# ANCHORED MASONRY VENEER CODE REFERENCES

- *2010 CBC – Chapters 14, 17, 17A*
- *2008 MSJC (TMS 402-08/ACI 530-08/ASCE 5-08) – Chapter 6*
- *2008 SMS (Specification for Masonry Structures TMS 602-08/ACI 530.1-08/ASCE 6-08)*

## DEFINITIONS:

**CBC:**
Section 1402.1

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

**ANCHORED MASONRY VENEER.** Veneer secured with approved mechanical fasteners to an approved backing.

**ADHERED MASONRY VENEER.** Veneer secured and supported through the adhesion of an approved bonding material applied to an approved backing.

**NOTE: Typical cmu as manufactured cannot meet the weight requirements for adhered veneer. Please contact your representative for more information.**

**MSJC:**
Section 1.6

*Veneer, masonry* — A masonry wythe that provides the exterior finish of a wall system and transfers out-of-plane load directly to a backing, but is not considered to add load resisting capacity to the wall system.

*Veneer, anchored* — Masonry veneer secured to and supported laterally by the backing through anchors and supported vertically by the foundation or other structural elements.

## PERFORMANCE REQUIREMENTS

**CBC:**
Section 1403.2

**Weather protection.** Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing, as described in Section 1405.4. The exterior wall envelope shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a water-resistive barrier behind the exterior veneer, as described in Section 1404.2, and a means for draining water that enters the assembly to the exterior.

Exception: a weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapters 19 [Concrete] and 21 [Masonry], respectively.

**MSJC:**
Section 6.1.6.1

**General design requirements.** Design and detail the backing system of exterior veneer to resist water penetration. Exterior sheathing shall be covered with a water-resistant membrane, unless the sheathing is water resistant and the joints are sealed.

6.1.6.2

Design and detail flashing and weep holes in exterior veneer wall systems to resist water penetration into the building interior. Weepholes shall be at least 3/16 in. (4.8 mm) in diameter and spaced less than 33 in. (838 mm) on center.

6.1.6.3

Design and detail the veneer to accommodate differential movement.

**CBC:**
Section 1403.3

**Structural.** Exterior walls, and the associated openings, shall be designed and constructed to resist safely the superimposed loads required by Chapter 16 [Structural Design].

**CBC:**
Section 1403.4

**Fire resistance.** Exterior walls shall be fire-resistance rated as required by other sections of this code with opening protection as required by Chapter 7 [Fire-Resistant-Rated Construction].

## MATERIALS

**CBC:**
Section 1404.2

**Water-resistive barrier.** A minimum of one layer of No.15 asphalt felt shall be attached to the studs or sheathing, with flashing as described in Section 1405.3, in such a manner as to provide a continuous water-resistive barrier behind the exterior wall veneer

**CBC:** Section 1404.4

**Masonry.** Masonry units, mortar and metal accessories used in anchored veneer shall meet the physical requirements of Chapter 21. The backing of anchored veneer shall be of concrete, masonry, steel framing or wood framing.

**MSJC:** Section 6.2.2.2

**Prescriptive requirements for anchored masonry veneer.** Anchors must comply with Section 6.2.2.5 *Anchor requirements* (see below) and Article 2.4 of TMS 602/ACI 530.1/ASCE 6.

**SMS:** Article 2.4

**Reinforcement, prestressing tendons, and metal accessories.** References ASTM standards for various types of reinforcement, anchors, and ties.

**SMS:** Article 2.4 F

**Coatings for corrosion protection.**

Carbon steel joint reinforcement, ties, and anchors must be galvanized or epoxy coated.

