# FINAL EXPRESS TERMS FOR PROPOSED BUILDING STANDARDS OF THE DIVISION OF THE STATE ARCHITECT (DSA-SS AND DSA-SS/CC) REGARDING THE **2022 CALIFORNIA BUILDING CODE**,

# CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART **2**

# (DSA-SS/CC 05/21)

The State agency shall draft the regulations in plain, straightforward language, avoiding technical terms as much as possible and using a coherent and easily readable style. The agency shall draft the regulation in plain English. A notation shall follow the express terms of each regulation listing the specific statutes authorizing the adoption and listing specific statutes being implemented, interpreted, or made specific (Government Code Section 11346.2(a)(1)).

If using assistive technology, please adjust your settings to recognize symbols, underline, strikeout, highlight, italic and ellipsis.

## LEGEND for EXPRESS TERMS (Based on model codes - Parts 2, 2.5, 3, 4, 5, 9, 10)

* Model Code language appears upright
* Existing California amendments appear in *italic*
* Amended model code or new California amendments appear *underlined & italic*
* Repealed model code language appears ~~upright and in strikeout~~
* Repealed California amendments appear in *~~italic and strikeout~~*
* Ellipsis ( ...) indicate existing text remains unchanged
* Existing deletion: IBC model code language that was deleted in the previous Code Adoption Cycles is shown for clarity only. This language appears in ~~strikeout and highlight~~.
* Amendments to ACI 318 in Chapter 19 and Chapter 19A:  Model code contains some amendments to ACI 318 in Sections 1903 through 1905; this amendment language appears in *italics* in these sections.  Therefore, California amendment language in Sections 1903A through 1905A appears in *italics and underline*.
* Existing amendments in Chapter 19A: In sections 1903A through 1905A only, deletion of existing California amendment language appears in *~~italics, underline and strikeout.~~*  Select existing California amendment language in Sections 1903A through 1905A is shown for clarity only.  This existing California amendment language appears in *italics, underline and highlight*, in order to distinguish **existing** California amendments in these sections from **new** California amendments, which appear *underlined & italic.*
* Instructions:  Text which contains instructions only that are not amendments and will not be printed appears in upright text with highlight or *italic text with highlight.*

# FINAL EXPRESS TERMS

# Chapter 1 SCOPE AND ADMINISTRATION

**CHAPTER 1**

**SCOPE AND ADMINISTRATION**

Adopt Chapter 1 of the 2021 International Building Code (IBC) as amended below. All existing California amendments that are not revised below shall continue without change.

**…**

**SECTION 106**

**FLOOR AND ROOF DESIGN LOADS**

**…**

**106.1 Live loads posted**. In commercial*, institutional* or industrial buildings, for each floor or portion thereof designed for live loads exceeding 50 psf (2.40 kN/m2), such design live loads shall be conspicuously posted by the owner or the owner’s authorized agent in that part of each story in which they apply, using durable signs. It shall be unlawful to remove or deface such notices. *[****DSA-SS, DSA-SS/CC****] These posting requirements also apply to school and state-owned essential services buildings as regulated by DSA.*

**…**

**SECTION 110**

**INSPECTIONS**

**…**

***~~110.3.12 Types IV-A, IV-B and IV-C connection protection inspection.~~****~~Type IV-A, IV-B, and IV-C connection protection inspection. In buildings of Type IV-A, IV-B, and IV-C Construction, where connection fire resistance ratings are provided by wood cover calculated to meet the requirements of Section 2304.10.1.2, inspection of the wood cover shall be made after the cover is installed, but before any other coverings or finishes are installed.~~*

**…**

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and 81143; Health and Safety Code section 16017 and 16022

Reference(s): Education Code sections 17310 and 81143; Health and Safety Code section 16017

**Notation for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147

**…**

# Chapter 2 DEFINITIONS

**CHAPTER 2**

**DEFINITIONS**

Adopt Chapter 2 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

**…**

***~~EQUIPMENT. [DSA-SS, DSA-SS/CC]~~*** *~~Equipment as used in this part and all applicable parts~~**~~of the California Building Standards Code shall be classified~~**~~as fixed equipment, mobile or movable equipment.~~*

1. (Relocate DSA definition for ’fixed equipment’ to co-adopt with OSHPD as modified below) ***FIXED EQUIPMENT*** *includes items that are permanently ...*
2. (Relocate DSA definition for ’movable equipment’ to co-adopt with OSHPD as modified below) ***MOVABLE EQUIPMENT*** *means equipment, ...*
3. (Relocate DSA definition for ’mobile equipment’ to co-adopt with OSHPD as modified below) ***MOBILE EQUIPMENT*** *means equipment, ...*

***EQUIPMENT. [DSA-SS, DSA-SS/CC, OSHPD 1, 2, 4, & 5]*** *Equipment as used in this part and all applicable parts of the California Building Standards Code shall be classified as fixedequipment, mobile, movable, countertop, interim, temporary or other equipment.*

1. ***COUNTERTOP EQUIPMENT*** *means equipment that typically remains on countertop, work bench, shelf or support other than the floor during its service life.*
2. ***[DSA-SS, DSA-SS/CC] ESSENTIAL EQUIPMENT*** *means equipment that failure of which will significantly impair operations during or after a disaster, for emergency preparedness, communications and operations centers, and other facilities required for emergency response of state-owned essential services buildings, as defined in the California Administrative Code (Title 24, Part 1, CCR) Section 4-207 and all structures required for their continuous operation or access/egress.*
3. (Relocated ’fixed equipment’ from DSA definition above and modified as shown) ***FIXED EQUIPMENT*** *~~includes items that are permanently affixed to the building or permanently~~ means equipment**that is directly attached to the building or directly connected to a service distribution system/utility and that typically remains in one fixed location during its service life or use ~~that is designed and installed for the specific use of the equipment~~.*
4. ***INTERIM EQUIPMENT*** *means temporary equipment that will be in use greater than 180 days but only for the duration of the construction project that it is related to.* ***[DSA-SS and DSA-SS/CC]*** *Not adopted by DSA.*
5. (Relocated ’mobile equipment’ from DSA definition above and modified as shown) ***MOBILE EQUIPMENT*** *means equipment, with or without wheels or rollers, that is typically used in a different location than where it is stored and moved from one location in the building to another during ordinary use. ~~Mobile equipment includes items that require floor space or electrical and/or mechanical connections but are portable, such as wheeled items, portable items, office-type furnishings, and diagnostic or monitoring equipment.~~*
6. (Relocated ’movable equipment’ from DSA definition above and modified as shown) ***MOVABLE EQUIPMENT*** *means equipment that is directly attached to the building and/or directly connected to a service distribution system/utility, with or without wheels or rollers, that typically remains in one fixed location during its service life or use, but is required to be periodically moved to facilitate cleaning or maintenance.*
7. ***OTHER EQUIPMENT*** *means equipment that is not directly connected to a building service distribution system, with or without wheels or rollers, and is typically used at a single location during its service life.*
8. ***TEMPORARY EQUIPMENT*** *means fixed, movable, countertop, or other equipment that is used during replacement, maintenance, or repair for a time of service as defined in Section 108.* ***[DSA-SS and DSA-SS/CC]*** *Not adopted by DSA.*

***...***

***~~MASS TIMBER.~~*** *~~Structural elements of Type IV construction primarily of solid, built-up, panelized or engineered wood products that meet minimum cross section dimensions of Type IV construction.~~*

**…**

**WALL, LOAD-BEARING.** Any wall meeting either of the following classifications:

1. Any metal or wood stud wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition to its own weight.

2. Any masonry or concrete *~~or mass timber~~* or mass timber wall that supports more than 200 pounds per linear foot (2919 N/m) of vertical load in addition to its own weight.

**…**

**Notation** **for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147

# Chapters 3-10, 12, 14

**CHAPTER 3**

**USE AND OCCUPANCY CLASSIFICATION**

Adopt Chapter 3 of the 2021 IBC without amendment.

**CHAPTER 4**

**SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY**

Adopt Chapter 4 of the 2021 IBC without amendment.

**CHAPTER 5**

**GENERAL BUILDING HEIGHTS AND AREAS**

Adopt Chapter 5 of the 2021 IBC without amendment.

**CHAPTER 6**

**TYPES OF CONSTRUCTION**

Adopt Chapter 6 of the 2021 IBC without amendment.

**CHAPTER 7**

**FIRE AND SMOKE PROTECTION FEATURES**

Adopt Chapter 7 of the 2021 IBC without amendment.

**CHAPTER 8**

**INTERIOR FINISHES**

Adopt Chapter 8 of the 2021 IBC without amendment.

**CHAPTER 9**

**FIRE PROTECTION AND LIFE SAFETY SYSTEMS**

Adopt Chapter 9 of the 2021 IBC without amendment.

**CHAPTER 10**

**MEANS OF EGRESS**

Adopt Chapter 10 of the 2021 IBC without amendment.

**CHAPTER 12**

**INTERIOR ENVIRONMENT**

Adopt Chapter 12 of the 2021 IBC without amendment.

**CHAPTER 14**

EXTERIOR WALLS

Adopt Chapter 14 of the 2021 IBC with existing California amendments continued without change.

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310 and 81142, and Health and Safety Code section 16022

Reference(s): Education Code sections 17280 through 17317, and 81130 through 81147, and Health and Safety Code sections 16000 through 16023

**Notation for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147

# Chapter 15 ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

**CHAPTER 15**

**ROOF ASSEMBLIES AND ROOFTOP STRUCTURES**

Adopt Chapter 15 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

**…**

***1511.9*** (Formerly 1510.7.2 in 2019 CBC) ***Photovoltaic (PV) panel systems. [DSA-SS, DSA-SS/CC]*** *Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 or with both UL 61730-1 and UL 61730-2 and shall be installed in accordance with the manufacturer’s instructions.*

***~~1510.7.2.1~~ 1511.9.1 Installation.*** *Supports and attachments of photovoltaic panels to the roof structure, the panels, modules and components shall be designed for applied loads per this code, and shall comply with industry standards determined applicable by the enforcement agency. Seismic design requirements shall be determined from ASCE 7 Section 13.6.12. Wind design pressures shall be determined from ASCE 7 Section 29.4.3 or 29.4.4 using effective wind area per ASCE 7 Section 26.2. Calculations and drawings of the supports and attachments shall be submitted to the enforcement agency for review.*

…

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310 and 81142, and Health and Safety Code section 16022

Reference(s): Education Code sections 17280 through 17317, and 81130 through 81147, and Health and Safety Code sections 16000 through 16023

**Notation for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147

# Chapter 16 STRUCTURAL DESIGN

**CHAPTER 16**

**STRUCTURAL DESIGN**

Adopt Chapter 16 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

...

*1617.3.2 Alternative allowable stress design load combinations. Where the alternative allowable stress design load combinations of Section 1605.2 are used, each load combination shall be investigated with one or more of the variable loads set to zero.*

***~~1617.3.2~~ 1617.3.3 Modifications to load combinations in ICC 300.*** *Modify the text of ICC 300~~,~~ as follows:*

***1617.3.3.1 ICC 300, Section 303.5.2.*** *Modify Section 303.5.2 by adding Equation 3-5a as follows:*

*D + 0.4L + Z (Equation 3-5a)*

***~~1617.3.2.3~~ 1617.3.3.2 ICC 300, Section 303.5.3.*** *Modify Section 303.5.3 as follows:*

*The uniform live load L used in Equation 3-2 and 3-4 may be taken as zero when ...*

***1617.4 Roof dead loads.*** *The design dead load shall provide for the weight of at least one additional roof covering in addition to other applicable loadings if the new roof covering is permitted to be applied over the original roofing without its removal, in accordance with Section ~~1511~~ 1512.*

...

***1617.5.1.3*** ***~~Item 24. Reviewing stands, grandstands and bleachers~~****~~.~~* ***Item 4. Bleachers, folding and telescopic seating and grandstands****. The minimum uniform live load for a press box floor or accessible roof with railing is 100 psf.*

***1617.5.1.4 Item ~~35~~ 37. Yards and terraces, pedestrians.*** *Item ~~35~~ 37 applies to pedestrian bridges and walkways that are not subjected to uncontrolled vehicle access.*

***1617.5.1.5 Item ~~36~~ 38. Storage racks and wall-hung cabinets.*** *The minimum vertical design live load shall be as follows:*

*…*

***~~1617.5.1.6. Footnote c:~~*** *~~Modify Footnote c as follows:~~*

*~~c. Design in accordance with ICC 300 as amended by Section 1616.3.2 Modifications to Load Combinations in ICC 300.~~*

...

***1617.5.3 Seating for assembly uses.*** *Replace Section 1607.19 by the following:*

*Bleachers, folding and telescopic seating and grandstands shall be designed for the loads specified in ICC 300 as modified by Section 1617.3.3 load combinations. Stadiums and arenas with fixed seats shall be designed for the horizontal sway loads in Section 1607.19.1.*

***1617.6 Determination of snow loads [DSA-SS]*** *The ground snow load or the design snow load for roofs shall conform with the adopted ordinance of the city, county, or city and county in which the project site is located, and shall be approved by DSA.**See Section ~~106.1.1~~ 106.1.2 for snow load posting requirements.*   
...

