Masonry Veneer Manufacturers Association

COMMUNICATIONS BULLETIN

Complying with the 2007 California Building Code

Purpose
The purpose of this technical bulletin is to serve as a guide for assisting with complying with 2007 California Building Code (CBC) prescriptive and performance requirements for **Adhered Concrete Masonry Veneer** (ACMV) products.

Note: Terms in **bold** can be found in *Terminology* on pages 4 & 5.

Background
ACMV products are manufactured, precast, stone veneers. They are similar in color and texture to natural stone and are used as a non-bearing exterior veneer or an interior finish and trim on concrete or masonry walls, wood stud walls, and light gage steel stud walls or metal buildings.

General Installation
ACMV shall be installed in accordance with the manufacturer's installation instructions. In support of the product's installation instructions, many ACMV manufacturers maintain a code compliance evaluation report summarizing their product's performance to ICC Evaluation Service (ICC ES) Acceptance Criteria 51 (AC51) for Precast Stone Veneer. These reports commonly include information covering the product's thickness, weight, and mortar type to be used. In addition, this report includes other documentation and testing which supports complementary performance elements of the product, including general conditions of use allowed by the building codes.

2007 California Building Code
Previous to 2007, the California Building Code (CBC) was based on the Uniform Building Code. In 2007, the state adopted major revisions to its building code based on the 2006 International Building Code. This new building code became effective January 1, 2008 for all building jurisdictions in the state.

Among other things, the 2007 CBC sets minimum requirements for structural safety of buildings, including general installation criteria for brick and stone / masonry veneer materials. The CBC contains both *prescriptive* and *performance* requirements regarding acceptable materials and building practice and these provisions apply to all building types – buildings considered **residential** and those considered **nonresidential** / commercial type buildings.

However, for many **public type building structures**, whether they are considered a **residential** building type or a **nonresidential** building type, unique and different building code requirements may affect the construction requirements for ACMV. This is because public type buildings in the CBC fall into special provision authority of different state agencies governing their performance and safety (see Table 1 below).

Determining how building code requirements affect the installation of the ACMV is typically the building designer's role and documented on the building plans. For the CBC there are three basic code requirements affecting the use and installation criteria of ACMV:

- The building type and occupancy category which drives structural reinforcement and inspection with different requirements based on building type and occupancy hazard due to the risk of failure of the building during a catastrophic event, such as an earthquake.[1]
- Design considerations for seismic [earthquake] bracing.[2]
- Limits on the amount of specific wall coverings with different requirements based on building type and inspection.[3]

TABLE 1

Regulatory Authority for Public Type Building Structures

State Agency	Occupancy
Building Standards Commission (BSC)	Occupancies of the University of California
Corrections Standards Authority (CSA)	Local detention facilities
Department of Consumer Affairs (DCA)	Facilities for barbering, cosmetology, acupuncture, pharmacy, veterinary medicine, pest control.
Department of Food and Agriculture (DFA)	Dairies, places of meat and poultry processing
Department of Health Services (DHS)	Organized camps, laboratory animal quarters, swimming pools, food establishments
Department of Housing and Community Development (HCD)	Hotels, motels and lodging houses, apartment houses, dwellings, dormitories, condominiums, employee housing, factory built housing, mobile home parks
Division of the State Architect (DSA)	State and municipal buildings, publicly funded one- or two-family dwellings
Office of Statewide Health Planning and Development (OSHPD)	General acute care hospitals and psychiatric hospitals, nursing facilities, intermediate care facilities*

Note: Except skilled nursing and intermediate care facilities of single-story, Type V, wood or light steel-frame construction.[4]

Seismic Requirements

To describe a building's seismic design and construction requirements, the 2007 CBC requires determining the "seismic design category" (SDC) for the building. Applicable SDC's are A through F. The SDC is assigned to a structure based on its occupancy category (I, II, III, or IV; per 2007 CBC Table 1604A.5), the building's "site class" (A, B, C . . . F; a function of the soil profile, per 2007 CBC Section 1613A), the mapped seismic activity for the building's location (per 2007 CBC Section 1613A), and possibly other factors identified in the 2007 CBC. SDC A represents the lowest level of potential seismic hazard, and seismic hazard increases up through SDC F. Building code requirements on building size, materials, and seismic construction become more stringent with increased SDC. Note: "seismic design category" and "site class" are not synonymous. Both use the A, B, C . . . F designation but seismic design category relates to the structure whereas site class refers to the soil characteristics on which the structure is built.

The CBC structural provisions primarily address *engineered design requirements* used in detailed engineering calculations. However, the CBC also contains *prescriptive requirements* for wood light-frame construction.