**CMU Requirements:**

| | For Anchored Masonry Veneer | |
|---|---|---|
| Minimum cmu thickness: | 2.625 in. | CBC Table 1405.2<br>MSJC 6.2.2.4 |
| Maximum weight: | None, except interior use on wood framing – max weight is 40 lb/sq ft (35.5 lbs for an 8x16 face) | MSJC 6.2.2.3.1.4 |
| | Exterior installed on wood limited to 40 lb/sq ft and height of 12 ft max. | MSJC 6.2.2.3.1.5 |

**Anchor Requirements:**

| Anchor Type | Size/Width | Thickness | Other | MSJC |
|---|---|---|---|---|
| Corrugated sheet-metal | 7/8 in. min. | 0.03 in. | Wavelength 0.3 – 0.5 in.<br>Amplitude 0.06 to 0.10 in. | 6.2.2.5.1.1 |
| Sheet-metal | 7/8 in. min. | 0.06 in. | Corrugations above, or bent, notched, or punched for equivalent performance | 6.2.2.5.2.1 |
| Wire | W1.7 min. | - | Ends bent and min. 2 in. extension | 6.2.2.5.3.1 |
| Joint reinforcement – ladder-type or tab-type | W1.7 min. | - | Cross wires spaced 16 in. o.c. max. | 6.2.2.5.4.1 |
| Adjustable | Sheet-metal and wire components to meet respective requirements above. Pintle anchors shall have at least 2 legs of W2.8 wire, each with 1.25 in. max offset | | | 6.2.2.5.5.1<br>6.2.2.5.5.4 |

**INSTALLATION**

**CBC:** Section 1405.4

**Flashing.** For masonry, flashing shall be installed in such a manner so as to prevent moisture from entering the wall or to redirect it to the exterior. Flashing shall be installed at the perimeters of exterior door and window assemblies, penetrations and terminations of exterior wall assemblies, exterior wall intersections with roofs, chimneys, porches, decks, balconies and similar projections and at built-in gutters and similar locations where moisture could enter the wall. Flashing with projecting flanges shall be installed on both sides and the ends of copings, under sills and continuously above projecting trim.

Flashing and weepholes shall be located in the first course of masonry above finished ground level above the foundation wall or slab, and other points of support, including structural floors, shelf angles and lintels for anchored veneers.

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| **CBC:** Section 1405.6 | **Anchored masonry veneer.** CBC refers to MSJC Sections 6.1 General and 6.2 Anchored veneer for design and detailing requirements (see below). |
| **CBC:** Section 1405.6.2 | **Seismic requirements.** Anchored masonry veneer in Seismic Design Category (SDC) C, E, or F must meet the requirements of MSJC 6.2.2.10 [Requirements in seismic areas] (see below). SDC D must meet MSJC requirements for SDCs E or F. |
| **CBC** Section 1409.1 | **General.** Anchored or adhered veneer shall not be used on overhead horizontal surfaces. |
| **MSJC:** Section 6.2.1 | **Anchored veneer. Alternative design of anchored masonry veneer.** May be designed rationally to meet criteria of 6.2.1 *Alternative design of anchored masonry veneer*, or the more common approach of detailing by 6.2.2 *Prescriptive requirements for anchored masonry veneer*. |
| **MSJC:** Section 6.2.2.1 | **Prescriptive requirements for anchored masonry veneer.** Prescriptive requirements shall not be used where the basic wind speed exceeds 110 mph per ASCE 7. Where basic wind speeds exceed 110 mph up to 130 mph, see Section 6.2.2.11 *Requirements in areas of high winds*. |
| **MSJC:** Section 6.2.2.3.1 | **Vertical support of anchored masonry veneer.**<br>Weight of veneer shall be supported by concrete, masonry, or other noncombustible structural supports, except: |
| 6.2.2.3.1.1 | Anchored veneer may be supported by preservative-treated wood foundation. Height of veneer shall not exceed 18 ft above such support. |
| 6.2.2.3.1.4 | For interior anchored veneer on wood framing, the weight of the veneer shall not exceed 40 lbs/ft$^2$. |
| 6.2.2.3.1.5 | For exterior anchored veneer with installed weight of 40 lbs/ft$^2$ or less and height not exceeding 12 ft, support by wood construction is permitted. |
| 6.2.2.3.1.2 | Anchored veneer on noncombustible foundation but supported by wood backing shall not exceed 30 ft at plate, or 38 ft at gable. |
| 6.2.2.3.1.3 | If anchored veneer on noncombustible foundation but supported by cold-formed steel framing exceeds 30 ft at plate, or 38 ft. at gable, veneer must be supported by noncombustible construction for each story above those heights. |
| 6.2.2.3.1.5, 6.2.2.3.2, 6.2.2.3.3 | Supporting horizontal spans or floors shall be designed so that deflection due to dead plus live loads does not exceed *l*/600 or 0.3 in. |
| **MSJC:** Section 6.2.2.5.1.2 6.2.2.5.2.2 6.2.2.5.3.2 | **Anchor requirements**.<br>For solid cmu, corrugated sheet-metal, sheet-metal, and wire anchors shall be embedded into the mortar joint and extend into the veneer a min. of 1 1/2 in., with min. 5/8 in cover to outside face. |
| 6.2.2.5.4.2 | For joint reinforcement, the longitudinal wires shall have minimum 5/8 in. mortar cover on each side. |
| 6.2.2.5.5.2 | For adjustable anchors, max. clearance between connecting parts of the tie is 1/16 in. |

