ANCHORED MASONRY VENEER CODE REFERENCES

- **CBC**: *2022 CBC – Chapters 14 and 17*
  2022 CBC – Chapter 17A (Modified for DSA, OSHPD 1 & 4)
- **TMS 402**: *TMS 402 – 2016 Building Code Requirements for Masonry Structures*
- **TMS 602**: *TMS 602 – 2016 Specification for Masonry Structures*

DEFINITIONS

CBC:	202	**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.
TMS 402:	2.2	*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 and PRESCRIPTIVE REQUIREMENTS

CBC:	1402.2	**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 1404.4. 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 1403.2, and a means for draining water that enters the assembly to the exterior. Protection against condensation in the exterior wall assembly per Section 1404.3. 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.
TMS 402:	12.1.1.1	**General.** Provisions of the following apply to anchored veneer, with exclusions: TMS 402 Part 1 [General Requirements], excluding 1.2.1(c) [Specified compressive strength] 1.2.2 [designed based on specified compressive strength] TMS 402 Chapter 4 [General Analysis and Design Considerations], excluding: 4.1 [Loading] 4.3 [Section properties] TMS 402 Chapter 6 [Reinforcement, Metal Accessories, and Anchor Bolts]
	12.1.1.2	TMS 402 Section 4.5 [Masonry not laid in running bond] shall not apply.

	12.1.1.3	The following TMS 602 articles shall not apply to anchored veneer: 1.4 A [*Compressive strength requirements*] 1.4 B [*Compressive strength determination*] 3.4 B [*Reinforcement*] 3.4 C [*Wall ties*] 3.4 F [*Glass unit masonry panel anchors*]
	12.1.2	*Design of anchored veneer.* Meet the requirements of Section 12.1.6, and either designed rationally by Section 12.2.1 or detailed by the prescriptive requirements of Section 12.2.2.
	12.1.6.1	*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.
	12.1.6.2	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.
	12.1.6.3	Design and detail the veneer to accommodate differential movement.
	12.2.2.1	*Prescriptive requirements for anchored masonry veneer.* Prescriptive requirements shall not be used where the velocity pressure, q_z, exceeds 40 psf per ASCE 7. See TMS 402 Section 12.2.2.11 *Requirements in areas of high winds*.
	12.2.2.2	Anchors must comply with Section 12.2.2.5 *Anchor requirements* (see below) and Article 2.4 of TMS 602.
	12.2.2.3.1	*Vertical support of anchored masonry veneer.* Weight of veneer shall be supported by concrete, masonry, or other noncombustible structural supports except as permitted:
	12.2.2.3.1.1	*Preservative-treated wood.* Anchored veneer may be supported by preservative-treated wood foundation. Height of veneer shall not exceed 18 ft above such support.
	12.2.2.3.1.2	*Exterior veneer supported on wood construction. Installed weight of 40 psf (195 kg/m2) or less and height of 12 ft (3.7 m) maximum is permitted to be supported on wood construction. A vertical movement joint in the masonry veneer shall be used to isolate the veneer supported by wood from that supported* by the foundation. Masonry is not to be in direct contact with wood.
	12.2.2.3.1.3	*Interior veneer supported on wood construction.* Anchored veneer as an interior finish on wood framing shall have a weight of 40 psf (195 kg/m^2) or less.
	12.2.2.3.2	*Lintels.* Provide noncombustible lintels or supports attached to noncombustible framing over openings. Lintels shall have a length of bearing not less than 4 in. (102 mm).
	12.2.2.3.3	*Deflection of horizontally spanning support members.* Horizontally spanning members supporting anchored veneer shall be designed so deflection does not exceed l/600.
	12.2.2.6.1	Anchored veneer with a backing of wood framing shall not exceed 30 ft., or 38 ft. at a gable, in height above its support.
	12.2.2.7.1	If anchored veneer with a backing of steel framing exceeds 30 ft., or 38 ft. at a gable, in height above its support, the weight of the veneer shall be supported by noncombustible construction at each story above 30 ft. in height.
CBC:	1402.3	**Structural.** Exterior walls, and the associated openings, shall be designed and constructed to resist safely the superimposed loads required by Chapter 16 [Structural Design].
	1402.4	**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:	1403.2	**Water-resistive barrier**. A minimum of one layer of listed barriers shall be attached to the studs or sheathing, with flashing as described in Section 1404.4, in such a manner as to provide a continuous water-resistive barrier behind the exterior wall veneer. Water-resistive barriers shall comply with one of the following: No. 15 felt, ASTM D226, Type I, ASTM E2556, Type I or II, ASTM E331 in accordance with Section 1402.2, or Other approved,

		installed per manufacturer.
	1403.4	**Masonry.** Masonry units, mortar and metal accessories used in exterior 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. Continuous insulation shall be permitted between the backing and masonry veneer.
TMS 602:	2.4	**Reinforcement, prestressing tendons, and metal accessories.** References ASTM standards for various types of reinforcement, anchors, and ties.
	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 1404.2 TMS 402 12.2.2.4
Maximum weight:	Exterior installed on wood limited to 40 psf and height of 12 ft max.	TMS 402 12.2.2.3.1.2
	Interior use on wood framing – max installed weight is 40 psf	TMS 402 12.2.2.3.1.3