***1617.9 Earthquake loads.***

***1617.9.1 Modifications to Table 1613.2.3(1).*** *Replace Table 1613.2.3(1) with Table 1613A.2.3(1).*

***1617.9.2 Modifications to Table 1613.2.3(2).*** *Replace Table 1613.2.3(2) with Table 1613A.2.3(2).*

***1617.9.~~1~~3 Seismic design category.*** *The seismic design category for a structure shall be determined in accordance with Section 1613.*

***1617.9.~~2~~4 Mapped acceleration parameters.*** *Seismic Design Category shall be determined in accordance with Section 1613.2.5.*

***1617.9.~~3~~5 Determination of seismic design category.*** *Structures not assigned to Seismic Design Category E or F, in accordance with Section 1613.2 shall be assigned to Seismic Design Category D.*

***1617.9.~~3~~5.1 Alternative seismic design category determination.*** *The alternative Seismic Design Category determination procedure of Section 1613.2.5.1 is not permitted by DSA-SS/CC.*

***1617.9.~~3~~5.2 Simplified design procedure.*** *The simplified design procedure of Section 1613.2.5.2 is not permitted by DSA-SS/CC.*

***1617.9.46 Ballasted photovoltaic panel systems.*** *Ballasted, roof-mounted photovoltaic panel systems shall comply with ASCE 7, Section 13.6.12.*

**...**

***1617.11.2 ~~Reserved.~~ ASCE 7, Section 11.4.*** *Modify ASCE 7, Section 11.4 to include the following:*

*Seismic ground motion values shall include updated subsections in Supplement 3.*

**…**

(Relocate Section 1617.11.4 to 1617.11.4.2)***1617.11.4 ASCE 7, Section 12.2.3.1.*** *Replace ASCE 7, Section 12.2.3.1, Items 1 and 2, ...*

***1617.11.4 ASCE 7, Section 12.2.3, 12.2.3.1, and 12.2.3.2.*** *Modify ASCE 7, Sections 12.2.3, 12.2.3.1, and 12.2.3.2 as follows:*

***1617.11.4.1 ASCE 7, Section 12.2.3.*** *Replace ASCE 7, Section 12.2.3 with the following:*

*Where different seismic force-resisting systems are used in combinations to resist seismic forces in the same direction, other than those combinations considered as dual systems, the design shall comply with the requirements of this section. The most stringent applicable structural system limitations contained in Table 12.2-1 shall apply, except as otherwise permitted by this section.*

(Relocated from 1617.11.4) ***1617.11.4.2 ASCE 7, Section 12.2.3.1.*** *Replace ASCE 7, Section 12.2.3.1, Items 1 and 2, by the following:*

*The value of the response modification coefficient, R, used for design at any story shall not exceed the lowest value of R that is used in the same direction at any story above that story. Likewise, the deflection amplification factor, Cd, and the system over strength factor, Ω0, used for the design at any story shall not be less than the largest value of these factors that are used in the same direction at any story above that story.*

***1617.11.4.3 ASCE 7, Section 12.2.3.2.*** *Modify ASCE 7, Section 12.2.3.2 by modifying Item a and adding Items f, g, and h, as follows:*

1. The stiffness of the lower portion shall be at least 10 times the stiffness of the upper portion. *For purposes of determining this ratio, the base shear shall be computed and distributed vertically according to Section 12.8. Using these forces, the stiffness for each portion shall be computed as the ratio of the base shear for that portion to the elastic displacement, δxe, computed at the top of that portion, considering the portion fixed at its base. For the lower portion, the applied forces shall include the reactions from the upper portion, modified as required in Item d.*
2. *The structural height of the upper portion shall not exceed the height limits of Table 12.2-1 for the seismic force-resisting system used, where the height is measured from the base of the upper portion.*
3. *Where Horizontal Irregularity Type 4 or Vertical Irregularity Type 4 exists at the transition from the upper to the lower portion, the reactions from the upper portion shall be amplified in accordance with Sections 12.3.3.3, 12.10.1.1, and 12.10.3.3 as applicable, in addition to amplification required by Item d.*
4. (Relocated from 1617.11.5, Item f) *Where design of vertical elements of the upper portion is governed by special seismic load combinations, the special loads shall be considered in the design of the lower portion.*

***1617.11.5 ~~ASCE 7, Section 12.2.3.2.~~****~~Modify ASCE 7 Section 12.2.3.2 by adding the following additional requirement:~~* ***Reserved.***

1. (Relocate Section 1617.11.5, Item f to 1617.11.4.3, Item h) *Where design of vertical elements ...*

**...**

***1617.11.9 ASCE 7, Section 12.3.3.1.*** *Modify first sentence of ASCE 7 Section 12.3.3.1 as follows:*

***12.3.3.1 Prohibited Horizontal and Vertical Irregularities for Seismic Design Categories D through F.*** *Structures assigned to Seismic Design Category E or F having horizontal structural irregularity Type 1b of Table 12.3-1 or vertical structural irregularities Type 1b, 5a or 5b of Table 12.3-2 shall not be permitted. Structures assigned to Seismic Design Category D having vertical irregularity Type 1b or 5b of Table 12.3-2 shall not be permitted.*

***~~Exception~~ Exceptions:***

*Structures with reinforced concrete or reinforced masonry shear wall systems and rigid or semi-rigid diaphragms, consisting of concrete slabs or concrete-filled metal deck having a span-to-depth ratio of 3 or less, having a horizontal structural irregularity Type 1b of Table 12.3-1 are permitted, provided the maximum story drift in the direction of the irregularity, computed including the torsional amplification factor from Section 12.8.4.3, is less than 10% of the allowable story drift in ASCE 7, Table 12.12-1.*

*Structures having a horizontal structural irregularity Type 1b of Table 12.3-1 are permitted, provided a redundancy factor, ρ, of 1.3 as defined in ASCE 7**, Section 12.3.4 is assigned to the seismic force-resisting system in both orthogonal directions and the structure is designed for one of the orthogonal procedures as defined in ASCE 7, Section 12.5.3.1.*

*...*

***~~1617.11.13 Reserved.~~***

(Relocated from 1617.11.14) ***1617.11.~~14~~13 ASCE 7, Section 12.13.1.*** *Modify ASCE 7, Section 12.13.1 by adding Section 12.13.1.1 as follows:*

…

(Relocate Section 1617.11.14 to 1617.11.13)***1617.11.14 ASCE 7, Section 12.13.1.*** *Modify ASCE 7, Section 12.13.1 by adding Section 12.13.1.1 as follows:*

…

***1617.11.14 ASCE 7, Section 12.13.9.2.*** *Modify ASCE 7, Section 12.13.9.2 by the following sentence added to the end of item b as follows:*

*Seismic load effects determined in accordance with Section 12.4 need not be considered in this check.*

***1617.11.15 ASCE 7, Section 13.1.4.*** *Replace ASCE 7, Section 13.1.4 with the following:*

***~~13.1.4 Exemptions.~~*** *~~The following nonstructural components are exempt from the requirements of this section:~~*

*~~Furniture except storage cabinets as noted in Table 13.5-1.~~*

*~~Temporary, moveable or mobile equipment.~~*

***~~Exceptions:~~***

1. *~~Equipment shall be anchored if it is permanently attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, “permanently attached” shall include all electrical connections except plugs for 110/220 volt receptacles having a flexible cable.~~*
2. *~~Movable or mobile equipment which is heavier than 400 pounds or has a center of mass located 4 feet (1.22 m) or more above the adjacent floor or roof level that directly support the component shall be restrained in a manner approved by the enforcement agency. Mobile equipment shall be restrained when not in use and is stored, unless the equipment is stored in a storage room that does not house hazardous materials or any facility systems or fixed equipment that can be affected by mobile equipment lacking restraint.~~*
   * + 1. *~~Discrete architectural, mechanical and electrical components and fixed equipment in Seismic Design Categories D, E, or F that are positively attached to the structure and anchorage is detailed on the plans, provided that either:~~*
   1. *~~The component weighs 400 pounds (1780 N) or less, the center of mass is located 4 feet (1.22 m) or less above the adjacent floor or roof level that directly support the component, and flexible connections are provided between the component and associated ductwork, piping and conduit.~~*

***~~Exception:~~*** *~~Special Seismic Certification requirements of this code in accordance with Section 1705A.12.3 shall be applicable.~~*

*~~or~~*

1. *~~The component weighs 20 pounds (89 N) or less or, in the case of a distributed system, 5 lb/ft (73 N/m) or less.~~*

***~~Exception:~~*** *~~The enforcement agency shall be permitted to require attachments for equipment with hazardous contents to be shown on construction documents irrespective of weight.~~*

***13.1.4.*** *The following nonstructural components and equipment shall be anchored in accordance with this section. Design and detailing shall be in accordance with Chapter 13 except as modified by this section.*

1. *Fixed Equipment: Equipment shall be anchored if it is directly attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, “directly attached” shall include all electrical connections except plugs for 110/220-volt receptacles having a flexible cable/cord. Equipment that is connected to the building plumbing system with a shut-off valve in proximity to the equipment shall not be considered as directly attached provided the inside diameter of the pipe/tubing is less than ½ inches.*
2. *Movable Equipment: Equipment is subject to the same requirement as fixed equipment, but is permitted to be anchored by re-attachable anchors or restraints in a manner approved by the enforcement agency. Utilities and services at the equipment shall have flexible connections to allow for necessary movement.*
3. *Mobile equipment: Equipment heavier than 400 lb. or has a center of mass located 4 ft. or more above the adjacent floor or roof level that directly support the equipment* *shall be restrained in a manner approved by the enforcement agency. Mobile equipment shall be restrained when not in use and is stored, unless the equipment is stored in a storage room that does not house hazardous materials or any facility systems or fixed equipment that can be affected by mobile equipment lacking restraint.*
4. *Countertop Equipment: Countertop Equipment shall be subject to the same anchorage or restraint requirements for fixed or movable equipment as applicable. Countertop equipment shall also be subject to the same requirements as mobile or other equipment if weight of equipment is greater than 100 lb. and has a center of mass located 4 ft. or more above the adjacent floor level or if equipment could fall and block a required means of egress.*
5. *Other Equipment: Equipment shall be anchored where any of the following apply:*
   1. *Weight of equipment is greater than 100 lb. and essential to operations for emergency preparedness, communications and operations centers and other facilities required for emergency response of state-owned essential, services buildings as defined in the California Administrative Code (Title 24, Part 1, CCR) Section 4-207 and all structures required for their continuous operation or access/egress.*
   2. *Could fall and block a required means of egress.*
   3. *Weight of equipment is greater than 400 lb. or center of mass is located greater than 4 ft. above the finished floor or roof level that directly supports the component.*
6. *Equipment with hazardous contents.*
7. *Other architectural, mechanical and electrical components stated in Chapter 13.*
8. *Wall, Roof or Floor Hung Equipment: Seismic design and seismic details shall be provided for wall, roof or floor hung nonstructural components and equipment when the component weighs more than 20 lb.*

***Exemptions:*** *The following nonstructural components are exempt from the requirements of ASCE 7 Chapter 13:*

1. *Furniture except storage cabinets as noted in Table 13.5-1.*
2. *Discrete architectural, mechanical and electrical components and fixed equipment that are positively attached to the structure, provided that none of the conditions in this section apply, and flexible connections are provided between the component and associated ductwork, piping and conduit where required.*

*...*

***1617.11.19 ASCE 7, Section 13.6.7.3*.** *Replace ASCE 7, Section 13.6.7.3 with the following:*

***13.6.7.3 Additional Provisions for Piping and Tubing Systems*.**

1. *Design for the seismic forces of Section 13.3 shall not be required for piping systems where flexible connections, expansion loops, or other assemblies are provided to accommodate the relative displacement between component and piping, where the piping system is positively attached to the structure, and where any of the following conditions apply:*
2. *Trapeze assemblies are supported by 3/8-inch (10 mm) or ½-inch (13 mm) diameter rod hangers not exceeding 12 inches (305 mm) in length from the pipe support point to the connection at the supporting structure, ~~do not support piping with I~~~~p~~ ~~greater than 1.0,~~ and no single pipe exceeds the diameter limits set forth in item 2b below or 2 inches (50 mm) ~~for Seismic Design Category D, E, or F~~ where Ip is greater than 1.0 and the total weight supported by any single trapeze is 100 pounds (445 N) or less; or*

…

***1617.11.20 ASCE 7, Section 13.6.11.1****. Modify ASCE 7, Section 13.6.11.1, by adding Section 13.6.11.1.1 as follows:*

***13.6.11.1.1 Elevators guide rail support.*** *The design of guide rail support-bracket fastenings and the supporting structural framing shall use the weight of the counterweight or maximum weight of the car plus not less than 40 percent of its rated load. The seismic forces shall be assumed to be distributed one third to the top guiding members and two thirds to the bottom guiding members of cars and counterweights, unless other substantiating data are provided. In addition to the requirements of ASCE 7, Section 13.6.11.1, the minimum seismic forces shall be 0.5g allowable stress design load acting in any horizontal direction.*

***1617.11.21 ASCE 7, Section 13.6.11.4.*** *Replace ASCE 7 Section 13.6.11.4, as follows:*

***13.6.11.4 Retainer plates.*** *Retainer plates are required at the top and bottom ...*

1. *The seismic force shall be computed per the requirements of ASCE 7 Section 13.6.11.1. The minimum horizontal acceleration shall be 0.5g allowable stress design load for all buildings.*

*...*

1. *With the car or counterweight located in the most adverse position, the stress in the rail shall not exceed the limitations specified in these regulations, nor shall the deflection of the rail relative to its supports exceed the deflection listed below ~~in Table 1224.4.11~~.*

(Relocated Table 1224.4.11 from below. Delete table number and title)

| ***RAIL SIZE***  ***(weight per foot***  ***of length,* pounds)** | ***WIDTH OF***  ***MACHINED***  ***SURFACE* (inches)** | ***ALLOWABLE RAIL DEFLECTION***  **(inches)** |
| --- | --- | --- |
| *...* | *...* | *...* |

*For SI: 1 inch = 25 mm, 1 foot = 305 mm, 1 pound = 0.454 kg.*

*Note: Deflection limitations are given to maintain a consistent factor of safety against disengagement of retainer plates from the guide rails during an earthquake.*

*...*

1. *Cab stabilizers and counterweight frames shall be designed to withstand computed lateral load with a minimum horizontal acceleration of 0.5g allowable stress design load.*

(Relocate Table 1224.4.11 to Section 1617.11.21 below Item 3. Delete table number and title)

***~~TABLE 1224.4.11~~***

***~~ALLOWABLE RAIL DEFLECTION~~***

***...***

**Notation:**

Authority: Education Code section 81053, and Health and Safety Code section 16022.

