

**CHAPTER 21A  
MASONRY**

Adopt and/or codify chapter as amended below:

PROPOSED ADOPTION	DSA-SS	DSA-SS/CC	Comments
Adopt entire chapter			
Adopt entire chapter as amended	<b>X</b>	-	
Adopt only those sections listed below			

*(All existing California amendments that are not revised below shall continue without change)*

**SECTION 2101A  
GENERAL**

**2101A.1 Scope.** This chapter shall govern the materials, design, construction and quality of masonry.

**2101A.1.1 Application.** *The scope of application of Chapter 21A is as follows:*

1. *Applications listed in Section 1.9.2.1 regulated by the Division of the State Architect-Structural Safety (DSASS). These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*
2. *(Reserved for OSHPD)*

**2101A.1.2 Amendments in this chapter.** *DSA-SS adopt this chapter and all amendments.*

**Exception:** *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

1. *Division of the State Architect-Structural Safety:*

[DSA-SS] For applications listed in Section 1.9.2.1.

2. **[Reserved for OSHPD]**

**2101A.1.3 Prohibition:** The following design methods, systems, and materials are not permitted by DSA-SS:

1. Unreinforced Masonry.
2. Autoclaved Aerated Concrete (AAC) Masonry.
3. Empirical Design of Masonry.
4. Adobe Construction.
5. Ordinary Reinforced Masonry Shear Walls.
6. Intermediate Reinforced Masonry Shear Walls.
7. Prestressed Masonry Shear Walls.
8. Direct Design of Masonry.

...

**2101A.2 Design methods.** Masonry shall comply with the provisions of TMS402/ACI 530/ASCE 5 or TMS 403 as well as applicable requirements of this chapter.

...

**SECTION 2102A  
DEFINITIONS AND NOTATIONS**

**2102.1 General.** The following terms are defined in Chapter 2, *except those defined below which shall, for the purposes of this chapter, have the meanings shown herein:*

...

**WALL. ...**

.....

**Hollow-unit Masonry Wall.** Type of construction made with hollow masonry units in which the units are laid and set in mortar, reinforced, and grouted, ~~solid, except as provided in Section 2114A.~~

...

**SECTION 2103A**  
**MASONRY CONSTRUCTION MATERIALS**

**2103A.1 Concrete masonry units.** Concrete masonry units, clay or shale masonry units, *and* glass unit masonry ~~and AAC masonry units~~ shall comply with Article 2.3 of TMS 602/ACI530.1/ASCE 6. Architectural cast stone shall conform to ASTM C 1364.

...

**2103A.3 Grout.** Grout shall comply with Article 2.2 of TMS 602/ACI 530.1/ASCE 6.

**2103A.3.1 ~~2103A.13.1~~ Water.** *Water content shall be adjusted to provide proper workability and to enable proper placement under existing field conditions, without segregation. The water content expressed on a saturated surface-dry basis shall not exceed 0.7 times the weight (mass) of cement.*

**2103A.3.2 ~~2103A.13.2~~ Selecting Proportions.** *Proportions of ingredients and any additives shall be based on laboratory or field experience with the grout ingredients and the masonry units to be used. Coarse grout proportioned by weight shall contain not less than 564 pounds of cementitious material per cubic yard (335 kg / m<sup>3</sup>).*

**2103A.3.3 ~~2103A.13.3~~ Aggregate.** *Coarse grout shall be used in grout spaces 2 inches (51 mm) or more in width and in all filled-cell masonry construction.*

...

**2103A.5 ~~2103A.15~~ Additives and Admixtures.**

**2103A.5.1 ~~2103A.15.1~~ General.** *Additives and admixtures to mortar or grout shall not be used unless approved by the enforcement agency.*

**2103A.5.2 ~~2103A.15.2~~ Antifreeze compounds.** Antifreeze liquids, chloride salts or other such substances shall not be used in mortar or grout.

**2103A.5.3 ~~2103A.15.3~~ Air entrainment.** Air-entraining substances shall not be used in mortar or grout unless tests are conducted to determine compliance with the requirements of this code.

## SECTION 2104A CONSTRUCTION

**2104A.1 Masonry construction.** Masonry construction shall comply with the requirements of Sections 2104A.1.1 and ~~2104A.1.2~~ through 2104A.1.3 and with TMS 602/ACI 530.1/ASCE 6.

...

