed to help strengthen new and existing homes through system-specific building upgrades to minimum building code requirements that will reduce damage from specific natural hazards. Fortified offers three different levels of designation (bronze, silver, and gold) depending on the extent of the recommended "upgrades" to the building's wind resistance. To qualify for a designation, the home has to be inspected. Without a permanent label providing traceability to the manufacturer and product, the performance characteristics often cannot be determined, and certain Fortified designations become difficult or impossible to be given.

This proposal also provides some additional clarification for impact protective systems that is lacking in the IRC. New Section R609.6.2 clarifies that impact protective systems also have to be capable of resisting the required design wind pressure as well as the impact criteria. New language is added to clarify the relationship between design wind loads calculated in accordance with ASCE 7-10 and the wind load testing requirements of ASTM E330.

Approval of this proposal will assure, going forward, that new or replaced impact protective systems will be labeled such that building owners and those considering the purchase of buildings with these products will be able to obtain information necessary for determining the expected performance of these critical components used to protect the building envelope in hurricane prone areas.

**Cost Impact:** Will increase the cost of construction
Will result in an increase in cost. A consultant representing the industry estimates the cost of providing labels on impact resistant covering products to be as follows:

- a. Water Resistant Self-adhering Permanent Labels approximately $0.15 per label. Such labels would most likely be used on Accordion, Roll, Bahama, and Colonial style shutters.
- b. Embossed or ink jet labels used on metal and plastic panels would cost approximately $0.05 per label.
RB260-16
IRC: R702.2.1.
Proponent: G Michael Starks, In-Spex, LLC, C B Goldsmith & assoc., FlroidaLath & Plaster Bureau, representing In-Spex, LLC (mstarks@in-spexllc.com)

2015 International Residential Code

Revise as follows:

R702.2.1 Gypsum plaster. Gypsum plaster materials shall conform to ASTM C 5, C 22, C 28, C 35, C 59, C 61, C 587, C 631, C 847, C 933, C 1032 and C 1047, and shall be installed or applied in compliance with ASTM C 841, C 843, C 842, and C 844. Gypsum lath or gypsum base for veneer plaster shall conform to ASTM C 1396 and shall be installed in compliance with ASTM C 844. Plaster shall be not less than three coats where applied over metal lath and not less than two coats where applied over other bases permitted by this section, except that veneer plaster shall be applied in one coat not to exceed 3/16 inch (4.76 mm) thickness, provided the total thickness is in accordance with Table R702.1(1).

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
ASTM C 841-03 (Reapproved 2013) Standard Specification for Installation of Interior Lathing and Furring;

Reason:
As currently written, the Code eliminates the use of full-depth plaster in favor of veneer plaster. However, the values in Table R702.1(1) Thickness of Plaster, reflect the values of ASTM C 842, Standard Specification for Application of Interior Gypsum Plaster. Thickness values for C 843, Standard Specification for Application of Gypsum Veneer Plaster, are much thinner. In addition, application of gypsum base is covered in the current reference standard, ASTM C 844.

Cost Impact: Will not increase the cost of construction
There is no cost of construction significance in this item.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM C841-03 and ASTM 842-05, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
RB261-16
IRC: R702.2.2.
Proponent: G Michael Starks, In-Spex, LLC, C b Goldsmith & Assoc., Florida Lath & Plaster Bureau, representing In-spex, LLC (mstarks@in-spexllc.com)

2015 International Residential Code

Revise as follows:

R702.2.2 Cement plaster. Cement plaster materials shall conform to ASTM C 91 (Type M, S or N), C 150 (Type I, II and III), C 595 (Type IP, I (PM), IS and I (SM)), C 847, C 897, C 926, C 933, C 1032, C 1047 and C 1328, and shall be installed or applied in compliance with ASTM C 926 and C 1063. Gypsum lath shall conform to ASTM C 1396. Plaster shall be not less than three coats where applied over metal lath and not less than two coats where applied over other bases permitted by this section, except that veneer plaster shall be applied in one coat not to exceed \( \frac{3}{16} \) inch (4.76 mm) thickness, provided the total thickness is in accordance with Table R702.1(1).

Reason: Currently there is an misplacement error in the reference standards as listed in the current section. ASTM C 926, Standard Specification for Application of Portland Cement-Based Plaster, is an application standard and belongs after "...in compliance with" prior to "ASTM C 1063."

Bibliography: ASTM C 926-13 Standard specification for Application of Portland Cement-Based Plaster;

Cost Impact: Will not increase the cost of construction
There is no cost of construction significance in this item.
### 2015 International Residential Code

Delete without substitution:

<table>
<thead>
<tr>
<th>PLASTER-BASE</th>
<th>FINISHED THICKNESS OF PLASTER FROM FACE OF LATH, MASONRY, CONCRETE (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gypsum-Plaster</td>
</tr>
<tr>
<td>Expanded metal-lath</td>
<td>$\frac{5}{32}$, minimum&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Wire-lath</td>
<td>$\frac{5}{32}$, minimum&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gypsum-lath&lt;sup&gt;g&lt;/sup&gt;</td>
<td>$\frac{1}{2}$, minimum&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Masonry walls&lt;sup&gt;c&lt;/sup&gt;</td>
<td>$\frac{1}{2}$, minimum&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Monolithic concrete walls&lt;sup&gt;c&lt;/sup&gt;&lt;br&gt;ceiling&lt;sup&gt;c&lt;/sup&gt;&lt;br&gt;ceilings&lt;sup&gt;c&lt;/sup&gt;&lt;br&gt;ceilings&lt;sup&gt;c&lt;/sup&gt;&lt;br&gt;ceilings&lt;sup&gt;c&lt;/sup&gt;&lt;br&gt;ceilings&lt;sup&gt;d&lt;/sup&gt;</td>
<td>$\frac{5}{32}$, maximum&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Monolithic concrete ceilings&lt;sup&gt;c&lt;/sup&gt;&lt;br&gt;ceilings&lt;sup&gt;c&lt;/sup&gt;&lt;br&gt;ceilings&lt;sup&gt;d&lt;/sup&gt;</td>
<td>$\frac{3}{16}$, maximum&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gypsum veneer base&lt;sup&gt;f,g&lt;/sup&gt;</td>
<td>$\frac{1}{16}$, minimum&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gypsum sheathing&lt;sup&gt;g&lt;/sup&gt;</td>
<td>—</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.

- <sup>a</sup> Where measured from back plane of expanded metal lath, exclusive of ribs, or self-furring lath, plaster thickness shall be $\frac{3}{16}$ inch minimum.
- <sup>b</sup> Where measured from face of support or backing.
- <sup>c</sup> Because masonry and concrete surfaces vary in plane, thickness of plaster need not be uniform.
- <sup>d</sup> Where applied over a liquid bonding agent, finish coat shall be permitted to be applied directly to concrete surface.
- <sup>e</sup> Approved acoustical plaster shall be permitted to be applied directly to concrete or over base coat plaster, beyond the
RB262-16 : ASTM-STARKS12611

maximum plaster thickness shown.

f. Attachment shall be in accordance with Table R702.3.6.
g. Where gypsum board is used as a base for cement plaster, a water resistant barrier complying with Section R703.2 shall be provided.

Reason: Rationale:
Currently the Code section requires compliance with ASTM C 843, Standard Specification for Gypsum Veneer Plaster, but includes thickness requirements for C 842, Standard Specification for Application of Interior Gypsum Plaster (full-depth plaster). The two are not the same. C 843 is intended to be coordinated with ASTM C 844; one is the application of the base and the other is for the plaster. The same is true for C 841 and C 842. However, both of these standards are absent in R702.2.1; leading one to suppose that full-depth plaster is no longer allowed. If so, then the thickness tables would need to be adjusted to the much thinner requirements for veneer plasters.

Additionally, the Tables combine interior and exterior requirements while attempting to separate gypsum and cement plasters, creating confusion as to which requirement should be met. Because, ASTM C 842, C 843, and C926 already incorporate thickness Tables for their respective applications, referencing installation in compliance with those standards renders Table 702.2.1 (1) redundant and unnecessary.


Cost Impact: Will not increase the cost of construction
There is no cost of construction significance in this item.
**2015 International Residential Code**

Delete without substitution:

<table>
<thead>
<tr>
<th>COAT</th>
<th>CEMENT-PLASTER TYPE</th>
<th>CEMENTITIOUS MATERIALS</th>
<th>VOLUME-OF AGGREGATE PER SUM-OF-SEPARATE VOLUMES-OF CEMENTITIOUS MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Portland or blended</td>
<td>1</td>
<td>2³/₄×k₂ ²</td>
</tr>
<tr>
<td></td>
<td>Masonry</td>
<td>-</td>
<td>1/2</td>
</tr>
<tr>
<td></td>
<td>Plastic</td>
<td>-</td>
<td>1/2</td>
</tr>
<tr>
<td>Second</td>
<td>Portland or blended</td>
<td>1</td>
<td>3/₄×k₁ ²×k₂ ²</td>
</tr>
<tr>
<td></td>
<td>Masonry</td>
<td>-</td>
<td>1/2</td>
</tr>
<tr>
<td></td>
<td>Plastic</td>
<td>-</td>
<td>1/2</td>
</tr>
<tr>
<td>Finish</td>
<td>Portland or blended</td>
<td>1</td>
<td>3/₄×k₁ ²×k₂ ²</td>
</tr>
<tr>
<td></td>
<td>Masonry</td>
<td>-</td>
<td>1/2</td>
</tr>
</tbody>
</table>
a. Lime by volume of 0 to \( \frac{3}{4} \) shall be used where the plaster will be placed over low-absorption surfaces such as dense clay tile or brick.

b. The same or greater sand proportion shall be used in the second coat than used in the first coat.

**Reason:** Table R702.1(3) is virtually identical to that of ASTM C926, Tables 3 & 4 rendering it redundant and unnecessary as installation in compliance with ASTM C926 is already mandated in the current version of the code, Section R702.2.2 Cement Plaster and 703.7 Exterior Plaster. Removal of Table R702.1(3) brings congruency to the Code and the reference standard, ASTM C 926, and prevents the two from conflicting in the future should a change be made to one or the other.

**Bibliography:** ASTM C 926-13 *Standard specification for Application of Portland Cement-Based Plaster, pg 5, www.astm.org*

**Cost Impact:** Will not increase the cost of construction

There is no cost of construction significance in this item.
**RB264-16**

**IRC: R702.3.1.**

**Proponent:** Mike Fischer, Kellen, representing The Gypsum Association, representing Gypsum Association (mfischer@kellencompany.com)

### 2015 International Residential Code

**Revise as follows:**

**R702.3.1 Materials.** Gypsum board and gypsum panel product materials and accessories shall conform to ASTM C 22, C 475, C 514, C 1002, C 1047, C 1177, C 1178, C 1278, C 1396 or C 1658, or C 1766, and shall be installed in accordance with the provisions of this section. Adhesives for the installation of gypsum board and gypsum panel products shall conform to ASTM C 557.

**Reference standards type:** This reference standard is new to the ICC Code Books

**Add new standard(s) as follows:**


**Reason:** ASTM C1766 was developed by ASTM subcommittee C11.01, assigned the responsibility for the development and maintenance of test methods and materials for gypsum products. Standard C 1766 addresses gypsum panel products, laminated in the factory, that are designed for use in sound control (in ceilings, walls, partitions etc.) or for gypsum studs or coreboards. Adding the standard to R702.3.1 will help ensure that the latest available information and product standards for these panels are appropriately applied.

**Cost Impact:** Will not increase the cost of construction

The proposal adds in a product standard that extends performance requirements for factory-laminated products to meet the current intent of the code. The proposal increases product selection options, but contains no mandatory requirements.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, ASTM C1766-13, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
RB265-16
IRC: R702.3.3.
Proponent: Jon-Paul Cardin, American Iron and Steel Institute, representing American Iron and Steel Institute (JCardin@steel.org)

2015 International Residential Code

Revise as follows:

R702.3.3 Cold-formed steel framing. Cold-formed steel framing supporting gypsum board and gypsum panel products shall be not less than 1\(\frac{1}{4}\) inches (32 mm) wide in the least dimension.

Nonload-bearing cold-formed steel framing shall comply with AISI S220 and ASTM C645, Section 10. Load-bearing cold-formed steel framing shall comply with AISI S200 and ASTM C955, Section 8 S240.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
AISI S240-15, North American Standard for Cold-Formed Steel Structural Framing (2015)
Standards Available for free download at www.aisistandards.org

Reason: This proposal is one in a series intended to update the content of the cold-formed steel (CFS) light-framed construction provisions of the IRC. The screw penetration test, as referenced to ASTM C645, Section 10, has been incorporated into AISI S220-15, North American Standard for Cold-Formed Steel Framing - Non-Structural Members. Therefore, the reference to AISI S220 is adequate to cover those requirements.
In addition, this section previously referenced AISI S200 for load-bearing cold-formed steel framing. However, the new standard AISI S240, North American Standard for Cold-Formed Steel Structural Framing, addresses requirements for construction with cold-formed steel structural framing that are common to prescriptive and engineered light frame construction. This comprehensive standard was formed by merging the following AISI standards:

- AISI S200, North American Standard for Cold-Formed Steel Framing-General Provisions
- AISI S210, North American Standard for Cold-Formed Steel Framing–Floor and Roof System Design
- AISI S211, North American Standard for Cold-Formed Steel Framing–Wall Stud Design
- AISI S212, North American Standard for Cold-Formed Steel Framing–Header Design
- AISI S213, North American Standard for Cold-Formed Steel Framing–Lateral Design
- AISI S214, North American Standard for Cold-Formed Steel Framing–Truss Design

Consequently, AISI S240 supersedes all previous editions of the above mentioned individual AISI standards and is the correct reference for this application.

The additional screw penetration test, as referenced to ASTM C955 Section 8, is intended for load-bearing CFS framing members. Through the ANSI approved process of developing AISI S240-15, it was the consensus of the AISI Committee on Framing Standards that the screw penetration test was not necessary for load-bearing CFS framing members. The basis of the determination is that the test never produced a failed result for the thickness of members used in structural framing applications. Therefore, the screw penetration test of ASTM C955 Section 8 was not included in AISI S240-15, and is not required as a separate reference in this section of the IRC.

Cost Impact: Will not increase the cost of construction
This proposal is intended to update the referenced AISI standards and does not effect the intended prescribed construction requirements.

Analysis: A review of the standard(s) proposed for inclusion in the code, AISI 240-15, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
R702.7 Vapor retarders. The control of vapor diffusion to prevent the accumulation of condensation and moisture in the exterior wall assembly shall be provided by vapor retarders in accordance with Section R702.7.1, R702.7.2 or R702.7.3. The vapor retarder class shall be based on the manufacturer’s certified testing or a tested assembly.

The following shall be deemed to meet the class specified:
Class I: Sheet polyethylene, unperforated aluminum foil or other approved vapor retarder materials with a perm rating of less than or equal to 0.1.
Class II: Kraft-faced fiberglass batts or other approved vapor retarder materials with a perm rating greater than 0.1 and less than or equal to 1.0.
Class III: Latex or enamel paint, applied in accordance with the manufacturer’s recommendations, or other approved vapor retarder materials with a perm rating greater than 1.0 and less than or equal to 10.0.

Revise as follows:

R702.7.1 Vapor Class I vapor retarders. Class I vapor retarders are shall be required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.

Exceptions:
1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

Class I vapor retarders shall not be permitted on the interior side of frame walls for the following:
1. In Climate Zones 1, 2, 3 and 4.
2. In Climate Zones 5, 6, 7, 8 and Marine 4 where continuous insulation with a perm rating of less than 1.0 is applied on the exterior side of frame walls.
3. In Climate Zones 5, 6, 7, 8 and Marine 4 where Class II vapor retarders are applied on the interior side of frame walls.

Add new text as follows:

R702.7.2 Class II vapor retarders. Class II vapor retarders shall be permitted on the interior side of frame walls in Climate Zones 3 through 8, and Marine 4. Class II vapor retarders shall not be permitted on the interior side of frame walls in Climate Zones 1 and 2.

Revise as follows:

R702.7.1 R702.7.3 Class III vapor retarders. Class III vapor retarders shall be permitted on the interior side of frame walls in Climate Zones 1, 2, 3 and 4. Class III vapor retarders shall be permitted on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4 where any one of the conditions in Table R702.7.1 is met.

<p>| TABLE: R702.7.1 R702.7.3 |</p>
<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>CLASS III VAPOR RETARDERS PERMITTED FOR:¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine 4</td>
<td>Vented cladding over wood structural panels.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over fiberboard.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over gypsum.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 2.5$ over $2 \times 4$ wall.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 3.75$ over $2 \times 6$ wall.</td>
</tr>
<tr>
<td>5</td>
<td>Vented cladding over wood structural panels.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over fiberboard.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over gypsum.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 5$ over $2 \times 4$ wall.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 7.5$ over $2 \times 6$ wall.</td>
</tr>
<tr>
<td>6</td>
<td>Vented cladding over fiberboard.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over gypsum.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 7.5$ over $2 \times 4$ wall.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 11.25$ over $2 \times 6$ wall.</td>
</tr>
<tr>
<td>7 and 8</td>
<td>Continuous insulation with $R$-value $\geq 10$ over $2 \times 4$ wall.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 15$ over $2 \times 6$ wall.</td>
</tr>
</tbody>
</table>

For SI: 1 pound per cubic foot = 16 kg/m$^3$.

a. Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard; insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam $R$-value meets or exceeds the specified continuous insulation $R$-value.

Delete without substitution:

R702.7.2 Material vapor retarder class. The vapor retarder class shall be based on the
manufacturer's certified testing or a tested assembly.

The following shall be deemed to meet the class specified:

Class I: Sheet polyethylene, unperforated aluminum foil.
Class II: Kraft-faced fiberglass batts.
Class III: Latex or enamel paint.

Revise as follows:

R702.7.3 R702.7.4 Minimum clear airspaces and vented openings for vented cladding.

For the purposes of this section, vented cladding shall include the following minimum clear airspaces. Other openings with the equivalent vent area shall be permitted.

   1. Vinyl lap or horizontal aluminum siding applied over a weather-resistive barrier as specified in Table R703.3(1).
   2. Brick veneer with a clear airspace as specified in Table R703.8.4.
   3. Other approved vented claddings.

Reason: This proposal reorganizes and clarifies the vapor retarder sections and addresses a significant technical shortfall on which the IRC is currently silent. In terms of reorganization of the section, the primary reason for the use of vapor retarders has been moved to the beginning of Section 702.7. It is important to give reason for the use of vapor retarders and to define the various classes prior to setting their requirements. Even though the vapor retarder classes are defined in Chapter 2 of the 2015 IRC, it is useful for the user to have direct access to the vapor retarder ranges for each class. This proposal also addresses the previously vague requirement for Class III vapor retarders by requiring that use of latex or enamel paint as a material that meets the class be applied according to the manufacturers' recommendations. Studies have shown that when paints intended to function as Class III vapor retarders are not installed per the manufacturer’s recommendations, they can actually result in perm ratings well above the upper limit of 10 perms. The addition of this language will help minimize potential performance issues in the field.

The second major reorganization of the vapor retarder section is the separation of each vapor retarder class into individual sections to improve clarity and to minimize confusion. Doing so clearly defines the unique requirements for each vapor retarder class separately in order to eliminate ambiguity. For instance, Section R702.7.1 in the 2015 IRC combines Class I and II vapor retarders into a single requirement, which may cause confusion. Class I and Class II vapor retarders exhibit very different performance characteristics. In certain cases, a Class II vapor retarder can easily have 10 times, or more, the vapor permeance of a Class I vapor retarder.

The primary technical change involves additional limitations on Class I vapor retarders. The added limitations prevent low vapor permeance materials from being used on both the interior and exterior side of frame walls, creating a "trap" for moisture that has penetrated the wall assembly. In such cases, the drying potential of the wall assembly is significantly reduced. The drying potential concept is based on recommendations through research conducted by Gatland (2010), Lstiburek (2006), and the HIRL Report No. 5932.001_08142014 (2015). The 2015 IRC does not address this important issue; however, it is addressed in Section 1405.4.2 of the 2015 IBC. In comparison, this proposal is similar to the current requirements in the 2015 IBC, but allows for the use of Class II vapor retarders in conjunction with a continuous insulation layer with a vapor permeance of less than 1.0 in Climate Zones 5, 6, 7, 8 and Marine 4.

In addition to the technical change above, this proposal clearly states the classes of vapor retarders that can or cannot be used in all climate zones. This proposal clearly states that Class I vapor retarders shall not be used in Climate Zones 1, 2, 3 and 4, and that Class II vapor retarders shall be not used in Climate Zones 1 and 2, which coincides with the requirements in the 2015 IBC. Furthermore, this proposal fills the explicit requirement gaps for Class II vapor retarders in Climate Zones 3 and 4, as well as Class III vapor retarders in Climate Zones 1, 2, 3 and 4. These additional requirements are not explicitly addressed in the 2015 IRC and is thus open for interpretation and possible misuse.

Bibliography:

Cost Impact: Will not increase the cost of construction
This code change will not increase the cost of construction as it reorganizes and clarifies the original code provisions.
Revise as follows:

**R702.7 Vapor retarders. Class I**

Vapor retarders as described in Section R702.7.3 shall be provided in accordance with Section R702.7.1 or II vapor retarders are required on the interior side of frame walls Section R702.7.2, or in Climate Zones 5, 6, 7, 8 and Marine 4 accordance with an approved design using accepted engineering practice for hygrothermal analysis.

**Exceptions:**
1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

Add new text as follows:

**R702.7.1 Class I and II vapor retarders.** A Class I or II vapor retarder shall be required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4. In Climate Zones 5 through 8, the application of a Class I or II vapor retarder shall comply with one of the following conditions:

1. Sheathing, water-resistive barrier, and other material layers located between the wall cavity and cladding shall have a water vapor permeance of 3 perms or greater as measured in accordance with ASTM E96 (Method A or B), or
2. Continuous insulation shall be located on the exterior side of the frame wall and the minimum R-value shall comply with Table R702.7.1.

Class I vapor retarders shall not be permitted on the interior side of frame walls in Climate Zones 1, 2, 3, and 4 except Marine 4. Class II vapor retarders shall not be permitted on the interior side of frame walls in Climate Zones 1 and 2.

**TABLE R702.7.1**

<table>
<thead>
<tr>
<th>Climate Zone per Section</th>
<th>Maximum Heating Degree Days (65°F basis)</th>
<th>Minimum Insulation Ratio</th>
<th>Acceptable Insulation R-values (Cavity + Continuous)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5, 6</td>
<td>9,000</td>
<td>0.2</td>
<td>R-13 + R-2.6ci</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R-15 + R-3.0ci</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R-20 + R-4.0ci</td>
</tr>
<tr>
<td>7</td>
<td>12,600</td>
<td>0.35</td>
<td>R-13 + R-4.6ci</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R-20 + R-7.0ci</td>
</tr>
</tbody>
</table>
For SI: 1 heating degree day (65°F basis) = 0.56 heating degree days (18°C basis)

a. Insulation ratio is determined by dividing the continuous insulation (ci) R-value by the cavity insulation R-value. Alternate acceptable insulation R-values shall be permitted provided the insulation ratio meets or exceeds the required minimum insulation ratio. Interpolation between the maximum heating degree day values shall be permitted to derive a minimum insulation ratio corresponding to a site-specific heating degree day value.

b. Continuous insulation (ci) R-values are minimums for use with the indicated cavity insulation R-value. Cavity insulation R-values are maximums for use with the indicated continuous insulation R-values.

c. In addition to the vapor retarder, spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam R-value plus any continuous insulation R-value meets or exceeds the indicated continuous insulation R-value.

d. Where the heating degree day limit is exceeded in Climate Zone 8, a design shall be required to determine the minimum insulation ratio and acceptable insulation R-values.

R702.7.1 R702.7.2 Class III vapor retarders. Class III vapor retarders shall be permitted in Climate Zones 1, 2, and 3 and where any one of the conditions in Table R702.7.1 R702.7.2 is met.

Revise as follows:

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>CLASS III VAPOR RETARDERS PERMITTED FOR:a,b</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 and Marine 4</td>
<td>Vented cladding over wood structural panels.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over fiberboard.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over gypsum.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 2.5$ over $2 \times 4$ wall.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 3.75$ over $2 \times 6$ wall.</td>
</tr>
<tr>
<td>5</td>
<td>Vented cladding over wood structural panels.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over fiberboard.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over gypsum.</td>
</tr>
</tbody>
</table>
Continuous insulation with $R$-value $\geq 5$ over 2 × 4 wall.

Continuous insulation with $R$-value $\geq 7.5$ over 2 × 6 wall.

Vented cladding over fiberboard.

Vented cladding over gypsum.

Continuous insulation with $R$-value $\geq 7.5$ over 2 × 4 wall.

Continuous insulation with $R$-value $\geq 11.25$ over 2 × 6 wall.

Continuous insulation with $R$-value $\geq 10$ over 2 × 4 wall.

Continuous insulation with $R$-value $\geq 15$ over 2 × 6 wall.

See Section R702.7.1

For SI: 1 pound per cubic foot = 16 kg/m$^3$.

- a. Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam $R$-value meets or exceeds the specified continuous insulation $R$-value.

- b. Vented cladding shall include non-insulated vinyl siding or aluminum siding, brick veneer with a clear airspace as specified in Table R703.8.4, furred siding of any type, and other approved vented claddings.

R702.7.2 R702.7.3 Material vapor retarder class. The vapor retarder class shall be based on the manufacturer's certified testing or a tested assembly.

The following shall be deemed to meet the class specified:

Class I: Sheet polyethylene, unperforated aluminum foil with a perm rating of less than or equal to 0.1.

Class II: Kraft-faced fiberglass batts with a perm rating greater than 0.1 and less than or equal to 1.0.

Class III: Latex or enamel paint with a perm rating of greater than 1.0 and less than or equal to 10.0 installed in accordance with the paint manufacturer’s installation instructions to achieve the required perm rating.

Delete without substitution:

R702.7.3 Minimum clear airspaces and vented openings for vented cladding. For the purposes of this section, vented cladding shall include the following minimum clear airspaces. Other openings with the equivalent vent area shall be permitted.

1. Vinyl lap or horizontal aluminum siding applied over a weather resistive barrier as specified in Table R703.3(1).
2. Brick veneer with a clear airspace as specified in Table R703.8.4.
3. Other approved vented claddings.

Reason: This proposal better organizes the vapor retarder section of the IRC in a manner similar to that done last
code cycle for the 2015 IBC by this proponent with modification and/or support by several interested parties. Significant effort and review of this proposal was also devoted to keeping this proposal as simple as possible without sacrificing important building science principles needed to ensure reasonably reliable and consistent performance, enforcement, and use. This proposal also addresses a commonly understood need to ensure that the water vapor control provisions of the building code are updated to adequately address modern wall materials and methods as well as advanced insulation requirements in the energy code.

In Section R702.7.1, the proposal clarifies and enhances the applicability of Class I and II vapor retarders without exclusion or preference to materials or methods of construction for common wall assemblies. For example, in the colder climate zones, a minimum 3 perm water vapor permeance requirement is provided as one option for the exterior sheathing, water-resistive barrier materials, and other materials between the wall cavity and cladding (which may include the more vapor-permeable types of exterior insulation). This option for compliance ensures adequate coordination of interior vapor resistance and exterior vapor permeance to help avoid excessive moisture accumulations. To accommodate various typical sheathing materials that act as “smart vapor retarders”, such as OSB and plywood, the provision permits the permeance to be based on the wet-cup (Method B) procedure of ASTM E96. This is confirmed by data reported in the literature, included in databases used for hygrothermal analysis (e.g., WUFI), and used in studies by the Home Innovation Research Labs and also USDA Forest Products Labs which indicate a wet-cup permeance of 3.8 perms for typical 7/16” OSB (HIRL, 2013). In addition, APA The Engineered Wood Association technical literature indicates that 7/16” OSB has a wet-cup water vapor permeance of greater than 5 perms (and 15/32” plywood greater than 10 perms) (APA, 2009). In addition, many common water-resistive barrier materials, such as house wraps, are vapor permeable (i.e., 5 perms or greater). Thus, common successful materials and applications are not excluded by this proposal.

A second option for compliance in Section R702.7.1 is provided specifically for walls with exterior continuous insulation (particularly those less than 3 perms and not able to comply with the first option). This second option relies on compliance with a minimum continuous insulation R-value or insulation ratio (Table R702.7.1) to control water vapor by keeping the interior of the wall sufficiently warm (e.g., above dew point).

Both compliance options described above are needed to help ensure poor performing conditions are avoided where the code is currently silent and documented moisture problems have occurred in practice. Both approaches adhere closely to tried and true methods that have been in practice successfully for more than 20 years in the Canadian National Building Code and the U.S. practice (although not yet formally recognized in U.S. model codes). These methods and numerous sources of data and research have been reviewed and analyzed to help inform the development of this proposal (ABTG, 2015).

In Section R702.7.2, the provisions for Class III vapor retarders are unchanged with the exception of clarifying that they also are permitted in Climate Zones 1, 2, and 3. In Table R702.7.2, Climate Zone 4 is include to address an omission when the table was first added to the IRC (and also to agree with more recent data per ABTG, 2015 and other studies). Also, Climate Zone 8 is deferred to Section R702.7.1 (Class I and II vapor retarders). Climate Zone 8 was inappropriately included with Climate Zone 7 as an unintended action when the Class III vapor retarder table was first adopted into the IRC. Other proposals are expected to address appropriate prescriptive solutions for Climate Zone 8 should it be desired to add an appropriate prescriptive solution for use of Class III vapor retarders in Climate Zone 8.

Existing Section R702.7.3 is deleted and incorporated into a simplified footnote “b” to Table R702.7.2 because vented cladding is only addressed for the purpose of the Class III vapor retarder table.

Existing Section R702.7.2 (renumbered to Section R702.7.3) for vapor retarder material classes is enhanced to be consistent with changes to this provision last code cycle for the 2015 IBC, incorporating the specific vapor permeance ranges for each class of vapor retarder and to ensure compliance of the listed deemed to comply materials (or alternatives). In particular, reference to paint manufacturers’ installation instructions is added to ensure proper paint selection and application to achieve the required permeance levels for use of paint as a Class III vapor retarder. Problems in this regard (i.e., paint that is too vapor permeable) has contributed to moisture accumulation problems in walls and wall sheathing as documented in the reviewed literature and experience (refer to ABTG, 2015 and HIRL, 2013).

Bibliography:
Wall Systems, Home Innovation Research Labs (formerly NAHB Research Center) and Dr. Sam Glass, USDA-Forest Products Lab (Appendix A), www.homeinnovation.com


Cost Impact: Will not increase the cost of construction
This proposal improves the clarity and effectiveness of vapor retarder requirements without material preference and without excluding common accepted practices. Alternative solutions are also recognized and not excluded. Thus, no cost impact is anticipated and reduction of long-term costs due to improved resiliency and avoided moisture problems is expected.
R702.7 Vapor retarders. Class I or II vapor retarders are required on the interior side of frame walls shall be provided in Climate Zones 5, 6, 7, 8 and Marine 4 in accordance with this section.

Exceptions:
1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

R702.7.1 Class I and II vapor retarders. Class I or II vapor retarders shall be provided on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.

Exceptions:
1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where accumulation, condensation or freezing of moisture will not damage the materials.

Class I and II vapor retarders shall not be provided on the interior side of frame walls in Climate Zone 1A, 2A, and portions of Climate Zone 3A south of the warm-humid line.

Reason: The purpose of this code change is to provide appropriate limitations on the use of Class I or II interior vapor retarders in the warm-humid climate zones. The intent of providing a vapor retarder in the wall assembly is to control the migration of moisture from the warm side of the wall assembly to the colder side, where it can condense against colder surfaces and, if trapped within a portion of the wall assembly, cause mold growth or material decay. The existing vapor retarder requirements are intended for colder climates where the most concerning direction of vapor drive is from the warm inside of the house towards the colder outside, occurring during the heating (winter) season. In warmer climates, the direction of concern could be from the warm outside towards the colder inside of the house, occurring during the cooling (summer) season. In the latter case, a vapor retarder on the inside of the wall assembly would prevent the wall from drying inwards and could result in condensation occurring on the interior gypsum board or on the back side of the vapor retarder. Either one could result in mold growth and decay. To minimize the risk of interior vapor retarders being installed where they are not necessary and could cause issues within the wall, an explicit limitation on interior vapor retarders in the warm-humid climate zones is proposed. The code change also provides several editorial revisions. A separate section under R702.7 for the Class I and II vapor retarder requirements is created, and new charging language for the entire vapor retarder provisions added. The third exception to providing Class I or II vapor retarders is revised to clarify what the moisture conditions of concern are that need to be evaluated in deciding whether a wall assembly can be exempted from the vapor retarder requirements.

The proposed limitations are consistent with industry guidance from Home Innovation Research Labs, Building Science Corporation, DOE's Building America, NAIMA and others.

Building Science Digest 106, Understanding Vapor Barriers, Building Science Corporation, October 2006 (revised April 2011).


**Cost Impact:** Will not increase the cost of construction

The code change clarifies when vapor retarders are not required, and in fact when they should not be used. If anything, this code change would reduce the cost of construction if interior vapor retarders are currently being installed where they are not necessary, as well as avoiding the potential cost of mitigating moisture issues down the road.
2015 International Residential Code

Revise as follows:

R702.7 Vapor retarders. Class
A class I, II, or III vapor retarder shall be utilized to manage moisture migration via vapor
retarders are required on the interior side diffusion. House tightness requirements of frame walls
in Climate Zones 5, 6, 7, 8 and Marine 4 N1102.4.1.2 shall be utilized to manage moisture
migration by air flow.

Exceptions: In Climate Zones 5, 6, 7, 8 and Marine 4 a class I and II vapor retarder are not
required in the following locations:
1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

Delete without substitution:

R702.7.1 Class III vapor retarders. Class III vapor retarders shall be permitted where any one
of the conditions in Table R702.7.1 is met.

Revise as follows:

R702.7.2 Material vapor retarder class. The vapor retarder class shall be based on the
manufacturer's certified testing or a tested assembly.
- The following shall be deemed to meet the class specified:
  - Class I: Sheet polyethylene, unperforated aluminum foil.
  - Class II: Kraft-faced fiberglass batts.
  - Class III: Latex or enamel paint.

Delete without substitution:

R702.7.3 Minimum clear airspaces and vented openings for vented cladding. For the
purposes of this section, vented cladding shall include the following minimum clear airspaces.
Other openings with the equivalent vent area shall be permitted.

1. Vinyl lap or horizontal aluminum siding applied over a weather-resistive barrier as
   specified in Table R703.3(1).
2. Brick veneer with a clear airspace as specified in Table R703.8.4.
3. Other approved vented claddings.

TABLE R702.7.1
CLASS III VAPOR RETARDERS

For SI: 1 pound per cubic foot = 16 kg/m².
- Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood
  structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the
  spray foam R-value meets or exceeds the specified continuous insulation R-value.

Reason: Water is the single largest item that affects a buildings long term durability. Bulk water is only a fraction of
the moisture that is at issue. Water in its vapor state is the other. The object of water vapor management is to not trap moisture but rather have as forgiving an assembly as possible with tremendous drying potential. Flexibility is a key component to allow design professionals and applied building science consultant the ability to create assemblies that will not get wet from the poor selection and installation of vapor retarders. This proposal allows the use of any vapor retarder material but requires a declaration of what is being used. A declaration is needed because there are three classes of vapor retarders defined by the code and significant thought needs to go into choosing the correct strategy that will be utilized. There is a national consensus that builders should be moving away from Class I poly vapor retarders in all climate zones, yet the code requires specific vapor retarders in colder climates and makes it difficult to utilize class III retarders. The installation of class I poly vapor retarders often comes down to a mandate by the jurisdiction that is not based on sound building science and does not include and installation inspection or rational why a vapor retarder is required on the main wall section but not at the rim joist. In Colorado fiberglass batt installs tend to require class I poly vapor barriers while blown fiberglass installs do not. The code and the code officials are clearly confused.

Installation of class I vapor retarders is a particular concern around the country as they often trap moisture that bypasses them as more water vapor migrates with air than by the process of diffusion which the retarder is design to stop. Realization that vapor management is not the installation of one component (a vapor retarder) but rather a complex strategy that involves vapor retarders, ventilation systems, tight assemblies, and more is important. In addition, emphasis and thought needs to be put into understanding of how what has been installed actually performs.

Bibliography: BSD-106: Understanding Vapor Barriers
Joseph Lstiburek

You don't need a Vapor Barrier
Energy Vanguard
Allison Bailes
http://www.energyvanguard.com/blog-building-science-HERS-BPI/bid/54110/You-Don-t-Need-a-Vapor-Banner-Probably

Cost Impact: Will increase the cost of construction
Flexibility generally reduces cost. However, in this case upfront design cost may increase as builders, designers, and consultants work toward a strategized approach rather than a one size solution approach toward moisture management. In this light, cost should increase in the short term but go back down as experience with the declaration becomes normalized.
RB270-16
IRC: R702.7, R702.7.1, R702.7.2, R702.7.3.
Proponent: Robby Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

2015 International Residential Code
Add new text as follows:

R702.7 Vapor retarders. Class I or II vapor retarders are required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.

Exceptions:
1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.
4. Dry climate zones B

R702.7.1 Class III vapor retarders. Class III vapor retarders shall be permitted in dry climate zones B and where any one of the conditions in Table R702.7.1 is met.

R702.7.2 Material vapor retarder class. The vapor retarder class shall be based on the manufacturer’s certified testing or a tested assembly.

The following shall be deemed to meet the class specified:
Class I: Sheet polyethylene, unperforated aluminum foil.
Class II: Kraft-faced fiberglass batts.
Class III: Latex or enamel paint.

R702.7.3 Minimum clear airspaces and vented openings for vented cladding. For the purposes of this section, vented cladding shall include the following a minimum clear airspaces air space that is equal to or greater than 1/4 of an inch. Other openings with the equivalent vent area shall be permitted.

1. Vinyl lap or horizontal aluminum siding applied over a weather-resistive barrier as specified in Table R703.3(1).
2. Brick veneer with a clear airspace as specified in Table R703.8.4.
3. In dry climate zones B, vented cladding shall include a minimum clear air space that is equal to or greater than 1/16 of an inch.
4. Other approved vented claddings.

TABLE R702.7.1
CLASS III VAPOR RETARDERS

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>CLASS III VAPOR RETARDERS PERMITTED FOR:a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vented cladding over wood structural panels.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over fiberboard.</td>
</tr>
<tr>
<td>Marine 4</td>
<td>Vented cladding over gypsum.</td>
</tr>
</tbody>
</table>
Vented cladding over a weather resistant barrier.

Continuous insulation with $R$-value $\geq 2.5$ over $2 \times 4$ wall.

Continuous insulation with $R$-value $\geq 3.75$ over $2 \times 6$ wall.

Continuous insulation with $R$-value $\geq 5$ over $2 \times 4$ wall.

Continuous insulation with $R$-value $\geq 7.5$ over $2 \times 6$ wall.

Continuous insulation with $R$-value $\geq 7.5$ over $2 \times 4$ wall.

Continuous insulation with $R$-value $\geq 11.25$ over $2 \times 6$ wall.

Continuous insulation with $R$-value $\geq 10$ over $2 \times 4$ wall.

Continuous insulation with $R$-value $\geq 15$ over $2 \times 6$ wall.

For SI: 1 pound per cubic foot = 16 kg/m$^3$.

a. Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam $R$-value meets or exceeds the specified continuous insulation $R$-value.

**Reason:** Water is the single largest item that affects a building's long term durability. Bulk water is only a fraction of the moisture that is at issue. Water in its vapor state is the other. The object of water vapor management is to not trap moisture but rather have as forgiving an assembly as possible with tremendous drying potential. Flexibility is a key component to allow design professionals and applied building science consultant the ability to create assemblies that will not get wet from the poor selection and installation of vapor retarders. This proposal allows flexibility in the use of class III vapor barriers in dry climates where greater drying potential exists as moisture moves from higher concentrations to lower concentration.

A declaration is needed because there are three classes of vapor retarders defined by the code and significant thought needs to go into choosing the correct strategy that will be utilized. There is a national consensus that builders should be moving away from Class 1 poly vapor retarders in all climate zones, yet the code requires
specific vapor retarders in in colder climates and makes it difficult to utilize class III retarders. The installation of class I poly vapor retarders often comes down to a mandate by the jurisdiction that is not based on sound building science and does not include and installation inspection or rational why a vapor retarder is required on the main wall section but not at the rim joist. In Colorado fiberglass batt installs tend to require class I poly vapor barriers while blow n fiberglass installs do not. The code and the code officials are clearly confused.

Installation of class I vapor retarders is a particular concern around the country as they often trap moisture that bypasses them as more water vapor migrates with air than by the process of diffusion which the retarder is design to stop. Realization that vapor management is not the installation of one component (a vapor retarder) but rather a complex strategy that involves vapor retarders, ventilation systems, tight assemblies, and more, is important. In addition, emphasis and thought needs to be put into the understanding of how what has been installed actually performs.

Another proposal is offered to require a water management declaration. The water management declaration is designed to get people to understand, train, and think about vapor retarder installation and more broadly about water vapor management. Lastly, it helps ensure not only that the components of the strategy are in place but that they actually work.

**Bibliography:** BSD-106: Understanding Vapor Barriers
Joseph Lstiburek

You don't need a Vapor Barrier
Energy Vanguard
Allison Bailes
http://www.energyvanguard.com/blog-building-science-HERS-BPI/bid/54110/You-Don-t-Need-a-Vapor-Barrier-Probably

**Cost Impact:** Will increase the cost of construction
Flexibility generally reduces cost. However, in this case upfront design cost may increase as builders, designers, and consultants work toward a strategized approach rather than a one size solution approach toward moisture management. In this light, cost should increase in the short term but go back down as experience with the declaration becomes normalized.
Part I:
IRC: 702.8 (New).

Part II:
R403.6.2 (New) [IRCN1103.6.2 (New)]

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

Proponent: Robby Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

Part I

2015 International Residential Code

Add new text as follows:

702.8 Vapor management declaration. A vapor management strategy shall be documented on the construction documents. The following shall be addressed:

1. Type and class of vapor retarder used throughout the building, or listed for each assembly, to manage moisture migration by diffusion.
2. Vapor retarder installation scope of work to ensure proper installation.
3. Projected building air leakage rate and testing strategy for whole house infiltration levels in accordance with Section N1102.4.1.2 to manage moisture migration by air leakage.
4. Whole house ventilation strategy to be used in accordance with Section M1507.3.
5. Spot or local ventilation strategy to be used in accordance with Section M1507.4.
6. Testing strategy of ventilation system in accordance with Section N1103.6.2 to manage or remove moisture as it is created and to ensure background ventilation moisture control.
7. Testing strategy of total duct leakage in accordance with Section N1103.3.3 to limit moisture migration into building cavities through duct leakage.

Part II

2015 International Energy Conservation Code

R403.6.2 (N1103.6.2) Testing of ventilation systems. Whole house, local and spot ventilation systems shall be tested to verify that the minimum required ventilation flow rates in accordance with the International Residential Code or International Mechanical Code, as applicable, are being produced by the systems. A flow rate report shall be provided to the code official prior to certificate of occupancy.

Reason:

Part I: The water management declaration is design to get people to understand, train, and think about vapor retarder installation and more broadly about water vapor management. Lastly, it helps ensure not only that the components of the strategy are in place but that they actually work.

Part II: As we continue to build tight homes as required by the IECC to achieve our energy efficiency goals, spot/local and whole house ventilation becomes and even more crucial aspect of ensuring that the full intent of the IECC is met. This includes durability, safety, flexibility as well as efficiency. If we do not more actively ensure that...
the systems in our homes are not only there but are also performing as intended we have missed the mark with regards to the intent of the code. The testing experience gained through the implementation of the EnergyStar program has clearly demonstrated that ventilation fans are installed but are not performing as required by the code. Simple cost effective testing is available to ensure that the systems in our home are not only there but that they work.

**Bibliography:** BSD-106: Understanding Vapor Barriers
Joseph Lstiburek
You don't need a Vapor Barrier
Energy Vanguard
Allison Bailes
http://www.energyvanguard.com/blog-building-science-HERS-BPI/bid/54110/You-Don-t-Need-a-Vapor-Barrier-Probably

**Cost Impact:**

**Part I:** Will increase the cost of construction
Flexibility generally reduces cost. However, in this case upfront design cost may increase as builders, designers, and consultants work toward a strategized approach rather than a one size solution approach toward moisture management. In this light, cost should increase in the short term but go back down as experience with the declaration becomes normalized.

**Part II:** Will increase the cost of construction
The cost implications of this code change are small. Qualified testing personnel are already available and at the building performing blower door and duct leakage tests. Adding simple flow measurements of ventilation systems at the same time a blower door test occurs, for example, is not only practical but cost effective. An increase is cost of $25-$50 is well worth the reduction in builder risk issues that are associated with poor implementation of code required moisture and pollutant management.

RB271-16 : 702.8 (NEW)-SCHWARZ13822
### 2015 International Residential Code

**TABLE R702.7.1**  
**CLASS III VAPOR RETARDERS**

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>CLASS III VAPOR RETARDERS PERMITTED FOR:¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine 4</td>
<td>Vented cladding over wood structural panels.</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<td></td>
<td>Continuous insulation with $R$-value $\geq 2.5$ over $2 \times 4$ wall.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 3.75$ over $2 \times 6$ wall.</td>
</tr>
<tr>
<td>5</td>
<td>Vented cladding over wood structural panels.</td>
</tr>
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</tr>
<tr>
<td>7 and 8</td>
<td>Continuous insulation with $R$-value $\geq 10$ over $2 \times 4$ wall.</td>
</tr>
<tr>
<td></td>
<td>Continuous insulation with $R$-value $\geq 15$ over $2 \times 6$ wall.</td>
</tr>
</tbody>
</table>
For SI: 1 pound per cubic foot = 16 kg/m$^3$.

a. Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam $R$-value meets or exceeds the specified continuous insulation $R$-value.

**Reason:** This corrects two errors made when this table was first adopted over a decade ago. Climate Zone 8 was originally omitted and then added at the last minute to the requirements of Climate Zone 7. There was no technical justification for this. Most of Climate Zone 4 was left out of the table for political reasons. I wrote the original language and did the research for the original vapor barrier code changes. There was no technical justification for leaving the largest part of Climate Zone 4 out of the table but I elected to leave it out in order to get the original code change passed. I have been meaning to fix these two errors for many years. Note that the thermal resistance values proposed for Climate Zone 8 are based on field measurements not computer simulations.

**Cost Impact:** Will not increase the cost of construction
These are options. In Climate Zone 4, which has the most construction, costs for the option would go down as the option is expanded into the whole of Climate Zone 4. In Climate Zone 8 cost might go up; however there is not much construction in the colder part of Alaska.
### TABLE R702.7.1
CLASS III VAPOR RETARDERS

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<tr>
<th>CLIMATE ZONE</th>
<th>CLASS III VAPOR RETARDERS PERMITTED FOR: a</th>
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</thead>
<tbody>
<tr>
<td>4 &amp; Marine 4</td>
<td>Vented cladding over wood structural panels.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over fiberboard.</td>
</tr>
<tr>
<td></td>
<td>Vented cladding over gypsum.</td>
</tr>
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<td></td>
<td>Continuous insulation with $R$-value $\geq$ 2.5 over 2 x 4 wall.</td>
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</tr>
<tr>
<td>7 &amp; 8</td>
<td>Continuous insulation with $R$-value $\geq$ 12 over 2 x 4 wall.</td>
</tr>
</tbody>
</table>
Continuous insulation with $R$-value $\geq 18$ over 2 × 6 wall.

Continuous insulation with $R$-value $\geq 17$ over 2x4 wall

Continuous insulation with $R$-value $\geq 25$ over 2x6 wall

For SI: 1 pound per cubic foot = 16 kg/m$^3$.

a. **Spray**: In addition to the vapor retarder, spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam $R$-value plus any continuous insulation $R$-value provided meets or exceeds the specified continuous insulation $R$-value.

b. Continuous insulation $R$-values shall be permitted to be determined using the following minimum ratios of exterior continuous insulation $R$-value to cavity insulation $R$-value by Climate Zone:

- 0.2 (Climate Zone 4 and Marine 4),
- 0.35 (Climate Zone 5),
- 0.5 (Climate Zone 6),
- 0.8 (Climate Zone 7), and
- 1.1 (Climate Zone 8).

Interpolation of insulation ratios shall be permitted based on the heating degree days of a given site and the maximum heating degree day limits defining the boundaries of each Climate Zone in accordance with Table N1101.7.2(2).

c. The continuous insulation requirement for Climate Zone 8 is based on a maximum 16,200 heating degree days (65F basis) [9,000 heating degree days (18C basis)]. Where this heating degree day limit is exceeded, an approved design to determine the amount of continuous insulation shall be required.

**Reason**: An extensive review and analysis of available data on actual performance of assemblies has been conducted to evaluate Canadian and US experience and practices related to water vapor control for modern insulated light-frame wall assemblies (ABTG, 2015). The findings from this study have re-affirmed most of the provisions in Table R702.7.1 and identified the need for a few refinements as described below.

First, when Table R702.7.1 was first introduced to the IRC, only Climate Zone 4 Marine and not all of Climate Zone 4 was addressed. Subsequent experience, field data, testing and analysis has demonstrated that these requirements should apply to Climate Zone 4 more broadly, not just Climate Zone 4 Marine. The study also has found that the continuous insulation requirements in Climate Zone 7 would benefit from a modest increase to better align with the extreme northern boundary of Climate Zone 7. For most of Climate Zone 7 there is no change when footnote 'b' is applied.

In addition, Climate Zone 8 was inadvertently included with Climate Zone 7 as an artifact or unintended action in the code development process when these provisions were first introduced in the IRC (the provisions were intended for Climate Zone 7 only). The revised values for Climate Zone 8 are based on an analysis consistent with that used as a basis for the remainder of the existing table and informed by findings mentioned above (ABTG, 2015). In addition, a limit on heating degree days (footnote 'c') is placed on the extent of Climate Zone 8 for the purpose of the table because of the large range of severe cold climate conditions in Climate Zone 8. This was necessary to develop an appropriate prescriptive solution.

Furthermore, the continuous insulation $R$-values in Table R702.7.1 have always been based on the concept of insulation ratios and this is now disclosed in footnote 'b' to allow alternative (more efficient) solutions for determining continuous insulation amounts depending on the cavity insulation amount and the site's heating degree day condition. Similarly, the current and proposed continuous insulation $R$-values are based on worst-case (maximal) assumptions for the $R$-value of vapor-permeable cavity insulation (e.g., R-15 for 2x4 and R-22.5 for 2x6) and use of footnote 'b' would result in a more efficient design where less cavity insulation is used (e.g., R-13 instead of R-15).

Finally, footnote 'a' is clarified in regard to the need for a Class III interior vapor retarder when closed-cell spray foam is used at the minimum amounts required by Table R702.7.1. In addition, it is clarified that the $R$-value requirement can be met by spray foam alone (in the cavity only) or by combination of spray foam in the cavity and continuous insulation on the exterior. This will provide more options to satisfy the requirements of the table.


**Cost Impact**: Will not increase the cost of construction

This proposal will increase cost in the northern portions of Climate Zones 7 and in Climate Zone 8 only when a Class III vapor retarder is used, but other vapor retarder options (e.g., Class I or Class II) are unchanged and are commonly
used. Thus, there is no cost impact to construction.
| CLIMATE ZONE | CLASS III VAPOR RETARDERS PERMITTED FOR:  
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Continuous insulation with $R$-value $\geq 15$ over $2 \times 6$ wall.

For SI: 1 pound per cubic foot = 16 kg/m$^3$.

a. Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam $R$-value meets or exceeds the specified continuous insulation $R$-value.

**Reason:** An extensive review of available research data on actual performance of wall assemblies has been conducted to evaluate Canadian and US experience and practices in regard to water vapor control in wall assemblies (ABTG, 2015). Among many other findings, this study found several sources indicating that "vented cladding over wood structural panels" can experience a high degree of wetting of the sheathing resulting in loss of strength due to moisture cycling. This happens in documented cases when a Class III vapor retarder (and even a Class II vapor retarder) is used in Climate Zone 5 with oriented strand board (OSB) sheathing used in highly insulated conventionally framed wall assemblies (for example, refer to HIRL, 2013; HIRL, 2014; Lstiburek, Ueno, and Musunru, 2015; Ueno, 2015; Parsons and Lieburn, 2013; and others). Based on this research, contributors to this outcome include:

1. The actual permeance of OSB can vary substantially and, in some cases, may be marginally greater than 1 perm (wet cup permeance),
2. The Class III vapor retarder paint can have permeance values well above 10 perm,
3. And actual indoor relative humidity levels vary from occupant to occupant and home to home, such that some are higher than others.

All of the above suggest that it is prudent to use a wood structural panel material that is known to be consistently more vapor permeable than OSB. These walls with Class III vapor retarders are more sensitive to variations in indoor relative humidity and this proposal will help to resolve that problem." It is for this same reason that the application of any wood structural panel with a Class III vapor retarder is not permitted in Climate Zones 6, 7, and 8. This proposal addresses these implications by limiting the application of a Class III vapor retarder in Climate Zone 5 with vented cladding to plywood rather than the more generally applied "wood structural panels", which includes OSB.


Cost Impact: Will not increase the cost of construction
The proposal does not alter other vapor retarder options that can provide low-cost and better performing solutions when OSB sheathing is used.
RB275-16
IRC: R702.7.2.
Proponent: Gary Ehrlich, National Association of Home Builders (gehrlich@nahb.org)

2015 International Residential Code

Revise as follows:

R702.7.2 Material vapor retarder class. The vapor retarder class shall be based on the manufacturer’s certified testing or a tested assembly. The following shall be deemed to meet the class specified:
Class I: Sheet polyethylene, unperforated aluminum foil.
Class II: Kraft-faced fiberglass batts.
Class III: Latex

The vapor retarder class of latex or enamel paint shall be determined based on the perm rating provided by the paint manufacturer. Paint thickness, number of coats and primer shall be in accordance with the paint manufacturer’s application instructions.

Reason: The purpose of this code change is to remove the automatic assumption that latex and enamel paint meets the requirements of a Class III vapor retarder. Depending on the paint thickness, number of coats, and type of primer used, the actual water vapor permeance can far exceed the 1 perm to 10 perm range which defines a Class III vapor retarder. Field studies using test huts or test houses have shown that a coat of primer and 2 coats of standard latex paint can have a perm rating of as much as 50. In one study using test huts in Climate Zone 4A, wall assemblies consisting of un-faced batt insulation and an interior painted wall developed mold within 6 months. In another recent study of 22 houses in a range of climate zones, some wall assemblies meeting the requirements of Table R702.7.1 but relying on gypsum board and paint as a Class III interior vapor retarder showed high cyclic inter moisture contents.

Some paint manufacturers produce a paint explicitly formulated to act as a Class II vapor retarder, if not Class I. When installed per the manufacturer’s instructions to the specified thickness and number of coats, plus any primer coat, these paints can achieve a tested water vapor permeance per ASTM E96 of less than 1.0 perm, qualifying as a Class II vapor retarder or better. The current code language has resulted in difficulty convincing some building officials to accept low-perm paints as a Class II or better vapor retarder. Removing the automatic classification and allowing the manufacturer’s specified perm rating and application instructions to be used is intended to help clarify when paints with high vapor-retarding properties (i.e. low perm ratings) can be used.

Examples of such vapor retarder paints include Glidden 1060 Vapor Barrier Interior Primer Sealer and Sherwin-Williams Moisture Vapor Barrier Primer/Finish Interior Latex.


Cost Impact: Will not increase the cost of construction
The code change will not increase the cost of construction. Paint manufacturers already provide information on perm ratings for paints sold as vapor retarding paints.
R702.7.3 Minimum clear airspaces and vented openings for vented cladding. For the purposes of this section, vented cladding shall include the following minimum clear airspaces. Other openings with the equivalent vent area shall be permitted.

1. Vinyl-lap, polypropylene, or horizontal aluminum siding applied over a weather-resistant barrier as specified in Table R703.3(1).
2. Brick veneer with a clear airspace as specified in Table R703.8.4.
3. Other approved vented claddings.

