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

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

# RB251–06/07
## R703.2

**Proponent:** Ronald Majette, United States Department of Energy

**Revise as follows:**

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

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

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

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

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

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

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

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

# RB252–06/07
## R703.3.1, Table R703.3.1(1)-(New), Table R703.3.1(2)-(New), Table R703.3.1(3)-(New), R703.4, Table R703.4(2)-(New), Table R703.4(3)-(New), R703.5.3, R703.5.3.1, R703.7, R703.7.4.2, R703.8, R703.9, R703.10, R703.10.1 (New), R703.10.2, R703.10.3, R703.12 (New), R703.12.1 (New), R703.12.2 (New) R703.12.3 (New)

**Proponent:** Bob Boyer, Building Officials Association of Florida

**1. Revise as follows:**

**R703.3.1 Panel siding.** Joints in wood, hard board or wood structural panel siding shall be made as follows unless otherwise approved. Vertical joints in panel siding shall occur over framing members, unless wood or wood structural panel sheathing is used, and shall be shiplapped or covered with a batten. Horizontal joints in panel siding shall be lapped a minimum of 1 inch (25 mm) or shall be shiplapped or shall be flashed with Z-flashing and occur over solid blocking, wood or wood structural panel sheathing.

**Exception:** Where the basic wind speed per Figure R301.2(4) is 100 miles per hour (45 m/s) or higher, the minimum panel thickness for wood, hardboard and wood structural panel siding shall be as specified in Table R703.3.1 (1) or (2) for that wind speed and the appropriate Exposure Category. Specific Gravities, G, for solid sawn lumber shall be as specified in Table 703.3.1 (3).

**2. Add new tables as follows:**

**TABLE R703.3.1(1)**
**WOOD, HARDBOARD, AND WOOD STRUCTURAL PANEL SIDING MINIMUM THICKNESS EXPOSURE CATEGORY B**

| WIND SPEED (mph) | 100 | 110 | 120 | 130 | 140 | 150 |
|---|---|---|---|---|---|---|
| | Wood Siding Structural Panel and Hardboard Panel Siding (Short dimension across studs) | | | | | |
| Stud Spacing (inches o.c.) | Minimum Panel Thickness (in.) | | | | | |
| 12 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 |
| 16 | 3/8 | 3/8 | 3/8 | 7/16 | 15/32 | 15/32 |
| 24 | 15/32 | 15/32 | 19/32 | 19/32 | 19/32 | 23/32 |
| | Board and Hardboard Lap Siding (diagonal across 3 or more supports) | | | | | |
| Stud Spacing (inches o.c.) | Minimum Panel Thickness (in.) | | | | | |
| 12-16 | 7/16 | 7/16 | 7/16 | 7/16 | 7/16 | 7/16 |

**TABLE R703.3.1(2)**
**WOOD, HARDBOARD, AND WOOD STRUCTURAL PANEL SIDING MINIMUM THICKNESS EXPOSURE CATEGORY C**

| WIND SPEED (mph) | 100 | 110 | 120 | 130 | 140 | 150 |
|---|---|---|---|---|---|---|
| | Wood Structural Panel and Hardboard Panel Siding (Short dimension across studs) | | | | | |
| Stud Spacing (inches o.c.) | Minimum Panel Thickness (in.) | | | | | |
| 12 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 7/16 |
| 16 | 3/8 | 7/16 | 15/32 | 15/32 | 15/32 | 19/32 |
| 24 | 19/32 | 19/32 | 19/32 | 23/32 | 23/32 | - |
| | Board and Hardboard Lap Siding (diagonal across 3 or more supports) | | | | | |
| Stud Spacing (inches o.c.) | Minimum Panel Thickness (in.) | | | | | |
| 12-16 | 7/16 | 7/16 | 7/16 | 7/16 | 7/16 | 7/16 |

**TABLE R703.3.1(3)**
**SPECIFIC GRAVITIES OF SOLID SAWN LUMBER**

| SPECIES COMBINATION | SPECIFIC GRAVITY[1], G | SPECIES COMBINATION | SPECIFIC GRAVITY[1], G |
|---|---|---|---|
| Aspen | 0.39 | Mountain Hemlock | 0.47 |
| Balsam Fir | 0.36 | Northern Pine | 0.42 |
| Beech-Birch-Hickory | 0.71 | Northern Red Oak | 0.68 |
| Coast Sitka Spruce | 0.39 | Northern Species | 0.35 |
| Cottonwood | 0.41 | Northern White Cedar | 0.31 |
| Douglas Fir-Larch | 0.50 | Ponderosa Pine | 0.43 |
| Douglas Fir-Larch (North) | 0.49 | Red Maple | 0.58 |
| Douglas Fir-South | 0.46 | Red Oak | 0.67 |
| Eastern Hemlock | 0.41 | Red Pine | 0.44 |
| Eastern Hemlock-Balsam Fir | 0.36 | Redwood, close grain | 0.44 |
| Eastern Hemlock-Tamarack | 0.41 | Redwood, open grain | 0.37 |
| Eastern Hemlock-Tamarack (North) | 0.47 | Sitka Spruce | 0.43 |
| Eastern Softwoods | 0.36 | | |
| | | Southern Pine | 0.55 |
| Eastern Spruce | 0.41 | Spruce-Pine-Fir | 0.42 |
| Eastern White Pine | 0.36 | Spruce-Pine-Fir | 0.50 |
| Engelmann Spruce-Lodgepole Pine | 0.38 | (E > 2,000,000 psi MSR and | |
| Engelmann Spruce-Lodgepole Pine[2] | 0.46 | MEL) | 0.36 |
| (MSR 1650f and higher grades) | | Spruce-Pine-Fir (South) | 0.36 |
| Engelmann Spruce-Lodgepole Pine[2] | 0.38 | Western Cedars | 0.35 |
| (MSR 1500f and lower grades) | | Western Cedars (North) | 0.47 |
| | | Western Hemlock | |
| Hem-Fir | 0.43 | Western Hemlock (North) | 0.46 |
| Hem-Fir (North) | 0.46 | Western White Pine | 0.40 |
| Mixed Maple | 0.55 | Western Woods | 0.36 |
| Mixed Oak | 0.68 | White Oak | 0.73 |
| Mixed Southern Pine | 0.51 | Yellow Poplar | 0.43 |

1 Specific gravity based on weight and volume when oven-dry.
2 Applies only to Engelmann Spruce-Lodgepole Pine machine stress rated (MSR) structural lumber.

**3. Revise as follows:**

**R703.4 Attachments.** Unless specified other wise, all wall coverings shall be securely fastened in accordance with Table R703.4(1) or with other approved aluminum, stainless steel, zinc-coated or other approved corrosion-resistive fasteners in accordance with the approved manufacturer's installation instructions. Where wind pressures determined in accordance with Table 301.2(2) do not exceed 30 psf, wall coverings are permitted to be installed in accordance with Table R703.4 (1).

**Exceptions:** Where the basic wind speed per Figure R301.2(4) is 100 ~~110~~ miles per hour (45 ~~49~~ m/s) or higher, the attachment of wall coverings shall:

1. Meet the requirements of Tables R704.2 (3) or (3) for the wind speed specified and the appropriate Exposure Category, or
2. 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) with the following limitations to Table R703.4(1):
    1. Wood, hardboard and wood structural panel siding shall be of the minimum; thickness specified in Tables R703.3.4(1) and R703.3.4(2). Fasteners shall be installed as per section R703.3.3. Notes "n" and "p" do not apply.
    2. Particleboard panels shall not be used.
    3. Vinyl siding shall be supported and fastened per the requirements of section R703.11.
    4. Staples shall not be used on steel panels.
    5. Notes "t" and "u" are replaced to read "Corrosion-resistant fasteners shall comply with ASTM F1667.
    6. Note "w" shall be replaced to read "Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one II gage roofing nail (0.120 inch shank, 0.371 inch head diameter, 1 ½ inch long) through the top edge of each plank at each stud.

[Renumber Table R703.4 to R703.4(1)]

**4. Add new tables as follows:**

**TABLE R703.4(2)**
**WOOD, HARDBOARD, AND WOOD STRUCTURAL PANEL SIDING ATTACHMENT EXPOSURE CATEGORY B**

| | **WIND SPEED (mph)** | **100** | | **110** | | **120** | | **130** | | **140** | | **150** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Structural Panel Siding | | | | | | | | | | | |
| | | E | F | E | F | E | F | E | F | E | F | E | F |
| Siding-Location | Stud Spacing (inches o.c.) | Nail Spacing for 8d Common Nails or 10d Box nails (inches o.c.) | | | | | | | | | | | |
| Interior Zone | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 |
| | 16 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 |
| | 24 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12[2] | 6 | 12[2] | 6 | 12[2] |
| Perimeter Edge Zone | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 |
| | 16 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12[2] |
| | 24 | 6 | 12 | 6 | 12 | 6 | 12[2] | 6 | 12[2] | 6 | 12[2] | 6 | 12[2] |
| | | Board or Lap Siding | | | | | | | | | | | |
| Siding Size | Stud Spacing (inches o.c.) | Number of 8d Common Nails or 10d Box Nails Per Support | | | | | | | | | | | |
| 1x6 or 1x8 Siding | 12-24 | 2 | | 2 | | 2 | | 2 | | 2 | | 2 | |
| 1x10 or Larger Siding | 12-24 | 3 | | 3 | | 3 | | 3 | | 3 | | 3 | |

Notes:
E – Nail spacing at panel edges (inches)
F – Nail spacing at intermediate supports (inches)
a. For wall siding within 4 feet of any corner, the 4 foot perimeter edge zone attachment requirements shall be used.
b. Tabulated 12 inch o.c. nail spacing assumes siding attached to stud framing members with a specific gravity, G ≥ 0.49. For framing members with 0.42 ≤ G < 0.49, the nail spacings shall be reduced to 6 inches o.c.
For exterior panel siding, galvanized box nails shall be permitted to be substituted for common nails.