### **2104A.1.3 ~~2104A.5~~ Grouted Masonry.**

**2104A.1.3.1 ~~2104A.5.1~~ General conditions.** Grouted masonry shall be constructed in such a manner that all elements of the masonry act together as a structural element. At the time of laying, all masonry units shall be free of dust and dirt. Prior to grouting, the grout space shall be clean so that all spaces to be filled with grout do not contain mortar projections greater than 1/4 inch (6.4 mm), mortar droppings and other foreign material. Grout shall be placed so that all spaces to be grouted do not contain voids.

Grout materials and water content shall be controlled to provide adequate fluidity for placement without segregation of the constituents, and shall be mixed thoroughly. Segregation of the grout materials and damage to the masonry shall be avoided during the grouting process.

Reinforcement and embedded items shall be clean, properly positioned and securely anchored against movement prior to grouting. Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent dislocation during grouting. Reinforcement, embedded items and bolts shall be solidly embedded in grout. Anchor bolts in the face shells of hollow masonry units shall be positioned to maintain a minimum of 1/2 in. of grout between the bolt and the face shell.

*The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.*

*Grout pours greater than 12 inches (300 mm) in height shall be consolidated by mechanical vibration during placement before loss of plasticity in a manner to fill the grout space, and reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours less than 12 inches in height may be puddled.*

*Between grout pours or where grouting has been stopped more than an hour, a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with the grout stopping a minimum of 1 1/2 inches (38 mm) below a mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of 1/2 inch (12.7 mm) below the top of the masonry.*

*Grout shall not be handled nor pumped utilizing aluminum equipment unless it can be demonstrated with the materials and equipment to be used that there will be no deleterious effect on the strength of the grout.*

**2104A.1.3.1.1 2104A.5.1.1 Reinforced grouted masonry.**

**2104A.1.3.1.1.1 2104A.5.1.1.1 General.** Reinforced grouted masonry is that form of construction made with clay or shale brick or made with solid concrete building brick in which interior joints of masonry are filled by pouring grout around reinforcement therein as the work progresses.

**2104A.1.3.1.1.1.1 2104A.5.1.1.1.1 Low-lift grouted construction.** Requirements for construction shall be as follows:

- 1. All units in the two outer wythes shall be laid with full-shoved head joint and bed mortar joints. Masonry headers shall not project into the grout space.*
- 2. The minimum grout space for low-lift grout masonry shall be 2 1/2 inches (64 mm). All reinforcement and wire ties shall be embedded in the grout. The thickness of the grout between masonry units and reinforcement shall be a minimum of one bar diameter.*

3. *One tier of a grouted reinforced masonry wall may be carried up 12 inches (305 mm) before grouting, but the other tier shall be laid up and grouted in lifts not to exceed one masonry unit in height. All grout shall be puddled with a mechanical vibrator or wood stick immediately after placing so as to completely fill all voids and to consolidate the grout. All vertical and horizontal steel shall be held firmly in place by a frame or suitable devices.*
4. *Toothing of masonry walls is prohibited. Racking is to be held to a minimum.*

**2104A.1.3.1.1.1.2 2104A.5.1.1.1.2 High-lift grouted construction.** *Where high-lift grouting is used, the method shall be subject to the approval of the enforcement agency. Requirements for construction shall be as follows:*

1. *All units in the two wythes shall be laid with full head and bed mortar joints.*
2. *The two wythes shall be bonded together with wall ties. Ties shall not be less than No. 9 wire in the form of rectangles 4 inches (102 mm) wide and 2 inches (51 mm) in length less than the overall wall thickness. Kinks, water drips, or deformations shall not be permitted in the ties. One tier of the wall shall be built up not more than 16 inches (406 mm) ahead of the other tier. Ties shall be laid not to exceed 24 inches (610 mm) on center horizontally and 16 inches (406 mm) on center vertically for running bond, and not more than 24 inches (610 mm) on center horizontally and 12 inches (305 mm) on center vertically for stack bond.*
3. *Cleanouts shall be provided for each pour by leaving out every other unit in the bottom tier of the section being poured or by cleanout openings in the foundation. The foundation or other horizontal construction joints shall be cleaned of all loose material and mortar droppings before each pour. The cleanouts shall be sealed after inspection and before grouting.*
4. *The grout space in high-lift grouted masonry shall be a minimum of 3 1/2 inches (89 mm). All reinforcement and wire ties shall be embedded in the grout. The*