Reference(s): Education Code sections 81052, 81053, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

# Chapter 16A STRUCTURAL DESIGN

**CHAPTER 16A**

**STRUCTURAL DESIGN**

Adopt Chapter 16 of the 2021 IBC as Chapter 16A of the 2022 CBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

**1603*A*.1 General.** Construction documents shall show the size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603*A*.1.1 through ~~1603.1.9~~ *1603A.1.10* shall be indicated on the construction documents.

**Exception:** Construction documents for buildings constructed in accordance with the conventional light-frame construction provisions of Section 2308~~A~~ (Remove “A”) shall indicate the following structural design information:

…

**1604*A*.3.1 Deflections.** The deflections of structural members shall not exceed the more restrictive of the limitations of Sections 1604*A*.3.2 through ~~1604.3.5~~ *1604A.3.9* or that permitted by Table 1604*A*.3.

...

**TABLE 1604*A*.5  
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES**

| **RISK CATEGORY** | **NATURE OF OCCUPANCY** |
| --- | --- |
| … | … |
| IV | Buildings and other structures designated as essential facilities, including but not limited to:   * ~~Group I-2, Condition 2 occupancies having emergency surgery or emergency treatment facilities.~~ * …Designated emergency preparedness, communications and operations centers and other facilities required for emergency response ***[DSA-SS]*** *as defined in the California Administrative Code (Title 24, Part 1, CCR) Section 4-207 and all structures required for their continuous operation or access/egress.*   … |

…

1605*A.*2 (Formerly 1605A.3.2) Alternative allowable stress design load combinations. In lieu of the load combinations in ASCE 7, Section 2.4, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following combinations. Where using these alternative allowable stress load combinations that include wind or seismic loads, allowable stresses are permitted to be increased or load combinations reduced where permitted by the material chapter of this code or the referenced standards. For load combinations that include the counteracting effects of dead and wind loads, only two-thirds of the minimum dead load likely to be in place during a design wind event shall be used. Where using these alternative load combinations to evaluate sliding, overturning and soil bearing at the soil-structure interface, the reduction of foundation overturning from Section 12.13.4 in ASCE 7 shall not be used. Where using these alternative basic load combinations for proportioning foundations for loadings, which include seismic loads, the vertical seismic load effect, Ev, in Equation 12.4-4 of ASCE 7 is permitted to be taken equal to zero. Where required by ASCE 7, Chapters 12, 13 and 15, the load combinations including overstrength of ASCE 7, Section 2.3.6 shall be used. *Each load combination shall be investigated with one or more of the variable loads set to zero.*

...

***~~1605A.4~~ 1605A.3 Modifications to load combinations in ICC 300.*** *Modify the text of ICC 300~~,~~ as follows:*

***1605A.3.1 ICC 300, Section 303.5.2.*** *Modify Section 303.5.2 by adding Equation 3-5a as follows:*

*D + 0.4L + Z (Equation 3-5a)*

***~~1605A.4.3~~ 1605A.3.2 ICC 300, Section 303.5.3.*** *Modify Section 303.5.3 as follows:*

*The uniform live load L used in Equation 3-2 and 3-4 may be taken as zero when ...*

...

***1606A.~~3~~6 Roof dead loads.*** *The design dead load shall provide for the weight of at least one additional roof covering in addition to other applicable loadings if the new roof covering is permitted to be applied over the original roofing without its removal, in accordance with Section ~~1511~~ 1512.*

...

**TABLE 1607*A*.1  
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS AND MINIMUM CONCENTRATED LIVE LOADS~~g~~** (Delete footnote g)

| **OCCUPANCY OR USE** | | | **UNIFORM (psf)** | **CONCENTRATED**  **(pounds)** | **ALSO SEE SECTION** |
| --- | --- | --- | --- | --- | --- |
| … | … | | … | … | … |
| 4. | Assembly Areas*~~o, q~~,c, e*  (Delete footnotes o, q) | ... | ... | ... | ... |
| Bleachers, folding and telescopic seating and grandstands *g*  (Formerly footnote s) | 100a (See Section 1607*A*.19) |
| Stadiums and arenas with fixed seats (fastened to the floor) | 60a (See Section 1607*A*.19) |
| ... | ... |
| … | … | | … | … | … |
| 20. | Libraries*~~n~~* (Delete footnote n) | ... | ... | ... | … |
| Stack rooms | ... | ... | Section 1607*A*.18 |
| … | … | | … | … | … |
| 23. | Office buildings*~~n~~b*  (Delete footnote n) | ... | ... | ... | ... |
| … | … | | … | … | … |
| 28. | Schools*~~p~~d*  (Delete footnote p) | Classrooms | 40*~~r~~*  (Relocated from footnote ‘f’) *[DSA-SS] 50f* | 1,000 | ... |
| ... | ... | ... |
| … | … | | … | … | … |
| 37. | Yards and terraces, pedestrian*~~t~~h*  (Delete footnote t) | | 100a (Formerly footnote m) | ... | ... |
| *~~36.~~38.* | *Storage racks and wall-hung cabinets.* | | *Total loads~~p~~d*  (Delete footnote p) | — | — |

|  |
| --- |
| **…**   1. *~~p.~~ The minimum vertical design live load shall be as follows:*   *Paper media:*  *12-inch-deep (305 mm) shelf 33 pounds per lineal foot (482 N/m)*  *15-inch-deep (381 mm) shelf 41 pounds per lineal foot (598 N/m), or*  *33 pounds per cubic foot (5183 N/m3) per total volume of the rack or cabinet, whichever is less.*  *Film media:*  *18-inch-deep (457 mm) shelf 100 pounds per lineal foot (1459 N/m), or*  *50 pounds per cubic foot (7853 N/m3) per total volume of the rack or cabinet, whichever is less.*  *Other media:*  *20 pounds per cubic foot (311 N/m3) or 20 pounds per square foot (958 Pa), whichever is less, but not less than actual loads.*   1. *~~q.~~* ***[DSA-SS]*** *The following minimum loads for stage accessories apply:* 2. *Gridirons and fly galleries: 75 pounds per square foot uniform live load.* 3. *Loft block wells: 250 pounds per lineal foot vertical load and lateral load.* 4. *Head block wells and sheave beams: 250 pounds per lineal foot vertical load and lateral load. Head block wells and sheave beams shall be designed for all tributary loft block well loads. Sheave blocks shall be designed with a safety factor of five.* 5. *Scenery beams where there is no gridiron: 300 pounds per lineal foot vertical load and lateral load.* 6. *Ceiling framing over stages shall be designed for a uniform live load of 20 pounds per square foot. For members supporting a tributary area of 200 square feet or more, this additional load may be reduced to 15 pounds per square foot.* 7. *~~r.~~* ***[DSA-SS]*** (Relocate minimum uniform live load value from footnote ‘f’ to Table 1607A.1, Item 28) *~~The minimum uniform live load for classroom occupancies is 50 psf.~~ Live load reduction is not permitted for classrooms classified as Group A occupancies ~~unless specific exception of Section 1607A.10 apply~~.* 8. *~~s.~~* ***[DSA-SS]*** *The minimum uniform live load for a press box floor or accessible roof with railing is 100 psf.* 9. *~~t.~~* ***[DSA-SS]*** *Item ~~35~~ 37 applies to pedestrian bridges and walkways that are not subjected to uncontrolled vehicle access.*   ... |

***~~1607A.13.6~~ 1607A.14.5 Uncovered open-frame roof structures.*** *Uncovered open-frame roof structures shall be designed for a vertical live load of not less than 10 pounds per square foot (0.48 kN/m2) of the total area encompassed by the framework.*

...

**1607*A*.16 Interior walls and partitions.** Interior walls and partitions that exceed 6 feet (1829 mm) in height, including their finish materials, shall have adequate strength and stiffness to resist the loads to which they are subjected but not less than a horizontal load of 5 psf (0.240 kN/m2). *The 5 psf (0.24 kN/m2) ~~service~~ allowable stress design load need not be applied simultaneously with wind or seismic loads. The deflection of such walls under a load of 5 psf (0.24 kN/m2) shall not exceed the limits in Table 1604A.3.*

...

**1607*A*.19 Seating for assembly uses.** Bleachers, folding and telescopic seating and grandstands shall be designed for the loads specified in ICC 300 *as modified by Section 1605A.3 load combinations*. Stadiums and arenas with fixed seats shall be designed for the horizontal sway loads in Section 1607*A*.19.1.

...

**1608*A*.2 Ground snow loads.** The ground snow loads to be used in determining the design snow loads for roofs shall be determined in accordance with ASCE 7 or Figures 1608*A*.2(1) and 1608*A*.2(2) for the contiguous United States ~~and Table 1608.2 for Alaska~~. Site-specific case studies shall be made in areas designated "CS" in Figures 1608*A*.2(1) and 1608*A*.2(2). Ground snow loads for sites at elevations above the limits indicated in Figures 1608*A*.2(1) and 1608*A*.2(2) and for all sites within the CS areas shall be approved. Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2-percent annual probability of being exceeded (50-year mean recurrence interval). ~~Snow loads are zero for Hawaii, except in mountainous regions as approved by the building official.~~

**~~TABLE 1608.2 - GROUND SNOW LOADS, p~~~~g~~ ~~, FOR ALASKAN LOCATIONS~~**(Existing deletion of IBC Table 1608.2)

(**FIGURE 1608*A*.2(1) - Not shown for Clarity)**

 (**FIGURE 1608*A*.2(2) - Not shown for Clarity)**

…

**1612*A*.3 Establishment of flood hazard areas.** To establish flood hazard areas, the applicable governing authority shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management ~~Agency in an engineering report entitled “The Flood Insurance Study for [INSERT NAME OF JURISDICTION],” dated [INSERT DATE OF ISSUANCE],~~ *Agency’s Flood Insurance Study (FIS) adopted by the local authority having jurisdiction where the project is located*, as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

…

**1613*A*.1 Scope.** Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with Chapters 11, 12, 13, 15, 17 and 18 of ASCE 7, as applicable. The seismic design category for a structure ~~is permitted to~~ *shall* be determined in accordance with Section 1613*A* ~~or ASCE 7~~*.*

**~~Exceptions: …~~** (Existing deletion of exceptions)

...

**1613*A*.2.1 Mapped acceleration parameters**. The parameters Ss and S1 shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.2.1(1) through 1613.2.1(10). ~~Where S~~~~1~~ ~~is less than or equal to 0.04 and S~~~~s~~ ~~is less than or equal to 0.15, the structure is permitted to be assigned to Seismic Design Category A.~~

*(Figures 1613.2.1(1) through 1613.2.1(10) were stricken in the 2019 CBC and will not be shown in Chapter 16A. These figures are shown in Chapter 16)*  
...

**1613*A*.2.3 Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters.** The maximum considered earthquake spectral response acceleration for short periods, *SMS*, and at 1-second period, *SM1*, adjusted for site class effects shall be determined by Equations 16*A*-20 and 16*A*-21, respectively:

*SMS* = *FaSs* **(Equation 16*A*-20)**

*SM1* = *FvS1* **(Equation 16*A*-21)**

but SMS shall not be taken less than SM1 except when determining the seismic design category in accordance with Section 1613*A*.2.5.

where:

*Fa* = Site coefficient defined in Table 1613*A*.2.3(1).

*Fv* = Site coefficient defined in Table 1613*A*.2.3(2).

*SS* = The mapped spectral accelerations for short periods as determined in Section 1613*A*.2.1.

*S*1 = The mapped spectral accelerations for a 1-second period as determined in Section 1613*A*.2.1.

Where Site Class D is selected as the default site class per Section 1613*A*.2.2, the value of Fa shall be not less than 1.2. ~~Where the simplified design procedure of ASCE 7 Section 12.14 is used, the value of F~~~~a~~ ~~shall be determined in accordance with ASCE 7 Section 12.14.8.1 and the values of F~~~~v~~~~, S~~~~MS~~ ~~and S~~~~M1~~ ~~need not be determined.~~

**TABLE 1613*A*.2.3(1) - VALUES OF SITE COEFFICIENT Faa**

| **SITE CLASS** | **MAPPED RISK TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCER) SPECTRAL RESPONSE ACCELERATION PARAMETER AT SHORT PERIOD** | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| ***Ss ≤***  **0.25** | ***Ss* = 0.50** | ***Ss* = 0.75** | ***Ss* = 1.00** | ***Ss* = 1.25** | ***Ss ≥*** **1.5** |
| ... | ... | ... | ... | ... | ... | ... |
| E | ... | ... | ... | ~~Note b~~ *1.2c* | ~~Note b~~ *1.2c* | ~~Note b~~ *1.2c* |
| ... | ... | ... | ... | ... | ... | ... |

1. Use straight-line interpolation for intermediate values of mapped spectral response acceleration at short period, *Ss*.
2. Values shall be determined in accordance with Section 11.4.8 of ASCE 7.
3. *See requirements for site-specific ground motions in Section 11.4.8 of ASCE 7. These values of Fa shall only be used for calculation of Ts, determination of Seismic Design Category, linear interpolation for intermediate values of Ss, and when taking the exception under Item 2 within Section 11.4.8 of ASCE 7.*

**TABLE 1613*A*.2.3(2) - VALUES OF SITE COEFFICIENT Fva**...

1. See requirements for site-specific ground motions in Section 11.4.8 of ASCE 7. *These values of Fv shall only be used for calculation of TS, determination of Seismic Design Category, linear interpolation for intermediate values of S1, and when taking the exceptions under Items 1 and 2 of Section 11.4.8 for the calculation of SD1.*

...