**TABLE R703.4 (3)**
**WOOD, HARDBOARD, AND WOOD STRUCTURAL PANEL SIDING ATTACHMENT EXPOSURE CATEGORY C**

| | **WIND SPEED (mph)** | **100** | | **110** | | **120** | | **130** | | **140** | | **150** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Structural Siding | | | | | | | | | | | |
| | | E | F | E | F | E | F | E | F | E | F | E | F |
| Siding Location | Stud Spacing (inches o.c.) | Nail Spacing for 8d Common Nails or 10d Box nails (inches o.c.) | | | | | | | | | | | |
| Interior Zone | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 |
| | 16 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12[2] | 6 | 12[2] |
| | 24 | 6 | 12 | 6 | 12[2] | 6 | 12[2] | 6 | 12[2] | 6 | 6 | 6 | 6 |
| Perimeter Edge Zone | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 12[2] | 6 | 12[2] |
| | 16 | 6 | 12 | 6 | 12 | 6 | 6 | 6 | 12[2] | 6 | 12[2] | 6 | 6 |
| | 24 | 6 | 12[2] | 6 | 12[2] | 6 | 6 | 6 | 6 | 6[3] | 6[3] | 6[3] | 6[3] |
| | | Board or Lap Siding | | | | | | | | | | | |
| Siding Size | Stud Spacing (inches o.c.) | Number of 8d Common Nails or 10d Box Nails Per Support | | | | | | | | | | | |
| 1x6 or 1x8 Siding | 12-24 | 2 | | 2 | | 2 | | 2 | | 2 | | 2 | |
| 1x10 or Larger Siding | 12-24 | 3 | | 3 | | 3 | | 3 | | 3 | | 3 | |

Notes:
E – Nail spacing at panel edges (inches)
F – Nail spacing at intermediate supports (inches)

a. For wall siding within 4 feet of any corner, the 4 foot perimeter edge zone attachment requirements shall be used.
b. Tabulated 12 inch o.c. nail spacing assumes siding attached to stud framing members with a specific gravity, $G \geq 0.49$. For framing members with $0.42 \leq G < 0.49$, the nail spacings shall be reduced to 6 inches o.c.
c. Tabulated 6 inch o.c. nail spacing assumes siding attached to stud framing members with a specific gravity, $G \geq 0.49$. For framing members with $0.42 \leq G < 0.49$, the nail spacings shall be reduced to 4 inches o.c.

For exterior panel siding, galvanized box nails shall be permitted to be substituted for common nails.

**5. Revise as follows:**

**R703.5.3 Attachment.** Wood shakes and shingles, and attachment and supports, shall be capable of resisting the wind pressures determined in accordance with Table R301.2(2). Where wind pressures determined in accordance with Table R301.2(2) do not exceed 30 psf, ~~E~~each shake or shingle shall be held in place by two hot-dipped zinc-coated, stainless steel, or aluminum nails or staples. The fasteners shall be long enough to penetrate the sheathing or furring strips by a minimum of ½ inch (12.7 mm) and shall not be overdriven.

> **Exception:** Where pressures determined in accordance with Table R301.2(2) exceed 30 pounds per square foot pressure (1.44 kN/m2), the attachment shall be designed to resist the prescribed wind pressures. Staples shall not be used.

**R703.5.3.1 Staple attachment.** Where staples are allowed, they ~~Staples~~ shall not be less than 16 gage and shall have a crown width of not less than 7/16 inch (11.1 mm), and the crown of the staples shall be parallel with the butt of the shake or shingle. In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25.4 mm) above the butt line of the succeeding course and 3/4 inch (19.1 mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two casing nails, driven approximately 2 inches (51 mm) above the butt line and 3/4 inch (19.1 mm) from each edge. In all applications, staples shall be concealed by the course above. With shingles wider than 8 inches (203 mm) two additional nails shall be required and shall be nailed approximately 1 inch (25.4 mm) apart near the center of the shingle.

> **Exception:** Where pressures determined in accordance with Table R301.2(2) exceed 30 pounds per square foot pressure (1.44 $kN/m^2$), staples are not allowed.

**R703.7 Stone and masonry veneer, general.** All stone and masonry veneer shall be installed in accordance with this chapter, Table R703.4 and Figure R703.7. These veneers installed over a backing of wood or cold-formed steel shall be limited to the first story above grade and shall not exceed 5 inches (127mm) in thickness.

**Exceptions:**

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

2. For detached one- or two-family dwellings in Seismic Design Categories D0, D1 and D2, exterior stone or masonry veneer, as specified in Table R703.7(2), with a backing of wood framing shall be permitted to the height specified in Table R703.7(2) above a noncombustible foundation. Wall bracing and hold downs at exterior and interior braced wall lines shall be in accordance with Sections R602.10 and R602.11 and the additional requirements of Table R703.7(2).

   In Seismic Design Categories D0, D1 and D2, cripple walls shall not be permitted, and required interior braced wall lines shall be supported on continuous foundations.
3. Where pressures determined in accordance with Table R301.2(2) exceed 30 pounds per square foot pressure (1.44 kN/m$^2$), veneers shall not be installed over wood or cold-formed steel.

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

**Exception:** Where the wind pressure determined in accordance with Table R301.2(2) exceeds 30 pounds per square foot pressure (1.44 kN/m$^2$), the air space shall not exceed 2 inches (51 mm).

**R703.8 Flashing.** Approved corrosion-resistive flashing shall be applied shingle-fashion in such a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashings shall be installed at all of 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 for subsequent drainage.

   **Exception:** Where the wind pressure determined in accordance with Table R301.2(2) exceeds 30 pounds per square foot pressure (1.44 kN/m$^2$), flashing for windows and doors shall be in accordance with Section R613.8.

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.

**R703.9 Exterior insulation finish systems, general.** All Exterior Insulation Finish Systems (EIFS) shall be designed or tested to meet the wind pressures specified in Table R301.2(2) and installed in accordance with the manufacturer's approved installation instructions and the requirements of this section. Decorative trim shall not be face nailed through the EIFS. The EIFS shall terminate not less than 6 inches (152 mm) above the finished ground level.

**R703.10 Fiber cement siding.** Fiber cement siding complying with ASTM C 1186 shall be permitted on exterior walls in accordance with the approved manufacturer's installation instructions.

**6. Add new text as follows:**

**R703.10.1 Fastening.** Weather boarding and wall coverings shall be securely fastened with aluminum, copper, zinc, zinc-coated or other approved corrosion-resistant fasteners in accordance with the manufacturer's approved installation instructions. Attachment and supports shall be capable of resisting the wind pressures determined in accordance with Table R301.2(2).

**Exception:** Where the wind pressure determined in accordance with Table R301.2(2) does not exceed 30 pounds per square foot pressure (1.44 kN/m$^2$), fiber cement siding is permitted to be attached in accordance with Table R703.4(1).

**7. Revise as follows:**

**R703.10.2~~1~~ Panel siding.** Panels shall be installed with the long dimension parallel to framing. Vertical joints shall occur over framing members and shall be sealed with caulking or covered with battens. Horizontal joints shall be flashed with Z-flashing and blocked with solid wood framing.

**R703.10.3~~2~~ Horizontal lap siding.** Lap siding shall be lapped a minimum of 1 ¼ inches (32 mm) and shall have the ends sealed with caulking, covered with an H-section joint cover, or located over a strip of flashing. Lap siding courses may be installed with the fastener heads exposed or concealed, according to approved manufacturers' installation instructions.

**8. Add new text as follows:**

**R703.12 Metal veneers.** Veneers of metal shall be fabricated from approved corrosion-resistant materials or shall be protected front and back with porcelain enamel, or otherwise be treated to render the metal resistant to corrosion. Such veneers shall not be less than specified in Table R703.13 mounted on wood or metal furring strips or approved sheathing on the wood construction.

**R703.12.1 Attachment.** Where the wind pressure determined in accordance with Table R301.2(2) do not exceed 30 pounds per square foot pressure (1.44 kN/$m^2$), metal veneers are permitted to be attached in accordance with Table R703.4(1).

> **Exception:** Where the wind pressure determined in accordance with Table R301.2(2) exceed 30s pounds per square foot pressure (1.44 kN/$m^2$), exterior metal veneer shall be securely attached to the supporting masonry or framing members with corrosion-resistant fastenings, metal ties or by other approved devices or methods capable of resisting the wind pressures specified in Table R301.2(2)., but in no case less than 20 psf (0.958 kg/m2).

**R703.12.2 Weather protection.** Metal supports for exterior metal veneer shall be protected by painting, galvanizing or by other equivalent coating or treatment. Wood studs, furring strips or other wood supports for exterior metal veneer shall be approved pressure-treated wood or protected as required in Section 1403.2 of the *International Building Code*. Joints and edges exposed to the weather shall be caulked with approved durable waterproofing material or by other approved means to prevent penetration of moisture.

**R703.12.3 Aluminum siding.** Aluminum siding shall conform to the requirements of AAMA 1402.

## CHAPTER 43
## REFERENCED STANDARDS

AAMA 1402-86 Standard Specifications for Aluminum Siding, Soffit and Fascia

**Reason:** To clarify the applicability limits of the provisions of the IRC as it relates to wind load resistance and to provide wind resistant prescriptive solutions where available. To change the wind speed design limitation to 100 mph. To add technologies not presently covered in the IRC.

The prescriptive solutions in the IRC pertaining to wind resistance of structural elements that comprise a building (components and cladding) are limited to areas where the basic wind speed is less than 100 mph. Accordingly, most of the prescriptive solutions for wind load resistance in the IRC are not applicable to Florida and other hurricane-vulnerable states with designated wind speeds greater than 100 mph.

In general, the proposed change is structured around the fact that the prescriptive methods outlined in Table R703.4 are capable of resisting a design wind pressure of 30 psf. The scoping language and material performance criteria for each material section acknowledges this and require testing or design for situations where the design pressure exceeds 30 psf. The material performance criteria were taken directly from the International Building Code where it was lacking in the IRC.

**Bibliography:** International Building Code, 2003.

**Cost Impact:** The code change proposal will not increase the cost of construction. It will provide prescriptive options.

