

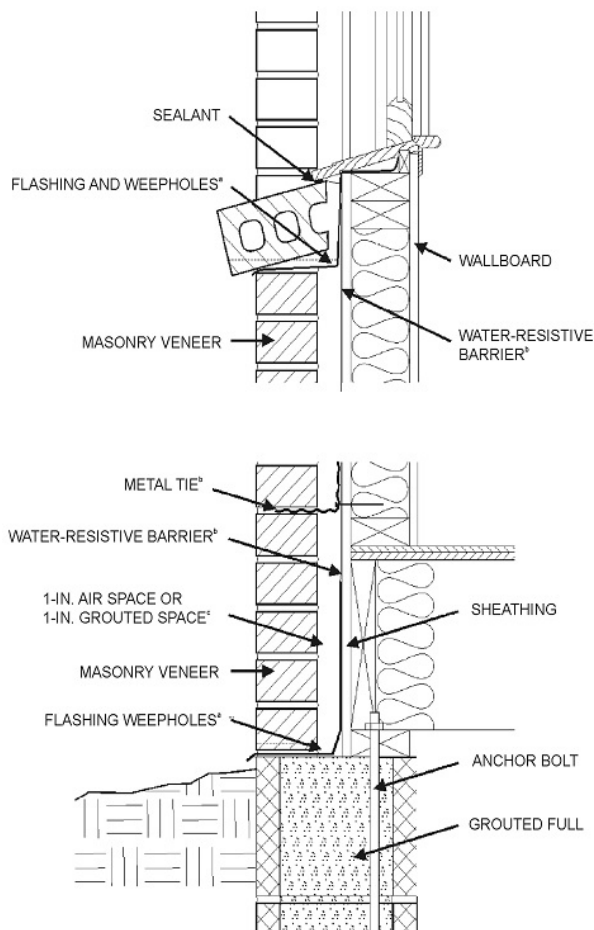
# Stone and Masonry Veneer

## R703.7 Stone and masonry veneer, general.

Stone and masonry veneer shall be installed in accordance with this chapter, Table R703.4 and Figure R703.7. These veneers installed over a backing of wood or cold-formed steel shall be limited to the first story above-grade plane and shall not exceed 5 inches (127 mm) in thickness. See Section R602.10 for wall bracing requirements for masonry veneer for wood-framed construction and Section R603.9.5 for wall bracing requirements for masonry veneer for cold-formed steel construction.

### Exceptions:

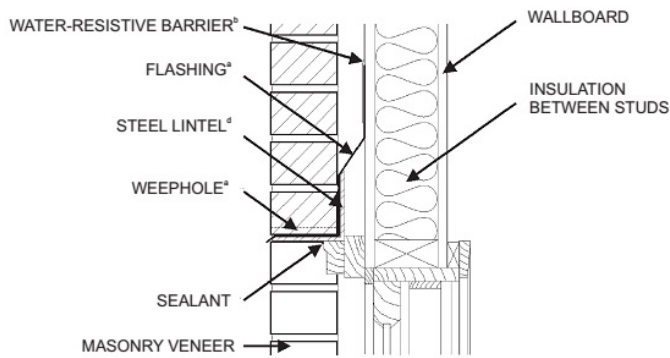
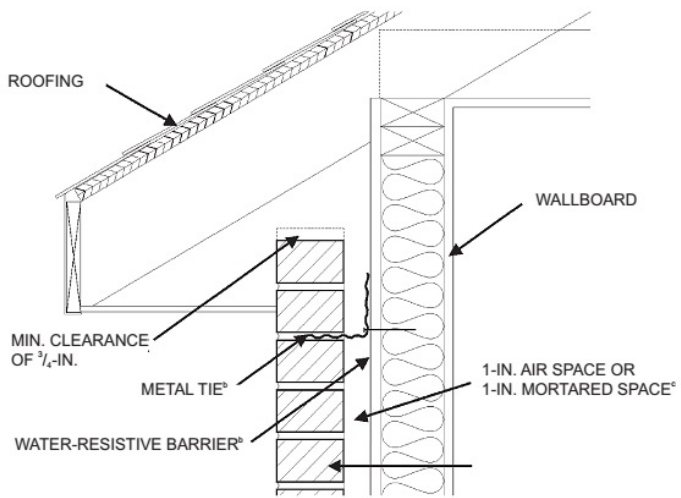
1. For all buildings in Seismic Design Categories A, B and C, exterior stone or masonry veneer, as specified in Table R703.7(1), with a backing of wood or steel framing shall be permitted to the height specified in Table R703.7(1) above a noncombustible foundation.
2. For detached one- or two-family dwellings in Seismic Design Categories D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub>, 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.