**1613*A*.2.5 Determination of seismic design category.** Structures classified as Risk Category I, II or III that are located where the mapped spectral response acceleration parameter at 1-second period, Sl, is greater than or equal to 0.75 shall be assigned to Seismic Design Category E. Structures classified as Risk Category IV that are located where the mapped spectral response acceleration parameter at 1-second period, S1, is greater than or equal to 0.75 shall be assigned to Seismic Design Category F. Other structures shall be assigned to *Seismic Design Category D*.~~a seismic design category based on their occupancy category and the design spectral response acceleration coefficients, S~~~~DS~~ ~~and S~~~~D1~~~~, determined in accordance with Section 1613.2.4 or the site-specific procedures of ASCE 7. Each building and structure shall be assigned to the more severe seismic design category in accordance with Table 1613.2.5(1) or 1613.2.5(2), irrespective of the fundamental period of vibration of the structure, T.~~

**~~TABLE 1613.2.5(1) - SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATIONS~~** (Existing deletion of IBC Table 1613.2.5(1))

**~~TABLE 1613.2.5(2) - SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION~~** (Existing deletion of IBC Table 1613.2.5(2))

**1613*A*.2.5.1 Alternative seismic design category determination.** *Not permitted by DSA-SS.*  (Existing deletion of IBC Section 1613.2.5.1)

**1613*A*.2.5.2 Simplified design procedure.** *Not permitted by DSA-SS.* (Existing deletion of IBC Section 1613.2.5.2)

...

**1613*A*.3 Ballasted photovoltaic panel systems.** Ballasted, roof-mounted photovoltaic panel systems need not be rigidly attached to the roof or supporting structure. ~~Ballasted non-penetrating systems shall be designed and installed only on roofs with slopes not more than one unit vertical in 12 units horizontal. Ballasted nonpenetrating systems shall be designed to resist sliding and uplift resulting from lateral and vertical forces as required by Section 1605~~*~~A~~*~~, using a coefficient of friction determined by acceptable engineering principles. In structures assigned to Seismic Design Category C, D, E or F, ballasted nonpenetrating systems shall be designed to accommodate seismic displacement determined by nonlinear response history analysis or shake-table testing, using input motions consistent with ASCE 7 lateral and vertical seismic forces for nonstructural components on roofs.~~

***~~Exception:~~ [DSA-SS]*** *Ballasted, roof-mounted photovoltaic panel systems shall comply with ASCE 7, Section 13.6.12.*

*...*

***1617A.1.3 ~~Reserved.~~ ASCE 7, Section 11.4.*** *Modify ASCE 7, Section 11.4 to include the following:*

*Seismic ground motion values shall include updated subsections in Supplement 3.*

…

(Relocate Section 1617A.1.5 to 1617A.1.5.2)***1617A.1.5 ASCE 7, Section 12.2.3.1.*** *Replace ASCE 7, Section 12.2.3.1, Items 1 and 2, ...*

***1617A.1.5 ASCE 7, Section 12.2.3, 12.2.3.1, and 12.2.3.2.*** *Modify ASCE 7, Sections 12.2.3, 12.2.3.1, and 12.2.3.2 as follows:*

***1617A.1.5.1 ASCE 7, Section 12.2.3.*** *Replace ASCE 7, Section 12.2.3 with the following:*

*Where different seismic force-resisting systems are used in combinations to resist seismic forces in the same direction, other than those combinations considered as dual systems, the design shall comply with the requirements of this section. The most stringent applicable structural system limitations contained in Table 12.2-1 shall apply, except as otherwise permitted by this section.*

(Relocated from 1617A.1.5) ***1617A.1.5.2 ASCE 7, Section 12.2.3.1.*** *Replace ASCE 7, Section 12.2.3.1, Items 1 and 2, by the following:*

*The value of the response modification coefficient, R, used for design at any story shall not exceed the lowest value of R that is used in the same direction at any story above that story. Likewise, the deflection amplification factor, Cd, and the system over strength factor, Ω0 , used for the design at any story shall not be less than the largest value of these factors that are used in the same direction at any story above that story.*

***1617A.1.5.3 ASCE 7, Section 12.2.3.2.*** *Modify ASCE 7, Section 12.2.3.2 by modifying Item a and adding Items f, g, and h, as follows:*

* 1. The stiffness of the lower portion shall be at least 10 times the stiffness of the upper portion. *For purposes of determining this ratio, the base shear shall be computed and distributed vertically according to Section 12.8. Using these forces, the stiffness for each portion shall be computed as the ratio of the base shear for that portion to the elastic displacement, δxe, computed at the top of that portion, considering the portion fixed at its base. For the lower portion, the applied forces shall include the reactions from the upper portion, modified as required in Item d.*

1. *The structural height of the upper portion shall not exceed the height limits of Table 12.2-1 for the seismic force-resisting system used, where the height is measured from the base of the upper portion.*
2. *Where Horizontal Irregularity Type 4 or Vertical Irregularity Type 4 exists at the transition from the upper to the lower portion, the reactions from the upper portion shall be amplified in accordance with Sections 12.3.3.3, 12.10.1.1, and 12.10.3.3 as applicable, in addition to amplification required by Item d.*
3. (Relocated from 1617A.1.6, Item f) *Where design of vertical elements of the upper portion is governed by special seismic load combinations, the special loads shall be considered in the design of the lower portion.*

***1617A.1.6 ~~ASCE 7, Section 12.2.3.2.~~****~~Modify ASCE 7 Section 12.2.3.2 by adding the following additional requirement:~~* ***Reserved.***

1. (Relocate Section 1617A.1.6, Item f to 1617A.1.5.3, Item h) *Where design of vertical elements ...*

...

***1617A.1.10 ASCE 7, Section 12.3.3.1.*** *Modify first sentence of ASCE 7 Section 12.3.3.1 as follows:*

***12.3.3.1 Prohibited Horizontal and Vertical Irregularities for Seismic Design Categories D through F.*** *Structures assigned to Seismic Design Category D, E, or F having horizontal structural irregularity Type 1b of Table 12.3-1 or vertical structural irregularities Type 1b, 5a or 5b of Table 12.3-2 shall not be permitted.*

***~~Exception~~ Exceptions:***

* 1. *Structures with reinforced concrete or reinforced masonry shear wall systems and rigid or semi-rigid diaphragms, consisting of concrete slabs or concrete-filled metal deck having a span-to-depth ratio of 3 or less, having a horizontal structural irregularity Type 1b of Table 12.3-1 are permitted, provided the maximum story drift in the direction of the irregularity, computed including the torsional amplification factor from Section 12.8.4.3, is less than 10% of the allowable story drift in ASCE 7, Table 12.12-1.*

1. *Structures having a horizontal structural irregularity Type 1b of Table 12.3-1 are permitted, provided a redundancy factor, ρ, of 1.3 as defined in ASCE 7, Section 12.3.4 is assigned to the seismic force-resisting system in both orthogonal directions and the structure is designed for one of the orthogonal procedures as defined in ASCE 7, Section 12.5.3.1.*

...

(Relocated from 1617A.1.15) ***1617A.1.~~15~~14*** ***[Reserved for OSHPD]***

(Relocate Section 1617A.1.15 to 1617A.1.14) ***1617A.1.15 [Reserved for OSHPD]***

(Relocated from 1617A.1.16) ***1617A.1.~~16~~15 ASCE 7, Section 12.13.1.*** *Modify ASCE 7 section 12.13.1 by adding Section 12.13.1.1 as follows:*

...

(Relocate Section 1617A.1.16 to 1617A.1.15) ***1617A.1.16 ASCE 7, Section 12.13.1.*** *Modify ASCE 7 section 12.13.1 by adding Section 12.13.1.1 as follows:*

...

***1617A.1.16 ASCE 7, Section 12.13.9.2.*** *Modify ASCE 7, Section 12.13.9.2 by the following sentence added to the end of item b as follows:*

*Seismic load effects determined in accordance with Section 12.4 need not be considered in this check.*

...

***1617A.1.18 ASCE 7, Section 13.1.4.*** *Replace ASCE 7 Section 13.1.4 with the following:*

***~~13.1.4 Exemptions.~~*** *~~The following nonstructural components are exempt from the requirements of this section:~~*

1. *~~Furniture except storage cabinets as noted in Table 13.5-1.~~*
2. *~~Temporary, moveable or mobile equipment.~~*

***~~Exceptions:~~***

1. *~~Equipment shall be anchored if it is permanently attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, “permanently attached” shall include all electrical connections except plugs for 110/220 volt receptacles having a flexible cable.~~*
2. ***~~[DSA-SS]~~*** *~~Movable or mobile equipment which is heavier than 400 pounds or has a center of mass located 4 feet (1.22 m) or more above the adjacent floor or roof level that directly support the component shall be restrained in a manner approved by the enforcement agency. Mobile equipment shall be restrained when not in use and is stored, unless the equipment is stored in a storage room that does not house hazardous materials or any facility systems or fixed equipment that can be affected by mobile equipment lacking restraint.~~*
3. *~~Discrete architectural, mechanical and electrical components and fixed equipment in Seismic Design Categories D, E, or F that are positively attached to the structure and anchorage is detailed on the plans, provided that either:~~*
   * + - 1. *~~The component weighs 400 pounds (1780 N) or less, the center of mass is located 4 feet (1.22 m) or less above the adjacent floor or roof level that directly support the component, and flexible connections are provided between the component and associated ductwork, piping and conduit.~~*

***~~Exception:~~*** *~~Special Seismic Certification requirements of this code in accordance with Section 1705A.13.3 shall be applicable.~~*

*~~Or~~*

* + - * 1. *~~The component weighs 20 pounds (89 N) or less or, in the case of a distributed system, 5 lb/ft (73 N/m) or less.~~*

***~~Exception:~~*** *~~The enforcement agency shall be permitted to require attachments for equipment with hazardous contents to be shown on construction documents irrespective of weight.~~*

(Section 13.1.4 replaces Section 13.1.4a and will be co-adopted with OSHPD as modified below)  
 ***13.1.4.*** *The following nonstructural components and equipment shall be anchored in accordance with this section. Design and detailing shall be in accordance with Chapter 13 except as modified by this section.*

1. *Fixed Equipment: Equipment shall be anchored if it is directly attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, “directly attached” shall include all electrical connections except plugs for 110/220-volt receptacles having a flexible cable/cord. Equipment that is connected to the building plumbing system with a shut-off valve in proximity to the equipment shall not be considered as directly attached provided the inside diameter of the pipe/tubing is less than ½ inches.*
2. *Movable Equipment: Equipment is subject to the same requirement as fixed equipment, but is permitted to be anchored by re-attachable anchors or restraints in a manner approved by the enforcement agency. Utilities and services at the equipment shall have flexible connections to allow for necessary movement.*
3. ***[DSA-SS]*** *Mobile equipment: Equipment heavier than 400 lb. or has a center of mass located 4 ft. or more above the adjacent floor or roof level that directly support the equipment* *shall be restrained in a manner approved by the enforcement agency. Mobile equipment shall be restrained when not in use and is stored, unless the equipment is stored in a storage room that does not house hazardous materials or any facility systems or fixed equipment that can be affected by mobile equipment lacking restraint.*
4. ***[DSA-SS]*** *Countertop Equipment: Countertop Equipment shall be subject to the same anchorage or restraint requirements for fixed or movable equipment as applicable. Countertop equipment shall also be subject to the same requirements as mobile or other equipment if weight of equipment is greater than 100 lb. and has a center of mass located 4 ft. or more above the adjacent floor level or if equipment could fall and block a required means of egress.*
5. *(Reserved for OSHPD)*
6. *(Reserved for OSHPD)*
7. *Other Equipment: Equipment shall be anchored where any of the following apply:*
8. ***[DSA-SS]*** *Weight of equipment is greater than 100 lb. and essential to operations for emergency preparedness, communications and operations centers, and other facilities required for emergency response of state-owned essential services buildings as defined in the California Administrative Code (Title 24, Part 1, CCR) Section 4-207 and all structures required for their continuous operation or access/egress.*
9. *(Reserved for OSHPD)*
10. *Could fall and block a required means of egress.*
11. ***[DSA-SS]*** *Weight of equipment is greater than 400 lb. or center of mass is located greater than 4 ft. above the finished floor or roof level that directly supports the component.*

*e. (Reserved for OSHPD)*

1. *Equipment with hazardous contents.*
2. *Other architectural, mechanical and electrical components stated in Chapter 13.*
3. *Wall, Roof or Floor Hung Equipment:*

***[DSA-SS]*** *Seismic design and seismic details shall be provided for wall, roof or floor hung nonstructural components and equipment when the component weighs more than 20 lb.*

***[DSA-SS] Exemptions:*** *The following nonstructural components are exempt from the requirements of ASCE 7 Chapter 13:*

1. *Furniture except storage cabinets as noted in Table 13.5-1.*
2. *Discrete architectural, mechanical and electrical components and fixed equipment that are positively attached to the structure, provided that none of the conditions in this section apply, and flexible connections are provided between the component and associated ductwork, piping and conduit where required.*

...