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

# RB253–06/07

## Table R703.4

**Proponent:** Edward L. Keith, APA-The Engineered Wood Association

**Revise table as follows:**

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

| Siding Material | | Nominal Thickness[a] (inches) | Joint Treatment | Water-Resistive Barrier Required | TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b,c,d]: Wood or wood structural panel sheathing | Fiberboard sheathing into stud | Gypsum sheathing into stud | Foam plastic sheathing into stud | Direct to studs | Number or spacing of fasteners |
|---|---|---|---|---|---|---|---|---|---|---|
| Horizontal aluminum[E] | Without insulation | 0.019[F] | Lap | Yes | 0.120 nail 1 ½" long | 0.120 nail 2" long | 0.120 nail 2" long | 0.120 nail[Y] | Not allowed | Same as stud spacing |
| | | 0.024 | Lap | Yes | 0.120 nail 1 ½" long | 0.120 nail 2" long | 0.120 nail 2" long | 0.120 nail[Y] | Not allowed | |
| | With insulation | 0.019 | Lap | Yes | 0.120 nail 1 ½" long | 0.120 nail 2½" long | 0.120 nail 2½" long | 0.120 nail[Z] | 0.120 nail 1 ½" long | |
| Brick veneer[Z] Concrete masonry veneer[Z] | | 2 2 | Section R703 | Yes (Note l) | See Section R703 and Figure R703.7[G] | | | | | |
| Hardboard[K] Panel siding-vertical | | 7/16 | | Yes | Note n | Note n | Note n | Note n | Note n | 6" panel edges 12" inter.sup.[O] |
| Hardboard[K] Lap-siding-horizontal | | 7/16 | Note q | Yes | Note p | Note p | Note p | Note p | Note p | Same as stud spacing 2 per bearing |
| Steel[H] | | 29 ga. | Lap | Yes | 0.113 nail 1¾" Staple-1¾" | 0.113 nail 2¾" Staple-2½" | 0.013 nail 2½" Staple- 2¼" | 0.113 nail[Y] Staple[Y] | Not allowed | Same as stud spacing |
| Stone veneer | | 2 | Section R703 | Yes (Note l) | See Section R703 and Figure R703.7[G] | | | | | |
| Particleboard panels | | 3/8 - ½ | | Yes | 6d box (2" x 0.099") nail | 6d box (2" x 0.099") nail | 6d box (2" x 0.099") nail | Box nail[Y] | 6d box (2" x 0.099") nail, 3/8 not allowed | 6" panel edge 12" inter. sup. |
| | | 5/8 | | Yes | 6d box (2" x 0.099") nail | 8d box (2 ½" x 0.113") nail | 8d box (2 ½" x 0.113") nail | Box nail[Y] | 6d box (2" x 0.099") nail | |
| ~~Plywood~~ wood structural panel-siding[i] (exterior grade) | | 3/8-1/2 | Note q | Yes | 0.099 nail-2" | 0.113 nail-2½" | ~~0.099nail-2"~~ 0.113 nail-2-1/2" | 0.113 nail[Y] | 0.099 nail-2" | 6" panel edges, 12" inter. sup. |
| wood structural panel lapsiding | | 3/8-1/2 | Note q Note aa | Yes | 0.099 nail-2" | 0.113 nail-2-1/2 | 0.113 Nail-2-1/2 | 0.113 nail[y] | 0.099 nail-2" | 8" along bottom edge |
| Vinyl siding[M] | | 0.035 | Lap | Yes | 0.120 nail 1½" Staple-1¾ | 0.120 nail 2" Staple-2½ | 0.120 nail 2" Staple-2½ | 0.120 nail[Y] staple[Y] | Not allowed | Same as stud spacing |
| Wood[J] Rustic, drop | | 3/8 Min | Lap | Yes | Fastener penetration into stud-1" | | | | 0.113 nail-2½" Staple-2" | Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over 2 nail per bearing |
| Shiplap | | No change | Lap | Yes | | | | | | |
| Bevel | | No change | | | | | | | | |
| Butt tip | | No change | Lap | Yes | | | | | | |
| Fiber cement panel siding[R] | | 5/16 | Note s | Yes Note x | 6d corrosion resistant nail[T] | 6d corrosion resistant nail[T] | 6d corrosion resistant nail[T] | 6d corrosion resistant (12"x0.113") nail[T,Y] | 4d corrosion resistant nail[U] | 6" oc on edges, 12" oc on intermed. studs |
| Fiber cement lap siding[R] | | No change | Note v | Yes Note x | 6d corrosion resistant nail[T] | 6d corrosion resistant nail[T] | 6d corrosion resistant nail[T] | 6d corrosion resistant (12"x0.113") nail[T,Y] | 6d corrosion resistant nail[W] | Note w |

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

aa. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.

**Reason:** To provide the user with guidance on proper installation of wood structural panel siding, both panel and lap.

The current provisions cover only plywood panel siding. There are other wood structural panel-based products on the market, including lap siding. The proposed provides guidance on how to install them. Note that the proposal also requires weather resistive barrier behind both panel and lap-siding wood structural panel products. This puts the table in line with industry recommendations as well as Section R703.1. It also clarifies the intent of the Table as it appears to be in conflict with other information in Section R703.1 as well as the IBC in Section 1404.2.

**Cost Impact:** The addition of building paper behind wood structural panel lap- and panel- siding will increase the cost of construction; however, we think this was the original intent of the section..

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

# RB254–06/07

## Table R703.4

**Proponent:** Matthew Dobson, Vinyl Siding Institute

**Revise table as follows:**

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

| | | | | | Type of supports for the siding material and fasteners [b,c,d] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Siding Material | | Nominal Thickness[A] (inches) | Joint Treatment | Water-Resistive Barrier Required | Wood or wood structural panel sheathing | Fiberboard sheathing into stud | Gypsum sheathing into stud | Foam plastic sheathing into stud | Direct to studs | Number or spacing of fasteners |
| Horizontal aluminum[E] | Without insulation | 0.019[F] | Lap | Yes | 0.120 nail 1 ½" long | 0.120 nail 2" long | 0.120 nail 2" long | 0.120 nail[Y] | Not allowed | Same as stud spacing |
| | | 0.024 | Lap | Yes | 0.120 nail 1 ½" long | 0.120 nail 2" long | 0.120 nail 2" long | 0.120 nail[Y] | Not allowed | |
| | With insulation | 0.019 | Lap | Yes | 0.120 nail 1 ½" long | 0.120 nail 2½" long | 0.120 nail 2½" long | 0.120 nail[Z] | 0.120 nail 1 ½" long | |
| Brick veneer[Z]<br>Concrete masonry veneer[Z] | | 2<br>2 | Section R703 | Yes (note L) | See Section R703 and Figure R703.7[G] | | | | | |
| Hardboard[K]<br>Panel siding-vertical | | 7/16 | | Yes | Note N | Note N | Note N | Note N | Note N | 6" panel edges 12" inter.sup.[O] |
| Hardboard[K]<br>Lap-siding-horizontal | | 7/16 | Note Q | Yes | Note P | Note P | Note P | Note P | Note P | Same as stud spacing 2 per bearing |
| Steel[H] | | 29 ga. | Lap | Yes | 0.113 nail 1¾" Staple-1¾" | 0.113 nail 2¾" Staple-2½" | 0.013 nail 2½" Staple- 2¼" | 0.113 nail[Y] Staple[Y] | Not allowed | Same as stud spacing |
| Stone veneer | | 2 | Section R703 | Yes (Note L) | See Section R703 and Figure R703.7 [G] | | | | | |
| Particleboard panels | | 3/8 - ½ | | Yes | 6d box (2" x 0.099") nail | 6d box (2" x 0.099") nail | 6d box (2" x 0.099") nail | Box nail[Y] | 6d box (2" x 0.099") nail, 3/8 not allowed | 6" panel edge 12" inter. sup. |
| | | 5/8 | | Yes | 6d box (2" x 0.099") nail | 8d box (2 ½" x 0.113") nail | 8d box (2 ½" x 0.113") nail | Box nail[Y] | 6d box (2" x 0.099") nail | |
| Plywood panel[I] (exterior grade) | | 3/8 | | Yes | 0.099 nail-2" | 0.113 nail-2½" | 0.099nail-2" | 0.113 nail[Y] | 0.099 nail-2" | 6" panel edges, 12" inter. sup. |
| Vinyl siding[M] | | 0.035 | Lap | Yes | ~~0.120 nail 1½" Staple 1¾~~<br>.125 nail (shank) with a .313 head or 16 gauge staple with 3⁄8 to 1⁄2-in. crown[aa,bb] | ~~0.120 nail 2" Staple 2½~~<br>125 nail (shank) with a .313 head or 16 gauge staple with 3⁄8 to 1⁄2-in. crown[aa] | ~~0.120 nail 2" Staple 2½~~<br>125 nail (shank) with a .313 head or 16 gauge staple with 3⁄8 to 1⁄2-in. crown[aa] | ~~0.120 nail[Y] staple[Y]~~<br>125 nail (shank) with a .313 head or 16 gauge staple with 3⁄8 to 1⁄2-in. crown[aa] | Not allowed | ~~Same as stud spacing~~<br>16 inches on center or as specified by the manufacturer instructions or test report |
| Wood[J] Rustic, drop | | 3/8 Min | Lap | Yes | Fastener penetration into stud-1" | | | | 0.113 nail-2½" Staple-2" | Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over 2 nail per bearing |
| Shiplap | | No change | Lap | Yes | | | | | | |
| Bevel | | No change | | | | | | | | |
| Butt tip | | No change | Lap | Yes | | | | | | |
| Fiber cement panel siding[R] | | 5/16 | Note S | Yes Note X | 6d corrosion resistant nail[T] | 6d corrosion resistant nail[T] | 6d corrosion resistant nail[T] | 6d corrosion resistant (12"x0.113") nail[T,Y] | 4d corrosion resistant nail[U] | 6" oc on edges, 12" oc on intermed. studs |
| Fiber cement lap siding[R] | | No change | Note V | Yes Note X | 6d corrosion resistant nail[T] | 6d corrosion resistant nail[T] | 6d corrosion resistant nail[T] | 6d corrosion resistant (12"x0.113") nail[T,Y] | 6d corrosion resistant nail[W] | Note W |

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

aa. Minimum fastener length must accommodate sheathing and penetrate framing .75 inches or in accordance with the manufacturer's installation instructions.

bb. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than .75 inches through wood or wood structural sheathing with or without penetration into the framing.

**Reason:** The purpose of this change is to update the code's current provisions for vinyl siding installation; it includes a correction of prescribed fastener types and an update that more clearly reflects approved application methods.

1) The first change is related to the current fastener specifications under the four sheathing columns, specifications are outdated and appear to be originally derived from aluminum siding standards. The fastener update is consistent with the requirements of ASTM D4756 –"Standard Practice for Installation of Rigid Poly(Vinyl Chloride) (PVC) Siding and Soffit".
2) The second change updates the "Number or spacing of fasteners" column. This column has been modified to recognize that manufacturers are regularly specifying installation methods different than the stud spacing and helps to direct the building official and other code users to the manufacturers approved installation instructions.
3) The third change is an addition of a footnote specifying a required stud penetration; this requirement is specified in the ASTM D4756 and should be adhered to for the product to perform correctly unless otherwise specified by the manufacturer.
4) The fourth change is an addition of a footnote which recognizes the common practice of fastening vinyl through solid wood sheathing and that if the manufacture has approved this installation method it can be permitted. Many manufactures now approve this method of installation as providing an acceptable performance level under certain conditions and therefore it should be recognized by the code.

**Cost Impact:** The code change proposal will not impact the current cost of construction – it is providing stronger language of current practices and product performance requirements of an existing standard and manufacturer's specifications.