For SI: 1 inch = 24.5 mm.

(continued)

**FIGURE R703.7 MASONRY VENEER WALL DETAILS**



**FIGURE R703.7—continued MASONRY VENEER WALL DETAILS**

For SI: 1 inch = 25.4 mm.

- a. See Sections R703.7.5, R703.7.6 and R703.8.
- b. See Sections R703.2 and R703.7.4.
- c. See Section R703.7.4.2 and Table R703.7.4.
- d. See Section R703.7.3.

**TABLE R703.7(1) STONE OR MASONRY VENEER LIMITATIONS AND REQUIREMENTS, WOOD OR STEEL FRAMING, SEISMIC DESIGN CATEGORIES A, B AND C**

SEISMIC DESIGN CATEGORY	NUMBER OF WOOD OR STEEL-FRAMED STORIES	MAXIMUM HEIGHT OF VENEER ABOVE NONCOMBUSTIBLE FOUNDATION <sup>a</sup> (feet)	MAXIMUM NOMINAL THICKNESS OF VENEER (inches)	MAXIMUM WEIGHT OF VENEER (psf) <sup>b</sup>	WOOD OR STEEL-FRAMED STORY
A or B	Steel: 1 or 2 Wood: 1, 2 or 3	30	5	50	all
C	1	30	5	50	1 only
	2	30	5	50	top
					bottom
	Wood only: 3	30	5	50	top
					middle
bottom					

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.479 kPa.

a. An additional 8 feet is permitted for gable end walls. See also story height limitations of Section R301.3.

b. Maximum weight is installed weight and includes weight of mortar, grout, lath and other materials used for installation. Where veneer is placed on both faces of a wall, the combined weight shall not exceed that specified in this table.

**TABLE R703.7(2) STONE OR MASONRY VENEER LIMITATIONS AND REQUIREMENTS, ONE- AND TWO-FAMILY DETACHED DWELLINGS, WOOD FRAMING, SEISMIC DESIGN CATEGORIES D<sub>0</sub>, D<sub>1</sub> AND D<sub>2</sub>**

SEISMIC DESIGN CATEGORY	NUMBER OF WOOD FRAMED STORIES <sup>a</sup>	MAXIMUM HEIGHT OF VENEER ABOVE NONCOMBUSTIBLE FOUNDATION OR FOUNDATION WALL (feet)	MAXIMUM NOMINAL THICKNESS OF VENEER (inches)	MAXIMUM WEIGHT OF VENEER (psf) <sup>b</sup>
D <sub>0</sub>	1	20 <sup>c</sup>	4	40
	2	20 <sup>c</sup>	4	40
	3	30 <sup>d</sup>	4	40
D <sub>1</sub>	1	20 <sup>c</sup>	4	40
	2	20 <sup>c</sup>	4	40
	3	20 <sup>c</sup>	4	40
D <sub>2</sub>	1	20 <sup>c</sup>	3	30
	2	20 <sup>c</sup>	3	30

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.479 kPa, 1 pound-force = 4.448 N.