Reason: Polypropylene siding is very similar to vinyl siding in its shape and design and has similar "vented cladding" characteristics. We are asking for recognition of this with respect to vapor barriers. Below are photos of a typical vinyl siding profile and a typical polypropylene siding profile. The similarities are self-evident.
Cost Impact: Will not increase the cost of construction
This change simply identifies another type of vented cladding.
2015 International Residential Code

Add new text as follows:

**R702.7.4 Wet-applied cavity insulation.** Prior to vapor retarder application, drying of wet-applied cavity insulation materials shall comply with the insulation manufacturer's installation instructions.

**Reason:** The vapor retarder provisions of the IRC and many of the materials used in wall construction (e.g., drywall, exterior sheathing, etc.) are not intended to handle wall assemblies that are enclosed with high levels of construction moisture, such as may be caused by wet-applied insulation materials. This proposal provides guidance to code user's and a means of enforcement to avoid this problem by referencing the insulation manufacturer's installation instructions.

Problems associated with high construction moisture from overly-wet insulation materials at the time of wall enclosure (i.e., installation of the vapor retarder) include mold, wood shrinkage and swelling, material degradation due to extended exposure to high levels of moisture and vapor drives, drywall cracks and nail pops, and other serviceability or building health problems. Wet-applied insulation manufacturers typically specify maximum moisture levels or minimum drying times for their materials prior to enclosure.

CIMA Technical Bulletin #3: Standard Practice for the Installation of Sprayed Cellulosic Wall Cavity Insulation (SCWCI), Section 8.4 states: "Installation of the interior finish should not be permitted until the insulation has dried...The manufacturer's recommended drying times shall be followed."

In addition, ASTM E1677 also recommends that "When vapor retarders are used on both sides of the opaque wall, precautions should be used to ensure that building materials within the wall cavity have a moisture content below 19%." This statement is based on Lstiburek and Carmody, "Moisture Control Handbook" published by Oak Ridge National Laboratory. More recent research has shown that, even with a vapor retarder only on one side of an assembly, enclosing walls too soon after application of wet-applied insulation materials will substantially delay drying and cause the moisture to accumulate to excessive levels in materials toward the inside or outside of the construction. Simply put, there are few cases or conditions where high initial moisture levels could be tolerated without significant consequences.

**Cost Impact:** Will not increase the cost of construction

The proposal clarifies requirements that are currently intended to be practiced, but are not specified in the code.
2015 International Residential Code

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining to the exterior water that enters the assembly. Where IRC Table N 1101.7 (R301.1) designates the city as either A - Moist or C - Marine, the means for preventing the accumulation of water with the wall assembly shall be provided by:

a. A drained and vented air space not less than 3/16 inch deep behind the exterior veneer, over the full height and width of the wall, or
b. an open drainage material complying with ASTM E2925, is installed behind the exterior veneer, over the full height and width of the wall.

Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7 of this code.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed in accordance with Section R703.4 or R703.8.

2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.4, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:

   2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end use configuration.

   2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.

   2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).

   2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours. The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings, penetration or intersections of terminations with dissimilar materials.

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Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
ASTM E2925 - 14 Standard Specification for Manufactured Polymeric Draining and Ventilation Materials used to Provide a Rainscreen Function
Reason: This proposal adds additional options to meeting the existing requirements of the code.

Cost Impact: Will not increase the cost of construction
As this adds additional options to meeting the existing requirements of the code, there is not a cost increase

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM E2925-14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
2015 International Residential Code

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining to the exterior water that enters the assembly. For climate zones 1 to 4 where Table N1101.7 (R301 designates the city as A - Moist, the means for preventing the accumulation of water within the wall assembly shall be provided by:

1. A drained and ventilated air space not less than 3/8 inch deep behind the exterior veneer, over the full height and width of the wall.
2. An open drainage material complying with ASTM E2925, is installed behind the exterior veneer, over the full height and width of the wall.
3. The exterior veneer is loosely fastened to the backing and behind each exterior veneer component there is a clear air space that is:
   3.1. continuous for the full width of the component, or
   3.2. not less than 3/8 inch deep at the bottom of the component.
4. The wall is a masonry cavity wall or the exterior veneer is masonry.

Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7 of this code.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed in accordance with Section R703.4 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.4, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
   2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
   2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
   2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
   2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours. The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings penetration or intersections of terminations with dissimilar materials.
Reference standards type:
Add new standard(s) as follows:

ASTM E 2925 - 14 Standard Specification for Manufactured Polymeric Draining and Ventilation Materials used to Provide a Rainscreen Function

Reason: For locations with high moisture indexes, this provides a number of options to provide drainage and ventilation.

Cost Impact: Will not increase the cost of construction
As there are a number of options and some of them do not incur an additional construction cost.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM E 2925-14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
RB280-16

IRC: R703.1.1.  
Proponent: Edward Keith, representing APA- The Engineered Wood Association  
(ed.keith@apawood.org)

2015 International Residential Code

Revise as follows:

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer-cladding as required by Section R703.2 and a means of draining to the exterior water that enters the assembly. Protection against condensation in penetrates the exterior wall assembly shall be provided in accordance with Section R702.7 of this code cladding.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed in accordance with Section R703.4 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.4, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
   2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
   2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
   2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
   2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours. The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings or intersections of terminations with dissimilar materials.

Reason: The term "veneer" can be misleading as its original meaning refers to a thin decorative covering. Certain siding products can exhibit structural and thermal properties which go beyond being decorative. "Cladding," on the other hand, is a more general term that can be applied to a wider range of products. The term "enters the assembly" can be misleading as it may suggest water penetrating into the structural assembly (i.e. stud cavity), which can no longer be drained to the exterior. Draining of exterior water should only apply to the water that has penetrated or passed through the first line of defense; the cladding. The last sentence does not belong in this section of the code and is addressed in the APA code change proposal on R702.7.

Cost Impact: Will not increase the cost of construction

This code change will not increase the cost of construction as it clarifies the intent of the original code provisions.
**2015 International Residential Code**

Add new definition as follows:

**SECTION R202 DEFINITIONS**

**ABSORPTIVE CLADDING.** Exterior wall covering that will absorb moisture.

**VENTED CLADDING.** Exterior wall covering that creates a cavity or space between the cladding and exterior wall assembly when installed.

Add new text as follows:

**R703.1.1.1 Water/Moisture Management.** In climate zones designated by Figure N1101.7(R301.1) as Moist (A) or Marine (C), cladding must be designed to drain exterior water that gets behind it in accordance with R703.1.1.1.1, R703.1.1.1.2, or R703.1.1.1.3.

R703.1.1.1.1 Vented Cladding. Meets the definition as a vented cladding.
R703.1.1.1.2 Absorptive Cladding. Absorptive cladding must have a minimum 1/8 inch (3 mm) space between the water-resistive barrier and the cladding.
R703.1.1.1.3 Absorptive Cladding. Absorptive cladding must demonstrate drainage efficiency of 75-percent per ASTM E2273.

Reference standards type: This reference standard is new to the ICC Code Books

Add new standard(s) as follows:


Reason: An increase in durability and resiliency in the codes is the next step to improving how homes will perform in the decades ahead. This change brings in concepts that have been recognized in the code, vented cladding, and in regionally modified codes and begins to better address moisture management from the outside. The Pacific Northwest (Oregon, Seattle) and the eastern parts of Canada have been addressing this issue for many years and it is time the IRC begins to recognize these types of construction and their benefits to building durability and resiliency.

This change defines different types of cladding: vented and absorptive. It then places requirements on absorptive cladding-cladding that will absorb moisture and retain it for a period of time-which will enable better water shedding and minimize chances for water accumulation, rot, mold build up and also potential for freeze-thaw issues.

This change is meant to start a conversation on this issue with a goal of developing a more comprehensive approach to moisture management.

Cost Impact: Will increase the cost of construction

Some materials will require rainscreening construction techniques and/or additional testing.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM E2273-03(2011), with regard to
the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
2015 International Residential Code

R703.1.2 Wind resistance. Wall coverings, roof overhang soffits, backing materials and their attachments shall be capable of resisting wind loads in accordance with Tables R301.2(2) and R301.2(3). Wind-pressure resistance of the siding, soffit, and backing materials shall be determined by ASTM E 330 or other applicable standard test methods. Where wind-pressure resistance is determined by design analysis, data from approved design standards and analysis conforming to generally accepted engineering practice shall be used to evaluate the siding, soffit, and backing material and its fastening. All applicable failure modes including bending rupture of siding, fastener withdrawal and fastener head pull-through shall be considered in the testing or design analysis. Where the wall covering, soffit, and the backing material resist wind load as an assembly, use of the design capacity of the assembly shall be permitted.

R703.3 Nominal Wall covering nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3(1), the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Sections R703.15 through R703.17. Nominal material thicknesses in Table R703.3(1) are based on a maximum stud spacing of 16 inches (406 mm) on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings attached to wood framing shall be in accordance with Section R703.3.2 R703.3.3 and Table R703.3(1). Exterior wall coverings shall be attached to cold-formed steel light frame construction in accordance with the cladding manufacturer's installation instructions, the requirements of Table R703.3(1) using screw fasteners substituted for the nails specified in accordance with Table R703.3(2), or an approved design.

R703.3.1 R703.3.2 Wind limitations. Where the design wind pressure exceeds 30 psf or where the limits of Table R703.3.1 R703.3.2 are exceeded, the attachment of wall coverings and roof overhang soffits shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering and roof overhang soffit attachment, component and cladding loads shall be determined using an effective wind area of 10 square feet (0.93 m²).

TABLE R703.3.1 R703.3.2

LIMITS FOR ATTACHMENT PER TABLE R703.3(1)

For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

NL = Not limited by Table R703.3.1, DR = Design required.

R703.3.2 R703.3.3 Fasteners. Exterior wall coverings and roof overhang soffits shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3(1) or with other approved corrosion-resistant fasteners in accordance with the wall covering manufacturer's installation instructions. Nails and staples shall comply with ASTM F 1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of \( \frac{7}{16} \) inch (11.1 mm) outside diameter and be manufactured of minimum 16-gage wire. Where fiberboard, gypsum, or
foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with either the siding manufacturer's installation instructions or Table R703.3.2.

R703.3.1 Roof overhang soffit nominal thickness and attachment. The minimum nominal thickness for wood structural panel roof overhang soffits shall be in accordance with Table R703.3(1). Fasteners for wood structural panel roof overhang soffits shall be in accordance with Section R703.3.3 and Table R703.3(1). Manufactured soffit panels shall be installed in accordance with the manufacturer's installation instruction for the design wind loads required in Section R703.1.2.

Reason: Little guidance is given in the code for soffit installation and design loads on soffits. The 2004 hurricane season resulted in significant damage to soffit panels in the State of Florida and resultant wind and water damage to many buildings. Further research revealed inconsistencies in the way loads were being calculated for roof overhang soffits. At the time, neither the codes nor ASCE 7 provided any guidance on the appropriate loads for the design of soffit panels. As a result, the 2007 Florida Building Code was revised to include new language specifically requiring soffits to be designed using the wall GCp coefficients based on an effective wind area of 10 square feet. Additionally, ASCE 7-10 addressed the issue by stating that the external pressure coefficient on underside of the roof overhang is the same as the adjacent wall surface adjusted for effective wind area. This language in ASCE 7-10 is somewhat ambiguous and is not readily identifiable. It is located in the definition of GCp in Section 30.10 for roof overhangs.

While design loads for soffits are addressed in the 2014 Edition of ICC 600, they are not addressed in some of the other prescriptive documents referenced by the IRC. This language simply seeks to clarify the design loads that are to be used on soffits.

The Hurricane Charley Mitigation Team Assessment (MAT) report (FEMA 488) identified widespread damage to vinyl and aluminum soffit panels, particularly on residential buildings. See Sections 8.2.2, 8.5, and 8.7.1 in FEMA 488. These panels were either pulled out by negative wind pressures (suction) or pushed up by positive pressures (Figure 3-21 from the Hurricane Charley MAT and Figure 1 from FEMA 499 Technical Fact Sheet No. 7.5). The damage was often not limited to the loss of the exterior soffit cladding system. Damages to these building envelope components led to wind-driven rain entering the homes and wetting the building interior and the internal wall cavities, and saturating attic insulation and ceilings that sometimes collapsed (Figure 3-22 from the Hurricane Charley MAT).

Additionally, the IRC doesn't specifically address soffit installation for low wind regions (areas where wind design is not required in accordance with Figure R301.2(4)(B)). Most of the nominal thicknesses and fastening requirements in Table R703.3(1) would not apply to soffit panels, with the exception of wood structural panel. Since the design wind pressures on the soffit are the same as the adjacent wall surface, the requirements for wood structural panel wall coverings would be acceptable for wood structural panel soffit panels. New Section R703.3.1 has been added requiring wood structural panel soffits to comply with Table R703.3.1 and Section R703.3.3 (formerly R703.3.2). Manufactured soffit panels have general installation instructions, but also include installation instructions for specific wind loads. The new language refers to the installation instructions for manufactured soffit panels but also emphasizes that the soffit panel has to be capable of resisting the design loads in Table R301.2(2) even in lower wind regions.

It's important to note that this code change does not add additional wind loading requirements for manufactured soffits. The materials and fastening requirements in Table R703.3(1) were prescriptively developed to resist a design wind pressure of 30 psf. This code change simply requires manufactured soffit panels to be installed to resist the minimum design wind pressure applicable.
Figure 1. Missing soffit material.
Figure 3-21.
Typical elevated wood-frame house with extensive soffit damage (North Captiva Island)
Homebuilders Guide to Coastal Construction Technical Fact Sheet Series - FEMA P-499

Cost Impact: Will increase the cost of construction
May result in an increase in the cost of construction for lower wind regions as the IRC doesn't specifically address soffit installation or attachment. However, any initial minimal up front construction costs will result in reduced owner residual risk through improved resilience to high wind loading, reduced wind driven rain associated damages and more than offset costs through mitigating already well documented failure modes and vulnerabilities.
The water-resistive barrier is not required for detached accessory buildings.

Reason: This proposal clarifies requirements for No. 15 asphalt felt and distinguishes requirements for other approved water-resistive barriers (WRBs) to improve application and enforceability. The specific installation instructions currently provided in the code apply only to a traditional application of No. 15 asphalt felt (and some types of membrane WRBs, but not always) and are exclusionary if applied to all other approved WRB materials as the code currently implies. While some other approved materials may use the same or similar installation details, they are frequently different. Also, the lapping method is impractical and exclusionary for some other approved materials, such as sheathing-type WRBs, that rely on approved sealed joints (e.g., adhered flashing or joint sealing tape) which also are used to enhance minimally lapped joints on membrane-type WRBs (and are often required at intersections with penetrations to provide continuity of the WRB). Thus, the phrase "or material" is stricken to avoid the unintended (and exclusionary) implication that all "other approved materials" (as mentioned in the first sentence) must be installed like No. 15 asphalt felt with lapped joints (as indicated in the second sentence for other materials than No. 15 felt). In coordination with the above change, it is made clear that other approved materials shall be installed in accordance with the manufacturer's installation instructions. Finally, it is made clear that continuity of the WRB (last sentence) applies to both No. 15 asphalt felt and any other approved WRB material.

Cost Impact: Will not increase the cost of construction

The proposal clarifies requirements and may actually help avoid unintended cost impacts or material choice limitations.

RB283-16 : R703.2-
CRANDELL12648
2015 International Residential Code
Delete without substitution:

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

Reason: Not requiring a water-resistive barrier for detached accessory building is illogical. Please consider:

- Why is it ok to allow water intrusion behind exterior coverings in an accessory building? The wall sheathing and framing will experience the same damaging affect of moisture as a SFD will experience.
- Virtually all exterior wall covering manufacturers require a water resistive barrier under their products.
- Vinyl siding installer typically seek to use this except to allow installation of vinyl siding over sheathing on exterior walls of detached garages and storage sheds; however, the siding manufacturers installation instructions specifically state their product should not be considered a water resistive barrier.
- Quoting the Vinyl Siding Institute Installation Manual: Vinyl siding, insulated siding, and polypropylene siding are exterior claddings, not water-resistive barriers, and are designed to allow the material underneath to breathe. This factor provides a supplemental rain-screen that reduces the amount of water that reaches an underlying water-resistive barrier. To achieve designed performance, and to comply with the 2015 International Residential Code, vinyl siding, insulated siding, and polypropylene siding must be installed over a water-resistive barrier, which is intended to prevent liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.
- Eliminating this exception will provide clarity to the code in that the water-resistive barrier is required by the manufacturers, insuring the products are installed correctly.

Cost Impact: Will not increase the cost of construction
There is no cost impact as the water-resistive barrier is required by the manufacturer and should already be including in the cost of the installation. This code change simply eliminates confusion.
2015 International Residential Code

R703.2 Water-resistive barrier. One water resistant barrier shall be not fewer than one layer of No. 15 asphalt felt, one of the following materials:

1. No. 15 asphalt felt, free from holes and breaks complying with ASTM D 226 for Type 1 felt
2. Grade D building paper or other water-resistive barrier, complying with ASTM E2556, or
3. other approved material.

The water-resistive barrier free from holes and breaks complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1. The water-resistive barrier is not required for detached accessory buildings.

Reference standards type: This reference standard is new to the ICC Code Books

Add new standard(s) as follows:

ASTM E2556-10 Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

Reason: This proposal adds a second reference standard for water-resistive barriers. The new reference standard, ASTM E2556, includes housewraps and building papers as well as felt, which is currently the only referenced material. All of the materials recognized in ASTM E2556 are installed in the manner described in Section R703.2. Based on discussion with other industry members, the current reference to ASTM D226 for felt was not replaced. ASTM E2556 is based on ICC-ES Acceptance Criteria AC-38, the standard by which building papers and housewraps are currently evaluated, so does not constitute a change in water-resistive barrier performance criteria. This inclusion of ASTM E2556 will add recognition to housewraps as a water-resistive barrier. This is appropriate as housewraps are the dominant water-resistive barrier currently in the industry. According to the 2011 new home construction survey 75% of new starts used a housewrap. Housewraps have been in market and performing for over 30 years. Currently there are over 100 housewrap products evaluated as water-resistive barrier alternate materials.

Cost Impact: Will not increase the cost of construction

The requirements in the referenced standard are consistent with requirements in ICC-ES Acceptance Criteria AC-38, the most broadly used water-resistive barrier qualification criteria, so will not change the water-resistive barrier requirements or costs associated with them.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM E2556-10, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

RB285-16 : R703.2-
WESTON13028
RB286-16
IRC: R703.2.1 (New).
Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council

2015 International Residential Code
Add new text as follows:

R703.2.1 Installed water-penetration resistance. Other approved water-resistive barrier materials shall be installed in accordance with the manufacturer's installation instructions. The installation method shall have water penetration resistance at least equivalent to accepted practice for installation of No. 15 asphalt felt.

Reason: This proposal specifies that other approved water-resistive barrier materials be installed in accordance with the manufacturer's installation instructions to assist in enforcement and proper application. It provides a consistent basis for ensuring equivalent performance of water-resistive barriers as installed. Because No. 15 felt is considered to be the minimum benchmark for water-resistive barrier installed performance (water penetration resistance), the requirements for No.15 felt remain unchanged. Furthermore, it is more clearly identified as the benchmark for equivalency for other approved materials and installation methods. Typically, equivalency would be shown by way of an ASTM E331 test method, which currently is applied inconsistently (or not at all) among other approved materials. The current lack of direction in the code has resulted in inequities as well as poor performance in some cases.

The need for a uniform and effective water-penetration resistance requirement is documented in the literature (Hall and Hoigard, 2005; Dorin, 2006; Lstiburek, 2012). In particular, Hall and Hoigard (2005) evaluated current code requirements, acceptance criteria, and field experience. They also report comparative test data under installed water exposure conditions, demonstrating that polymeric building wrap materials are capable of performing equivalently to asphalt-saturated paper and felt materials (but not all types). The relevant conclusions from this study include:

"Current building code provisions offer no rational means of assessing the equivalency of alternative WRB products to ASTM D-266 type 1 asphalt-saturated felt."

"They [material-only water resistance tests] fail to address several important moisture transport mechanisms that affect the in-service performance of WRBs."

The proposed requirements are consistent with the intent to ensure equivalency between code-recognized materials and methods (e.g., asphalt felt) and other alternative water-resistive barrier materials and methods. Therefore, this proposal will help to ensure acceptable and consistent performance of various types of alternative WRB materials and methods in an effective and non-exclusionary way. The justification is further supplemented with a review of data from various test standards, approved agencies, and technical literature (ABTG, 2015).


Cost Impact: Will not increase the cost of construction
The proposal only addresses the performance requirements for other approved materials to ensure equivalent performance as intended by the code. Requirements for many (if not most) types of alternative materials that are currently properly qualified will remain unaffected and have no cost impact. In addition, requirements for code-
recognized conventional materials, like No.15 felt, are unchanged and have no cost impact.
2015 International Residential Code

R703.4 Flashing. Exterior walls shall be flashed in accordance with this section.

703.4.1 Materials. Approved corrosion-resistant flashing materials shall include one or more of the following:

1. Self-adhered membranes complying with AAMA 711;
2. Fluid-applied membranes complying with AAMA 714;
3. Mechanically attached flexible flashings complying with AAMA 712;
4. Corrosion-resistant plastic flashing;
5. Corrosion-resistant metal flashing; or,
6. Other approved flashing materials.

R703.4.2 Installation. Flashing materials complying with Section R703.4.1 shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes Where multiple flashing components of the same or different materials are used as flashing and intersect each other, they shall comply be applied in shingle fashion or in accordance with AAMA 711. Fluid-applied membranes used as flashing in exterior walls shall comply with AAMA 714 an approved design. The flashing shall extend from the flashed component to the surface of the exterior wall finish or to the water-resistive barrier complying with Section R703.2 for subsequent drainage. Approved corrosion-resistant flashings shall be installed at the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier complying with Section 703.2 for subsequent drainage. Mechanically attached flexible flashings shall comply with AAMA 712. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
   1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall incorporate flashing or protection at the head and sides.

2. In accordance with the flashing design or method of a registered design professional.
3. In accordance with other approved methods.
4. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
5. Under and at the ends of masonry, wood or metal copings and sills.
6. Continuously above all projecting wood trim.
7. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
8. At wall and roof intersections.
9. At built-in gutters.

1. **Exterior window and door openings.** Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
   1.1. The fenestration manufacturer's installation and flashing instructions.
   1.2. The flashing manufacturer's installation instructions.
   1.3. The water-resistive barrier manufacturer's installation instructions.
   1.4. In accordance with the flashing design or method of a registered design professional.
   1.5. In accordance with other approved methods.

**Exception:** Where flashing is provided by a means different than specified above, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall incorporate flashing or protection at the head and sides.

2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

**Reason:** This proposal improves organization, usability, and enforceability by distinguishing material requirements from installation requirements. It also makes a number of clarifications and improvements to installation requirements. For example, the proposal corrects an inconsistency in the current code whereby flashing must extend to the exterior wall finish in Section R703.4, but later in Item 1 is allowed to also extend to the water-resistive barrier surface. The requirement in Item 1 for flashing to extend from the window or door to the exterior wall finish or WRB is a general requirement that should apply for all flashing of all components. Thus, this language is moved to the charging language in a new Section R703.4.2 on installation to have broader applicability as appropriate. In addition, flexible mechanically attached flashing referenced in Item 1 is a flashing material as are fluid-applied and adhered membrane flashing materials currently listed separately in Section R703.4. All of these flashing material types should be addressed in one section as done in this proposal by creating a new subsection R703.4.1 on materials. Additional common flashing materials and other approved materials are included for completeness.

The concept of a "shingle fashion" installation of flashing is improved to avoid an exclusionary implication that would prevent some approved methods of application of flashing materials at specific flashing locations. However, it preserves the desired effect of having flashings lap in "shingle fashion" where they intersect. While flashings are generally applied in a sequential and shingle lapped fashion, there are specific applications where this is not required and would be exclusionary or impractical. For example, self-adhered membranes are commonly used as a sealed-joint flashing at window heads for applications with sheathing-type water-resistive barriers and "shingle lap" flashing is not required at this location for this flashing material and method. Manufacturer installation instructions or an approved design are also recognized as important factors to ensure appropriate flashing and provide flexibility for special conditions.

Finally, this proposal re-organizes the list of accepted methods for flashing of exterior window and door openings to better identify and distinguish the appropriate sources for flashing details and methods. Any one of these methods can independently provide appropriate and code-compliant flashing methods and details for windows suited to a particular application. No one source can feasibly claim (and in some cases has no desire to claim) solutions to all possible applications involving numerous potential combinations of different material types and substrates and components to be integrated. In addition, the water-resistive barrier manufacturer's instructions are added to the list since these materials and associated flashing/penetration details are often included in product approvals and are
system-dependent. Also, the pan flashing requirement is moved to an exception statement that applies more sensibly to the entire list of methods since it is intended to be a "catch-all" condition that provides some additional level of protection of openings. It is also clarified that this "catch-all" use of pan flashing is not intended to be a substitute for having no other flashing at all applied to the window or door opening. Instead, it is clarified that pan flashing is to be used where the flashing approach was not qualified by or based on one of the listed sources for flashing methods and materials.

Cost Impact: Will not increase the cost of construction
This proposal is a clarification without changing the many options for compliance and adds an additional option.
2015 International Residential Code

R703.4 Flashing. Approved corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. Fluid-applied membranes used as flashing in exterior walls shall comply with AAMA 714. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashings shall be installed at the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier complying with Section 703.2 for subsequent drainage. Mechanically attached flexible flashings shall comply with AAMA 712. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
   1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall incorporate flashing or protection at the head and sides.

2. In accordance with the flashing design or method of a registered design professional.
3. In accordance with other approved methods.
4. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
5. Under and at the ends of masonry, wood or metal copings and sills.
6. Continuously above all projecting wood trim.
7. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
8. At wall and roof intersections.
9. At built-in gutters.
10. At penetrations through the exterior wall.

Reason: Many penetrations through the sides of homes for services are often simply caulked or taped, and this is often done incorrectly – our work has shown over 50% of these are improperly sealed to protect against water infiltration, air infiltration, insect infestation and subsequent energy and health concerns. By using flashing integral to the siding/envelope, these concerns can be minimized, reducing mold/mildew issues, related health concerns and repair costs. This also helps carry this practice forth from and develop consistency between the IBC (section 1405.4) and the IRC and improves upon the provisions of the plumbing section of the IRC (section P2607.2).

Cost Impact: Will increase the cost of construction
Estimated cost impact is less than $10 per penetration.
2015 International Residential Code

R703.4 Flashing. Approved corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. Fluid-applied membranes used as flashing in exterior walls shall comply with AAMA 714. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashings shall be installed at the following locations:

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   1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall incorporate flashing or protection at the head and sides.

2. In accordance with the flashing design or method of a registered design professional.
3. In accordance with other approved methods.
4. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
5. Under and at the ends of masonry, wood or metal copings and sills.
6. Continuously above all projecting wood trim.
7. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
8. At wall and roof intersections.
9. At built-in gutters.

Reason: This proposal moves the two reference standards AAMA-714 and AAMA-711 into the window flashing section rather than in the general charging section to be more consistent with the scope of the standards. The scope of AAMA-711 is for "self-adhering flashing surrounding exterior wall fenestration products". The scope of AAMA-714 is for "exterior wall openings in buildings that includes fenestration products such as windows and doors, as other through-wall penetrations"

Cost Impact: Will not increase the cost of construction
This proposal is a reorganization for clarity and does not change code requirements.
RB290-16
IRC: R703.7.1.
Proponent: G Michael Starks, representing In-spex, LLC (mstarks@in-spexllc.com)

2015 International Residential Code
Revise as follows:

R703.7.1 Lath. Lath and lath attachments shall be of corrosion-resistant materials. Expanded metal or woven wire Lath attachments shall be of the type, location and spacing as set forth in ASTM C 1063 for the substrate to which the lath shall be attached with $\frac{1}{2}$-inch-long (38 mm), 11 gage nails having a $\frac{7}{16}$-inch (11.1 mm) head, or $\frac{7}{8}$-inch-long (22.2 mm), 16 gage staples, spaced not more than 6 inches (152 mm), or as otherwise approved installed.

Reason: This section appears to have been written for stucco over open-framing. The code referenced standard, ASTM C 1063, Standard specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster, requires that staples used to apply lath over sheathing must have a $\frac{3}{4}$ inch crown and must penetrate the framing or structural members by $\frac{3}{4}$ inch. In the case of $\frac{7}{16}$ wood sheathing, that would require $\frac{7}{16} + 3/4 + 1/8$ for the lath itself or a minimum of 1-3/16 inch leg. The closest size to meeting the minimum would be a 1 ½ inch leg staple with a $\frac{3}{4}$ crown which will also accommodate 5/8 wood-sheathing.

C 1063 also includes requirements for screws used to attach lath to differing substrates and conditions. At present, the code does not allow for that unless they are "otherwise approved."

Fastener spacing is another concern. Over fastening lath can lead to a lack of embedment or encapsulation of the metal. In damper climates, this leads to failure due to the eventual corrosion of the lath. C 1063 is more definitive in fastener spacing and type dependent upon the location of the required fastener.

C 1063 already includes much more definitive fastener and fastening requirements for all types of lath in all wall or ceiling configurations. As C 1063 is more restrictive and specific, it might be best to revise the current sections as indicated above.


Cost Impact: Will not increase the cost of construction
There is no cost of construction significance to this item.
2015 International Residential Code

Revise as follows:

R703.6.1 Application. Wood shakes or shingles shall be applied either single course or double course over nominal 1\(\frac{1}{2}\) inch (12.7 mm) wood-based sheathing or to horizontal furring strips over 1\(\frac{1}{2}\) inch (12.7 mm) nominal nonwood sheathing. A water-resistant barrier shall be provided over all sheathing, in accordance with horizontal overlaps in the membrane of not less than 2 inches (51 mm) and vertical overlaps of not less than 6 inches (152 mm). Section R703.2 Where horizontal horizontal furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25 mm by 76 mm or 25 mm by 102 mm) and shall be fastened to the studs with minimum 7d or 8d box nails and or in accordance with Sections R703.15, R703.16, or R703.17 where installed over foam plastic insulating sheathing. Furring shall be spaced a distance on center equal to the actual weather exposure of the shakes or shingles, not to exceed the maximum exposure specified in Table R703.6.1. When installing shakes or shingles over a nonpermeable water-resistant barrier, furring strips shall be placed first vertically over the barrier and in addition, horizontal furring strips shall be fastened to the vertical furring strips prior to attaching the shakes or shingles to the horizontal furring strips. The spacing between adjacent shingles to allow for expansion shall be 1\(\frac{1}{8}\) inch (3.2 mm) to 1\(\frac{1}{4}\) inch (6.4 mm) apart, and between adjacent shakes shall be 3\(\frac{1}{8}\) inch (9.5 mm) to 1\(\frac{1}{2}\) inch (12.7 mm) apart. The offset spacing between joints in adjacent courses shall be not less than 1\(\frac{1}{2}\) inches (38 mm).

Reason: This section is confusing and also creates an unjustified "double standard" whereby wood furring is not required in one case and in another case requiring a double-layered lattice of furring when a non-permeable water resistant barrier or substrate is used. This is not only confusing but is technically inconsistent and unjustified. Wood shakes and shingles are an air-permeable cladding and use of a single layer of horizontal furring over any substrate has proven to provide an adequate ventilated condition for wood shake/shingle durability (and not rely on inward moisture movement into the wall materials for purpose of drying shingles), particularly given that when used over wood sheathing it currently is permitted to be installed without any furred air-space. The fact that wood shakes and shingles are considered inherently air-permeable is supported in the literature (Kerr 2004):

"Examples of simple rainscreen walls include vinyl siding or overlapping wood shingles and shakes on wood frame construction; in these wall types, small air spaces are created between the laps in the siding and the back-up board or strapping, effectively creating a vented out rainscreen layer with an inner cavity." [p.22]

Furthermore, the USDA Forest Products Laboratory guide for wood shakes and shingles recognizes that not all wood sheathings are equivalent in regard to water permeance and that a distinction is needed in regard to even a "rainscreen" application of wood shakes and shingles over wood sheathing (Dwyer et al., 2011):

"Although the shakes and shingles are not nailed directly to the sheathing in rain-screen applications, most codes still require plywood sheathing. Plywood sheathing transmits moisture better than OSB; therefore, if it gets wet, it dries more quickly. A variance to use OSB in a rain-screen application needs to be requested before installing the sheathing." [p.5]

Therefore, the goal of this change supports a widely recommended practice of a single layer of horizontal furring for consistently durable wood shake and shingle installation and to also protect from reliance on drying of shakes and shingles into wall assemblies when a furred air-space is not provided. It also creates a sensible "level playing field" for all types of sheathing (various types of wood and non-wood sheathing with varying water vapor permeance characteristics), removes the "double standard" as described above, and is also consistent with the British Columbia
Wood Shake and Shingle Industry's Application Handbook which addresses a region that experiences significant rainfall and recommends a single layer of furring even for application on roofs over a non-permeable substrate (clearly showing a double layered lattice of furring is not necessary for similar application on walls). Refer to Figure 15 in that guide (see bibliography). Furthermore, FSC has conducted a case study of an existing application of wood shakes and shingles installed directly over foam sheathing (no furring) and found no evidence of performance or durability problems, even in a severe lake-front exposure in the Northeastern US. Thus, it is clearly evident that either a single layer of furring is adequate over a wide variety of sheathing and WRB substrates or that no furring is adequate. But, to require a double layer of furring in one case and none in the other is not justified by the evidence; it is a double standard. Consequently, this proposal takes the approach that the best practical and overall equitable solution for all substrates on light-frame wall assemblies and for wood shake and shingle performance is to uniformly require a single layer of horizontal furring.

In addition, Section R703.6.1 has an exclusionary specification of water-resistive barrier installation that requires lapped joints. Other approved sheathing-type water-resistive barriers do not require or rely on lapped joints. Thus, this proposal refers to requirements for water-resistive barriers in Section R703.2 where other approved methods are recognized and eliminates redundant and incomplete information in this section.

Finally, this proposal provides a needed link to new requirements for furring attachment addressed in a later section of R703 for cases where furring is installed over foam plastic insulating sheathing.


**Cost Impact:** Will increase the cost of construction
The proposal requires furring for installation of wood shakes and shingles over all types of substrates for reason of equivalent, reliable, and acceptable performance and durability. This may increase costs in cases where no furring is used at all, but in other cases it may decrease costs. Overall, this proposal should serve to decrease long-term costs to consumers for maintenance/replacement of wood shakes and shingles.
RB292-16
IRC: R703.7.2.
Proponent: G Michael Starks, In-Spex, LLC, C B Goldsmith & Assoc., Florida Lath & Plaster Bureau, representing In-Spex, LLC (mstarks@in-spexllc.com)

2015 International Residential Code

R703.7.2 Plaster. Plastering with portland-cement plaster
Portland-cement-based plaster shall be not less than three coats where applied over metal lath or wire lath and shall be not less than two coats where applied over when direct-applied to solid plaster bases: cast-in-place and precast concrete, concrete and stone masonry, concrete, pressure-preservative treated wood or decay-resistant wood as specified in Section R317.1 or gypsum backing clay brick and tile. If the plaster surface is completely covered by veneer or other facing material or is completely concealed, plaster application need only be two coats, provided the total thickness is as set forth in Table R702.1(1).

On wood-frame construction with an on-grade floor-slab system, exterior plaster shall be applied to cover, but not extend below, lath, paper and screed.

The proportion of aggregate to cementitious materials shall be as set forth in Table R702.1(3) ASTM C 926.

Reason: Section R703.7 Exterior Plaster already defines the number of coats for specific substrates by means of, "in compliance with ASTM C 926 and C 1063..." Further, C 926, Standard Specification for Application of Portland Cement-Based Plaster, is more restrictive than the code in that it defines solid plaster bases to which stucco may be directly-applied and calls out the number of coats required for different substrates.

ASTM C926-13

3.2.25 solid plaster bases, n—substrates that do not require a metal plaster base, including cast in place and precast concrete, concrete and stone masonry, clay brick, and tile.

Neither pressure-preservative treated wood nor decay-resistant wood nor gypsum backing have the necessary mechanical keying ability to develop sufficient bond. All three of these substrates require a plaster base (lath) for successful application. Where lath is applied over these wood or gypsum substrates, three coats are necessary to fully embed and protect the lath from corrosive degradation.

This first paragraph, in particular, is erroneous in its seeming allowance of direct-applied stucco to other than solid plaster bases and is redundant to items already addressed in the reference standard, including the thickness Table R 702.1(2).

Paragraph 2 is fine as it refers to R703.7.2.1 Weep Screeds. The locations for weep are identified in ASTM C 1063. However, C 1063 fails to define the physical characteristics necessary.

Proportions of aggregates to cementitious materials is covered in ASTM C 926 with virtually identical values.

The proposed language clarifies the requirements for 2 and 3 coats and brings the code and reference standards in to conformity. It also recognizes that not all lath is metal without specifically approving any non-metallic lath and prepares the code section for such an event so that no further change would be necessary should that occur in the future.

Bibliography: C 926, Standard Specification for Application of Portland Cement-Based Plaster

Cost Impact: Will not increase the cost of construction
There is no cost of construction significance in this item.
RB293-16
IRC: R703.7.2.1.
Proponent: G Michael Starks, In-Spex, LLC, C B Goldsmith & Assoc., Florida Lath & Plaster Bureau, representing In-Spex, LLC (mstarks@in-spexllc.com)

2015 International Residential Code

Revise as follows:

R703.7.2.1 Weep screeds. A minimum 0.019-inch (0.019 inch (0.5 mm) (No. 26 galvanized sheet gage) gauge, corrosion-resistant weep screed or plastic weep screed, with a minimum vertical attachment flange of 3½-3-1/2 inches (89 mm) shall be provided at or below the foundation plate line on exterior stud walls in accordance with ASTM C 926 and C 1063. The weep screed shall be placed not less than a minimum of 4 inches (102 mm) above the earth expected final landscape grade or 2 inches (51 mm) above paved areas and shall be of a type that will allow trapped water to drain to the exterior of the building. The weather-resistant water-resistant barrier shall lap the attachment flange. The exterior lath shall cover and terminate on the attachment flange of the weep screed.

Reason: The section, as it stands, contains a reference to ASTM C 926, in which there is some guidance as to the need for weep screeds. However, more specific requirements for weep screeds are in ASTM C 1063, Standard specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster. The clauses are not in conflict with each other. Both should be referenced in R703.7.2.1 as indicated above. At present only metal and PVC accessories are provided for in the reference standards. PVC products are governed by ASTM D 1784 and D 4216, both of which are included as reference standards in ASTM C 1063. Other types of plastics would not be allowed by C 1063, so it may be best just to refer to those that are vetted through the requirements of the their own ASTM standards.

R703.7.2.1 is currently in conflict with the termite inspections requirements of R318.7. Since R703.7.2.1 applies only to stud walls, shouldn't the two sections coincide? This would also coincide with the requirements for EIFS terminations, R703.9.4.1.

The change to water-resistant barriers merely provides consistency to current code language.

ASTM C 1063, Standard specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster,
Cost Impact: Will not increase the cost of construction
There is no cost of construction significance in this item.
RB294-16
IRC: R703.7.5.
Proponent: G Michael Starks, representing In-Spex, LLC (mstarks@in-spexllc.com)

2015 International Residential Code

Revise as follows:

R703.7.5 Curing. The finish coat for two-coat cement plaster
Time between coats and curing periods shall be no less than as specified in ASTM C 926. Longer
times between coats and longer curing periods shall not be applied sooner than seven days after
application of the first coat prohibited. For three-coat cement plaster, the second coat shall not
be applied sooner than 48 hours after application of the first coat. The finish coat for three-coat
cement plaster shall not be applied sooner than seven days after application of the second coat.

Reason: Many questions have arisen concerning the requirements for the application of stucco to wood frame and
masonry exterior walls as contained in the current (and earlier) International Building Code, Residential Volume.
While the 2015 code still references ASTM C 926, Standard Specification for Application of Portland Cement-Based
Plaster, the code also contains antiquated requirements specifying minimum curing times between the stucco coat
applications. These requirements appear to conflict with those contained in the referenced standard.
It is appropriate to compare the requirements as contained in the current (2015) edition of the IRC Volume under
Section R703, to those of the currently referenced standard, ASTM C 926-13:

R703.7.4 Application. Each coat shall be kept in a moist condition for at least 48 hours prior to application of the
next coat.

Exception: Applications installed in accordance with ASTM C 926.

- An area of concern is the minimum curing time required between coats per sections R703.7.4,
  Application and R703.7.5, Curing, as follows:

R703.7.5 Curing. The finish coat for two-coat cement plaster shall not be applied sooner than seven days after
application of the first coat. For three-coat cement plaster, the second coat shall not be applied sooner than 48
hours after application of the first coat. The finish coat for three-coat cement plaster shall not be applied sooner
than seven days after application of the second coat.

- Note that while Section R703.7.4 provides an exception for applications installed per ASTM C
  926, Section R703.7.5 does not.

Next, consider the following excerpt taken from ASTM C 926 – 15b Standard Specification for Application of
Portland Cement-Based Plaster (which is identical to that of C 926-98a Section X1.4.2):

1. Application 7.1.10 Plaster coats that have become dry shall be evenly dampened with water prior to
   applying subsequent coats to obtain uniform suction. There shall be no visible water on the surface when
   plaster is applied.
2.
3. 7.1.9 Each coat shall be permitted to set before the next coat is applied. (See X1.5.2.)
4. **Curing and Time Between Coats**

1. Provide sufficient moisture in the plaster mix or by moist or fog curing to permit continuous hydration of the cementitious materials. The most effective procedure for curing and time between coats will depend on climatic and job conditions. (See X1.5.2.)

2. Sufficient time between coats shall be allowed to permit each coat to cure or develop enough rigidity to resist cracking or other physical damage when the next coat is applied. (See X1.5.2).

3. Note the references to Section X1.5.2, which states that curing times vary with climatic conditions and the type of plaster base, as follows:

---

**X1.5.2 Time Between Coats and Curing for Portland Cement-Based Plaster:**

**X1.5.2.1** The timing between coats will vary with climatic conditions and types of plaster base. Temperature and relative humidity extend or reduce the time between consecutive operations. Cold or wet weather lengthens and hot or dry weather shortens the time period. Moderate changes in temperature and relative humidity can be overcome by providing additional heating materials during cold weather and by reducing the absorption of the base by pre-wetting during hot or dry weather. **X1.5.2.2** In order to provide more intimate contact and bond between coats and to reduce rapid water loss, the second coat should be applied as soon as the first coat is sufficiently rigid to resist cracking, the pressures of the second coat application, and the leveling process.

**X1.5.2.3** The amount of water and the timing for curing portland cement plaster will vary with the climatic conditions, the type of base, and use or nonuse of water-retentive admixtures.

**X1.5.2.4** Some moisture must be retained in or added back to freshly applied portland cement-based plaster. If the relative humidity is relatively high (above 75%), the frequency for rewetting a surface may be reduced. If it is hot, dry, and windy, the frequency of rewetting must be increased.

**X1.5.2.5** Consider the physical characteristics of the structure as well as the previously mentioned conditions when selecting the method of curing. The method can be one or a combination of the following:

1. **Moist curing** is accomplished by applying a fine fog spray of water as frequently as required, generally twice daily in the morning and evening. Care must be exercised to avoid erosion damage to portland cement-based plaster surfaces. Except for severe drying conditions, the wetting of finish coat should be avoided, that is, wet the base coat prior to application of the finish coat.

2. **Plastic film**, when taped or weighted down around the perimeter of the plastered area, can provide a vapor barrier to retain the moisture between the membrane and plaster. Care must be exercised in placing the film: if too soon, the film may damage surface texture; if too late, the moisture may have already escaped.

3. **Canvas, cloth, or sheet material barriers** can be erected to deflect sunlight and wind, both of which will reduce the rate of evaporation. If the humidity is very low, this option alone may not provide adequate protection. So the question is, "What do you do"? Sections R703.7.4 and R 703.7.5 are in direct contradiction as one cannot comply with the exception in the former without violating the latter. ASTM C 926 allows for curing requirements to be specified in either manner (Section 8.2); though the preferred method is to apply successive coats as soon as the plaster has set to sufficient rigidity to carry the weight of the next coat. This does not present an on-site issue as where the underlying coat has not reached sufficient rigidity, the subsequent coat will cause sagging and fall-off. Plasterers do not want to do things twice, so they avoid this by waiting for set. Whether 2 coats over solid base or 3 coats over lath makes no difference. The 24-48 hour and 7 day waiting periods have been in the code for decades without change. These requirements were written for Portland cement/lime and gypsum plasters long before masonry cements and stucco cements were developed. Cement technology changes. Experience shows that applying successive coats while the previous coat is set but still damp promotes monolithic growth between the coats and prevents delamination (between coats) issues.

On the other hand, ASTM C 926 undergoes updates as frequently as deemed necessary by a consensus group of stucco experts in a cross-section of the industry that includes architects, engineers, manufacturers, contractors and consultants.

Cost Impact: Will not increase the cost of construction
This proposal will reduce the cost of construction where periods less than the current requirement of 24, 48 hours or 7 days are specified. Primarily, the reductions will be due to fewer mobilizations by the plasterer and more efficient time use of the labor force assigned. Additionally, in general, Stucco Cements and Masonry Cements are less costly than Portland Cement/Lime mixes whether preblended or jobsite mixed. This may not hold true nationwide. Because pricing of products varies greatly between regions, specificity in this regard is not possible.
## TABLE R702.1 (3)
CEMENT PLASTER PROPORTIONS, PARTS BY VOLUME

<table>
<thead>
<tr>
<th>COAT PLASTER TYPE</th>
<th>CEMENTITIOUS MATERIALS</th>
<th>VOLUME OF AGGREGATE PER SUM OF SEPARATE VOLUMES OF CEMENTITIOUS MATERIALS&lt;sup&gt;b&lt;/sup&gt;</th>
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</thead>
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<td>Portland or blended</td>
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</tr>
<tr>
<td></td>
<td>Masonry</td>
<td>2 1/2 - 4</td>
</tr>
<tr>
<td></td>
<td>Plastic</td>
<td>2 1/2 - 4</td>
</tr>
<tr>
<td></td>
<td>First</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Portland or blended</td>
<td>3 1/4 - 1 1/2&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Masonry</td>
<td>3 - 5</td>
</tr>
<tr>
<td></td>
<td>Plastic</td>
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<td>Portland or blended</td>
<td>3 1/4 - 1 1/2&lt;sup&gt;a&lt;/sup&gt;</td>
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<td></td>
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<td>1 1/2 - 2&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Masonry</td>
<td>1 1/2 - 3</td>
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</table>
R703.7 Exterior plaster (stucco). Installation of these materials
Exterior plaster (stucco) shall be installed in compliance accordance with ASTM C 926, ASTM C 1063 and the provisions of this code section.

R703.7.1 Lath. Lath and lath attachments shall be of corrosion-resistant materials in accordance with ASTM C 1063. Expanded metal, welded wire or woven wire lath shall be attached into wood framing members with 1\(\frac{1}{2}\)-inch-long (38 mm), 11 gage nails having a 7/16-inch (11.1 mm) head, or 7/8-inch-long (22.2 mm), 16 gage staples, spaced not more than 6 7 inches (178 mm) on center vertically and not more than 24 inches (152 mm) on center horizontally, or as otherwise approved. Lath attachments to cold-formed steel framing or to masonry, stone, or concrete substrates shall be in accordance with ASTM C 1063.

R703.7.2 Plaster. Plastering with portland cement plaster shall be in accordance with ASTM C 926. Cement materials shall be in accordance with ASTM C 91, ASTM C 150, ASTM C 595 or ASTM C 1328. Plaster shall be not less than three coats where applied over metal lath or wire lath and shall be not less than two coats where applied over masonry, concrete, pressure-preservative-treated wood or decay-resistant wood as specified in Section R317.1 or gypsum backing. If the plaster surface is completely covered by veneer or other facing material or is completely concealed, plaster application need be only two coats, provided the total thickness is as set forth in Table R702.1(1).

Exception: Where in dry climate zones, the water-resistant barrier that is applied over wood-based sheathing shall be vapor permeable and shall have a water resistance equal performance at least equivalent to two layers 10-minute Grade D paper. The individual layers shall be installed independently such that each is separated from the stucco by an intervening, substantially nonwater-absorbing layer and any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier is directed between the layers or designed drainage space.

R703.7.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include have a water-resistant vapor-permeable barrier with a performance at least equivalent water resistance equal to two layers or greater than that of 60-minute Grade D paper. The individual layers shall be installed independently such that each is separated from the stucco by an intervening, substantially nonwater-absorbing layer and any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier is directed between the layers or designed drainage space.
R703.7.3.1 Furring. Furring between lath and vertical supports or solid sheathing shall consist of wood furring strips not less than 1 inch by 2 inches (25 mm by 51 mm) in nominal dimension, minimum ¾" metal channels, or self-furring lath manufactured to provide a minimum ¼ inch space between the lath and the vertical support or sheathing. Furring shall be spaced a maximum of 24 inches on center horizontally and, where installed over wood or cold-formed steel framing, shall be fastened into framing members.

**Reason:** The purpose of this code change is to correlate the requirements for exterior lath and plaster (stucco) with the requirements of ASTM C 926 and C 1063 and recommended practice. The code requirements in the IRC are not in alignment with the reference standards and lack key details needed to insure a good installation and minimize the risk of moisture intrusion.

In particular, the IRC lath attachment requirements state a 6" nail or staple spacing but do not specify direction or what nailing substrates are permitted. ASTM C 1063 specifies a 7" vertical spacing along and 16" to 24" horizontal spacing into wood studs. Without this clear direction in the code, some stucco is being installed with fasteners in a 6" grid pattern (both horizontal and vertical), leading to fasteners penetrating sheathing and providing a path for moisture intrusion behind the WRB and exterior sheathing and causing decay and water damage. The code user is referred to C 1063 for lath attachment requirements for other substrates, and is allowed to omit the lath when permitted by C 1063 for concrete substrates which have been properly prepared such that the plaster will bond directly to the concrete.

Also, the IRC does not include the requirement in C 1063 to provide furring behind expanded metal or wire lath except where such lath is self-furring, and that the furring shall create a minimum ¾" space between the lath and the vertical supports (framing, sheathing, or other vertical substrates). The furring requirement is added here using sizes consistent with other wood furring requirements in the IRC and the minimum channel size from C 1063. Again, the proposed language underscores that furring attachment to metal or wood framing must be into studs. Significant water damage has occurred in stucco walls due to improper provisions for drainage and drying behind the lath and plaster. The minimum drainage space created by the furring requirements specified in C 1063 and included in this proposal allows for some drying of moisture which gets into the wall assembly, however if sufficient amounts of moisture accumulate, especially around penetrations and rough openings, it may be able to wick through the traditional 10-minute layers of Grade D paper. The larger drainage space associated with brick or natural-cut stone veneer would be necessary. Thus, the current exception for one layer of minimum 60-minute Grade D paper or equivalent, plus an additional non-absorbent layer (frequently an additional layer of 10-minute Grade D paper) or "designed" drainage space (using drainage mat, drainage board or other products) is elevated to the base practice. The existing requirement for 2 layers of 10-minute Grade D paper is retained as an exception for the dry climate zones.

Inconsistencies in Table R702.1(3) were also noted. For a first coat of masonry cement plaster, the "1" should appear under the Masonry Cement column, not the Lime column. The proportions of lime for a Portland cement finish coat are also revised to align with Table 3 of ASTM C926. Significant water damage has occurred in stucco walls due to improper provision for drainage and drying behind the lath and plaster. A physical air space separation between the layers needs to be provided similar to the air space provided behind brick or natural cut stone veneers. Proper selection of a water-resistant barrier is also critical to good performance of a stucco wall assembly. The current exception for one layer of minimum 60-minute Grade D paper or equivalent is a good recommended practice and is elevated here to the base requirement. In wetter climates the possibility exists for bulk moisture to be present for extended periods of time between the layers, thus a requirement for an additional layer of 10-minute Grade D paper or equivalent is added.

Inconsistencies in Table R702.1(3) were also noted. For a first coat of masonry cement plaster, the "1" should appear under the Masonry Cement column, not the Lime column. The proportions of lime for a Portland cement finish coat are also revised to align with Table 3 of ASTM C926.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: [BCAC](http://www.icc.org).
**Cost Impact:** Will increase the cost of construction
Depending on the products selected to meet the water-resistant barrier requirements, the cost to provide a single 60-minute layer may be greater than the cost to provide two separate 10-minute layers. In warm-humid climates, the requirement for an additional 10-minute layer over the 60-minute layer would be an increase in cost if not already being provided as the "substantially non-water absorbing layer".
### Table R702.1 (3)
CEMENT PLASTER PROPORTIONS, PARTS BY VOLUME

<table>
<thead>
<tr>
<th>COAT</th>
<th>CEMENT PLASTER TYPE</th>
<th>CEMENTITIOUS MATERIALS</th>
<th>VOLUME OF AGGREGATE PER SUM OF SEPARATE VOLUMES OF CEMENTITIOUS MATERIALS&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Portland or blended</td>
<td>Portland Cement Type I, II or III; Blended Hydraulic Cement Type IP, PM (S&lt;70), IL, or IT(S&lt;70); or Hydraulic Cement Type GU, HE, MS, HS, or MH</td>
<td>1 3/4 - 1 1/2&lt;sup&gt;a&lt;/sup&gt; 2 1/2 - 4</td>
</tr>
<tr>
<td>First</td>
<td>Masonry</td>
<td>Plastic Cement</td>
<td>1 3/4 - 1 1/2&lt;sup&gt;a&lt;/sup&gt; 2 1/2 - 4</td>
</tr>
<tr>
<td></td>
<td>Plastic</td>
<td>Plastic</td>
<td>1 3/4 - 1 1/2&lt;sup&gt;a&lt;/sup&gt; 2 1/2 - 4</td>
</tr>
<tr>
<td>Second</td>
<td>Portland or blended</td>
<td>Portland Cement Type I, II or III; Blended Hydraulic Cement Type IP, PM (S&lt;70), IL, or IT(S&lt;70); or Hydraulic Cement Type GU, HE, MS, HS, or MH</td>
<td>3/4 - 1 1/2 3 - 5</td>
</tr>
<tr>
<td></td>
<td>Masonry</td>
<td>Masonry Cement Type M, S or N</td>
<td>3/4 - 1 1/2 3 - 5</td>
</tr>
<tr>
<td></td>
<td>Plastic</td>
<td>Plastic</td>
<td>3/4 - 1 1/2 3 - 5</td>
</tr>
</tbody>
</table>

<sup>a</sup> Lime: 1 1/2 - 4 2 1/2 - 4

<sup>b</sup> Lime: 1 1/2 - 4 2 1/2 - 4
<table>
<thead>
<tr>
<th>Finish</th>
<th>Portland or blended</th>
<th>1</th>
<th>Masonry</th>
<th>1</th>
<th>Plastic</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound = 0.454 kg.

a. Lime by volume of 0 to \( \frac{3}{4} \) shall be used where the plaster will be placed over low-absorption surfaces such as dense clay tile or brick.

b. The same or greater sand proportion shall be used in the second coat than used in the first coat.

**Revise as follows:**

**R703.7 Exterior plaster (stucco).** No change to text.

**R703.7.1 Lath.** Lath and lath attachments shall be of corrosion-resistant materials. Expanded metal or woven wire lath shall be attached with 1\( \frac{1}{2} \)-inch-long (38 mm), 11 gage nails having a \( \frac{7}{16} \)-inch (11.1 mm) head, or \( \frac{7}{8} \)-inch-long (22.2 mm), 16 gage staples, spaced not more than 6 inches (152 mm), or as otherwise approved.

**Exception:** Lath is not required over masonry, cast-in-place concrete, precast concrete or stone substrates prepared in accordance with ASTM C1063.

**R703.7.2 Plaster.** Plastering with portland cement plaster shall be in accordance with ASTM C926. Cement materials shall be in accordance with one of the following:

- Masonry cement plaster conforming to ASTM C91 Type M, S or N
- Portland cement conforming to ASTM C150 Type I, II, or III;
- Blended hydraulic cement conforming to ASTM C595 Type IP, IS(<70), IL, or IT(S<70);
- Hydraulic cement conforming to C1157 Type GU, HE, MS, HS, or MH; or
- Plastic (stucco) cement conforming to C 1328.