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

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# RB255–06/07
## Table R703.4

**Proponent:** Charles Clark, Brick Industry Association

**Revise table footnotes as follows:**

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

(No changes to table entries)

a. through k. (No change to current text)
l. ~~For masonry veneer~~ When an air space in compliance with Section R703.7.4.2 is provided, a ~~weather-resistive sheathing paper~~ water-resistive barrier is not required over a sheathing installed to ~~that~~ performs as a ~~weather-resistive~~ water-resistive barrier ~~when a 1-inch air space is provided between the veneer and the sheathing~~. When a mortar or grout filled air space in compliance with Section R703.7.4.3 is provided ~~the 1-inch space is filled with mortar~~, a ~~weather-resistive sheathing paper~~ water-resistive barrier is required over studs or sheathing.
m. through z. (No change to current text)

**Reason:** To update this section of code to the same water-resistive barrier term defined by Section R703.2.
This code change is a follow-up to code changes RB181-04/05 and RB187-04/05.
RB181-04/05 changed the term "weather-resistive sheathing paper" to "water-resistive barrier" defined in Section R703.2.
RB187-04/05 dealt with making the air space requirement for masonry veneer buildable by inserting "nominal" before the dimensioned air space requirements of Sections R703.7.4 Anchorage and R703.7.4.2 Air Space. This code change did away with the perception that the air space must be an absolute dimension to meet anchorage and air space requirements.
The current proposed code change will update the wording of the foot note to reflect the current Section R703.2 definition of water-resistive barrier. It will also point the user to the appropriate sections of code to comply with in regard to an air space and a mortar or grout filled air space while maintaining text on when a water-resistive barrier is required. Additionally, it will allow the use of sheathing that performs as a water-resistive barrier for an air space up to 4½ inches.

**Cost Impact:** The code change proposal will decrease the cost of construction by removing with the perception that the air space must be an absolute dimension.

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

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# RB256–06/07
## R703.7.3

**Proponent:** Charles Clark, Brick Industry Association

**Revise as follows:**

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

**Reason:** To require corrosion-resistance for lintels.

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

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

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

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

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# RB257–06/07

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

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

**1. Revise as follows:**

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

**2. Add new text as follows:**

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

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

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

**3. Revise table as follows:**

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

(No change to table entries)

**4. Add new table and figure as follows:**

**TABLE R703.7.3.2**
**DETAILING MASONRY VENEER ABOVE GARAGE DOOR OPENING**

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

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

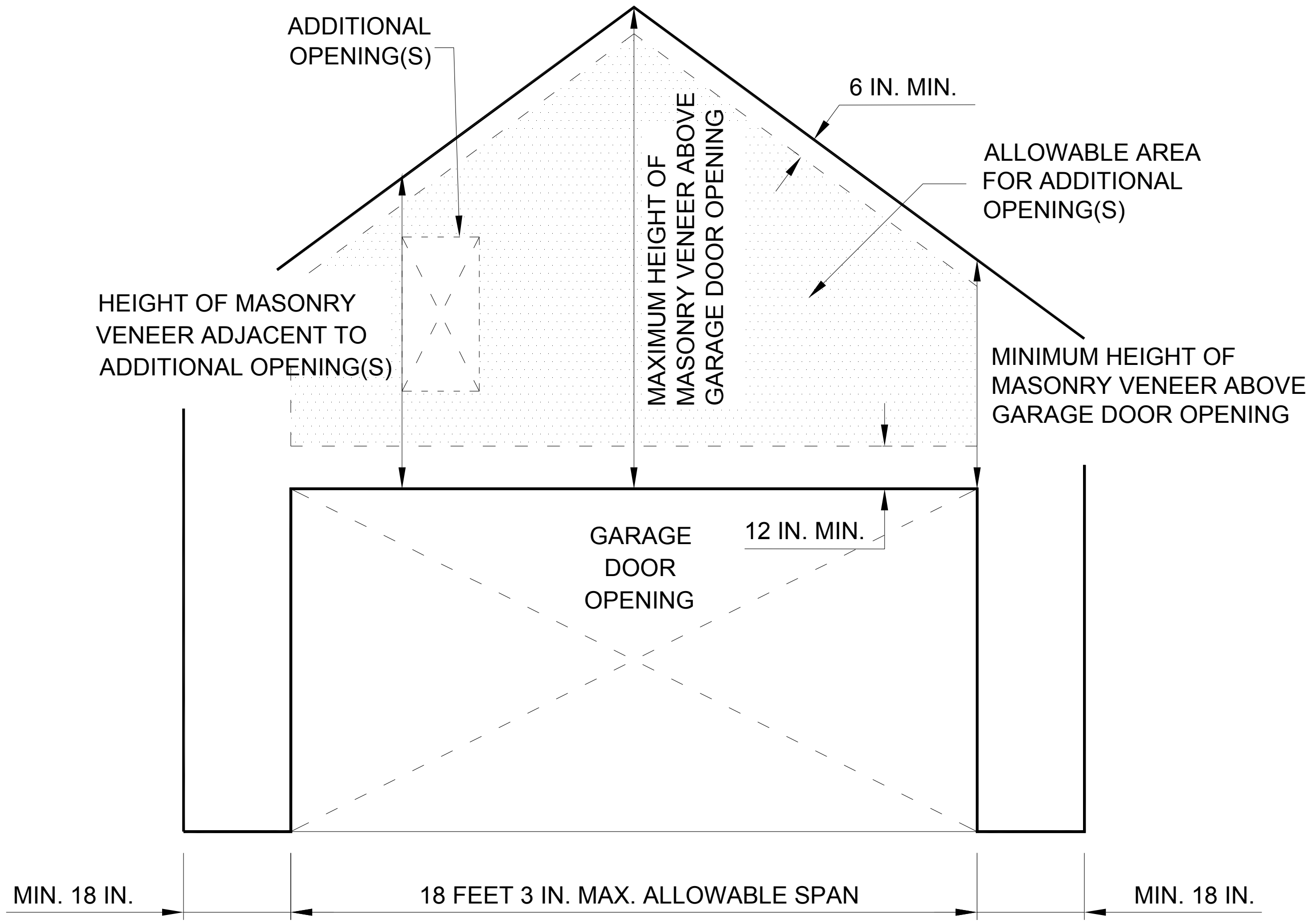


**FIGURE R703.7.3.2**
**MASONRY VENEER GARAGE DOOR OPENING**

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

**Pacific A 1**

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

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

**Bibliography:**

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

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

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

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# RB258–06/07

## R703.13 (New), Table R703.13 (New)

**Proponent:** Bob Boyer, Building Officials Association of Florida

**Add new text and table as follows:**

**R703.13 Weather protection.** Exterior walls shall provide weather protection for the building. The materials of the minimum nominal thickness specified in Table R703.13 shall be acceptable as approved weather coverings.

## TABLE R703.13
## MINIMUM THICKNESS OF WEATHER COVERINGS

| COVERING TYPE | MINIMUM THICKNESS (inches) |
|---|---|
| Adhered masonry veneer | 0.25 |
| Anchored masonry veneer | 2.625 |
| Aluminum siding | 0.019 |
| Asbestos-cement boards | 0.125 |
| Asbestos shingles | 0.156 |
| Cold-rolled copper[d] | 0.0216 nominal |
| Copper shingles[d] | 0.0162 nominal |
| Exterior plywood (with sheathing) | (See Table R602.3(3) |
| Exterior plywood (without sheathing) | See Table R602.3(3) |
| Fiberboard siding | 0.5 |
| Fiber cement lap siding | 0.25[c] |
| Fiber cement panel siding | 0.25[c] |
| Glass-fiber reinforced concrete panels | 0.375 |
| Hardboard siding[c] | 0.25 |
| High-yield copper[d] | 0.0162 nominal |
| Lead-coated copper[d] | 0.0216 nominal |
| Lead-coated high-yield copper | 0.0162 nominal |
| Marble slabs | 1 |
| Particleboard (with sheathing) | See Table R602.3(4) |
| Particleboard (without sheathing) | See Table R602.3(4) |
| Precast stone facing | 0.625 |
| Steel (approved corrosion resistant) | 0.0149 |
| Stone (cast artificial) | 1.5 |
| Stone (natural) | 2 |
| Structural glass | 0.344 |
| Stucco or exterior Portland cement plaster | |
| Three-coat work over: | |
| Metal plaster base | 0.875[b] nominal |
| Unit masonry | 0.625[b] nominal |
| Cast-in-place or precast concrete | 0.625[b] nominal |
| Two-coat work over: | |
| Unit masonry | 0.5[b] nominal |
| Cast-in-place or precast concrete | 0.375[b] nominal |
| Terra cotta (anchored) | 1 |
| Terra cotta (adhered) | 0.25 |
| Vinyl siding | 0.035 |
| Wood shingles | 0.375 |
| Wood siding (without sheathing)[a] | 0.5 |

For SI: 1 inch = 25.4 mm.

a. Wood siding of thicknesses less than 0.5 inch shall be placed over sheathing that conforms to Tables R602.3(1), R602.3(3) and R602.3(4).
b. Exclusive of texture.
c. As measured at the bottom of decorative grooves.
d. 16 ounces per square foot for cold-rolled copper and lead-coated copper, 12 ounces per square foot for copper shingles, high-yield copper and ounces per square foot for copper shingles, high-yield copper and lead-coated high-yield copper.

**Reason:** The proposed language is intended to provide improved performance of exterior wall products from water penetration and infiltration during storms.

Water intrusion has been demonstrated around exterior wall treatments. This code change is needed to ensure adequate weather protection for the building's exterior siding, panels and veneers .

This section and table were taken from Section 1405.2 of the International Building Code and constitute a recognized industry standard.

Significant water intrusion has been demonstrated by Dr. Joseph Lstiburek in the report "Rainwater Management Performance of Newly Constructed Residential Building Enclosures During August and September", January 11, 2005 (pp.43-44).

"The use of paint as a water management technique for stucco renderings applied to mass assemblies was also examined. As the mil thickness of paint increases, the ability of some paints to span micro cracks also increases. However, this applies primarily to mostly smooth surfaces. Highly textured surfaces are almost impossible to coat in a manner to seal micro cracks.

As the mil thickness of paint coatings increases, the water vapor permeability of these coatings decreases leading to problems with blistering and re-emulsification of some stucco renderings. The appropriate mil thickness and water vapor permeability relationship is currently unknown.

[Description of test method not quoted]

Three-hour water spray tests on unpainted walls systems rendered with stucco did not leak in the absence of cracks. To state the obvious, stucco without cracks does not leak – paint or no paint (Photograph 58 and Photograph 59). However, the presence of cracks (Photograph 60 and Photograph 61) caused all mass wall assemblies to pass water. The type of crack shown in Photograph 60 is indicative of typical and expected stucco rendering crackage. Workmanship, quality control and cure impact the number and extent of shrinkage cracking. Soil conditions, the nature of the materials, geometry and aspect ratio of mass wall assemblies impact the number and extent of settlement cracking. However, the nature of stucco application, materials and substrates make it impossible to construct crack free monolithic stucco renderings – in other words shrinkage cracks and settlement cracks are to be expected.

These shrinkage cracks and settlement cracks traditionally are handled through ongoing maintenance. At present, technology offers no other practical approach.