- a. Cripple walls are not permitted in Seismic Design Categories D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub>.
- b. Maximum weight is installed weight and includes weight of mortar, grout and lath, and other materials used for installation.
- c. The veneer shall not exceed 20 feet in height above a noncombustible foundation, with an additional 8 feet permitted for gable end walls, or 30 feet in height with an additional 8 feet for gable end walls where the lower 10 feet has a backing of concrete or masonry wall. See also story height limitations of Section R301.3.
- d. The veneer shall not exceed 30 feet in height above a noncombustible foundation, with an additional 8 feet permitted for gable end walls. See also story height limitations of Section R301.3.

#### **R703.7.1 Interior veneer support.**

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

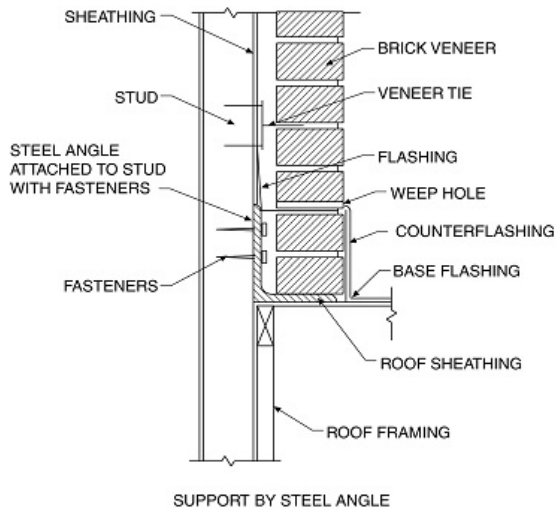
#### **R703.7.2 Exterior veneer support.**

Except in Seismic Design Categories D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub>, exterior masonry veneers having an installed weight of 40 pounds per square foot (195 kg/m<sup>2</sup>) or less shall be permitted to be supported on wood or cold-formed steel construction. When masonry veneer supported by wood or cold-formed steel construction adjoins masonry veneer supported by the foundation, there shall be a movement joint between the veneer supported by the wood or cold-formed steel construction and the veneer supported by the foundation. The wood or cold-formed steel construction supporting the masonry veneer shall be designed to limit the deflection to  $1/600$  of the span for the supporting members. The design of the wood or cold-formed steel construction shall consider the weight of the veneer and any other loads.

##### **R703.7.2.1 Support by steel angle.**

A minimum 6 inches by 4 inches by  $5/16$  inch (152 mm by 102 mm by 8 mm) steel angle, with the long leg placed vertically, shall be anchored to double 2 inches by 4 inches (51 mm by 102 mm) wood studs at a maximum on-center spacing of 16 inches (406 mm). Anchorage of the steel angle at every double stud spacing shall be a minimum of two  $7/16$  inch (11 mm) diameter by 4 inch (102 mm) lag screws. The steel angle shall have a minimum clearance to underlying construction of  $1/16$  inch (2 mm). A minimum of two-thirds the width of the masonry veneer thickness shall bear on the steel angle. Flashing and weep holes shall be located in the masonry veneer wythe in accordance with Figure R703.7.2.1. The maximum height of masonry veneer above the steel angle support shall be 12 feet, 8 inches (3861 mm). The air space separating the masonry veneer from the wood backing shall be in accordance with Sections R703.7.4 and R703.7.4.2. The method of support for the masonry veneer on wood construction shall be constructed in accordance with Figure R703.7.2.1.

The maximum slope of the roof construction without stops shall be 7:12. Roof construction with slopes greater than 7:12 but not more than 12:12 shall have stops of a minimum 3 inch by 3 inch by  $1/4$  inch (76 mm by 76 mm by 6 mm) steel plate welded to the angle at 24 inches (610 mm) on center along the angle or as *approved* by the *building official*.