Plaster shall be not less than three coats where applied over metal lath or wire lath and shall be not less than two coats where applied over masonry, concrete, pressure-preservative-treated wood or decay-resistant wood as specified in Section R317.1 or gypsum backing. If the plaster surface is completely covered by veneer or other facing material or is completely concealed, plaster application need be only two coats, provided the total thickness is as set forth in Table R702.1(1).

On wood-frame construction with an on-grade floor slab system, exterior plaster shall be applied to cover, but not extend below, lath, paper and screed.

The proportion of aggregate to cementitious materials shall be as set forth in Table R702.1(3).

**Reason:** The purpose of this code change is to correlate the requirements for exterior lath and plaster (stucco) with the requirements of ASTM C926 and C1063 and ACI 524R-08 Guide to Portland Cement-Based Plaster. The code requirements in the IRC are not in alignment with the reference standards and industry recommended practice. This change clarifies that lath is not required for stucco to be applied to masonry, concrete or stone surfaces and updates the acceptable types of cement to current ASTM designations.
Cost Impact: Will not increase the cost of construction
The code change will not increase the cost of construction. The change corrects the designations for acceptable, currently available cement types clarifies that lath is not required where stucco is permitted to be placed directly on concrete or masonry surfaces.
Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council

2015 International Residential Code

Revise as follows:

R703.7.1 Lath. Lath support by framing, furring, or sheathing and attachment to framing or furring shall be in accordance with ASTM C 1063. Lath and lath attachments shall be of corrosion-resistant materials. Expanded metal or woven wire lath shall be attached with minimum \( \frac{1}{2} \)-inch-long (38 mm), 11 gage nails having a \( \frac{7}{16} \)-inch (11.1 mm) head, or \( \frac{7}{8} \)-inch-long minimum 1-inch-long (22.2 mm), 16 gage staples with minimum 3/4-inch crown, spaced not more than 6 inches (152 mm), on center vertically along all wall studs. Penetration of lath fasteners into framing shall not be less than 3/4 inch. Lath shall be supported by and fastened to framing members spaced not greater than 16-inches on center or 24-inches on center where placed over sheathing or a solid surface. Alternate lath support and fastening conditions shall be permitted in accordance with ASTM C 1063 or as otherwise approved.

Reason: This proposal is a clarification of code and coordination with ASTM standard C 1063 for lath installation as referenced in Section R703.7. This provision is sometimes misinterpreted as requiring 6" fastener spacing at 6"oc in both directions, requiring use of studs at 6"oc or some type of nail base sheathing. Thus, the proposal corrects the fastener spacing to 7"oc (to agree with ASTM C 1063) and clarifies fastener placement along studs. There also are several other items that are not consistent with the ASTM C 1063 reference standard that are addressed in this proposal. Finally, the ASTM C 1063 standard provides additional options for lath and its attachment that are appropriately recognized as alternative solutions in the last sentence of this proposal.

Cost Impact: Will not increase the cost of construction
This proposal may actually decrease cost by coordinating connection requirements with requirements in the referenced ASTM standard.
RB298-16
IRC: R703.7.3.
Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council

2015 International Residential Code

Revise as follows:

R703.7.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include a water-resistive vapor-permeable comply with Section R703.7.3.1.

R703.7.3.1 Application over wood-based sheathing. Water-resistive barrier applications over wood-based sheathing shall comply with a performance at least equivalent to two one of the following materials and methods:

1. Two layers of Grade D paper. The individual layers shall be installed independently such that each layer provides a separate continuous plane in accordance with Section R703.2 and any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier is directed between the layers.

   Exception: Where the water resistive barrier that is applied over wood based sheathing has a water resistance equal to or greater than that of 60-minute Grade D paper and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space.

2. One layer of 60-minute Grade D paper installed in accordance with Section 1404.2 and separated from the stucco by an intervening, substantially non-water-absorbing layer or drainage space with any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier directed between the layers or into the drainage space.

3. One layer of an approved water-resistive barrier material installed in accordance with the manufacturer’s installation instructions with a water resistance equal to or greater than that of 60-minute Grade D paper. The approved water-resistive barrier material shall be separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space with any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier directed between the layers or into the drainage space.

Reason: This proposal improves enforceability and clarity of this section of code by clarifying general requirements (Section R703.7.3) and transparently distinguishing the three options for application with wood based sheathing (new Section R703.7.3.1). More importantly, the building science intent of the code is improved by removing an exclusionary and problematic specification of a “vapor permeable” water-resistant barrier (WRB). The exclusive specification of “vapor permeable” conflicts with the ability to use a vapor permeable or non-vapor permeable WRB when they are properly coordinated with the vapor retarder provisions in Section R702.7. For example, in warm/humid climates it is actually preferable to have a lower vapor permeance (non-vapor permeable) WRB on the exterior behind the stucco to mitigate excessive inward vapor drives and moisture movement. In cold climates, it also is possible to apply provisions of Section R702.7.1 (Class III vapor retarder) or Section R702.7 (Class I or II vapor retarder) with an appropriate amount of exterior continuous insulation to allow the use of a lower vapor permeance (non-vapor permeable) WRB. Thus, the code appropriately permits the use of vapor permeable and non-vapor permeable WRB materials when properly coordinated with the use of vapor retarders in Section R702.7.
**Cost Impact:** Will not increase the cost of construction
The proposal is primarily a clarification and provides more options for WRB specification without increasing cost.
RB299-16

IRC: R703.7.3.

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council

2015 International Residential Code

Revise as follows:

R703.7.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include a water-resistive vapor-permeable barrier with a performance at least equivalent to two layers of Grade D paper. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier is directed between the layers.

Exceptions:

Exception 1. Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of 60-minute Grade D paper and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space.

Exception 2. Where the water-resistive barrier is applied over vapor permeable or wood-based sheathing in Climate Zones 1A, 2A, 3A, 4A, 5A, and 4C in accordance with Section N1101.7, the water-resistive barrier material shall have a water vapor permeance of 10 perms or less in accordance with ASTM E96 (Method A) to minimize inward moisture movement. Alternatively, a ventilated air space shall be provided between the stucco and water-resistive barrier.

Reason: In many climates, having a vapor permeable WRB that is too vapor permeable (i.e., > 10 perms) can result in significant solar-driven inward moisture movement into and through exterior sheathing and farther into the wall assembly (e.g., to the interior vapor retarder or interior finishes), causing significantly increased risk of moisture damage or mold. This concern is particularly relevant to Section R703.7.3 which deals with conventional stucco -- a moisture storage ("reservoir") cladding. Consequently, a new exception #2 is provided to address this problem and is based on consistent findings and recommendations from several studies including Derome (2010), Wilkinson et al. (2007), BSC (2005), and Lepage and Lstiburek (2013). Key findings and recommendations from these studies also are summarized and applied in ABTG (2015). Finally, it is important to note that this proposal does NOT eliminate the use of WRB materials of greater than 10 perms in the stated application and climate zones because an alternative is provided to use a ventilated air space.

Bibliography:


Cost Impact: Will not increase the cost of construction
The proposal provides limitations on use that may affect some product choices under the specified conditions of use, but many material options of all types remain available and are unaffected by this proposal. In addition, provision for use of a ventilated air space would prevent any impact on WRB selection in the stated climate conditions.
RB300-16
IRC: R703.7.3.
Proponent: Laverne Dalgleish, Building Professionals, representing Building Professionals (ldalgleish@buildingprofessionals.com)

2015 International Residential Code

R703.7.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include a water-resistive vapor-permeable barrier with a performance at least equivalent to two layers of Grade D paper. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier is directed between the layers.

Exception: Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of 60-minute Grade D paper and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or a designed drainage space or material complying with ASTM E2925.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
ASTM E2925 - 14 Standard Specification for Manufactured Polymeric Drainage and Ventilation Materials used to Provide a Rainscreen Function
Reason: This allows another option for materials that meet a standard specification for materials that have been tested for allowing drainage and drying.

Cost Impact: Will not increase the cost of construction
This proposal simply add another option and as such does not add any cost to construction

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM E2925-14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
2015 International Residential Code

R703.7.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include a water-resistive vapor-permeable barrier with a performance at least equivalent to two layers or greater than that of Grade D paper. A water-resistive barrier complying with ASTM E2556, Type II. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier is directed between the layers.

Exception: Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of 60-minute Grade D paper and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space:

a. material complying with ASTM E 2556 Type I and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space or,
b. material complying with ASTM E2556 Type II and is separated from stucco by a intervening material complying with ASTM E2925.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
ASTM E2925-14 Standard Specification for Manufactured Polymeric Drainage and Ventilation Materials used to Provide a Rainscreen Function
Reason: This proposal provides another option in meeting the existing requirements of the code and references standards for materials selection

Cost Impact: Will not increase the cost of construction
As this simply provides another option, there is no additional cost

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM E2925-14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
2015 International Residential Code

R703.7.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include a water-resistive vapor-permeable barrier with a performance at least equivalent to two layers of Grade D paper, complying with ASTM E2556, Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing (installed in accordance with Section R703.4) intended to drain to the water-resistive barrier is directed between the layers.

Exception: Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of 60-minute Grade D paper, complying with ASTM E2556, Type II and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space.

Reference standards type: This is an update to reference standard(s) already in the ICC Code Books

Add new standard(s) as follows:
ASTM E2556-10 Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers intended for Mechanical Attachment

Reason: This proposal adds a reference standard specification to the Grade D Paper requirements, which are currently unspecified. Not only will this better define the existing requirements for Grade D Paper it will also provide more consistency between the codes, as IBC Section 2510.6 on stucco water-resistive barriers references ASTM E2556.

Cost impact: Will not increase the cost of construction
This code does not change the requirements, only improves their definition.
RB303-16
IRC: R703.8.4, R703.8.4(2) (New).
Proponent: Edward Keith, representing APA-The Engineered Wood Association (ed.keith@apawood.org)

2015 International Residential Code
Revise as follows:

R703.8.4 Anchorage. Masonry veneer shall be anchored to the supporting wall studs with corrosion-resistant metal ties embedded in mortar or grout and extending into the veneer a minimum of $1\frac{1}{2}$ inches (38 mm), with not less than $\frac{5}{8}$-inch (15.9 mm) mortar or grout cover to outside face. Masonry veneer tie attachment and air space requirements shall conform to Table R703.8.4 R703.8.4(1). For brick tie attachment recommendations when brick ties are attached to wood structural panel sheathing only, see Table R703.8.4(2).

<table>
<thead>
<tr>
<th>Fastener Type</th>
<th>Size (dia. or Screw #)</th>
<th>Minimum Required Brick-Tie Spacing (Vertical-Tie-Spacing/Horizontal-Tie-Spacing)</th>
<th>110 mph $V_{ult}$</th>
<th>130 mph $V_{ult}$</th>
<th>140 mph $V_{ult}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ring Shank</td>
<td>0.091</td>
<td>16/12, 12/16 12/12 12/12 -- -- --</td>
<td></td>
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<td>0.148</td>
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<td>Screws #6</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 mph = 0.447 m/s.

a. This table is based on attachment of brick ties directly to wood structural panel sheathing only. Additional attachment of the brick tie to lumber framing is not required.
b. Wood structural panels shall have a specific gravity of 0.42 or greater in accordance with NDS.
c. Foam sheathing shall have a minimum compressive strength of 15 psf in accordance with ASTM C578 of ASTM C1289.
d. Fasteners shall be sized such that the tip of the fastener passes completely through the wood.
structural panel sheathing by at least 1/4 inch.

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**Reason:** The trend toward using more foam sheathing along with the use of advanced framing techniques in an effort to conserve energy has made it increasingly difficult to install wall cladding. Not only is the framing difficult to find under 2 inches of foam and building paper or house wrap, it may not even be present near corners and around openings because it may be completely masked by trim at corners and around windows.

The attachment of brick veneer brick-ties can similarly be a problem as the current attachment recommendations assume the brick ties are going to be nailed directly to those scarce framing members. The proposed table provided brick-tie attachment recommendations for attachment direct to a minimum 7/16 performance category wood structural panels. As the wood structural panel thickness does not permit the full use of the nail’s shank, it is essential that either ring-shank nails or screws be used to keep the brick veneer in place. The above table provides this information. We think that while the use of ring shank fasteners will not be appropriate for every installation, the table provided is a tool that the mason may use if faced with the attachment of brick to a fully sheathed, energy efficient home.

We ask the Committee to favorably consider this table for inclusion into the list of similar tables recently provided for the use of the builder, providing guidance for the installation of siding products over foam sheathing.

**Cost Impact:** Will increase the cost of construction

The proposed change will increase the cost of construction. The increase will be due to the use of ring-shank nails or screws over the more traditional nailed connections. The increase in construction costs can be partially offset by the fact that the builder will not have to locate the studs behind the various materials covering the studs (sheathing, foam, building paper) when attaching the brick ties, as attachment to the studs will not be required. The proposed solution will also eliminate the need to provide extra wall framing just to facilitate the attachment of the brick ties. The use of extra framing adds cost as well as reduces the thermal efficiency of the system.
2015 International Residential Code

Revise as follows:

R703.10.2 Lap siding. Fiber-cement lap siding having a maximum width of 12 inches (305 mm) shall comply with the requirements of ASTM C 1186, Type A, minimum Grade II or ISO 8336, Category A, minimum Class 2. Lap siding shall be lapped a minimum of $1\frac{1}{4}$ inches (32 mm) and lap siding not having tongue and groove end joints shall have been installed in accordance with the ends protected with caulking, covered with an H-section joint cover, located over a strip of flashing manufacturer's installation instructions, or shall be designed to comply with Section R703.1. Lap siding courses shall be installed with the fastener heads exposed or concealed, in accordance with Table R703.3(1) or approved manufacturer's instructions.

Reason: Manufacturers of these products recommend the use of flashing strips, to be installed behind the product, at all field butt joints. Applying caulking to the butt joint is ineffective because the gap is not large enough to accommodate the sealant. Also, on prefinished products, caulking may leave an unsightly looking finish. Spreading or feathering the sealant into a thin film will create a noticeably different appearance, and it can remove the needed thickness required to withstand UV exposure and joint movement. In many instances if specific manufacturer-approved products are not used, it can void the warranty from the manufacturer.

Cost Impact: Will not increase the cost of construction
This code change will reduce the cost of construction as caulking would no longer be used for field butt joints. Caulk manufacturers and industry experts agree that the caulking in field butt joints and horizontal laps will need to be periodically removed and/or reapplied to maintain the seal over the life of the building. Ongoing maintenance of the field butt joint caulking causes an unnecessary financial impact.
2015 International Residential Code

Revise as follows:

R703.11.2 Foam Installation over foam plastic sheathing. Where vinyl siding and or insulated vinyl siding used with is installed over foam plastic sheathing, the vinyl siding shall comply with Section R703.11 and shall be installed in accordance with Sections R703.11.1 and R703.3.3. The foam plastic sheathing and its attachment shall have a design wind pressure resistance complying with Section R703.11.2.1 R316.8. Where design is required in accordance with Figure R301.2(4)B, R703.11.2.2 or R703.11.2.3 the foam plastic sheathing and vinyl siding installation shall comply with Section 705.2 of ICC 600.

Exceptions:

1. Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other approved backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with Sections R703.11.1 and R703.3.3, and the foam plastic sheathing shall not be required to comply with Section R703.11.1 R316.8.

2. Where the vinyl siding manufacturer's product specifications provide an approved design wind pressure rating for installation over foam plastic sheathing, use of this design wind pressure rating shall be permitted and the siding shall be installed in accordance with the manufacturer's instructions.

Delete without substitution:

R703.11.2.1 Basic wind speed not exceeding 115 miles per hour and Exposure Category B. Where the ultimate design wind speed does not exceed 115 miles per hour (51 m/s), the exposure category is B and gypsum board, gypsum panel product or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 1\(\frac{1}{4}\) inches (32 mm) using minimum 0.120-inch-diameter (3 mm) nail (shank) with a minimum 0.313-inch-diameter head, 16 inches (406 mm) on center. The foam plastic sheathing shall be minimum 1\(\frac{1}{2}\)-inch-thick (12.7 mm) (nominal) extruded polystyrene in accordance with ASTM C 578, 1\(\frac{1}{2}\)-inch-thick (12.7 mm) (nominal) polyisoceyanurate in accordance with ASTM C 1289 or 1-inch-thick (25 mm) (nominal) expanded polystyrene in accordance with ASTM C 578.

R703.11.2.2 Basic wind speed exceeding 115 miles per hour or Exposure Categories C and D. Where the ultimate design wind speed exceeds 115 miles per hour (51 m/s), the exposure category is C or D, or all conditions of Section R703.11.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:

1. For wall assemblies with foam plastic sheathing on the exterior side and gypsum wall board, gypsum panel product or equivalent on the interior side of the wall, the vinyl...
siding's design wind pressure rating shall be multiplied by 0.39.

2. For wall assemblies with foam plastic sheathing on the exterior side and without gypsum wall board, gypsum panel product or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.

R703.11.2.3 - Manufacturer specification - Where the vinyl siding manufacturer's product specifications provide a design wind pressure rating for installation over foam plastic sheathing, use of this design wind pressure rating shall be permitted and the siding shall be installed in accordance with the manufacturer's instructions.

Reason: The provisions for application of vinyl siding with foam plastic sheathing are revised to coordinate with changes made last code cycle to address foam sheathing wind pressure resistance in Section R316.8 and to reference the clarified attachment requirements in Section R703.11.1 and R703.3.3. Also, the section is revised to require that the foam sheathing and its attachment are rated for wind pressure resistance per Section R316.8 such that the adjustment factors and additional conditions in Sections R703.11.2.1 and R703.11.2.2 are no longer necessary (these sections are deleted). In addition, Section R703.11.2.3 is deleted because it is included as exception #2 in the revised Section R703.11.2. Finally, guidance specifically addressing this topic for high wind conditions (where design is required in the IRC) have been added to the ICC 600 reference standard. Thus, these new provisions are coordinated in this proposal to ensure appropriate use and limitations for applications of vinyl siding and foam sheathing. Overall, these provisions will simplify the code, its enforcement, and its use while maintaining intended levels of performance.

Cost Impact: Will not increase the cost of construction
This proposal simplifies the code and compliance while maintaining equivalent performance with no cost impact.

RB305-16 : R703.11.2-
CRANDELL12822
RB306-16

IRC: R703.11.2, R703.11.2.1, R703.11.2.2, R703.11.2.3.

Proponent: Paul Coats, PE CBO, representing American Wood Council (pcoats@awc.org)

2015 International Residential Code

Revise as follows:

R703.11.2 Foam plastic sheathing. Vinyl siding and insulated vinyl siding used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2 or R703.11.2.3 R703.11.2.2.

Exception: Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other approved backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with Section R703.11.1.

R703.11.2.2 Basic wind speed not exceeding 115 miles per hour and Exposure Category B Installation. Where the ultimate design wind speed does not exceed 115 miles per hour (51 m/s), the exposure category
Vinyl siding and insulated vinyl siding used to secure foam sheathing directly to wall framing shall be permitted where installation is B and gypsum board, gypsum panel product or equivalent is installed on the side in accordance with all of the wall opposite the foam plastic sheathing, following:

1) the minimum siding fastener penetration into wood framing shall be $1\frac{1}{4}$ inches (32 mm) using minimum 0.120-inch-diameter (3 mm) nail (shank) with a minimum 0.313-inch-diameter head, 16 inches (406 mm) on center. The, and

2) the foam plastic sheathing shall be minimum $1\frac{1}{2}$-inch-thick (12.7 mm) (nominal) extruded polystyrene in accordance with ASTM C 578, $1\frac{1}{2}$-inch-thick (12.7 mm) (nominal) polyisocyanurate in accordance with ASTM C 1289 or 1-inch-thick (25 mm) (nominal) expanded polystyrene in accordance with ASTM C 578, and

R703.11.2.2 Basic wind speed exceeding 115 miles per hour or Exposure Categories C and D. Where the ultimate design wind speed exceeds 115 miles per hour (51 m/s)

the adjusted design pressure rating for the assembly shall meet or exceed the loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:

1. For wall assemblies with foam plastic sheathing on the exterior side and gypsum wall board, gypsum panel product or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.

2. For wall assemblies with foam plastic sheathing on the exterior side and without gypsum wall board, gypsum panel product or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.
**R703.11.2.3 R703.11.2.2 Manufacturer specification.** Where the vinyl siding manufacturer's product specifications provide an *approved* design wind pressure rating for installation over foam plastic sheathing, use of this design wind pressure rating shall be permitted and the siding shall be installed in accordance with the manufacturer's instructions.

**Reason:** The fastening permitted by R703.11.2.1 for 115 mph and less wind speeds for purposes of securing foam sheathing direct to wall studs is significantly less than is required for locations having wind speed greater than 115 mph and is also significantly less than would be required based on an engineered design to resist wind pressures required by R703.1.2. The proposed revision extends the R703.11.2.2 method for 115 mph and greater wind speed zones to 115 mph and lower wind speed zones. No change is proposed to the R703.11.2.2 method for vinyl siding used to secure foam direct to wall studs or to the R703.11.2.3 method to follow manufacturer's specifications when vinyl siding is used to secure foam direct to wall studs.

**Cost Impact:** Will increase the cost of construction
This change does not affect cost in greater than 115 mph wind speed zones because requirements remain unchanged. This change may require better performing vinyl siding and attachment when used to secure foam sheathing to wall studs in 115 mph and lower wind speed zones and therefore increase cost of construction.
2015 International Residential Code

R703.14 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D 7254 by an approved quality control agency.

R703.14.1 Polypropylene siding and accessories. Polypropylene siding and accessories shall be installed in accordance with manufacturer's installation instructions.

R703.14.1.1 Installation. Polypropylene siding shall be installed over and attached to wood structural panel sheathing with minimum thickness of $\frac{7}{16}$ inch (11.1 mm), or other substrate, composed of wood or wood-based material and fasteners having equivalent withdrawal resistance.

R703.14.1.2 Fastener requirements. Unless otherwise specified in the approved manufacturer's instructions, nails shall be corrosion resistant, with a minimum 0.120-inch (3 mm) shank and minimum 0.313-inch (8 mm) head diameter. Nails shall be a minimum of $1\frac{1}{4}$ inches (32 mm) long or as necessary to penetrate sheathing or substrate not less than $\frac{3}{4}$ inch (19.1 mm). Where the nail fully penetrates the sheathing or nailable substrate, the end of the fastener shall extend not less than $\frac{1}{4}$ inch (6.4 mm) beyond the opposite face of the sheathing or substrate. Staples are not permitted.

Add new text as follows:

R703.14.1.3 Flame spread index. The certification of the flame spread index shall be accompanied by a test report stating that all portions of the test specimen ahead of the flame front remained in position during the test in accordance with ASTM E84 or UL 723.

Reason: The reason for this proposal is that polypropylene is a material that exhibits much poorer fire performance than other siding materials such as wood (e.g. cedar), vinyl (PVC) or aluminum. This proposal adds the requirements contained in the 2015 IBC, which have not been altered in the current code cycle. ASTM D7254 requires polypropylene siding to comply with a flame spread index (FSI) of 200 when tested in the ASTM EB4 test. That is an appropriate requirement since it is consistent with the performance of wood siding materials in the same test. Unfortunately, polypropylene has the tendency to melt and flow away from the flame, while vinyl and wood do not. ASTM EB4 warns (in section 1.4) that, when materials that melt or delaminate are tested, they will generate inadequately low FSI values.

The flame spread index in accordance with ASTM EB4 must be assessed with a test specimen that remains in position during the test ahead of the flame front because of the well-known tendency for polypropylene to melt and drip. This tendency of polypropylene to melt and drip has been recognized by the IBC when it incorporated the requirements in section 1404.12.1 (for polypropylene siding) and in section 803.12 (for polypropylene used as interior finish). In the case of polypropylene siding the IBC has language consistent with the proposed to the IRC for the siding. In the case of polypropylene as interior finish, the IBC does not allow it to be tested to ASTM EB4 but requires the use of the room-corner test (NFPA 286). The proposal does not recommend using the room-corner test for siding in the IRC that is unnecessary. With the proposed provisions, enough safety is provided that polypropylene siding can be used safely in the IRC.

The data below shows fire tests on two different PP siding materials and on a wood (cedar) siding using the cone calorimeter, ASTM E1354, at an incident heat flux of 25 kW/m$^2$, as well as some material tests on vinyl (PVC) and on a fire retarded polypropylene. The data indicates the problem with some polypropylene materials used for siding.

Siding tests (ASTM E1354)

Wood (cedar) siding: peak heat release rate 309 kW/m$^2$ - effective heat of combustion: 13 MJ/kg
Polypropylene siding 1: peak heat release rate 546 kW/m² - effective heat of combustion: 25 MJ/kg
Polypropylene siding 2: peak heat release rate 878 kW/m² - effective heat of combustion: 32 MJ/kg
Material tests (ASTM E1354)

Vinyl (PVC): peak heat release rate 190 kW/m² - effective heat of combustion: 9 MJ/kg
Fire retarded polypropylene: peak heat release rate 200 kW/m² - effective heat of combustion: 25 MJ/kg

The data below show s fire tests using the ASTM E84 test on materials that cause no flaming on the floor ahead of the flame front, as recommended in this proposal. The data show that polypropylene can be made so that it meets the requirements indicated in the proposal, in the ASTM E84 test without melting, and perform just like PVC (vinyl) or wood products.

Vinyl (PVC): ASTM E84 FSI 10
Fire retarded polypropylene: ASTM E84 FSI 50
Western red cedar: ASTM E84 FSI 70
Douglas fir: ASTM E84 FSI 70-100
Western white pine: ASTM E84 FSI 75

For information, the IBC 2015 contains the following section:
1404.12.1 Flame spread index. The certification of the flame spread index shall be accompanied by a test report stating that all portions of the test specimen ahead of the flame front remained in position during the test in accordance with ASTM E84 or UL 723.

Also, for information, section 1.4 of ASTM E84 reads as follows:
"1.4 Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place."

**Cost Impact:** Will increase the cost of construction
The added requirements are consistent with those in the IBC and with requirements to ensure safe use of polypropylene siding.
TABLE R703.15.1
CLADDING MINIMUM FASTENING REQUIREMENTS FOR DIRECT ATTACHMENT OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT

<table>
<thead>
<tr>
<th>CLADDING FASTENER THROUGH FOAM SHEATHING</th>
<th>CLADDING FASTENER TYPE AND MINIMUM SIZE</th>
<th>MAXIMUM THICKNESS OF FOAM SHEATHING (inches)</th>
<th>16&quot; o.c. Fastener Horizontal Spacing</th>
<th>24&quot; o.c. Fastener Horizontal Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cladding Weight:</td>
<td>Cladding Weight:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 psf</td>
<td>11 psf</td>
<td>18 psf</td>
<td>25 psf</td>
<td>3 psf</td>
</tr>
<tr>
<td>6</td>
<td>2.00</td>
<td>1.45</td>
<td>0.75</td>
<td>2.00</td>
</tr>
<tr>
<td>8</td>
<td>2.00</td>
<td>1.00</td>
<td>DR</td>
<td>2.00</td>
</tr>
<tr>
<td>12</td>
<td>2.00</td>
<td>0.55</td>
<td>DR</td>
<td>1.85</td>
</tr>
<tr>
<td>0.113&quot; diameter nail</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>3.00</td>
<td>1.70</td>
<td>0.90</td>
<td>0.55</td>
</tr>
<tr>
<td>8</td>
<td>3.00</td>
<td>1.20</td>
<td>0.60</td>
<td>DR</td>
</tr>
<tr>
<td>12</td>
<td>3.00</td>
<td>0.70</td>
<td>DR</td>
<td>2.15</td>
</tr>
<tr>
<td>Wood Framing (minimum 1(\frac{1}{4}) -inch penetration)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.120&quot; diameter nail</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4.00</td>
<td>2.15</td>
<td>1.20</td>
<td>0.75</td>
</tr>
<tr>
<td>8</td>
<td>4.00</td>
<td>1.55</td>
<td>0.80</td>
<td>DR-5</td>
</tr>
<tr>
<td>12</td>
<td>4.00</td>
<td>0.90</td>
<td>DR</td>
<td>2.70</td>
</tr>
<tr>
<td>0.131&quot; diameter nail</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4.00</td>
<td>3.55</td>
<td>2.05</td>
<td>1.40</td>
</tr>
<tr>
<td>8</td>
<td>4.00</td>
<td>2.55</td>
<td>1.45</td>
<td>0.95</td>
</tr>
<tr>
<td>12</td>
<td>4.00</td>
<td>0.95</td>
<td>DR</td>
<td>2.70</td>
</tr>
<tr>
<td>0.162&quot; diameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Furring Material</td>
<td>Framing Member</td>
<td>Furring Type and Minimum Size</td>
<td>Minimum Penetration Into Wall Framing (inches)</td>
<td>Fastener Spacing in Furring (inches)</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16” o.c. Furring&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Siding Weight:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 psf</td>
</tr>
<tr>
<td>Min. 1” Wood Furring&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td>0.131” diameter nail 1/4”</td>
<td>8</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>4.00</td>
</tr>
<tr>
<td>Min. 2x Wood Stud</td>
<td></td>
<td>0.152” diameter nail 1/4”</td>
<td>8</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>4.00</td>
</tr>
<tr>
<td>No. 10 Wood Screw</td>
<td></td>
<td></td>
<td>12</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>4.00</td>
</tr>
<tr>
<td>1/4” lag screw</td>
<td></td>
<td></td>
<td>24</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td>4.00</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design required.

o.c. = on center

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design required.

o.c. = on center
a. Wood framing and furring shall be Spruce-pine-fir or any wood species with a specific gravity of 0.42 or greater in accordance with AWC NDS.

b. Nail fasteners shall comply with ASTM F 1667, except nail length shall be permitted to exceed ASTM F 1667 standard lengths.

c. Where the required cladding fastener penetration into wood material exceeds $\frac{3}{4}$ inch and is not more than $1\frac{1}{2}$ inches, a minimum 2× wood furring or an approved design shall be used.

d. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C 578 or ASTM C 1289.

e. Furring shall be spaced not more than 24 inches on center, in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, the indicated 8-inch and 12-inch fastener spacing in furring shall be achieved by use of two fasteners into studs at 16 inches and 24 inches on center, respectively.

**Reason:** This proposal updates the table values to a consistent rounding approach by rounding the values down to the nearest 0.05" to address actual thicknesses of foam sheathing materials that often vary from nominal dimensions such as 0.5", 1", 1.5" 2", 3" and 4" as used in the existing table. In addition, an 18psf cladding weight category was added to accommodate common application of adhered veneers as requested by the brick industry. All of the values were evaluated using the same analysis approach used to derive the existing tables. In addition, the foam thickness remains capped at 4 inches in all cases and at 2 inches for 0.113-in diameter nails and 3 inches for 0.120-in diameter nails as was done in the existing table for practical reasons.

**Cost Impact:** Will not increase the cost of construction

The proposal adds an additional option (18 psf cladding weight) and does not increase cost.
Table R703.16.1
Cladding Minimum Fastening Requirements for Direct Attachment over Foam Plastic Sheathing to Support Cladding Weight

<table>
<thead>
<tr>
<th>Cladding Fastener Through Foam Sheathing INTO:</th>
<th>Cladding Fastener Type and Minimum Size$^b$</th>
<th>Cladding Fastener Vertical Spacing (inches)</th>
<th>Maximum Thickness of Foam Sheathing$^c$ (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>16” o.c. Fastener Horizontal Spacing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24” o.c. Fastener Horizontal Spacing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cladding Weight:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 psf</td>
</tr>
<tr>
<td>Steel Framing (minimum penetration of steel thickness + 3 threads)</td>
<td>No. 8 screw into 33 mil steel or thicker</td>
<td>6</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>No. 10 screw into 33 mil steel</td>
<td>6</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>No. 10 screw into 43 mil steel or thicker</td>
<td>6</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>4.00</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design required.
a. Steel framing shall be minimum 33 ksi steel for 33 mil and 43 mil steel, and 50 ksi steel for 54 mil steel or thicker.

b. Screws shall comply with the requirements of ASTM C 1513.

c. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C 578 or ASTM C 1289.

### TABLE R703.16.2
Furring Minimum Fastening Requirements for Application Over Foam Plastic Sheathing to Support Cladding Weight

| Furring Material | Framing Member | Fastener Type and Minimum Size | Minimum Penetration into Wall Framing (inches) | Fastener Spacing in Furring (inches) | Maximum Thickness of Foam Sheathing
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16&quot; o.c. Furring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 psf</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18 psf</td>
</tr>
<tr>
<td>33 mil Steel Stud</td>
<td>No. 8 Screw</td>
<td>Steel thickness + 3 threads</td>
<td>12</td>
<td>1.00</td>
<td>1.806 DR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>1.00</td>
<td>1.00 DR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td>2.85 DR</td>
<td>2.85 DR</td>
</tr>
<tr>
<td>Minimum 33 mil Steel Furring or Minimum 1 x Wood Furring</td>
<td>No. 10 Screw</td>
<td>Steel thickness + 3 threads</td>
<td>12</td>
<td>3.854 DR</td>
<td>2.25 DR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>1.05 DR</td>
<td>1.40 DR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td>3.40 DR</td>
<td>2.70 DR</td>
</tr>
<tr>
<td>43 mil or thicker Steel Stud</td>
<td>No. 8 Screw</td>
<td>Steel thickness + 3 threads</td>
<td>12</td>
<td>1.00</td>
<td>1.806 DR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>1.00</td>
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For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design required.

o.c. = on center

a. Wood furring shall be Spruce-pine-fir or any softwood species with a specific gravity of 0.42 or greater. Steel furring shall be minimum 33 ksi steel. Steel studs shall be minimum 33 ksi steel for 33 mil and 43 mil thickness, and 50 ksi steel for 54 mil steel or thicker.

b. Screws shall comply with the requirements of ASTM C 1513.

c. Where the required cladding fastener penetration into wood material exceeds \( \frac{3}{4} \) inch and is not more than \( 1 \frac{1}{2} \) inches, a minimum 2-inch nominal wood furring or an approved design shall be used.
d. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C 578 or ASTM C 1289.

e. Furring shall be spaced not more than 24 inches (610 mm) on center, in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, the indicated 8-inch and 12-inch fastener spacing in furring shall be achieved by use of two fasteners into studs at 16 inches and 24 inches on center, respectively.

**Reason:** This proposal updates the table values to a consistent rounding approach by rounding the values down to the nearest 0.05" to address actual thicknesses of foam sheathing materials that often vary from nominal dimensions such as 0.5", 1", 1.5", 2", 3", and 4" as used in the existing table. In addition, an 18 psf cladding weight category was added to accommodate common application of adhered veneers as requested by the brick industry. All of the values were evaluated using the same analysis approach used to derive the existing table values. In addition, the foam sheathing thickness remains capped at 4 inches in all cases and at 3 inches for #8 screws as was done in the existing table for practical reasons.

**Cost Impact:** Will not increase the cost of construction

This proposal adds an additional option (18 psf cladding weight) and does not increase cost.
R802.2 Design and construction. The framing details required in Section R802 apply to roof and ceiling assembly shall provide a continuous tie across the structure to roofs having a minimum roof slope of three units vertical in 12 units horizontal (25-percent slope) or greater to prevent roof thrust from being applied to the supporting walls. Roof ceilings. The assembly shall be designed and constructed in accordance with the provisions of this chapter and Figures R606.11(1), R606.11(2) and R606.11(3) or in accordance with AWC NDS. Components of roof ceilings shall be fastened in accordance with Table R602.3(1).

R802.3 Ridge. A ridge board used to connect opposing rafters shall be not less than 1 inch (nominal) thickness and not less in depth than the cut end of the rafter. Where ceiling joist or rafter ties do not provide a continuous tie across the structure, a ridge beam shall be provided and supported on each end by a wall or girder.

R802.4 Rafters. Rafters shall be in accordance with this section.

R802.5 R802.4.1 Allowable rafter spans Rafter size. Spans for rafters shall be sized based on the rafter spans in accordance with Tables R802.5.1(1) through R802.5.1(8). Rafter spans shall be measured along the horizontal projection of the rafter. For other grades and species and for other loading conditions, refer to the AWC STJR. The span of each rafter shall be measured along the horizontal projection of the rafter.

R802.3 R802.4.2 Framing details. Rafters shall be framed not more than 1\(\frac{1}{2}\)-inch (38 mm) offset from each other to a ridge board or directly opposite from each other with a collar tie, gusset plate as a tie or ridge strap. Ridge board Rafters shall be not less than 1 inch (25 mm) nominal thickness and not less nailed to the top wall plates in depth than the cut end of the rafter. At valleys and hips, there shall be a valley or hip rafter not less than 2-inch (51 mm) nominal thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be designed to carry and distribute the specific load at that point. Where, unless the roof pitch assembly is less than three units vertical in 12 units horizontal (25-percent slope), structural members that support rafters and ceiling joists, such as ridge beams, hips and valleys, shall be designed as beams required to comply with the uplift requirements of Section R802.11.

R802.4.3 Hips and Valleys. Hip and valley rafters shall be not less than 2-inch nominal
thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point.

R802.4.4 Rafter supports. Where the roof pitch is less than 3 units vertical in 12 units horizontal (25-percent slope), structural members that support rafters, such as ridges, hips and valleys, shall be designed as beams.

R802.5.1 R802.4.5 Purlins. Installation of purlins to reduce the span of rafters is permitted as shown in Figure R802.5.1 R802.4.5. Purlins shall be sized not less than the required size of the rafters that they support. Purlins shall be continuous and shall be supported by 2-inch by 4-inch (51 mm by 102 mm) braces installed to bearing walls at a slope not less than 45 degrees (0.785 rad) from the horizontal. The braces shall be spaced not more than 4 feet (1219 mm) on center and the unbraced length of braces shall not exceed 8 feet (2438 mm).

R802.4.6 Collar ties. Where collar ties are used to connect opposing rafters, they shall be located in the upper third of the attic space and fastened in accordance with Table R602.3(1). Collar ties shall be not less than 1 inch by 4 inch (nominal), spaced not more than 4 feet on center. Ridge straps shall be permitted to replace collar ties.

R802.5 Ceiling joists. Ceiling joists shall be continuous across the structure or securely joined where they meet over interior partitions in accordance with Table R802.5.2.

R802.4 R802.5.1 Allowable ceiling Ceiling joist spans size. Spans for ceiling Ceilings joists shall be sized based on the joist spans in accordance with Tables R802.4(1 R802.5.1(1) and R802.4(2 R802.5.1(2). For other grades and species and for other loading conditions, refer to the AWC STJR.

R802.3.1 R802.5.2 Ceiling joist and rafter connections. Ceiling
Where ceilings joists and run parallel to rafters, they shall be nailed connected to each other in accordance with Table R802.5.1(9), and the rafter shall be nailed to rafters at the top wall plate in accordance with Table R602.3(1) R802.5.2.. Ceiling joists shall be continuous or securely joined in accordance with Table R802.5.1(9) where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building where such joists are parallel to the rafters.

Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the attic shall be installed as rafter ties, or rafter ties they shall be installed to provide a continuous tie in the bottom third of the rafter height in accordance with Figure R802.4.5. and Table R802.5.2. Where the ceiling joists are installed above the bottom third of the rafter height, the ridge shall be designed as a beam.

Where ceiling joists do not run parallel to rafters, rafter ties shall be installed. Rafter ties shall be not less than 2 inches by 4 inches (51 mm by 102 mm) (nominal), installed in accordance with the connection requirements in Table R802.5.1(9), or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.

ICC COMMITTEE ACTION HEARINGS :::: April, 2016 RB771
Collar ties or ridge straps to resist wind uplift shall be connected in the attic space to the upper third of the top plates in accordance with Table R602.3(1).

Collar ties

Each rafter shall be not less than 1 inch by 4 inches (25 mm by 102 mm) nominal, spaced not more than 4 feet (1219 mm) on center tied across the structure with a rafter tie or a 2x4 kicker connected to the ceiling diaphragm with nails equivalent in capacity to Table R802.5.2.

R802.3.2 R802.5.2.1 Ceiling joists lapped. Ends of ceiling joists shall be lapped not less than 3 inches (76 mm) or butted over bearing partitions or beams and toenailed to the bearing member. Where ceiling joists are used to provide resistance to rafter thrust, lapped joists shall be nailed together in accordance with Table R802.5.1(9) R802.5.2, and butted joists shall be tied together in a manner to resist such thrust. Joists that do not resist thrust shall be permitted to be nailed in accordance with Table R602.3(1).

R802.5.2.2 Rafter ties. Wood rafter ties shall be not less than 2 inches by 4 inches installed in accordance with Table R802.5.2 at each rafter. Other approved rafter tie methods shall be permitted.

R802.3.3 R802.5.2.3 Blocking. Blocking shall be a minimum of utility grade lumber.

Related changes

1. Renumber the following tables:
   R802.4(1) as R802.5.1(1) - no change to table.
   R802.4(2) as R802.5.1(2) - no change to table.

   R802.5.1(1) as R802.4.1(1) - no change to table.
   R802.5.1(2) as R802.4.1(2) - no change to table.
   R802.5.1(3) as R802.4.1(3) - no change to table.
   R802.5.1(4) as R802.4.1(4) - no change to table.
   R802.5.1(5) as R802.4.1(5) - no change to table.
   R802.5.1(6) as R802.4.1(6) - no change to table.
   R802.5.1(7) as R802.4.1(7) - no change to table.
   R802.5.1(8) as R802.4.1(8) - no change to table.

   R802.5.1(9) as R802.5.2 - no change to table.

2. Renumber Figure R802.5.1 as R802.4.5 and delete all cross references to section numbers from the table. and delete "Note: Where ceiling joists..."

3. Renumber the cross reference in Table R602.3(1), item 4: Table R802.5.1(9) as R802.5.2
Reason:
WHAT: This code proposal is a rewrite with minor technical changes. It is intended to reorganize the roof and ceiling assembly by separating out the requirements of the components:

- R802.3 Ridge
- R802.4 Rafters
- R802.5 Ceiling joists

WHY: The current text is rather scrambled and the major components intermingled. It is not easy to read or understand.

This is a clean version without strikethroughs and underlines for your enhanced reading:

**R802.2 Design and construction.** The roof and ceiling assembly shall provide a continuous tie across the structure to prevent thrust from being applied to the supporting walls. The assembly shall be designed and constructed in accordance with the provisions of this chapter and Figures R606.11(1), R606.11(2) and R606.11(3) or in accordance with AWC NDS.

**R802.3 Ridge.** A ridge board used to connect opposing rafters shall be not less than 1 inch (nominal) thickness and not less in depth than the cut end of the rafter. Where ceiling joist or rafter ties do not provide a continuous tie across the structure a ridge beam shall be provided and supported on each end by a wall or girder.

**R802.4 Rafters.** Rafters shall be in accordance with this section.

- **R802.4.1 Rafter size.** Rafters shall be sized based on the rafter spans in Tables R802.4.1(1) through R802.4.1(8). Rafter spans shall be measured along the horizontal projection of the rafter. For other grades and species and for other loading conditions, refer to the AWC STJR.

- **R802.4.2 Framing details.** Rafters shall be framed not more than 1-1/2-inch offset from each other to a ridge board or directly opposite from each other with a collar tie, gusset plate or ridge strap. Rafters shall be nailed to the top wall plates in accordance with Table R602.3(1) unless the roof assembly is required to comply with the uplift requirements of Section R802.11.

- **R802.4.3 Hips and valleys.** Hip and valley rafters shall be not less than 2-inch nominal thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point.

- **R802.4.4 Rafter supports.** Where the roof pitch is less than 3 units vertical in 12 units horizontal (25-percent slope), structural members that support rafters, such as ridges, hips and valleys, shall be designed as beams.

- **R802.4.5 Purlins.** Installation of purlins to reduce the span of rafters is permitted as shown in Figure R802.4.5. Purlins shall be sized not less than the required size of the rafters that they support. Purlins shall be continuous and shall be supported by 2 inch by 4 inch braces installed to bearing walls at a slope not less than 45 degrees from the horizontal. The braces shall be spaced not more than 4 feet on center and the unbraced length of braces shall not exceed 8 feet.

- **R802.4.6 Collar ties.** Where collar ties are used to connect opposing rafters, they shall be located in the upper third of the attic space and fastened in accordance with Table R602.3(1). Collar ties shall be not less than 1 inch by 4 inch (nominal), spaced not more than 4 feet on center. Ridge straps shall be permitted to replace collar ties.

**R802.5 Ceiling joists.** Ceiling joists shall be continuous across the structure or securely joined where they meet over interior partitions in accordance with Table R802.5.2.

- **R802.5.1 Ceiling joist size.** Ceiling joists shall be sized based on the joist spans in Tables R802.5.1(1) and R802.5.1(2). For other grades and species and for other loading conditions, refer to the AWC STJR.

- **R802.5.2 Ceiling joist and rafter connections.** Where ceilings joists run parallel to rafters, they shall be connected to the rafters at the top wall plate in accordance with Table R802.5.2. Where ceiling joists are not connected to the rafters at the top wall plate, they shall be installed in the bottom third of the rafter height in...
accordance with Figure R802.4.5. and Table R802.5.2. Where the ceiling joists are installed above the bottom third of the rafter height, the ridge shall be designed as a beam.

Where ceiling joists do not run parallel to rafters, the ceiling joists shall be connected to the top plates in accordance with Table R602.3(1). Each rafter shall be tied across the structure with a rafter tie or a 2x4 kicker connected to the ceiling diaphragm with nails equivalent in capacity to Table R802.5.2.

**R802.5.2.1 Ceiling joists lapped.** Ends of ceiling joists shall be lapped not less than 3 inches or butted over bearing partitions or beams and toenailed to the bearing member. Where ceiling joists are used to provide resistance to rafter thrust, lapped joists shall be nailed together in accordance with Table R802.5.2 and butted joists shall be tied together in a manner to resist such thrust. Ceiling joists that do not resist thrust shall be permitted to be nailed in accordance with Table R602.3(1).

**R802.5.2.2 Rafter ties.** Wood rafter ties shall be not less than 2 inches by 4 inches installed in accordance with Table R802.5.2 at each rafter. Other approved rafter tie methods shall be permitted.

**R802.5.2.3 Blocking.** Blocking shall be a minimum of utility grade lumber.

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**FIGURE R802.4.5** Braced rafter construction deleted all cross references to section numbers and table numbers | R802.5 |
**Cost Impact:** Will not increase the cost of construction

This rewrite is essentially a non-technical code change intended to reorganize the section by components of the roof-ceiling assembly. It should not impact the cost of roof construction.
2015 International Residential Code

Revise as follows:

R802.1.5 Fire-retardant-treated wood. Fire-retardant-treated wood (FRTW) is any listed wood product that, when impregnated with chemicals by a pressure process or other means during manufacture, shall comply with one of the following:

1. It shall have, when tested in accordance with ASTM E 84 or UL 723, a listed flame spread index of 25 or less and show 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 10.5 feet (3200 mm) beyond the center line of the burners at any time during the test.

2. It shall be listed to both comply with all of the requirements of ASTM E2768, and also show no evidence of significant progressive combustion during the 30 minute test, when tested on all sides with a ripped or cut longitudinal gap of 1/8 inch (3.2 mm).

Reference standards type: This is an update to reference standard(s) already in the ICC Code Books

Add new standard(s) as follows:

There have been multiple discussions since ASTM E2768 was developed in 2011 at various code hearings as to whether the added requirement (no significant progressive combustion) is included or not in ASTM E2768. The wording of ASTM E2768 reads as follows: “13.1.2 The flame front shall not progress more than 10.5 ft (3.2 m) beyond the centerline of the burners at any time during the 30 min test period. This is considered evidence of no significant progressive combustion in this test method.” In order to recognize this test method the present proposal does not enter this debate but it requires that, for a wood product to be accepted as “fire-retardant-treated wood” it must also have been listed, beyond compliance to ASTM E2768, to demonstrate “no evidence of significant progressive combustion”.

Furthermore, this proposal also requires that a product tested to ASTM E2768 must have been tested on all sides and must have been tested with a longitudinal gap of 1/8 inch. The intent of this requirement is to ensure that a product that is coated and not impregnated cannot be accepted as “fire-retardant-treated wood”. The requirements in this proposal can clearly not be met by a wood product coated with a flame retardant, because the flame retardant needs to have been impregnated in order to have the good fire performance when exposed to flame through the gap, and tested on all sides.

The IWUIC has accepted requirements with language similar to this and it is time for the IBC to accept it too. The IWUIC language for ignition resistant building materials reads as follows (note that the section covers materials that are not made of wood also):

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on all sides with the extended ASTM E 84 (UL 723) test or ASTM E 2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of 1/8 inch (3.2 mm). Materials that, when tested in accordance with the test procedures set forth in ASTM E 84 or UL 723 for a test period of 30 minutes, or with ASTM E 2768, comply with the following:
1.1. Flame spread. Material shall exhibit a flame spread index not exceeding 25 and shall not show evidence of progressive combustion following the extended 30-minute test.

1.2. Flame front. Material shall exhibit a flame front that does not progress more than 10 1/2 feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test.

1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:


1.3.2. ASTM D 7032 for wood-plastic composite materials.

1.3.3. ASTM D 6662 for plastic lumber materials.

1.4. Identification. All materials shall bear identification showing the fire test results.

Exception: Materials comprised of a combustible core and a noncombustible exterior covering, comprised of either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap.

A consistent proposal is also being made to section 2303 of the IBC (Structural).

**Cost Impact:** Will not increase the cost of construction

ASTM E2768 is simply an alternate means for a wood product to be designated FRTW.
2015 International Residential Code

R802.1.5.2 Other means during manufacture. For wood products produced impregnated with chemicals by other means during manufacture the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product. The use of paints coating stains and other surface treatment shall not be permitted.

Reason: This section is subject to misinterpretation. The phrase "other means during manufacture" is often quoted as "other means" leaving it open to nonconforming material such as paints, stains and other surface treatments. These surface treatments are not permanent. They are subject to abrasion, degradation from exposure to rain during installation, and flaking or peeling due to the difference in the expansion coefficient of the two materials. When used as roof sheathing the material can be subjected to temperature swings of 100 degrees F or more and during winter months exposure to substantial moisture can be expected. All of the testing (full scale, large scale and small scale) done on fire-retardant-treated wood in order to be recognized in the code was done on pressure impregnated lumber and plywood.

Cost Impact: Will not increase the cost of construction
Material now recognized is pressure impregnated or the furnish (chips, strands, and flakes) is treated during the manufacturing process. There is no change in those requirements
2015 International Residential Code

Delete without substitution:

R802.1.5.3 Testing. For wood products produced by other means during manufacture, other than a pressure process, all sides of the wood product shall be tested in accordance with and produce the results required in Section R802.1.5. Testing of only the front and back faces of wood structural panels shall be permitted.

Reason: This code section simply includes added testing requirements (and thus added burden) to fire-retardant treated wood materials that have been manufactured by a process different than pressure treatment. Note that all fire retardant treated wood products must meet the requirements of section 802.1.5 (which contains the fire test requirements). Moreover, all fire retardant treated wood products, irrespective of how they are manufactured, must meet the requirements (also contained in section 802.1.5) that they must be impregnated with chemicals. A wood material can only be fire retardant treated wood if it is impregnated with chemicals and that will differentiate it from fire retardant coated materials.

Testing requirements should be a function of performance and not of the way a product is made. There is no reason that some fire retardant treated wood materials should be treated in a different fashion by the code as a function of how they are manufactured.

If it is believed that it is important that all side of a fire retardant treated wood product be tested for fire safety, then 802.1.5.3 can be rewritten as follows, in which case also all products are treated the same way, without differences as a function of how they are manufactured:

"802.1.5.3 Testing. All sides of the fire retardant treated wood product shall be tested in accordance with and produce the results required in Section 802.1.5.

Wood structural panels shall be permitted to test only the front and back faces."

A proposal consistent with this proposal is also being made to IBC 2303.2 (IBC Structural).

Cost Impact: Will not increase the cost of construction

This proposal will lower the excessive burden of fire testing for some materials as a function of how they are manufactured and not of their performance.
2015 International Residential Code

R802.1.5.4 Labeling. Fire-retardant-treated

In addition to the labels required by Section 802.1.1 for sawn lumber and Section 803.2.1 for wood structural panels each piece of fire-retardant-treated lumber and wood structural panels shall be labeled. The label shall contain:

1. The identification mark of an approved agency in accordance with Section 1703.5 of the International Building Code.
2. Identification of the treating manufacturer.
3. The name of the fire-retardant treatment.
4. The species of wood treated.
5. Flame spread index and smoke-developed index.
7. Conformance to applicable standards in accordance with Sections R802.1.5.5 through R802.1.5.10.
8. For FRTW exposed to weather, or a damp or wet location, the words "No increase in the listed classification when subjected to the Standard Rain Test" (ASTM D 2898).

Reason: There are products coming into the marketplace that have obscured the labels required by Section 802.1.1 and 803.2.1. This change clarifies that FRTW must have two labels: one for the grading of the wood, the other for the treatment. There are also manufacturers making the claim for a lift of lumber or wood structural panel. The change clarifies each piece must be labeled with both marks.

Cost Impact: Will not increase the cost of construction

Manufacturer's treating in accordance with the code requirement for pressure treatment or other means during manufacturer already mark each piece. The proposal clarifies, for others, what is already being done.
Add new text as follows:

**R802.1.8 Prefabricated wood I-joists.** Structural capacities and design provisions for prefabricated wood I-joists shall be established and monitored in accordance with ASTM D5055.

**Reason:** This proposal adds prefabricated wood I-joists to the list of wood and wood-based products listed in the IRC for roof framing. Prefabricated wood I-joists have been used in roof framing in commercial and residential projects for over 25 years. Prefabricated wood I-joists are already recognized in Section R802.7.2 as part of a description of engineered wood products. As is customary in the IRC, recognition of the product and its relevant manufacturing standard is provided at the beginning of relevant chapters. This links the I-joist product to the relevant standard.

Note that the language proposed is exactly the same as used in the Chapter 5 of the IRC in Section R502.1.2.

**Cost Impact:** Will not increase the cost of construction

This proposal will not increase the cost of construction as the change is editorial in nature.
RB316-16
IRC: R802.10.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R802.10.1 Truss design drawings. Truss design drawings, prepared in conformance to Section R802.10.1, shall be provided, submitted to the building official and approved prior to installation. These design drawings shall be submitted for approval as part of the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the following information:

1. Slope or depth, span and spacing.
2. Location of all joints.
3. Required bearing widths.
4. Design loads as applicable.
   4.1. Top chord live load (as determined from Section R301.6).
   4.2. Top chord dead load.
   4.3. Bottom chord live load.
   4.4. Bottom chord dead load.
   4.5. Concentrated loads and their points of application.
   4.6. Controlling wind and earthquake loads.
5. Adjustments to lumber and joint connector design values for conditions of use.
6. Each reaction force and direction.
7. Joint connector type and description such as size, thickness or gage and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface.
8. Lumber size, species and grade for each member.
9. Connection requirements for:
   9.1. Truss to girder-truss.
   9.2. Truss ply to ply.
   9.3. Field splices.
10. Calculated deflection ratio and/or maximum description for live and total load.
11. Maximum axial compression forces in the truss members to enable the building designer to design the size, connections and anchorage of the permanent continuous lateral bracing. Forces shall be shown on the truss design drawing or on supplemental documents.
12. Required permanent truss member bracing location.

Reason: What the current section implies is that truss design drawings can be handed to the building official five minutes before a framing inspection with the expectation that the approval will come in the field. That may seem unrealistic but happens frequently. The fact is that the rest of the house cannot be properly built without having the truss design drawings from the beginning which provide information required for bearing points, bracing, foundation design, and other pertinent design considerations. Not having the plans from the beginning results in after the fact fixes for foundations and framing to accommodate the roof design. This can be costly and the information should be provided with the rest of the construction documents at the time of plan submittal. Deferred submittals can be addressed on a case by case basis.