*thickness of the grout between masonry units and reinforcement shall be a minimum of one bar diameter.*

*5. Vertical grout barriers or dams of solid masonry shall be built across the grout space the entire height of the wall to control the flow of the grout horizontally. Grout barriers shall not more than 30 feet (9144 mm) apart.*

*6. An approved admixture of a type that reduces early water loss and produces an expansive action shall be used in high-lift grout.*

*7. Grouting shall be done in a continuous pour in lifts not exceeding 4 feet (1219 mm). Grout shall be consolidated by mechanical vibration only, and shall be reconsolidated after excess moisture has been absorbed, but before plasticity is lost. The grouting of any section of a wall between control barriers shall be completed in one day, with no interruptions greater than one hour.*

**2104A.1.3.1.2 ~~2104A.5.1.2~~ Reinforced hollow-unit masonry.**

**2104A.1.3.1.2.1 ~~2104A.5.1.2.1~~ General.** Reinforced hollow-unit masonry is that type of construction made with hollow-masonry units in which cells are continuously filled with grout, and in which reinforcement is embedded. All cells shall be solidly filled with grout in reinforced hollow-unit masonry, ~~except as provided in Section 2114A.1.~~

**Exception:** ~~(Relocated from 2013 CBC 2114A.1)~~ Reinforced hollow-unit masonry laid in running bond used for freestanding site walls ~~fences and~~ or interior nonbearing non-shear wall ~~partitions~~ may be ~~of hollow-unit masonry construction~~ grouted only in cells containing vertical and horizontal reinforcement.

Construction shall be one of the two following methods: The low-lift method where the maximum height of construction laid before grouting is 4 feet (1220 mm), or the high-lift method where the full height of construction between horizontal cold joints is grouted in one operation. General requirements for construction shall be as follows:

- 1. Bond shall be provided by lapping units in successive vertical courses. Where stack bond is used in reinforced hollow-unit masonry, the open-end type of unit*

shall be used with vertical reinforcement spaced a maximum of 16 inches (406 mm) on center.

2. Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear unobstructed, continuous vertical cell measuring not less than 2 inches by 3 inches (51 mm by 76 mm), except the minimum cell dimension for high-lift grout shall be 3 inches (76 mm).
3. Grout shall be a workable mix suitable for placing without segregation and shall be thoroughly mixed. Grout shall be placed by pumping or an approved alternate method and shall be placed before initial set or hardening occurs. Grout shall be consolidated by mechanical vibration during placing and reconsolidated after excess moisture has been absorbed, but before workability is lost.
4. All reinforcement and wire ties shall be embedded in the grout. The space between masonry unit surfaces and reinforcement shall be a minimum of one bar diameter.
5. Horizontal reinforcement shall be placed in bond beam units with a minimum grout cover of 1 inch (25 mm) above steel for each grout pour. The depth of the bond beam channel below the top of the unit shall be a minimum of 1 1/2 inches (38 mm) and the width shall be 3 inches (76 mm) minimum.

**2104A.1.3.1.2.2 ~~2104A.5.1.2.2~~ Low-lift grouted construction.** Units shall be laid a maximum of 4 feet (1220 mm) before grouting. Grouting shall follow each 4 feet (1220 mm) of construction laid and shall be consolidated so as to completely fill all voids and embed all reinforcing steel. Horizontal reinforcement shall be fully embedded in grout in an uninterrupted pour.

**2104A.1.3.1.2.3 ~~2104A.5.1.2.3~~ High-lift grouted construction.** Where high-lift grouting is used, the method shall be approved by the enforcement agency. Cleanout openings shall be provided in every cell at the bottom of each pour of grout. Alternatively, if the course at the bottom of the pour is constructed entirely of inverted double open-end bond beam units, cleanout openings need only be provided for access to every reinforced cell at the bottom of each pour of grout. The cleanouts shall be sealed before grouting. An approved

admixture that reduces early water loss and produces an expansive action shall be used in the grout.

## SECTION 2105A QUALITY ASSURANCE

...