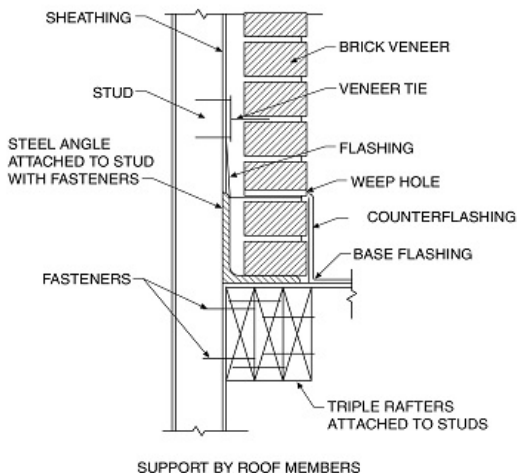


**FIGURE R703.7.2.1 EXTERIOR MASONRY VENEER SUPPORT BY STEEL ANGLES**

**R703.7.2.2 Support by roof construction.**

A steel angle shall be placed directly on top of the roof construction. The roof supporting construction for the steel angle shall consist of a minimum of three 2 inch by 6 inch (51 mm by 152 mm) wood members. The wood member abutting the vertical wall stud construction shall be anchored with a minimum of three  $\frac{5}{8}$ -inch (16 mm) diameter by 5-inch (127 mm) lag screws to every wood stud spacing. Each additional roof member shall be anchored by the use of two 10d nails at every wood stud spacing. A minimum of two-thirds the width of the masonry veneer thickness shall bear on the steel angle. Flashing and weep holes shall be located in the masonry veneer wythe in accordance with Figure R703.7.2.2. The maximum height of the masonry veneer above the steel angle support shall be 12 feet, 8 inches (3861 mm). The air space separating the masonry veneer from the wood backing shall be in accordance with Sections R703.7.4 and R703.7.4.2. The support for the masonry veneer on wood construction shall be constructed in accordance with Figure R703.7.2.2.

The maximum slope of the roof construction without stops shall be 7:12. Roof construction with slopes greater than 7:12 but not more than 12:12 shall have stops of a minimum 3 inch by 3 inch by  $\frac{1}{4}$  inch (76 mm by 76 mm by 6 mm) steel plate welded to the angle at 24 inches (610 mm) on center along the angle or as *approved by the building official*.



**FIGURE R703.7.2.2 EXTERIOR MASONRY VENEER SUPPORT BY ROOF MEMBERS**

### 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. The lintels shall have a length of bearing not less than 4 inches (102 mm). Steel lintels shall be shop coated with a rust-inhibitive paint, except for lintels made of corrosion-resistant steel or steel treated with coatings to provide corrosion resistance. Construction of openings shall comply with either Section R703.7.3.1 or 703.7.3.2.

#### R703.7.3.1 Allowable span.

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

**TABLE R703.7.3.1 ALLOWABLE SPANS FOR LINTELS SUPPORTING MASONRY VENEER<sup>a, b, c, d</sup>**

SIZE OF STEEL ANGLE <sup>a, c, d</sup> (inches)	NO STORY ABOVE	ONE STORY ABOVE	TWO STORIES ABOVE	NO. OF 1/2-INCH OR EQUIVALENT REINFORCING BARS IN REINFORCED LINTEL <sup>b, d</sup>
3 × 3 × 1/4	6'-0"	4'-6"	3'-0"	1
4 × 3 × 1/4	8'-0"	6'-0"	4'-6"	1
5 × 3 1/2 × 5/16	10'-0"	8'-0"	6'-0"	2
6 × 3 1/2 × 5/16	14'-0"	9'-6"	7'-0"	2
2-6 × 3 1/2 × 5/16	20'-0"	12'-0"	9'-6"	4

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

- Long leg of the angle shall be placed in a vertical position.
- Depth of reinforced lintels shall not be less than 8 inches and all cells of hollow masonry lintels shall be grouted solid. Reinforcing bars shall extend not less than 8 inches into the support.
- Steel members indicated are adequate typical examples; other steel members meeting structural design requirements may be used.
- Either steel angle or reinforced lintel shall span opening.