Regarding including roof truss design drawings with the truss shipment, this is unenforceable text. If they aren’t provided with the truss delivery, who do you cite for the failure, the truck driver? By providing the truss drawings at plan review, an approved copy will go to the job site and having them delivered with the trusses is a moot point.
Cost Impact: Will not increase the cost of construction
This is an administrative amendment that will have no impact on construction costs.
2015 International Residential Code

Revise as follows:

**R802.10.1 Truss design drawings.** Truss design drawings, prepared in conformance to Section R802.10.1, shall be provided to the building official and approved prior to installation. Truss design drawings shall be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the following information:

1. Slope or depth, span and spacing;
2. Location of all joints and support locations;
3. Number of piles if greater than one;
4. Required bearing widths;
5. Design loads as applicable.
   5.1. Top chord live load (as determined from Section R301.6);
   5.2. Top chord dead load;
   5.3. Bottom chord live load;
   5.4. Bottom chord dead load;
   5.5. Concentrated loads and their points of application.
   5.6. Controlling wind and earthquake loads.
6. Design loads as applicable, including:
   6.1. Top chord live load (as determined from Section R301.6);
   6.2. Top chord dead load;
   6.3. Bottom chord live load (as determined from Section R301.5);
   6.4. Bottom chord dead load;
   6.5. Additional loads and locations;
   6.6. Environmental design criteria and loads (wind, snow, seismic, etc.).
7. Adjustments to lumber wood member and joint connector design values for conditions of use;
8. Each reaction force and direction;
9. Maximum reaction force and direction, including maximum uplift reaction forces where applicable;
10. Joint connector type and description such as size, thickness or gage and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface;
11. Lumber size, species and grade for each member;
12. Size, species and grade for each wood member;
13. Connection requirements for:
   11.1. Truss to girder-truss;
   11.2. Truss ply to ply;
   11.3. Field splices;
14. Truss to truss connections and truss field assembly requirements;
15. Calculated deflection ratio and/or maximum description for live and total load;
16. Calculated span-to-deflection ratio and maximum vertical and horizontal deflection for live and total load, as applicable;
17. Maximum axial compression forces in the truss members to enable the building designer to design the size, connections and anchorage of the permanent continuous
lateral bracing. Forces shall be shown on the truss design drawing or on supplemental documents.

15. Required permanent truss member bracing location.

15. Required permanent individual truss member restraint location and the method and details of restraint/bracing to be used in accordance with Section R802.10.3.

**Reason:** The intent of this proposal is to harmonize the truss design drawing language in both the IBC and IRC. The recommended language is taken from IBC Section 2303.4.1.1 when the language is similar. This will clarify for truss designers working in both codes the information required to be shown on the truss design drawings. It should be noted that currently IRC Section R802.10.1 item 4 does not contain snow load requirements. Snow loads, as required per IRC Section R301.2.3 should be included in the design criteria, and are added as part of item 5.6.

**Cost Impact:** Will not increase the cost of construction

The code change does not change the truss design drawing requirements, seeking only to harmonize the IBC and IRC.
RB318-16
IRC: R802.3.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R802.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9), and the rafter shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or securely joined in accordance with Table R802.5.1(9) where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building where such joists are parallel to the rafters.

Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the attic shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie. Where ceiling joists are not parallel to rafters, rafter ties shall be installed. Rafter ties shall be not less than 2 inches by 4 inches (51 mm by 102 mm) (nominal), installed in accordance with the connection requirements in Table R802.5.1(9), or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with this code or accepted engineering practice.

Collar ties or ridge straps to resist wind uplift shall be connected installed; in the upper third of the attic space in accordance with Table R602.3(1).

Collar ties shall be not less than 1 inch by 4 inches (25 mm by 102 mm) (nominal), and spaced not more than 4 feet (1219 mm) on center. Ridge straps shall be 1 1/4" by 20 gage minimum.

Reason: There are a few commentary terms proposed to be deleted. For example, the term "securely" is proposed to be deleted in the first paragraph. There is a prescriptive method of attaching joists so the term is unnecessary. In the second paragraph, references to equivalent capacities are proposed for deletion as a prescriptive method is provided. Alternates are always permitted under the code if designed and do not need to be continually listed. Also, text is added to imply that there may be prescriptive means available in the IRC, such as requirements for walls that would avoid the need to design a component. The third and fourth paragraphs are combined because they deal with one subject. Besides elimination of some commentary language, there is prescriptive language inserted for ridge straps which is taken from Table R602.3(1) and the term "connected" is replaced with "installed". The text can currently be interpreted as voluntary because it only says how a collar tie or ridge strap must be connected, not that it is required. The revision makes clear that the collar ties or ridge straps are required.

Cost Impact: Will not increase the cost of construction

This revision is editorial and will not impact costs.
**Table R802.5.1 (9)**

**RAFT/CEILING JOIST HEEL JOINT CONNECTIONS**

<table>
<thead>
<tr>
<th>Rafter Slope (inches)</th>
<th>Rafter Spacing (feet)</th>
<th>Ground Snow Load (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>20^g</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>3:12</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>7</td>
</tr>
<tr>
<td>4:12</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>5:12</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>7:12</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>3</td>
</tr>
</tbody>
</table>

Required number of 16d common nails per heel joint splices

---

*Notes:* a, b, c, d, e, f, h
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. 40d box nails shall be permitted to be substituted for 16d common nails.

b. Nailing requirements shall be permitted to be reduced 25 percent if nails are clinched.

c. Heel joint connections are not required where the ridge is supported by a load-bearing wall, header or ridge beam.

d. Where intermediate support of the rafter is provided by vertical struts or purlins to a load-bearing wall, the tabulated heel joint connection requirements shall be permitted to be reduced proportionally to the reduction in span.

e. Equivalent nailing patterns are required for ceiling joist to ceiling joist lap splices.

f. Where rafter ties are substituted for ceiling joists, the heel joint connection requirement shall be taken as the tabulated heel joint connection requirement for two-thirds of the actual rafter slope.

g. Applies to roof live load of 20 psf or less.

h. Tabulated heel joint connection requirements assume that ceiling joists or rafter ties are located at the bottom of the attic space. Where ceiling joists or rafter ties are located higher in the attic, heel joint connection requirements shall be increased by the following factors:

<table>
<thead>
<tr>
<th>HC/HR</th>
<th>Heel Joint Connection Adjustment Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3</td>
<td>1.5</td>
</tr>
<tr>
<td>1/4</td>
<td>1.33</td>
</tr>
<tr>
<td>1/5</td>
<td>1.25</td>
</tr>
<tr>
<td>1/6</td>
<td>1.2</td>
</tr>
<tr>
<td>1/10 or less</td>
<td>1.11</td>
</tr>
</tbody>
</table>

where:

\[ HC = \text{Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.} \]

\[ HR = \text{Height of roof ridge measured vertically above the top of the rafter support walls.} \]

**Reason:** Footnote “f” is redundant to footnote “h” in purpose. Footnote “f” should have been removed at the time footnote “h” was added to better account for the effect of rafter ties located above the bottom of the attic space. The approach in footnote “h” allows application for use on lower slope rafter systems, less penalty for smaller raised distances, and a more simple method to determine heel joint connection requirements. There is no change to footnote h.

**Cost Impact:** Will not increase the cost of construction

This is an editorial change that removes an unneeded provision which is captured by another footnote, and
therefore represents no increase in cost of construction.
2015 International Residential Code

Revise as follows:

R802.9 Framing of openings. Openings in roof and ceiling framing shall be framed with header and trimmer joists. Where the header joist span does not exceed 4 feet (1219 mm), the header joist shall be permitted to be a single member the same size as the ceiling joist or rafter. Single trimmer joists shall be permitted to be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. Where the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafter framing into the header. Approved hangers shall be used for the header joist to trimmer joist connections where the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

Reason: The bearing of rafters and ceiling joists is covered in R802.6 and the last sentences of R802.9. But, they conflict. One section applies when members exceed certain lengths and the other section applies to members of any length. This proposal deletes the conflicting language and treats all members the same.

R802.6 Bearing. The ends of each rafter or ceiling joist shall have not less than 1 1/2 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on masonry or concrete. The bearing on masonry or concrete shall be direct, or a sill plate of 2-inch (51 mm) minimum nominal thickness shall be provided under the rafter or ceiling joist. The sill plate shall provide a minimum nominal bearing area of 48 square inches (30865 mm2).

Cost Impact: Will not increase the cost of construction. This code change will have no impact on construction costs as it is only a clarification of existing rules.
2015 International Residential Code

Revise as follows:

R804.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel roof framing for buildings not greater than 60 feet (18 288 mm) perpendicular to the joist, rafter or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist span or truss, less than or equal to three stories above grade plane and with roof slopes not less than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Cold-formed steel roof framing constructed in accordance with the provisions of this section shall be limited to sites where the ultimate design wind speed is less than 139 140 miles per hour (62 63 m/s), Exposure Category B or C, and the ground snow load is less than or equal to 70 pounds per square foot (3350 Pa).

R804.3.1.1 Minimum ceiling joist size. Ceiling joist size and thickness shall be determined in accordance with the limits set forth in Tables R804.3.1.1(1) and R804.3.1.1(2). When determining the size of ceiling joists, the lateral support of the top flange shall be classified as unbraced, braced at midspan or braced at third points in accordance with Section R804.3.1.4 R804.3.1.3. Where sheathing material is attached to the top flange of ceiling joists or where the bracing is spaced closer than third point of the joists, the "third point" values from Tables R804.3.1.1(1) and R804.3.1.1(2) shall be used.

Ceiling joists shall have a bearing support length of not less than 1 1/2 inches (38 mm) and shall be connected to roof rafters (heel joint) with No. 10 screws in accordance with Figure R804.3.1.1 and Table 804.3.1.1(3).

Where continuous joists are framed across interior bearing supports, the interior bearing supports shall be located within 24 inches (610 mm) of midspan of the ceiling joist, and the individual spans shall not exceed the applicable spans in Tables R804.3.1.1(1) and R804.3.1.1(2).

Where the attic is to be used as an occupied space, the ceiling joists shall be designed in accordance with Section R505.

<table>
<thead>
<tr>
<th>TABLE R804.3.1.1 (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>**CEILING JOIST SPANS 10 PSF LIVE LOAD (NO ATTIC STORAGE)**a, b, c</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEMBER DESIGNATION</th>
<th>ALLOWABLE SPAN (feet - inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lateral Support of Top (Compression) Flange</td>
</tr>
<tr>
<td></td>
<td>Unbraced</td>
</tr>
<tr>
<td>Ceiling Joist Spacing (inches)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>350S162-33</td>
<td>9'-6&quot;-9'-6&quot;</td>
</tr>
<tr>
<td>350S162-43</td>
<td>10'-3&quot;10'-4&quot;</td>
</tr>
<tr>
<td>350S162-54</td>
<td>11'-1&quot;</td>
</tr>
<tr>
<td>350S162-68</td>
<td>12'-1&quot;12'-2&quot;</td>
</tr>
<tr>
<td>550S162-33</td>
<td>10'-7&quot;10'-11&quot;</td>
</tr>
<tr>
<td>550S162-43</td>
<td>11'-8&quot;</td>
</tr>
<tr>
<td>550S162-54</td>
<td>12'-6&quot;12'-7&quot;</td>
</tr>
<tr>
<td>550S162-68</td>
<td>13'-6&quot;13'-7&quot;</td>
</tr>
<tr>
<td>800S162-33</td>
<td>—</td>
</tr>
<tr>
<td>800S162-43</td>
<td>13'-6&quot;13'-1&quot;</td>
</tr>
<tr>
<td>800S162-54</td>
<td>13'-10&quot;13'-11&quot;</td>
</tr>
<tr>
<td>800S162-68</td>
<td>14'-11&quot;</td>
</tr>
<tr>
<td>1000S162-43</td>
<td>—</td>
</tr>
<tr>
<td>1000S162-54</td>
<td>14'-9&quot;14'-10&quot;</td>
</tr>
<tr>
<td>1000S162-68</td>
<td>15'-10&quot;</td>
</tr>
<tr>
<td>1200S162-43</td>
<td>—</td>
</tr>
<tr>
<td>1200S162-54</td>
<td>—</td>
</tr>
<tr>
<td>1200S162-68</td>
<td>16'-8&quot;</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 pound per square foot = 0.0479 kPa.

a. Deflection criterion: $L/240$ for total loads.

b. Ceiling dead load = 5 psf.

c. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 mil thicknesses.
d. Listed allowable spans are not applicable for 350S162-33, 550S162-33, 550S162-43, and 800S162-43 continuous joist members.

### TABLE R804.3.1.1 (2)

**CEILING JOIST SPANS 20 PSF LIVE LOAD (LIMITED ATTIC STORAGE)**

<table>
<thead>
<tr>
<th>MEMBER DESIGNATION</th>
<th>Lateral Support of Top (Compression) Flange</th>
<th>Ceiling Joist Spacing (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unbraced</td>
<td>Midspan Bracing</td>
</tr>
<tr>
<td>350S162-33</td>
<td>8'-2&quot;</td>
<td>6'-10&quot;5'-5&quot;</td>
</tr>
<tr>
<td>350S162-43</td>
<td>8'-10&quot;7'-11&quot;</td>
<td>7'-10&quot;7'-8&quot;</td>
</tr>
<tr>
<td>350S162-54</td>
<td>9'-6&quot;7&quot;</td>
<td>9'-6&quot;7&quot;</td>
</tr>
<tr>
<td>350S162-68</td>
<td>10'-4&quot;</td>
<td>9'-2&quot;9'-3&quot;</td>
</tr>
<tr>
<td>550S162-33</td>
<td>9'-2&quot;9&quot;5&quot;</td>
<td>9'-2&quot;6&quot;11&quot;</td>
</tr>
<tr>
<td>550S162-43</td>
<td>10'-1&quot;10'-2&quot;</td>
<td>9'-1&quot;9'-2&quot;</td>
</tr>
<tr>
<td>550S162-54</td>
<td>10'-9&quot;10'-10&quot;</td>
<td>9'-8&quot;9&quot;9&quot;</td>
</tr>
<tr>
<td>550S162-68</td>
<td>11'-7&quot;11'-8&quot;</td>
<td>10'-4&quot;10'-5&quot;</td>
</tr>
<tr>
<td>800S162-33</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>800S162-43</td>
<td>11'-4&quot;</td>
<td>10'-1&quot;10'-2&quot;</td>
</tr>
<tr>
<td>800S162-54</td>
<td>20'-0&quot;12'-0&quot;</td>
<td>10'-9&quot;10'-10&quot;</td>
</tr>
<tr>
<td>800S162-68</td>
<td>12'-10&quot;</td>
<td>11'-6&quot;11'-6&quot;</td>
</tr>
<tr>
<td>1000S162-43</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
TABLE R804.3.2.1 (1)
ROOF RAFTER SPANS\textsuperscript{a}, b, c, d

<table>
<thead>
<tr>
<th>MEMBER DESIGNATION</th>
<th>ALLOWABLE SPAN MEASURED HORIZONTALLY (feet - inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ground snow load (psf)</td>
</tr>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEMBERS</th>
<th>ALLOWS SPANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>550S162-33</td>
<td>14'-6&quot;11'-7&quot;</td>
</tr>
<tr>
<td>550S162-68</td>
<td>13'-8&quot;</td>
</tr>
<tr>
<td>1200S162-43</td>
<td>—</td>
</tr>
<tr>
<td>1200S162-54</td>
<td>—</td>
</tr>
<tr>
<td>1200S162-68</td>
<td>14'-4&quot;14'-5&quot;</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 pound per square foot = 0.0479 kPa.

a. Deflection criterion: L/240 for total loads.

b. Ceiling dead load = 5 psf.

c. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

d. Listed allowable spans are not applicable for 350S162-33, 350S162-43, 550S162-33, 550S162-43, and 800S162-43 continuous joist members.
<table>
<thead>
<tr>
<th>Table R804.3.2.1 (2)</th>
<th>Table provides maximum horizontal rafter spans in feet and inches for slopes between 3:12 and 12:12.</th>
</tr>
</thead>
<tbody>
<tr>
<td>For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.</td>
<td></td>
</tr>
<tr>
<td>a. Table provides maximum horizontal rafter spans in feet and inches for slopes between 3:12 and 12:12.</td>
<td></td>
</tr>
<tr>
<td>b. Deflection criteria: L/240 for live loads and L/180 for total loads.</td>
<td></td>
</tr>
<tr>
<td>c. Roof dead load = 12 psf.</td>
<td></td>
</tr>
<tr>
<td>d. Grade 33 ksi steel is permitted to be used for 33 mil and 43 mil thicknesses. Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE R804.3.2.1 (2) ULTIMATE DESIGN WIND SPEED TO EQUIVALENT SNOW LOAD CONVERSION**

<table>
<thead>
<tr>
<th>ULTIMATE WIND SPEED AND EXPOSURE</th>
<th>EQUIVALENT GROUND SNOW LOAD (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof slope</td>
<td></td>
</tr>
</tbody>
</table>

RB795
<table>
<thead>
<tr>
<th>Exposure</th>
<th>Wind Speed (mph)</th>
<th>3:12</th>
<th>4:12</th>
<th>5:12</th>
<th>6:12</th>
<th>7:12</th>
<th>8:12</th>
<th>9:12</th>
<th>10:12</th>
<th>11:12</th>
<th>12:12</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>115</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>50</td>
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<tr>
<td></td>
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<td>&lt;140</td>
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<td>50</td>
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<td>50</td>
<td>50</td>
</tr>
<tr>
<td>C</td>
<td>115</td>
<td>20</td>
<td>20</td>
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<td>70</td>
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</tbody>
</table>

For SI: 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

**R804.3.6 Roof trusses.** Cold-formed steel trusses shall be designed and installed in accordance with AISI S100, Section D4 S240. In the absence of specific bracing requirements, trusses shall be braced in accordance with accepted industry practices, such as the SBCA Cold-Formed Steel Building Component Safety Information (CFSBCSI) Guide to Good Practice for Handling, Installing & Bracing of Cold-Formed Steel Trusses. Trusses shall be connected to the top track of the load-bearing wall in accordance with Table R804.3, either with two No. 10 screws applied through the flange of the truss or by using a 54-mil (1.37 mm) clip angle with two No. 10 screws in each leg.

**TABLE R804.3.7.1**

**REQUIRED LENGTHS FOR CEILING DIAPHRAGMS AT GABLE ENDWALLS GYPSUM BOARD SHEATHED,**

**CEILING HEIGHT = 8 FEET**

<table>
<thead>
<tr>
<th>EXPOSURE CATEGORY</th>
<th>ULTIMATE DESIGN WIND SPEED (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>126115</td>
</tr>
<tr>
<td></td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>—130</td>
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<td>—&lt;140</td>
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<td>130</td>
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<tr>
<td></td>
<td>&lt;140</td>
</tr>
</tbody>
</table>

Minimum diaphragm length (feet)
<table>
<thead>
<tr>
<th>Pitch</th>
<th>Width (feet)</th>
<th>Length (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:12 to 6:12</td>
<td>24-28</td>
<td>29.16</td>
</tr>
<tr>
<td></td>
<td>&gt; 28-32</td>
<td>28.20</td>
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<tr>
<td></td>
<td>&gt; 32-36</td>
<td>28.26</td>
</tr>
<tr>
<td></td>
<td>&gt; 36-40</td>
<td>26.25</td>
</tr>
<tr>
<td>6:12 to 9:12</td>
<td>24-28</td>
<td>26.20</td>
</tr>
<tr>
<td></td>
<td>&gt; 28-32</td>
<td>26.24</td>
</tr>
<tr>
<td></td>
<td>&gt; 32-36</td>
<td>28.30</td>
</tr>
<tr>
<td></td>
<td>&gt; 36-40</td>
<td>26.30</td>
</tr>
<tr>
<td>9:12 to 12:12</td>
<td>24-28</td>
<td>26.22</td>
</tr>
<tr>
<td></td>
<td>&gt; 28-32</td>
<td>26.26</td>
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<tr>
<td></td>
<td>&gt; 32-36</td>
<td>26.30</td>
</tr>
<tr>
<td></td>
<td>&gt; 36-40</td>
<td>26.30</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm, 1 mil = 0.0254 mm.

a. Ceiling diaphragm is composed of 1/2-inch gypsum board (min. thickness) secured with screws spaced at 6 inches o.c. at panel edges and 12 inches o.c. infield. Use No. 8 screws (min.) where framing members have a designation thickness of 54 mils or less and No. 10 screws (min.) where framing members have a designation thickness greater than 54 mils.

b. Maximum aspect ratio (length/width) of diaphragms is 2:1.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Required diaphragm lengths are to be provided at each end of the structure.

e. Multiplying required diaphragm lengths by 0.35 is permitted if all panel edges are blocked.

f. Multiplying required diaphragm lengths by 0.9 is permitted if all panel edges are secured with screws spaced at 4 inches o.c.

g. To determine the minimum diaphragm length for buildings with ceiling heights of 9 feet or 10 feet values in the table above shall be multiplied by 1.15.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
AISI S240-15, North American Standard for Cold-Formed Steel Structural Framing (2015)
Standards are available for free download at www.aisistandards.org
Reason: The proposal is one in a series intended to update the content of the Cold-Formed Steel (CFS) light-framed construction provisions of the IRC. The proposed revisions align the IRC with the provisions of *AISI S230-15, Standard for Cold-Formed Steel Framing - Prescriptive Method for One- and Two-Family Dwellings*. The wind loads are adjusted to conform to the provisions of the ASCE 7-10 Directional Procedure, and the wind speed increments are modified to correlate with increments as shown in the wind speed maps (Figures R301.2(4)A and B). Editorial corrections have been made to the text where applicable. Further explanation for each section follows:

**Section R804.1.1 Applicability Limits** - This proposal adjusts the upper limit of the ultimate design wind speed from less than 139 miles per hour (mph) to less than 140 mph. The previous upper limit was based on a conversion of the wind speed from a nominal speed to an ultimate speed. For which, the conversion of the 110 mph nominal wind speed resulted in a rounded value of 139 mph ultimate wind speed upper limit (ie. less than 139 mph). This is detailed in the last cycle code change proposal RB258-13. Since the wind speeds now listed in this section are actual ultimate wind speeds, as derived from the ultimate wind speed maps, this section is now applicable for ultimate wind speeds up to 140 mph.

**Tables R804.3.1.1(1), R804.3.1.1(2), and R804.3.2.1** – The listed allowable spans are updated to correlate with AISI S230.

**Table R804.3.2.1(2) Wind speed to snow load conversion** – This table replaces the previous conversion table to correlate with AISI S230.

**Section R804.3.6 Roof Trusses** – Previously this section referenced AISI S100, Section D4 for truss design. Section D4 of AISI S100 directed the user to *AISI S214 - North American Standard for Cold-Formed Steel Framing - Truss Design*. However, the new standard *AISI S240, North American Standard for Cold-Formed Steel Structural Framing*, addresses requirements for construction with cold-formed steel structural framing that are common to prescriptive and engineered light frame construction. This comprehensive standard was formed by merging the following AISI standards:

- *AISI S200, North American Standard for Cold-Formed Steel Framing-General Provisions*
- *AISI S210, North American Standard for Cold-Formed Steel Framing–Floor and Roof System Design*
- *AISI S211, North American Standard for Cold-Formed Steel Framing–Wall Stud Design*
- *AISI S212, North American Standard for Cold-Formed Steel Framing–Header Design*
- *AISI S213, North American Standard for Cold-Formed Steel Framing– Lateral Design*
- *AISI S214, North American Standard for Cold-Formed Steel Framing–Truss Design*

Consequently, AISI S240 supersedes all previous editions of the above mentioned individual AISI standards and is the correct reference for this application.

**Table R804.3.7.1 Required lengths for ceiling diaphragms** - The required diaphragm lengths are modified to accommodate the corresponding wind load adjustments as previously stated.

The AISI Standards are available for free download at [www.aisistandards.org](http://www.aisistandards.org)

**Cost Impact:** Will increase the cost of construction

The proposed changes to this section will not increase the cost of construction in general. While the overwhelming majority of the prescribed members have not changed or are reduced in size, there may be conditions for which the minimum member size will increase.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, AISI 240 - 15, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
RB322-16
IRC: R806.1, R806.2, R806.3 (New).
Proponent: Mike Fischer, Kellen, representing Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

2015 International Residential Code
Revise as follows:

R806.1 Ventilation required. Enclosed
For roofs with slopes equal to or greater than 2:12, enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of \( \frac{1}{16} \) inch (1.6 mm) minimum and \( \frac{1}{4} \) inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than \( \frac{1}{4} \) inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth or similar material with openings having a least dimension of \( \frac{1}{16} \) inch (1.6 mm) minimum and \( \frac{1}{4} \) inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

R806.2 Minimum vent area. The minimum net free ventilating area shall be \( \frac{1}{150} \) of the area of the vented space.

Exception: The minimum net free ventilation area shall be \( \frac{1}{300} \) of the vented space provided one or more of the following conditions are met:
1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.

In Climate Zones 6, 7 and 8, a Class I or II vapor retarder shall be installed on the warm-in-winter side of the ceiling.

Add new text as follows:

R806.3 Balanced ventilation. Not less than 40 percent and not more than 50 percent of the required ventilating area shall be provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted. Intake and exhaust vents shall be provided in accordance with Section R806 and the vent product manufacturer's approved installation instructions.
**Reason:** Attic ventilation should be balanced. Ventilation device manufacturers and the National Roofing Contractors Association recommend that ventilation be balanced. This separates the requirement for balanced ventilation from the required amount of ventilation. Proper ventilation occurs when there is intake (at the eaves) and exhaust in the upper portion of the attic (ridge or near ridge), allowing the convective flow to occur whereby removing excess heat and moisture from the attic.

**Cost Impact:** Will increase the cost of construction
The proposal will increase the amount of required vents.
RB323-16
IRC: R806.1, R806.3.
Proponent: Mike Fischer, Kellen, representing Asphalt Roofing Manufacturers Association
(mfischer@kellencompany.com)

2015 International Residential Code

Revise as follows:

R806.1 Ventilation required. Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of $\frac{1}{16}$ inch (1.6 mm) minimum and $\frac{1}{4}$ inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than $\frac{1}{4}$ inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material with openings having a least dimension of $\frac{1}{16}$ inch (1.6 mm) minimum and $\frac{1}{4}$ inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air and shall be protected to prevent the entry of birds, rodents, snakes and other similar creatures.

R806.3 Vent and insulation clearance. Where eave or cornice vents are installed, blocking, bridging and insulation shall not block the free flow of air. Not less than a 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.

Reason: This proposal is editorial and will bring the IRC requirements into alignment with the IBC ventilation requirements.

Cost Impact: Will not increase the cost of construction
The proposal is editorial and adds no additional requirements.
RB324-16
IRC: R806.2.
Proponent: Mike Fischer, Kellen, representing Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

2015 International Residential Code
Revise as follows:

R806.2 Minimum vent area. The minimum net free ventilating area shall be $\frac{1}{150}$ of the area of the vented space.

Exception: The minimum net free ventilation area shall be $\frac{1}{300}$ of the vented space provided one or more both of the following conditions are met:

1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.

Reason: The proposal is a clarification to align the IRC with the IBC requirements for the reduction in ventilation area.

Cost Impact: Will increase the cost of construction
The proposal may increase the cost of construction due to additional requirements to reduce the net free vent area.
**RB325-16**

**IRC: R806.2.**

*Proponent:* Kevin McOsker, representing Southern Nevada Chapter of ICC (ktm@ClarkCountyNV.gov)

**2015 International Residential Code**

**R806.2 Minimum vent area.** The minimum net free ventilating area shall be $\frac{1}{150}$ of the area of the vented space.

**Exception:** The minimum net free ventilation area shall be $\frac{1}{300}$ of the vented space provided one or more of the following conditions are met:

1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents shall be located in the bottom 1/3 of the attic space. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.

**Reason:** Due to property line separation requirements, restricting the lower vents to the eave or cornice, may not be achievable. The intent of this change does not restrict the use of eave or cornice vents when they are located in the bottom 1/3 of the attic space. Installing ventilation at the bottom 1/3 of the attic space achieves similar cross ventilation effect as eave and cornice vents. Allowing the lower ventilators to be placed on the roof, allows the designer flexibility, without creating a conflict with Table R302.1(1) or R302.1(2), where opening may not be allow ed.

**Cost Impact:** Will not increase the cost of construction
Design flexibility will not increase costs.
R806.5 Unvented attic and unvented enclosed rafter assemblies. Unvented attics and unvented enclosed roof framing assemblies created by ceilings that are applied directly to the underside of the roof framing members and structural roof sheathing applied directly to the top of the roof framing members/rafters, shall be permitted where all the following conditions are met:

1. The unvented attic space is completely within the building thermal envelope.
2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum $\frac{1}{4}$-inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall be located in accordance with the following:
   5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
      5.1.1. Where only air-impermeable insulation is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.
      5.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Section 5.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the R-values in Table R806.5 for condensation control.
      5.1.3. Where both air-impermeable and air-permeable insulation are provided, the air-impermeable insulation shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 and shall be in accordance with the R-values in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.
      5.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.
5.2. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

**Reason:** This is an editorial improvement, which makes the code clearer. There is no change in the requirements.

**Cost Impact:** Will not increase the cost of construction

This clarifies the code.
2015 International Residential Code

Add new definition as follows:

SECTION R202 DEFINITIONS

Vapor Diffusion Port. A passageway for conveying water vapor from an unvented attic to the outside atmosphere.

- 

Revise as follows:

R806.5 Unvented attic and unvented enclosed rafter assemblies. Unvented attics and unvented enclosed roof framing assemblies created by ceilings that are applied directly to the underside of the roof framing members and structural roof sheathing applied directly to the top of the roof framing members/rafters, shall be permitted where all the following conditions are met:

1. The unvented attic space is completely within the building thermal envelope.
2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum 1/4-inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall be located in accordance with the following with comply with either 5.1 or 5.2, and additionally 5.3:
   5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
   5.1.1. Where only air-impermeable insulation is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.
   5.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Section 5.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the R-values in Table R806.5 for condensation control.
   5.1.3. Where both air-impermeable and air-permeable insulation are provided, the air-impermeable insulation shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 and shall be in
accordance with the R-values in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.

5.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

5.2. In climate zones 1, 2, and 3 when air-permeable insulation is installed in unvented attics it shall meet the following requirements:

1) An approved vapor diffusion port shall be installed not more than 12 inches (305mm) from the highest point of the roof, measured vertically from the highest point of the roof to the lower edge of the port. 2) The port area shall be ≥ 1:600 of the ceiling area. Where there are multiple ports in the attic, the sum of the port areas shall be greater than or equal to the area requirement. 3) The vapor permeable membrane in the vapor diffusion port shall have a vapor permeance rating of ≥20 perms when tested in accordance with Procedure A of ASTM E96. 4) The vapor diffusion port shall serve as an air barrier between the attic and the exterior of the building. 5) The vapor diffusion port shall protect the attic against the entrance of rain and snow. 6) Framing members and blocking shall not block the free flow of water vapor to the port. Not less than a 2-inch (50 mm) space shall be provided between any blocking and the roof sheathing. Air-permeable insulation shall be permitted within that space. 7) The roof slope shall be ≥3:12 (vertical/horizontal). 8) Where only air-permeable insulation is used, it shall be installed directly below the structural roof sheathing. 9) Air-impermeable insulation, if any, shall be directly above or below the structural roof sheathing and is not required to meet the R-value in in table 806.5. When directly below the structural roof sheathing, there shall be no space between the air-impermeable and air-permeable insulation. 10) The air shall be supplied at a flow rate ≥50 CFM (23.6 L/s) per 1000 ft² of ceiling. The air shall be supplied from ductwork providing supply air to the occupiable space when the conditioning system is operating. Alternatively, the air shall be supplied by a supply fan when the conditioning system is operating.

5.3. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

Reason: Unvented attic assemblies have a record of success. Unvented attic assemblies are most commonly constructed with spray polyurethane foam applied directly to the underside of the roof deck. This is a historically successful method of construction with over 20 years of experience. Another approach to unvented attic assemblies is to insulate over the top of the roof deck with rigid insulation boards. The proposed code change allows the use of lower cost alternatives. Specifically, the proposed code change allows the use of fiberglass batts, blown cellulose and blown fiberglass to construct unvented attic assemblies. The approach is limited to Climate Zones 1, 2 and 3 based on research and historic experience over the past decade.

The proposed code change adds a vapor diffusion port/vent. The port acts as a moisture control measure, allowing...
moisture in the attic to be removed by vapor diffusion rather than by air change. This allows the attic assembly to remain airtight while providing a path for vapor moisture via vapor diffusion. Airtight attics also benefit energy efficiency.

This allows alternatives to rigid board and spray polyurethane foam. Alternatives provides more material choices for designers, builders and consumers who have issues with the greenhouse gas potential of blowing agents, impacts of fire retardants and off-gassing of some insulation products. Or just want to try a less expensive option.

Adding new unvented attic options to the existing options provides additional benefits. In high wildfire regions the elimination of eave vents and air sealing the upper attic vents at ridges reduces the entry of embers. In hurricane zones the elimination of roof vents reduces the entry of rainwater during hurricane events.

The research work supporting this code change is an outgrowth of the original research work supporting unvented attic assemblies started in 1995 under the Department of Energy's Building America Program. The same technical team and the same technical rigor that supported the original code changes for unvented attics in the early 2000's are behind this proposed code change.

The technical rationale and research behind this code change can be found at Venting Vapor. For a history of conditioned attics, see Cool Hand Luke Meets Attics. Here is the technical data and more technical data (link to research report at lower right of page on web site).

Cost Impact: Will not increase the cost of construction
This will provide options.
2015 International Residential Code

Revise as follows:

R806.5 Unvented attic and unvented enclosed rafter assemblies. Unvented attics and unvented enclosed roof framing assemblies created by ceilings that are applied directly to the underside of the roof framing members and structural roof sheathing applied directly to the top of the roof framing members/rafters, shall be permitted where all the following conditions are met:

1. The unvented attic space is completely within the building thermal envelope.
2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum 1/4-inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall be located in accordance with the following:
   5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
      For Climate Zones 1, 2 and 3 item 5.1.5 shall also be met.
      5.1.1. Where only air-impermeable insulation is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.
      5.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Section 5.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the R-values in Table R806.5 for condensation control.
      5.1.3. Where both air-impermeable and air-permeable insulation are provided, the air-impermeable insulation shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 and shall be in accordance with the R-values in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.
      5.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F.
(20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

5.1.5. In climate zones 1, 2 and 3 air shall be supplied at a flow rate ≥50 CFM (23.6 L/s) per 1000 ft² of ceiling. The air shall be supplied from ductwork providing supply air to the occupiable space when the conditioning system is operating. Alternatively, the air shall be supplied by a supply fan when the conditioning system is operating.

5.2. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

**Reason:** This code change is necessary to address a problem with moisture accumulation in unvented conditioned attics in Climate Zones 1, 2 and 3. One of the original rationales for unvented conditioned attics is that they addressed the issue of leaky ductwork located in attic spaces. By constructing an unvented attic this duct leakage no longer occurred to the outside. This was a huge benefit to the building. One of the other benefits of this duct leakage was that it now provided conditioning to the attic space - removing moisture via the air conditioning process. The leaky ductwork in essence supplied conditioned air to the attic space. Over the past decade the installation of ductwork has significantly improved to the point where typical ductwork does not leak enough to provide incidental conditioning to the unvented attic space. A source of dedicated supply air must be provided to unvented attics to remove moisture to compensate for the improvement in duct tightness.

For a more detailed discussion of the technical justification for this proposed code change see [Cool Hand Luke Meets Attics](#).

**Cost Impact:** Will increase the cost of construction

This will result in a minor cost increase - the cost of one supply duct (typically 4 to 6 inch in diameter) or supply register in an existing supply duct. A return duct or return register is not necessary. Incidental leakage of the attic ceiling provides a sufficient return path.
2015 International Residential Code

R806.5 Unvented attic and unvented enclosed rafter assemblies.  (Note to staff: This is a definition that should be added to chapter 2)

Vapor Diffusion Port – A passageway for conveying water vapor from an unvented attic to the outside atmosphere. The vapor permeable membrane in the port shall have a vapor permeance rating of ≥20 perms (1.1 x 10^-9 kg/Pa · s · m²) when tested in accordance with Procedure A of ASTM E96. The port shall serve as an air barrier between the attic and the exterior of the building and protect the attic against the entrance of rain and snow.

Unvented attics and unvented enclosed roof framing assemblies created by ceilings that are applied directly to the underside of the roof framing members and structural roof sheathing applied directly to the top of the roof framing members/rafters, shall be permitted where all the following conditions are met:

1. The unvented attic space is completely within the building thermal envelope.
2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum 1/4-inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall be located in accordance with the following:
   5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
      5.1.1. Where only air-impermeable insulation is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.
      5.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Section 5.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the R-values in Table R806.5 for condensation control.
      5.1.3. Where both air impermeable and air-permeable insulation are provided, the air-impermeable insulation shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 and shall be in accordance with the R-values in Table R806.5 for condensation control. The air-permeable insulation shall be...
installed directly under the air-impermeable insulation.

5.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

5.2. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

1. The unvented attic space is completely within the building thermal envelope.
2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum 1\(\frac{1}{4}\) -inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall comply with 5.1 or 5.2, and 5.3:
   5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
   5.1.1. Where only air-impermeable insulation is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.
   5.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Section 5.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the R-values in Table R806.5 for condensation control.
   5.1.3. Where both air-impermeable and air-permeable insulation are provided, the air-impermeable insulation shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 and shall be in accordance with the R-values in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.
   5.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature.
of the three coldest months.

5.2. In climate zones 1, 2, and 3 when air-permeable insulation is installed in unvented attics it shall meet the following requirements:

1) An approved vapor diffusion port shall be installed not be more than 12 inches (305mm), from the highest point of the roof, measured vertically from the highest point of roof to the lower edge of the port.

2) The port shall have an area ≥1:600 of the ceiling area. Where there are multiple ports in the attic, the sum of the port areas shall be greater than or equal to the area requirement.

3) Framing members and blocking shall not block the free flow of water vapor to the port. Not less than a 2-inch (50 mm) space shall be provided between any blocking and the roof sheathing. Air-permeable insulation shall be permitted within that space.

4) The roof slope shall be ≥3:12 (vertical/horizontal).

5) Where only air-permeable insulation is used, it shall be installed directly below the structural roof sheathing.

6) Air-impermeable insulation, if any, shall be directly above or below the structural roof sheathing and is not required to meet the R-value requirement in Table 806.5. When directly below the structural roof sheathing, there shall be no space between the air-impermeable and air-permeable insulation.

7) The attic space shall be supplied with air from the supply ducting at a flow rate ≥50 CFM (metric) per 1000 ft2 (metric) of ceiling when the ducts are supplying air to the occupiable space.

5.3. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

Reason: The purpose of this proposal is to provide additional options for insulating unvented attic assemblies. As currently written, the IRC currently has limited options for insulating unvented attics using air permeable insulation materials including fiber glass, mineral wool, and cellulose. The majority of unvented attic assemblies have been insulated with spray foam installed directly underneath the roof deck or using foam sheathing either above or below the wood sheathing. This proposal would expand the ability to use air permeable insulation materials in climate zones 1, 2, and 3 supported by research and field testing during the past 10 years.

Unvented attic assemblies offer several benefits to builders and homebuyers including increased home energy efficiency, lower cost alternatives, and design flexibility.

Unvented attic assemblies can reduce energy costs for homes with HVAC systems located in the attic by lowering the temperature of the air surrounding the system and reducing the loss of conditioned air to areas outside the conditioned space. Building an unvented attic is essentially the same as bringing the air handler and ducts inside the conditioned space. The heat loss from the ducts and air handler is reduced because the temperature difference between the inside of the duct and the surrounding air is lower and any air leaking from the ducts is inside the conditioned space.

Expanding the ability to use other materials including fiber glass, rock wool and cellulose will increase competition and likely lower construction costs for unvented attic assemblies.

This proposal includes adding a vapor diffusion port for air permeable insulation materials. This is an assembly similar in appearance to a ridge vent, except it prevents air movement between the attic and exterior of the building and vents moisture from the attic by diffusion.

Unvented attics have been a standard construction practice for more than 20 years and air permeable insulation materials have been used successfully for more than 10 years in climate Zones 1, 2 and 3.
Bibliography: Following is a list links to research reports and information for this code proposal:
For a history of conditioned attics, see “Cool Hand Luke Does Attics”:
For the technical data see:
http://buildingscience.com/documents/building-america-reports/ba-1409-field-testing-unvented-roofs-asphalt-shingles-cold-and
(NOTE: The link to the research report above is at the lower right of this web page.)

Cost Impact: Will not increase the cost of construction
This will not increase the cost of construction when comparing it to the cost of unvented attic assemblies currently permitted by the code.
2015 International Residential Code

Revise as follows:

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that have a vertical height of 30 inches (762 mm) or greater over an area of not less than 30 square feet (2.8 m²). The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

- The rough-framed opening shall be not less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. Where located in a wall, the opening shall be not less than 22 inches wide by 30 inches high (559 mm wide by 762 mm high). Where the access is located in a ceiling, minimum unobstructed headroom in the attic space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical equipment is located in attics.

Reason: If you have appliances in attics then M1305.1.3 will provide all of the necessary guidance. If you don't have appliances in the attic, then there is really no other reason to enter the attic and few homeowners ever will. Access will occur through self-regulation. In some of these attics there is nothing in the attic that needs access and one can always be cut in later if the need arises. Garage attics are an example. What part of the purpose of the IRC is served by requiring access to an attic with no appliances and no other need for access?

Cost Impact: Will not increase the cost of construction
This proposal reduces regulation and will reduce construction costs.
RB331-16
IRC: R807.1.
Proponent: Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R807.1 Attic access. Buildings with combustible concealed ceiling or roof construction shall have an attic access opening to attic areas that have a vertical height of 30 inches (762 mm) or greater over an area of not less than 30 square feet (2.8 m²). The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall be not less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. Where located in a wall, the opening shall be not less than 22 inches wide by 30 inches high (559 mm wide by 762 mm high). Where the access is located in a ceiling, minimum unobstructed headroom in the attic space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical equipment is located in attics.

Reason: The ICC Commentary for the IRC states: "The requirement for an attic access is predicated on the likelihood that during the life of the structure, access to an attic space for repair of piping, electrical and mechanical systems will be required."

If this is true, then language in the section that states "Buildings with combustible ceilings or roof construction shall have..." is misleading because attics of non-combustible construction are just as likely to have piping, electrical and mechanical systems. The IBC makes no mention of combustibility in its attic access requirements. And, the mechanical code (M1305.1.3) already requires access for equipment in an attic. It is less obvious why access is need for piping or electrical systems that would never need service. So the purpose of the access is universally poorly understood.

If it is believed that access should be provided regardless of equipment, a more realistic approach would be to require access to any attic that contains concealed spaces and without regard to construction materials used. Furthermore, direction on the location of the access needs to be more useful. Currently the code says the access must be "in a hallway or other readily accessible location". There are a number of problems with this language. It leads one to believe that the access must be interior to the dwelling. Why couldn't the access be via a gable end hatch, through a knee wall, or via a garage attic? Eliminating the access within the dwelling solves a problem involving heat loss and air infiltration and can also make replacement of equipment less intrusive.

The IBC provides no direction on where the access must be. It only requires that there be one and stipulates the size.

To alleviate these issues, this proposal would require an access for all attics in dwellings that have concealed spaces and would not dictate where the access must be consistent with the IBC.

It should also be remembered that an access can be provided even if the code does not require one or where there is none and that creating an opening in a ceiling or wall that does not contain an opening is a very simple operation.

Cost Impact: Will not increase the cost of construction
This proposal is largely a reduction in regulation and should have no impact on construction costs.
2015 International Residential Code

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that have a vertical height of 30 inches (762 mm) or greater over an area of not less than 30 square feet (2.8 m²). The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

Exception: Access openings shall not be required for non-contiguous enclosed attic areas that do not have electrical, plumbing, or mechanical equipment that require access for periodic maintenance.

The rough-framed opening shall be not less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. Where located in a wall, the opening shall be not less than 22 inches wide by 30 inches high (559 mm wide by 762 mm high). Where the access is located in a ceiling, minimum unobstructed headroom in the attic space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical equipment is located in attics.

Reason: The proposed exception in this section is to clarify that when a structure has non-contiguous attic spaces and no equipment that would require periodic maintenance, access openings are not required. This proposal would also address large porch, patio, or other outdoor living spaces that may require access per the current language due to the size of the attic area.

Cost Impact: Will not increase the cost of construction
The exception reduces additional access that may be unnecessary.
2015 International Residential Code

Add new text as follows:

R807.1.1 Attic Service Access Attics containing appliances, mechanical equipment, ventilation, electrical wiring, plumbing components, or alarm systems, needing periodic inspection or service shall be accessible by pull down stairs or permanent steps and allow the removal of the largest appliance.

Reason: It is very common in many of today’s homes for ventilation fans and electrical/alarm/plumbing systems to be located within attic areas even if mechanical equipment is not. These systems located in attic areas need to be accessible for inspection, servicing and maintenance just like that required for appliances in Section M1305.1.3. This new section is added to the general section of attic access (R807) to require access to these attic spaces for inspection/servicing/maintaining these other systems.

In addition, to facilitate access to these attic spaces, permanent steps or stairs are being required. This eliminates the need to bring in portable ladders which can be especially difficult when access is located on the upper floors (a common arrangement in many dwellings today). Having readily available steps or stairs provide a convenient means for access by inspection and service personnel, homeowners and the fire service. Too, these permanent steps or stairs can reduce the risk of ladder related injury to persons.

The Liberty Mutual Research Institute for Safety, in their report on Ladder Safety (Volume 15, No. 3, March 2012) state "the real danger of ladders lies in their everyday use at home and on the job". They say, based on the National Safety Council’s 2011 Injury Facts, more than 135,000 people are treated each year in US emergency departments for ladder-related injuries.

The Liberty Mutual Research Institute also collaborated with researchers with the Harvard School of Public Health, the US Consumer Product Safety Commission (CPSC), the Center for Construction Research, and the National Institute for Occupational Safety and Health (NIOSH) in literature research and field surveys to "identify critical variables and risk factors related to falls from portable ladders". They reported that more than 50% of the falls examined were from workers using step or trestle ladders. In addition more than 30% of the step or trestle ladder cases were attributed to ladder movement. Having fixed steps or pull-down stairs could help reduce the risk to injury from ladder movement.

Also, in a study for 2011, the Center for Disease Control (CDC) reported a high incident of ladder fall injuries [Occupational Ladder Fall Injuries — United States, 2011. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6316a2.htm]. The findings reported one of the highest fatal and nonfatal ladder fall injury (LFI) rates was in the construction industry. Installation, maintenance and repair occupations were third highest. The study also reported an estimated 34,000 plus nonfatal LFIs with about 50% of the injuries coming from fall heights of six (6) to ten (10) feet.

Attic access in residences is commonly in the six (6) to ten (10) feet. With a large numbers of ladder related injuries (+ 17,000) occurring in this height range, and considering data that shows a significant number of ladder related injuries attributable to ladder movement (+ 30%), having code required permanent means of access to these attics with steps or pull-down stairs would reduce the risk of these ladder related injuries.
Cost Impact: Will increase the cost of construction
Minimal as this is a very common practice for new homes.
2015 International Residential Code

Delete without substitution:

R902.2 Fire-retardant-treated shingles and shakes. -Fire-retardant-treated wood shakes and shingles shall be treated by impregnation with chemicals by the full-cell vacuum-pressure process, in accordance with AWPA C1. Each bundle shall be marked to identify the manufactured unit and the manufacturer, and shall be labeled to identify the classification of the material in accordance with the testing required in Section R902.1, the treating company and the quality control agency.

Reason: If FR shingles aren't required anywhere, which they aren't, why have this text in the code? It only creates confusion and is misleading. We don't need to fill the book with rules for non-required applications. It can't be enforced when it isn't required.

Cost Impact: Will not increase the cost of construction
This is an editorial revision that will have no impact on construction costs.
RB335-16
IRC: R902.2.
Proponent: Colin McCown, representing American Wood Protection Association

2015 International Residential Code

Revise as follows:

R902.2 Fire-retardant-treated shingles and shakes. Fire-retardant-treated wood shakes and shingles shall be treated by impregnation with chemicals by the full-cell vacuum-pressure process, in accordance with AWPA C1. Each bundle shall be marked to identify the manufactured unit and the manufacturer, and shall be labeled to identify the classification of the material in accordance with the testing required in Section R902.1, the treating company and the quality control agency.

Reason: The reference to AWPA Standard C1 is not appropriate because C1 does not contain specifications for results of treatment. In addition, C1 is an outdated standard.

Cost Impact: Will not increase the cost of construction
The referenced standard contained no specifications for results of treatment, so deleting the reference would have no effect on the cost of the materials.
RB336-16

IRC: R202, R902.4.

Proponent: Joseph Cain, SunEdison, representing Solar Energy Industries Association (SEIA) (joecainpe@aol.com)

2015 International Residential Code

Add new definition as follows:

SECTION R202 DEFINITIONS

PHOTOVOLTAIC PANEL, TYPE-RATED. A photovoltaic panel tested for spread-of-flame and burning brand, and assigned a type rating according to UL 1703.

Revise as follows:

R902.4 Rooftop-mounted photovoltaic panels and modules. Rooftop-mounted photovoltaic panels and modules installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.

Exception: Photovoltaic panel systems with listed and type-rated photovoltaic panels installed on noncombustible mounting systems over roof coverings of clay or concrete tile installed in conformance with Section R905.3.

Reason: In the UL 1703 PV system test protocol, the test method is referred to as “first item ignited; second item ignited.” The steep-slope testing is conducted using a roof deck with asphalt shingles, which serve as the “first item ignited.” The PV system is exposed to the combined thermal stress from the burning asphalt shingles plus the primary ignition source. The asphalt shingle roof deck is used in base case tests and in tests including the PV mounting system with type-rated modules installed. The UL fire classification test protocol does not include any method for fire testing of PV panel systems installed over noncombustible roof coverings such as metal or tile roofs. It is not possible to ignite a noncombustible roof covering, so the “first item ignited; second item ignited” protocol cannot be used. Rather than providing credit for the added safety of installing a roof covering that will not ignite, the current standard requires that PV systems be tested on the ignitable base-case asphalt shingle roof in order to justify installation on a noncombustible roof covering. These systems must be tested on an unrelated combustible roof covering in order to justify installation on a safer, noncombustible roof covering.

In the installation of a photovoltaic panel system over a clay or concrete tile roof covering, the only fuel above the roof covering is the encapsulent (usually EVA), and in framed modules the backsheet of the PV panel/module and moulding between the glass and aluminum frame. Owing to the added safety of PV systems installed on noncombustible roof coverings, plus the existence of only minimal fuel, this proposal seeks an exemption from fire classification testing for these systems for which no fire test protocol exists.

A new definition is introduced to clarify that Type-Rated Photovoltaic Panels are those that have been subjected to spread-of-flame and burning brand tests and assigned a type rating in accordance with UL 1703.

Fire-tested and listed PV modules installed on noncombustible mounting systems over noncombustible Class A roof coverings create very little risk of fire propagation owing to flying embers. These systems provide a high level of safety owing to near-absence of fuel, and should not be subjected to testing on unrelated combustible roof coverings in order to allow their installation.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction, as it will reduce the amount of testing required for a safer installation of photovoltaic panel systems.
RB337-16
IRC: R202, R902.1, R902.4.
Proponent: Joseph Cain, SunEdison, representing Solar Energy Industries Association (SEIA) (joecainpe@aol.com)

2015 International Residential Code
SECTION R202  DEFINITIONS

DEFINITIONS

PHOTOVOLTAIC PANEL, TYPE-RATED. A photovoltaic panel tested for spread-of-flame and burning brand, and assigned a type rating according to UL 1703.

R902.1 Roofing covering materials. Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line. Class A, B and C roofing required by this section to be listed shall be tested in accordance with UL 790 or ASTM E 108.

Exceptions:
1. Class A roof assemblies include those with coverings of brick, masonry and exposed concrete roof deck.
2. Class A roof assemblies include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile, or slate installed on noncombustible decks.
3. Class A roof assemblies include minimum 16 ounces per square foot copper sheets installed over combustible decks.
4. Class A roof assemblies include slate installed over underlayment over combustible decks.

Revise as follows:

R902.4 Rooftop-mounted photovoltaic panels and modules. Rooftop-mounted photovoltaic panels and modules installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.

Exception: Photovoltaic panel systems with listed and type-rated photovoltaic panels installed on noncombustible mounting systems over those specific Class A roof assemblies in Exceptions 1 through 4 of Section R902.1.

Reason: In the UL 1703 PV system test protocol, the test method is referred to as "first item ignited; second item ignited." The steep-slope testing is conducted using a roof deck with "marginal Class A" asphalt shingles, which serve as the "first item ignited." The PV system is exposed to the combined thermal stress from the burning asphalt shingles plus the primary ignition source. The asphalt shingle roof deck is used in base case tests and in tests including the PV mounting system with type-rated modules installed. The UL fire classification test protocol does not include any method for fire testing of PV panel systems installed over noncombustible roof coverings such as metal or tile roofs. It is not possible to ignite a noncombustible roof covering, so the "first item ignited; second item ignited" protocol cannot be used. Rather than providing credit for the added safety of installing a roof covering that will not ignite, the current standard requires that PV systems be tested on the ignitable base-case asphalt shingle roof in order to justify installation on a noncombustible roof covering. These systems must be tested on an unrelated
Combustible roof covering in order to justify installation on a safer, noncombustible roof covering. In the installation of a photovoltaic panel system over a Class A roof assembly with a noncombustible roof covering, the only fuel above the roof covering is the encapsulant (usually EVA), and in framed modules the backsheet of the PV panel/module and moulding between the glass and aluminum frame. Owing to the added safety of PV systems installed on noncombustible roof coverings, plus the existence of only minimal fuel, this proposal seeks an exemption from fire classification testing for these systems for which no fire test protocol exists.

A new definition is introduced to clarify that Type-Rated Photovoltaic Panels are those that have been subjected to spread-of-flame and burning brand tests and assigned a type rating in accordance with UL 1703.

Fire-tested and listed PV modules installed on noncombustible mounting systems over noncombustible Class A roof assemblies create very little risk of fire propagation owing to flying embers. These systems provide a high level of safety owing to near-absence of fuel, and should not be subjected to testing on unrelated combustible roof coverings in order to allow their installation.

**Cost Impact:** Will not increase the cost of construction
This proposal will not increase the cost of construction, as it will reduce the amount of testing required for a safer installation of photovoltaic panel systems.
2015 International Residential Code

Revise as follows:

R902.4 Rooftop-mounted photovoltaic panels and modules shall be tested, listed and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.

Reason: This proposal incorporates the defined term "photovoltaic panel systems" to clarify that the fire classification is assigned after testing a photovoltaic panel system including the mounting system. As part of that fire classification, photovoltaic panels must be tested on their own and assigned a type rating. This is a revision to correct the language, without changing any technical requirements.

Cost Impact: Will not increase the cost of construction
No change in requirements.
2015 International Residential Code

Revise as follows:

**R902.4 Rooftop-mounted photovoltaic panels and modules panel systems.** Rooftop-mounted photovoltaic panels and modules panel systems installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703 and UL 2703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.

**Reference standards type:** This reference standard is new to the ICC Code Books

**Add new standard(s) as follows:**
UL 2703-14, Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels

**Reason:** This correlates with the action taken in group A, S2-15 at the public comment hearing. This proposal aligns the IRC requirements with IBC Section 1505.9 for fire classification of photovoltaic panel systems. The position of the photovoltaic panels, as well as the slope of the roof, are critical factors in determining the fire classification of a photovoltaic panel system. The position of the photovoltaic panels is established by the racking system. Thus, the testing for photovoltaic panel systems are covered in both UL 1703 and UL 2703. The new UL 2703 standard, which is an ANSI consensus standard, provides the test method for testing multiple panels for each racking system.

**Cost Impact:** Will not increase the cost of construction

This code change simply provides the appropriate method for testing photovoltaic panel systems for fire classification, as required by the ANSI standards. This method is already in use within the industry therefore there is no additional cost to construction.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, UL 2703-14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

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RB339-16 : R902.4- ROBERTS10763
2015 International Residential Code

Add new text as follows:

**R903.4.2 Wind resistance of gutters and downspouts.** Where wind design is required in accordance with Figure R301.2(4)B, gutters and downspouts on the exterior of buildings shall be attached in accordance with this section. Gutters and downspouts shall be attached to resist the following loads:

- **Gutters:**
  1. Lateral loads using the component and cladding loads for walls in accordance with ASCE 7.
  2. Vertical loads using the component and cladding loads for roof overhangs in accordance with ASCE 7.

- **Downspouts:**

  Lateral loads using the component and cladding loads for walls in accordance with ASCE 7.