***1617A.1.19 ASCE 7, Section 13.4*** *Replace ASCE 7, Sections 13.4.2.3, with the following:*

***13.4.2.3 Prequalified post-installed anchors and specialty inserts in concrete and masonry.***

*...*

***Exception: [DSA-SS]*** *Screw anchors are permitted for use in building enclosures and may also be used in exterior conditions when permitted in accordance with a valid evaluation report.*

*…*

***1617A.1.26 ASCE 7, Section 13.6.7.3*.** *Replace ASCE 7, Section 13.6.7.3 with the following:*

***13.6.7.3 Additional provisions for piping and tubing systems*.**

*A) Design for the seismic forces of Section 13.3 shall not be required for piping systems where flexible connections, expansion loops, or other assemblies are provided to accommodate the relative displacement between component and piping, where the piping system is positively attached to the structure, and where any of the following conditions apply:*

1. *Trapeze assemblies are supported by 3/8-inch (10 mm) or ½-inch (13 mm) diameter rod hangers not exceeding 12 inches (305 mm) in length from the pipe support point to the connection at the supporting structure, ~~do not support piping with I~~~~p~~ ~~greater than 1.0,~~ and no single pipe exceeds the diameter limits set forth in item 2b below or 2 inches (50 mm) ~~for Seismic Design Category D, E, or F~~ where Ip is greater than 1.0 and the total weight supported by any single trapeze is 100 pounds (445 N) or less; or*

***1617A.1.27 ASCE 7, Section 13.6.11.1****. Modify ASCE 7, Section 13.6.11.1, by adding Section 13.6.11.1.1 as follows:*

***13.6.11.1.1 Elevators guide rail support.*** *The design of guide rail support-bracket fastenings and the supporting structural framing shall use the weight of the counterweight or maximum weight of the car plus not less than 40 percent of its rated load. The seismic forces shall be assumed to be distributed one third to the top guiding members and two thirds to the bottom guiding members of cars and counterweights, unless other substantiating data are provided. In addition to the requirements of ASCE 7, Section 13.6.11.1, the minimum seismic forces shall be 0.5g allowable stress design load acting in any horizontal direction.*

***1617A.1.28 ASCE 7, Section 13.6.11.4.*** *Replace ASCE 7, Section 13.6.11.4, as follows:*

***13.6.11.4 Retainer plates.*** *Retainer plates are required at the top and bottom ...*

1. *The seismic force shall be computed per the requirements of ASCE 7 Section 13.6.11.1. The minimum horizontal acceleration shall be 0.5g allowable stress design load for all buildings.*

*...*

1. *Cab stabilizers and counterweight frames shall be designed to withstand computed lateral load with a minimum horizontal acceleration of 0.5g allowable stress design load.*

…

**Notation:**

Authority: Education Code § 17310 and 81142, and Health and Safety Code §16022.

Reference(s): Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

# Chapter 17A SPECIAL INSPECTIONS AND TESTS

**CHAPTER 17*A***

**SPECIAL INSPECTIONS AND TESTS**

Adopt Chapter 17 of the 2021 IBC as Chapter 17A of the 2022 CBC as amended below. All existing California amendments that are not revised below shall continue without change.

Remove “User Note” at beginning of Chapter 17.

Add “*A*” to new model code sections and/or reference(s) to other sections within Chapter 17A.

…

**SECTION 1704*A***

**SPECIAL INSPECTIONS AND TESTS,**

**CONTRACTOR RESPONSIBILITY AND**

**STRUCTURAL OBSERVATION**

…

**1704*A*.2 Special inspections and tests.**

Where application is made to the building officialfor construction as specified in Section 105, the owner ~~or the owner’s authorized agent, other than the contractor,~~ shall employ one or more approved agenciesto provide special inspectionsand tests during construction on the types of work specified in Section 1705*A* and identify the approved agencies to the building official. These special inspections and tests are in addition to the inspections by the building officialthat are identified in Section 110.

**Exceptions:**

* 1. Special inspectionsand tests are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as approvedby the building official.
  2. ***[DSA-SS, DSA-SS/CC]*** *Reference to Section 105 and Section 110 shall be to the California Administrative Code instead.* ~~Unless otherwise required by the~~ *~~building official~~*~~,~~ *~~special inspections~~* ~~and tests are not required for Group U occupancies that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1.~~
  3. *~~Special inspections~~* ~~and tests are not required for portions of structures designed and constructed in accordance with the cold-formed steel~~ *~~light-frame construction~~* ~~provisions of Section 2211.1.2 or the~~ *~~conventional light-frame construction~~* ~~provisions of Section 2308.~~
  4. ~~The contractor is permitted to employ the~~ *~~approved agencies~~* ~~where the contractor is also the owner.~~

…

**1704*A*.2.3 Statement of special inspections.** The applicant shall submit a statement of special inspections *prepared by the registered design professional in responsible charge* in accordance with Section 107.1 as a condition for ~~permit issuance~~ *construction documents review*. This statement shall be in accordance with Section 1704*A*.3.

**~~Exception:~~** ~~…~~ (Existing deletion of exception)

***[DSA-SS, DSA-SS/CC]*** *Reference to Section 107.1 shall be to the California Administrative Code instead.*

**1704*A*.2.4 Report requirement.** *The* *inspector(s) of record and* ~~A~~*a*pproved agencies shall keep records of special inspections and tests. The *inspector of record and* approved agency shall submit reports of special inspections and tests to the building official, and to the registered design professional in responsible charge *as required by the California Administrative Code.* Reports shall indicate that work inspected or tested was or was not completed in conformance to approved construction documents *as required by the California Administrative Code and this code.* Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted at a point in time agreed upon prior to the start of work by the owner or owner’s authorized agent to the building official.

**1704*A*.2.5 Special inspection of fabricated items.** Where fabrication of structural, load-bearing or lateral load resisting members or assemblies is being conducted on the premises of a fabricator’s shop, special inspectionsof the fabricated items shall be performed during fabrication~~, except where the fabricator has been approved to perform work without special inspections in accordance with Section 1704.2.5.1~~.

**1704*A*.2.5.1 Fabricator approval.** *Not permitted by DSA-SS or DSA-SS/CC.* (Existing deletion of IBC Section 1704.5.1.1)

…

**1704*A*.3.2 Seismic requirements in the statement of special inspections.** Where Section 1705.13 or 1705.14 specifies special inspectionsor tests for seismic resistance, the statement of *special inspections* shall identify the *equipment/components that require special seismic certification* *~~designated seismic systems~~* and seismic force-resisting systemsthat are subject to the *special inspections* or tests.

…

**1704*A*.4 Contractor responsibility.** Each contractor responsible for the construction of a main wind- or seismic force resisting system, *installation of equipment/components requiring special seismic certification* ~~designated seismic system~~ or a wind- or seismic-resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the building officialand the owner or the Owner’s authorized agent prior to the commencement of work on the system or component. The contractor’s statement of responsibility shall contain acknowledgement of awareness of the special requirements contained in the statement of special inspections.

**1704*A*.5 Submittals to the building official.** In addition to the submittal of reports of special inspectionsand tests in accordance with Section 1704.2.4, reports and certificates shall be submitted by the owner or the owner’s authorized agent to the building officialfor each of the following:

1. *~~Certificates of compliance~~* ~~for the fabrication of structural, load-bearing or lateral load-resisting members or assemblies on the premises of an~~ *~~approved fabricator~~* ~~in accordance with Section 1704.2.5.1.~~
2. 1. Certificates of compliancefor the ~~seismic qualification~~ *manufacturer’s certification* of nonstructural components, supports and attachments in accordance with Section 1705*A*.14.2.
3. *2.* Certificates of compliancefor *~~designated seismic systems~~ equipment/components requiring special seismic certification* in accordance with Section 1705*A*.14.3.
4. *3.* Reports of preconstruction tests for shotcrete in accordance with *~~A~~* ACI 318 *and 1705A.3.9.2*.
5. *4.* Certificates of compliancefor open web steel joistsand joist girders in accordance with Section 2207*A*.5.
6. *5.* Reports of material properties verifying compliance with the requirements of AWS D1.4 for weldability as specified in Section 26.6.4 of ACI 318 for reinforcing bars in concrete complying with a standard other than ASTM A706 that are to be welded.
7. *6.* Reports of mill tests in accordance with Section 20.2.2.5 of ACI 318 for reinforcing bars complying with ASTM A615 and used to resist earthquake-induced flexural or axial forces in the special moment frames, special structural walls or coupling beams connecting special structural walls of seismic force-resisting systemsin structures assigned to Seismic Design Category~~B, C,~~ D, E or F.

**1704*A*.6 Structural observations.** ~~Where required by the provisions of Section 1704.6.1, t~~*T*he owner ~~or the owner’s authorized agent~~ shall employ a registered design professional to perform structural observations. The structural observer shall visually observe representative locations of structural systems, details and load paths for general conformance to the approved construction documents. Structural observationdoes not include or waive the responsibility for the inspections in Section 110 or the special inspectionsin Section 1705*A* or other sections of this code. Prior to the commencement of observations, the structural observer shall submit to the building official a written statement identifying the frequency and extent of structural observations. At the conclusion of the work included in the permit, the structural observer shall submit to the building officiala written statement that the site visits have been made and identify any reported deficiencies that, to the best of the structural observer’s knowledge, have not been resolved.

***[DSA-SS, DSA-SS/CC]*** *Reference to Section 110 shall be to the California Administrative Code instead.*

**~~1704.6.1 Structural observations for structures.~~** (Existing deletion of IBC Section 1704.6.1.)

…

**1704*A*.6.1 *[DSA-SS, DSA-SS/CC] Construction documents.*** (Withdrawn)

**1704*A*.6.2 *[DSA-SS, DSA-SS/CC] Preconstruction meeting.*** (Withdrawn)

…

**SECTION 1705A**

**REQUIRED SPECIAL INSPECTIONS AND TESTS**

…

**1705*A*.2.1 Structural steel.** Special inspections and nondestructive testing of structural steel elements in buildings, structures and portions thereof shall be in accordance with the quality assurance ~~inspection~~ requirements ~~of AISC 360~~ *of this section, Chapter 22A and quality control requirements of AISC 360, AISC 341 and AISC 358.*

…

***TABLE 1705A.2.1 REQUIRED SPECIAL INSPECTIONS AND TESTS OF STEEL CONSTRUCTION***

| ***TYPE*** | ***CONTINUOUS SPECIAL INSPECTION*** | ***PERIODIC SPECIAL INSPECTION*** | ***REFERENCED***  ***STANDARD****~~a~~* | ***CBC REFERENCEa*** |
| --- | --- | --- | --- | --- |
| *1. Material identification and testing of high-strength bolts, nuts and washers:* | | | | |
| *…* |  |  |  |  |
| *c. Testing of high-strength bolts, nuts and washers.* | *─* | *─* | *RCSC: 7.2, Applicable ASTM material standards* | *1705A.2.6, ~~2213A.1, [DSA-SS/CC] 2212.6.1~~* |
| *…* |  |  |  |  |
| *4. Material identification of welding consumables and testing of welded elements:* | | | | |
| *c. Nondestructive testing of welded joints.* | *─* | *─* | *AISC 360:*  *N5.5* | *─* (Add dash here) |
| *…* |  |  |  |  |
| *5. Inspection of welding:* | | | | |
| *…* |  |  |  |  |
| *b. Reinforcing steel~~:~~* | *─* | *─* | *─* | *Table 1705A.3, Item 2* |
| (Relocating remaining rows with sub-items 1-5 to Table 1705A.3.)*1) Verification of weldability of reinforcing steel other than ASTM A706.* | *─* | *X* | *AWS D1.4, ACI 318: 18.2.8, 25.5.7.4, 26.6.4.1* | *1705A.3.1, 1903A.8* |
| *2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.* | *X* | *─* |
| *3) Shear reinforcement.* | *X* | *─* |
| *4) Other reinforcing steel.* | *─* | *X* |
| *5) Tests of reinforcing bars.* | *─* | *─* | *─* | *1910A.2, [DSA-SS/CC] 1909.2.4* |
| *…* |  |  |  |  |

*For SI: 1 inch = 25.4 mm.*(The following item is an existing amendment that was missed in the printed version of the 2019 CBC and should be added back into the 2022 CBC with the renumbering modification shown.)

1. *Where applicable, see also Section 1705A.~~12~~13, Special inspection for seismic resistance.*

**1705A.2.2 Cold-formed steel deck.** Special inspections ~~and qualification of welding special inspectors~~ for cold formed steel floor and roof deck shall be in accordance with the quality assurance inspection requirements of SDI QA/QC.

*Deck weld special inspection and testing shall also satisfy requirements in Table 1705A.2.1 and Section 1705A.2.5.*

…

**TABLE 1705*A*.2.3 REQUIRED SPECIAL INSPECTIONS OF OPEN-WEB STEEL JOISTS AND JOIST GIRDERS**

…

1. Where applicable, see Section 1705*A.*~~12~~13, Special inspection for seismic resistance. …

***1705A.2.5 Inspection and tests of structural welding.*** *Inspection and testing (including non-destructive testing) of all shop and field welding operations shall be in accordance with this section, Section 1705A.2.1, and Table 1705A.2.1. Inspections shall be made by a qualified welding inspector approved by the enforcement agency. The minimum requirements for a qualified welding inspector shall be as those for an AWS Certified Welding Inspector (CWI), as defined in the provisions of the AWS QC1.*

***[DSA-SS, DSA-SS/CC]*** *Welding inspector approval by the enforcement agency shall occur when specified in the California Administrative Code. Nondestructive testing shall be performed by qualified NDT Level II personnel employed by the approved agency.*

*The welding inspector shall make a systematic daily record of all welds. In addition to other records, this record shall include:*

1. *Identification marks of welders.*
2. *List of defective welds.*
3. *Manner of correction of defects.*

*The welding inspector shall check the material, details of construction and procedure, as well as workmanship of the welds. The inspector shall verify that the installation and testing of end-welded stud shear connectors is in accordance with the requirements of 2213A.2 ([DSA-SS/CC] 2212.6.2) and the approved plans and specifications. The approved agency shall furnish the architect, structural engineer, and the enforcement agency with a verified report that the welding has been done in conformance with AWS D1.1, D1.3, D1.4, D1.8, and the approved construction documents.*

***1705A.2.6 Special inspection and tests of high-strength fastener assemblies.*** *Special inspections and tests for high-strength fasteners shall be in accordance with this section, Section 1705A.2.1, and Table 1705A.2.1. ~~Tests of h~~High-strength bolts, nuts, and washers shall be sampled and tested by an approved agency for conformance with the requirements of applicable ASTM standards~~in accordance with Section 2213A.1 ([DSA-SS/CC] 2212.6.1)~~.* ***[Reserved for OSHPD]***

***[DSA-SS, DSA-SS/CC]*** *The minimum requirements for a qualified high-strength bolting special inspector shall be an International Code Council certified Structural Steel and Bolting Special Inspector (S1).*

**1705A.3 Concrete construction.** Special inspectionsand tests of concrete construction shall be performed in accordance with this section and Table 1705*A*.3.