#### R703.7.3.2 Maximum span.

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

- Provide a minimum length of 18 inches (457 mm) of masonry veneer on each side of opening as shown in Figure R703.7.3.2.
- Provide a minimum 5-inch by 3 1/2-inch by 5/16-inch (127 mm by 89 mm by 7.9 mm) steel angle above the opening and shore for a minimum of 7 days after installation.
- Provide double-wire joint reinforcement extending 12 inches (305 mm) beyond each side of the opening. Lap splices of joint reinforcement a minimum of 12 inches (305 mm). Comply with one of the following:
  - 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 opening.
  - Double-wire joint reinforcement shall be 9 gauge (0.144 inch or 3.66 mm diameter) and shall be

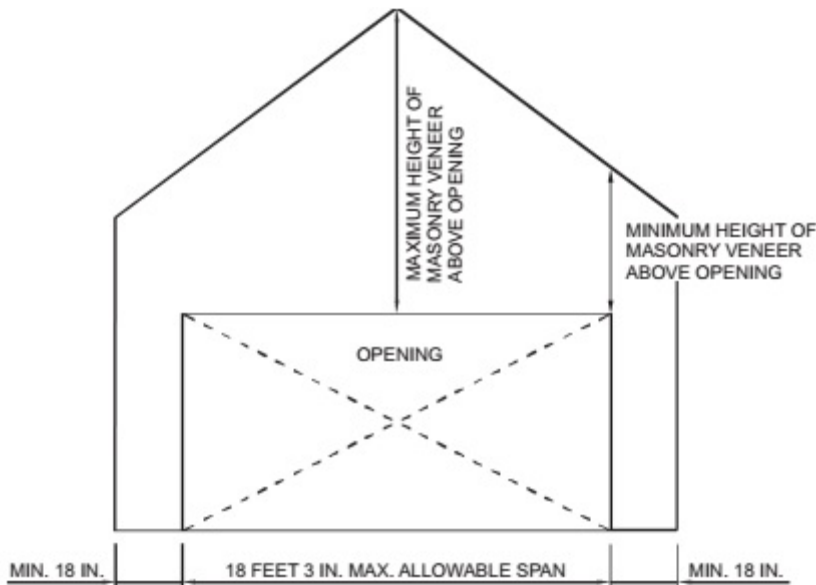
placed in the first three bed joints above the opening.

4. Provide the height of masonry veneer above opening, in accordance with Table R703.7.3.2.

**TABLE R703.7.3.2 HEIGHT OF MASONRY VENEER ABOVE OPENING**

MINIMUM HEIGHT OF MASONRY VENEER ABOVE OPENING (INCH)	MAXIMUM HEIGHT OF MASONRY VENEER ABOVE OPENING (FEET)
13	< 5
24	5 to < 12
60	12 to height above support allowed by Section R703.7

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



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

**FIGURE R703.7.3.2 MASONRY VENEER OPENING**

**R703.7.4 Anchorage.**

Masonry veneer shall be anchored to the supporting wall studs with corrosion-resistant metal ties embedded in mortar or grout and extending into the veneer a minimum of 1½ inches (38 mm), with not less than 5/8-inch (15.9 mm) mortar or grout cover to outside face. Masonry veneer shall conform to Table R703.7.4.