Attachment of gutters shall be determined using a design analysis or testing in accordance with Test Methods G-1 and G-2 of ANSI/SPRI GD-1-2010.

**P2912.5.2 Wind resistance of gutters and downspouts.** Gutters and downspouts on the exterior of buildings shall be attached to resist wind loads in accordance with Section R903.4.2.

Reference standards type: This reference standard is new to the ICC Code Books

Add new standard(s) as follows:

Chapter 35

Referenced Standards

**SPRI**

**ANSI/SPRI GD-1-2010 Structural Design Standard for Gutter Systems Use with Low-Slope Roofs**

**Reason:** This code change is primarily providing more specific guidance for what is already required by the code. Section R301.1 clearly states that buildings, structures, and parts thereof shall be designed to resist the minimum wind loads prescribed by the IRC. However, the code, its prescriptive references nor ASCE 7 provide specific guidance on the design loads for gutters and leaders. ANSI/SPRI GD-1-2010 Structural Design Standard for Gutter Systems Used with Low-Slope Roofs does provide guidance for the design, attachment, and testing for gutters and leaders. This standard was proposed for inclusion in the 2012 IBC as code change S15-12. It was disapproved by the Structural Committee primarily because the wind provisions in the standard are based on ASCE 7-05. ASCE 7 was being updated to the 2010 edition during that code change cycle. Instead of simply referencing ASCE 7, GD-1 reproduces many of the provisions in ASCE 7 such as Exposure Categories and the wind Importance Factor. This reproduction of content makes it problematic to reference in the IBC or IRC since the Exposure Categories have changed and ASCE 7-10 doesn't require the use of a wind Importance Factor. Its use may result in confusion when using ASCE 7-10.

While GD-1 is limited to low-slope roof systems, the design load methodology in GD-1 would technically apply to any roof system (low-slope or high-slope). From a wind loading standpoint, the only reason GD-1 is limited to low-slope roofs is because the design criteria in GD-1 is based on the GCp values in ASCE 7 for roof slopes less than 7° and for mean roof heights ≤ 60 ft. The language proposed in this code change is consistent with the technical design loads for gutters in GD-1. The proposed language requires gutters to be attached to resist uplift loads using the roof overhang loads from ASCE 7 as gutters will feel the effects of wind on the upper and lower surfaces. The GCp values in ASCE 7 for roof overhang state that the values include contributions from both upper and lower surfaces. Additionally, gutters are installed on vertical faces such as walls or fascia boards which would necessitate they be
designed for lateral loads using the component and cladding loads for walls from ASCE 7. Downspouts are required
to be attached to resist lateral loads using the component and cladding loads for walls from ASCE 7.

GD-1 also contains a test method for determining the wind resistance of gutter system. The proposal allows gutter
systems to be tested in accordance with Test Methods G-1 and G-2 as an alternative to designing the system. Only
the test method is referenced. The rest of GD-1 would not be applicable.

Numerous studies of the aftermath of hurricanes have shown the need for better attachment of gutters. The
Hurricane Charley (FEMA 488), Hurricane Ivan (FEMA 489), and Hurricane Katrina (FEMA 549) Mitigation
Assessment Team (MAT) reports specifically recommend that design criteria for gutters and downspouts be added
to the codes. See Sections 8.2.2, 8.5, and 8.7 of FEMA 488. See Tables 8-6, 8-7, and 8-9 of FEMA 489. The
Hurricane Charley MAT observed numerous failures to gutter systems on roofs and some were of sufficient mass
to be very damaging missiles. Additionally, the Hurricane Charley MAT observed damage to a low-sloped roof
where wind lifted the gutter and metal edge flashing and peeled the modified bitumen membrane. Successful
performance of edge flashings, copings, and gutters is vital to avoid progressive lifting and peeling of roof
membranes. The roof systems observed by the Hurricane Ivan MAT noted that membrane damage was typically
caused by windborne debris punctures and tears, and by membrane lifting and peeling after lifting of either the
gutter, edge flashing, or coping. The Hurricane Katrina MAT observed several types of low-slope roof systems that
included built-up roofs (BURs), modified bitumen, and single-ply where damage was typically caused by membrane
lifting and peeling after lifting of the gutter, edge flashing, or coping, and by puncturing and tearing by windborne
debris. Gutters and leaders that fail can become wind-borne debris and break unprotected glazing in addition to
puncturing other areas of the building envelope such as the walls and roof. Additionally, when gutters lift up and
initiate roof failure, water can enter the building.

The following pictures show gutter failures on residential buildings impacted by Hurricane Marilyn (1995):
FEMA 549, Hurricane Katrina in the Gulf Coast: Mitigation Assessment Team Report, Building Performance

Cost Impact: Will increase the cost of construction
May result in an increase in cost of construction. Since the codes and design standards are not specific about
design wind loads for gutters and leaders, it's unclear what criteria designers are actually using to attach gutters
and leaders. However, any initial minimal up front construction costs will result in reduced owner residual risk
through improved resilience to high wind loading, reduced wind driven rain associated damages and more than
offset costs through mitigating already well documented failure modes and vulnerabilities.
2015 International Residential Code

R905.1.1 Underlayment. Underlayment for asphalt shingles, clay and concrete tile, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles, wood shakes and metal roof panels shall conform to the applicable standards listed in this chapter. Underlayment materials required to comply with ASTM D 226, D 1970, D 4869 and D 6757 shall bear a label indicating compliance to the standard designation and, if applicable, type classification indicated in Table R905.1.1(1). Underlayment shall be applied in accordance with Table R905.1.1(2). Underlayment shall be attached in accordance with Table R905.1.1(3).

Exceptions:

1. As an alternative, self-adhering polymer-modified bitumen underlayment complying with ASTM D 1970 installed in accordance with both the underlayment manufacturer's and roof covering manufacturer's instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed, shall be permitted.

2. As an alternative, a minimum 4-inch-wide (102 mm) strip of self-adhering polymer-modified bitumen membrane complying with ASTM D 1970, installed in accordance with the manufacturer's instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering for maximum ultimate design wind speeds, $V_{ult}$, less than 140 miles per hour shall be applied over the entire roof over the 4-inch-wide (102 mm) membrane strips.

3. As an alternative, two layers of underlayment complying with ASTM D 226 Type II or ASTM D 4869 Type IV shall be permitted to be installed as follows:
   Apply a 19-inch strip of underlayment parallel with the eave. Starting at the eave, apply 36-inch-wide strips of underlayment felt, overlapping successive sheets 19 inches. The underlayment shall be attached with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at side and end laps. End laps shall be 4 inches and shall be offset by 6 feet (1829 mm). Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch for ring shank cap nails and 0.091 inch for smooth shank cap nails. Cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than 3/4 inch into the roof sheathing.

Reason: This proposal simply adds an additional method for preventing water penetration when the primary roof covering is lost due to high winds. Water penetration has been well documented from post-hurricane damage assessments where hurricane winds were strong enough to blow off the primary roof covering, but not strong enough to blow off roof sheathing. In such instances, significant property damage and extended occupant displacement routinely occur due to water intrusion. Such damage is common as asphalt shingles age and is particularly common in inland areas, where hurricane-strength winds occur, but building codes and standards are not as stringent as in coastal jurisdictions.

While the enhanced underlayment provisions are addressed in Tables R905.1.1(1), R905.1.1(2), and R905.1.1(3),
the protection afforded by the current exceptions to Section R905.1.1 are in a bit of a different category. When the self-adhering polymer-modified bitumen underlayment as described in Exceptions 1 and 2 is used, the condition it creates is referred to as a "sealed roof deck" in that it prevents water from entering the building through gaps in the roof sheathing. They are also a component of the IBHS Fortified program for creating a sealed roof deck. The Fortified program is a set of engineering and building standards designed to help strengthen new and existing homes through system-specific building upgrades to minimum building code requirements that will reduce damage from specific natural hazards. Recent tests conducted at the IBHS Research Facility have found the system proposed as new Exception 3, to perform similar to the self-adhering polymer-modified bitumen underlayment. As a result, this system of underlayment application and attachment is now recognized by the Fortified program for creating a sealed roof deck.

While this system is currently required in the code for roof slopes between 2:12 and 4:12 by Tables R905.1.1(2), R905.1.1(2), and R905.1.1(3), it provides an enhanced level of water penetration protection for roof slopes above 4:12 as well. Incorporating this method in the code provides an option for reducing the risk of water penetration that is on par with the self-adhering polymer-modified bitumen underlayment and makes it easier for local jurisdictions to accept its use as an option in areas where incentives for a sealed roof deck are provided.

**Cost Impact:** Will not increase the cost of construction

The proposed criteria is optional.
IRC: R905.1.1, R905.1.3 (New).
Proponent: T. Eric Stafford, PE, representing Institute for Business and Home Safety

2015 International Residential Code

R905.1.1 Underlayment. Underlayment for asphalt shingles, clay and concrete tile, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles, wood shakes and metal roof panels shall conform to the applicable standards listed in this chapter. Underlayment materials required to comply with ASTM D 226, D 1970, D 4869 and D 6757 shall bear a label indicating compliance to the standard designation and, if applicable, type classification indicated in Table R905.1.1(1). Underlayment shall be applied in accordance with Table R905.1.1(2). Underlayment shall be attached in accordance with Table R905.1.1(3).

Exceptions:

1. As an alternative, self-adhering polymer-modified bitumen underlayment complying with ASTM D 1970 installed in accordance with both the underlayment manufacturer’s and roof covering manufacturer’s instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed, shall be permitted.

2. As an alternative, a minimum 4-inch-wide (102 mm) strip of self-adhering polymer-modified bitumen membrane complying with ASTM D 1970, installed in accordance with the manufacturer’s instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering for maximum ultimate design wind speeds, \( V_{ult} \), less than 140 miles per hour shall be applied over the entire roof over the 4-inch-wide (102 mm) membrane strips.

As an alternative, underlayment is permitted to be installed in accordance with Section R905.1.3.

Add new text as follows:

R905.1.3 Sealed roof decks In lieu of Section R905.1.1, underlayment for asphalt shingles, clay and concrete tile, metal roof shingles, mineral surfaced roll roofing, slate and slate-type shingles, wood shingles, wood shakes and metal roof panels is permitted to comply with one of the following:

1. Self-adhering polymer-modified bitumen underlayment complying with ASTM D 1970 shall be permitted to be installed in accordance with both the underlayment manufacturer’s and roof covering manufacturer’s instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed.

2. A minimum 4-inch-wide (102 mm) strip of self-adhering polymer-modified bitumen membrane complying with ASTM D 1970, installed in accordance with the manufacturer’s instructions for the deck material, shall be permitted to be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering for maximum ultimate design wind speeds, \( V_{ult} \), less than 140 miles per hour shall be applied over the entire roof over the 4-inch-wide (102 mm) membrane strips.

3. Two layers of underlayment complying with ASTM D 226 Type II or ASTM D 4869 Type IV shall be permitted to be installed as follows: Apply a 19-inch strip of underlayment parallel with the eave. Starting at the eave, apply 36-inch-wide strips of
underlayment felt, overlapping successive sheets 19 inches. The underlayment shall be attached with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6 inch spacing at side and end laps. End laps shall be 4 inches and shall be offset by 6 feet (1829 mm). Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch for ring shank cap nails and 0.091 inch for smooth shank cap nails. Cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than 3/4 inch into the roof sheathing.

**Reason:** This proposal seeks to essentially create a sub classification of roofing underlayment. While basic underlayment provisions are addressed in Tables R905.1.1(1), R905.1.1(2), and R905.1.1(3), the protection afforded by the current exceptions to Section R905.1.1 are in a bit of a different category. When the self-adhering polymer-modified bitumen underlayment as described in Exceptions 1 and 2 is used, the condition it creates is referred to as a "sealed roof deck" in that it provides a higher degree of water intrusion prevention through gaps in the roof sheathing when the primary roof covering has been blown off. They are also a component of the IBHS Fortified program for creating a sealed roof deck. The Fortified program is a set of engineering and building standards designed to help strengthen new and existing homes through system-specific building upgrades to minimum building code requirements that will reduce damage from specific natural hazards. Water penetration has been well-documented from post-hurricane damage assessments where hurricane winds were strong enough to blow off the primary roof covering, but not strong enough to blow off roof sheathing. In such instances, significant property damage and extended occupant displacement routinely occur due to water intrusion. Such damage is particularly common in the hurricane-prone region. A definition of "sealed roof deck" is not being proposed, but is simply offered as a section title.

While there are no technical changes to the existing exceptions, this new location and section title will provide added clarity to the differences between the underlayment requirements of Tables R905.1.1(1) and the exceptions to Section R905.1.1. Insurance incentives are now being offered in some states for homes, new and existing, that comply with certain levels of the Fortified program. Fortified offers three different levels of designation (bronze, silver, and gold) depending on the extent of the recommended "upgrades" to the building’s wind resistance. This added clarity will make it easier for local jurisdictions to accept these options in lieu of the conventional underlayment systems and thereby be used as an option in areas where incentives for a sealed roof deck are provided.

Recent tests conducted at the IBHS Research Facility have found the system proposed as new Exception 3, to perform similar to the self-adhering polymer-modified bitumen underlayment. As a result, this system of underlayment application and attachment is now recognized by the Fortified program for creating a sealed roof deck. While this system is currently required in the code for roof slopes between 2:12 and 4:12 by Tables R905.1.1(2), R905.1.1(2), and R905.1.1(3), it provides an enhanced level of water penetration protection for roof slopes above 4:12 as well. Incorporating this method in the code provides an additional option for reducing the risk of water penetration that is on par with the self-adhering polymer-modified bitumen underlayment and makes it easier for local jurisdictions to accept its use and thereby be used as an option in areas where incentives for a sealed roof deck are provided.

**Cost Impact:** Will not increase the cost of construction
Existing exceptions are simply being relocated to a new section an additional underlayment option is added.
# 2015 International Residential Code

## TABLE R905.1.1 (1)
### UNDERLAYMENT TYPES

<table>
<thead>
<tr>
<th>ROOF COVERING</th>
<th>SECTION</th>
<th>MAXIMUM ULTIMATE DESIGN WIND SPEED, $V_{ult}$</th>
<th>MAXIMUM ULTIMATE DESIGN WIND SPEED, $V_{ult}$ ≥ 140 MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt shingles</td>
<td>R905.2</td>
<td>ASTM D 226 Type I</td>
<td>ASTM D 226 Type II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASTM D 4869 Type I, II, III or IV</td>
<td>ASTM D 4869 Type IV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASTM D 6757</td>
<td>ASTM D 6757</td>
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<tr>
<td>Clay and concrete tile</td>
<td>R905.3</td>
<td>ASTM D 226 Type II</td>
<td>ASTM D 226 Type II</td>
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<td></td>
<td>ASTM D 2626 Type I</td>
<td>ASTM D 2626 Type I</td>
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<tr>
<td></td>
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<td>ASTM D 6380 Class M mineral-surfaced roll roofing</td>
<td>ASTM D 6380 Class M mineral-surfaced roll roofing</td>
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<td>Metal roof shingles</td>
<td>R905.4</td>
<td>ASTM D 226 Type I or II</td>
<td>ASTM D 226 Type II</td>
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<td></td>
<td></td>
<td>ASTM D 4869 Type I, II, III or IV</td>
<td>ASTM D 4869 Type IV</td>
</tr>
<tr>
<td>Mineral-surfaced roll roofing</td>
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<td>ASTM D 226 Type I or II</td>
<td>ASTM D 226 Type II</td>
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<td></td>
<td></td>
<td>ASTM D 4869 Type I, II, III or IV</td>
<td>ASTM D 4869 Type IV</td>
</tr>
<tr>
<td>Slate and slate-type shingles</td>
<td>R905.6</td>
<td>ASTM D 226 Type I</td>
<td>ASTM D 226 Type II</td>
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<td>ASTM D 4869 Type IV</td>
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<td></td>
<td>ASTM D 4869 Type I, II, III or IV</td>
<td>ASTM D 4869 Type IV</td>
</tr>
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<td>Wood shakes</td>
<td>R905.8</td>
<td>ASTM D 226 Type I or II</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>ASTM D 4869 Type I, II, III or IV</td>
<td>ASTM D 4869 Type IV</td>
</tr>
<tr>
<td>Metal panels</td>
<td>R905.10</td>
<td>Manufacturer's instructions</td>
<td>ASTM D 226 Type II ASTM D 4869 Type IV</td>
</tr>
<tr>
<td>Photovoltaic shingles</td>
<td>R905.16</td>
<td>ASTM D 4869 Type I, II, III or IV</td>
<td>ASTM D 4869 Type IV</td>
</tr>
<tr>
<td>ROOF COVERING</td>
<td>SECTION</td>
<td>MAXIMUM ULTIMATE DESIGN WIND SPEED, $V_{ult}$</td>
<td>MAXIMUM ULTIMATE DESIGN WIND SPEED, $V_{ult}\geq140$ MPH</td>
</tr>
<tr>
<td>---------------</td>
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<td>---------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Asphalt shingles</td>
<td>R905.2</td>
<td>For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide sheets of underlayment, overlapping successive sheets 19 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. <strong>End laps shall be 4 inches and shall be offset by 6 feet.</strong></td>
<td>Same as Maximum Ultimate Design Wind Speed, $V_{ult}$</td>
</tr>
</tbody>
</table>

For roof slopes from two and one-half units vertical in 12 units horizontal ($2^{1/2}:12$), up to four units vertical in 12 units horizontal (4:12), underlayment shall be a minimum of two layers
| Clay and concrete tile | R905.3 | Same as Maximum Ultimate Design Wind Speed, $V_{\text{Ult}}$

applied as follows: starting at the eave, apply a 19-inch strip of underlayment parallel with the eave. Starting at the eave, apply 36-inch-wide strips of underlayment felt, overlapping successive sheets 19 inches. End laps shall be 4 inches and shall be offset by 6 feet. For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be a minimum of one layer of underlayment felt applied shingle fashion, parallel to and starting from the eaves and lapped 2 inches. End laps shall be 4 inches and shall be offset by 6 feet.

| Photovoltaic Shingles | R905.16 | Same as Maximum Ultimate Design Wind Speed, $V_{\text{Ult}} < 140$ mph except all laps shall be not less than 4 inches.

For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide sheets of underlayment, overlapping successive sheets 19 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall
not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.

For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide sheets of underlayment, overlapping successive sheets 19 inches, and fastened sufficiently to hold in place. End laps shall be 4 inches and shall be offset by 6 feet. For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 4 inches. End laps shall be 4 inches and shall be offset by 6 feet.

### TABLE R905.1.1 (3)
**UNDERLAYMENT ATTACHMENT**

<table>
<thead>
<tr>
<th>ROOF COVERING</th>
<th>SECTION</th>
<th>MAXIMUM ULTIMATE DESIGN WIND SPEED, $V_{ult}$</th>
<th>MAXIMUM ULTIMATE DESIGN WIND SPEED, $V_{ult} \geq 140$ MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt shingles</td>
<td>R905.2</td>
<td></td>
<td>The underlayment shall be attached with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at the side and end laps. Underlayment shall be attached using metal or plastic cap nails or</td>
</tr>
<tr>
<td>Clay and concrete tile</td>
<td>R905.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Code</td>
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<td>-------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Photovoltaic shingles</td>
<td>R905.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal roof shingles</td>
<td>R905.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mineral-surfaced roll roofing</td>
<td>R905.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slate and slate-type shingles</td>
<td>R905.6</td>
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<tr>
<td>Wood shingles</td>
<td>R905.7</td>
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<td>Wood shakes</td>
<td>R905.8</td>
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</tr>
<tr>
<td>Metal panels</td>
<td>R905.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Photovoltaic shingles**

- Fastened sufficiently to hold in place cap staples with a nominal cap diameter of not less than 1 inch.
- Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch for ring shank cap nails and 0.091 inch for smooth shank cap nails. Staples shall be not less than 21 gage. Cap nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or not less than \( \frac{3}{4} \) inch into the roof sheathing.

**Metal roof shingles**

- Manufacturer's installation instructions.

**Mineral-surfaced roll roofing**

- The underlayment shall be attached with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at the side and end laps.

**Slate and slate-type shingles**

- The underlayment shall be attached using metal or plastic cap nails or cap staples with a nominal cap diameter of not less than 1 inch.

**Wood shingles**

- Metal caps shall have a thickness of at least 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch for ring shank cap nails and 0.091 inch for smooth shank cap nails.
Staples shall be not less than 21 gage. Cap nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or not less than 3/4 inch into the roof sheathing.

For SI: 1 inch = 25.4 mm.

Revise as follows:

R905.16.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D 4869 or ASTM D 6757. Comply with Section R905.1.1.

R905.16.4.1 R905.16.3.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water, as designated in Table R301.2(1), an ice barrier that consists of not less than two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet barriers shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the exterior wall line of the building. Comply with Section R905.1.2.

Exception: Detached accessory structures that contain no conditioned floor area.

Delete without substitution:

R905.16.4 - Underlayment application. Underlayment shall be applied shingle fashion, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.

R905.16.4.2 - Underlayment and high winds. Underlayment applied in areas subject to high winds [above 140 mph (63 m/s), in accordance with Figure R301.2(4)A] shall be applied with corrosion resistant fasteners in accordance with the manufacturer’s installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the ultimate design wind speed equals or exceeds 150 mph (67 m/s) shall comply with ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied as required for asphalt shingles in accordance with Table R905.1.1(2). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25 mm) with a thickness of not less than 32-gage sheet metal. The cap-nail shank shall be not less than 12 gage (0.105 inches) with a length to penetrate through the roof sheathing or not less than 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

Reason: This proposal is primarily a clarification regarding the lapping requirements for underlayment and brings the underlayment requirements for PV shingles in line with other roof covering types. For the two-layer underlayment application on low-sloped roofs, ends of the underlayment should be lapped 4
inches and offset 6 feet as required for the single layer application. The language “fastened to sufficiently hold in place” should be deleted from the underlayment application table (Table R905.1.1(2)) because underlayment attachment is covered in Table R905.1.1(3) and contains specific fastening requirements for wind speeds greater than or equal to 140 mph. Also, Table R905.1.1(3) has been revised to clarify that fastener spacing is the same for side and end laps.

Underlayment requirements for PV shingles have been relocated to Section R905.1.1 with the underlayment requirements for other roof coverings. The underlayment types, fastening requirements and wind speed triggers have been revised for consistent with the other roof covering types as required in the 2015 IRC.

**Cost Impact:** Will increase the cost of construction

Will result in a cost increase for PV shingles in some areas. The wind speed trigger for the enhanced underlayment provisions has been slightly lowered resulting in it applying to more areas where PV shingles are installed. Underlayment provisions for PV shingles will be aligned with other roof covering types.
# 2015 International Residential Code

## TABLE R905.9.2

### BUILT-UP ROOFING MATERIAL STANDARDS

<table>
<thead>
<tr>
<th>MATERIAL STANDARD</th>
<th>STANDARD</th>
</tr>
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<tbody>
<tr>
<td>Acrylic coatings used in roofing</td>
<td>ASTM D 6083</td>
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<tr>
<td>Aggregate surfacing</td>
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<tr>
<td>Asphalt adhesive used in roofing</td>
<td>ASTM D 3747</td>
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<tr>
<td>Asphalt cements used in roofing</td>
<td>ASTM D 2822; D 3019; D 4586</td>
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<tr>
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<td>Asphalt coatings used in roofing</td>
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<td>Asphalt primer used in roofing</td>
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<td>Asphalt-saturated and asphalt-coated organic felt base sheet</td>
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<td>Asphalt-saturated organic felt (perforated)</td>
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<td>Coal-tar used in roofing</td>
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### TABLE R905.11.2
**MODIFIED BITUMEN ROOFING MATERIAL STANDARDS**

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<tr>
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<tr>
<td>Asphalt primer</td>
<td>ASTM D 41</td>
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<tr>
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### TABLE R905.14.3
**PROTECTIVE COATING MATERIAL STANDARDS**

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<td>Moisture-cured polyurethane coating</td>
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</table>

**Revise as follows:**

**R905.15.2 Material standards.** Liquid-applied roofing shall comply with ASTM C 836, C 957, D 1227, D 3468, D 6083, D 6694 or D 6947.
Reason: ASTM D 6083 has been withdrawn by ASTM and thus should no longer be referenced in the I-Codes.

Cost Impact: Will not increase the cost of construction
The proposed change is a clarification and does not change the stringency of existing code requirements so the cost of construction will be unchanged.
RB345-16
IRC: R905.15.3.
Proponent: James Kirby, representing Roof Coating Manufacturers Association, representing Center for Environmental Innovation in Roofing (jkirby@kellencompany.com)

2015 International Residential Code

R905.15.3 Application. Liquid-applied roofing shall be installed in accordance with this chapter and the manufacturer's approved installation instructions.

Reason: The proposal adds necessary language so that the application of roof coatings follows manufacturer's approved installation instructions.

Cost Impact: Will not increase the cost of construction
The proposal adds clarity and does not change code requirements.
2015 International Residential Code

Revise as follows:

R905.16.4.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 140 mph (63 m/s), in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with the manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the ultimate design wind speed equals or exceeds 150 mph (67 m/s) shall comply with ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied as required for asphalt shingles in accordance with Table R905.1.1(2). Underlayment shall be attached using metal or plastic cap nails or cap staples with a nominal head diameter of not less than 1 inch (25 mm) with . Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25mm). Minimum thickness of the outside edge plastic caps shall be 0.035 inch (0.89mm). The cap-nail shank shall be not less than 12 a minimum of 0.083 inch (2.11mm) for ring shank cap nails and 0.091 inch (2.31mm) for smooth shank cap nails. Staple gage (0.105 inches) shall be a minimum of 21 gage. The cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

Reason: Two proposals were submitted and approved in 2013 for the IRC (RB 429-13 and RB430-13). These proposals provided test results supporting the changes. The section on photovoltaic shingles was added during that same cycle and did not get picked up and included with the other underlayment sections in Table 905.1.1. This proposal brings this section into alignment with the other sections that have already been approved and are included in the 2015 IRC.

Cost Impact: Will not increase the cost of construction
This proposal will align the final section in the IRC with the rest of the underlayment sections and will allow the end user to utilize fasteners commercially available in the local markets.
RB347-16
IRC: R905.2.8.5.
Proponent: Richard Davidson, representing Self

2015 International Residential Code

Revise as follows:

R905.2.8.5 R903.2.3 Drip edge. A drip edge shall be provided at eaves and rake edges of shingle roofs. Drip edge shall be installed in accordance with the manufacturer's written installation instructions and this section. Adjacent segments of drip edge shall be overlapped not less than 2 inches (51 mm). Drip edges shall extend not less than 1/4 inch (6.4 mm) below the roof sheathing and extend up back onto the roof deck not less than 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at not more than 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Drip edge shall not be altered or bent except where necessary at changes of direction. Gutters, gutter covers, and similar devices shall be removed to allow for proper installation of drip edge. Underlayment shall be installed over the drip edge along eaves and under the drip edge along rake edges.

Reason: Drip edge is currently required only for asphalt shingle roofs. I read where the Committee believes drip edge should be required because it breaks "the capillary action" (see p 361 or the 2013 Report of the Committee Action Hearing Results for RB440-13). If this is true, then drip edge should be provided for all roofing materials, not just asphalt roofs. Capillary action and wind driven rain are not unique to asphalt roofs and can occur with every type of roofing. This proposal relocates the code section making it applicable to all roof types. The EPA states that "Drip-edge materials protect the edges of roof sheathing from water penetration due to driving rains" (http://www.epa.gov/indoorairplus/technical/moisture/roof_drip_edge.html). I believe driving rains can occur anywhere.

To level the playing field, this proposal would require drip edge for all roof types by moving this section to the beginning of the roofing chapter and provides additional direction on installation.

There is another proposal to exempt drip edge when reroofing occurs. If that proposal is approved, the sentence that reads "Gutters, gutter covers, and similar devices shall be removed to allow for proper installation of drip edge." should be amended out of this proposal.

Cost Impact: Will increase the cost of construction
This proposal will increase construction costs for roofing types other than asphalt.
2015 International Residential Code

Revise as follows:

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and rake edges of shingle roofs. Adjacent segments of drip edge shall be overlapped not less than 2 inches (51 mm). Drip edges shall extend not less than $\frac{1}{4}$ inch (6.4 mm) below the roof sheathing and extend up back onto the roof deck not less than 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at not more than 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the drip edge along rake edges.

   Exception: Reroofing.

   Reason: I read the following comment regarding committee action on a proposal regarding drip edge and the committee states that drip edge is not a problem for new construction (see page 361 of the 2013 Report of the Committee Action Hearing Results for RB440-13). This implies that it is a problem for reroofing and that is true, it is a problem for reroofing with existing gutters and other devices creating a problem for proper installation. This proposal provides an exception for reroofing. Many roofs were installed without drip edge and have performed perfectly. There is no reason to apply a new requirement to a roof that has performed as required by the code.

Cost Impact: Will not increase the cost of construction
This proposal reduces regulation and will not increase construction costs.
RB349-16
IRC: R905.2.8.5.
Proponent : Richard Davidson, representing Self

2015 International Residential Code
Revise as follows:

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and rake edges of shingle roofs where edges of roof sheathing are exposed. Adjacent segments of drip edge shall be overlapped not less than 2 inches (51 mm). Drip edges shall extend not less than $\frac{1}{4}$ inch (6.4 mm) below the roof sheathing and extend up back onto the roof deck not less than 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at not more than 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the drip edge along rake edges.

Reason: An internet search of the purpose drip edge serves provides limited evidence of its need. The most common suggestion is that it keeps rain off the fascia. I suspect that it takes very little wind to blow rain coming off a roof onto the fascia making this argument questionable. It isn't required by the roofing manufacturers. Probably the most reasonable argument that was found is on the EPA website which states that the purpose is to protect exposed edges of roof sheathing. Where there is a fascia or other architectural treatment that covers the edge of the roof sheathing, it seems like requiring drip edge is a waste. This proposal would require drip edge only on those roofs where edges of roof decking are exposed for consistency with the EPA "Best Practice" provisions. Best Practice: Roof Drip-edge: Metal drip edge material should be installed at all exposed edges of the roof decking. http://www.epa.gov/indoorairplus/technical/moisture/roof_drip_edge.html

Cost Impact: Will not increase the cost of construction
This proposal reduces regulation and will not increase construction costs.

RB349-16 : R905.2.8.5-
DAVIDSON10890
RB350-16
IRC: R905.8.2.
Proponent: T. Eric Stafford, PE, representing Institute for Business and Home Safety

2015 International Residential Code

R905.8.2 Deck slope. Wood shakes shall only be used on slopes of three four units vertical in 12 units horizontal (25-percent 33-percent slope) or greater.

Reason: This proposal simply corrects the minimum roof slope for using wood shakes for consistency with CSSB Manual and the IBC. The CSSB Manual requires a minimum 4:12 roof slope for wood shakes. Additionally, Section 1507.9.2 of the IBC states that wood shakes shall only be used on slopes of not less than 4:12.

Cost Impact: Will not increase the cost of construction
Correlates the minimum slope for wood shakes in the IRC with the CSSB manual and the IBC.
Add new definition as follows:

SECTION R202 DEFINITIONS

BUILDING-INTEGRATED PHOTOVOLTAIC ROOF PANEL (BIPV Roof Panel). A photovoltaic panel that functions as a component of the building envelope.

Add new text as follows:

R324.5.2 BIPV roof panels. BIPV roof panels shall comply with Section R905.17.

R905.17 BIPV roof panels applied directly to the roof deck. The installation of BIPV roof panels shall comply with the provisions of this section, Section R324 and NFPA 70.

R905.17.1 Deck requirements. BIPV roof panels shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.

R905.17.2 Deck slope. BIPV roof panels shall be used only on roof slopes of two units vertical in 12 units horizontal (2:12) or greater.

R905.17.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D4869 or ASTM D6757.

R905.17.4 Underlayment application. Underlayment shall be applied shingle fashion, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.

R905.17.4.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water, as designated in Table R301.2(1), an ice barrier that consists of not less than two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the exterior wall line of the building.

Exception. Detached accessory structures that contain no conditioned floor area.

R905.17.4.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 140 mph (63 m/s), in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with the manufacturer's installation instructions. Fasteners are to be applied along the overlap not further apart than 36 inches (914 mm) on center. Underlayment installed where the ultimate design wind speed equals or exceeds 150 mph (67 m/s) shall comply with ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm)
spacing at the side laps. Underlayment shall be applied as required for asphalt shingles in
accordance with Table R905.1.1(2). Underlayment shall be attached using metal or plastic cap
nails with a head diameter of not less than 12 gage (0.105 inches) with a length to penetrate
through the roof sheathing or not less than 3/4 inch (19 mm) into the roof sheathing.
Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be
permitted.

R905.17.5 Material standards. BIPV roof panels shall be listed and labeled in accordance with
UL 1703.

R905.17.6 Attachment. BIPV roof panels shall be attached in accordance with the
manufacturer's installation instructions.

R905.17.7 Wind resistance. BIPV roof panels shall be tested in accordance with UL
1897. BIPV roof panel packaging shall bear a label to indicate compliance with UL 1897.

Add new standard(s) follows:

SECTION UL Chapter 44 Referenced Standards
UL 1897-12 Uplift Tests for Roof Covering System

Reason: This proposal adds new sections to the IRC to address Building-integrated (BIPV) roof panels. These
products form part of the roof assembly and are subject to the same requirements as any other roof covering. As
opposed to BIPV Shingles that are already regulated by the code, these BIPV panels are larger and the wind
resistance is determined by UL 1897 Uplift Tests for Roof Covering System. The overall proposal contains four parts:

- A new definition for BIPV Roof Panel is added to Chapter 2
- A new section is added to R324 to point to the applicable technical requirements in Chapter 9 Roof
  Assemblies.
- A new section is added to Chapter 9 to detail the proper application of BIPV Roof Panels, including deck,
  underlayment, material standards and attachment requirements.
- A new standard, UL 1897 Uplift Tests for Roof Covering System is added to Chapter 44 of the IRC. This
  standard is already included in Chapter 34 of the IBC.

Cost Impact: Will not increase the cost of construction
This proposal does not increase the cost of construction. It adds another type of roof covering, enhancing builder
choices.
RB352-16
IRC: R906.2.
Proponent: Rick Roos, ROXUL Inc., representing ROXUL Inc. (richard.roos@roxul.com)

2015 International Residential Code

TABLE R906.2
MATERIAL STANDARDS FOR ROOF INSULATION

<table>
<thead>
<tr>
<th>Material</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular glass board</td>
<td>ASTM C 552</td>
</tr>
<tr>
<td>Mineral wool board</td>
<td>ASTM C 726</td>
</tr>
<tr>
<td>Composite boards</td>
<td>ASTM C 1289, Type III, IV, V or VI</td>
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<td>Expanded poly styrene</td>
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<td>Extruded poly styrene board</td>
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<td>Perlite board</td>
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<td>Poly isocyanurate board</td>
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<td>Wood fiberboard</td>
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<tr>
<td>Fiber-reinforced gypsum board</td>
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</tr>
<tr>
<td>Glass-faced gypsum board</td>
<td>ASTM C 1177</td>
</tr>
</tbody>
</table>

Reference standards type: This is an update to reference standard(s) already in the ICC Code Books
Add new standard(s) as follows:
ASTM C726-12 Standard Specification for Mineral Wool Roof Insulation Board

Reason: Reason:
This proposal will add reference to the appropriate ASTM Standard specification for mineral wool roof insulation and make Table R906.2 consistent with IBC Table 1508.2. This will help to ensure that roofing systems designed using mineral wool roof insulation will perform as intended by the IRC. This standard has been referenced in the IBC since the 2012 edition.

ASTM C 726 specifies the composition and physical properties of mineral fiber insulation board used above structural roof decks as a base for built-up roofing and single ply membrane systems in building construction.

The use of thermal insulation materials covered by this Standard are regulated by the codes in the same manner as the other materials in the Table. This Standard covers testing and conformance to the following physical properties:
compressive resistance, tensile strength, breaking load strength, water absorption, response to thermal and humid aging, linear dimensional change, thermal resistance, and dimensions.

**Cost Impact:** Will not increase the cost of construction
This proposal does not add to the cost of construction because it provides an additional, non-mandatory, alternative material that may or may not be used in these applications at the discretion of the user.
2015 International Residential Code

Revise as follows:

**R907.1 Rooftop-mounted photovoltaic systems.** Rooftop-mounted photovoltaic panels or modules installed on or above the roof covering shall be installed in accordance with this section, Section R324 and NFPA 70.

**R907.2 Wind resistance.** Rooftop-mounted photovoltaic panel or modules systems shall be installed to resist the component and cladding loads specified in Table R301.2(2) R907.1, considering edge distance, separation distance, roof slope, roof shape, and angle or panel relative to the roof slope below in accordance with Table R907.2 and adjusted for height and exposure in accordance with Table R301.2(3) R907.2. Net design wind loads determined by multiplying the basic net design wind load values in Table R907.1 by the adjustment factors in Table R907.2 shall not be less than 10 psf. Positive pressure act perpendicular to and towards the top surface of the photovoltaic panels and negative pressures act perpendicular to and away from the top surface of the photovoltaic panels.

**TABLE R907.1**

**NET WIND LOADS FOR DESIGN OF ROOF MOUNTED PHOTOVOLTAIC SYSTEMS INSTALLED ON GABLE AND HIPPED ROOFS**

| Roof Slope to 7 degrees | Array Slope | Zone | Effective Wind Area | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 130 | 140 |
|-------------------------|-------------|------|---------------------|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1                       | Parallel to Roof +/- 2 Degrees Max Height Above Roof < or = 10 inches (0.25 m) | 100 | 3.3  | -3.3  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 2                       | 100 | 4.4  | -4.4  | 0.0  | -4.9 | 0.0  | -5.4 | 0.0  | -5.9 | 0.0  | -6.5 | 0.0  | -7.1 | 0.0  | -7.7 | 0.0  | -9.1 | 0.0  |

*Table values are in pounds per square foot.*
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</table>

**20 degrees**
<p>| Roof &gt;20 to 27 degrees | Array | Panels | 1, 2e | 10 | 6.2 | - | 6.9 | - | 7.7 | - | 8.5 | - | 9.3 | - | 10.2 | - | 11.1 | - | 13.0 | - | 15.1 | |
| | | | 20 | 4.4 | - | 4.9 | - | 5.4 | - | 6.0 | - | 6.5 | - | 7.2 | - | 7.8 | - | 9.1 | - | 10.6 | |
| | | | 50 | 2.4 | - | 2.7 | - | 3.0 | - | 3.8 | - | 4.3 | - | 5.1 | - | 5.9 | |
| | | | 100 | 1.3 | - | 1.5 | - | 1.6 | - | 1.8 | - | 2.0 | - | 2.2 | - | 2.4 | - | 2.8 | - | 3.2 | |
| | Height Above Roof &lt; or = 10 inches (0.25 m) | | 2n,2r,3e | 10 | 6.2 | - | 6.9 | - | 7.7 | - | 8.5 | - | 9.3 | - | 10.2 | - | 11.1 | - | 13.0 | - | 15.1 | |
| | | | 20 | 4.4 | - | 4.9 | - | 5.4 | - | 6.0 | - | 6.5 | - | 7.2 | - | 7.8 | - | 9.1 | - | 10.6 | |
| | | | 50 | 2.4 | - | 2.7 | - | 3.0 | - | 3.3 | - | 3.6 | - | 4.0 | - | 4.3 | - | 5.1 | - | 5.9 | |
| | | | 100 | 1.3 | - | 1.5 | - | 1.6 | - | 1.8 | - | 2.0 | - | 2.2 | - | 2.4 | - | 2.8 | - | 3.2 | |
| | | 3r | 10 | 6.2 | - | 6.9 | - | 7.7 | - | 8.5 | - | 9.3 | - | 10.2 | - | 11.1 | - | 13.0 | - | 15.1 | |
| | | | 20 | 4.4 | - | 4.9 | - | 5.4 | - | 6.0 | - | 6.5 | - | 7.2 | - | 7.8 | - | 9.1 | - | 10.6 | |
| | | | 50 | 2.4 | - | 2.7 | - | 3.0 | - | 3.3 | - | 3.6 | - | 4.0 | - | 4.3 | - | 5.1 | - | 5.9 | |
| | | | 100 | 1.3 | - | 1.5 | - | 1.6 | - | 1.8 | - | 2.0 | - | 2.2 | - | 2.4 | - | 2.8 | - | 3.2 | |
| Array not Parallel to Roof +/- 2 Degrees | | | 1,2e,2n,2r,3e | 10 | 6.2 | - | 6.9 | - | 7.7 | - | 8.5 | - | 9.3 | - | 10.2 | - | 11.1 | - | 13.0 | - | 15.1 | |
| | | | 20 | 4.4 | - | 4.9 | - | 5.4 | - | 6.0 | - | 6.5 | - | 7.2 | - | 7.8 | - | 9.1 | - | 10.6 | |
| | | | 50 | 2.4 | - | 2.7 | - | 3.0 | - | 3.3 | - | 3.6 | - | 4.0 | - | 4.3 | - | 5.1 | - | 5.9 | |
| | | | 100 | 1.3 | - | 1.5 | - | 1.6 | - | 1.8 | - | 2.0 | - | 2.2 | - | 2.4 | - | 2.8 | - | 3.2 | |</p>
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ICC COMMITTEE ACTION HEARINGS :: April, 2016
RB860
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a. A minimum gap of 0.25 inches (6.4 mm) shall be provided between all panels.
b. Arrays shall be located a minimum distance from the roof edge, a gable ridge, or a Hip ridge, equal to two times the maximum height of the panel above the roof, measured perpendicular to the plane of the roof below.
c. See Figure R907.1 for location of zones.

**FIGURE R907.1**
ROOFTOP-MOUNTED PHOTOVOLTAIC SYSTEMS WIND PRESSURE ZONES

![Gable and Flat Roofs θ ≤ 7°](image)
Gable Roofs $7 < \theta \leq 45^\circ$

Gable Roofs $7 < \theta \leq 45^\circ$
### TABLE R907.2
HEIGHT AND EXPOSURE ADJUSTMENT FACTORS FOR TABLE R907.1

<table>
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<tr>
<th>Mean Roof Height</th>
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**Reason:** The proposed changes will align the IRC wind loads with new provisions in ASCE 7-16 for addressing wind loading of roof-mounted photovoltaic systems. The ASCE provisions are split into two categories consisting of systems with any angle of inclination relative to the roof slope mounted on relatively flat roofs (slope less than or equal to 7 degrees) and those that are mounted on sloped roofs where the panels are mounted close to the roof surface and essentially parallel to the roof surface below. The wind loads for arrays mounted on low slope roofs use the coefficients provided in ASCE 7-16 for that case, which are lower than the loads produced by using the second procedure which starts with the roof pressure coefficients for the roof below. The ASCE 7-16 procedure for determining wind loads on arrays mounted close to the roof surface and essentially parallel to the roof surface below is similar to the basic procedure used in the 2015 IRC except that the slope of the panels is constrained to +/- 2 degrees of the slope of the roof surface and the panels have to be no more than 10 inches away from the roof surface. The provisions also allow a reduction for pressure equalization across the panels; but add requirements for minimum gaps between panels. Footnotes have been added to spell out these restrictions and the net design pressures have been reduced to take advantage of this effect. ASCE 7-15 provisions for both cases include a factor that increases the loads for perimeter panels in an array or for arrays that have too large spacing between rows. Because residential installations may be small enough that the number of panels not subjected to the increased loads may be small, the loads provided in Table R907.1 include that edge factor. A footnote is included that allows a reduction in loads for interior panels for systems installed parallel to the roof that are not located in the perimeter locations identified in ASCE 7-15 nor farther apart than allowed in the ASCE 7-15 provisions. ASCE 7-15 does not address systems where panels with slopes differing from the roof slope are mounted on roofs with slopes greater than 7 degrees. However, the 2105 IRC contains no restrictions on the use of roof pressures for these installations. In order to continue to provide loading information for these types of installations, data from
studies conducted in the 1970's was used to provide reasonable estimates of net design loads. The result is that the design loads for portions of the arrays located in areas with the lowest roof pressure zones have been increased to those of the next higher roof zone and the reduction for interior panels is not allowed.

**Cost Impact:** Will increase the cost of construction
Some loads will increase because of the higher roof pressures used as the basis for calculation of wind loads on arrays mounted on roofs with slopes greater than 7 degrees. These increases will be reduced somewhat by the addition of the equalization factor which was not included in 2015 IRC provisions. Wind loads for systems mounted on flat roofs will decrease. Consequently, there will be some increases in costs for some installations and decreases for others.
2015 International Residential Code

Revise as follows:

R907.2 R324.4.2 Wind resistance load. Roof-mounted photovoltaic panel or modules systems and their supports shall be installed designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

Reason: This proposal places the requirement for PV panel wind design in the same location as the other design load requirements. Section R324.4 does not contain the wind load requirements for PV panels, although it references Section 907, which does. This proposal moves the text to a new section R324.4.2, so the requirement does not get missed. The phrase, "and their supports" was added to clarify that a complete load path must be provided to resist the wind loads. A separate proposal addresses roof loads.

Cost Impact: Will not increase the cost of construction
This proposal only moves a requirement and provides clarification and does not result in a change of design or construction.
2015 International Residential Code

Revise as follows:

**SECTION R908 APPENDIX AX**

**REROOFING**

**R908.1 AX101.1 General.** Materials and methods of application used for re-covering or replacing an existing roof covering shall comply with the requirements of Chapter 9.

**Exceptions:**
1. Reroofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section R905 for roofs that provide positive roof drainage.
2. For roofs that provide positive drainage, re-covering or replacing an existing roof covering shall not require the secondary (emergency overflow) drains or scuppers of Section R903.4.1 to be added to an existing roof.

**R908.2 AX101.2 Structural and construction loads.** No change to text.

**R908.3 AX101.3 Roof replacement.** Roof replacement shall include the removal of existing layers of roof coverings down to the roof deck.

**Exception:** Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section R905.

**R908.3.1 AX101.3.1 Roof re-cover.** The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions
2. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs where applied in accordance with Section R908.4.
4. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear-off of existing roof coverings.

**R908.3.1.1 AX101.3.1.1 Roof re-cover not allowed.** A roof re-cover shall not be permitted where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the
point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

R908.4 **AX101.4 Roof re-covering.** No change to text.

R908.5 **AX101.5 Reinstallation of materials.** No change to text.

R908.6 **AX101.6 Flashings.** No change to text.

**Reason:** The purpose of this proposal is to move the reroofing section to an appendix. Years ago reroofing was only found in an appendix.

An oft asked question from homeowners regarding permits for reroofing is “what do you look at?”

Realistically, not much.

You can require the roofing contractor/homeowner to coordinate inspections with the building department at the time reroofing occurs. The problem is that schedules of roofing contractors can change on short notice with the weather. And homeowners like working evenings and weekends. Building departments may have inspection schedules set days in advance. They may not be able to respond on short notice. Also, they may not be able to conduct repeat visits on the same day as progress with different portions of the roof occurs. Building departments cannot afford and permit fees do not cover the cost of maintaining an inspector on site during the duration of the work. At best, you will see only a small portion of any given reroofing job which leaves plenty of opportunity for violations to occur on a roof that could be argued was inspected.

Alternatively, the inspection can be conducted after the work is complete. But then access to the roof is required to be provided by the applicant. This insures that the roofing contractor will need to be on site for the inspection meaning they will need to set up an appointment a few days or more after the work is complete and make an extra trip to the site. But frost, rain, ice and snow can make roofs treacherous delaying inspections and some administrations may prohibit their inspection staff from going onto roofs to reduce risk of falls and injuries. Even if you do, you can’t see the ice and water barrier, the underlayment, much of the flashing, or the nailing. What does the permit holder get for his fee?

Then comes the issues of fall protection and proper equipment for accessing the roof and what you look at during the inspection. If you attempt to remove roofing materials to view any of the components such as the nailing, flashing, underlayment, or ice and water barrier, you risk damaging shingles or breaking the adhesive seal. And walking on some roof types tends to damage roofs, especially asphalt roofs on hot days.

You can require pictures for compliance but then comes the issue of validating that the picture is of exactly the address that you are inspecting. Do you allow pictures for other inspections? If not, why not? Are pictures equal to seeing something first hand. Most would argue that it is not. And then there is the issue of pictures being lost. What do you do if pictures are lost?

Obviously the permit holder is getting little for their fee. And they realize this and object to paying a permit fee for so little value. And homeowners call elected officials and elected officials wonder what their staff are doing to validate a permit fee. It is a lose, lose, lose situation.

This entire section needs to be moved to the appendix where it can be adopted by those jurisdictions if desired. This proposal does just that.

**Cost Impact:** Will not increase the cost of construction

This proposal will reduce construction costs by eliminating regulation.
2015 International Residential Code

Revise as follows:

R908.1 General. Materials and methods of application used for re-covering or replacing an existing roof covering shall comply with the requirements of Chapter 9.

Exceptions:

1. Reroofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section R905 for roofs that provide positive roof drainage.

2. For roofs that provide positive drainage, re-covering or replacing an existing roof covering shall not require the secondary (emergency overflow) drains or scuppers of Section R903.4.1 to be added to an existing roof.

3. An ice barrier shall not be required when a roof re-cover occurs.

Reason: Most ice barrier installation instructions are limited to application directly to the roof deck and not to an existing roof. Because the code currently states that recovering an existing roof must comply with the requirements of Chapter 9 some building officials are ruling that several feet of an existing roof be removed to allow for the ice barrier installation. This creates other installation and aesthetic issues that sometimes still require complete removal of the existing roof. That is not what was intended when the membership voted to allow re-covers to occur. This proposal provides an exception allowing the exclusion of the ice barrier when a roof re-cover occurs.

Cost Impact: Will not increase the cost of construction

This proposal will not increase costs because it reduces regulation.
RB357-16
IRC: R909.2.
Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov)

2015 International Residential Code

Revise as follows:

R909.2 Structural requirements. Rooftop-mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof upon which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

Exception: The roof structure shall be deemed to be adequate to support the load of the rooftop solar photovoltaic panel system if all of the following requirements are met:

1. The solar photovoltaic panel system is designed for the wind speed of the local area, and is installed per the manufacturer’s specifications.
2. The ground snow load does not exceed 70 pounds per square foot.
3. The total dead load of modules, supports, mountings, raceways, and all other appurtenances is no more than four pounds per square foot.
4. The photovoltaic panels are not mounted more than 18 inches above the surface of the roofing to which they are affixed.
5. Supports for the solar modules are to be installed to spread the dead load across as many roof-framing members as needed, so that no point load exceeds 50 pounds.

Reason: Compliance with the 5 requirements in the proposed exception precludes the need to modify the design per Section R909.2. These "demanded to comply" requirements have been used in the State of Washington to eliminate the need for the applicant to provide engineering documentation to prove that photovoltaic panels will not overload the roof structure. Sections R324, R907 & R2301 are related to this subject but Section R909.2 appears to be the most logical location to place the proposed exception.

Cost Impact: Will not increase the cost of construction
Approval of this proposal will not increase the cost of installation and in fact may reduce the cost because engineering calculations would not be required in most cases.
2015 International Residential Code

Revise as follows:

R1001.1 General. Masonry fireplaces shall be constructed in accordance with this section and the applicable provisions of Chapters 3 and 4 and Section R1003.

Reason: The IRC Commentary states the following: “This section outlines the general code requirements regarding construction details for all masonry chimneys including those serving fireplaces regulated by Section 1003.” Currently Section R1001.1 of the IRC does not provide tracking in the code, to send the user to Section 1003 addressing masonry chimneys. This tracking is needed to complete the code and the code language for construction of masonry fireplaces.

Cost Impact: Will not increase the cost of construction
This change is nothing more than adding language to provide to the user of the code, language that will tie the masonry fireplace code requirements together with the masonry chimney requirements in the code. Without this change there is no technical way to tie them together.
2015 International Residential Code

Add new text as follows:

**R1005.8 Insulation shield** Where factory-built chimneys pass through insulated assemblies, an insulation shield constructed of steel having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage) shall be installed to provide clearance between the chimney and the insulation material. The clearance shall not be less than the clearance to combustibles specified by the chimney manufacturer's installation instructions. Where chimneys pass through attic space, the shield shall terminate not less than 2 inches (51 mm) above the insulation materials and shall be secured in place to prevent displacement. Insulation shields provided as part of a listed chimney system shall be installed in accordance with the manufacturer's installation instructions.

**Reason:** The codes currently require insulation shields for vents to ensure proper clearance to insulation so as not to cause a fire hazard, the code should also require insulation shields for factory-built chimneys as they also require clearance to insulation and it represents a fire hazard when one is not installed.

**Cost Impact:** Will not increase the cost of construction
Will not increase cost as the insulation shield should already be used, however, when the code does not call it out as required many times it gets overlooked.
2015 International Residential Code

Revise as follows:

**AE101.1 General.** These provisions shall be applicable only to a *manufactured home* used as a single *dwelling unit* installed on privately owned (nonrental) lots and shall apply to the following:

1. Construction, *alteration* and repair of any foundation system that is necessary to provide for the installation of a *manufactured home* unit.
2. Construction, installation, *addition*, *alteration*, repair or maintenance of the building service *equipment* that is necessary for connecting *manufactured homes* to water, fuel, or power supplies and sewage systems.
3. *Alterations*, *additions* or repairs to existing *manufactured homes*. The construction, *alteration*, moving, demolition, repair and use of accessory buildings and structures, and their building service *equipment*, shall comply with the requirements of the codes adopted by this jurisdiction.

These provisions shall not be applicable to the design and construction of *manufactured homes* and shall not be deemed to authorize either modifications or *additions* to *manufactured homes* where otherwise prohibited.

**Exception:** In addition to these provisions, new and replacement *manufactured homes* to be located in flood hazard areas as established in Table R301.2(1) of the *International Residential Code* shall meet the applicable requirements of Section R322 of the *International Residential Code*.

Add new text as follows:

**AE101.2 Flood hazard areas.** New and replacement *manufactured homes* to be installed in flood hazard areas as established in Table R301.2(1) of the *International Residential Code* shall also meet the applicable requirements of Section R322 of the *International Residential Code*.

**Reason:** This proposal is editorial. The text current in an exception should be a separate section. It is not good code writing to have an exception written to add to the basic requirement.

**Cost Impact:** Will not increase the cost of construction
Proposal only clarifies and puts the provision in proper format.
2015 International Residential Code

Add new definition as follows:

SECTION R202 ACTIVE SOIL DEPRESSURIZATION (ASD) SYSTEM.
A system using a fan-powered vent drawing air from beneath a slab or membrane designed to achieve lower air pressure under the sub-slab or sub-membrane relative to air pressure above the slab or membrane.

SECTION R202 DRAIN TILE LOOP.
A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a basement or crawl space footing.

SECTION R202 RADON GAS.
A naturally-occurring, radioactive, cancer-causing gas that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.

SECTION R202 ROUGH-IN.
The installation of all parts and materials of an active soil depressurization system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials include gas permeable layers, soil gas retarding plenums, membranes, piping, suction inlets, discharge outlets and wiring.

SECTION R202 SOIL GAS RETARDER.
A continuous membrane of 6-mil (0.15 mm) polyethylene or other equivalent material used to retard the flow of soil gases into a building.

SECTION R202 SUB-MEMBRANE DEPRESSURIZATION SYSTEM.
An active soil depressurization system designed to achieve lower sub-membrane air pressure relative to crawl space air pressure by use of a fan powered vent drawing air from beneath the soil gas retarder membrane.

SECTION R202 SUB-SLAB DEPRESSURIZATION SYSTEM.
An active soil depressurization system designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the floor slab.

Add new text as follows:

SECTION R327 RADON CONTROL METHODS
R327.1 General. Where provided, the design and installation of radon control methods for new construction shall comply with one of the following:

1. Section R327, or
2. State or local requirements, where applicable.

R327.2 Intent. Radon control methods are intended to reduce radon entry and prepare the building for post-construction radon mitigation.

R327.3 Active soil depressurization system rough-in. A rough-in is required for all foundations and combination foundation types, including crawlspace, basement, slab on grade, and slab on grade garage located below a living area as shown in Figure R327.3

FIGURE R327
Foundation Types

R327.4 Sub-slab depressurization system rough-in. In basement or slab-on-grade buildings, the components of a sub-slab depressurization system shall be installed during construction in accordance with Sections R327.4.1 through R327.4 and R327.5 through R327.8.9.