**Exception:** Special inspections and testsshall not be required for~~:~~

1. ~~Isolated spread concrete footings of buildings three stories or less above grade plane~~~~that are fully supported on earth or rock.~~
2. ~~Continuous concrete footings supporting walls of buildings three stories or less above grade plane~~~~that are fully supported on earth or rock where:~~
   1. ~~The footings support walls of light-frame construction.~~
   2. ~~The footings are designed in accordance with Table 1809.7.~~
   3. ~~The structural design of the footing is based on a specified compressive strength,~~ *~~f 'c~~*~~, not more than 2,500 pounds per square inch (psi) (17.2 MPa), regardless of the compressive strength specified in the approved construction documents~~~~or used in the footing construction.~~
3. ~~Nonstructural concrete~~~~slabs supported directly on the ground, including prestressed slabs on grade, where the effective prestress in the concrete is less than 150 psi (1.03 MPa).~~
4. ~~Concrete foundation walls constructed in accordance with Table 1807.1.6.2.~~
5. ~~C~~ *c*oncrete patios, driveways and sidewalks, on grade.

**TABLE 1705*A*.3**

**REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION**

| **TYPE** | **CONTINUOUS SPECIAL INSPECTION** | **PERIODIC SPECIAL INSPECTION** | **REFERENCED**  **STANDARD**a | **~~IBC~~*CBC* REFERENCE** |
| --- | --- | --- | --- | --- |
| 1. Inspect *and test* reinforcement, including prestressing tendons, and verify placement.  *a. Reinforcement in special moment frames, boundary elements of special structural wall, and coupling beams.*  *b. All other reinforcement* | X  ─ | ─  X | ACI 318: Ch. 20, 25.2, 25.3, *25.5.1,* 26.6.1- 26.6.3, *26.13.1, 26.13.3.2, 26.13.3.3* | *1705A.3.9, 1908A.1, ~~1908A.3, 1908A.4,~~* *1910A.2, 1910A.3;*  *[DSA-SS/CC] 1909.2.4, 1909.2.5, 1909.4.1* |
| 2. Reinforcing bar welding:  a. Verify weldability of reinforcing bars other than ASTM A706.  b. Inspect single pass fillet welds, maximum 5/16”, *not defined in 2.d or 2.e.* ~~and~~  c. Inspect all other welds.  (Relocated from Table 1705A.2.1 items 1 and 2 to new items d and e.)  *d. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements and coupling beams of special structural* *walls of concrete and shear reinforcement.*  *e. Shear reinforcement.* | ─  ─  X  *X*  *X* | X  X  ─  *─*  *─* | (Relocated ACI 318 references 18.2.8, 25.5.7 from Table 1705A.2.1 item b1 and b2.)  AWS D1.4  ACI 318: *18.2.8, 25.5.7,* 26.6.4,  *26.13.1.4, 26.13.3.2, 26.13.3.3* | *1705A.3.1, 1903A.8* |
| 3. Inspect anchors cast in concrete. | ─ | X | ACI 318: 17.8.2*, 26.7.2, 26.8.2, 26.13.1, 26.13.3.3* | ─ |
| 4. Inspect *and test* anchors post-installed in hardened concrete members.b, c  a. Adhesive anchors installed horizontally or upwardly inclined orientations to resist sustained tension loads.  b. Mechanical anchors and adhesive anchors not defined in 4.a. | X  ─ | ─  X | ACI 318: 17.8.2.4*26.7.2, 26.13.1, 26.13.3.2*  ACI 318: 17.8.2*26.7.2, 26.13.1, 26.13.3.3* | *1705A.3.8, 1910A.5,*  *[DSA-SS/CC] 1909.2.7*  *1705A.3.8, 1910A.5,*  *[DSA-SS/CC] 1909.2.7* |
| 5. Verify use of required design mix. | ~~─~~X | ~~X~~─ | ACI 318: Ch.19, *26.4,* ~~26.4.3, 26.4.4~~ *26.13.3.2* | *1903A.5, 1903A.6, 1903A.7,* 1904*A*.1, 1904*A*.2, *~~1908A.2, 1908A.3,~~ 1910A.1,[DSA-SS/CC] 1909.2.1, 1909.2.2, 1909.2.3* |
| 6. Prior to *and during* concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete. | X | ─ | ASTM C31  ASTM C172  ACI 318: *26.4,* 26.5, 26.12 | *1705A.3.5, 1705A.3.6, 1705A.3.9, 1905A.1.~~16~~17, ~~1908A.5, 1908A.10,~~ [DSA-SS/CC] ~~1908.5,~~ 1909.3.~~7~~9,~~1908.10, 1909.4.1~~* |
| 7. Inspect concrete and shotcrete for proper application techniques. | X | ─ | ACI 318: 26.5*, 26.13*  *ACI 506: 3.4* | *1705A.3.9, 1905A.1.15, 1905A.1.16, ~~1908A.5, 1908A.6, 1908A.7, 1908A.8, 1908A.10, 1908A.12,~~ [DSA-SS/CC] 1909.3.7, 1909.3.8 ~~1909.4.5~~* |
| 8. Verify maintenance of specific curing temperature and techniques. | ─ | X | ACI 318: 26.5.3–26.5.5, *26.13.3.3* | *~~1908A.9,~~*  ─ |
| 9. Inspect prestressed concrete for:  a. Application of prestressing forces; and  b. Grouting of bonded prestressing tendons. | X  X | ─  ─ | ACI 318: 26.10*.2, 26.13.1, 26.13.3.2* | *1705A.3.4* |
| 10. Inspect erection of precast concrete members. | ─ | X | ACI 318: 26.9*.2,26.13.1, 26.13.3.3* | ─ |
| 11. For precast concrete diaphragm connections or reinforcement at joints classified as moderate or high deformability elements (MDE or HDE) in structures assigned to Seismic Design Category ~~C,~~ D, E or F, inspect such connections and reinforcement in the field for:   * 1. Installation of the embedded parts   2. Completion of the continuity of reinforcement across joints.   3. Completion of connections in the field. | X  X  X | —  —  — | ACI 318:  26.13.1.3  ACI 550.5 | — |
| 12. Inspect installation tolerances of precast concrete diaphragm connections for compliance with ACI 550.5. | — | X | ACI 318:  26.13.1.3 | — |
| 13. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs. | ─ | X | ACI 318: *26.10.2,* 26.11.2, *26.13.3.3* | *~~1911A.1, [DSA-SS/CC] 1909.5,~~* |
| 14. Inspect formwork for shape, location and dimensions of the concrete member being formed | ─ | X | ACI 318: 26.11.1.2(b), *26.13.3.3* | *1908A.~~11~~3, [DSA-SS/CC] 1909.4.~~4~~3* |

…

**1705A.3.2 Material tests.** In the absence of sufficient data or documentation providing evidence of conformance to quality standards for materials in Chapters 19*,* ~~and~~ 20*, and 26* of ACI 318, *as modified by Chapter 19A,* the building official shall require testing of materials in accordance with the appropriate standards and criteria for the material in Chapters 19*,* ~~and~~ 20*, and 26* of ACI 318 *as modified by Chapter 19A*. *Cementitious materials shall be in accordance with 1910A.1 ([DSA-SS/CC] 1909.2.3). Tests of reinforcing bars shall be in accordance with 1910A.2 ([DSA-SS/CC] 1909.2.4).*

…

***~~1705A.19~~1705A.3.9 Shotcrete.*** *All shotcrete work shall be continuously inspected during placing by an approved agency. The special shotcrete inspector shall check the materials, placing equipment, details of construction and construction procedure. The approved agency shall furnish a verified report that of his or her own personal knowledge the work covered by the report has been performed and materials used and installed in every material respect in compliance with the duly approved plans and specifications.*

*[****DSA-SS, DSA-SS/CC****] Testing requirements per ACI 318 and ACI 506.2 shall also apply.*

***~~1705A.19.1~~1705A.3.9.1 Visual examination for structural soundness of in-place shotcrete.*** *Completed shotcrete work shall be …*

(Relocated from 1908.5/1908A.5 deleted by model code and modifying, including incorporation of 1908.4.1/1908A.4.1, and 1909.4.2 and amendment in 1908A.10.2.)***1705A.3.9.2******Preconstruction tests.*** *A shotcrete mockup panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project. The mockup panel shall be representative of the project and simulate job conditions as closely as possible. The mockup panel thickness and reinforcing shall reproduce the thickest and most congested area specified in the structural design. It shall be shot at the same angle, using the same nozzleman and with the same concrete mix design that will be used on the project. Adequate encasement of bars larger than No. 5 shall be demonstrated by the mockup panel. The equipment used in preconstruction testing shall be the same equipment used in the work requiring such testing, unless substitute equipment is approved by the building official. Reports of preconstruction tests shall be submitted to the building official as specified in Section 1704A.5. ~~[~~****~~DSA-SS, DSA-SS/CC~~****~~]~~  Approval from the enforcement agency must be obtained prior to performing shotcrete mockup panels.*

**1705*A*.4 Masonry construction.** Special inspectionsand tests of masonry construction shall be performed in accordance with the quality assurance program requirements of TMS 402 and TMS 602*, as set forth in Tables 3 and 4, Level 3 requirements and Chapter 21A. Testing shall be performed in accordance with Section 2105A ([DSA-SS/CC] 2115.8). Special inspection and testing of post-installed anchors in masonry shall be required in accordance with Chapter 17A and 19A*.

**~~Exception:~~** ~~…~~ (Existing deletion of exception)

…

**1705*A*.4.1 Glass unit masonry and masonry veneer in Risk Category *II, III or* IV.** Post CAC: Item Withdrawn. Proposal to change term ‘category’ to ‘categories’ is Withdrawn.

…

**TABLE 1705*A*.5.3**

**REQUIRED SPECIAL INSPECTIONS OF MASS TIMBER CONSTRUCTION**

(Relocating 3.1-3.5 item numbering from repealed Table 1705*A*.5.7 below.)

| **TYPE** | | | **CONTINUOUS SPECIAL INSPECTION** | **PERIODIC SPECIAL INSPECTION** | |
| --- | --- | --- | --- | --- | --- |
|  | … | |  |  |
| **3.** | Inspection of connections where installation methods are required to meet design loads. | |  |  | |
|  | (Relocating 3.1-3.5 item numbering from former *Table 1705A.5.7*)  *3.1.* Threaded fasteners | *3.1.1.* Verify use of proper installation equipment. | — | X | |
| *3.1.2.* Verify use of pre-drilled holes where required. | — | X | |
| *3.1.3.* Inspect screws, including diameter, length, head type, spacing, installation angle and depth. | — | X | |
| *3.2.* Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads. | | X | — | |
| *3.3.* Adhesive anchors not defined in preceding cell. | | — | X | |
| *3.4.* Bolted connections. | | — | X | |
| *3.5.* Concealed connections. | | — | X | |

Renumber remaining subsections 1705A.5.X due to model code insertion of Section 1705A.5.3.

…

***1705A.5.~~4~~5 Structural glued laminated and cross-laminated timber.****Manufacture of all structural glued laminated and cross-laminated timber shall be continuously inspected by an approved agency.*

*The approved agency shall verify that proper quality control procedures and tests have been employed for all materials and the manufacturing process, and shall perform visual inspection of the finished product. Each inspected member shall be stamped by the approved agency with an identification mark.*

***Exception:****Special Inspection is not required for non-custom prismatic glued laminated members identified on drawings and sourced from stock or general inventory of 5 1/2-inch maximum width and 18-inch maximum depth, and with a maximum clear span of 32 feet, manufactured and marked in accordance with ANSI~~/APA~~ A190.1 Section 13.1 for non-custom members.*

**…**

***~~1705A.5.7 Mass timber construction.~~*** *~~Special inspections of Mass Timber elements in Types IV-A, IV-B and IV-C construction shall be in accordance with Table 1705A.5.7.~~*

**~~TABLE 1705A.5.7~~**

**~~REQUIRED SPECIAL INSPECTIONS OF MASS TIMBER CONSTRUCTION~~**

| **~~TYPE~~** | **~~CONTINUOUS SPECIAL INSPECTION~~** | **~~PERIODIC SPECIAL INSPECTION~~** |
| --- | --- | --- |
| *~~1. Inspection of anchorage and connections of mass timber construction to timber deep foundation systems.~~* |  | *~~X~~* |
| *~~2. Inspect erection of mass timber construction.~~* |  | *~~X~~* |
| *~~3. Inspection of connections where installation methods are required to meet design loads:~~* |  |  |
| (Relocating 3.1-3.5 item numbering to Table 1705A.5.3) *3.1. ~~Threaded fasteners:~~* |  |  |
| *3.1.1. ~~Verify use of proper installation equipment.~~* |  | *~~X~~* |
| *3.1.2. ~~Verify use of pre-drilled holes where required.~~* |  | *~~X~~* |
| *3.1.3. ~~Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.~~* |  | *~~X~~* |
| *3.2. ~~Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads~~* | *~~X~~* |  |
| *3.3. ~~Adhesive anchors not defined in 3.2.~~* |  | *~~X~~* |
| *3.4. ~~Bolted connections~~* |  | *~~X~~* |
| *3.5. ~~Concealed connections~~* |  | *~~X~~* |

**…**

***1705A.6.3******Vibro stone columns.*** *Special inspections and tests of vibro stone columns for ground improvement shall be in accordance with ~~applicable portions of~~ Section 1813A.5.*

**…**

***1705A.8.1 Micropile tests.***  *Micropile preproduction and production load tests shall be in accordance with Section 1810A.3.10.4.*

**…**

***1705A.9.1 Helical pile tests.***  *Helical pile preproduction and production load tests shall be in accordance with Section 1810A.3.1.5.1.*

**…**

1705*A*.12.1 Structural wood.