- The CBC prescriptive design provisions apply to all wood light-frame buildings and limit the building's maximum height, but may include engineered design provisions depending upon building type.
  Note: Other building types must meet the engineered design requirements or reference standards of the CBC.
- In all SDC's, masonry, concrete, and steel frame wall construction is required to meet the engineered design requirements or reference standards of the CBC.
- The CBC prohibits use of prescriptive design in SDC F.

Installing Adhered Concrete Masonry Veneer

ACMV may be used without limitation on the exterior and interior of all buildings of wood-frame, light gage steel framed, or masonry walls up to a height of 30' *except* as noted below:[5]

Public Type Buildings Subject to DSA & OSHPD[6]

- Cannot be used on overhead horizontal surfaces.
- Where used over exit ways or more than 20' in height above adjacent ground elevation, installation must conform to method(s) required for **anchored veneer.**
- Bond strength as demonstrated by a minimum of two shear tests.
- A special inspection must be conducted for all adhered veneer products.

Installing ACMV on exterior walls and columns

Light-Frame Wood Construction, All Buildings

- In SDC A, B, C, D and E, ACMV may be used **without limitation** to the top of the basement.[7]
- In SDC A, B and C, ACMV may be used **without limitation** up to a height not exceeding the lesser of: through the first-story above grade, or through the second-story above grade, or 30' above the foundation. **Additional backing and bracing** requirements pertain.[8]
- In SDC B, ACMV may be used **without limitation** up to a height not exceeding the lesser of: through the second-story above grade; or through the first three-stories above grade, or 30' above the foundation. **Additional backing and bracing** requirements pertain.[9]
- In SDC B and C, ACMV may be used **without limitation** up to a height not exceeding the lesser of: through the second-story above grade or 30' above the foundation. **Additional backing and bracing** requirements pertain.[10]
- In SDC D, ACMV may be used **without limitation** up to a height not exceeding the lesser of: one-story above grade or 30' above the foundation. **Additional backing and bracing** requirements pertain.[11]

Average Wall Weight Method for All Buildings

- In SDC A, B, C, D and E, veneer covering a portion of the exterior wall area may be used provided the **average wall assembly weight** in any **wall line** does not exceed 15 psf (See Table 2).[12]

Installing ACMV on fireplaces and chimneys:

- In SDC A, B, C, D, and E, ACMV may be used on light-frame fireplace and chimney walls in accordance with the provisions discussed above. For use beyond these limits, contact the local building department for guidance.

Summary:

ACMV is an allowable material under the 2007 California Building Code. The extent of its use and area of coverage on the building is dependent on the building's intended use, construction type, and structural seismic requirements as required by the building code and summarized in this technical bulletin.

Terminology

Adhered concrete masonry veneer (ACMV)

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

Additional backing and bracing requirements pertain

These requirements may include some or all these construction items: wood structural panel bracing, increased length of minimum bracing, tie-downs, wood structural panel minimum fastening, prohibited cripple walls, and concrete or masonry walls at the lowest story. See cited footnote(s) for additional information.

Anchored [masonry] veneer

Veneer secured with approved mechanical fasteners to an approved backing.

Average wall assembly weight

To be calculated for each **wall line** at each story as follows: multiply each **wall assembly weight** (W, lb/ft^2) by the corresponding wall assembly surface area (A, ft^2), sum the products, and divide this sum by the sum of wall area (A, ft^2),

$$\text{Average wall assembly weight (psf)} = \frac{A_1 \times W_1 + \ldots + A_n \times W_n}{A_1 + \ldots + A_n}$$

Where: A_x = Area of wall line using assembly 'X' (ft^2)
W_x = Wall weight for assembly 'X' (lb/ft^2)

Detached one-and-two-family dwelling

A building or townhouse containing one or two dwelling units providing complete independent living facilities.

First story above grade

The lowest story having its finished floor surface entirely above grade except that a basement shall be considered the first story above grade where the finished surface of the floor above the basement is: (1) more than 6-feet above grade plane (a reference plane representing the average of the finished ground level adjoining the building at all exterior walls); (2) more the 6-feet above the finished ground level for more than 50 percent of the total building perimeter; or (3) more than 12-feet above finished ground level at any point. (Note: second and third stories above grade are identified based on this definition of the first story above grade).

Nonresidential building

Any building which is an Occupancy Classification of Group A, B, E, F, H, M, or S, or is a U Occupancy when the Group U Occupancy is on a nonresidential site. Occupancy Classification Groups are defined in Chapter 3 the 2007 California Building Code.

Public type building structure

A building of any occupancy regulated by a state agency (see Table 1).