Based on the field observations it is our belief that it is not possible to construct stucco assemblies without cracks. It is also our belief that paint coating systems – even the high build coatings - are unable to span the typical stucco cracks encountered, both from initial drying and from subsequent settlement. Increasing the moisture storage capacity of mass assemblies can partially address this issue. One approach is to construct a "seat" in the perimeter slab foundation to provide a reservoir for penetrating rainwater and to direct this rainwater to the exterior (Figure 20, Figure 21 and Photograph 62). The experience with high build paint systems – such as "elastomeric paints" can lead to blistering (Photograph 63) and re-emulsification of additives. The use of such coatings should remain a specialty technique specified and supervised by professionals.

The inward migration of moisture can also be moderated Low build and high build paint system on both smooth and textured surfaces were carefully examined (Photograph 66, Photograph 67 and Photograph 68) and it is our conclusion that almost no coating or painting system is able to span settlement cracks (Photograph 69). Only small hairline cracks on relatively smooth, and relatively untextured surfaces are there likely to be significant performance benefits of high build systems. A more promising approach appears to lie with fiber reinforcement to control cracking and premium polymer modified and polymer based cementitious renderings (Photograph 70).

Most shrinkage cracking occurs over the first few weeks and most settlement cracking happens over the first year. In other words the majority of the movement resulting in stucco cracks happens within the first year. After the building and building systems have equilibrated standard paint finishes are often able to seal small cracks as subsequent movement is typically minor. However, the larger settlement cracks require flexible sealants – typically brushed into the crack.

After buildings are repainted and settlement cracks are addressed in the normal course of home maintenance stucco leakage is typically reduced significantly."

**Bibliography:**

Section 1405.2, Minimum Thickness of Weather Coverings, International Building Code, 2003.
Lstiburek, Joseph, Ph.D., Building Science Corporation, "Rainwater Management Performance of Newly Constructed Residential Building Enclosures During August and September", January 11, 2005, pp. 43-44..

**Cost Impact:** The code change proposal may increase the cost of construction, although it is expected to be minimal.

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

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# RB259–06/07

## R703.14 (New)

**Proponent:** Bob Boyer, Building Officials Association of Florida

**Add new text as follows:**

**R703.14 Drained assembly wall over mass assembly wall.** Where wood frame or other types of drained wall assemblies are constructed above mass wall assemblies, flashing or other approved drainage system shall be installed as required by R703.8.

**Reason:** The proposed language is intended to provide improved performance of exterior wall products from water penetration and infiltration during storms.

Water intrusion has been demonstrated between floors where lightweight walls are constructed above massive block walls. This interface has not been adequately treated in the code. Criteria to ensure moisture drainage need to be added to resolve this trouble spot.

In a report produced for the Florida Home Builders Association after 4 major hurricanes hit Florida in 2004, Dr. Joseph Lstiburek described (pages 9-10) the performance of second story frame walls constructed above concrete block walls:

"The mass assemblies were overwhelmed due to the extraordinary weather events. The mass assemblies were not able to store the quantity of penetrating water and not able to dry rapidly enough between wetting events and in many situations water entered past the interior lining (Figure 8). The second floor frame assemblies provided mixed performance. In many cases the second floor assemblies were also overwhelmed (Photograph 2) – principally for two reasons:

- drainage was poor due to the failure of plastic housewraps and other WRB systems to provide drainage and water holdout
- drained rainwater was not expelled to the exterior at the base of the second floor frame assemblies

The performance of the second floor frame assemblies is also based on a “rate-storage” relationship. However, unlike the mass assemblies, very little moisture storage capacity is available. As such for the second floor frame assemblies the rate of drying must match or exceed the rate of wetting. The key drying method in the second floor frame assemblies is drainage. This drainage depends on the provision of a drainage space between the stucco rendering and WRB and the water repellency of the WRB. Additionally, the drainage depends on the draining water being expelled to the exterior at the base of the frame assembly. In the mass assemblies water penetrated the stucco via micro cracks (as the water also did in the frame assemblies). Typical paint finishes are unable to span micro cracks. Under normal conditions this is not an issue for the reasons previously mentioned (the huge moisture storage capacity of masonry block assemblies). As stucco buildings age and are successively repainted the water entry is reduced after each layer of paint is added. In general this is why many older buildings constructed with mass walls performed somewhat better.

In the second floor frame assemblies water also penetrated the stucco via micro cracks. Again, as previously mentioned, typical paint finishes are unable to span micro cracks. In frame wall assemblies it is expected that this penetrating water will be drained back to the exterior. However, in many cases the penetrating rainwater was not drained to the exterior due to adhesion between WRB’s and the stucco renderings preventing drainage between the stucco renderings and WRB’s, a loss of water repellency of the WRB’s and the lack of effective flashing at the base of the drained assemblies.”

The report can be found at
w.dca.state.fl.us/fbc/Hurricane_Research_Advisory_Committee/FHBA_Water_Intrusion_Report/FHBA_Water_Intrusion_report.pdf

**Bibliography:** Lstiburek, Joseph, Ph.D., Building Science Corporation, “Rainwater Management Performance of Newly Constructed Residential Building Enclosures During August and September”, January 11, 2005.

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

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

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# RB260–06/07
## R801.3

**Proponent:** Alan Seymour, Oregon Department of Energy

**Revise as follows:**

**R801.3 Roof drainage.** In areas where expansive or collapsible soils are known to exist, all dwellings shall have a controlled method of water disposal from roofs that will collect and discharge all roof drainage to [~~the ground surface at least 5 feet (1524 mm) from foundations or to~~ ]an approved drainage system.

**Reason:** Where required, this would require a drainage system that assures water will be diverted away from the structure whenever gutters are installed. It would not allow the downspout to be located five feet away from the foundation.

This requires when gutters and downspouts are installed, they must be drained away from the building. Allowing downspouts to drain onto the ground five feet away from the foundation is problematic. If the grade is not adequately sloped away from the house, water can get up against the foundation wall and cause moisture related problems and damage. Ground grade may appear to be adequately sloped during inspection but can easily settle to no slope or a negative grade.

The potential for moisture-related problems exist in buildings. Lack of measures necessary to prevent moisture into a structure is lacking in code. A major vehicle for water intrusion into buildings is through the foundation for specific soil types and climatic conditions. As stated in Reasons above, this is problematic in more types of construction than covered in current code. In addition, as specified in Cost Impact below, these measures are very expensive, if not nearly impossible to install after a building has been constructed.

**Cost Impact:** The proposal is related to reducing moisture-related problems within a building. Increased levels of moisture in homes contribute to mold, which can become health issues and lead to dry rot damage in wood components of the building. Insurance for a contractor, architect, or homeowner does not cover damages due to moisture related issues.

While most molds are benign, some can cause devastating health problems and lead to dry rot in wood building components. Requiring replacement of wood components due to dry rot after a building is constructed is much more expensive to mitigate and repair than during construction of a new building.

There is an increased cost associated with the proposal. The cost for mitigation during construction would be less a fraction of the cost associated with mitigating and repairing damage. One of the mitigating measures to prevent damage from occurring again may be the measure that being proposed. Due to the magnitude of the potential problems, a cost cannot be associated with this proposal.

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

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# RB261–06/07
## R801.4 (New)

**Proponent:** Cincinati Smith, Super Anchor Safety

**Add new text as follows:**

**R801.4 Roof fall protection anchor.** An anchor system for attaching a personal fall protection system shall be provided for all roof surfaces edges located 6 feet or more above the finished grade or surfaces below. The anchor shall be capable of withstanding a 5000 pound load (2270 kg).

**Reason:** During construction of a residential structure OSHA Standard 1926 Subpart M – Fall Protection, requires that all workers exposed to a fall hazard of 6' or more must use some form of fall protection.

(**1926.501(b)(1)** Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.)

Based on data from the NIOSH National Traumatic Occupational Fatalities (NTOF) Surveillance System, falls from elevations were the fourth leading cause of workplace death from 1980 through 1994. The 8,102 deaths due to falls from elevations accounted for 10% of all occupational fatalities during this period and an average of 540 deaths per year. Once the fourth leading cause of work-related death across all industries, falls have surpassed workplace homicide to become the second leading cause after motor vehicle crashes. In 2000 alone some 717 workers died of injuries caused by falls from ladders, scaffolds, buildings, or other elevations. That equaled almost two deaths per day on average. In the construction industry specifically, falls lead all other causes of occupational death and this trend is taking a disturbing increase. According to the National Safety Counsel occupational deaths rose last year by 2% overall and the major cause was falls. Falls accounted for 815 deaths in 2004 up 17% from 2003 and accounted for 14% of the year's total occupational deaths. A large portion of the increase, 39%, was workers who died falling from a roof. The economic burden from just these falls accounts for a very conservative estimate of 205 to 605 million dollars, some studies place this number much higher. The majority of these deaths could be prevented by simply requiring an anchor point be installed to secure with.

It is not that workers are against using fall protection but most workers constructing a residence arrive at the job site with no place to tie off to for adequate fall protection purposes. If a permanent anchor were included as part of the architects plan and installed at the framing stage nearly all trades could use this to secure with and thus comply with the OSHA regulations in place. Although OSHA does allow for a safety net system or a guardrail, for practical purposes, including the higher cost as opposed to a roof anchor fall arrest system, they are almost never used. Considering the danger involved in working in an elevated position and the high incidence of fall related injury and death this is a simple solution for an ongoing problem in the residential construction field. Attached in a picture of a possible anchor solution as well as a picture of a person using the anchor along with a personal fall protection system, (harness, lifeline and anchor).

A possible anchor application shown for permanent fall protection to be used by someone working in an elevated position.

**Pacific A 2**

A complete personal fall protection system (anchor, harness and lifeline) shown being used.

**Pacific A 3**

**Cost Impact:** The code change proposal will increase the cost of construction approximately $100 in total per new house constructed.

| Public Hearing: | Committee: | AS | AM | D |
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# RB262–06/07
## R802

**Proponent:** Bob Boyer, Building Officials Association of Florida

**Delete current Section 802 and substitute as follows:**

**SECTION R802**
**WOOD ROOF FRAMING**

**R802.1 General Requirements.** Roof and ceiling framing of wood construction shall be designed and constructed in accordance with the provisions of this section.

**R802.1.1 Identification.** Load-bearing dimension lumber for rafters, trusses and ceiling joists shall be identified by a grade mark of a lumber grading or inspection agency that has been approved by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

**R802.1.3 End-jointed lumber.** Approved end-jointed lumber identified by a grade mark conforming to Section R802.1 may be used interchangeably with solid-sawn members of the same species and grade.

**R802.1.4 Fire-retardant-treated wood.** Fire-retardant treated wood is any wood product which, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E84, 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.