**2105A.2 Compressive Strength,  $f'_m$ .** *The specified compressive strength,  $f'_m$ , assumed in design shall be 1,500 psi (10.34 MPa) for all masonry construction using materials and details of construction required herein. Testing of the constructed masonry shall be provided in accordance with Section 2105A.5 [DSA-SS].*

**Exception: [DSA-SS]** *Subject to the approval of the enforcement agency, higher values of  $f'_m$  may be used in the design of reinforced grouted masonry and reinforced hollow-unit masonry. The approval shall be based on prism test results submitted by the architect or engineer which demonstrate the ability of the proposed construction to meet prescribed performance criteria for strength and stiffness. The design shall take into account the mortar joint depth. In no case shall the  $f'_m$  assumed in design exceed 3,000 psi (20.7 MPa).*

*Where an  $f'_m$  greater than 1,500 psi (10.34 MPa) is approved, the architect or structural engineer shall establish a method of quality control of the masonry construction acceptable to the enforcement agency which shall be described in the contract specifications. Compliance with the requirements for the specified compressive strength of masonry  $f'_m$  shall be provided using prism test method or unit strength method as amended in Section 2105A.3 in accordance with Section 2105A.2.2.1 or 2105A.2.2.2. Substantiation for the specified compressive strength prior to the start of construction shall be obtained by using prism test method in accordance with Section 2105A.2.2.2.2. Testing of the constructed masonry shall also be provided in accordance with Section 2105A.5.*

**2105A.3 ~~2105A.2.2.1.4~~ Mortar and grout tests.** *These tests are to establish whether the masonry components meet the specified component strengths. At the beginning of all masonry work, at least one test sample of the mortar ~~and grout~~ shall be taken on three successive working days and at least at one-week intervals thereafter. Samples of grout shall be taken for each mix design, each day grout is placed, and not less than every 5,000 square feet of masonry wall area. They shall meet the minimum strength requirement given in this code Sections 2103A.9 and 2103A.13 for mortar and grout. ~~respectively.~~ Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official. ~~or whenever in~~*

~~the judgment of the architect, structural engineer or the enforcement agency such tests are necessary to determine the quality of the material. When the prism test method of Section 2105A.2.2.2 is used during construction, the tests in this section are not required.~~

Test specimens for mortar and grout shall be made as set forth in ASTM C 1586 and ASTM C 1019.

**Exception:** For non-bearing non-shear masonry walls not exceeding total wall height of 12' above wall base, mortar test shall be permitted to be limited to those at the beginning of masonry work for each mix design.

**2105A.4 Masonry core testing. [OSHPD 1 & 4]** ~~Not less than two cores shall be taken from each building for each 5,000 square feet (465 m<sup>2</sup>) of the greater of the masonry wall area or the floor area or fraction thereof. The architect or structural engineer in responsible charge of the project or his/her representative or the inspector of record shall select the areas for sampling. The inspector of record approved agency shall perform or observe the coring of the masonry walls and sample locations shall be subject to approval of the registered design professional.~~

Cores samples shall comply with the following:

1. Cored no sooner than 7 days after grouting of the selected area;
2. ~~h~~ Be a minimum of 3-3/4" in nominal diameter; and
3. Sampled shall be taken in such a manner as to exclude any masonry unit webs, mortar joint, or and reinforcing steel. If all cells contain reinforcement, alternate core locations or means to detect void or delamination shall be selected by the registered design professional and approved by the building official.

Visual examination of all cores shall be made by an approved agency a laboratory acceptable to the building official and the condition of the cores reported as required by the California Administrative Code. One half of the number of cores taken shall be tested in shear 28 days after grouting of the sample area using a shear test apparatus acceptable to the enforcement agency. The shear test shall test both joints between the grout core and the outside wythes or face shell of the masonry. ~~Shear testing apparatus shall be of a design approved by the enforcement agency.~~ Core samples shall not be soaked before testing. Core samples to be tested shall be stored in sealed plastic bags or non-absorbent containers immediately after coring and for at least 5 days prior to testing. The average unit shear on the cross section of any three consecutive cores tested shall not be less than 2.5 √f<sub>m</sub> psi.

All cores shall be submitted to an approved agency the laboratory, acceptable to the building official, for examination, regardless of whether even where the core specimens failed during the cutting operation. The approved agency laboratory shall report the location where each core was taken, the findings of their visual examination of each core, identify which cores were selected for shear testing, and the results of the shear tests.