**MSJC:** Section 6.2.2.5.6.1 **Anchor spacing.**

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|---|---|---|
| 6.2.2.5.6.1 | Max. area: | 2-pc. Adjustable – 2.67 $ft^2$ |
| 6.2.2.5.6.2 | | Others – 3.5 $ft^2$ |
| 6.2.2.10.2 | | Seismic Design Category D – Reduce above to 75 percent. |
| 6.2.2.11(a) | | High winds areas (>110 mph ≤ 130 mph) – Reduce above to 70 percent. |
| 6.2.2.5.6.3 | Max. horiz: | 32 in. for running bond, not to exceed max area. |
| 6.2.2.9 | | Other than running bond – 18 in. |
| 6.2.2.11(b) | | High winds areas (>110 mph ≤ 130 mph) – 18 in. |
| 6.2.2.5.6.3 | Max. vert: | 25 in., not to exceed max area. |

**MSJC:** Section 6.2.2.5.6.4 For openings larger than 16 in. either direction, provide additional anchors around perimeter at max. of 3 ft o.c., within 12 in. of opening

6.2.2.11(c) High wind areas: Additional anchors around perimeter at max. of 2 ft o.c., within 12 in. of opening.

**MSJC:** Section 6.2.2.10.3.3 **Requirements in seismic areas. SDC E and F. Joint reinforcement spacing.**

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|---|---|---|
| 6.2.2.10.3.3 | Max. vert: | Seismic Design Categories E and F – 18 in. and mechanically attached to anchors. |

**MSJC:** Section **Masonry veneer anchored to…backing[1].** Space between backing and inside face of the veneer:

| | [1]Backing: | Min. specified air space*: | Max. distance: |
|---|---|---|---|
| 6.2.2.6.3 | Wood | 1 in. | 4.5 in.<br>1 in. for corrugated anchors |
| 6.2.2.7.4, 6.2.2.8.2 | Steel, masonry, or concrete | 1 in. | 4.5 in. |

* MSJC Commentary to Section 6.1.6 *General Design Requirements* addresses the practical difficulty of maintaining a mortar-free 1 in. space. It suggests a wider air space, a vented air space, or use of the rain screen principle.

**SPECIAL INSPECTION FOR SEISMIC RESISTANCE**:

**CBC:** Section 1707.6 **Architectural components.** Periodic special inspection is required during the erection and fastening of interior and exterior veneer in structures assigned to Seismic Design Category D, E, or F.

**Exceptions:**

1. Not required in structures 30 feet or less above grade or walking surface.

**CBC:** Section 1707A.6 **Architectural components.** Periodic special inspection is required during the erection and fastening of interior and exterior veneer in structures assigned to Seismic Design Category D, E, or F.