**R802.1.4.1 Labeling.** 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 and smoke developed rating.
6. Method drying after treatment.
7. Conformance with appropriate standards in accordance with Sections R802.1.3.2 through R802.1.3.5.
8. For FRTW exposed to weather, damp or wet location, the words “No increase in the listed classification when subjected to the Standard Rain Test” (ASTM D2898).

**R802.1.4.2 Strength adjustments.** Design values for untreated lumber and wood structural panels as specified in Section R802.1, shall be adjusted for fire retardant treated wood. Adjustments to design values shall be based upon an approved method of investigation which takes into consideration the effects of the anticipated temperature and humidity to which the fire-retardant- treated wood will be subjected, the type of treatment and redrying procedures.

**R802.1.4.2.1Wood structural panels.** The effect of treatment and the method of redrying after treatment, and exposure to high temperatures and high humidities on the flexure properties of fire-retardant- treated softwood plywood shall be determined in accordance with ASTM D 5516. The test data developed by ASTM D 5516 shall be used to develop adjustment factors, maximum loads and spans, or both for untreated plywood design values in accordance with ASTM D 6305. Each manufacturer shall publish the allowable maximum loads and spans for service as floor and roof sheathing for their treatment.

**R802.1.4.2.2 Lumber.** For each species of wood treated, the effect of the treatment and the method of redrying after treatment and exposure to high temperatures and high humidities on the allowable design properties of fire-retardant-treated lumber shall be determined in accordance with ASTM D 5664. The test data developed by ASTM D 5664 shall be used to develop modification factors for use at or near room temperature and at elevated temperatures and humidity in accordance with ASTM D 6841.

Each manufacturer shall publish the modification factors for service at temperatures of not less than 80°F (27°C) and for roof framing. The roof framing modification factors shall take into consideration the climatological location.

**R802.1.4.3 Exposure to weather.** Where fire-retardant- treated wood is exposed to weather, or damp or wet locations, it shall be identified as "Exterior" to indicate there is no increase in the listed flame spread index as defined in Section R802.1.3 when subjected to ASTM D 2898.

**R802.1.4.4 Interior applications.** Interior fire retardant- treated wood shall have a moisture content of not over 28 percent when tested in accordance with ASTM D 3201 procedures at 92 percent relative humidity. Interior fire-retardant-treated wood shall be tested in accordance with Section R802.1.3.2.1 or R802.1.3.2.2. Interior fire-retardant-treated wood designated as Type A shall be tested in accordance with the provisions of this section.

**R802.1.4.5 Moisture content.** Fire-retardant-treated wood shall be dried to a moisture content of 19 percent or less for lumber and 15 percent or less for wood structural panels before use. For wood kiln dried after treatment (KDAT) the kiln temperatures shall not exceed those used in kiln drying the lumber and plywood submitted for the tests described in Section R802.1.3.2.1 for plywood and R802.1.3.2.2 for lumber.

**R802.1.5 Structural glued laminated timbers.** Glued laminated timbers shall be manufactured and identified as required in AITC A190.1 and ASTM D3737.

**R802.1.6 Structural log members.** Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with ASTM D 3957. Such structural log members shall be identified by the grade mark of an approved lumber grading or inspection agency. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by a lumber-grading or inspection agency meeting the requirements of this section shall be permitted to be accepted.

**R802.1.7 Wood trusses.**

**R802.1.7.1 Truss design drawings.** Truss design drawings, prepared in conformance with Section R802.10.1, shall be provided to the building official and approved prior to installation. Truss design drawings shall include, at a minimum, the information specified below. Truss design drawing shall be provided with the shipment of trusses delivered to the jobsite.

1. Design wind speed and exposure category.
2. Slope or depth, span and spacing.
3. Location of all joints.
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. Adjustments to lumber and joint connector design values for conditions of use.
7. Each reaction force and direction.
8. Joint connector type and description (e.g., size, thickness or gauge) and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface.
9. Lumber size, species and grade for each member.
10. Connection requirements for:
    - 10.1. Truss to girder-truss.
    - 10.2. Truss ply to ply.
    - 10.3. Field splices.
11. Calculated deflection ratio and/or maximum description for live and total load.
12. 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.
13. Required permanent truss member bracing location.

**R802.1.7.2 Design.** Wood trusses shall be designed in accordance with accepted engineering practice. The design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1. The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.

**R802.1.7.3 Applicability limits.** The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist span or truss, not greater than two stories in height with each story not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure A, B or C, and a maximum ground snow load of 70 psf (3352 Pa). Roof snow load is to be computed as: 0.7 *p*g.

**R802.1.7.4 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 the Building Component Safety Information (BCSI 1-03) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.

**R802.1.7.5 Alterations to trusses.** Truss members shall not be cut, notched, drilled, spliced or otherwise altered in any way without the approval of a registered design professional. Alterations resulting in the addition of load (e.g., HVAC equipment, water heater) that exceeds the design load for the truss shall not be permitted without verification that the truss is capable of supporting such additional loading.

**R802.1.7.6 Truss to wall connection.** Trusses shall be connected to wall plates by the use of approved connectors having a resistance to design uplift, lateral and shear forces, Trusses shall be installed in accordance with the manufacturer's design and specifications. For roof assemblies subject to wind uplift pressures of 20 pounds per square foot (0.958 kN/m2) or greater, as established in Table R301.2(2), adjusted for height and exposure per Table R301.2(3), see section R802.11.

**R802.2 Design and construction where basic wind speed is less than 100 mph (160.9 km/h) in hurricane-prone regions or 110 miles per hour (177.1 km/h) elsewhere.** The framing details required in Section R802 apply to roofs having a minimum slope of three units vertical in 12 units horizontal (25-percent slope) or greater. Roof-ceilings of conventional light-frame wood construction shall be designed and constructed in accordance with the provisions of this Section and Figures R606.10(1), R606.10(2) and R606.10(3). Alternately, roof-ceilings may be designed and constructed in accordance with AF&PA"s NDS or AF&PA's WFCM. Components of roof-ceilings shall be fastened in accordance with Table R602.3(1).

**R802.2.1 Framing details.** Rafters shall be framed to ridge board or to each other with a gusset plate as a tie. Ridge board shall be at least 1-inch (25.4 mm) nominal thickness and not less in depth than the cut end of the rafter. At all 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 supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point. Where the roof pitch 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.

**R802.2.1.1 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 when 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 a minimum of 2-inch by 4-inch (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.

Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the attic space in accordance with Table R602.3(1).

Collar ties shall be a minimum of 1-inch by 4-inch (25 mm by 102 mm) (nominal), spaced not more than 4 feet (1219 mm) on center.

**R802.2.1.2 Ceiling joists lapped.** Ends of ceiling joists shall be lapped a minimum of 3 inches (76 mm) or butted over bearing partitions or beams and toe nailed to the bearing member. When ceiling joists are used to provide resistance to rafter thrust, lapped joists shall be nailed together in accordance with Table R602.3(1) and butted joists shall be tied together in a manner to resist such thrust.

**R802.2.2 Allowable ceiling joist spans.** Spans for ceiling joists shall be in accordance with Tables R802.4(1) and R802.4(2). For other grades and species and for other loading conditions, refer to the AF&PA Span Tables for Joists and Rafters.

**R802.2.3 Allowable rafter spans.** Spans for rafters shall be in accordance with Tables R802.5.1(1) through R802.5.1(8). For other grades and species and for other loading conditions, refer to the AF&PA Span Tables for Joists and Rafters. The span of each rafter shall be measured along the horizontal projection of the rafter.

**R802.2.3.1 Purlins.** Purlins are permitted to be installed to reduce the span of rafters as shown in Figure R802.5.1. Purlins shall be sized no 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 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).

**R802.2.4 Bearing.** The ends of each rafter or ceiling joist shall have not less than 11/2 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on masonry or concrete.

**R802.2.5 Finished ceiling material.** If the finished ceiling material is installed on the ceiling prior to the attachment of the ceiling to the walls, such as in construction at a factory, a compression strip of the same thickness as the finish ceiling material shall be installed directly above the top plate of bearing walls if the compressive strength of the finish ceiling material is less than the loads it will be required to withstand. The compression strip shall cover the entire length of such top plate and shall be at least one-half the width of the top plate. It shall be of material capable of transmitting the loads transferred through it.

**R802.2.6 Cutting and notching.** Structural roof members shall not be cut, bored or notched in excess of the limitations specified in this section.

**R802.2.6.1 Sawn lumber.** Notches in solid lumber joists, rafters and beams shall not exceed one-sixth of the depth of the member, shall not be longer than one-third of the depth of the member and shall not be located in the middle one-third of the span. Notches at the ends of the member shall not exceed one-fourth the depth of the member. The tension side of members 4 inches (102 mm) or greater in nominal thickness shall not be notched except at the ends of the members. The diameter of the holes bored or cut into members shall not exceed one-third the depth of the member. Holes shall not be closer than 2 inches (51 mm) to the top or bottom of the member, or to any other hole located in the member. Where the member is also notched, the hole shall not be closer than 2 inches (51 mm) to the notch.

> **Exception:** Notches on cantilevered portions of rafters are permitted provided the dimension of the remaining portion of the rafter is not less than 4-inch nominal (102 mm) and the length of the cantilever do not exceed 24 inches (610 mm).

**R802.2.6.2 Engineered wood products.** Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members or I-joists are prohibited except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design professional.

**R802.2.7 Lateral support.** Rafters and ceiling joists having a depth-to-thickness ratio exceeding 5 to 1 based on nominal dimensions shall be provided with lateral support at points of bearing to prevent rotation.

**R802.2.7.1 Bridging.** Rafters and ceiling joists having a depth-to-thickness ratio exceeding 6 to 1 based on nominal dimensions shall be supported laterally by solid blocking, diagonal bridging (wood or metal) or a continuous 1-inch by 3-inch (25.4mmby 76 mm)wood strip nailed across the rafters or ceiling joists at intervals not exceeding 8 feet (2438 mm).

**R802.2.8 Framing of openings.** Openings in roof and ceiling framing shall be framed with header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the ceiling joist or rafter. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When 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 when 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).

**R802.2.9 Roof tie-down.**

**R802.2.9.1 Uplift resistance.** Roof assemblies which are subject to wind uplift pressures of 20 pounds per square foot (0.958 kN/m2) or greater shall have roof rafters or trusses attached to their supporting wall assemblies by connections capable of providing the resistance required in Table R802.11.Wind uplift pressures shall be determined using an effective wind area of 100 square feet (9.3m2) and Zone 1 in Table R301.2(2), as adjusted for height and exposure per Table R301.2(3).

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

**R802.2.10 Blocking.** Blocking shall be a minimum of utility grade lumber.

**R802.3 Design and construction where basic wind speed equals or exceeds 100 mph (160.9 km/h) in hurricane-prone regions or 110 miles per hour (177.1 km/h) elsewhere.** Roof-ceilings of light-frame wood construction shall be designed and constructed in accordance with the provisions of Section R301.2.1.1 and Section R802.1.