Exceptions:

1. Core sampling and testing is not required for non-bearing non-shear masonry walls, not exceeding total wall height of 12' above wall base, built with single-wythe hollow unit concrete masonry that attaches opposite face shells using webs cast as single unit, when designed using an  $f'_m$  equal to or less than 1500 psi (10.34 MPa).
2. An infrared thermographic survey or other nondestructive test procedures, shall be permitted to be approved as an alternative system to detect voids or delamination in grouted masonry in-lieu of core sampling and testing.

**2105A.5 Masonry core testing. [DSA-SS]** ~~Not less than two cores shall be taken from each building for each 5,000 square foot (465 m<sup>2</sup>) of the greater of the masonry wall area or the floor area or fraction thereof. The architect or structural engineer in responsible charge of the project or his/her representative or the inspector of record shall select the areas for sampling. Cores shall be a minimum of 33/4 inches (76mm) in diameter and shall be taken in such a manner as to exclude masonry unit webs and reinforcing steel. If vertical reinforcing steel is placed such that cores will include reinforcing steel, core testing may be waived by the design professional in responsible charge, as approved by the enforcement agency. The inspector of record shall observe the coring of the masonry walls.~~

~~Visual examination of all cores shall be made by a laboratory acceptable to the building official and the condition of the cores reported as required by the California Administrative Code. All cores taken shall be tested in shear. The shear test shall test both joints between the grout core and the outside wythes or face shell of the masonry. Shear testing apparatus shall be of a design approved by the enforcement agency. Core samples shall not be soaked before testing. The average unit shear on the cross section of all the cores shall not be less than  $2.5\sqrt{f'_m}$  psi.~~

~~All cores shall be submitted to the laboratory, acceptable to the building official, for examination, regardless of whether the outside wythe or face shells separated during the cutting operation. The laboratory shall report the location where each core was taken, the findings of their visual examination of each core, and the results of the shear tests.~~

## SECTION 2106A

## SEISMIC DESIGN

**2106A.1 Seismic design requirements for masonry.** Masonry structures and components shall comply with the requirements in Section 1.18 of TMS 402/ACI 530/ASCE 5 depending on the structure's *Seismic Design Category*.

**2106A.1.1 Modifications to TMS 402 / ACI 530 / ASCE 5.** *Modify TMS 402 / ACI 530 / ASCE 5 Section 7.4.4 4-18 as follows:*

**1. - Minimum reinforcement requirements for Masonry Walls** *The total area of reinforcement in reinforced masonry walls shall not be less than 0.003 times the sectional area of the wall. Neither the horizontal nor the vertical reinforcement shall be less than one third of the total. Horizontal and vertical reinforcement shall be spaced at not more than 24 inches (610 mm) center to center. The minimum reinforcing shall be No. 4, except that No. 3 bars may be used for ties and stirrups and wire shall be permitted for joint reinforcement. Vertical wall reinforcement shall have dowels of equal size and equal matched spacing in all footings. Reinforcement shall be continuous around wall corners and through intersections. Only reinforcement which is continuous in the wall shall be considered in computing the minimum area of reinforcement. Reinforcement with splices conforming to TMS 402 / ACI 530 / ASCE 5 as modified by Section 2107A and 2108A shall be considered as continuous reinforcement.*

*Horizontal reinforcing ~~ement~~ bars in bond beams shall be provided in the top of footings, at the top of wall openings, at roof and floor levels, and at the top of parapet walls. For walls 12 inches (nominal) (305 mm) or more in thickness, horizontal and vertical reinforcement shall be equally divided into two layers, except where designed as retaining walls. Where reinforcement is added above the minimum requirements, such additional reinforcement need not be so divided.*

*In bearing walls of every type of reinforced masonry, there shall be trim reinforcement of not less than one No. 5 bar or two No. 4 bars on all sides of, and adjacent to, every opening which exceeds 16 inches (406 mm) in either direction, and such bars shall extend not less than 48 diameters, but in no case less than 24 inches (610 mm) beyond the corners of the opening. The bars required by this paragraph shall be in addition to the minimum reinforcement elsewhere required.*

When the reinforcement in bearing walls is designed, placed and anchored in position as for columns, the allowable stresses shall be as for columns

~~Joint reinforcement shall not be used as principal reinforcement in masonry designed by the strength design method.~~

Where joint reinforcement is used as shear reinforcement, the requirements of TMS 402 / ACI 530 / ASCE 5 Sections 9.3.3.2.3 and 9.3.3.7 shall apply for all design methods.