Continuous special inspection is required during field gluing operations of elements of the main windforce-resisting system. Periodic special inspection is required for nailing, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.

**~~Exception:~~** ~~…~~ (Existing deletion of exception)

1705*A*.12.2 Cold-formed steel light-frame construction. Periodic special inspection is required for welding operations of elements of the main windforce-resisting system. Periodic special inspection is required for screw attachment, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

~~Exception: …~~ (Existing deletion of exception)

**…**

1705*A*.13 Special inspections for seismic resistance. Special inspectionsfor seismic resistance shall be required as specified in Sections 1705*A*.13.1 through 1705*A*.13.9, unless exempted by the exceptions of Section 1704*A*.2.

~~Exception: …~~ (Existing deletion of exception)

1705*A*.13.1 Structural steel. Special inspectionsfor seismic resistance shall be in accordance with Section 1705*A*.13.1.1 or 1705*A*.13.1.2, as applicable.

1705*A*.13.1.1 Seismic force-resisting systems. Special inspections of structural steel in the seismic force-resisting systems in buildings and structures assigned to Seismic Design Category~~B, C,~~ D, E or F shall be performed in accordance with the quality assurance requirements of AISC 341 *as modified by Section 1705A.2.1 of this code*.

~~Exceptions: …~~ (Existing deletion of exception)

1705*A*.13.1.2 Structural steel elements. Special inspections of structural steel elements in the seismic force-resisting systems of buildings and structures assigned to Seismic Design Category ~~B, C,~~ D, E or F other than those covered in Section 1705*A*.13.1.1, including struts, collectors, chords and foundation elements, shall be performed in accordance with the quality assurance requirements of AISC 341 *as modified by Section 1705A.2.1 of this code*.

~~Exceptions: …~~ (Existing deletion of exception)

1705*A*.13.2 Structural wood. For the seismic force-resisting systems of structures assigned to Seismic Design Category~~C,~~ D, E or F:

1. Continuous special inspection shall be required during field gluing operations of elements of the seismic force-resisting system.
2. Periodic special inspection shall be required for nailing, bolting, anchoring and other fastening of elements of the seismic force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, shear panels and hold-downs.

~~Exceptions: …~~ (Existing deletion of exception)

1705*A*.13.3 Cold-formed steel light-frame construction. For the seismic force-resisting systems of structures assigned to Seismic Design Category ~~C,~~ D, E or F, periodic special inspection shall be required for both:

1. Welding operations of elements of the seismic force-resisting system.
2. Screw attachment, bolting, anchoring and other fastening of elements of the seismic force-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

**~~Exceptions:~~** ~~…~~ (Existing deletion of exception)

**1705*A*.13.4 *Special inspection for special seismic certification.* ~~Designated seismic systems.~~** For structures assignedto Seismic Design Category ~~C,~~ D, E or F, the special inspector shall examine *equipment and components* ~~designated seismic systems~~ requiring *special* seismic *certification* ~~qualification~~ in accordance with *Section ~~1705A.13.3~~1705A.14.3 or* ASCE 7 Section 13.2.2 and verify that the label, anchorage and mounting conforms to the certificate of compliance.

**1705*A*.13.5 Architectural components.** Periodic special inspectionis required for the erection and fastening of exterior cladding, interior and exterior nonbearing walls*, ceilings*, and interior and exterior veneer in structures assigned to Seismic Design CategoryD, E or F.

**~~Exceptions:~~** ~~…~~ (Existing deletion of exception)

**…**

***1705A.13.5.2* *Structural sealant glazing.*** *Special inspection shall be in accordance with Section 2410.2 item 9.*

**1705*A*.13.6 Plumbing, mechanical and electrical components.** Periodicspecial inspectionof plumbing, mechanical and electrical components shall be required for the following:

1. Anchorage of electrical equipment for emergency or standby power systems in structures assigned to Seismic Design Category~~C,~~ D, E or F.
2. Anchorage of other electrical equipment in structures assigned to Seismic Design Category *D,* E or F.
3. Installation and anchorage of piping systems designed to carry hazardous materials and their associated mechanical units in structures assigned to Seismic Design Category ~~C,~~ D, E or F.
4. Installation and anchorage of ductwork designed to carry hazardous materials in structures assigned to Seismic Design Category~~C,~~ D, E or F.
5. Installation and anchorage of vibration isolation systems in structures assigned to Seismic Design Category~~C,~~ D, E or F where the approved construction documentsrequire a nominal clearance of 1/4 inch (6.4 mm) or less between the equipment support frame and restraint.
6. Installation of mechanical and electrical equipment, including duct work, piping systems and their structural supports, where automatic sprinkler systems are installed in structures assigned to Seismic Design Category ~~C,~~ D, E or F to verify one of the following:
   1. Minimum clearances have been provided as required by Section 13.2.3 ASCE/SEI 7.
   2. A nominal clearance of not less than 3 inches (76 mm) has been provided between automatic sprinkler system drops and sprigs and structural members not used collectively or independently to support the sprinklers; equipment attached to the building structure; and other systems’ piping.

Where flexible sprinkler hose fittings are used, special inspection of minimum clearances is not required.

**1705*A*.13.8 Seismic isolation *and damping* system*s*.** Periodic special inspection shall be provided for seismic isolation *and damping* system*s* in ~~seismically isolated~~ structures assigned to Seismic Design Category ~~B, C,~~ D, E or F during the fabrication and installation of isolator units and energy dissipation devices*.* *Continuous special inspection is required for prototype and production testing of isolator units and damping devices.*

**~~1705.13.9 Cold-formed steel special bolted moment frames.~~** ~~Periodic special inspection shall be provided for the installation of cold-formed steel special bolted moment frames in the seismic force-resisting systems of structures assigned to Seismic Design Category~~~~D, E or F.~~

**1705*A*.14 Testing for seismic resistance.** Testing for seismic resistance shall be required as specified in Sections 1705*A*.14.1 through 1705*A*.14.4, unless exempted from special inspectionsby the exception~~s~~ of Section 1704*A*.2.

**1705*A*.14.1 Structural steel.** Nondestructive testing for seismic resistance shall be in accordance with Section 1705*A*.14.1.1 or 1705*A*.14.1.2, as applicable.

**1705*A*.14.1.1 Seismic force-resisting systems.** Nondestructive testing of structural steel in the seismic force-resisting systems in buildings and structures assigned to Seismic Design Category ~~B, C,~~ D, E or F shall be performed in accordance with the quality assurance requirements of AISC 341.

**~~Exceptions:~~** ~~…~~ (Existing deletion of exception)

**1705*A*.14.1.2 Structural steel elements.** Nondestructive testing of structural steel elements in the seismic force-resisting systems of buildings and structures assigned to Seismic Design Category~~B, C,~~ D, E or F other than those covered in Section 1705*A*.14.1.1, including struts, collectors, chords and foundation elements, shall be performed in accordance with the quality assurance requirements of AISC 341.

**~~Exceptions:~~** ~~…~~ (Existing deletion of exception)

**1705*A*.14.2 Nonstructural Components.** For structures assigned to Seismic design Category ~~B, C,~~ D, E or F, where requirements of Section 13.2.1 of ASCE 7 for non-structural components, supports, or attachments are met by *manufacturer’s certification* ~~seismic qualification~~ as specified in Item 2 therein, the registered design professional shall specify on the approved construction documents the requirements for seismic *certification* ~~qualification~~ by analysis~~,~~ *or* testing. ~~or experience data.~~ Certificates of compliance for the ~~seismic qualification~~ *manufacturer’s certification* shall be submitted to the building official as specified in Section 1704*A*.5. …

***1705A.14.2.1* *Structural sealant glazing testing.*** *Testing and the manufacturer’s certification shall be in accordance with Section 2410.1.2.*

**1705*A*.14.3 *Special Seismic Certification. /*~~Designated Seismic System.~~** For structures assigned to Seismic design Category ~~C,~~ D, E or F*,* ~~and with designated seismic systems~~ *equipment and components* that are subject to the requirements of Section 13.2.2 of ASCE 7 for *special seismic* certification, the registered design professional shall specify on the approved construction documents the requirements to be met by analysis~~,~~ *or* testing ~~or experience data~~ as specified therein. Certificates of compliance documenting that the requirements are met shall be submitted to the building official as specified in Section 1704*A*.5. …

**1705*A*.14.4 Seismic isolation *and damping* systems.** Seismic isolation *and damping* systems in ~~seismically isolated~~ structures assigned to Seismic Design Category ~~B, C,~~ D, E or F shall be tested in accordance with Section 17.8 *and 18.6* of ASCE 7. …

…

***~~1705A.20 Sealing of mass timber.~~*** *~~Periodic special inspections of sealants or adhesives shall be conducted where sealant or adhesive required by Section 703.9 is applied to mass timber building elements as designated in the approved construction documents.~~*

**…**

**Notation** **for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code section 81053.

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 18A SOILS AND FOUNDATIONS*.*

**CHAPTER 18A**

**SOILS AND FOUNDATIONS**

Adopt Chapter 18 of the 2021 IBC as Chapter 18A of the 2022 CBC as amended below. All existing California amendments that are not revised below shall continue without change.

Remove “User Note” at beginning of Chapter 18

**…**

**1803*A*.1 General.** Geotechnical investigations shall be conducted in accordance with Section 1803*A*.2 and reported in accordance with Section *1803A.7.* ~~Where required by the building official or where geotechnical investigations involve in-situ testing, laboratory testing or engineering calculations, such investigations shall be conducted by a registered design professional.~~

**…**

**1803*A*.2 Investigations required.** Geotechnical investigations shall be conducted in accordance with Sections 1803*A*.3 through *1803A.6.*

**Exception*s*:** ~~The building official shall be permitted to waive the requirement for a geotechnical investigation where satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions in Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 and 1803.5.11.~~

1. …

**…**

**1803*A*.5.4 Ground-water table.** A subsurface soil investigation shall be performed to determine whether the existing ground water table is above or within 5 feet (1524 mm) below the elevation of the lowest floor level where such floor is located below the finished ground level adjacent to the foundation.

**~~Exception: …~~** (Existing deletion of exception)

**…**

**1805*A*.2 Dampproofing.** Where hydrostatic pressure will not occur as determined by Section 1803*A*.5.4, floors and walls ~~for other than wood foundation systems~~ shall be dampproofed in accordance with this section. ~~Wood foundation systems shall be constructed in accordance with AWC PWF.~~

**…**

**1807*A*.1.1 Design lateral soil loads.** Foundation walls shall be designed for the lateral soil loads ~~set forth in Section 1610~~ *determined by a geotechnical investigation, in accordance with Section 1803A.*

…

**1807*A*.1.3 Rubble stone foundation walls.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* (Existing deletion of IBC Section 1807.1.3)

**1807*A*.1.4 Permanent wood foundation systems.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* (Existing deletion of IBC Section 1807.1.4)

**1807*A*.1.5 Concrete and masonry foundation walls.** Concrete and masonry foundation walls shall be designed in accordance with Chapter 19*A* or 21*A*, as applicable.

**~~Exception: …~~** (Existing deletion of exception)

**~~1807.1.6 Prescriptive design of concrete and masonry foundation walls. …~~** (Existing deletion of IBC Section 1807.1.6, including all subsections and Tables)

**…**

**1807*A*.2.2 Design lateral soil loads.** Retaining walls shall be designed for the lateral soil loads ~~set forth in Section 1610~~ *determined by a geotechnical investigation in accordance with Section 1803A* *and shall not be less than eighty percent of the lateral soil loads determined in accordance with Section 1610A. For use with the load combinations, lateral soil loads due to gravity loads surcharge shall be considered gravity loads and seismic earth pressure increases due to earthquake shall be considered as seismic loads*. For structures assigned to Seismic Design Category D, E, or F, the design of retaining walls supporting more than 6 feet (1829 mm) of backfill height shall incorporate the additional seismic lateral earth pressure in accordance with the geotechnical investigation where required in Section 1803*A*.2.

…

***1807A.2.~~4~~5 Freestanding cantilever walls.*** *Freestanding cantilever walls shall comply with Section 15.6.8 of ASCE 7. ~~A stability check against the possibility of overturning shall be performed for isolated spread footings which support freestanding cantilever walls. The stability check shall be made by dividing R~~~~p~~ ~~used for the wall by 2.0. The allowable soil pressure may be doubled for this evaluation.~~*

***~~Exception:~~*** *~~For overturning about the principal axis of rectangular footings with symmetrical vertical loading and the design lateral force applied, a triangular or trapezoidal soil pressure distribution which covers the full width of the footing will meet the stability requirement.~~*

…

**1808*A*.8 Concrete foundations.** The design, materials and construction of concrete foundations shall comply with Sections 1808*A*.8.1 through 1808*A*.8.6 and the provisions of Chapter 19*A*.

**~~Exception: …~~** (Existing deletion of exception)

…

**TABLE 1808*A*.8.1**

**MINIMUM SPECIFIED COMPRESSIVE STRENGTH *f*** ′***c* OF CONCRETE OR GROUT**

| **FOUNDATION ELEMENT OR CONDITION** | **SPECIFIED COMPRESSIVE STRENGTH, *f*** ′***c*** |
| --- | --- |
| ~~1. Foundations for structures assigned to Seismic Design Category A, B or C~~ | ~~2,500 psi~~ |
| ~~2a. Foundations for Group R or U occupancies of light-frame construction, two stories or less in height, assigned to Seismic Design Category D, E or F~~ | ~~2,500 psi~~ |
| ~~2b~~*1*. Foundations for structures assigned to Seismic Design Category D, E or F | 3,000 psi |
| ~~3~~*2*. Precast nonprestressed driven piles | 4,000 psi |
| ~~4~~*3*. Socketed drilled shafts | 4,000 psi |
| ~~5~~*4*. Micropiles | 4,000 psi |
| ~~6~~*5*. Precast prestressed driven piles | 5,000 psi |

For SI: 1 pound per square inch = 0.00689 MPa.