R327.4.1 Gas permeable layer. To facilitate future installation of an active soil depressurization system, a gas-permeable layer shall be constructed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building. The gas-permeable layer shall be designed to allow the lateral flow of soil gases and consist of one of the following:

1. A uniform layer of clean aggregate, not less than 4 inches (102 mm) in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or a Size Number 4, 5, 56, or 6 as classified by ASTM C33.
2. A uniform layer of native or fill sand, a minimum of 4 inches (102 mm) in depth, overlain by a layer or strips of geotextile drainage matting or loop of perforated pipe. The geotextile drainage matting shall have a cross-sectional
area of at least 12 square inches (774 sq mm). The geotextile matting shall be placed not closer than 12 inches (305 mm) to the foundation wall around the interior of the foundation perimeter.

3. A loop of 4 inch (102 mm) nominal or larger size perforated pipe placed in a trench along the perimeter of the foundation, with the trench backfilled with clean aggregate having a void ratio of not less than 35 percent or a size number 4, 5, 56, or 6 as classified by ASTM C33 such that the pipe is surrounded by a not less than 4 inches (102mm) of aggregate on all sides. The pipe shall be placed not closer than 12 inches (305 mm) to the foundation wall around the interior of the foundation perimeter.

4. Other materials, systems or floor designs with demonstrated capability for depressurization across the entire sub-floor area.

R327.4.2 Soil gas retarder. A minimum 6-mil (0.15 mm), or 3-mil (0.075 mm) cross-laminated, polyethylene or equivalent flexible sheeting material shall be placed on top of the gas permeable layer prior to casting the slab or placing the floor assembly. The sheeting shall cover the entire floor area with separate sections of sheeting lapped not less than 12 inches (305 mm). Openings in the sheeting caused by pipe, wire and other penetrations shall be sealed. Punctures or tears in the material shall be sealed or covered with additional sheeting. Where under slab insulation is installed, it shall be placed on top of the sheeting.

R327.4.3 Vent pipe connector. A 3 inch nominal (76 mm) or larger size ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the gas permeable layer before the slab is cast. A tee fitting or equivalent method shall be used to secure the pipe opening within the gas permeable layer. Not less than 5 feet (1524 mm) of perforated pipe shall be connected to the two horizontal openings of the tee fitting or the two horizontal openings shall be connected to the interior drain tile system.

Alternatively, the 3 inch nominal (76 mm) size pipe shall connect through a sealed sump cover where the sump communicates directly with the sub-slab aggregate or with it through a drainage system. A flexible rubber coupling connector shall be provided at the sump cover connection to facilitate servicing the sump.

R327.4.4 Sub-membrane depressurization system rough-in. In buildings with crawl space foundations, the components of a sub-membrane depressurization system shall be installed during construction in accordance with Sections R327.4.4.1 through R327.4.4.3.

Exception: Buildings in which an approved mechanical crawl space ventilation system is installed.

R327.4.4.1 Ventilation. Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.

Exception: Outdoor ventilation is not required for conditioned crawl spaces.
R327.4.4.2 Soil gas-membrane.
The soil in crawl spaces shall be covered with a continuous layer of soil gas-membrane complying with ASTM E1745 Class A, B or C. The membrane shall be lapped not less than 12 inches (305 mm) at joints and shall extend upwards 12 inches (305 mm) and be sealed to all foundation walls enclosing the crawl space area.

R327.4.4.3 Vent pipe connector.
A tee fitting shall be installed beneath the soil gas membrane with not less than 10 feet of perforated pipe connected to the two horizontal openings of such fitting or the two horizontal openings of the tee fitting shall connect to the interior drain tile system. The branch opening of the tee fitting shall be connected to the vent pipe in accordance with Section R327.5.

R327.5 Vent pipe.
A 3 inch (76 mm) nominal size or larger ABS, PVC or equivalent gas-tight pipe shall be extended from the tee fitting up through the building floors and in accordance with Sections R327.5.1 through R327.5.8.

R327.5.1 Vent pipe termination.
The vent pipe shall terminate vertically upward not less than 12 inches (305 mm) above the roof in a location not less than 10 feet (3048 mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point. The vent pipe shall terminate not less than 10 feet (3048 mm) from windows or other opening in adjoining or adjacent buildings.

R327.5.2 Vent pipe drainage.
Components of the radon vent pipe system shall be installed to provide condensation drainage to the ground beneath the slab or soil gas retarder.

R327.5.3 Vent pipe installation.
Components of the radon vent pipe system shall be installed in accordance with Section 512 of the International Mechanical Code.

R327.5.4 Vent pipe identification.
Exposed and visible interior radon vent pipes shall be identified with not less than one label on each floor level and in crawlspaces and accessible attics. The label shall read: "Radon Vent."

R327.5.5 Combination foundations.
Combination basement and crawl space and combination slab-on grade and crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

R327.5.6 Multiple vent pipes.
In buildings where interior footings or other barriers separate areas of sub-slab aggregate or other gas-permeable material, each area shall be fitted with an individual
vent pipe or a pipe loop shall connect such areas below the slab. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

R327.5.7 Vent pipe accessibility. Radon vent pipes shall be provided with access in an attic or other area outside the habitable space for the purpose of installing an active soil depressurization system fan. Exception: Where an approved electrical supply is installed on the roof for future use.

R327.5.8 Provisions for fan. A cylindrical space having a vertical height of not less than 48 inches (122 cm) and a diameter of not less than 21 inches (53 cm) shall be provided in the location where an active soil depressurization fan would be installed. The active soil depressurization pipe shall be centered in this space. The space provided for the active soil depressurization system fan shall be located in accordance with Section R327.6.

R327.6 Active soil depressurization system fan locations. Active soil depressurization system fans shall be installed outdoors, in attics or in garages that are not beneath conditioned spaces. Active soil depressurization system fans shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in any basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. Active soil depressurization system fans shall not be installed in any location where pipe positively pressured by the fan would be located inside conditioned or occupiable space.

R327.7 Power source. To provide for future installation of an active soil depressurization system fan, an electrical circuit that terminates in an approved junction box shall be installed in the attic or other anticipated location of active soil depressurization system fans.

R327.8 Entry routes. Potential radon entry routes shall be closed in accordance with Sections R327.8.1 through R327.8.9.

R327.8.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires and other objects that penetrate concrete slabs or floor assemblies shall be sealed in a permanent manner.

R327.8.2 Concrete joints. Control joints, isolation joints, construction joints and other joints in concrete slabs and between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk complying with ASTM C920 class 25 or higher or equivalent method applied in accordance with the manufacturer’s instructions.

R327.8.3 Foundation and condensation drains. Foundation and HVAC condensate drains routed below the soil gas retarder area shall be isolated through a plumbing trap or routed through non-perforated pipe to outdoors.
R327.8.4 Sumps.
Sump pits open to soil or serving as the termination point for sub-slab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a sub-slab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

R327.8.5 Foundation walls.
Hollow block masonry foundation walls shall be constructed with a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface to prevent passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed. Joints, cracks and other openings around penetrations of both exterior and interior surfaces of masonry block and wood foundation walls below the ground surface shall be filled with polyurethane caulk complying with ASTM C920 class 25 or higher, or equivalent method applied in accordance with the manufacturer’s recommendations. Penetrations of concrete walls shall be sealed.

R327.8.6 Damp proofing.
The exterior surfaces of portions of concrete and masonry block walls below the ground surface shall be damp proofed in accordance with Section R406.

R327.8.7 Air handling units.
Air-handling units in crawl spaces shall be sealed to prevent air from being drawn into the unit.

R327.8.8 Crawlspace floors.
Openings around penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.

Exception: Air sealing is not required for floors above conditioned crawl spaces complying with Section R408.3.2.2.

R327.8.9 Crawlspace access.
Access doors and other openings or penetrations between basements and adjoining crawl spaces shall be closed, gasketed or otherwise filled to prevent air leakage.

Exception: Air sealing is not required for conditioned crawl spaces conforming to Section R408.3.2.2.

Reason: The inclusion of this section into the IRC reflects the intent of the International Residential Code of providing minimum requirements to ensure the public health and safety. This proposed change does not require Radon Control Methods, rather it creates a uniform method of design, installation and inspection when Radon Control Methods are used during new construction.

Currently RRNC is being provided in new construction in most jurisdictions without a means for the building inspector to evaluate the work performed. Four states do have statewide RRNC Codes, but local jurisdictions must adopt them. Nineteen states do not have statewide RRNC codes, but do have some local jurisdictions that have RRNC codes. Seven states do have statewide RRNC Codes that apply to designated jurisdictions. Twenty States and three Districts/Territories do not have any statewide or local jurisdictions that have RRNC Codes.

The Federal government has recently published the Federal Radon Action Plan (FRAP), a collaborative effort led by
the Environmental Protection Agency, Department of Health and Human Services, Department of Agriculture, Department of Defense, Department of Energy, Department of Housing and Urban Development (HUD), Department of Interior, Department of Veterans Affairs and the General Services Administration. One of the goals of the FRAP is to increase to 100% the number of new single family homes constructed with RRNC by 2020. As part of HUD's commitment to healthy housing, they now require RRNC in 100% of multi-family communities constructed or renovated in Zone 1 counties that have HUD backed mortgages and currently support changes in radon requirements for all Federal Housing Finance Agency (FHFA) single family mortgages (this is 90% of all mortgages).

According to the NAHB, 1.5 million homes were constructed with RRNC between 1990 and 2006. This number is likely twice that today, yet only a small percentage of them have been inspected to ensure they are properly constructed.

According to the NAHB, more than half of the NAHB members incorporate green practices into development, design and construction of new homes.

There is precedent in the IRC for the inclusion of the requirements of the proposal. Many chapters in the Code pertain to elements of construction that are not required in all homes, but are present in order to provide a means of design, installation and inspection (Chapter 10 Chimneys and Fireplaces, Chapter 18 Chimneys and Vents, Chapter 19 Special Fuel-burning Equipment, Chapter 21 Hydronic Piping, Chapter 22 Special Piping and Storage Systems, Chapter 23 Solar Systems, Chapter 24 Fuel Gas).

Bibliography:
List of state and local RRNC Codes:  http://www.epa.gov/radon/building-codes-radon-resistant-new-construction-rrnc
References to NAHB RRNC statistics:  http://www.epa.gov/radon/radon-resistant-new-construction-home-buyers
Law suit against builder for incorrectly installed RRNC:  (http://www.journal-news.net/page/content/detail/id/511633.html) and (http://www.lehighvalleylive.com/warren-county/index.ssf?/base/new-s-3/1287115540270780.xml&coll=3)

Cost Impact: Will not increase the cost of construction
This proposal does not require Radon Control Systems to be installed, however it will apply a minimum standard to those that are being installed. If systems are currently being installed correctly, the only impact of the proposal is the local code official will now have a means of inspecting the installed system. If systems are currently being installed incorrectly, the proposal may actually reduce cost to a builder from potential corrective action or legal financial liability created by systems being incorrectly installed.

A review of the standard(s) proposed for inclusion in the code, ASTM E1745-11, Standard Specification for Plastic Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2015.
Delete and substitute as follows:

APPENDIX F PASSIVE RADON GAS CONTROLS

CONTROL METHODS

AF101.1 General. This appendix contains requirements for new construction in jurisdictions where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques, rather than passive techniques, shall be permitted to be used where approved.

Inclusion of this appendix by jurisdictions shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

SECTION AF102 DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

Add new definition as follows:

AF102.1 ACTIVE SOIL DEPRESSURIZATION (ASD) A system using a fan-powered vent drawing air from beneath a slab or membrane designed to achieve lower air pressure under the sub-slab or sub-membrane relative to air pressure above the slab or membrane.

Delete without substitution:

DRAIN TILE LOOP.
A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a basement or crawl space footing.

ENCLOSED CRAWL SPACE.
A crawl space that is enclosed with foundation walls inclusive of any windows, doors, access openings and required vents.

GAS-PERMEABLE LAYER.
A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is not less than 4 inches (102 mm) thick.
aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a $\frac{3}{4}$-inch (6.4 mm) sieve.

2. A uniform layer of sand (native or fill) that is not less than 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's instructions.

Delete and substitute as follows:

**AF102.1 RADON GAS.** A naturally occurring, chemically inert, radioactive gas. A naturally-occurring, radioactive, cancer-causing gas that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.

Add new definition as follows:

**AF102.1 ROUGH-IN** The installation of all parts and materials of an ASD system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials include gas permeable layers, soil gas retarders, plenums, membranes, piping, suction inlets, discharge outlets and wiring.

Delete and substitute as follows:

**SOIL-GAS-RETARDER.** A continuous membrane of 6 mil (0.15 mm) polyethylene used to retard the flow of soil gases into a dwelling. A continuous membrane of 6-mil [0.15 mm] polyethylene or other equivalent material used to retard the flow of soil gases into a building.

**SUBMEMBRANE DEPRESSURIZATION SYSTEM.** A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent drawing air from beneath the soil gas retarder membrane. An ASD system designed to achieve lower sub-membrane air pressure relative to crawl space air pressure by use of a fan powered vent drawing air from beneath the soil gas retarder membrane.

**SUBSLAB DEPRESSURIZATION SYSTEM (Passive).** A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent pipe drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground. An ASD system designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the floor slab.

Delete without substitution:

**VENT PIPE.**

No change to text.

**AF102**

RADON-RESISTANT CONSTRUCTION DETAILS FOR FOUR FOUNDATION TYPES
Revise as follows:

SECTION AF103 PASSIVE RADON-RESISTANT SYSTEM REQUIREMENTS

Delete and substitute as follows:
AF103.1 General. The following components of a passive submembrane or subslab depressurization system shall be installed during construction.
AF103 is required in areas where designated by the jurisdiction and is intended to reduce radon entry and prepare the building for post-construction radon mitigation.

AF103.2 Entry routes ASD System Rough-in. Potential radon entry routes shall be closed in accordance with Sections AF103.2.1 through AF103.2.8.
A rough-in is required for all foundations and combination foundation types, including crawlspace, basement, slab on grade, and slab on grade garage located below a living area as shown in Figure AF103.2

![Figure AF103.2 FOUNDATION TYPES](image)

Delete without substitution:

AF103.2.6 Ducts. Ductwork passing through or beneath a slab within a dwelling shall be of seamless material unless the air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed.
Ductwork located in enclosed crawl spaces shall have seams and joints sealed by closure systems in accordance with Section M1601.4.1.

Delete and substitute as follows:

AF103.3 Basements or enclosed crawl spaces with soil floors Sub-slab depressurization system rough-in. In dwellings with basements or enclosed crawl spaces with soil floors, the following components of a passive submembrane depressurization system shall be installed during construction.

Exception: Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with Section R408.3.

In basement or slab-on-grade buildings, the components of a sub-slab depressurization system shall be installed during construction in accordance with AF103.3.1 through AF103.3 and AF103.5 through AF108.9.
AF103.3.1 Soil-gas-retarder Gas permeable layer. The soil in basements and enclosed crawl spaces shall be covered with a soil gas retarder. The soil gas retarder shall be lapped not less than 12 inches (305 mm) at joints and shall extend to foundation walls enclosing the basement or crawl space. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. Punctures or tears in the material shall be sealed or covered with additional sheeting.

To facilitate future installation of an ASD system, a gas-permeable layer shall be constructed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building.

The gas-permeable layer shall be designed to allow the lateral flow of soil gases and consist of one of the following:

1. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or a Size Number 4, 5, 56, or 6 as classified by ASTM C33.
2. A uniform layer of native or fill sand, a minimum of 4 inches [102 mm] in depth, overlain by a layer or strips of geotextile drainage matting or loop of perforated pipe. The geotextile drainage matting shall have a cross-sectional area of at least 12 square inches [774 sq mm]. The geotextile matting shall be placed no closer than 12 inches [305 mm] to the foundation wall around the interior of the foundation perimeter.
3. A loop of 4 inch [102 mm] nominal or larger size perforated pipe placed in a trench along the perimeter of the foundation, with the trench backfilled with clean aggregate having a void ratio of not less than 35 percent or a Size Number 4, 5, 56, or 6 as classified by ASTM C33 such that the pipe is surrounded by a minimum of 4 inches [102mm] of aggregate on all sides. The pipe shall be placed no closer than 12 inches [305 mm] to the foundation wall around the interior of the foundation perimeter.
4. Other materials, systems or floor designs with demonstrated capability for depressurization across the entire sub-floor area.

AF103.3.2 “T” fitting and vent pipe Soil gas retarder. A 3- or 4-inch “T” fitting shall be inserted beneath the soil gas retarder and be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate not less than 12 inches (305 mm) above the roof in a location not less than 10 feet (3048 mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point.

A minimum 6-mil [0.15 mm] (or 3-mil [0.075 mm] cross-laminated) polyethylene or equivalent flexible sheeting material shall be placed on top of the gas permeable layer prior to casting the slab or placing the floor assembly. The sheeting shall cover the entire floor area with separate sections of sheeting lapped not less than 12 inches [305 mm]. Openings in the sheeting caused by pipe, wire and other penetrations shall be sealed. Punctures or tears in the material shall be sealed or covered with additional sheeting. Where under slab insulation is installed, it shall be placed on top of the sheeting.

Add new text as follows:

AF103.3.3 Vent pipe connector. A 3 inch nominal [76 mm] or larger size ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the gas permeable layer before the slab is cast. A tee fitting or equivalent method shall be used to secure the pipe opening within the gas permeable layer. Not less than 5 feet [1524 mm] of perforated pipe shall be connected to the two horizontal openings of the tee fitting or the two horizontal openings shall be connected to the
interior drain tile system.

Alternatively, the 3 inch nominal [76 mm] size pipe shall connect through a sealed sump cover where the sump communicates directly with the sub-slab aggregate or communicates with it through a drainage system. A flexible rubber coupling connector shall be provided at the sump cover connection to facilitate servicing the sump.

Delete and substitute as follows:

AF103.4 Basements or enclosed crawl spaces with concrete floors or other floor systems and slab-on-grade dwellings Sub-membrane depressurization system rough-in. The following components of a passive subslab depressurization system shall be installed during construction in slab-on-grade dwellings or in dwellings with basements or crawl spaces with concrete or other floor systems.

In buildings with crawl space foundation, the components of a sub-membrane depressurization system shall be installed during construction in accordance with AF103.4.1 through AF103.4.3.

Exception: Buildings in which an approved mechanical crawl space ventilation system is installed.

AF103.4.1 Sub-slab preparation Ventilation. A layer of gas-permeable material shall be placed under concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.

Exception: Outdoor ventilation not required for conditioned crawl spaces.

AF103.4.2 Soil-gas retarder. Soil gas membrane A soil-gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped not less than 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. Punctures or tears in the material shall be sealed or covered.

The soil in crawl spaces shall be covered with a continuous layer of soil gas-membrane complying with ASTM E1745 Class A, B or C. The membrane shall be lapped not less than 12 inches [305 mm] at joints and shall extend upwards 12 inches [305 mm] and be sealed to all foundation walls enclosing the crawl space area.

AF103.4.3 "T" fitting and vent Vent pipe connector. Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate not less than 12 inches (305 mm) above the roof in a location not less than 10 feet (3048 mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point.

A tee fitting shall be installed beneath the soil gas membrane with not less than 10 feet of perforated pipe connected to the two horizontal openings of such fitting or the two horizontal openings of the tee fitting shall connect to the interior drain tile system. The branch opening of the tee fitting shall be connected to the vent pipe in accordance with section AF103.5.

AF103.5 Drain tile and sump used for depressurization Vent pipe. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe shall be permitted to be inserted directly into an
interior perimeter drain tile loop or through a sump cover where the drain tile or sump is exposed to the gas permeable layer.

A 3 inch [76 mm] nominal size or larger ABS, PVC or equivalent gas-tight pipe shall be extended from the tee fitting up through the building floors and in accordance with Sections AF103.5.1 through AF103.5.8.

Add new text as follows:

**AF103.5.1 Vent pipe termination.** The vent pipe shall terminate vertically upward not less than 12 inches [305 mm] above the roof in a location not less than 10 feet [3048 mm] away from any window or other opening into the conditioned spaces of the building that is less than 2 feet [610 mm] below the exhaust point. The vent pipe shall terminate not less than 10 feet [3048 mm] from windows or other opening in adjoining or adjacent buildings.

Delete and substitute as follows:

**AF103.8** AF103.5.2 Vent pipe drainage. Components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the soil-gas retarder. Components of the radon vent pipe system shall be installed to provide condensate drainage to the ground beneath the slab or soil-gas-retarder.

Add new text as follows:

**AF103.5.3 Vent pipe installation.** Components of the radon vent pipe system shall be installed in accordance with Section 512 of the International Mechanical Code.

Delete and substitute as follows:

**AF103.9** AF103.5.4 Vent pipe identification. Exposed and visible interior vent pipes shall be identified with not less than one label on each floor and in accessible attics. The label shall read:"Radon Reduction System."

Exposed and visible interior vent pipes shall be identified with not less than one label on each floor and in crawlspaces and accessible attics. The label shall read:"Radon Vent

**AF103.7** AF103.5.5 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes shall be permitted to be connected to a single vent pipe that terminates above the roof.

Combination basement and crawl space and combination slab-on grade and crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

**AF103.6** AF103.5.6 Multiple vent pipes. In dwellings where interior footings or other barriers separate the gas-permeable layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

In dwellings where interior footings or other barriers separate areas of subslab aggregate or other gas-permeable material, each area shall be fitted with an individual vent pipe or a pipe loop shall connect such areas below the slab. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

**AF103.5.7 Vent pipe accessibility.** Radon vent pipes shall be provided with access in an attic or other area outside the habitable space for the purpose of installing a ASD fan.
Exception: Where an approved electrical supply is installed on the roof for future use.

Add new text as follows:

**AF103.5.8 Provision for ASD fan.** A cylindrical space having a vertical height of not less than 48 inches [122 cm] and a diameter of not less than 21 inches [53 cm] shall be provided in the location where an ASD fan would be installed. The ASD pipe shall be centered in this space. The space provided for the ASD fan shall be located in accordance with Section AF103.6.

**AF103.6 ASD fan location.** ASD fans shall be installed outdoors, in attics or in garages that are not beneath conditioned spaces. ASD fans shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in any basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. ASD fans shall not be installed in any location where pipe positively pressured by the fan would be located inside conditioned or occupiable space.

**AF103.7 Power source.** To provide for future installation of an ASD fan, an electrical circuit that terminates in an approved junction box shall be installed in the attic or other anticipated location of ASD fans.

**AF103.8 Entry routes.** Potential radon entry routes shall be closed in accordance with Sections AF103.8.1 through AF103.8.9.

Delete and substitute as follows:

**AF103.8.1 Floor openings.** Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs, or other floor assemblies, shall be filled with a polyurethane caulk or expanding foam applied in accordance with the manufacturer's instructions.

Openings around bathtubs, showers, water closets, pipes, wires and other objects that penetrate concrete slabs or floor assemblies shall be sealed in a permanent manner.

**AF103.8.2 Concrete joints.** Control joints, isolation joints, construction joints and other joints in concrete slabs and between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk complying with ASTM C920 class 25 or higher or equivalent method applied in accordance with the manufacturer's recommendations.

Add new text as follows:

**AF103.8.3 Foundation and condensate drains.** Foundation and HVAC condensate drains routed below the soil gas retarder area shall be isolated through a plumbing trap or routed through non-perforated pipe to outdoors.

Delete and substitute as follows:

**AF103.8.4 Sumps.** Sumps open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

Sump pits open to soil or serving as the termination point for sub-slab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a sub-slab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.
AF103.2.3 Foundation walls. Hollow block masonry foundation walls shall be constructed with a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above grade. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be solid masonry, one course of masonry grouted solid, or a solid concrete beam. Joints, cracks or other openings around penetrations of both exterior and interior surfaces of foundation walls below grade shall be filled with polyurethane caulk.

Hollow block masonry foundation walls shall be constructed with a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface to prevent passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed. Joints, cracks and other openings around penetrations of both exterior and interior surfaces of masonry block and wood foundation walls below the ground surface shall be filled with polyurethane caulk complying with ASTM C920 class 25 or higher, or equivalent method applied in accordance with the manufacturer's recommendations. Penetrations of concrete walls shall be sealed.

AF103.2.4 Dampproofing. No change to text.

AF103.2.5 Air-conditioning systems. Air-handling units Entry points, joints or other openings into air-conditioning systems in enclosed crawl spaces shall be sealed.

Exception: Systems with gasketed seams or that are otherwise sealed by the manufacturer.

Add new text as follows:

AF103.8.8 Crawl space floors. Openings around penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.

Exception: Air sealing is not required for floors above conditioned crawl spaces complying with Section R408.3.2.2.

Delete and substitute as follows:

AF103.2.7 Crawl space access. Access doors and other openings or penetrations between basements and adjoining crawl spaces shall be closed, gasketed or sealed. Access doors and other openings or penetrations between basements and adjoining crawl spaces shall be closed, gasketed or otherwise filled to prevent air leakage.

Exception: Air sealing is not required for conditioned crawl spaces conforming to Section R408.3.2.2.

TABLE AF101 (1)

HIGH RADON-POTENTIAL (ZONE 1) COUNTIES

a. The EPA recommends that this county listing be supplemented with other available State and local data to further understand the radon potential of a Zone 1 area.

FIGURE AF101
a. pCi/L standard for picocuries per liter of radon gas. The U.S. Environmental Protection Agency (EPA) recommends that homes that measure 4 pCi/L and greater be mitigated.

The EPA and the U.S. Geological Survey have evaluated the radon potential in the United States and have developed a map of radon zones designed to assist building officials in deciding whether radon-resistant features are applicable in new construction.

The map assigns each of the 3,141 counties in the United States to one of three zones based on radon potential. Each zone designation reflects the average short-term radon measurement that can be expected to be measured in a building without the implementation of radon-control methods. The radon zone designation of highest priority is Zone 1. Table AF101 lists the Zone 1 counties illustrated on the map. More detailed information can be obtained from state-specific booklets (EPA-402-R-93-021 through 070) available through State Radon Offices or from EPA Regional Offices.

**Reference standards type:** This reference standard is new to the ICC Code Books

**Add new standard(s) as follows:**

A review of the standard(s) proposed for inclusion in the code, ASTM E1745-11, Standard Specification for Plastic Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2015.

**Reason:** 21,000 Americans die each year from radon-induced lung cancer. The primary source of exposure to radon for the general public is the home. Geographical areas of the highest radon potential in the United States are located in EPA radon zones 1.

The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Appendix F is a voluntary code which can be adopted by local jurisdictions where radon is known to be a problem.

Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations.

**Radon Test Results Data by State**

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Because the proposal includes many edits to the existing Appendix F, a Clean Read copy of the proposed new Appendix F is included to assist the reader.

IRC Appendix F (Proposed Changes: Clean Read Text)

Radon Control Methods

Section AF101

SCOPE

AF101.1 General. This appendix contains requirements for new construction in jurisdictions where radon control methods are required. The requirement for radon control shall be determined by use of locally available data or by determination of Zone 1 radon designation in Figure AF104 or Table AF104.

Section AF102

DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

ACTIVE SOIL DEPRESSURIZATION (ASD) SYSTEM. A system using a fan-powered vent drawing air from beneath a slab or membrane designed to achieve lower air pressure under the sub-slab or sub-membrane relative to air pressure above the slab or membrane.

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a basement or crawl space footing.

RADON GAS. A naturally-occurring, radioactive, cancer-causing gas that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.

ROUGH-IN. The installation of all parts and materials of an ASD system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials include gas permeable layers, soil gas retarders, plenums, membranes, piping, suction inlets, discharge outlets and wiring.

SOIL GAS RETARDER. A continuous membrane of 6-mil [0.15 mm] polyethylene or other equivalent material used to retard the flow of soil gases into a building.

SUB-MEMBRANE DEPRESSURIZATION SYSTEM. An ASD system designed to achieve lower sub-membrane air pressure relative to crawl space air pressure by use of a fan powered vent drawing air from beneath the soil gas retarder membrane.
SUB-SLAB DEPRESSURIZATION SYSTEM. An ASD system designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the floor slab.

Section AF103
Section AF103. REQUIREMENTS

AF103.1 General. Section AF103 is required in areas where designated by the jurisdiction and is intended to reduce radon entry and prepare the building for post-construction radon mitigation.

AF103.2 ASD System rough-in. A rough-in is required for all foundations and combination foundation types, including crawlspace, basement, slab on grade, and slab on grade garage located below a living area as shown in Figure AF103.2.

FIGURE AF103.2
FOUNDATION TYPES

AF103.3 Sub-slab depressurization system rough-in. In basement or slab-on-grade buildings, the components of a sub-slab depressurization system shall be installed during construction in accordance with AF103.3.1 through AF103.3 and AF103.5 through AF108.9.

AF103.3.1 Gas Permeable Layer. To facilitate future installation of an Active Soil Depressurization (ASD) system, a gas-permeable layer shall be constructed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building.

The gas-permeable layer shall be designed to allow the lateral flow of soil gases and consist of one of the following:

1. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or a Size Number 4, 5, 56, or 6 as classified by ASTM C33.
2. A uniform layer of native or fill sand, a minimum of 4 inches [102 mm] in depth, overlain by a layer or strips of geotextile drainage matting or loop of perforated pipe. The geotextile drainage matting shall have a cross-sectional area of at least 12 square inches [774 sq mm]. The geotextile matting shall be placed no closer than 12 inches [305 mm] to the foundation wall around the interior of the foundation perimeter.

3. A loop of 4 inch [102 mm] nominal or larger size perforated pipe placed in a trench along the perimeter of the foundation, with the trench backfilled with clean aggregate having a void ratio of not less than 35 percent or a Size Number 4, 5, 56, or 6 as classified by ASTM C33 such that the pipe is surrounded by a minimum of 4 inches [102mm] of aggregate on all sides. The pipe shall be placed no closer than 12 inches [305 mm] to the foundation wall around the interior of the foundation perimeter.

4. Other materials, systems or floor designs with demonstrated capability for depressurization across the entire sub-floor area.

AF103.3.2 Soil gas retarder. A minimum 6-mil [0.15 mm] (or 3-mil [0.075 mm] cross-laminated) polyethylene or equivalent flexible sheeting material shall be placed on top of the gas permeable layer prior to casting the slab or placing the floor assembly. The sheeting shall cover the entire floor area with separate sections of sheeting lapped not less than 12 inches [305 mm]. Openings in the sheeting caused by pipe, wire and other penetrations shall be sealed. Punctures or tears in the material shall be sealed or covered with additional sheeting. Where under slab insulation is installed, it shall be placed on top of the sheeting.

AF103.3.3 Vent pipe connector. A 3 inch nominal [76 mm] or larger size ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the gas permeable layer before the slab is cast. A tee fitting or equivalent method shall be used to secure the pipe opening within the gas permeable layer. Not less than 5 feet [1524 mm] of perforated pipe shall be connected to the two horizontal openings of the tee fitting or the two horizontal openings shall be connected to the interior drain tile system.

Alternatively, the 3 inch nominal [76 mm] size pipe shall connect through a sealed sump cover where the sump communicates directly with the sub-slab aggregate or communicates with it through a drainage system. A flexible rubber coupling connector shall be provided at the sump cover connection to facilitate servicing the sump.

AF103.4 Sub-membrane depressurization system rough-in. In buildings with crawl space foundation, the components of a sub-membrane depressurization system shall be installed during construction in accordance with AF103.4.1 through AF103.4.3.

Exception: Buildings in which an approved mechanical crawl space ventilation system is installed.

AF103.4.1 Ventilation. Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.

Exception: Outdoor ventilation not required for conditioned crawl spaces.

AF103.4.2 Soil gas-membrane. The soil in crawl spaces shall be covered with a continuous layer of soil gas-membrane complying with ASTM E1745 Class A, B or C. The membrane shall be lapped not less than 12 inches [305 mm] at joints and shall extend upwards 12 inches [305 mm] and be sealed to all foundation walls enclosing the crawl space area.

AF103.4.3 Vent pipe connector. A tee fitting shall be installed beneath the soil gas membrane with not less than
10 feet of perforated pipe connected to the two horizontal openings of such fitting or the two horizontal openings of the tee fitting shall connect to the interior drain tile system. The branch opening of the tee fitting shall be connected to the vent pipe in accordance with section AF103.5.

**AF103.5 Vent pipe.** A 3 inch [76 mm] nominal size or larger ABS, PVC or equivalent gas-tight pipe shall be extended from the tee fitting up through the building floors and in accordance with Sections AF103.5.1 through AF103.5.8.

**AF103.5.1 Vent pipe termination.** The vent pipe shall terminate vertically upward not less than 12 inches [305 mm] above the roof in a location not less than 10 feet [3048 mm] away from any window or other opening into the conditioned spaces of the building that is less than 2 feet [610 mm] below the exhaust point. The vent pipe shall terminate not less than 10 feet [3048 mm] from windows or other opening in adjoining or adjacent buildings.

**AF103.5.2 Vent pipe drainage.** Components of the radon vent pipe system shall be installed to provide condensation drainage to the ground beneath the slab or soil gas retarder.

**AF103.5.3 Vent pipe installation.** Components of the radon vent pipe system shall be installed in accordance with Section 512 of the International Mechanical Code.

**AF103.5.4 Vent pipe identification.** Exposed and visible interior radon vent pipes shall be identified with not less than one label on each floor level and in crawlspaces and accessible attics. The label shall read: "Radon Vent."

**AF103.5.5 Combination foundations.** Combination basement and crawl space and combination slab-on-grade and crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

**AF103.5.6 Multiple vent pipes.** In buildings where interior footings or other barriers separate areas of sub-slab aggregate or other gas-permeable material, each area shall be fitted with an individual vent pipe or a pipe loop shall connect such areas below the slab. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

**AF103.5.7 Vent pipe accessibility.** Radon vent pipes shall be provided with access in an attic or other area outside the habitable space for the purpose of installing a ASD fan.

**Exception:** Where an approved electrical supply is installed on the roof for future use.

**AF103.5.8 Provision for ASD fan.** A cylindrical space having a vertical height of not less than 48 inches [122 cm] and a diameter of not less than 21 inches [53 cm] shall be provided in the location where an ASD fan would be installed. The ASD pipe shall be centered in this space. The space provided for the ASD fan shall be located in accordance with Section AF103.6.

**AF103.6 ASD fan location.** ASD fans shall be installed only outdoors, in attics or in garages that are not beneath conditioned spaces. ASD fans shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in any basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. ASD fans shall not be installed in any location where pipe positively pressured by the fan would be located inside conditioned or occupiable space.

**AF103.7 Power source.** To provide for future installation of an ASD fan, an electrical circuit which terminates in an approved junction box shall be installed in the attic or other anticipated location of ASD fans.
AF103.8 Entry routes. Potential radon entry routes shall be closed in accordance with Sections AF103.8.1 through AF103.8.9.

AF103.8.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires and other objects that penetrate concrete slabs or floor assemblies shall be sealed in a permanent manner.

AF103.8.2 Concrete joints. Control joints, isolation joints, construction joints and other joints in concrete slabs and between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk complying with ASTM C920 class 25 or higher or equivalent method applied in accordance with the manufacturer's recommendations.

AF103.8.3 Foundation and condensate drains. Foundation and HVAC condensate drains routed below the soil gas retarder area shall be isolated through a plumbing trap or routed through non-perforated pipe to outdoors.

AF103.8.4 Sumps. Sump pits open to soil or serving as the termination point for sub-slab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a sub-slab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

AF103.8.5 Foundation walls. Hollow block masonry foundation walls shall be constructed with a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface to prevent passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed. Joints, cracks and other openings around penetrations of both exterior and interior surfaces of masonry block and wood foundation walls below the ground surface shall be filled with polyurethane caulk complying with ASTM C920 class 25 or higher, or equivalent method applied in accordance with the manufacturer's recommendations. Penetrations of concrete walls shall be sealed.

AF103.8.6 Damp proofing. The exterior surfaces of portions of concrete and masonry block walls below the ground surface shall be damp proofed in accordance with Section R406.

AF103.8.7 Air-handling units. Air-handling units in crawl spaces shall be sealed to prevent air from being drawn into the unit.

AF103.8.8 Crawl space floors. Openings around penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.

Exception: Air sealing is not required for floors above conditioned crawl spaces complying with Section R408.3.2.2.

AF103.8.9 Crawl space access. Access doors and other openings or penetrations between basements and adjoining crawl spaces shall be closed, gasketed or otherwise filled to prevent air leakage.

Exception: Air sealing not required for conditioned crawl spaces conforming to Section R408.3.2.2.

Section AF104
Figure AF104
TABLE AF104

EPA Map of Radon Zones

LEGEND

Zone 1
Zone 2
Zone 3

The purpose of the map is to assist local, state, and federal organizations to target their resources and programs to non-attainment areas. The map is not intended to be used to determine if a home in a given zone should be tested for radon. Homes with elevated levels of radon have been found in all three zones. All homes should be tested regardless of geographic location.

IMPORTANT: Consult the EPA Map of Radon Zones document (EPA 402-R-06-007) before using this map. This document contains information on radon potential.

Quoita - Preliminary Zone designation

RB896
**Cost Impact:** Will not increase the cost of construction

Appendix F is a voluntary standard and will not impact the cost of construction unless the local jurisdiction has decided that the additional $300-$400 in cost is justified by the prevalence of radon in their area and thereby adopts this code chapter.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, ASTM E1745-11, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2015.
2015 International Residential Code
Revise as follows:
K SECTION R327 SOUND TRANSMISSION

SECTION AK101 - GENERAL

AK101.1 R327.1 General. No change to text.

Delete without substitution:

SECTION AK102 - AIR-BORNE SOUND

AK102.1 R327.2 General Air-borne sound. No change to text.

AK102.1.1 R327.2.1 Masonry. No change to text.

SECTION AK103 - STRUCTURAL-BORNE SOUND

Revise as follows:

AK103.1 R327.3 General Floor/ceiling assemblies. No change to text.

Delete without substitution:

SECTION AK104 REFERENCED STANDARDS

ASTM

ASTM E 90—04
Test Method for Laboratory Measurement of Air-borne Sound Transmission Loss of Building Partitions and Elements

ASTM E 492—09
Specification for Laboratory Measurement of Impact Sound Transmission through Floor-ceiling Assemblies Using the Tapping Machine

The Masonry Society

TMS 0302—12
Standard for Determining the Sound Transmission Class Rating for Masonry Walls
Reason: Previous versions of the code included the sound transmission language of Appendix K into the body of the code. Making the information easier to access and it also acted as a reminder for the required use of sound transmission into the buildings design. In the 2006, 2012, and 2015 versions of the IRC this language was not included in the body of the code. Without some language addressing the need to include sound transmission in the buildings design into the body of the code, there is no way to track the code requirement for sound transmission back to Appendix K. Unless the jurisdiction adopts appendix K as part of their code for residential buildings specifically into their ordinance. Adding this language back into the code will also create better built buildings and make it easier to enforce the requirements for sound transmission.

Cost Impact: Will not increase the cost of construction
There will be no cost impact related to the inclusion of the proposed amendment. The requirements for sound transmission are already listed in the code in Appendix K. This proposal is only to add language to provide tracking language from section Chapter 3 to Appendix K.
Proponent: Robert Snyder, representing Washington Association of Building Officials Technical Code Development Committee (rsnyder@bellevuewa.gov)

### 2015 International Residential Code

Delete without substitution:

**APPENDIX K  SOUND-TRANSMISSION**

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

Revise as follows:

**SECTION R303 LIGHT, VENTILATION, HEATING AND HEATING SOUND TRANSMISSION**

Delete without substitution:

**SECTION AK101  GENERAL**

Revise as follows:

AK101.1 R303.10 General Sound transmission. No change to text.

Delete without substitution:

**SECTION AK102  AIR-BORNE-SOUND**

Revise as follows:

AK102.1 R303.10.1 General Airborne sound. No change to text.

AK102.1.1 R303.10.2 Masonry. No change to text.

Delete without substitution:

**SECTION AK103  STRUCTURAL-BORNE-SOUND**

Revise as follows:

AK103.1 R303.10.3 General Structural-borne sound. Floor/ceiling assemblies between dwelling units, or between a dwelling unit and a public or service area within a structure, shall have an impact insulation class (IIC) rating of not less than 45 when tested in accordance with ASTM E 492.

**Reason:** The purpose of this proposal is to establish a minimum mandatory requirement for mitigation of air-borne and structure-borne sound between adjacent multi-family dwelling units. This is currently a requirement for multi-family development constructed under the International Building Code. The text of this proposal is taken directly from appendix K of the International Residential Building Code. We believe that this is a very important health and quality of life issue for which a minimum mandatory requirement should be established in the body of the code.

**Cost Impact:** Will increase the cost of construction

The addition of sound insulation and acoustical treatment will add cost to construction of wall and floor-ceiling assemblies which separate dwelling units from adjacent units.
2015 International Residential Code

APPENDIX R LIGHT STRAW-CLAY CONSTRUCTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION AR101 GENERAL

Revise as follows:

AR101.1 Scope. This appendix shall govern the use of light straw-clay as a nonbearing building material and wall infill system in Seismic Design Categories A and B. Use of light straw-clay in Seismic Design Categories C, D1, D2 and D3 shall require an approved engineered design by a registered design professional in accordance with Section R301.1.3.

SECTION AR102 DEFINITIONS

AR102.1 General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of the International Residential Code for general definitions.

CLAY.
Inorganic soil with particle sizes of less than 0.00008 inch (0.002 mm) having the characteristics of high to very high dry strength and medium to high plasticity.

CLAY SLIP.
A suspension of clay soil subsoil in water.

CLAY SOIL SUBSOIL.
Inorganic soil
Subsoil sourced directly from the earth or refined, containing 50 percent or more clay by volume and free of organic matter.

INFILL.

Proponent: Lou Host-Jablonski, Design Coalition, Inc., representing Design Coalition, Inc. and StrawClay.org (lou@designcoallition.org); Scott Cherry, representing Lightfoot inc. (scott@lightfootinc.com); Douglas Piltingsrud, Design Coalition Institute, Inc., representing Sustainable Housing Research, LLC (dougpiltingsrud@gmail.com); Richie Duncan, Kodama Zomes LLC, representing self (richie@kodamazomes.com); Paula Baker-Laporte, representing Econest Architecture Inc. (paula@econest.com); Martin Hammer, representing Martin Hammer, Architect (mfhammer@pacbell.net); Robert Laporte, representing EcoNest Company (robert@econest.com); Susan Thering, representing Design Coalition Institute Inc.; Jacob Racusin, New Frameworks Natural Design/Build, representing New Frameworks Natural Design/Build (jacob@newframeworks.com)
Light straw-clay that is placed between the structural and nonstructural members of a building.

LIGHT STRAW-CLAY.
A mixture of straw and clay slip compacted and dried to form insulation and plaster substrate between or around structural and nonstructural members in a wall.

NONBEARING.
Not bearing the weight of the building other than the weight of the light straw-clay itself and its finish.

STRAW.
The dry stems of cereal grains after the seed heads have been removed.

VOID.
Any space in a light straw-clay wall wider than 1/4 inch (6mm), greater than 2 inches (51mm) in which a 2-inch horizontal length and greater than 2 inches (51 mm 51mm) sphere can be inserted in depth.

SECTION AR103 NONBEARING LIGHT STRAW-CLAY CONSTRUCTION

AR103.1 General. Light straw-clay shall be limited to infill between or around structural and nonstructural wall framing members.

AR103.2 Structure. The structure of buildings using light straw-clay shall be in accordance with the International Residential Code or shall be in accordance with an approved design by a registered design professional.

AR103.2.1 Number of stories. Use of light straw-clay infill shall be limited to buildings that are not more than one story above grade plane.

Exception: Buildings using light straw-clay infill that are greater than one story above grade plane shall be in accordance with an approved design by a registered design professional.

AR103.2.2 Bracing. Wind bracing
Bracing for buildings with light straw-clay infill shall be in accordance with Section R602.10 and shall use Method LIB. Walls with light straw-clay infill shall use Method LIB and shall not be sheathed with solid sheathing. Walls without light straw-clay infill shall comply with any bracing method prescribed by this code.

AR103.2.3 Weight Requirements and properties of light straw-clay mixtures. Light straw-clay shall be reinforced or stabilized as follows, or shall be in accordance with an approved design by a registered design professional:

1. Vertical reinforcing stabilization shall be not less than nominal 2-inch by 6-inch (51 mm by 152 mm) of structural or nonstructural wood framing in accordance with Figures AR103.2.4(1), AR103.2.4(2) or AR103.2.4(3). Such framing members shall not be prohibited to be both load-bearing and stabilization members where they meet the requirements of Section R602 and this section. Nonstructural stabilization
members shall be not more than 32 inches (813 mm) on center where the vertical reinforcing is nonload bearing and at 24 inches (610 mm) on center where it is load bearing. The vertical reinforcing shall not exceed an unrestrained height of 10 feet (3048 mm) and shall be attached at top and bottom in accordance with Chapter 6 of the this code. In lieu of these requirements, vertical reinforcing shall be in accordance with an approved design by a registered design professional.

2. Horizontal reinforcing stabilization shall be installed in the center of the wall at not more than 24 inches (610 mm) on center and shall be secured to vertical members in accordance with Figures AR103.2.4(1), AR103.2.4(2) or AR103.2.4(3). Horizontal reinforcing stabilization shall be of any of the following with the stated minimum dimensions: 3/4-inch (19.1 mm) bamboo, 1/2-inch (12.7 mm) fiberglass rod, 1-inch (25 mm) wood dowel or nominal 1-inch by 2-inch (25 mm by 51 mm) wood.

AR103.3 Materials. The materials used in light straw-clay construction shall be in accordance with Sections AR103.3.1 through AR103.3.4.

AR103.3.1 Straw requirements. Straw shall be stems of wheat, rye, oats, rice or barley, and shall be free of visible decay, insects and insects green plant material.

AR103.3.2 Clay soil subsoil requirements. Suitability of clay soil subsoil shall be determined in accordance with the Figure 2 Ribbon Test or the Figure 3 Ball Test of the Appendix to ASTM E 2392/ E 2392M Table AR103.2.3.

Delete without substitution:

AR103.3.3 Clay slip. Clay slip shall be of sufficient viscosity such that a finger dipped in the slip and withdrawn remains coated with an opaque coating.

Revise as follows:

AR103.3.4 Light straw-clay mixture. Light straw-clay mixture shall contain not less than 65 percent and not more than 85 percent straw, by volume consist of bale compacted loose straw to clay soil. Loos straw shall be mixed and coated with clay slip such that there is not more than 5 percent uncoated straw and shall be in accordance with Table AR103.2.3.

AR103.4 Wall construction. Light straw-clay wall construction shall be in accordance with the requirements of Sections AR103.4.1 through AR103.4.7.

AR103.4.1 Light straw-clay maximum thickness. Light straw-clay shall not be more than 12 inches (305 mm) thick, to allow adequate drying of the installed material in accordance with Table AR103.2.3.

AR103.4.2 Distance above grade. Light straw-clay and its exterior finish shall be not less than 8 inches (203 mm) above exterior finished grade.

AR103.4.3 Moisture barrier. An approved moisture barrier shall separate the bottom of light straw-clay walls from any masonry or concrete foundation or slab that directly supports the walls. Penetrations and joints in the barrier shall be sealed with an approved sealant.

AR103.4.4 Contact with wood members. Light straw-clay shall be permitted to be in contact with untreated wood members.

AR103.4.5 Contact with nonwood structural members. Nonwood structural members in
contact with light straw-clay shall be resistant to corrosion or shall be coated to prevent corrosion with an approved coating.

**AR103.4.6 Installation.** Light straw-clay shall be installed in accordance with the following:

1. Formwork shall be sufficiently strong to resist bowing where the light straw-clay is compacted into the forms.
2. Light straw-clay shall be uniformly placed into forms and evenly tamped to achieve stable walls free of voids. Light straw-clay shall be placed in lifts of not more than 6 inches (152 mm) and shall be thoroughly tamped before additional material is added.
3. Temporary formwork shall be removed from walls within 24 hours after tamping, and walls shall remain exposed until moisture content is in accordance with Section AR103.5.1. Visible voids shall be patched with light straw-clay or other insulative material prior to plastering.

**AR103.4.7 Openings in walls.** Openings in walls shall be in accordance with the following:

1. Rough framing for doors and windows shall be fastened to structural members in accordance with the International Residential Code. Windows and doors shall be flashed in accordance with the International Residential Code.
2. An approved moisture barrier shall be installed at window sills in light straw-clay walls prior to installation of windows.

**AR103.5 Wall finishes.** The interior and exterior surfaces of light straw-clay walls shall be protected with a finish in accordance with Sections AR103.5.1 through AR103.5.5.

**AR103.5.1 Moisture content Dimensional stability of light straw-clay prior to application of plaster finish.** Light straw-clay walls in fill having a density of 30 pounds per cubic foot (480.6 kg/m$^3$) or greater shall be dry to a moisture content of not more than 20 percent at a depth of 4 inches (102 mm), as measured from each side of the wall prior to application of plaster finish. Light straw-clay infill having a density of less than 30 pounds per cubic foot (480.6 kg/m$^3$) shall be sufficiently dry such that the application of finish on either side overall shrinkage of the wall. Moisture content shall be measured with a moisture meter equipped with a probe that light straw-clay is designed for use with baled straw or hay dimensionally stable.

**AR103.5.2 Plaster finish.** Exterior plaster finishes shall be clay plaster plasters or lime plaster plasters. Interior plaster finishes shall be clay plaster plasters, lime plaster plasters or gypsum plaster plasters. Plasters shall be permitted to be applied directly to the surface of the light straw-clay walls without reinforcement, except that the juncture of dissimilar substrates shall be in accordance with Section AR103.5.4. Plasters shall have a thickness of not less than $\frac{1}{2}$ inch (12.7 mm) and not more than 1 inch (25 mm) and shall be installed in not less than two coats. Exterior rain-exposed clay plaster plasters shall be finished with a lime-based or silicate-mineral coating.

**AR103.5.3 Separation of wood and plaster.** Where wood framing occurs in light straw-clay walls, such wood surfaces shall be separated from exterior plaster with No.15 asphalt felt, Grade D paper or other approved material except where the wood is preservative treated or naturally durable.

Exception: Exterior clay plasters shall not be required to be separated from wood.

**AR103.5.4 Bridging across dissimilar substrates.** Bridging shall be installed across dissimilar
substrates prior to the application of plaster. Acceptable bridging materials include: expanded metal lath, woven wire mesh, welded wire mesh, fiberglass mesh, reed matting or burlap. Bridging shall extend not less than 4 inches (102 mm), on both sides of the juncture.

AR103.5.5 Exterior siding cladding. Exterior wood, metal or composite material siding cladding shall be spaced not less than 1/2\(^3\) inch (19.1 mm) from the light straw-clay such that a ventilation space is created to allow for moisture diffusion. Furring strips that create this ventilation space shall be securely fastened to the stabilization members or framing. The siding cladding shall be fastened to the wood furring strips in accordance with the manufacturer's instructions. Furring strips shall be spaced not more than 32 inches (813 mm) on center, and shall be securely fastened to the vertical wall reinforcing or structural framing. Insect screening shall be provided at the top and bottom of the ventilation space. An air barrier consisting of not more than 3/8-inch thick (9.5 mm) clay plaster or lime plaster shall be applied to the light straw-clay prior to the application of siding.

SECTION AR104 THERMAL INSULATION PERFORMANCE

AR104.1 R-value Thermal characteristics. Light Walls with light straw-clay, where installed, infill of densities of greater than or equal to 20 pounds per cubic foot (480.6 kg/m\(^3\)) shall be classified as mass walls in accordance with this appendix, Section N1102.2.5 and shall be deemed to have an R-value meet the R-value requirements for mass walls in Table N1102.1.2 (R402.1.2). Walls with light straw-clay infill of 1.6 densities less than 20 pounds per inch cubic foot (480.6 kg/m\(^3\)) shall meet the R-value requirements for wood frame walls in Table N1102.1.1 (R402.1.2).

AR104.2 Thermal resistance. Light straw-clay shall be deemed to have a thermal resistance as specified in Table AR103.2.3.

Delete without substitution:

SECTION AR105 REFERENCED STANDARD


TABLE AR103.2.3

REQUIREMENTS AND PROPERTIES OF LIGHT STRAW-CLAY MIXTURES

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b. Water mixed with subsoil equals clay slip.

c. Subsoil Testing Methods:
   
   A. Lab test for percent of clay, silt and sand via hydrometer method.
   
   B. Ribbon Test of the Figure 3 Ball Test in the Appendix of ASTM E2392/E2392M.

d. Trace amounts of organic materials are acceptable.

FIGURE AR103.2.4(1)
LIGHT STRAW-CLAY WALL WITH LARSEN TRUSSES
DOUBLE TOP PLATE

VERTICAL SOLID BLOCKING

FLAT SOLID BLOCKING

LADDER (LARSEN) TRUSSES MADE WITH 2X4s AND GUSSETS PER SECTION AR.103.2.4(1)

GUSSETS: 3/8” x 3” PLYWOOD OR 1x4
FASTENERS: 4-4d NAILS OR 4- 13/4” STAPLES

WOOD OR METAL STRAP BRACING (LIB) PER TABLE 602.10.4 WHERE APPLICABLE PER SECTION R602.10

LIGHT STRAW-CLAY INFILL

HORIZONTAL STABILIZATION OF LIGHT STRAW-CLAY PER SECTION AR.103.2.4(2)

ANCHORAGE PER SECTION R403.1.6

2X SILL PLATE

CONCRETE OR MASONRY FOUNDATION PER SECTION R401

FRAMING FASTENERS PER TABLE R602.3(1)

FIGURE AR.103.2.4(1)
LIGHT STRAW-CLAY WALL
WITH LARSEN TRUSSES

FIGURE AR.103.2.4(2)
LIGHT STRAW-CLAY WALL SINGLE STUD WIDTH

DOUBLE TOP PLATE

SOLID BLOCKING

WOOD OR METAL STRAP BRACING (LIB) PER TABLE R602.10.4 WHERE APPLICABLE PER SECTION R602.10

2X STUDS PER SECTION AR103.2.4(1)

1 X 1 CLEAT CENTERED ON EACH STUD FACE BETWEEN HORIZONTAL STABILIZATION

HORIZONTAL STABILIZATION OF LIGHT STRAW-CLAY PER SECTION AR103.2.4(2)

LIGHT STRAW-CLAY INFILL

ANCHORAGE PER SECTION R403.1.6

2X SILL PLATE

CONCRETE OR MASONRY FOUNDATION PER SECTION R401

FRAMING FASTENERS PER TABLE R602.3(1)

FIGURE AR103.2.4(2)
LIGHT STRAW-CLAY WALL SINGLE STUD WIDTH
FIGURE AR103.2.4(3)
LIGHT STRAW-CLAY WALL WITH BLIND STUDS

DOUBLE TOP PLATES

2X LET-IN PLATE

WOOD OR METAL BRACING (LIB) PER TABLE R602.10.4 WHERE APPLICABLE PER SECTION R602.10

2x6 MINIMUM STUDS PER SECTION AR103.2.4(1)

LIGHT STRAW-CLAY INFILL

HORIZONTAL STABILIZATION PER SECTION AR103.2.4(2)

2X BOTTOM PLATE

2X SILL PLATE

ANCHORAGE PER SECTION R403.1.6

CONCRETE OR MASONRY FOUNDATION PER SECTION R401

FRAMING FASTENERS PER TABLE R602.3(1)
**Reason: Summary/Abstract:** Updates to Appendix R Light Straw Clay Construction will provide clarification and incorporate new scientific information regarding material performance and construction methodology. This proposal adds new Figures and a Table, information previously published in the 2015 IRC Commentary Appendix R, and proposes text changes to certain Sections to coordinate with same.

**Scope:** Proposed additional text clarifies the scope of structural design requirements in seismic design zones.

**Definitions:** Several definitions are updated to be more accurate and congruent with other sections of this Appendix.

**Bracing:** Proposed text clarifies that lateral bracing at light straw-clay infill is confined to method LIB and solid sheathing is not allowed, but that other wall types within a building that do not use light straw-clay infill are permitted to use any bracing allowed in the code.

**Table:** Proposed Table is introduced. Further scientific testing has yielded data to more fully define light straw-clay materials and characteristics. Table AR103.2.3 covers the range of the requirements and properties of light straw-clay infill without limiting it to single specific weight. Text changes in subsequent sections refer to and coordinate with the new table.