**2. - Minimum reinforcement for masonry columns.** The spacing of column ties shall be as follows: not greater than 8 bar diameters, 24 tie diameters, or one half the least dimension of the column for the full column height. Ties shall be at least 3/8" in diameter and shall be embedded in grout. Top tie shall be within 2 inches (51 mm) of the top of the column or of the bottom of the horizontal bar in the supported beam.

**3. Lateral support.** Lateral support of masonry may be provided by cross walls, columns, pilasters, counterforts or buttresses where spanning horizontally or by floors, beams, girts or roofs where spanning vertically. Where walls are supported laterally by vertical elements, the stiffness of each vertical element shall exceed that of the tributary area of the wall.

**4. Anchor Bolts.** Bent bar anchor bolts shall not be allowed. The maximum size anchor shall be 1/2-inch (13 mm) diameter for 6-inch (152 mm) nominal masonry, 3/4-inch (19 mm) diameter for 8-inch (203 mm) nominal masonry, 7/8-inch (22 mm) diameter for 10-inch (254 mm) nominal masonry, and 1-inch (25mm) diameter for 12-inch (304.8 mm) nominal masonry.

## SECTION 2107A ALLOWABLE STRESS DESIGN

**2107A.1 General.** The design of masonry structures using *allowable stress design* shall comply with Section 2106A and the requirements of Chapters 1 and 2 of TMS 402/ACI 530/ASCE 5 except as modified by Sections 2107A.2 through 2107A.4 2107A.6.

...

**2107A.2 TMS 402/ACI 530/ASCE 5, Section 2.1.7.7.1.1, lap splices.** In lieu of Section 2.1.7.7.1.1, it shall be permitted to design lap splices in accordance with Section 2107A.2.1.

**2107A.2.1 Lap splices.** The minimum length of lap splices for reinforcing bars in tension or compression,  $l_d$ , shall be

$$l_d = 0.002d_b f_s \quad \text{(Equation 21A-1)}$$

For SI:  $l_d = 0.29d_b f_s$

but not less than 12 inches (305 mm). In no case shall the length of the lapped splice be less than 40 bar diameters, and need not be greater than 72 bar diameters.

where:

...

**2107A.5 Modify TMS 402 / ACI 530/ASCE 5 by adding Section 8.1.7 2-4-8 as follows:**

**8.1.7 2-4-8 - Walls and Piers.**

**Thickness of Walls.** For thickness limitations of walls as specified in this chapter, nominal thickness shall be used. Stresses shall be determined on the basis of the net thickness of the masonry, with consideration for reduction, such as raked joints.

The thickness of masonry walls shall be designed so that allowable maximum stresses specified in this chapter are not exceeded. Also, no masonry wall shall exceed the height or length-to-thickness ratio or the minimum thickness as specified in this chapter and as set forth in Table 2107A.5. ~~below.~~

**Piers.** Every pier or wall section which width is less than three times its thickness shall be designed and constructed as required for columns if such pier is a structural member. Every pier or wall section which width is between three and five times its thickness or less than one half the height of adjacent openings shall have all horizontal steel in the form of ties except that in walls 12 inches (305 mm) or less in thickness such steel may be in the form of hair-pins.

**TABLE 2107A.5 - MINIMUM THICKNESS OF MASONRY WALLS<sup>1, 2</sup>**

TYPE OF MASONRY	MAXIMUM RATIO UNSUPPORTED HEIGHT OR LENGTH TO THICKNESS <sup>2,3</sup>	NOMINAL MINIMUM THICKNESS (inches)
<b>BEARING OR SHEAR WALLS:</b>		
1. Stone masonry	14	16
2. Reinforced grouted masonry	25	6
3. Reinforced hollow-unit masonry	25	6
<b>NONBEARING WALLS:</b>		
4. Exterior reinforced walls	30	6
5. Interior partitions reinforced	36	4

<sup>1</sup>For walls of varying thickness, use the least thickness when determining the height or length to thickness ratio.

<sup>2</sup>In determining the height or length-to-thickness ratio of a cantilevered wall, the dimension to be used shall be twice the dimension of the end of the wall from the lateral support.

<sup>3</sup>Cantilevered walls not part of a building and not carrying applied vertical loads need not meet these minimum requirements but their design must comply with stress and overturning requirements.