**Reason:** This modification reorganizes the provisions for wood-frame construction of roofs by separating general provisions applicable to all wood construction from that of prescriptive wood-frame construction from that of engineered wood construction. This change adds new Section R802.1 General Requirements, revising Section R802.2 to clarify where the prescriptive construction applies and adding new Section R802.3 to clarify where an engineered construction is required. Also, Section R802.1.7.6 (old R802.10.5) Truss to wall connection is revised to require the connection to have a resistance to design uplift, lateral and shear forces.

**Cost Impact:** The code change proposal will not increase costs. This change merely reorganizes the provisions for wood-frame construction of roofs by separating general provisions applicable to all wood construction from that of prescriptive wood-frame construction from that of engineered wood construction.

| Public Hearing: | Committee: | AS | AM | D |
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# RB263–06/07

## R802.10, R802.10.1 (New), R802.10.2 (New), R802.10.3 (New), R802.10.4, R802.10.4.1, R802.10.4.2, R802.10.4.3, R802.10.4.4 (New), R802.10.4.4.1 (New), R802.10.5 (New), R802.10.6, R802.10.7 (New)

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

**Revise as follows:**

**R802.10 Wood trusses.**

**R802.10.1 Truss design drawing**. A type of construction document that includes the written, graphic and pictorial depiction of each individual truss.

**R802.10.2 Truss submittal package**. Shall consist of each individual Truss Design Drawing, the Truss Member Permanent Bracing per R802.10.3 and, as applicable, the cover sheet/truss index sheet.

**R802.10.3 Truss placement diagram.** Optional manufacturer's installation instructions, which identifies the proposed location for each individually designated truss and references the corresponding Truss Design Drawing. The Truss Placement Diagram shall not be required to bear the seal or signature of the Truss Designer.

**R802.10.~~2~~4 Design.** Wood trusses shall be designed in accordance with the provisions of this code and approved ~~accepted~~ engineering practice. ~~The design and manufacture of metal-plate-connected wood trusses shall comply with ANSI/TPI 1.The truss design drawings shall be prepared by a registered professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.1.~~ Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other approved framing devices.

**R802.10.~~1~~4.1 Truss design drawings.** The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. ~~Truss design drawings, prepared in compliance with Section R802.10.1, shall be submitted to the building official and approved prior to installation.~~ Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

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 wood member ~~lumber~~ and metal connector plate ~~joint~~ connector design values for conditions of use.
6. Each reaction force and direction.
7. ~~Joint~~ Metal connector plate type ~~and description, e.g.,~~ size, and thickness or gauge, and the dimensioned location of each metal connector plate ~~joint~~ connector except where symmetrically located relative to the joint Interface.
8. ~~Lumber~~ Size, species and grade for each wood member.
9. Connection requirements for:
   9.1. Truss-to-girder-truss~~;~~.
   9.2. Truss ply-to-ply~~; and~~.
   9.3. Field splices.
10. Calculated deflection ratio and~~/or~~ maximum vertical and horizontal deflection ~~description~~ for live and total load, as applicable.
11. Maximum axial tension and 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~~ individual truss member permanent bracing location, and method per Section R802.10.4.2, unless a specific truss member permanent bracing plan for the roof or floor structural system is provided by a registered design professional.

**R802.10.~~2.1~~4.2 Applicability limits.** The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist ~~span or truss~~, rafter or truss span, not greater than two stories in height with each story not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure A, B or C, and a maximum ground snow load of 70 psf (3352 Pa). Roof snow load is to be computed as: 0.7 pg.

**R802.10.~~3~~4.3 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 shall be braced where permanent bracing of individual truss member is indicated on the individual truss design drawings. Where permanent bracing of individual truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:

1. The trusses shall be designed so that the buckling of any individual truss member can be resisted internally by the structure (e.g. buckling member T-bracing, L-bracing, etc) of the individual truss. The individual truss member buckling reinforcement shall be installed as shown on the Truss Design Drawing or on supplemental truss member buckling reinforcement diagrams provided by the Truss Designer.
2. Permanent bracing shall be installed using standard industry bracing details that conform with generally accepted engineering practice.

In the absence of specific bracing requirements, trusses shall be braced in accordance with the Building Component Safety Information (BCSI 1-~~03~~) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses.

**R802.10.4.4 Truss designer**: The individual or organization responsible for the design of trusses.

**R802.10.4.4.1 Seal and signature on truss design drawings.** Where required by a registered design professional; or a building official; or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

**Exceptions:**

1. When a cover sheet and truss index sheet are combined into a single cover sheet and attached to the set of truss design drawings, the single sheet/truss index sheet is the only document required to be signed and sealed within the truss submittal package.
2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, both the cover sheet and the truss index sheet are the only documents that need to be signed and sealed within the truss submittal package.

**R802.10.5 Anchorage**. All transfer of loads and anchorage of each truss to the supporting structure is the responsibility of the individual submitting the construction documents for the structure for approval.

**R802.10.46 Alterations to trusses.** Truss members and components shall not be cut, notched, spliced or otherwise altered in anyway without the approval of a registered design professional. Alterations resulting in the addition of load (e.g., HVAC equipment, water heater, etc.), that exceed the design load for the truss, shall not be permitted without verification that the truss is capable of supporting the additional loading.

**R802.10.7 Metal-plate-connected trusses**. In addition to Sections R802.10.1 through R802.10. 6, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Manufactured trusses shall comply with R109, as applicable.

(Renumber existing R802.10 5 to R802.10.8)

**Reason: (see corresponding code change proposal for R502.11)**
The overall goal of this proposed code change is to more clearly define the current design process as it pertains to metal plate connected wood trusses. Our experience is that there are a variety of expectations and there can be a great deal of confusion regarding trusses. By developing clearer code language, we believe this change will markedly improve the construction process as it relates to trusses.

This harmonizes this section with the language in the IBC section 2303.4. The wood truss sections included in Chapter 5 and 8 contain the same requirements with the exception of the direct reference to Section R301.6 regarding the controlling roof load in 4.1 of proposed Section R802.10.4.1 and the applicability limitations imposed upon roof trusses for snow loading in proposed Section R802.10.4.2.

The order of the sections in Chapter 5 and 8 has also been harmonized.

R502.11.7 & R802.10.7 - Revises the reference to the truss design standard in conformity with language used elsewhere in the IRC; see R505.1.3 for Cold-Formed Steel Floor Trusses.

R502.11.4.3 & R802.10.4.4 – This section has been added to clearly define a term unique to this revised code section, Truss Designer. It also refines the requirements for signing and sealing each Truss Design Drawing as well as allowing for a cover or index sheet to be used in lieu of signing and sealing each individual truss design drawing. This is a method that is often used in engineering practice.

R502.11.1 & R802.10.1 This proposal includes the definition of a Truss Design Drawing that explicitly defines it as a Construction Document.

R502.11.2 & R802.10.2 This proposal adds a definition for a truss submittal package which provides much greater clarity and easier understanding surrounding what needs to be included in a truss submittal package.

R502.11.3 & R802.10.3 This proposal adds a definition of the term 'truss placement diagram' to minimize the confusion that exists in the construction industry between a variety of terms that can mean the same thing, such as “installation documents,” “construction documents,” “shop drawings,” etc. The term “truss placement diagram” has been used by the truss industry and is very specific. This change is intended to provide much greater clarity, easier understanding and better communication

R502.11.4.1 & R802.10.4.1 a few clarifying words have been added at items #10, 11 and 12.

R502.11.4.2 & R802.10.4.3 expands on the requirements of item #12 and is intended to help focus everyone involved in the construction process on the need for permanent truss bracing to be installed. Two options are provided to define the requirements for permanent truss member bracing:

1. The trusses can be designed so that the buckling of any individual truss member is resisted internally by the structure of the individual truss.
2. Permanent bracing shall be installed in compliance with the Truss Industry’s permanent bracing standard details that follow sound engineering practice. Conceptual details are provided by:
   a. component manufacturers to the building design professional as the projects are being designed
   b. component manufacturers to the jobs that they supply through their job site packages that are shipped with each job.
   c. WTCA on its website at www.sbcindustry.com or by calling WTCA staff at 608-274-4849.
   d. the *Building Component Safety Information (BCSI 1) Guide to Good Practice for the Handling, Installing & Bracing of Metal Plate Connected Wood Trusses*.

R502.11.5 & R802.10.5 this section has been added to ensure that it is clear that the transfer of all design loads through the building and the connections of the trusses to the supporting structure to resist those loads remain the responsibility of the individual taking out the building permit.

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

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

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# RB264–06/07

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

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

**1. Revise as follows:**

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

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

Where wind uplift loads determined in accordance with Table R802.11 exceed 100 plf, rafters or trusses shall be attached to supporting wall assemblies by connections capable of providing the required resistance.

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

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

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

**pounds per linear foot (plf) of wall**

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

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

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

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

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

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

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

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

# RB265–06/07
## R802.10.5, R802.11.1

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

**Revise as follows:**

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

**R802.11 Roof tie-down.**

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

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

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

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

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

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

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# RB266–06/07
## R802.10.5, R802.11.1