**Stabilization:** Proposed substitution of the term ‘stabilization’ in lieu of ‘reinforcement’ as used previously. This clarifies the role of this element in light straw-clay construction, acknowledging that the term ‘reinforcement’ in construction is generally more commonly associated with the structural reinforcement of concrete.

The purpose of the stabilizing elements in light straw-clay infill is to ensure overall wall dimensional stability and to transfer out-of-plane lateral loads to structural members; not, as in concrete practice, the way steel reinforcing is used to impart tensile strength to the material. The use of the term stabilization here more accurately describes the functioning of the required vertical and horizontal members.

In addition, the introduction of three Figures previously included in the Appendix R 2015 Commentary serves to visually illustrate this stabilization and communicate its function more clearly.

**Plaster:** Proposed text distinguishes between densities of light straw-clay infill and creates requirements for evaluating the dimensional stability of the infill prior to plastering, appropriate to density of the infill.

**Thermal:** Performance of the wall thermally is outlined by proposed new table AR103.2.3 for varying densities, correlated to R-value. Table and text also clarify the design densities regulated distinctly as wood frame and as mass walls.

Where this 2015 Section currently provides a one-size-fits-all thermal definition, the proposed changes provide updated data that reflects further scientific tests and the advancement of construction techniques. Previously, the information in the proposed Table AR103.2.3 was available only in the Appendix R 2015 Commentary.

**Proponents:** The proposed changes are presented by a collaboration of North America’s most experienced light straw-clay practitioners, representing over 2 decades of active research, design and construction of light straw-clay buildings across climate zones in Canada and the U.S. The team includes 3 architects, 2 builders, a structural engineer and a building materials scientist, and this proposal incorporates input from multiple other practitioners.

**Bibliography:**
- An Introduction to the Science of Northern Light Straw-Clay Construction; The Affordable Natural
Cost Impact: Will not increase the cost of construction

The changes proposed do not affect or change the cost of the design or construction of Light Straw-Clay from the existing 2015 IRC code.
2015 International Residential Code

Revise as follows:

AS101.1 Scope. This appendix provides prescriptive and performance-based requirements for the use of baled straw as a building material. Other methods of strawbale construction shall be subject to approval in accordance with Section 104.11 of this code. Buildings using strawbale walls shall comply with this code except as otherwise stated in this appendix.

AS102.1 Definitions. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of the International Residential Code for general definitions.

Bale. Equivalent to straw bale.

Clay. Inorganic soil with particle sizes less than 0.00008 inch (0.002 mm) having the characteristics of high to very high dry strength and medium to high plasticity.

Clay slip. A suspension of clay particles in water.

Finish. Completed compilation of materials on the interior or exterior faces of stacked bales.

Flake. An intact section of compressed straw removed from an untied bale.

Laid flat. The orientation of a bale with its largest faces horizontal, its longest dimension parallel with the wall plane, its ties concealed in the unfinished wall and its straw lengths oriented predominantly across the thickness of the wall.

Load-bearing wall. A strawbale wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition its own weight.

Mesh. An openwork fabric of linked strands of metal, plastic, or natural or synthetic fiber, embedded in plaster.

Nonstructural wall. Walls other than load-bearing walls or shear walls.

On-edge. The orientation of a bale with its largest faces vertical, its longest dimension parallel with the wall plane, its ties on the face of the wall and its straw lengths oriented predominantly vertically.

Pin. A vertical metal rod, wood dowel or bamboo, driven into the center of stacked bales, or placed on opposite surfaces of stacked bales and through-tied.

Plaster. Gypsum or plaster, cement plaster, as defined in Sections R702 and AS104, or clay plaster, soil-cement plaster, lime plaster or cement-lime plaster as defined described in Section AS104.

Precompression. Vertical compression of stacked bales before the application of finish.

Reinforced plaster. A plaster containing mesh reinforcement.

Running bond. The placement of straw bales such that the head joints in successive courses are offset not less than one-quarter the bale length.

Shear wall. A strawbale wall designed and constructed to resist lateral seismic and wind forces parallel to the plane of the wall in accordance with Section AS106.13.

Skin. The compilation of plaster and reinforcing, if any, applied to the surface of stacked bales.
STRUCTURAL WALL. A wall that meets the definition for a load-bearing wall or shear wall.

STACK BOND. The placement of straw bales such that head joints in successive courses are vertically aligned.

STRAW. The dry stems of cereal grains after the seed heads have been removed.

STRAW BALE. A rectangular compressed block of straw, bound by ties.

STRAW-CLAY. Loose straw mixed and coated with clay slip.

TIE. A synthetic fiber, natural fiber or metal wire used to confine a straw bale.

TRUTH WINDOW. An area of a strawbale wall left without its finish, to allow view of the straw otherwise concealed by its finish.

AS103.4 Moisture content. The moisture content of bales at the time of application of the first coat of plaster or the installation of another finish shall not exceed 20 percent of the weight of the bale. The moisture content of bales shall be determined by use of a moisture meter designed for use with baled straw or hay, equipped with a probe of sufficient length to reach the center of the bale. Not less than 5 percent and not less than 10 bales used shall be randomly selected and tested.

AS103.5 Density. Bales shall have a dry density of not less than 6.5 pounds per cubic foot (104 kg/cubic meter). The dry density shall be calculated by subtracting the weight of the moisture in pounds (kg) from the actual bale weight and dividing by the volume of the bale in cubic feet (cubic meters). Not less than 2 percent and not less than five bales to be used shall be randomly selected and tested on site.

AS104.4.5 Gypsum plaster. Gypsum plaster shall comply with Section R702 R702.2.1. Gypsum plaster shall be limited to use on interior surfaces of nonstructural walls, and as an interior finish coat over a structural plaster that complies with this appendix.

AS104.4.6 Lime plaster. Lime plaster shall comply with Sections AS104.4.6.1 and through AS104.4.6.3.

AS104.4.8 Cement plaster. Cement plaster shall conform to ASTM C 926 and shall comply with Sections R703.6.2, R703.6.4 R703.7.4 and R703.6.5 R703.7.5, except that the amount of lime in plaster coats shall be not less than 1 part lime to 6 parts cement to allow a minimum acceptable vapor permeability. The combined thickness of plaster coats shall be not more than $1\frac{1}{2}$ inches (38 mm) thick.

AS105.2 Building limitations and requirements for use of strawbale nonstructural walls. Buildings using strawbale nonstructural walls shall be subject to the following limitations and requirements:

1. Number of stories: not more than one, except that two stories shall be allowed with an approved engineered design.
2. Building height: not more than 25 feet (7620 mm), except that greater heights shall be allowed with an approved engineered design.
3. Wall height: in accordance with Table AS105.4.
4. Braced wall panel length, and increase lengths: in Seismic Design Categories C, D1, D2 and D3; the required length of bracing for buildings using strawbale nonstructural walls shall comply accordance with Section R602.10.3 of this code, with the additional requirements that Table 602.10.3(3 R602.10.3(3) shall be applicable apply to all buildings in Seismic Design Category C, and that the minimum total length of braced wall panels in Table R602.10.3(3) shall be increased by 60 percent.
AS105.4 Out-of-plane resistance methods and unrestrained wall dimensions dimension limits. Strawbale walls shall employ a method of out-of-plane load resistance in accordance with Table AS105.4, and comply with its associated limits and requirements.

AS105.4.1 Determination of out-of-plane loading. Out-of-plane loading for the use of Table AS105.4 shall be in terms of the ultimate design wind speed and seismic design category as determined in accordance with Sections R301.2.1 and R301.2.2 of this code.

**TABLE AS105.4**
OUT-OF-PLANE RESISTANCE METHODS AND UNREstrained WALL DIMENSIONS DIMENSION LIMITS

<table>
<thead>
<tr>
<th>METHOD OF OUT-OF-PLANE LOAD RESISTANCE&lt;sup&gt;a&lt;/sup&gt;</th>
<th>FOR ULTIMATE DESIGN WIND DESIGN SPEEDS (mph)</th>
<th>FOR SEISMIC DESIGN CATEGORIES</th>
<th>UNRESTRIRED WALL DIMENSIONS, H&lt;sub&gt;b&lt;/sub&gt;</th>
<th>MESH STAPLE SPACING AT BOUNDARY RERAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonplaster finish or unreinforced plaster</td>
<td>≤ 100&lt;sup&gt;130&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;</td>
<td>H ≤ 8</td>
<td>H ≤ 5T</td>
</tr>
<tr>
<td>Pins per Section AS105.4.2</td>
<td>≤ 100&lt;sup&gt;130&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;</td>
<td>H ≤ 12</td>
<td>H ≤ 8T</td>
</tr>
<tr>
<td>Pins per Section AS105.4.2</td>
<td>≤ 110&lt;sup&gt;140&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>H ≤ 10</td>
<td>H ≤ 7T</td>
</tr>
<tr>
<td>Reinforced&lt;sup&gt;d&lt;/sup&gt; clay plaster</td>
<td>≤ 110&lt;sup&gt;140&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>H ≤ 10</td>
<td>H ≤ 87&lt;sup&gt;0.5&lt;/sup&gt; (H ≤ 140&lt;sup&gt;0.5&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Reinforced&lt;sup&gt;d&lt;/sup&gt; clay plaster</td>
<td>≤ 110&lt;sup&gt;140&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>10 H ≤ 12</td>
<td>H ≤ 87&lt;sup&gt;0.5&lt;/sup&gt; (H ≤ 140&lt;sup&gt;0.5&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Reinforced&lt;sup&gt;d&lt;/sup&gt; cement, cement-lime, lime or soil-cement plaster</td>
<td>≤ 110&lt;sup&gt;140&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>H ≤ 10</td>
<td>H ≤ 97&lt;sup&gt;0.5&lt;/sup&gt; (H ≤ 157&lt;sup&gt;0.5&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Reinforced&lt;sup&gt;d&lt;/sup&gt; cement,</td>
<td></td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;,</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
cement-lime, lime or soil-cement plaster

| \( \leq 120 \) | \( D_1, D_2 \) | \( H \leq 12 \) | \( \leq 157T^{0.5} \) |

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

a. Finishes applied to both sides of stacked bales. Where different finishes are used on opposite sides of a wall, the more restrictive requirements shall apply.

b. \( H \) = Stacked bale height in feet (mm) between sill plate and top plate or other approved horizontal restraint, or the horizontal distance in feet (mm) between approved vertical restraints. For load-bearing walls, \( H \) refers to vertical height only.

c. \( T \) = Bale thickness in feet (mm).

d. Plaster reinforcement shall be any mesh allowed in Table AS106.16 for the matching plaster type, and with staple spacing in accordance with this table. Mesh shall be installed in accordance with Section AS106.9.

e. Sill plate attachment shall be with 5/8-inch anchor bolts or approved equivalent at not more than 48 inches on center where staple spacing is required to be \( \leq 4 \) inches.

**AS105.4.2 Pins.** Pins used for out-of-plane resistance shall comply with the following or shall be in accordance with an approved engineered design. Pins shall be external, internal or a combination of the two.

1. Pins shall be 1/2-inch-diameter (12.7 mm) steel, 3/4-inch-diameter (19.1 mm) wood or 1/2-inch-diameter (12.7 mm) bamboo.

2. External pins shall be installed vertically on both sides of the wall at a spacing of not more than 24 inches (610 mm) on center. External pins shall have full lateral bearing on the sill plate and the top plate or roof-bearing element, and shall be tightly tied through the wall to an opposing pin with ties spaced not more than 32 inches (813 mm) apart and not more than 8 inches (203 mm) from each end of the pins.

3. Internal pins shall be installed vertically within the center third of the bales, at spacing of not more than 24 inches (610 mm) and shall extend from top course to bottom course. The bottom course shall be similarly connected to its support and the top course shall be similarly connected to the roof- or floor-bearing member above with pins or other approved means. Internal pins shall be continuous or shall overlap through not less than one bale course.

**AS105.6.4 Horizontal surfaces.** Bale walls and other bale elements shall be provided with a water-resistant barrier at weather-exposed horizontal surfaces. The water-resistant barrier shall be of a material and installation that will prevent water from entering the wall system. Horizontal surfaces shall include exterior window sills, sills at exterior niches and buttresses. The finish material at such horizontal surfaces shall be sloped not less than 1 unit vertical in 12 units horizontal (8-percent slope) and shall drain away from bale walls and elements. Where the water-resistant barrier is below the finish material, it shall be sloped not less than 1 unit vertical in 12 units horizontal (8-percent slope) and shall drain to the outside surface of the bales wall's vertical finish.

**AS105.6.8 Separation of wood and plaster.** Where wood framing or wood sheathing occurs at the exterior face of strawbale walls, such wood surfaces shall be separated from exterior plaster with two layers of Grade D paper, No. 15 asphalt felt or other approved material in accordance with Section R703.6.3.

**Exceptions:**

1. Where the wood is preservative treated or naturally durable and is not greater than 1 1/2 inches (38 mm) in width.
2. Clay plaster shall not be required to be separated from untreated wood that is not greater than $1\frac{1}{2}$ inches (38 mm) in width.

**AS105.8 Voids and stuffing** Voids between bales and between bales and framing members shall not exceed 4 inches (102 mm) in width, and such voids shall be tightly stuffed with flakes, loose straw, or straw-clay before application of finish.

**AS106.5 Voids and stuffing** Voids between bales in strawbale structural walls shall not exceed 4 inches (102 mm) in width, and such voids shall be stuffed with flakes of straw or straw-clay, before application of finish.

**AS106.11 Transfer of loads to and from plaster skins**. Where plastered strawbale walls are used to support superimposed vertical loads, such loads shall be transferred to the plaster skins by continuous direct bearing or by an approved engineered design. Where plastered strawbale walls are used to resist in-plane lateral loads, such loads shall be transferred to the reinforcing mesh from the structural member or assembly above and to the sill plate in accordance with Table AS106.13(3 AS106.13(1).

**AS106.12 Load-bearing walls**. Plastered strawbale walls shall be permitted to be used as load-bearing walls in one-story buildings to support vertical loads imposed in accordance with Section R301, in accordance with and not more than the allowable bearing capacities indicated in Table AS106.12.

**AS106.13 Braced wall panels**. No change to text.

**AS106.13.1 Bale wall thickness**. The thickness of the stacked bale strawbale braced wall panels without their plaster shall be not less than 15 inches (381 mm).

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**TABLE AS106.13 (2) BRACING REQUIREMENTS FOR STRAWBALE BRACED WALL PANELS BASED ON WIND SPEED**

<table>
<thead>
<tr>
<th>Exposure Category B\textsuperscript{d}, 25-Foot Mean Roof Height • 10-Foot Eave-to-Ridge Height • 10-Foot Wall Height • 2 Braced Wall Lines\textsuperscript{d}</th>
<th>Minimum Total Length (Feet) of Strawbale Braced Wall Panels Required Along Each Braced Wall Line\textsuperscript{a, b, c, d}</th>
<th>Strawbale braced wall panel\textsuperscript{e} A2, A3</th>
<th>Strawbale braced wall panel\textsuperscript{e} C1, C2, D1</th>
<th>Strawbale braced wall panel\textsuperscript{e} B2, D2, E1, E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Ultimate design wind speed (mph)</td>
<td>Story location</td>
<td>Braced wall line spacing (feet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\textless 85</td>
<td>One-story building</td>
<td>10</td>
<td>6.4</td>
<td>3.8</td>
</tr>
<tr>
<td>20</td>
<td>6.5</td>
<td>3.8</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>10.2</td>
<td>6.1</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>13.3</td>
<td>6.9</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>16.3</td>
<td>7.7</td>
<td>6.1</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>19.4</td>
<td>8.3</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>\textless 110</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 90</td>
<td>One-story building</td>
<td>10</td>
<td>6.4</td>
<td>3.8</td>
</tr>
<tr>
<td>------</td>
<td>-------------------</td>
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<tr>
<td></td>
<td></td>
<td>20</td>
<td>8.5</td>
<td>5.1</td>
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<td></td>
<td>30</td>
<td>11.2</td>
<td>6.4</td>
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<tr>
<td></td>
<td></td>
<td>40</td>
<td>14.3</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
<td>18.4</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>21.4</td>
<td>8.8</td>
</tr>
</tbody>
</table>

| ≤ 120 | One-story building | 10 | 7.1 | 4.3 | 3.4 |
|       |                   | 20 | 9.0 | 5.4 | 4.3 |
|       |                   | 30 | 12.2| 6.6 | 5.3 |
|       |                   | 40 | 16.3| 7.7 | 6.1 |
|       |                   | 50 | 19.4| 8.3 | 6.6 |
|       |                   | 60 | 23.5| 9.2 | 7.3 |

| ≤ 140 | One-story building | 10 | 7.1 | 4.3 | 3.4 |
|       |                   | 20 | 10.2| 6.1 | 4.8 |
|       |                   | 30 | 14.3| 7.2 | 5.7 |
|       |                   | 40 | 18.4| 8.1 | 6.5 |
|       |                   | 50 | 22.4| 9.0 | 7.1 |
|       |                   | 60 | 26.5| 9.8 | 7.8 |

| ≤ 140 | One-story building | 10 | 7.8 | 4.7 | 3.7 |
|       |                   | 20 | 11.2| 6.6 | 5.1 |
|       |                   | 30 | 16.3| 7.7 | 6.1 |
|       |                   | 40 | 21.4| 8.8 | 7.0 |
|       |                   | 50 | 26.5| 9.8 | 7.8 |
|       |                   | 60 | 30.6| 11.0| 8.3 |

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mile per hour = 0.447 m/s.

a. Linear interpolation shall be permitted.

b. All braced wall panels shall be without openings and shall have an aspect ratio (H:L) ≤ 2:1.

c. Tabulated minimum total lengths are for braced wall lines using single braced wall panels with an aspect ratio (H:L) ≤ 2:1, or using multiple braced wall panels with aspect ratios (H:L) ≤ 1:1. For braced wall lines using two or more braced wall panels with an aspect ratio (H:L) > 1:1, the minimum total length shall be multiplied by the largest aspect ratio (H:L) of braced wall panels in that line.

d. Subject to applicable wind adjustment factors associated with "All methods" in Table R602.10.3(2)

e. Strawbale braced panel types indicated shall comply with Sections AS106.13.1 through AS106.13.3 and with Table AS106.13(1).

**TABLE AS106.13 (3)**

**BRACING REQUIREMENTS FOR STRAWBALE BRACED WALL PANELS BASED ON SEISMIC DESIGN**
**Seismic Design Category**

<table>
<thead>
<tr>
<th>Seismic Design Category</th>
<th>Story location</th>
<th>Braced wall line length (feet)</th>
<th>Strawbale Braced Wall Panele A2, C1, C2, D1</th>
<th>Strawbale Braced Wall Panele B, D2, E1, E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>One-story building</td>
<td>10</td>
<td>5.7</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>8.0</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30</td>
<td>9.8</td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
<td>12.9</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
<td>16.1</td>
<td>10.4</td>
</tr>
<tr>
<td>D₀</td>
<td>One-story building</td>
<td>10</td>
<td>6.0</td>
<td>4.8</td>
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<td>11.7</td>
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<tr>
<td>D₁</td>
<td>One-story building</td>
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<td>6.3</td>
<td>5.1</td>
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<td>8.8</td>
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<tr>
<td>D₂</td>
<td>One-story building</td>
<td>10</td>
<td>7.1</td>
<td>5.7</td>
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<td>15.1</td>
<td>9.9</td>
</tr>
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<td></td>
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<td>40</td>
<td>20.1</td>
<td>13.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
<td>25.1</td>
<td>16.3</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. **Braced wall panels** shall be without openings and shall have an aspect ratio (H:L) ≤ 2:1.

c. Tabulated minimum total lengths are for **braced wall lines** using single **braced wall panels** with an aspect ratio (H:L) ≤ 2:1, or using multiple **braced wall panels** with aspect ratios (H:L) ≤ 1:1. For **braced wall lines** using two or more **braced wall panels** with an aspect ratio (H:L) > 1:1, the minimum total length shall be multiplied by the largest aspect ratio (H:L) of **braced wall panels** in that line.
d. Subject to applicable seismic adjustment factors associated with "All methods" in Table R602.10.3(4), except "Wall dead load."

e. Strawbale braced wall panel types indicated shall comply with Sections AS106.13.1 through AS106.13.3 and Table AS106.13(1).

f. Wall bracing lengths are based on a soil site class "D". Interpolation of bracing lengths between Sds values associated with the seismic design categories is allowable where a site-specific Sds value is determined in accordance with Section 1613.3 of the International Building Code.

Reason: The proposed changes in this proposal fall into one of the following three categories, and are needed to:
1. Simplify or clarify ambiguous language.
2. Correct typographical errors, errata, and changes to referenced section numbers in the IRC that changed from the 2012 to the 2015 IRC, but were not identified in Appendix S in the process of publishing the 2015 IRC.
3. Change "basic wind speed" to "ultimate design wind speed" terminology and wind speeds in Tables AS105.4 and AS106.13(2), and update associated braced wall panel lengths in Table AS106.13(2).

Example changes in category 1 include adding "predominantly" to the definition of "Laid Flat", and removing "similarly" in Section AS105.4.2

Example changes in category 2, include removing the word "the" in Section AS101.1, correcting the footnote in column 1 of Table AS105.4 from "c" to "d", and replacing R703.6.4 with R703.7.4 in Section AS104.4.8. Another change in this category is the inclusion of strawbale braced wall panel type 'B' in Table AS106.13(2), which was inadvertently left out of the proposal approved by ICC in 2013. Wall type 'B' should have been included with wall types D₁, E₁, and E₂ in the last column of that table.

The changes in category 3 are necessary because of the change in use from "basic wind speed" to "ultimate design wind speed" from the 2012 IRC to the 2015 IRC. This proposal updates Tables AS105.4 and AS106.13(2) to use "ultimate design wind speed" to make them consistent with the rest of the IRC. Table R301.2.3.1 Wind Speed Conversions was used in converting "basic wind speeds" to "ultimate design wind speeds."

The revised values for "minimum total length of straw bale braced wall panel" in Table AS106.13(2) were determined using the same procedure as in the original proposal approved by ICC in 2013. A new row is included in Table AS106.13(2) that correlates with the added row in Table 602.10.3(1) in the 2015 IRC, with an ultimate design wind speed of 120 mph.

The basis for the braced wall panel lengths in Table AS106.13(2) is in a document posted on the following webpage: http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents

In Section AS105.2, the words "except that greater heights shall be allowed with an approved engineered design" are added to item 2 to be consistent with the existing language in related item 1.

Existing Section AS106.3 Voids and stuffing is moved from AS106 Structural to AS105 General to become Section AS105.8 because stuffing of voids is important not only for structural performance, but to ensure proper thermal performance and fireblocking for all straw bale walls. The content of the relocated section is the same, but with the important condition of voids between bales and framing members added.

Footnote 'f' is added to Table AS106.13(3) to be consistent with footnote 'b' in the correlating braced wall panel table in the IRC, Table R602.10.3(3).


Cost Impact: Will not increase the cost of construction
The proposed changes in this proposal address matters of ambiguous language and corrections of errata. Therefore they have no cost impact.
2015 International Residential Code

Revise as follows:

**AS101.2 Strawbale wall systems.** Strawbale wall systems include those shown in Figure AS101.2 and approved variations.

**FIGURE AS101.2**
Typical Strawbale Wall Systems

**AS102.1 Definitions.** The following words and terms shall, for the purposes of this appendix,
have the meanings shown herein. Refer to Chapter 2 of the *International Residential Code* for general definitions.

**BALE.** Equivalent to straw bale.

**CLAY.** Inorganic soil with particle sizes less than 0.00008 inch (0.002 mm) having the characteristics of high to very high dry strength and medium to high plasticity.

**CLAY SLIP.** A suspension of clay particles in water.

**FINISH.** Completed compilation of materials on the interior or exterior faces of stacked *bales*.

**FLAKE.** An intact section of compressed *straw* removed from an untied *bale*.

**LAID FLAT.** The orientation of a *bale* with its largest faces horizontal, its longest dimension parallel with the wall plane, its *ties* concealed in the unfinished wall and its *straw* lengths oriented across the thickness of the wall. See Figure AS102.1.

**LOAD-BEARING WALL.** A strawbale wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition to its own weight.

**MESH.** An openwork fabric of linked strands of metal, plastic, or natural or synthetic fiber, embedded in plaster.

**NONSTRUCTURAL WALL.** Walls other than load-bearing walls or shear walls.

**ON-EDGE.** The orientation of a *bale* with its largest faces vertical, its longest dimension parallel with the wall plane, its *ties* on the face of the wall and its *straw* lengths oriented vertically. See Figure AS102.1.

**ON-END.** The orientation of a *bale* with its longest dimension vertical. For use in nonstructural strawbale walls only. See Figure AS102.1.

**PIN.** A vertical metal rod, wood dowel or bamboo, driven into the center of stacked bales, or placed on opposite surfaces of stacked bales and through-tied.

**PLASTER.** Gypsum or cement plaster, as defined in Sections R702 and AS104, or clay plaster, soil-cement plaster, lime plaster or cement-lime plaster as defined in Section AS104.

**PRECOMPRESSION.** Vertical compression of stacked bales before the application of finish.

**REINFORCED PLASTER.** A plaster containing mesh reinforcement.

**RUNNING BOND.** The placement of straw bales such that the head joints in successive courses are offset not less than one-quarter the bale length.

**SHEAR WALL.** A strawbale wall designed and constructed to resist lateral seismic and wind forces parallel to the plane of the wall in accordance with Section AS106.13.

**SKIN.** The compilation of plaster and reinforcing, if any, applied to the surface of stacked bales.

**STRUCTURAL WALL.** A wall that meets the definition for a load-bearing wall or shear wall.

**STACK BOND.** The placement of straw bales such that head joints in successive courses are vertically aligned.

**STRAW.** The dry stems of cereal grains after the seed heads have been removed.

**STRAW BALE.** A rectangular compressed block of straw, bound by ties.

**STRAWBALE.** The adjective form of straw bale.

**STRAW-CLAY.** Loose straw mixed and coated with clay slip.

**TIE.** A synthetic fiber, natural fiber or metal wire used to confine a straw bale.

**TRUTH WINDOW.** An area of a strawbale wall left without its finish, to allow view of the straw otherwise concealed by its finish.

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**FIGURE AS101.2**

_Bale Orientations_
AS103.2 Size. Bales shall have a height and thickness of not less than 12 inches (305 mm), except as otherwise permitted or required in this appendix. Bales used within a continuous wall shall be of consistent height and thickness to ensure even distribution of loads within the wall system. See Figure AS103.2 for approximate dimensions of common straw bales.

FIGURE AS103.2
Approximate Dimensions of Common Straw Bales
AS105.1 General. Strawbale walls shall be designed and constructed in accordance with this section and with Figures AS105.1(1) through AS105.1(4) or an approved alternative design. Strawbale structural walls shall be in accordance with the additional requirements of Section AS106.

AS105.3 Sill plates. Sill plates shall be installed in accordance with Figure AS105.3(1) or AS105.3(2). Sill plates shall support and be flush with each face of the straw bales above and shall be of naturally durable or preservative-treated wood where required by this code. Sill plates shall be not less than nominal 2 inches by 4 inches (51 mm by 102 mm) with anchoring complying with Section R403.1.6 and the additional requirements of Tables AS105.4 and AS106.6(1), where applicable.

AS106.3 Foundations. Foundations for plastered strawbale walls shall be in accordance with Chapter 4, Figure AR105.1(1) or Figure AR105.1(2).

AS106.10 Support of plaster skins. Plaster skins on strawbale structural walls shall be continuously supported along their bottom edge. Acceptable supports include: a concrete or masonry stem wall, a concrete slab-on-grade, a wood-framed floor blocked in accordance with Figure AS105.1(2) and an approved engineered design, or a steel angle anchored with an approved engineered design. A weep screed as described in Section R703.7.2.1 is not an acceptable support.

AS106.11 Transfer of loads to and from plaster skins. Where plastered strawbale walls are used to support superimposed vertical loads, such loads shall be transferred to the plaster skins by continuous direct bearing in accordance with Figure AS105.1(3) or by an approved engineered design. Where plastered strawbale walls are used to resist in-plane lateral loads, such loads shall be transferred to the reinforcing mesh from the structural member or assembly above in accordance with Figure AS105.1(3) or AS105.1(4) and to the sill plate in accordance with Figure AS105.1(1) or AS105.1(2) and with Table AS106.13(3) AS106.13(1).
AS106.12.3 Roof bearing assembly. Roof bearing assemblies shall be of nominal 2-inch by 6-inch (51 mm by 152 mm) lumber with 15/32-inch (12 mm) plywood or OSB panels fastened with 8d nails at 6 inches (152 mm) o.c. in accordance with Figure AS105.1(3) and Items 1 through 4, or be of an approved engineered design.

1. Discontinuous lumber shall be spliced with a metal strap with not less than a 500 pound (2224 N) allowable wind or seismic load tension capacity. Where the wall line includes a braced wall panel the strap shall have not less than a 2000 pound (8896 N) capacity.
2. Panel joints shall be blocked.
3. Roof and ceiling framing shall be attached to the roof bearing assembly in accordance with Table R602.3(1) Items 2 and 6.
4. Where the roof bearing assembly spans wall openings it shall comply with Section AS106.12.3.1

AS106.12.3.1 Roof bearing assembly spanning openings. Roof bearing assemblies that span openings in strawbale walls shall comply with the following at each opening:

1. Lumber on each side of the assembly shall be of the dimensions and quantity required to span each opening in accordance with Table R602.7(1).
2. The required lumber in the assembly shall be supported at each side of the opening by the number of jack studs required by Table R602.7(1), or shall extend beyond the opening on both sides a distance D, using the following formula:

\[ D = \frac{S \times R}{2} / (1-R) \]

where:
- \( D \) = minimum distance (in feet) for required spanning lumber to extend beyond the opening
- \( S \) = span in feet
- \( R \) = \( \frac{B_L}{B_C} \)
- \( B_L \) = design load on the wall (in pounds per lineal foot) in accordance with Sections R301.4 and R301.6
- \( B_C \) = allowable bearing capacity of the wall in accordance with Table AS106.12

AS106.15 Post-and-beam with strawbale infill. Post-and-beam with strawbale infill systems shall be in accordance with Figure AS105.1(4) and Items 1 through 6, or be of an approved engineered design.

1. Beams shall be of the dimensions and number of members in accordance with Table R602.7(1), where the space between posts equals the span in the table.
2. Beam ends shall bear over posts not less than 1 1/2 inches (38 mm) or be supported by a framing anchor in accordance with Table R602.7(1).
3. Discontinuous beam ends shall be spliced with a metal strap with not less than 1000 pound (4448 kg) wind or seismic load tension capacity. Where the wall line includes a braced wall panel the strap shall have a not less than a 4000 pound (17,793 kg) capacity.
4. Each post shall equal \( NJ + 1 \) in accordance with Table R602.7(1), where the space between posts equals the span in the table.
5. Posts shall be connected to the beam with an approved means.
6. Roof and ceiling framing shall be attached to the beam in accordance with Table R602.3(1) Items 2 and 6.
FIGURE AS105.1(1)
Typical Base of Plastered Strawbale Wall on Concrete Slab and Footing

For SI: 1 inch = 25.4 mm

FIGURE AS105.1(2)
Typical Base of Plastered Strawbale Wall Over Raised Floor
FIGURE AS105.1(3)
Typical Top of Load-Bearing Strawbale Wall
FIGURE AS105.1(3)
TYPICAL TOP OF LOAD-BEARING STRAWBALE WALL

FIGURE AS105.1(4)
Typical Top of Post-And-Beam Wall With Plastered Straw Bale Infill
**Reason:** This proposal brings seven Figures that illustrate straw bale wall systems and their components from the Commentary into Appendix S. Many design professionals, builders, and building officials are unfamiliar with straw bale construction, and these Figures provide clear visualization of the primary components of the most common systems of straw bale construction. The Figures reference appendix sections and their associated requirements. The callout text of the Commentary Figures was modified in some cases to make the Figures suitable for inclusion in the Appendix.

Sections AS106.12.3 Roof bearing assembly, and AS106.15 Post-and-beam with straw bale infill, are added to bring requirements from the figures into the body of the appendix. These requirements are complete, whereas the requirements in the figures in the commentary of the 2015 IRC are not. Engineering analysis justifying these requirements are posted at: http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents

Ten registered design professionals and builders with extensive experience in straw bale construction in different climates and regions of the United States had input in the creation of these Figures. At least half of these practitioners have experience with straw bale buildings in high seismic zones.

**Bibliography:** http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents

**Cost Impact:** Will not increase the cost of construction

The proposed Figures depict components of straw bale wall systems and illustrate requirements that already exist in Appendix S. Therefore there is no cost impact.
RB368-16

IRC: AS102.1, AS104.2, AS104.4.3.1, AS104.4.3.2, AS104.4.4.1, AS105.3.1 (New), AS105.4, AS105.6, AS105.6.9 (New), AS106.1, AS106.12.3 (New), AS106.12.3.1 (New), AS106.12.5 (New), AS106.2 (New), AS108.1, AS108.2 (New), AS109.

Proponent: Martin Hammer, representing Martin Hammer, Architect (mfhammer@pacbell.net); David Eisenberg, representing Development Center for Appropriate Technology

2015 International Residential Code

APPENDIX S STRAWBALE CONSTRUCTION

Revise as follows:

AS102.1 Definitions. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of the International Residential Code for general definitions.

BALE. Equivalent to straw bale.

CLAY. Inorganic soil with particle sizes less than 0.00008 inch (0.002 mm) having the characteristics of high to very high dry strength and medium to high plasticity.

CLAY SLIP. A suspension of clay particles subsoil in water.

CLAY SUBSOIL. Subsoil sourced directly from the earth or refined, containing clay and free of organic matter.

FINISH. Completed compilation of materials on the interior or exterior faces of stacked bales.

FLAKE. An intact section of compressed straw removed from an untied bale.

LAID FLAT. The orientation of a bale with its largest faces horizontal, its longest dimension parallel with the wall plane, its ties concealed in the unfinished wall and its straw lengths oriented across the thickness of the wall.

LOAD-BEARING WALL. A strawbale wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition to its own weight.

MESH. An openwork fabric of linked strands of metal, plastic, or natural or synthetic fiber, embedded in plaster.

NONSTRUCTURAL WALL. Walls other than load-bearing walls or shear walls.

ON-EDGE. The orientation of a bale with its largest faces vertical, its longest dimension parallel with the wall plane, its ties on the face of the wall and its straw lengths oriented vertically.

ON-END. The orientation of a bale with its longest dimension vertical. For use in nonstructural strawbale walls only.

PIN. A vertical metal rod, wood dowel or bamboo, driven into the center of stacked bales, or placed on opposite surfaces of stacked bales and through-tied.

PLASTER. Gypsum or cement plaster, as defined in Sections R702 and AS104, or clay plaster, soil-cement plaster, lime plaster or cement-lime plaster as defined in Section AS104.

PRECOMPRESSION. Vertical compression of stacked bales before the application of finish.

REINFORCED PLASTER. A plaster containing mesh reinforcement.

RUNNING BOND. The placement of straw bales such that the head joints in successive courses are offset not less than one-quarter the bale length.

SHEAR WALL. A strawbale wall designed and constructed to resist lateral...
seismic and wind forces parallel to the plane of the wall in accordance with Section AS106.13. 

SKIN. The compilation of plaster and reinforcing, if any, applied to the surface of stacked bales.

STRUCTURAL WALL. A wall that meets the definition for a load-bearing wall or shear wall.

STACK BOND. The placement of straw bales such that head joints in successive courses are vertically aligned.

STRAW. The dry stems of cereal grains after the seed heads have been removed.

STRAW BALE. A rectangular compressed block of straw, bound by ties.

STRAW BALE. The adjective form of straw bale.

STRAW-CLAY. Loose straw mixed and coated with clay slip.

TIE. A synthetic fiber, natural fiber or metal wire used to confine a straw bale.

TRUTH WINDOW. An area of a strawbale wall left without its finish, to allow view of the straw otherwise concealed by its finish.

AS104.2 Purpose, and where required. Strawbale walls shall be finished so as to provide mechanical protection, fire resistance and protection from weather and to restrict the passage of air through the bales, in accordance with this appendix and this code. Vertical strawbale wall surfaces shall receive a coat of plaster not less than \( \frac{3}{8} \) inch (10 mm) thick, or greater where required elsewhere in this appendix, or shall fit tightly against a solid wall panel or dense-packed cellulose insulation with a density of not less than 3.5 pounds per cubic foot (56 kg/cubic meter) blown into an adjacent framed wall. The tops of strawbale walls shall receive a coat of plaster not less than \( \frac{3}{8} \) inch (10 mm) thick where straw would otherwise be exposed.

Exception: Truth windows shall be permitted where a fire-resistance rating is not required. Weather-exposed truth windows shall be fitted with a weather-tight cover. Interior truth windows in Climate Zones 5, 6, 7, 8 and Marine 4 shall be fitted with an air-tight cover.

AS104.4.3.1 General. Clay plaster shall be any plaster having a clay or clay-soil binder. Such plaster shall contain sufficient clay to fully bind the sand or other inert granular material, and shall be permitted to contain reinforcing fibers. Acceptable reinforcing fibers include chopped straw, sisal and animal hair.

AS104.4.3.2 Lath and mesh. Clay subsoil requirements. Clay plaster shall not be required to contain reinforcing lath or mesh except as required in Tables AS105.4 and AS106.13(1). Where provided, mesh:

The suitability of clay subsoil shall be natural fiber, corrosion-resistant metal, nylon, high-density polypropylene determined in accordance with the Figure 2 Ribbon Test or other approved material the Figure 3 Ball Test in the appendix of ASTM E2392/E2392M.

AS104.4.4.1 General. Soil-cement plaster shall be composed of soil (free of organic matter) clay subsoil, sand and not less than 10 percent and not more than 20 percent Portland cement by volume, and shall be permitted to contain reinforcing fibers.

AS105.3.1 Exterior sill plate flashing. Exterior sill plates shall receive flashing across plate to slab or foundation joints.

### TABLE AS105.4

OUT-OF-PLANE RESISTANCE METHODS AND UNRESTRAINED WALL DIMENSIONS DIMENSION LIMITS
<table>
<thead>
<tr>
<th>METHOD OF OUT-OF-PLANE RESISTANCE&lt;sup&gt;a&lt;/sup&gt;</th>
<th>FOR ULTIMATE DESIGN WIND SPEEDS (mph)</th>
<th>FOR SEISMIC DESIGN CATEGORIES</th>
<th>DIMENSIONS, H&lt;sup&gt;b&lt;/sup&gt;</th>
<th>MESH STAPLE SPACING AT BOUNDARY RESTRAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonplaster finish or unreinforced plaster</td>
<td>≤ 100&lt;sup&gt;130&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;</td>
<td>H ≤ 8</td>
<td>H ≤ 5T</td>
</tr>
<tr>
<td>Pins per Section AS105.4.2</td>
<td>≤ 100&lt;sup&gt;130&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;</td>
<td>H ≤ 12</td>
<td>H ≤ 8T</td>
</tr>
<tr>
<td>Pins per Section AS105.4.2</td>
<td>≤ 110&lt;sup&gt;140&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>H ≤ 10</td>
<td>H ≤ 7T</td>
</tr>
<tr>
<td>Reinforced&lt;sup&gt;d&lt;/sup&gt; clay plaster</td>
<td>≤ 110&lt;sup&gt;140&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>H ≤ 10</td>
<td>H ≤ 8T&lt;sup&gt;0.5&lt;/sup&gt;(H ≤ 140T&lt;sup&gt;0.5&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Reinforced&lt;sup&gt;d&lt;/sup&gt; clay plaster</td>
<td>≤ 110&lt;sup&gt;140&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>10 H ≤ 12</td>
<td>H ≤ 8T&lt;sup&gt;0.5&lt;/sup&gt;(H ≤ 140T&lt;sup&gt;0.5&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Reinforced&lt;sup&gt;d&lt;/sup&gt; cement, cement-lime, lime or soil-cement plaster</td>
<td>≤ 120&lt;sup&gt;155&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>H ≤ 10</td>
<td>H ≤ 9T&lt;sup&gt;0.5&lt;/sup&gt;(H ≤ 157T&lt;sup&gt;0.5&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Reinforced&lt;sup&gt;d&lt;/sup&gt; cement, cement-lime, lime or soil-cement plaster</td>
<td>≤ 120&lt;sup&gt;155&lt;/sup&gt;</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>H ≤ 12</td>
<td>H ≤ 9T&lt;sup&gt;0.5&lt;/sup&gt;(H ≤ 157T&lt;sup&gt;0.5&lt;/sup&gt;)</td>
</tr>
<tr>
<td>2x6 load-bearing studs&lt;sup&gt;f&lt;/sup&gt; at max. 6’ o.c.</td>
<td>≤ 140</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>H&lt;sub&gt;1&lt;/sub&gt; ≤ 9</td>
<td>NA</td>
</tr>
<tr>
<td>2x6 load-bearing studs&lt;sup&gt;f&lt;/sup&gt; at max. 4’ o.c.</td>
<td>≤ 140</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
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<td>NA</td>
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<tr>
<td>2x6 load-bearing</td>
<td>≤ 140</td>
<td>A, B, C, D&lt;sub&gt;0&lt;/sub&gt;, D&lt;sub&gt;1&lt;/sub&gt;, D&lt;sub&gt;2&lt;/sub&gt;</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>studs at max. 2' o.c.</td>
<td>$D_1, D_2$</td>
<td>$H^g$ ≤ 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2x4 load-bearing</td>
<td>≤ 140</td>
<td>A, B, C, D_0, $D_1, D_2$</td>
<td>$H^g$ ≤ 10</td>
<td>NA</td>
</tr>
<tr>
<td>2x6 nonload-bearing</td>
<td>≤ 140</td>
<td>A, B, C, D_0, $D_1, D_2$</td>
<td>$H^g$ ≤ 12</td>
<td>NA</td>
</tr>
</tbody>
</table>

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

a. Finishes applied to both sides of stacked bales. Where different finishes are used on opposite sides of a wall, the more restrictive requirements shall apply.

b. $H = $ Stacked bale height in feet (mm) between sill plate and top plate or other approved horizontal restraint, or the horizontal distance in feet (mm) between approved vertical restraints. For load-bearing walls, $H$ refers to vertical height only.

c. $T = $ Bale thickness in feet (mm).

d. Plaster reinforcement shall be any mesh allowed in Table AS106.16 for the matching plaster type, and with staple spacing in accordance with this table. Mesh shall be installed in accordance with Section AS106.9.

e. Sill plate attachment shall be with $5/8$-inch anchor bolts or approved equivalent at not more than 48 inches on center where staple spacing is required to be ≤4 inches

f. Bales shall be attached to the studs by an approved method. Horizontal framing and attachment at top and bottom of studs shall be in accordance with Section R602 or an approved alternative. Table R602.7(1) shall be used to determine the top framing member where load-bearing stud spacing exceeds 24-inches o.c.

g. $H$ is vertical height only.

**AS105.6 Moisture control.** Strawbale walls shall be protected from moisture intrusion and damage in accordance with Sections AS105.6.1 through AS105.6.8.

**AS105.6.9 Separation of exterior plaster and foundation.** Exterior plaster shall be separated from the building foundation with a moisture barrier.

**AS106.1 General.** Plastered strawbale walls shall be permitted to be used as structural walls in one-story buildings in accordance with the prescriptive provisions of this section.

**AS106.2 Building limitations and requirements for use of strawbale structural walls.** Buildings using strawbale structural walls shall be subject to the following limitations and requirements:

1. **Number of stories:** Not more than one.
2. **Building height:** Not more than 25 feet (7620 mm).
3. **Wall height:** In accordance with Tables AS105.4, AS106.13(2) and AS106.13(3) as applicable, whichever is most restrictive.
4. **Braced wall panel lengths:** The greater of the values determined in accordance with Tables AS106.13(2) and AS106.13(3) for buildings using strawbale braced wall panels, or in accordance with Section AS105.2(4) for buildings with load-bearing strawbale walls that do not use strawbale braced wall panels.

**AS106.12.3 Roof bearing assembly.** Roof bearing assemblies shall be of nominal 2-inch by 6-inch (51 mm by 152 mm) lumber with 15/32-inch (12 mm) plywood or OSB panels fastened with 8d nails at 6 inches (152 mm) o.c. in accordance with Items 1 through 6, or be of an approved engineered design.
1. Assembly shall be a box assembly on the top course of bales, with the panels horizontal.
2. Assembly shall be the width of the strawbale wall and shall comply with Section AS106.11.
3. Discontinuous lumber shall be spliced with a metal strap with a minimum 500 pound (2224 N)
   allowable wind or seismic load tension capacity. Where the wall line includes a braced wall panel
   the strap shall have not less than a 2000 pound (8896 N) capacity.
4. Panel joints shall be blocked.
5. Roof and ceiling framing shall be attached to the roof bearing assembly in accordance with
   Table R602.3(1) Items 2 and 6.
6. Where the roof bearing assembly spans wall openings it shall comply with Section
   AS106.12.3.1.

**AS106.12.3.1 Roof bearing assembly spanning openings.** Roof bearing assemblies that
span openings in strawbale walls shall comply with the following at each opening:

1. Lumber on each side of the assembly shall be of the dimensions and quantity required to span
   each opening in accordance with Table R602.7(1).
2. The required lumber in the assembly shall be supported at each side of the opening by the
   number of jack studs required by Table R602.7(1), or shall extend beyond the opening on
   both sides a distance D, using the following formula:

   \[ D = \frac{S \times R}{2 \times (1-R)} \]

   where:
   - \( D \) = minimum distance (in feet) for required spanning lumber to extend beyond the opening
   - \( S \) = span in feet
   - \( R = \frac{B_L}{B_C} \)
   - \( B_L \) = design load on the wall (in pounds per lineal foot) in accordance with Sections R301.4 and
     R301.6
   - \( B_C \) = allowable bearing capacity of the wall in accordance with Table AS106.12

**AS106.12.5 Post-and-beam with strawbale infill.** Post-and-beam with strawbale infill systems
shall be in accordance with Items 1 through 6, or an approved engineered design.

1. Beams shall be of the dimensions and number of members in accordance with Table
   R602.7(1), where the space between posts equals the span in the table.
2. Beam ends shall bear over posts not less than 1 1/2 inches (38 mm) or be supported by
   a framing anchor in accordance with Table R602.7(1).
3. Discontinuous beam ends shall be spliced with a metal strap with not less than 1000 pound
   (4448 kg) wind or seismic load tension capacity. Where the wall line includes a braced wall panel,
   the strap shall have not less than a 4000 pound (17,793 kg) capacity.
4. Each post shall equal \( NJ + 1 \) in accordance with Table R602.7(1), where the space between
   posts equals the span in the table.
5. Posts shall be connected to the beam by an approved means.
6. Roof and ceiling framing shall be attached to the beam in accordance with Table R602.3(1)
   Items 2 and 6.

**AS108.1 R-value.** The unit R-value of a strawbale wall with bales laid flat is \( R-1.3 \) per
\( R-1.55 \) for each inch of bale thickness. The unit R-value of a strawbale wall with bales on-edge is
\( R-2 \) per \( R-1.85 \) for each inch of bale thickness.

**AS108.2 Compliance with Section R302.10.1** Straw bales meet the requirements for insulation
Section R302.10.1 for flame spread index and smoke-developed index as tested in accordance with ASTM E84.

**SECTION AS109 REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>ASTM</th>
<th>Standard</th>
<th>AS104.4.6.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 5—10</td>
<td>Standard Specification for Quicklime for Structural Purposes</td>
<td></td>
</tr>
<tr>
<td>C 141/C141M—09</td>
<td>Standard Specification for Hydrated Hydraulic Lime for Structural Purposes</td>
<td>AS104.4.6.1</td>
</tr>
<tr>
<td>C 206—03</td>
<td>Standard Specification for Finishing Hydrated Lime</td>
<td>AS104.4.6.1</td>
</tr>
<tr>
<td>C 926—12a</td>
<td>Standard Specification for Application of Portland Cement Based Plaster</td>
<td>AS104.4.7, AS104.4.8</td>
</tr>
<tr>
<td>C 1707—11</td>
<td>Standard Specification for Pozzolanic Hydraulic Lime for Structural Purposes</td>
<td>AS104.4.6.1</td>
</tr>
<tr>
<td>E2392/E2392M—10</td>
<td>Standard Guide for Design of Earthen Wall Building Systems</td>
<td>AS104.4.3.2</td>
</tr>
</tbody>
</table>

**Reason:** The proposed code changes in this proposal create new or revised requirements relative to the appendix as first approved for the 2015 IRC. These changes are based on further experience and additional input from prominent straw bale construction design and building professionals in different regions of the United States. Reasons for proposed changes per section are as follows:

**AS102.1 Definitions:**

A definition for CLAY SUBSOIL is added and the term is then used in subsections of Section AS104.4.3 and in the definition of CLAY SLIP. This brings clarity to this often misunderstood material used in many straw bale wall systems.

A definition for ON-END is added because bales are increasingly and successfully being used in this orientation in nonstructural straw bale walls for insulation and a substrate for plaster.

**AS104.2 Purpose, and where required:**

New language allows the face of a bale wall to remain unplastered when tight against dense-packed cellulose insulation in an adjacent framed wall. This satisfies the relevant purposes of restricting air movement for thermal performance and the potential spread of fire. This has been practiced successfully in permitted, inspected straw bale buildings regionally. An industry magazine article is posted at: [http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents](http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents)

**AS104.4.3.2 Lath and mesh:**

The existing section title and content are sufficiently addressed in Section AS104.4.2 Lath and mesh for plaster, and therefore are removed. The important subject clay subsoil suitability is absent from the current appendix. Therefore a new section title, "Clay subsoil requirements", and two tests from ASTM 2392-10 that are commonly used by clay plaster practitioners to determine the suitability of clay subsoil, are proposed.

**AS105.3.1 Exterior sill plate flashing:**

This new section requires flashing across plate to slab or foundation joints to prevent water intrusion at this location. This important requirement is currently absent from Appendix S.

**Table AS105.6:**

Wood framing is added as a method of out-of-plane resistance with an approved means of attachment of the bales to the framing. This method has been successfully utilized regionally for over 10 years for straw bale walls adjacent to or integrated with wood frame walls. Structural calculations justifying the particulars of the variables in the table are posted at: [http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents](http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents)

**AS105.6.9 Separation of exterior plaster and foundation:**
This new section requires a moisture barrier between a straw bale wall's exterior plaster and the foundation to prevent the wicking of moisture into the exterior plaster and potentially to the bales at this location. This important requirement is currently absent from Appendix S.

AS106.1 General:

The limitation of one-story is removed from this section and relocated to Section AS106.2.

AS106.2 Building limitations and requirements for use of straw bale structural walls:

This new section gives building limitations and requirements in the same format as Section 105.2 for non-structural walls. It gives clarity and corrals existing information for structural walls is in scattered locations. In Item 4 it also clarifies that braced wall panel lengths are to be the greater value of those shown in Tables AS106.13.3(1) and AS106.13.3(2).

AS106.12.3 Roof bearing assembly:

This new section prescribes a roof bearing assembly for load-bearing straw bale walls. Details of this common member of a load-bearing straw bale wall are currently absent from Appendix S. Engineering analysis justifying the requirements in this section are posted at: http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents

AS106.12.3.1 Roof bearing assembly spanning openings:

IRC Table R602.10(1) for girders and headers is used to determine the size of lumber elements in the roof bearing assembly where it spans a wall opening. A formula is given to determine the required distance for the header element to extend beyond the wall opening where jack studs are not used. Engineering analysis justifying the requirements in this section are posted at: http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents

AS106.15 Post-and-beam with straw bale infill:

This new section prescribes a post-and-beam system with straw bale infill. Details of this common system are currently absent from Appendix S. IRC Table R602.10(1) for girders and headers is used to determine the beam size and the posts depending on the span and loading conditions. Engineering analysis justifying the requirements in this section are posted at: http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents

AS108.1 R-value:

The proposed changes in unit R-values for bales laid flat and bales on-edge are based on new data from thermal resistance tests conducted in Denmark (2004) and the U.K. (2012) along with tests at the Oak Ridge National Laboratory (ORNL) in Tennessee (1998). The ORNL tests were conducted in accordance with the guarded hot box protocol of ASTM C236, and the Danish and U.K. tests in accordance with its ISO equivalent, ISO 8990.

The current values in Section AS108.1 were based on the ORNL test and analysis by the California Energy Commission (CEC), which conservatively established the R-value for bales laid flat at R1.3 per inch from the ORNL test value of R1.45. Taking all three tests into account, the R-value for bales laid flat is adjusted upward to R1.55 and is adjusted downward to R1.85 for bales on-edge. The predominant orientation of straw in common bales continues to explain why the unit R-value varies with bale orientation.

Analysis of the data was performed by energy consultant Nehemiah Stone who was part of the team that conducted the CEC analysis in 1998. The current analysis as well as the reports from the Danish Urban and Building Research Institute and University of Bath (U.K.) tests are posted at: http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents

AS108.2 Compliance with Section R302.10.1:

This new section states compliance with the requirements of Section R302.10.1 and is necessary because building officials and design and building professionals are generally unaware of or would be unable to find the ASTM E84 test conducted in 2000 that demonstrated that straw bales meet these requirements. The test report is posted at: http://ecobuildnetwork.org/projects/straw-bale-code-supporting-documents


Cost Impact: Will not increase the cost of construction

The proposed code changes in this proposal are minor relative to the overall system of straw bale construction and therefore will have no cost impact when using this method of construction.
2015 International Residential Code

Revise as follows:

**AS107.1 Fire-resistance rating.** Strawbale walls shall **not** be considered to be non-rated exhibit a fire resistance rating, except for walls constructed in accordance with Section AS107.1.1 or AS107.1.2. Alternately, fire-resistance ratings of strawbale walls shall be determined in accordance with Section R302 of the *International Residential Code*.

**Reason:** Purely editorial: the correct terminology is to address fire resistance rating.

**Cost Impact:** Will not increase the cost of construction

Purely editorial
2015 International Residential Code

Revise as follows:

**AS107.1.1 One-hour rated clay plastered wall.** One-hour fire-resistance-rated nonload-bearing clay plastered strawbale walls shall comply with all of the following:

1. Bales shall be laid flat or on-edge in a running bond.
2. Bales shall maintain thickness of not less than 18 inches (457 mm).
3. Bales shall have a minimum density of 7.5 pounds per cubic foot.
4. Gaps shall be stuffed with straw-clay.
5. Clay plaster on each side of the wall shall be not less than 1 inch (25 mm) thick and shall be composed of a mixture of 3 parts clay, 2 parts chopped straw and 6 parts sand, or an alternative approved clay plaster.
6. Plaster application shall be in accordance with Section AS104.4.3.3 for the number and thickness of coats.

**AS107.1.2 Two-hour rated cement plastered wall.** Two-hour fire-resistance-rated nonload-bearing cement plastered strawbale walls shall comply with all of the following:

1. Bales shall be laid flat or on-edge in a running bond.
2. Bales shall maintain a thickness of not less than 14 inches (356 mm).
3. Bales shall have a minimum density of 7.5 pounds per cubic foot.
4. Gaps shall be stuffed with straw-clay.
5. one (1)$^{1/2}$-inch (38 mm) by 17-gage galvanized woven wire mesh shall be attached to wood members with 1$^{1/2}$-inch (38 mm) staples at 6 inches (152 mm) on center. 9 gage U-pins with not less than 8-inch (203 mm) legs shall be installed at 18 inches (457 mm) on center to fasten the mesh to the bales.
6. Cement plaster on each side of the wall shall be not less than 1 inch (25 mm) thick.
7. Plaster application shall be in accordance with Section AS104.4.8 for the number and thickness of coats.

**Reason:** This appendix was added to the code last cycle. The fire test reports provided by the submitter stated that the bales tested had a density of 7.5 pcf. This section currently mandates a minimum bale density of 6.5 pcf. So, the appendix currently permits a 1-hour or 2-hour fire resistance rating for assemblies which have not demonstrated this level of performance in fire tests.

The ASTM E119 test involves measuring the temperature on the unexposed side of the specimen when it is exposed to heat from a furnace. A more dense bale will delay the temperature rise on the unexposed side and perform better in this test. As such, the fire test provided does not represent the worst case scenario, as it should.