**2107A.6 (reserved for OSHPD)**

**SECTION 2108A  
STRENGTH DESIGN OF MASONRY**

**2108.1 General.** The design of masonry structures using strength design shall comply with Section 2106 and the requirements of Chapters 1 and 3 of TMS 402/ACI 530/ASCE 5, except as modified by Sections 2108.2 through 2108.3.

**Exception:** AAC masonry shall comply with the requirements of Chapters 1 and 8 of TMS 402/ACI 530/ASCE 5.

...

**SECTION 2109A**

## EMPIRICAL DESIGN OF MASONRY

*Not permitted by DSA.*

**(Existing amendment deleting Section 2109 of IBC is retained and deleted Section 2109 is not shown here for clarity)**

### SECTION 2110A GLASS UNIT MASONRY

**2110A.1 General.** Glass unit masonry construction shall comply with Chapter 7 of TMS402/ACI 530/ASCE 5 and this section.

*Masonry of glass blocks walls or panels shall be designed for seismic forces. permitted in non-load-bearing exterior or interior walls and shall conform to the requirements of Section 2115A. Stresses in glass block shall not be utilized. Glass block may be solid or hollow and may contain inserts.*

...

### ~~SECTION 2114A~~ ~~NONBEARING WALLS~~

~~**2114A.1 General.** All nonbearing masonry walls shall be reinforced as specified in Section 2106A.1.1. Fences and interior nonbearing nonshear walls may be of hollow-unit masonry construction grouted in cells containing vertical and horizontal reinforcement. Nonbearing walls may be used to carry a superimposed load of not more than 200 pounds per linear foot (2.92 kN/m).~~

~~**1. Thickness.** Every nonbearing masonry wall shall be so constructed and have a sufficient thickness to withstand all vertical loads and horizontal loads, but in no case shall the thickness of such walls be less than the values set forth in Table 2107A.5.  
Plaster shall not be considered as contributing to the thickness of a wall in computing the height-to-thickness ratio.~~

**2. Anchorage.** All nonbearing walls shall be anchored as required by Sections 1604A.8.2 and ASCE 7 Chapter 13. Suspended ceilings or other nonstructural elements shall not be used to provide anchorage for masonry walls.

## **SECTION 2115A MASONRY SCREEN WALLS**

**2115A.1 General.** Masonry units may be used in nonbearing decorative screen walls. Units may be laid up in panels with units on edge with the open pattern of the unit exposed in the completed wall.

**1. Horizontal Forces.** The panels shall be capable of spanning between supports to resist the horizontal forces specified in Chapter 16A. Wind loads shall be based on gross projected area of the block.

**2. Mortar Joints.** Horizontal and vertical joints shall not be less than 1/4 inch (6 mm) thick. All joints shall be completely filled with mortar and shall be "shoved joint" work. The units of a panel shall be so arranged that either the horizontal or the vertical joint containing reinforcing is continuous without offset. This continuous joint shall be reinforced with a minimum of 0.03 square inch (19 mm<sup>2</sup>) of reinforcing steel and maximum spacing of 16 inches on center. Reinforcement may be embedded in mortar.

**3. Reinforcement.** Joint reinforcement may be composed of two wires made with welded ladder or trussed wire cross ties. In calculating the resisting capacity of the system, compression and tension in the spaced wires may be utilized. Ladder wire reinforcement shall not be spliced and shall be the widest that the mortar joint will accommodate, allowing 1/2 inch (13 mm) of mortar cover.

**4. Size of Panels.** The maximum size of panels shall be 144 square feet (13.4 m<sup>2</sup>), with the maximum dimension in either direction of 15 feet (4572 mm). The specified thickness of the units for exterior applications shall not be less than 3 7/8 inches.

**5. Panel Support.** Each panel shall be supported on all edges by a structural member of concrete, masonry or steel. Supports at the top and ends of the panel shall be by means of confinement of the masonry by at least 1 inch (25 mm) into and between the flanges of a steel channel. The space between the end of the panel and the web of the channel shall be filled with

~~resilient material. The use of equivalent configuration in other steel section or in masonry or concrete is acceptable.~~

**(All existing amendments, except where section is deleted in the model code, that are not revised above shall continue without any change)**

**NOTATION:**

Authority: Health and Safety Code Section 130005(g) & 130021

Reference: Health and Safety Code Section 1275, 129790, 129850 & 130005(g)

DRAFT