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

**1. Delete without substitution:**

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

**2. Revise as follows:**

**R802.11 Roof tie-down.**

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

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

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

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

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

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

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

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

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

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

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

**Based on NDS-97 & NER-272**

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

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

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

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

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# RB267–06/07
## R802.11.1

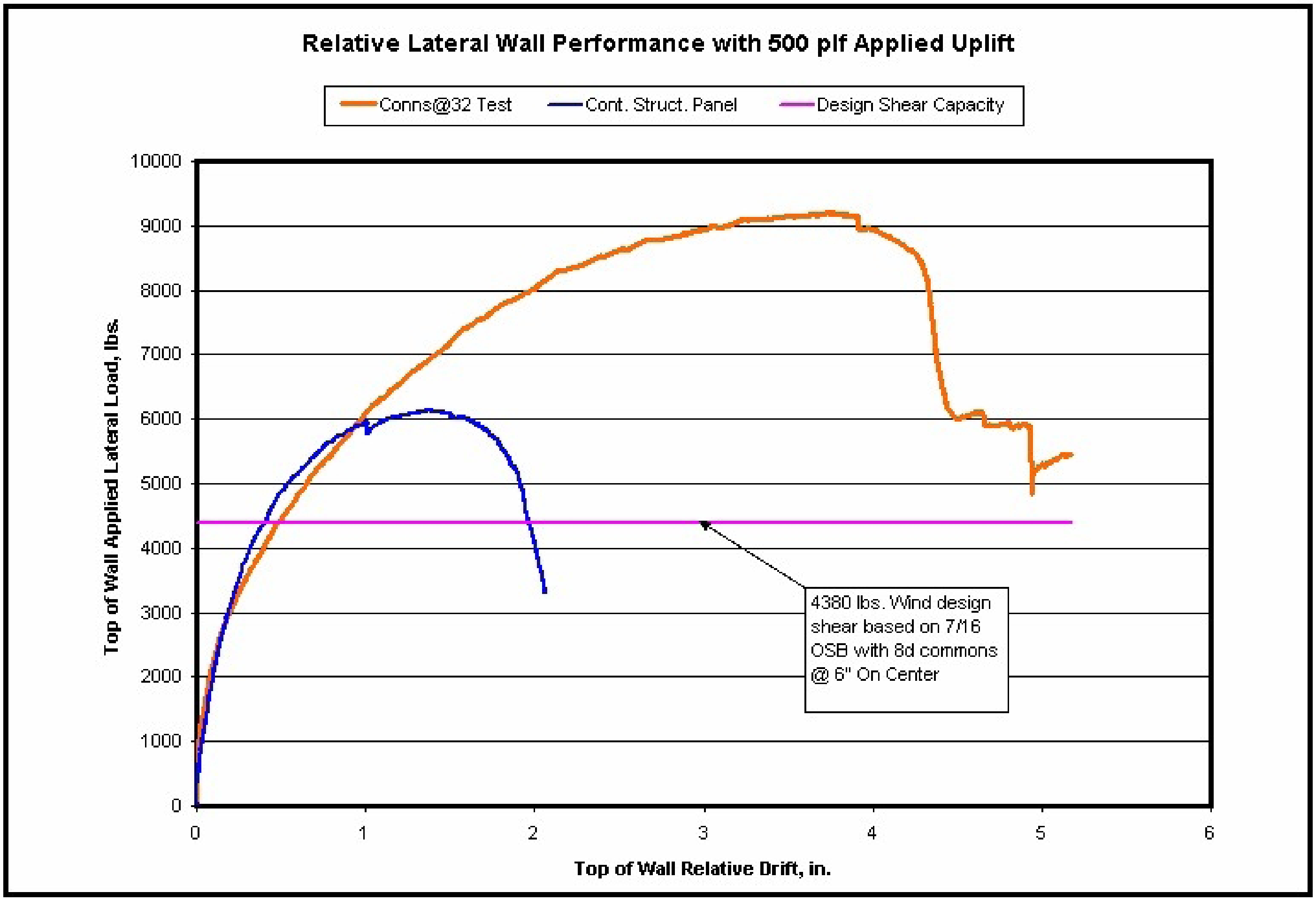
**Proponent:** Randall Shackelford, Simpson Strong-Tie Co.

**Revise as follows:**

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

A continuous load path shall be designed to transmit the uplift forces from the rafter or truss ties to the foundation. Wall sheathing that is used as a braced wall panel shall not be used to resist wind uplift forces.

**Reason:** Clarify code by adding new requirements. This change is to prevent wall sheathing that is used for braced wall panels from being used to resist uplift forces in addition to shear forces. Recent testing in Simpson Strong-Tie's state of the art laboratory has shown that sheathing cannot maintain the code-required required safety factor when it is used to resist uplift forces and shear forces simultaneously. This is especially important for braced walls in the IRC, because they lack holdowns to prevent overturning forces, so the sill plate nails are already resisting some uplift force in addition to the shear force.
In addition, corner framing in the continuously sheathed method is already providing an anchorage force to the perpendicular wall, so it cannot provide additional uplift resistance. Since the continuous sheathing method is a modification of the perforated shearwall method, and peforated shearwalls inherently have an additional uplift force at the sheathing to plate connection, there is no additional capacity to take additional uplift. Structural sheathing that is not being used as a braced wall panel could be used to transfer uplift forces.




**Pacific A 4**

**Cost Impact:** The code change proposal will increase the cost of construction only if sheathing of braced wall panels is being used to resist uplift forces.

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

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# RB268–06/07
## R802.11.1

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

**Revise as follows:**

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

**Exceptions:**

1. Where uplift forces in Table R802.11 do not exceed 150 pounds, roof rafters and trusses are permitted to be attached in accordance with Table R602.3(1) and Section R802.10.5 respectively.
2. Where uplift forces in Table R802.11 do not exceed 210 pounds, roof rafters are permitted to be attached with 3 16d toenails.
3. Where uplift forces in Table R802.11 do not exceed 210 pounds, and rafters are fastened to ceiling joists at the plate, rafters and ceiling joists are permitted to be attached in accordance with Table R602.3(1).

4. For trusses designed per Section R802.10.1, the fasteners or connectors shall resist the uplift force specified on the Truss Design Drawing.

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

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

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

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

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

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

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

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

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# RB269–06/07

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

**Proponent:** Joseph Lstiburek, Building Science Corporation, representing himself

**1. Add new definition as follows:**

**SECTION R202**
**GENERAL DEFINITIONS**

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

**2. Revise as follows:**

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

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

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

~~3.~~ ~~In the warm humid locations as defined in Section N1101.2.1:~~
~~3.1.~~ ~~For asphalt roofing shingles: A 1-perm (5.7 °x10-11 kg/s⁻ m2⁻ Pa) or less vapor retarder (determined using Procedure B of ASTM E 96) is placed to the exterior of the structural roof deck; that is, just above the roof structural sheathing.~~
3.~~2.~~ ~~For~~ Where wood shingles ~~and~~ or shakes are used~~:~~, a minimum continuous ¼ inch (6 mm) vented air space separates the shingles~~/~~ or shakes and the roofing ~~felt placed over~~ underlayment above the structural sheathing.

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

**3. Add new table and standard as follows:**

**TABLE R806.4**
**MINIMUM INSULATION**

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

**CHAPTER 43**
**REFERENCED STANDARDS**

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

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

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

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

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

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

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

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

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

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

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# RB270–06/07
## R806.4

**Proponent:** Lorraine Ross, Intech Consulting Inc., representing Polyisocyanurate Insulation

**Revise as follows:**

**R806.4 Conditioned attic assemblies.** Unvented conditioned attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) are permitted under the following conditions:

1. No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
2. ~~An air-impermeable insulation is applied in direct contact to the underside/interior of the structural roof deck.~~
   1. ~~"Air-impermeable" shall be defined by ASTM E 283.~~ Composite nailbase panels composed of rigid foam insulation that complies with IRC Section 314, a 1", 1.5" or 2" airspace and a nailable wood structural layer shall be installed on the topside of the roof deck. Composite panels shall be installed in accordance with manufacturers' installation instructions.

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

3. ~~In the warm humid locations as defined in Section N1101.2.1:~~
   - ~~3.1. For asphalt roofing shingles: A 1-perm (5.7 10-11 kg/s □m2 □Pa) or less vapor retarder (determined using Procedure B of ASTM E 96) is placed to the exterior of the structural roof deck; that is, just above the roof structural sheathing.~~
   - ~~3.2. For wood shingles and shakes: a minimum continuous 1/4-inch (6 mm) vented air space separates the shingles/shakes and the roofing felt placed over the structural sheathing.~~
4. ~~In Zones 3 through 8 as defined in Section N1101.2, sufficient insulation is installed to maintain the monthly average temperature of the condensing surface above 45°F (7°C). The condensing surface is defined as either the structural roof deck or the interior surface of an air-impermeable insulation applied in direct contact with the underside/interior of the structural roof deck. "Air-impermeable" is quantitatively defined by ASTM E 283. For calculation purposes, an interior temperature of 68°F (20°C) is assumed. The exterior temperature is assumed to be the monthly average outside temperature.~~

**Reason:** This proposal revises material for a current provision of the Code.

This code change has several errors in the current language:

1. The standard referenced in current Item 2, ASTM E283, does not define "air impermeable", which makes the current language unenforceable. This ASTM Standard does not cover insulation in its scope. ASTM E 283-91 (1999) is entitled: E283-91(1999) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen. The scope section states:

1. Scope

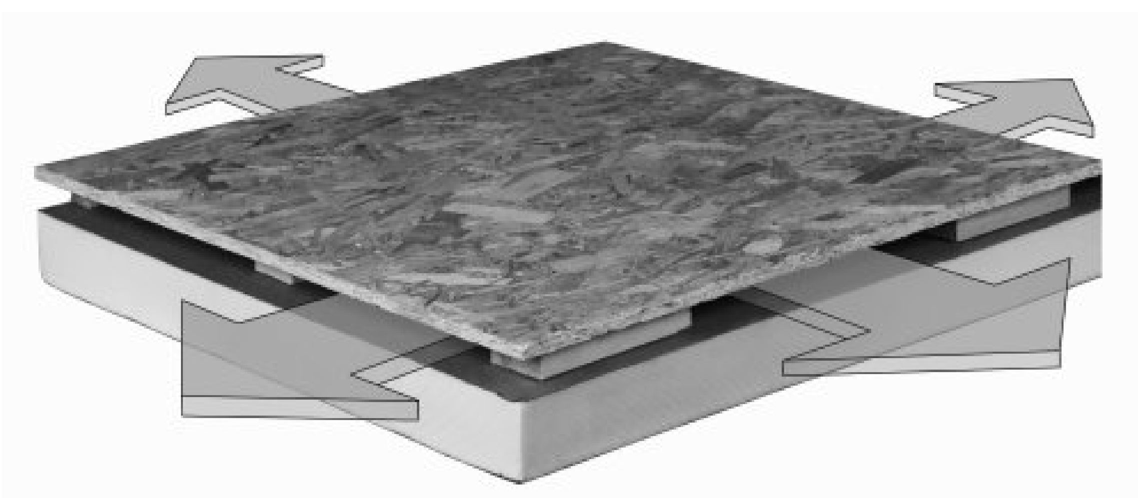
1.1 This test method provides a standard laboratory procedure for determining the air leakage rates of exterior windows, curtain walls, and doors under specified differential pressure conditions across the specimen. The test method described is for tests with constant temperature and humidity across the specimen.

1.2 This laboratory procedure is applicable to exterior windows, curtain walls, and doors and is intended to measure only such leakage associated with the assembly and not the installation. The test method can be adapted for the latter purpose.

*This standard does not address the "air impermeabilty" of insulation – it is clearly a window, curtain wall and door assembly test.*

2. The current language refers to products that are extremely installation dependent and there is no code language that ensures the proper thickness is actually evenly installed. The use of composite insulated panels above the roof deck is an easy installation, can be clearly verified as to thickness and greatly enables code enforcement. Some products installed on the underside of the roof deck are limited in thickness because of fire tests and this limitation on thickness may result in violation of the energy code.

3. Composite nailbase insulated panels are available in all thicknesses that easily meet the energy code and have been available for many years with proven performance. This is an example of the product. There are strips separating the nailable surface from the rigid insulation.



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