Therefore, the 1-hour or 2-hour fire resistance rating should only be assigned to walls with bale density of at least 7.5 pcf, as no fire test data has been provided for bales of lesser density.

**Cost Impact:** Will increase the cost of construction

This proposal may increase the cost of construction if a user intended to build a 1-hour or 2-hour rated wall with
bales of a density less than 7.5 pcf.
IRC: U103, U103.1, U103.2, U103.3, U103.4, U103.5, U103.5 (New), U103.6, U103.6 (New), U103.7, U103.8.

Proponent: Kathleen Petrie, City of Seattle, Department of Construction and Inspections, representing City of Seattle, Department of Construction and Inspections (kathleen.petrie@seattle.gov)

2015 International Residential Code

APPENDIX U SOLAR-READY PROVISIONS—DETACHED ONE- AND TWO-FAMILY DWELLINGS, MULTIPLE SINGLE- FAMILY DWELLINGS (TOWNHOUSES)

SECTION U103 SOLAR-READY ZONE

Revise as follows:

U103.1 General. New detached one- and two-family dwellings, and multiple single-family dwellings (townhouses) with not less than 600 square feet (55.74 m²) of roof area oriented between 110° 90° degrees and 270 degrees of true north shall comply with sections U103.2 through U103.8.

Exceptions:
1. New residential buildings with a permanently installed on-site renewable energy system.
2. A building with a solar-ready zone where all areas of the roof that is shaded would otherwise meet the requirements of Section U103 are in full or partial shade for more than 70 percent of daylight hours annually.

U103.2 Construction document requirements for solar ready zone. Construction documents shall indicate the solar-ready zone.

U103.3 Solar-ready zone area. The total solar-ready zone area shall be not less than 300 square feet (27.87 m²) exclusive of mandatory access or set back areas as required by the International Fire Code. New multiple single-family dwellings (townhouses) three stories or less in height above grade plane and with a total floor area less than or equal to 2,000 square feet (185.8 m²) per dwelling shall have a solar-ready zone area of not less than 150 square feet (13.94 m²). The solar-ready zone shall be composed of areas not less than 5 feet (1.52 m) in width and not less than 80 square feet (7.44 m²) exclusive of access or set back areas as required by the International Fire Code.

U103.4 Obstructions. Solar-ready zones shall be free from obstructions, including but not limited to vents, chimneys, and roof-mounted equipment.

Add new text as follows:

U103.5 Shading. The solar-ready zone shall be set back from any existing or new permanently affixed object on the building or site that is located south, east, or west of the solar zone a distance at least two times the object's height above the nearest point on the roof surface. Such objects include, but are not limited to, taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees, and roof plantings.

U103.6 Capped roof penetration sleeve. A capped roof penetration sleeve shall be provided adjacent to a solar-ready zone located on a roof slope of 2:12 or less. The capped roof penetration sleeve shall be sized to accommodate the future photovoltaic system conduit.
shall have an inside diameter of not less than 1 ¼ inches.

Revise as follows:

U103.5 **U103.7 Roof load documentation.** *No change to text.*

U103.6 **U103.8 Interconnection pathway.** *No change to text.*

U103.7 **U103.9 Electrical service reserved space.** *No change to text.*

U103.8 **U103.10 Construction documentation certificate.** *No change to text.*

**Reason:** The modifications proposed are designed to provide clarification and strengthen the existing Solar-ready Appendix U.

In Section U103.1, the roof area orientation has been modified from 110 degrees to 90 in order to maximize the roof slopes that maximize solar technology effectiveness. For similar reasons, Section U103.3 now precludes any portion of the solar zone from being located on a roof slope greater than 2:12 that faces within 45 degrees of true north.

New Section U103.5 clarifies the term "shading" used in Section U103.1, Exception #2, by clarifying how far the designated solar-ready zone should be set back from permanently affixed objects.

If necessary for the system, it is considerably cheaper to provide a path for future wiring from the solar panel to the meter at the time of new construction than after, so roofs with a slope of 2:12 or less must provide a pipe sleeve penetration. There are other design options for roofs with greater slopes, so a penetration is not necessary.

**Cost Impact:** Will increase the cost of construction

Only in roofs with a slope of 2:12 or less will this proposal increase the cost of construction by $100. In all other projects it will not increase the cost of construction.
APPENDIX V Seismic Repair and Seismic Retrofit of Masonry Chimneys in Existing One- and Two-Family Detached Dwellings.

SECTION AV101 General

AV101.1 Scope. This appendix chapter provides prescriptive methods for repair of earthquake-damaged chimneys and fireboxes in one- and two-family detached dwellings. The provisions of this chapter are also allowed to be used for pre-earthquake seismic retrofit of existing masonry chimneys. The use of these provisions is limited to one- and two-family dwellings of wood or cold-formed steel light-frame construction.

AV101.2 Intent. The provisions of this chapter are intended to promote public safety and welfare by reducing the risk of earthquake-induced damage, but will not necessarily prevent damage.

AV101.3 Repair and retrofit methods. Repair or seismic retrofit of existing masonry chimneys and fireboxes shall be in accordance with one of the following methods:

1. Capping of the chimney at the roof level in accordance with Section AV103.
2. Reconstruction of the chimney from the top of the smoke chamber up in accordance with Section AV104.
3. Reconstruction of the chimney from the top of the smoke chamber up and installation of a fireplace insert in accordance with Section AV105, or
4. Full reconstruction of the firebox and chimney in accordance with Section AV106.

AV101.4 General Requirements. Other items of repair, retrofit, or reconstruction not specifically addressed in this chapter shall be in accordance with applicable requirements of this code.

SECTION AV102 Definition

AV102.1 General. The following word and term shall, for purposes of this appendix, have the meaning shown herein.

CHIMNEY CHASE. A light-frame weather enclosure surrounding a factory-built metal chimney.

SECTION AV103 Capping of Chimney at Roof Level

AV103.1 Scope. This section provides prescriptive methods for partial removal and capping of masonry chimneys at the roof level.
AV103.2 **Limitations.** The following limitations apply to this section:

1. Use of these provisions on a damaged chimney is limited to chimneys in which damage only occurs above the roof level. A chimney and firebox inspection indicating extent of damage shall be submitted with the permit application.
2. Access to the interior of the firebox shall be completely closed off from the dwelling interior with an infill of gypsum wallboard or wood structural panel sheathing, masonry, or other material permanently affixed.

AV103.3 **Chimney partial removal and capping.** The chimney shall be removed to a distance of eight inches above the highest adjacent roofing, leaving existing roof flashing undisturbed. A sheet metal cap of galvanized steel or stainless steel shall be provided for weather protection. The cap shall extend not less than three inches down each side of the chimney. The cap shall be secured to the chimney with corrosion-resistant fasteners.

**SECTION AV104 Reconstruction From Top of Smoke Chamber**

**AV104.1 Scope.** This section provides prescriptive methods for partial removal of the masonry chimney above the smoke chamber-to-chimney transition, and reconstruction using a factory-built metal chimney enclosed in a chimney chase.

**AV104.2 Limitations.** The following limitations apply to this section:

1. Use of these provisions on a damaged chimney is limited to chimneys in which damage only occurs above the transition from smoke chamber to chimney. A chimney and firebox inspection indicating extent of damage shall be submitted with the permit application.
2. Use of these provisions is limited to chimneys occurring at the exterior walls of dwellings. Chimneys completely interior to the dwelling are beyond the scope of this appendix.
3. Where the exterior walls adjacent to the chimney are required to be fire-rated, chimney chase construction shall confirm to the requirements of Section R302.

**AV104.3 Chimney partial removal.** The chimney shall be removed down to the top of the smoke chamber-to-chimney transition, as shown in Figure AV104.3.

**FIGURE AV104.3**
Components of masonry fireplace with chimney reconstruction from top of smoke chamber up.
See Section AV104.4 for numbered items.

**AV104.4 Reconstruction.** Reconstruction shall be in accordance with the following requirements and Figure AV104.3. Item numbers below correspond to Figure AV104.3.

1. Masonry firebox. The existing masonry firebox shall remain up to the top of the smoke chamber as shown in Figure AV104.3.

2. Existing framing. Existing roof, wall, and ceiling framing shall remain. Existing framing shall be re-supported in accordance with applicable requirements of this code where existing support is disrupted.
3. Masonry veneer. Where existing masonry veneer is disrupted, re-support and anchorage of masonry veneer shall be provided in accordance with the requirements of this code.

4. Smoke chamber-to-chimney transition. The transition from the smoke chamber to the metal chimney shall be in accordance with Section AV104.5.

5. Track or sill plate. Cold-formed steel track sections matching the thickness of the studs shall be provided at the bottom of cold-formed steel chimney chase walls. Wood sill or bottom (sole) plates, having a width not less than the supported studs, shall be provided at the bottom of wood chimney chase walls. Wood sill or bottom plates shall be protected against decay in accordance with Section R317.1. Fasteners in contact with wood sill or bottom plates shall be in accordance with Section R317.3. Tracks and sill plates shall be anchored to the concrete beam in accordance with Section AV104.5.

6. Chimney chase stud wall. Chimney chases shall be constructed of full-height wood studs in accordance with Section R602 or full-height cold-formed steel studs in accordance with Section R603. Studs shall be selected based on story clear height, but not less than eight feet, and applicable Section R301.2 wind criteria. Wood studs shall be not less than 2 by 3 and spaced not more than 12 inches on center. Cold-formed steel studs shall be not less than 43 mil thickness by 2-1/2 inch deep and spaced not more than 12 inches on center. The top of the chimney shall extend not less than three feet above the eave of roof and not less than two feet above the maximum roof elevation, or maximum elevation of other construction located within a ten foot horizontal dimension in any direction from the chimney. Where this requires that the chimney chase extend more than four feet above the highest roof elevation immediately adjacent to the chimney, bracing of the chimney chase shall be provided in accordance with Section AV104.6.

7. Chimney chase connection to dwelling. The chimney chase studs shall be fastened to the existing dwelling exterior wall with minimum No. 8 wood screws at 12 inches on center. The chimney chase framing shall be strapped to existing floor, ceiling and roof framing with not less than two steel straps not less than 1-1/4 inches in width and 33 mil in thickness, on two opposing sides of the chimney. The steel straps shall be fastened to steel blocking between steel studs with minimum four No. 8 sheet metal screws, or to wood blocking between wood studs with not less than four 8d common nails. The steel straps shall be fastened to existing wood floor, ceiling or roof framing with not less than four 8d common nails, or to existing steel framing with not less than four No. 8 sheet metal screws.

8. Factory-built metal chimney. Factory-built metal chimneys shall be in accordance with Section R1005.

9. Flue cap. Where required by the metal chimney manufacturer, a flue cap shall be installed, complying with the metal chimney's listing.

10. Fireblocking. Fireblocking between the chimney chase and the attic shall be installed as required by Section R302.11.

AV104.5 Smoke chamber-to-chimney transition. The transition from the masonry smoke chamber to the factory-built metal chimney and chimney chase shall be in accordance with the following requirements and Figure AV104.5.

1. A 12 gauge (97 mil) minimum thickness sheet steel transition cone shall be provided, as shown in Figure AV104.5. The transition cone shall have minimum 12 gauge (97 mil) thickness sheet steel top and bottom plates, and shall provide a smooth-surfaced transition between the flue opening at the top of the firebox and the anchor plate and...
metal flue. The bottom plate geometry shall match the opening geometry at the top of the smoke chamber, and the top plate geometry shall be coordinated with the UL listed anchor plate. The transition cone shall be set in cementitious grout, and all transition cone seams shall be continuously welded.

2. The transition cone base plate shall be anchored to the firebox masonry with not less than four 1/2-inch diameter galvanized threaded rod anchors, as shown in Figure AV104.5. The threaded rods shall be extended to one inch below the top of the concrete beam, shall be embedded six inches into masonry at the firebox, and shall be set in cementitious grout.

3. Reinforcing steel (rebar) and a concrete beam shall be constructed around the transition cone, using the cone as the inside form in accordance with Figure AV104.5. Not less than a 1-1/2-inch clear distance shall be provided between the rebar and outside face of concrete.

4. Mineral insulation shall be installed on top of the transition cone top plate as shown in Figure AV104.5 where required by the anchor plate manufacturer.

5. A fireplace adapter (chimney anchor plate), tested in accordance with UL 103a, shall be installed in accordance with the manufacturer's installation instructions.

**FIGURE AV104.5**

Masonry smoke chamber to chimney and chimney chase transition.

**AV104.6 Chimney chase bracing to roof.** Where bracing of the chimney chase is required by Section AV104.4, Item 6, the bracing shall be connected to the chimney chase in the upper third of the chimney chase clear height above the roof (H), in accordance with Figures AV104.6(1) and AV104.6(2). Bracing steel angles not less than 2-1/2x2-1/2x1/4-inch shall be provided at not less
than two locations. The bracing slope shall be no less than 30 degrees and not more than 60 degrees from vertical.

**FIGURE AV104.6**
(1) Bracing of chimney chase to roof.

**FIGURE AV104.6**
(2) Details of chimney chase roof bracing.
SECTION AV105 Reconstruction From Top of Smoke Chamber Using a Factory-Built Fireplace Insert

AV105.1 Scope. This section provides prescriptive methods for partial removal of the masonry chimney above the smoke chamber-to-chimney transition, and reconstruction using a factory-built fireplace insert enclosed in a chimney chase.

AV105.2 Limitations. The following limitations apply to this section:

1. Use of these provisions on a damaged chimney is limited to chimneys in which damage only occurs above the transition from smoke chamber to chimney. A chimney and firebox inspection indicating extent of damage shall be submitted with the permit application.
2. Use of these provisions is limited to chimneys occurring at the exterior wall of dwellings. Chimneys completely interior to the dwelling are beyond the scope of this chapter.
3. Where the exterior walls adjacent to the chimney are required to be fire-rated, chimney chase construction shall confirm to the requirements of Section R302.

AV105.3 Chimney partial removal. The chimney shall be removed in accordance with Section AV104.3.
**AV105.4 Reconstruction.** Reconstruction shall be in accordance with Section AV104.4 and the following:

1. The factory-built fireplace insert shall conform to UL 1482.
2. The factory-built chimney liner shall conform to UL 1777.
3. A hearth extension, where required by the fireplace insert listing, shall conform to UL 1618.
4. The transition from masonry firebox and chimney liner to the factory-built chimney and chimney chase shall be constructed in accordance with Section AV105.5.

**AV105.5 Smoke chamber-to-chimney transition.** The transition from the masonry smoke chamber to the metal chimney and chimney chase shall be in accordance with the following requirements and Figure AV105.5.

1. A 12 gauge (97 mil) thickness sheet steel transition cone shall be provided as shown in Figure AV105.5. The transition cone shall have minimum 12 gauge (97 mil) thickness sheet steel top and bottom plates, and shall provide a smooth-surfaced transition between the flue opening at the top of the firebox and the anchor plate and metal flue. The bottom plate geometry shall match and allow for attachment of the factory-built insert chimney liner. The top plate geometry shall be coordinated with the UL listed anchor plate. The transition cone shall be set in cementitious grout, and all transition cone seams shall be continuously welded.
2. The transition cone base plate shall be anchored to the firebox masonry with not less than four 1.2-inch diameter galvanized threaded rod anchors, as shown in Figure AV104.5. The threaded rods shall be extended to one inch below the top of the concrete beam, shall be embedded six inches into the masonry at the firebox, and shall be set in cementitious grout.
3. Reinforcing steel (rebar) and a concrete beam shall be constructed around the transition cone, using the cone as the inside form in accordance with Figure AV104.5. Not less than a 1-1/2 inch clear distance shall be maintained between rebar and the outside face of concrete.
4. The listed insert, chimney liner, chimney, and accessories shall be installed in accordance with the manufacturer's instructions and the listing. Clearances required by the manufacturer and the listing shall be maintained.

**FIGURE AV105.5**
Transition from masonry smoke chamber to factory-built chimney where factory-built fireplace insert is used.
SECTION AV106  Full Reconstruction of Firebox and Chimney Using a Factory-Built Fireplace

**AV106.1 Scope.** This section provides prescriptive methods for complete removal of the masonry chimney and firebox, and for reconstruction using a factory-built fireplace enclosed in a chimney chase.

**AV106.2 Limitations.** The following limitations apply to this section:

1. Use of these provisions is limited to chimneys occurring at the exterior walls of dwellings. Chimneys completely interior to the dwelling are beyond the scope of this chapter.
2. Where the exterior walls adjacent to the chimney are required to be fire-rated, chimney chase construction shall confirm to the requirements of Section R302.

**AV106.3 Chimney and firebox removal.** The chimney and firebox shall be completely removed.

**AV106.4 Reconstruction.** Reconstruction shall be in accordance with the following requirements and Figure AV106.4. Item numbers below correspond to Figure AV106.4.

1. Existing foundation. Where a concrete footing exists, use of the concrete footing shall not be prohibited. Where the existing footing is other than concrete, the footing shall be removed and replaced in accordance with Chapter 4.
2. Extension of existing foundation. Where required to meet dimensional requirements specified by the fireplace manufacturer, the existing concrete footing shall be extended as shown in Figure AV106.4. Where footing extension is required, the
depth of the new footing shall match the depth of the existing foundation, however the bottom of the footing extension shall not be less than 12 inches below grade. The foundation extension shall be reinforced with one No. 4 bar at the top and bottom of new concrete, and adhesive dowels to the existing footing at not more than 12 inches on center. See the applicable provisions of this code for additional requirements.

3. Non-combustible hearth extension. Where required to meet the manufacturer's requirements or fireplace listing, a hearth extension confirming to UL 1618 shall be installed.

4. Factory-built fireplace. The factory-built fireplace shall comply with Section R1004.

5. Chimney chase stud walls. In single-story dwellings the studs shall extend full height from the foundation to the top of the chimney chase. In two-story dwellings the studs shall extend full-height from the second floor to the top of the chimney chase. Wood stud walls shall be constructed in accordance with Section R602. Cold-formed steel stud walls shall be constructed in accordance with Section R603. The top of the chimney shall extend not less than three feet above the roof and not less than two feet above the elevation of the roof or other construction within a ten foot dimension. Where this requires that the chimney chase extend more than four feet above the highest roof elevation immediately adjacent to the chimney, bracing of the chimney chase shall be provided in accordance with Section AV104.6.

6. Existing wall framing. Where existing wall framing requires modification to accommodate the new fireplace opening, framing shall be reconstructed in accordance with applicable requirements of Chapter 6.

7. Factory-built metal chimney. A listed and labeled factory-built metal chimney supplied by the fireplace manufacturer shall be installed in accordance with the manufacturer's installation instructions and listing.

8. Stud blocking. Continuous blocking shall be installed at 4'-0" maximum vertical spacing. Blocking size shall match studs.

9. Chimney chase connection to dwelling. The chimney chase studs shall be fastened to the existing residence exterior wall with not less than No. 8 wood screws at 12 inches on center. The chimney chase framing shall be strapped to the existing floor, ceiling, and roof framing with not less than two steel straps at each location. The steel straps shall be not less than 1-1/4-inch by 33 mil in thickness, and installed on two opposing faces of the chimney chase. The steel straps shall be fastened to steel blocking between steel studs with not less than four No. 8 sheet metal screws, or to wood blocking between wood studs with not less than four 8d common nails. The steel straps shall be fastened to existing wood floor, ceiling, or roof framing with minimum four 8d common nails or the existing steel framing with not less than four No. 8 sheet metal screws.

10. Existing roof, ceiling and floor framing. Existing roof, ceiling and floor framing shall remain. Existing framing shall be re-supported in accordance with applicable requirements of this code where existing support is disrupted.

11. Chimney chase. The chimney chase shall be constructed as required in item 6.

12. Chimney cap. A framed chimney cap shall be constructed at the top of the chimney chase.

13. Flue cap. Where required by the factory-built fireplace manufacturer, a flue cap shall be installed, complying with the fireplace listing.

14. Fireblocking. Fireblocking between the chimney chase and the attic or second floor framing shall be installed as required by Section R302.11.
Components of a reconstructed fireplace and chimney with factory-built fireplace in chimney chase.
**Reference standards type:** This reference standard is new to the ICC Code Books

**Add new standard(s) as follows:**
UL 103a-2005, Outline of Investigation for Masonry Fireplace Adapters for Residential Type and Building Heating Appliance Chimneys.

**Reason:** In most recent moderate to major earthquakes, widespread damage has occurred to masonry chimneys and fire boxes. As a result, jurisdictions have needed to provide direction for repair. Following the 2014 South Napa Earthquake, FEMA funded the writing of a recovery advisory (FEMA DR-4193-RA1) addressing recommendations for repair of earthquake damaged chimneys and fireboxes. The recommendations were drawn in part from repair approaches developed post-earthquake by the Cities of Napa, Seattle and Los Angeles. This code change makes the recovery advisory guidance available to all jurisdictions to adopt on an as-needed basis, and permits the same approaches developed for repair to be used for the voluntary retrofit of chimneys prior to an earthquake.

This appendix chapter requires the construction of chimney chases even though UL listed metal chimneys are not required to be enclosed in chases. This is done in order to return to the pre-removal enclosure geometry, allowing the wall and roof weather-barrier systems to be returned to their pre-removal configuration. This is not meant to prohibit alternative approaches being approved by the building official.

**Cost Impact:** Will not increase the cost of construction

The provisions of this appendix chapter will reduce the cost of repairing earthquake-damaged chimneys. The alternative methods of this chapter have estimated costs from less than $1,000.00 to approximately $5,000.00, as compared to a cost of $10,000.00 or higher for complete reconstruction of a masonry fireplace and chimney.

**Analysis:** A review of the standard(s) proposed for inclusion in the code, UL 103a, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
APPENDIX V

ALTERNATIVE INSULATION R-VALUES AND VAPOR RETARDER APPLICATIONS FOR ABOVE-GRADE WOOD-FRAME WALLS

SECTION AV101 GENERAL

AV101.1 General. Insulation component R-value alternatives to those specified in Table N1102.1.2 and vapor retarder application alternatives to those specified in Section R702.7 for above-grade wood-frame walls shall comply with Table AV101.1, or Sections AV102 and AV103.

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>WALL INSULATION COMPONENTS a,b,c,d (cavity + continuous)</th>
<th>MINIMUM STUD SIZE</th>
<th>VAPOR RETARDER APPLICABILITY e,f</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insulation R-value</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cavity</td>
<td>Continuous</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>Class II</td>
<td>Class III</td>
<td></td>
</tr>
</tbody>
</table>

Cavity Insulation Permeance Greater than 1.5 Perms

<table>
<thead>
<tr>
<th>1,2</th>
<th>13</th>
<th>0</th>
<th>2x4</th>
<th>NA</th>
<th>NA</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>8.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,4,5</td>
<td>20</td>
<td>0</td>
<td>2x6</td>
<td>See Table AV103(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>30</td>
<td>0</td>
<td>2x8</td>
<td>See Table AV103.1(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>4.8</td>
<td>2x6</td>
<td>AS</td>
<td>AS</td>
<td>See Table AV103.1(2)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>8.5</td>
<td>2x4</td>
<td>AS</td>
<td>AS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>9.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>18.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.6</td>
<td>30</td>
<td>0</td>
<td>2x8</td>
<td>See Table AV103.1(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20h</td>
<td>4.8h</td>
<td>2x6</td>
<td>AS</td>
<td>AS</td>
<td>See Table AV103.1(2)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>8.5</td>
<td>2x4</td>
<td>AS</td>
<td>AS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>9.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>18.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cavity Insulation Less Than or Equal to 1.5 Perms at Installed Thickness

| 1.2 | 13  | 0.0  | 2x4 | NA  | NA  | ASi |
| 5   | 4.5 |     |     |     |     |     |
| 3   | 6.0 |     |     |     |     |     |

| 3,4,5 | 20  | 0.0  | 2x6 | ASi | ASi | ASi |
| 16   | 3.0  | 2x4 |     |     |     |     |
| 12   | 4.8 |     |     |     |     |     |
| 8    | 7.2 |     |     |     |     |     |

(Climate Zone 5 only)

(except R-15+3.4ci in Climate Zone 5 not permitted)
a. Table component R-value combinations comply with Table N1102.1.4 and are based on calculation in accordance with Section AV102 with wood studs spaced at 16 inches on center (framing factor of 25%). Interpolation of cavity and continuous insulation component R-values shall be prohibited.
b. Cavity and continuous insulation components, where included, shall be combined as indicated in the table. An R-value of zero '0' indicates that either no continuous insulation or no cavity insulation is required.
c. Indicated R-values for continuous insulation are minimums that can be exceeded where product availability results in the installation of greater R-values. Where R-values for continuous insulation are shown as '0' for cases with cavity insulation greater than 1.5 perms, any increase in the continuous insulation R-value shall comply with Table AV103.1(2).
d. Where insulation components are continuous insulation only (no cavity insulation), a separate vapor retarder shall not be required where the water vapor permeance of the continuous insulation product or a continuous material layer towards the interior side of the continuous insulation is not greater than 1 perm.
e. NA -- vapor retarder not applicable to the indicated Climate Zone.
f. AS -- acceptable solution deemed to comply with Sections AV102 and AV103 for the indicated vapor retarder and wall insulation condition.
g. Where the site-specific heating degree day value is greater than 16,200 (65°F basis) [9,000 (18°C basis)], a design shall be required to determine an acceptable solution.
h. For applications in Climate Zone 7 where the heating degree day value (65°F basis) exceeds 9,900 and in Climate Zone 8, the minimum amount of continuous insulation shall be increased to R-7.0ci and R-10.0ci, respectively. Alternatively, closed-cell spray foam applied to not less than R-7 to the interior face of the exterior sheathing plus additional cavity insulation to achieve a total cavity insulation component R-value of R-20 shall be provided.
i. Where the cavity insulation permeance at the installed thickness is not greater than 1 perm, or where the continuous insulation permeance is not greater than 1 perm, a vapor retarder as indicated in the table shall not be required.

SECTION AV102 ALTERNATE R-VALUE SOLUTIONS

AV102.1 Alternate R-value solutions (calculation method). Alternate component insulation R-values shall be determined in accordance with this section for above-grade wood frame walls.

AV102.2 Criteria. Alternate R-value solutions shall result in a total assembly U-factor that does not exceed the maximum U-factors required in Table N1102.1.4 except as determined in accordance with Section N1102.1.5. The U-factor calculation method shall comply with Section AV102.2.
AV102.3 Calculation method. The method of calculation of U-factors for an alternate R-value assembly shall be the parallel-path method in accordance with Chapter 27 of the ASHRAE Handbook of Fundamentals or an other approved method. All of the following R-values for insulation components and other materials in the assembly shall apply:

1. Cavity insulation component R-value shall comply with Section N1101.10.4.
2. Continuous insulation component R-value shall comply with Section N1101.10.4.
3. Exterior air-film shall be R-0.17.
4. Interior air-film shall be R-0.68.
5. Cladding R-value shall be based on an approved source. Where cladding is insulated siding, the R-value shall comply with Section N1101.10.4.
6. Exterior sheathing shall be R-0.62 for 7/16 inch OSB or other sheathing material having a R-value based on an approved source.
7. Airspace R-value shall comply with Appendix A, Section 9.4 and Addendum AC of ASHRAE 90.1.
8. Wood framing (headers & studs) shall be R-1.25 per inch for spruce-pine-fir wood framing or R-value data from an approved source for other species of wood or for engineered wood framing.
9. Interior finish shall be R-0.45 for 1/2 inch gypsum board or other material with R-value based on an approved source.

SECTION AV103 INSULATION PLACEMENT AND WATER VAPOR CONTROL

AV103.1 Insulation placement and water vapor control. The location and properties of insulation components, vapor retarders, and other material layers on the wall assembly shall comply with Table AV103.1(1) or Table AV103.1(2). Alternatively, the wall assembly shall be designed in accordance with accepted engineering practice for hygrothermal analysis.

TABLE AV103.1(1)
MINIMUM WATER VAPOR PERMEANCE (WVP)
FOR MATERIAL LAYERS LOCATED ON THE EXTERIOR SIDE OF WALL STUDS a,b,c

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>Class I Vapor Retarder</th>
<th>Class II Vapor Retarder</th>
<th>Class III Vapor Retarder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class I not applicable</td>
<td>Class II not applicable</td>
<td>No minimum WVP</td>
</tr>
<tr>
<td>2</td>
<td>Class I not applicable</td>
<td>Class II not applicable</td>
<td>No minimum WVP</td>
</tr>
<tr>
<td>3</td>
<td>Class I not applicable</td>
<td>No minimum WVP</td>
<td>No minimum WVP</td>
</tr>
<tr>
<td>4</td>
<td>0.5 perm (Marine 4 only)</td>
<td>0.5 perm</td>
<td>3 perm</td>
</tr>
<tr>
<td></td>
<td>otherwise Class I not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.5 perm</td>
<td>3 perm</td>
<td>5 perm</td>
</tr>
<tr>
<td>6</td>
<td>1 perm</td>
<td>5 perm</td>
<td>15 perm</td>
</tr>
</tbody>
</table>
For SI: 1 perm = 57.2 ng/s-m²-Pa

a. The WVP of materials on the exterior side of the wall studs shall be determined, for the purpose of compliance with this table, using Method A ('dry cup') or Method B ('wet-cup') of ASTM E96.
b. Where there is more than one layer to the exterior side of wall studs, the net WVP of the layers comprising the exterior wall covering assembly, excluding vented claddings, shall be determined using the following equation:

\[
Net\ WVP = \frac{1}{\frac{1}{perm1} + \frac{1}{perm2} + \frac{1}{perm3} + \frac{1}{permX} + \ldots},
\]

*Equation AV-1*

where,

Net WVP is in units of perms and

‘permX’ is the WVP of each individual layer, exterior to the wall studs.

Perm ratings for each material layer shall be based on approved test data representative of the actual product, including all component layers of composite products.

c. As an alternative to Table AV103.1(2), exterior continuous insulation of any thickness shall comply with this table and shall be considered in accordance with note b.

d. The WVP requirement for Climate Zone 8 is based on a maximum 16,200 heating degree days (65°F basis) [9,000 heating degree days (18°C basis)]. Where this heating degree day limit is exceeded, a design shall be required to determine the minimum required water vapor permeance for materials on the exterior side of the assembly.

**TABLE AV103.1(2)**

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>MAXIMUM HEATING DEGREE DAYS (65°F basis)</th>
<th>Class I Vapor Retarder</th>
<th>Class II Vapor Retarder</th>
<th>Class III Vapor Retarder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class I not permitted</td>
<td>Class II not permitted</td>
<td>R-2ci minimum</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Class I not permitted</td>
<td>Class II not permitted</td>
<td>R-2ci minimum</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3,600</td>
<td>Class I not permitted</td>
<td>R-2ci minimum</td>
<td>R-2ci minimum</td>
</tr>
<tr>
<td>4</td>
<td>5,400</td>
<td>Class I not permitted</td>
<td>R-2ci minimum</td>
<td>0.2</td>
</tr>
<tr>
<td>5</td>
<td>7,200</td>
<td>0.2</td>
<td>0.2</td>
<td>0.35</td>
</tr>
</tbody>
</table>

a,b,c
For SI: 1 heating degree day (65°F basis) = 0.56 heating degree days (18°C basis)
a. Insulation ratio is the exterior continuous insulation R-value divided by the cavity insulation R-value.
b. Interpolation of insulation ratios using a site-specific heating degree day value shall be permitted.
c. In addition to the vapor retarder, spray foam with a permeance not greater than 1.5 perms at the installed thickness and applied to the interior side of wood structural panels, fiberboard, insulating sheathing or gypsum board, complies with the insulation ratio requirement provided that the spray foam R-value plus continuous insulation R-value, if any, meets or exceeds the R-value requirement for continuous insulation using the tabulated insulation ratios.
d. The minimum insulation ratios for Climate Zone 8 are based on a maximum 16,200 heating degree days (65°F basis) [9,000 heating degree days (18°C basis)]. Where this heating degree day limit is exceeded, a design shall be required to determine the minimum required insulation ratio.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:

TO BE ADDED TO APPENDIX AV ONLY;

ASHRAE 90.1 - 2013 Energy Standard for Buildings Except Low-Rise Residential Buildings

Reason:
This proposal provides a prescriptive application (Section AV101) of water vapor retarders corresponding with a variety of insulation strategies to provide a simple and reliable means of addressing the important inter-relationship between the energy code (Chapter 11) and building code (Section R702.7) for energy efficiency and water vapor control. This prescriptive “menu-driven” approach (Table AV101.1) is coupled with a transparent and flexible design method to determine assembly U-factors for energy code compliance (Section AV102) and insulation ratios or permeance requirements for water vapor control purposes (Section AV103). Thus, a full gambit of non-material-biased prescriptive solutions and alternative solutions are made available to code users. Builders, designers and code officials will be able to readily achieve or verify code compliant wall assemblies in a coordinated and reliable fashion. The proposal is offered as an informative appendix that is adoptable at the election of individual states and answers the call for simplicity yet comprehensive and effective solutions with essentially unlimited flexibility to optimize wall assemblies to meet a particular need or preference. It is based on and informed by an extensive review and analysis of available data, codes, and practices in the United States and in Canada (ABTG, 2015). The builder or designer is able to select a wall (2x4, 2x6, or 2x8) with cavity insulation only of any material type (of low or high permeance) and a variety of vapor retarders suitable to the climate zone with simple verification of exterior permeance as needed to avoid moisture problems. Similarly, a wall with cavity insulation plus continuous insulation may be selected using a variety of exterior insulation and cavity insulation materials (again of high or low permeance), each with a specified vapor retarder condition which can be met with a variety of vapor retarder material options. Finally, solutions with exterior insulation only are also provided without material preference, accommodating all types. For cases not addressed in the prescriptive Table AV101.1, including unique designs, Sections AV102 and AV103 provide a means to develop consistent and equivalent alternate solutions using hygrothermal analysis or a simple design procedure. Several ways of optimizing walls for code compliance and cost-effectiveness are provided while giving assurance (particularly where the code is currently silent) of reliable performance and avoidance of designs that have increased potential of moisture problems.

This proposal fills a number of “gaps” in the code that can lead to unforeseen and avoidable moisture problems due to a lack of guidance and appropriate limits to practice. For example, the IRC is currently silent on the matter of coordinating the use of vapor retarders with the vapor permeance of materials on the exterior side of the assembly. Yet, the minimum vapor permeance of exterior materials is known to be important factors in the control of water vapor. Similarly, the IRC does not specify minimum continuous insulation R-values (or insulation ratios) for walls with Class I or II vapor retarders, although the importance of such is well known and currently practiced with success in
Canada. These “gaps” in the IRC have become increasingly important with advancements to the energy code (Chapter 11) as well as changes to many common material types used to construct wall assemblies of all types that otherwise can lead to unintended and avoidable consequences. The wall and its component parts must be viewed as a system to achieve reliable performance consistently and this proposal provides a straightforward means of doing so.

While Table AV101 provides a simple prescriptive "look-up" procedure suitable to selection of a wide variety of wall assemblies and materials, Tables AV102 and AV103 do require some modest homework to provide assurance of adequate moisture control (i.e., there is "no free lunch"). Example applications of the design methodology represented in Tables AV103.1(1) and AV103.1(2) are as follows:

TABLE AV103.1(1):

**Given:** Assume the energy code requires minimum R-20 cavity insulation and the product used is vapor permeable (e.g., fiberglass, cellulose, etc.). Also assume that 7/16” OSB sheathing is used (typical wet cup vapor permeance of ~3.8 perms) together with a 10 perm building wrap and a vented cladding (e.g., anchored brick veneer, vinyl siding, etc.).

**Find:** What Class of interior vapor retarder is permitted for use with this assembly in Climate Zone 5?

**Solution:** First, determine the net vapor permeance of the exterior material layers (excluding the vented cladding) in accordance with footnote ‘b’ of Table AV103.1(1). Thus, net permeance = 1/[(1/3.8)+1/(1/10)] = 1/0.36 = 2.75 perm. This is just under the 3 perm required by Table AV103.1(1) for Climate Zone 5 for use with a Class II vapor retarder. Thus, a Class I vapor retarder is required. However, there are alternatives. For example, one could use a sheathing product with a minimum vapor permeance of 4.3 perms or greater (e.g., 1/2” plywood, fiberboard, etc.) which would result in a net vapor permeance of 3.0 perms or greater, allowing use of a Class II vapor retarder. Alternatively, the ~3.8 perm (or greater) OSB can be used with a house wrap material of 15 perms or more instead of 10 perm house wrap as initially tried and this adjustment will allow use of a Class II vapor retarder in Climate Zone 5. Using a non-vented cladding will require similar adjustments to achieve compliance. This check only needs to be done one time for a given assembly of a specific combination of materials and then it can be used multiple times without repeating the check (kind of a like a standard detail).

TABLE AV103.1(2):

**Given:** Assume the energy code requires R20+5ci (2x6 wall with R-20 cavity insulation and R5 continuous insulation).

**Find:** What is the maximum (coldest) permissible climate zone for this wall when using a Class I, II, or III vapor retarder?

**Solution:** First, determine the insulation ratio, Re/Ri = 5/20 = 0.25. In accordance with Table AV103(2), the maximum/coldest Climate Zone is 6 with a Class I or II vapor retarder and Climate Zone 4 with a Class III vapor retarder. The use of each of these assemblies can be extended into a portion of the next greater climate zone by use of a site-specific heating degree day value in accordance with footnote ‘b’ of Table AV103.1(2).

Thus, multiple alternative solutions (beyond the many already provided prescriptively in Table AV101) can be quickly and effectively developed using Tables AV103.1(1) or AV103.1(2). These alternate assemblies can then be easily evaluated for energy code compliance following the requirements in Section AV102.

To demonstrate compliance of the prescribed assemblies in Table AV101 with the required U-factors in the energy code (Chapter 11), the following example U-factor calculations are provided:
### Climate Zone 1, 2

<table>
<thead>
<tr>
<th>Wall Thermal Resistance by Component</th>
<th>2 x 4 Wall R-0+R8.5ci</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R-value Cavity Path</td>
</tr>
<tr>
<td>Wall - Outside Winter Air Film</td>
<td>0.17</td>
</tr>
<tr>
<td>Siding - Vinyl</td>
<td>0.62</td>
</tr>
<tr>
<td>Continuous Insulation</td>
<td>8.5</td>
</tr>
<tr>
<td>OSB - 7/16&quot;</td>
<td>0.62</td>
</tr>
<tr>
<td>SPF Stud/Cavity Insulation</td>
<td>0</td>
</tr>
<tr>
<td>1/2 Drywall</td>
<td>0.45</td>
</tr>
<tr>
<td>Inside Air Film</td>
<td>0.68</td>
</tr>
<tr>
<td>16&quot; o.c. Framing Factor</td>
<td>75%</td>
</tr>
<tr>
<td>Total Wall R-Values</td>
<td>11.04</td>
</tr>
<tr>
<td>Assembly U-Factor</td>
<td><strong>0.084</strong></td>
</tr>
</tbody>
</table>

*2009 ASHRAE Handbook of Fundamentals

### Climate Zone 3, 4, 5

<table>
<thead>
<tr>
<th>Wall Thermal Resistance by Component</th>
<th>2 x 4 Wall R-15+R3.4ci</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R-value Cavity Path</td>
</tr>
<tr>
<td>Wall - Outside Winter Air Film</td>
<td>0.17</td>
</tr>
<tr>
<td>Siding - Vinyl</td>
<td>0.62</td>
</tr>
<tr>
<td>Continuous Insulation</td>
<td>3.4</td>
</tr>
<tr>
<td>OSB - 7/16&quot;</td>
<td>0.62</td>
</tr>
<tr>
<td>SPF Stud/Cavity Insulation</td>
<td>15</td>
</tr>
<tr>
<td>1/2 Drywall</td>
<td>0.45</td>
</tr>
<tr>
<td>Inside Air Film</td>
<td>0.68</td>
</tr>
<tr>
<td>16&quot; o.c. Framing Factor</td>
<td>75%</td>
</tr>
<tr>
<td>Total Wall R-Values</td>
<td>20.94</td>
</tr>
<tr>
<td>Assembly U-Factor</td>
<td><strong>0.060</strong></td>
</tr>
</tbody>
</table>

*2009 ASHRAE Handbook of Fundamentals
### Wall Thermal Resistance by Component

<table>
<thead>
<tr>
<th>Component</th>
<th>2 x 4 Wall R-13+R4.3ci</th>
<th>2 x 6 Wall R-20+R4.8ci</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R-value Cavity Path</td>
<td>R-value Stud Path</td>
</tr>
<tr>
<td>Wall - Outside Winter Air Film&lt;sup&gt;a&lt;/sup&gt;</td>
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<sup>a</sup> 2009 ASHRAE Handbook of Fundamentals

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**Climate Zone 6, 7, 8**

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<sup>a</sup> 2009 ASHRAE Handbook of Fundamentals
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\(^A\) 2009 ASHRAE Handbook of Fundamentals
### Wall Thermal Resistance by Component

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*2009 ASHRAE Handbook of Fundamentals*

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**Bibliography:**

**Cost Impact:** Will not increase the cost of construction
This proposal improves clarity and effectiveness of code compliance and provides many options for doing so, such that there is no cost impact to construction other than some minimal effort (if not using one of the prescriptive solutions in AV101) to identify a compliant solution. Alternative solutions also are recognized and not excluded. Thus, no cost impact is anticipated and reduction of long-term costs due to improved resiliency and avoided moisture problems is expected.
2015 International Residential Code

Revise as follows:

R303.4 Mechanical ventilation. Where the air infiltration rate of a dwelling unit is 5 air changes per hour or less where tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3.

M1507.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

Reason:

SUMMARY

1. Mechanical ventilation is needed in tight homes to provide minimum indoor air quality and reduce exposure to harmful and costly air pollutants
2. Homes built to the 2009 or later versions of the IECC are tight, regardless of whether a blower door test is used to confirm this fact
3. 90% of new single family starts are now built to the 2009 IECC or later, and 70% of these tight homes have no requirement for mechanical ventilation
4. Because over 90% of new construction is now required to be tight, the IRC needs a requirement for all new construction to have mechanical ventilation

DETAILS

Tight Dwelling Units are Now Standard Practice in at Least 90% of New Construction

When the 2006 IECC was developed, the assumption was that typical new construction would result in houses with an air tightness of about 6.6 ACH50 (this is based on a SLA of 0.00036 listed in Table 404.5.2(1), assuming that builders followed the 10 mandatory air sealing requirements of 2006 IECC Section 402.4.1). When the 2009 IECC was introduced, air tightness requirements were made even more stringent, with the list of mandatory air sealing requirements increasing from 10 to 17 (2009 IECC Table 402.4.2). In 2012, recognizing that homes were becoming increasingly tighter, the IRC mechanical committee approved a proposal to require mechanical ventilation when a blower door test confirmed that the air tightness was less than 5 ACH50, aligning with the broad industry consent that mechanical ventilation should absolutely be required when a home’s air leakage is below 5 ACH50. While this change was a good first step towards providing minimum acceptable indoor air quality, the fact is that a blower door test does not make a house air tight; it only confirms how tight the house is. What makes a house tight is following the mandatory air sealing provisions of the 2009 and later versions of the IECC.

Experience from decades of work with builders confirms that achieving a home air tightness of less than 5 ACH50 is not difficult if the builder just addresses the “big holes” during construction – those mandated by the 2009 air sealing provisions of the IECC. Similarly, feedback from building officials and HERS raters have confirmed that following the 2009 IECC air sealing checklist is all that is necessary to achieve building tightness below 5 ACH50 (and regularly below 3 ACH50). Following are some examples of this testimony from internet threads, studies, and personal communications:

- Connecticut Light and Power Study: Blower door tests on a statistical sample of 69 single family homes built to the 2006 IECC and spread across Connecticut found an average air tightness of 5.8 ACH50. These homes were built from 2009-2011 and were constructed prior to the state’s adoption of the 2009 IECC and its prescriptive air sealing checklist. Minimum code compliant homes built since this time are expected to be tighter.
From 2013-2014, only three of the first 424 air tightness tests conducted on single family homes built by production builders in Parker, CO, failed to achieve 3 ACH50, with an average score of 2.3 ACH50. According to the building official, this level of tightness was achieved by simply following the same air tightness checklist that was in the 2009 IECC.12

California homes built from 2002-2004: Testing of a random sample of 102 tract homes built in California between 2002-2004 (well before the detailed air sealing requirements of the 2009 IECC were developed) showed a median air tightness of 4.8 ACH50.8

Energy performance consultant in Illinois: "In my experience with testing homes in new construction, the 5ACH50 is too easy to achieve. I find that the builders don't have to try very hard to get under 5ACH50. What I find most disheartening is that they can pass code (5 ACH50 in Illinois) with a blower door test and not do any attic air sealing or properly seal rim joists - which would be my top priorities in most homes. I had a recent test where I walked away shaking my head. There were the usual suspects that I find with a leaky attic floor - no top plates sealed, leaky recessed lights, unsealed electrical penetrations, etc. Yet, they easily achieve the 5ACH50."13

Largest HERS Rater in Colorado: "Colorado has had good success in achieving 3 or less ACH50 consistently. We see a consistent average of 2.5 ACH50 for single family homes. Following the air tightness table in the code...well is the issue to achieve this. How well builders follow this guidance is directly relational to their ability to meet the 3 ACH50 threshold."14

Builder in Illinois: "Our interest in the 1990's and early 2000's was more driven by reduced homeowner "cold room" complaints than energy compliance. But with that said, we did, inadvertently, start to build a more energy efficient home and thereby had a happier customer base and referral stream... It was not hard to get to 5Ach50 at all. But never being required to measure the tightness level of our homes prior to 2010, ... I went back a tested a sampling of homes we had built in the past 10 years to pleasantly find most were testing right at or below 5Ach50."15

Habitat for Humanity affiliate's experience: "If a habitat for humanity affiliate can make 5 ACH50 with different volunteers on each house, and that means retraining them for every build; I think a commercial builder that tells all subs his homes are going to be tested and will hit 5 or lower; is easy. This affiliate builds in a No Energy Code jurisdiction and looks for building tasks their volunteers can do. They turn down donations of site applied spray on WRB to allow their volunteers to install house wrap."16

HERS rater in Colorado: "Based on the experience of the contractors we are working with 5 should be a no brainer and 3 should come with a few attention to details. Most of our contractors are consistently at 2 or better and many are at 1."17

HERS rater in Kansas: "I did a brief study for our local HBA as they were working with the code officials and found most builders were at 6 ACH before implementation of the 2012 code air sealing requirements. Now most homes build to the code are under five with the larger homes under three as a general rule."18

Program manager in Alaska: "The average ACH50 for homes built in Alaska since 2000 (all types) 3.93; Average ACH50 for homes built in Alaska since 2006 (all types) 3.37; Average ACH50 for homes built in Alaska since 2010 (all types) 2.96."19

Builder from Washington: "Our worst blower-door test ever was our first, back in 2005. It came in at just under 2.5 ACH 50, and we didn't even know what a tight house was back then."20

Despite homes being built to much tighter levels since 2009 (i.e., 5 ACH50 and below), a large majority of these homes across the U.S. are not receiving a blower door test and are not being provided with mechanical ventilation. At the end of 2014, 90% of new low-rise housing starts occurred in jurisdictions that had adopted the 2009 IECC or more stringent, but 70% of these housing starts have no code requirement for blower door testing or mechanical ventilation (i.e., are required to comply with the 2009 IECC but not the 2012 IECC and associated mechanical ventilation requirement).2

**Building Tight without Mechanically Ventilating Can Have Huge Health Impacts**

Building tight (5 ACH50 and below) has become the new standard practice across 90% of the single family starts across the country, regardless of whether or not a builder confirms the tightness with a blower door test. Of course, the one potential problem with building tight is the negative impact it has on indoor air quality if mechanical ventilation is not provided. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as particulate matter (which can be transmitted to the circulatory system and...
organisms after being introduced to the lungs), radon (the second leading cause of lung cancer), formaldehyde, acetaldehyde, and other VOCs that have negative health impacts.

We spend 90% of our time indoors, so it's no wonder that health impacts associated with poor indoor air quality include increased risk or exacerbation of asthma, stroke, neurotoxicity, and cancer, among others.\textsuperscript{6,9,10} Many indoor air pollutants originate from building materials and finishes. Recent studies have shown that air pollution levels in dwelling units that are not mechanically ventilated can exceed outdoor national air quality standards for CO in 7-8% of homes and NO\textsubscript{2} in 55-70% of homes, during a typical week.\textsuperscript{3} Other sources point to the increase in flame retardants in building materials and finishes driven by codes and standards as contributing to the presence of these chemicals in indoor dust and air and ultimately in the bodies of people (33 different flame retardants products have now been discovered in people's bodies; health effects of many of these are still largely unknown).\textsuperscript{11}

Estimates for the cost of poor indoor air quality are staggering. The cost of asthma triggered by dampness and mold in U.S. residences has been estimated at $3.5 billion annually\textsuperscript{5}, and asthma now affects one in five Americans\textsuperscript{4}. While dampness and mold should be controlled as much as possible at the source, there are other pollutants where source control is not an option for many households. Even when you exclude radon and second hand smoke from the list of indoor pollutants, poor indoor air quality in U.S. residences is estimated to account for 14% of all years of life lost and years of disability associated with “noncommunicable and nonpsychiatric diseases.”\textsuperscript{6} Based on another study, this is roughly equal to the negative health impacts of alcohol use, diabetes, and HIV/AIDS combined.\textsuperscript{7}

**Relying on Natural Ventilation Alone Doesn't Cut it In Tight Homes**

A prominent study on occupant window operation in new (2002-2004 era) single family homes concluded that “a substantial percentage of homeowners never open their windows, especially in the winter” and that window operation coupled with natural infiltration does not provide the airflow rates necessary to achieve minimum indoor air quality.\textsuperscript{8}

Nonetheless, natural ventilation through operable windows provides a useful and sometimes necessary function. Operable windows offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g., being able to open windows for airflow in the aftermath of a storm or blackout or in the case of equipment failure). The intention of this proposal is not to remove natural ventilation, but to complement it.

Experience shows that where mechanical ventilation is required (i.e., all ENERGY STAR homes, homes built to the 2012 IECC, all new homes in CA, etc.), builders are not generally using it to trade off against natural ventilation requirements. The exception for this would be toilet rooms, which for decades have often been provided with local exhaust instead of an operable window.

At this point, mechanical ventilation is needed to provide minimum acceptable air quality for code-minimum construction. This change will ensure that the comfortable, energy efficient homes that builders are now building are also provided with the systems required by national consensus standards to provide for this need.

**Bibliography:**

2. States/jurisdictions that do not have a mechanical ventilation requirement include all of those that are currently enforcing the 2009 IECC. Percentages of new starts in states/jurisdictions that have adopted the 2009 IECC and the 2012 IECC were developed from the following sources:
   c. Jurisdictional data: Building department websites of various jurisdictions.
8. Offerman, F.J. (2009). Ventilation and indoor air quality in new homes. PIER Collaborative Report. California Energy Commission & California Environmental Protection Agency Air Resources Board. At the time of construction, air sealing requirements in the CA Building Energy Efficiency Standards were limited to the following sentence, “Joints and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weatherstripped, or otherwise sealed to limit infiltration and exfiltration,” (CEC 2001 Energy Efficiency Standards, Section 117). Air sealing of CA residences has been required since 1982.
12. Email communication with Gil Rossmiller, Chief Building Official, Parker, CO. Dec 8, 2014.
15. Email communication with Brian Flaherty of Flaherty Builders. Dec 4, 2014.
18. Comment from Bruce Chyka, Owner at Performance Plus Homes. Posted on LinkedIn's RESNET.US Group discussion, "How Tough is it to Hit 5 ACH50?" Dec 9, 2014.
19. Comment from Nathan Wiltse, Policy Program Manager / Building Economist at Cold Climate Housing Research Center. Posted on LinkedIn's RESNET.US Group discussion, "How Tough is it to Hit 5 ACH50?" Dec 9, 2014.

Cost Impact: Will increase the cost of construction
For dwelling units that are not already installing whole house mechanical ventilation systems, retail incremental costs for compliant systems can be less than $70. This is based on the incremental, retail cost difference between an entry-level exhaust fan (Broan 688 at $11.56) and a quiet, higher-efficiency exhaust fan that meets the requirements of the 2012 IECC (Broan QTR080 at $79.15). Prices were sourced from zoro.com on December 19, 2014.
RB375-16
IRC: M1503.1, M1507.1, R303.4.
Proponent: Mike Moore, Newport Ventures, representing Broan-NuTone, representing Newport (mmoore@newportventures.net)

2015 International Residential Code

Revise as follows:

R303.4 Mechanical ventilation. Kitchens shall be provided with local exhaust in accordance with Sections M1503 and M1507. Where the air infiltration rate of a dwelling unit is 5 air changes per hour or less where tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3._

M1503.1 General. Range hoods shall discharge to the outdoors through a duct. The duct serving the hood shall have a smooth interior surface, shall be air tight, shall be equipped with a back-draft damper and shall be independent of all other exhaust systems. Ducts serving range hoods shall not terminate in an attic or crawl space or areas inside the building.

Exception: Where installed in accordance with the manufacturer's instructions, and where mechanical or natural ventilation is otherwise provided in accordance with Section M1507.4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.

M1507.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section. Local exhaust shall be provided for kitchens in accordance with Section M1507.4.

Reason:
Pollutants from cooking have been identified as some of the worst in the home, in terms of health impacts. Pollution during cooking events includes NO₂, CO, HCHO (formaldehyde), acrolein (produced when cooking meats and oils; used as a nerve agent in WWI), polycyclic aromatic hydrocarbons, and particulate matter (which can become lodged in the lungs or pass through the lungs to the circulatory system). Overall, indoor air pollution from residential dwelling units (excluding the impacts of radon and second hand smoke) is estimated to account for 14% of all years of life lost and years of disability associated with "noncommunicable and nonpsychiatric diseases." Based on another study, this is roughly equal to the negative health impacts of alcohol use, diabetes, and HIV/AIDS combined. The lion's share of the health impacts of poor indoor air quality in dwelling units has been linked to particulate matter, and indoor particulate matter is emitted when cooking on both electric and gas stoves.

Overall, the primary source of particulate matter in non-smoking dwelling units is unvented cooking. Natural ventilation alone is an insufficient means to provide required ventilation because it relies on pressure differentials that may or may not exist, and when they exist, the pressure differential could be equally as likely to spread the pollutant throughout the dwelling unit and neighboring units (in the case of attached dwelling units) as it would be to exhaust the pollutant directly to the outdoors. Further, studies have shown that occupants often do not operate windows for ventilation. Concerns with window operation include security and discomfort (including severe draft in winter).

To improve the health and life safety of dwelling unit occupants, this proposal would require that mechanical ventilation be provided for all kitchens in dwelling units. Some compelling facts and quotes on kitchen pollutants and ventilation follow:

- Simulations show that where a natural gas cooktop is used without a vented range hood, “62%, 9%, and 53% of occupants are routinely exposed to NO₂, CO, and HCHO (formaldehyde) levels that exceed acute health-based standards and guidelines.”
"Emissions of nitrogen dioxide in homes with gas stoves exceed the EPA’s definition of clean air in an estimated 55 percent to 70 percent of those homes, according to one model; a quarter of them have air quality worse than the worst recorded smog (nitrogen dioxide) event in London. Cooking represents one of the single largest contributors, generating particulate matter (formally known as PM2.5) at concentrations four times greater than major haze events in Beijing."\textsuperscript{13}

Increased exposure to NO2 in dwelling units has been associated with an increased number of asthma attacks.\textsuperscript{14,15,16}

"People don't need to radically change their lifestyles. We need to change the building codes so that everyone gets a venting range hood."- Dr. Jennifer Logue, Research Scientist with Lawrence Berkeley National Laboratory\textsuperscript{13}

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**Bibliography:**


**Cost Impact:** Will increase the cost of construction

For those units that do not already install kitchen exhaust, the cost of construction will increase, depending on equipment selection. Exhaust hoods start around $30 retail (e.g., Broan economy hood #403001, 2-speed, moving 160 cfm, priced on zoro.com at $33.36 with free shipping on December 19, 2014). Most dwelling units have some sort of recirculating exhaust hood at a minimum, so the actual incremental cost could probably be disregarded for the equipment itself. For units that are recirculating only, installed cost to the GC for ducting is estimated at ~$13/linear foot for 3.25x10" duct (RS Means 2013 Residential Cost Data, adjusted for inflation).