Residential building

A building or townhouse of three stories or less containing one or two dwelling units providing complete independent living facilities (e.g., detached one-and-two-family dwelling)

Townhome or townhouse

Multiple single-family dwelling units constructed in a group of three or more attached units not more than three stories in height in which each unit extends from foundation to roof and with open space on at least two sides.

Veneer weight

Maximum installed weight 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 the table.

Wall line

An interior or exterior wall within a given story, with partial or complete coverage by the adhered concrete masonry veneer material. The wall line shall be in one plane, except that offsets out-of-plane of up to 4-feet shall be permitted provided that the total out-to-out dimension in any wall line is not more than 8-feet. The wall line will substantially correspond to the braced wall line as defined by the 2007 California Building Code.

Without limitation

This term means there are no limits on coverage of the wall area. All other code requirements must still be met. Note: depending on the weight of the installed ACMV, maximum wall assembly weight requirements may limit ACMV area coverage on the wall.

Wall assembly weight

Weight (lb/ft^2) of the ACMV system installed on the wall. This weight is obtained by summing the weight of the materials of the installed ACMV, including but not limited to finished materials on each side, structural sheathing, studs and insulation. The weight of lath and mortar is to be included where used in the ACMV installation.

Footnotes and 2007 California Building Code References

[1] Table 1604A.5
[2] Section 1613A
[3] Sections 1405.9, 1405.9.1, and 1408
[4] Section 110.1, Application
[5] Sections 1405.9 and 1405.9.1
[6] Section 1408
[7] Section 2308.11.2 and 2308.12.2
[8] Section 2308.11.2 Exception 2

- Second story above grade permitted where the lowest story has concrete or masonry walls

[9] Section 2308.11.2 Exception 1

- Two stories above grade permitted where wood structural panel wall bracing is used and bracing length is increased
- Three stories above grade permitted where the lowest story has concrete or masonry walls, wood structural panel and wall bracing is used, and bracing length is increased

[10] Section 2308.11.2 Exception 3

- Permitted in wood light-frame buildings without cripple walls and with specified bracing and hold down connectors

[11] Section 2308.12.2 Exception

- Permitted in wood light-frame buildings without cripple walls and with specified bracing and hold down connectors

[12] Section 2308.2, Item 3.1

- Average wall weight in any wall line is a recommended approach to application of this provision.

TABLE 2

Percent (%) Permitted Wall Coverage of Adhered Concrete Masonry Veneer[a]																	
		Wall Assembly Weight with Adhered Concrete Masonry Veneer (lb/ft^2)															
		15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Wall Assembly Weight without ACMV (lb/ft^2)	6	100.0	90.0	81.8	75.0	69.2	64.3	60.0	56.3	52.9	50.0	47.4	45.0	42.9	40.9	39.1	37.5
	7	100.0	88.9	80.0	72.7	66.7	61.5	57.1	53.3	50.0	47.1	44.4	42.1	40.0	38.1	36.4	34.8
	8	100.0	87.5	77.8	70.0	63.6	58.3	53.8	50.0	46.7	43.8	41.2	38.9	36.8	35.0	33.3	31.8
	9	100.0	85.7	75.0	66.7	60.0	54.5	50.0	46.2	42.9	40.0	37.5	35.3	33.3	31.6	30.0	28.6
	10	100.0	83.3	71.4	62.5	55.6	50.0	45.5	41.7	38.5	35.7	33.3	31.3	29.4	27.8	26.3	25.0
	11	100.0	80.0	66.7	57.1	50.0	44.4	40.0	36.4	33.3	30.8	28.6	26.7	25.0	23.5	22.2	21.1
	12	100.0	75.0	60.0	50.0	42.9	37.5	33.3	30.0	27.3	25.0	23.1	21.4	20.0	18.8	17.6	16.7
	13	100.0	66.7	50.0	40.0	33.3	28.6	25.0	22.2	20.0	18.2	16.7	15.4	14.3	13.3	12.5	11.8
	14	100.0	50.0	33.3	25.0	20.0	16.7	14.3	12.5	11.1	10.0	9.1	8.3	7.7	7.1	6.7	6.3

[a] For average wall assembly weight of 15 lb/ft^2

Instructions:

Step 1. Determine **wall assembly weight** without ACMV (lb/ft^2)

Step 2. Determine **wall assembly weight** with ACMV (lb/ft^2)*

Step 3. Locate **wall assembly weight** without ACMV (lb/ft^2) in yellow vertical column

Step 4. Locate **wall assembly weight** with ACMV (lb/ft^2)* in green horizontal row.

Step 5. Determine the permitted percentage of wall coverage using ACMV by locating the cell intersection of the wall weights determined in Steps 3 and 4.

*See manufacturer's product information for weight of ACMV.