Anchor Requirements:

Anchor Type	Size/Width	Thickness	Other	TMS 402
Corrugated sheet-metal	7/8 in. min.	0.03 in.	Wavelength 0.3 – 0.5 in. Amplitude 0.06 to 0.10 in.	12.2.2.5.1.1
Sheet-metal	7/8 in. min.	0.06 in.	Corrugations above, or bent, notched, or punched for equivalent performance	12.2.2.5.2.1
Wire	W1.7 min.	-	Ends bent and min. 2 in. extension	12.2.2.5.3.1
Joint reinforcement – ladder-type or tab-type	W1.7 min. W2.8 if air space > 4.625 in.	-	Cross wires spaced 16 in. o.c. max.	12.2.2.5.4.1
Adjustable	Sheet-metal and wire components to meet respective requirements above. Pintle anchors shall have one or more pintle legs of W2.8 wire, each with 1.25 in. max offset			12.2.2.5.5.1 12.2.2.5.5.4

INSTALLATION

CBC:	1404.4	**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. Self-adhered flashings shall comply with AAMA 711. Fluid applied membranes shall comply with AAMA 714.
	1404.4.2	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.
CBC:	1404.6	**Anchored masonry veneer.** CBC refers to TMS 402 Sections 12.1 [General] and 12.2 [Anchored] veneer for design and detailing requirements (see below).
	1404.6.2	**Seismic requirements.** Anchored masonry veneer in Seismic Design Category (SDC) C, D, E, or F must meet the requirements of TMS 402 12.2.2.11 [Requirements in seismic areas] (see below).
CBC:	1410.1	[**DSA-SS, DSA-SS/CC, OSHPD 1 &4] Additional Requirements. General.** Anchored or adhered veneer shall not be used on overhead horizontal surfaces.

TMS 402:	12.2.2.5.1.2 12.2.2.5.2.2 12.2.2.5.3.2	*Anchor requirements.* (See also Anchor Requirements chart above.) 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.
	12.2.2.5.4.2	For joint reinforcement, the longitudinal wires shall have minimum 5/8 in. mortar cover on each side.
	12.2.2.5.5.2	For adjustable anchors, max. clearance between connecting parts of the tie is 1/16 in.

Anchor spacing.

TMS 402:	12.2.2.5.6.1	Max. area:	2-pc. Adjustable, anchors of wire size W1.7, and 22-gage corrugated – 2.67 ft^2
	12.2.2.5.6.2		Others – 3.5 ft^2
	12.2.2.11.2.2		Seismic Design Category D – Reduce to 75 percent of above.
	12.2.2.12 (a)		High winds areas (>40 psf ≤ 55 psf) – Reduce to 70 percent of above.
	12.2.2.5.6.3	Max. horiz:	32 in. for running bond, not to exceed max area above.
	12.2.2.12 (b)		High winds areas (>40 psf ≤ 55 psf) – 18 in.
	12.2.2.5.6.3	Max. vert:	25 in., not to exceed max area above.
	12.2.2.10		Other than running bond – joint reinforcement at 18 in.

TMS 402:	12.2.2.5.6.4	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
	12.2.2.12 (c)	High wind areas: Additional anchors around perimeter at max. of 2 ft o.c., within 12 in. of openings greater than 16 in.

Masonry veneer anchored to…backing. Space between backing and inside face of the veneer:

TMS 402:	12.2.2.6.4 12.2.2.9.2	Backing:	Min. specified air space*:	Max. distance:
		Wood or masonry	1 in.	6.625 in. for adjustable anchors 4.625 in. for other anchors
	12.2.2.7.5 12.2.2.8.2	Steel or concrete	1 in.	6.625 in.

* MSJC Commentary to Section 12.1.6 *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:	1705.4.1	**…masonry veneer in Risk Category IV.** Special inspections and tests for masonry veneer designed per Chapter 14 and part of a structure classified as Risk Category IV performed per TMS 602 Level 2. *Not permitted by OSHPD.*
CBC:	1705A.4.1 1705.4.1 for OSHPD 1R, 2 & 5	**…masonry veneer in Risk Category II, III, or IV.** Special inspections and tests for masonry veneer designed per Chapter 14 and part of a structure classified as Risk Category II, III, or IV performed per TMS 602 Tables 3 and 4, Level 2 Quality Assurance.