**TABLE R703.7.4 TIE ATTACHMENT AND AIR SPACE REQUIREMENTS**

BACKING AND TIE	MINIMUM TIE	MINIMUM TIE FASTENER <sup>a</sup>	AIR SPACE	
Wood stud backing with corrugated sheet metal	22 U.S. gage (0.0299 in.) × 7/8 in. wide	8d common nail <sup>b</sup> (2 1/2 in. × 0.131 in.)	Nominal 1 in. between sheathing and veneer	
Wood stud backing with metal strand wire	W1.7 (No. 9 U.S. gage; 0.148 in.) with hook embedded in mortar joint	8d common nail <sup>b</sup> (2 1/2 in. × 0.131 in.)	Minimum nominal 1 in. between sheathing and veneer	Maximum 4 1/2 in. between backing and veneer
Cold-formed steel stud backing with adjustable metal strand wire	W1.7 (No. 9 U.S. gage; 0.148 in.) with hook embedded in mortar joint	No. 10 screw extending through the steel framing a minimum of three exposed threads	Minimum nominal 1 in. between sheathing and veneer	Maximum 4 1/2 in. between backing and veneer

For SI: 1 inch = 25.4 mm.

a. In Seismic Design Category D<sub>0</sub>, D<sub>1</sub> or D<sub>2</sub>, the minimum tie fastener shall be an 8d ring-shank nail (2 1/2 in. × 0.131 in.) or a No. 10 screw extending through the steel framing a minimum of three exposed threads.

b. All fasteners shall have rust-inhibitive coating suitable for the installation in which they are being used, or be manufactured from material not susceptible to corrosion.

**R703.7.4.1 Size and spacing.**

Veneer ties, if strand wire, shall not be less in thickness than No. 9 U.S. gage [(0.148 inch) (4 mm)] wire and shall have a hook embedded in the mortar joint, or if sheet metal, shall be not less than No. 22 U.S. gage by [(0.0299 inch) (0.76 mm)] 7/8 inch (22 mm) corrugated. Each tie shall support not more than 2.67 square feet (0.25 m<sup>2</sup>) of wall area and shall be spaced not more than 32 inches (813 mm) on center horizontally and 24 inches (635 mm) on center vertically.

**Exception:** In Seismic Design Category D<sub>0</sub>, D<sub>1</sub> or D<sub>2</sub> or townhouses in Seismic Design Category C or in wind areas of more than 30 pounds per square foot pressure (1.44 kPa), each tie shall support not more than 2 square feet (0.2 m<sup>2</sup>) of wall area.

**R703.7.4.1.1 Veneer ties around wall openings.**

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

**R703.7.4.2 Air space.**

The veneer shall be separated from the sheathing by an air space of a minimum of a nominal 1 inch (25 mm) but not more than 4 1/2 inches (114 mm).

**Exception:** One layer of water-resistive barrier complying with Section R703.2 is permitted when a drainage space that allows bulk water to flow freely behind the cladding is provided.



**R703.7.4.3 Mortar or grout fill.**

As an alternate to the air space required by Section R703.7.4.2, mortar or grout shall be permitted to fill the air space. When the 1-inch (25.4 mm) space is filled with mortar, a weather-resistant membrane or building paper as described in Section R703.2 or R703.6.3 is required over studs or sheathing. When filling the air space, it is permitted to replace the sheathing and weather-resistant membrane or asphalt-saturated felt paper with a wire mesh and approved paper or an approved paper-backed reinforcement attached directly to the studs.

**R703.7.4.4 Masonry veneer on sheathed substrates.**

On sheathed substrates, a corrosion-resistant, self-furring expanded metal lath shall be installed over the weather-resistant membrane or building paper with appropriate fasteners as described in Section R703.6.1. Fasteners shall penetrate wood supports a minimum of one inch (25.4 mm).

**R703.7.5 Flashing.**

Flashing shall be located beneath the first course of masonry above finished ground level above the foundation wall or slab and at other points of support, including structural floors, shelf angles and lintels when masonry veneers are designed in accordance with Section R703.7. See Section R703.8 for additional requirements.

**R703.7.6 Weep holes.**

Weep holes shall be provided in the outside wythe of masonry walls at a maximum spacing of 33 inches (838 mm) on center. Weep holes shall not be less than  $\frac{3}{16}$  inch (5 mm) in diameter. Weep holes shall be located immediately above the flashing.