…

**1808*A*.8.6 Seismic requirements.** See Section 1905*A* for additional requirements for foundations of structures assigned to Seismic Design Category ~~C,~~ D, E or F.

For structures assigned to Seismic Design Category D, E or F, provisions of Section 18.13 of ACI 318 shall apply where not in conflict with the provisions of Sections 1808*A* through 1810*A*.

**~~Exceptions: …~~** (Existing deletion of exceptions)

…

**1809*A*.7 Prescriptive footings for light-frame construction.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* (Existing deletion of IBC Section 1809.7, including all subsections and Table 1809.7)

**1809*A*.8 Plain concrete footings.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* (Existing deletion of IBC Section 1809.8)

**1809*A*.9 Masonry-unit footings.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* (Existing deletion of IBC Section 1809.9, including all subsections)

**1809*A*.10 Pier and curtain wall foundations.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.*(Existing deletion of IBC Section 1809.10)

…

**1809*A*.12 Timber footings.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* (Existing deletion of IBC Section 1809.12)

…

***1809A.15 Grade beams. [DSA-SS, DSA-SS/CC]*** *~~For structures assigned to Seismic Design Category D, E or F,~~ Where grade beams in shallow foundations are provided, they shall comply with Section 1810A.3.12.*

…

***1810A.3.1.5.1 Helical piles seismic requirements.*** *For structures assigned to Seismic Design Category D, E or F, capacities of helical piles shall be determined in accordance with Section 1810A.3.3 by at least two project-specific preproduction tests for each soil profile, size and depth of helical pile. At least two percent of all production piles shall be proof tested to the load determined in accordance with Section 1617A.1.~~16~~15. …*

…

**~~1810.3.2.1.2 ACI 318 Equation (25.7.3.3). …~~** (Existing deletion of IBC Section 1810.3.2.1.2)

…

**1810*A*.3.2.4 Timber.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* (Existing deletion of IBC Section 1810.3.2.4)

…

**1810*A*.3.3.1.9 Helical piles.** The allowable axial design load, *Pa*, of helical piles shall be determined as follows:

*Pa* = 0.5 *Pu*  **(Equation 18*A*-4)**

where *Pu* is the least value of:

1. Base capacity plus shaft resistance of the helical pile. The base capacity is equal to the sumof the areas of the helical bearing plates times the ultimate bearing capacity of the soil or rock comprising the bearing stratum. The shaft resistance is equal to the area of the shaft above the uppermost helical bearing plate times the ultimate skin resistance.
2. Ultimate capacity determined from well-documented correlations with installation torque.
3. Ultimate capacity determined from load tests ~~where required by Section 1810A.3.3.1.2~~.
4. Ultimate axial capacity of pile shaft.
5. Ultimate axial capacity of pile shaft couplings.
6. Sum of the ultimate axial capacity of helical bearing plates affixed to pile.

…

**1810*A*.3.6 Splices.** Splices shall be…

**~~Exception:~~** ~~For buildings assigned to~~ *~~Seismic Design Category~~* ~~A or B, splices need not comply with the 50-percent tension and bending strength requirements where justified by supporting data.~~

…

**1810*A*.3.8 Precast concrete piles.** Precast concrete piles shall be designed and detailed in accordance with ACI 318.

**~~Exceptions:~~**

1. ~~For precast prestressed piles in Seismic Design Category C, the minimum volumetric ratio of spirals or circular hoops required by Section 18.13.5.10.4 of ACI 318 shall not apply in cases where the design includes full consideration of load combinations specified in ASCE 7, Section 2.3.6 or Section 2.4.5 and the applicable overstrength factor, Ω~~~~0~~~~. In such cases, minimum transverse reinforcement index shall be as specified in Section 13.4.5.6 of ACI 318.~~
2. ~~For precast prestressed piles in Seismic Design Categories D through F, the minimum volumetric ratio of spirals or circular hoops required by Section 18.13.5.10.5(c) of ACI 318 shall not apply in cases where the design includes full consideration of load combinations specified in ASCE 7, Section 2.3.6 or Section 2.4.5 and the applicable overstrength factor, Ω~~~~0~~~~. In such cases, minimum transverse reinforcement shall be as specified in Section 13.4.5.6 of ACI 318.~~

**…**

***Exception:*** *Where the axial load from seismic forces is amplified by the applicable overstrength factor, Ω0, the axial load limits in Section 18.13.5.10.6 of ACI 318 may be increased by two times.*

…

**1810*A*.3.9.4 Seismic reinforcement.** ~~Where a structure is assigned to Seismic Design Category C, reinforcement shall be provided in accordance with Section 1810~~*~~A~~*~~.3.9.4.1.~~ Where a structure is assigned to Seismic Design Category D, E or F, reinforcement shall be provided in accordance with Section 1810*A*.3.9.4.2.

…

**1810*A*.3.9.4.1 Seismic reinforcement in Seismic Design Category C.** *Not permitted by DSA-SS, DSA-SS/CC.* ~~For structures assigned to Seismic Design Category C, cast-in-place deep foundation elements shall be reinforced as specified in this section. Reinforcement shall be provided where required by analysis.~~

~~Not fewer than four longitudinal bars, with a minimum longitudinal reinforcement ratio of 0.0025, shall be provided throughout the minimum reinforced length of the element as defined in this section starting at the top of the element. The minimum reinforced length of the element shall be taken as the greatest of the following:~~

1. ~~One-third of the element length.~~
2. ~~A distance of 10 feet (3048 mm).~~
3. ~~Three times the least element dimension.~~
4. ~~The distance from the top of the element to the point where the design cracking moment determined in accordance with Section 1810~~*~~A~~*~~.3.9.1 exceeds the required moment strength determined using the load combinations of ASCE 7, Section 2.3.~~

~~Transverse reinforcement shall consist of closed ties or spirals with a minimum 3/8 inch (9.5 mm) diameter. Spacing of transverse reinforcement shall not exceed the smaller of 6 inches (152 mm) or 8-longitudinal-bar diameters, within a distance of three times the least element dimension from the bottom of the pile cap. Spacing of transverse reinforcement shall not exceed 16 longitudinal bar diameters throughout the remainder of the reinforced length.~~

**~~Exceptions:~~**

* 1. ~~The requirements of this section shall not apply to concrete cast in structural steel pipes or tubes.~~
  2. ~~A spiral-welded metal casing of a thickness not less than the manufacturer’s standard No. 14 gage (0.068 inch) is permitted to provide concrete confinement in lieu of the closed ties or spirals. Where used as such, the metal casing shall be protected against possible deleterious action due to soil constituents, changing water levels or other factors indicated by boring records of site conditions.~~

…

**1810*A*.3.9.4.2.1 Site Classes A through D.** For Site Class A, B, C or D sites, transverse confinement reinforcement shall be provided in the element in accordance with Sections 18.7.5.2, 18.7.5.3, and 18.7.5.4 of ACI 318 within three times the least element dimension *at* ~~of~~ the bottom of the pile cap. A transverse spiral reinforcement ratio of not less than one-half of that required in Table 18.10.6.4(g) of ACI 318 shall be permitted *for concrete deep foundation elements*.

**1810*A*.3.9.4.2.2 Site Classes E and F.** For Site Class E or F sites, transverse confinement reinforcement shall be provided in the element in accordance with Sections 18.7.5.2, 18.7.5.3 and 18.7.5.4 of ACI 318 within seven times the least element dimension *at the bottom* of the pile cap and within seven times the least element dimension *at* ~~of~~ the interfaces of strata that are hard or stiff and strata that are liquefiable or are composed of soft- to medium-stiff clay.

…

**1810A.3.10.4 Seismic ~~reinforcement~~ *requirements.*** ~~For structures assigned to Seismic Design Category C, a permanent steel casing shall be provided from the top of the micropile down to the point of zero curvature. For structures assigned to Seismic Design Category D, E or F, the micropile shall be considered as an alternative system in accordance with Section 104.11. The alternative system design, supporting documentation and test data shall be submitted to the building official for review and approval.~~*For structures assigned to Seismic Design Category D, E or F, a permanent steel casing having a minimum thickness of 3/8 inch shall be provided from the top of the micropile down to a minimum of 120 percent of the point of zero curvature. Capacity of micropiles shall be determined in accordance with Section 1810A.3.3 by at least two project-specific preproduction tests for each soil profile, size and depth of micropile. At least two percent of all production piles shall be proof tested to the load determined in accordance with Section 1617A.1.~~16~~15.*

*Steel casing length in soil shall be considered as unbonded and shall not be considered as contributing to friction. Casing shall provide confinement at least equivalent to hoop reinforcing required by ACI 318 Section ~~18.13.4~~ 18.13.5. …*

…

**1810*A*.3.11.2 Seismic Design Categories D through F.** For structures assigned to Seismic Design Category D, E or F, deep foundation element resistance to uplift forces or rotational restraint shall be provided by anchorage into the pile cap, designed considering the combined effect of axial forces due to uplift and bending moments due to fixity to the pile cap. Anchorage shall develop not less than 25 percent of the strength of the element in tension. Anchorage into the pile cap shall comply with the following:

* 1. In the case of uplift, the anchorage shall be capable of developing the least of the following:
     1. The nominal tensile strength of the longitudinal reinforcement in a concrete element.
     2. The nominal tensile strength of a steel element.
     3. The frictional force developed between the element and the soil multiplied by 1.3.

**Exception:** The anchorage is permitted to be designed to resist the axial tension force resulting from the seismic load effects including overstrength factor in accordance with Section 2.3.6 or 2.4.5 of ASCE 7.

* 1. In the case of rotational restraint, the anchorage shall be designed to resist the axial and shear forces, and moments resulting from the seismic load effects including overstrength factor in accordance with Section 2.3.6 or 2.4.5 of ASCE 7 or the anchorage shall be capable of developing the full axial, bending and shear nominal strength of the element.
  2. The connection between the pile cap and the steel H-piles or unfilled steel pipe piles in structures assigned to Seismic Design Category D, E or F shall be designed for a tensile force of not less than 10 percent of the pile compression capacity.

**Exceptions:**

1. Connection tensile capacity need not exceed the strength required to resist seismic load effects including overstrength of ASCE 7 Section 12.4.3 or 12.14.3.2.
2. ~~Connections need not be provided where the foundation or supported structure does not rely on the tensile capacity of the piles for stability under the design seismic force.~~

…

**1810*A*.3.12 Grade beams.** Grade beams shall comply with the provisions of ACI 318.

**Exception:** Grade beams designed to resist the seismic load effects including overstrength factor in accordance with Section 2.3.6 or 2.4.5 of ASCE 7 *need not comply with Section 18.13.3 of ACI 318*.

…

**1810*A*.4.1.5 Defective timber piles.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* (Existing deletion of IBC Section 1810.4.1.5)

…

***1811A.3 Geotechnical requirements.*** *Geotechnical report for the prestressed rock and soil foundation anchors shall address the following:*

*…*

1. *Class I ~~C~~corrosion ~~P~~protection is required for all permanent and extended temporary anchors in service more than 2 years. A minimum of Class II ~~C~~corrosion ~~P~~protection is required for temporary anchors in service less than or equal to 2 years.*

…

***1811A.4 Structural Requirements.***

*…*

1. *Design loads shall be based upon the load combinations in Section 2.4 of ASCE 7 ~~1605A.3.1~~ and shall not exceed 60 percent of the specified minimum tensile strength of the tendons.*

…

***1812A.4.1 Geotechnical requirements:*** *The geotechnical report for the earth retaining shoring shall address the following:*

*…*

* 1. *Class I corrosion protection is required for all permanent and extended temporary anchors in service more than 2 years. A minimum of Class II ~~C~~corrosion ~~P~~protection is required for temporary anchors in service less than or equal to 2 years.*

…

***1812A.4.2 Structural requirements****:*

1. *Tendons shall be thread-bar anchors conforming to ASTM A722.*
2. *Anchor design loads shall be based upon the load combinations in Section 2.4 of ASCE 7 ~~1605A.3.1~~ and shall not exceed 60 percent of the specified minimum tensile strength of the tendons.*

…

***1812A.4.3 Testing of tie-back anchors****:*

1. *The geotechnical engineer shall keep a record at job site of all test loads, total anchor movement, and report their accuracy.*
2. (Relocate Item #2 to Section 1812A.5, Item #15) *If a tie-back anchor …*
3. (Relocate Item #3 to Section 1812A.5, Item #16) *After a satisfactory test, each…*
4. (Renumber as Item #2) *The shoring design engineer shall specify design loads for each anchor.*

…

***1812A.5 Construction.*** *The construction procedure shall address the following:*

…

1. *Testing of anchors in accordance with Section 1812A.4.1, Item #7 may be performed after post-grouting operations, provided grout has reached strength of 3,000 psi as required by PTI Recommendations for Prestressed Rock and Soil Anchors Section 6.11.*

*…*

1. (Relocated from Section 1812A.4.3, Item #2) *If a tie-back anchor initially fails the testing requirements, the anchor shall be permitted to be regrouted and retested. If anchor continues to fail, the followings steps shall be taken:*
   1. *The contractor shall determine the cause of failure – variations of the soil conditions, installation methods, materials, etc.*
   2. *The contractor shall propose a solution to remedy the problem. The proposed solution will need to be reviewed and approved by the geotechnical engineer, shoring design engineer and building official.*
2. (Relocated from Section 1812A.4.3, Item #3) *After a satisfactory test, each anchor shall be locked-off in accordance with Section 8.4 of PTI Recommendations for Prestressed Rock and Soil Anchors.*

…

***1812A.6 Inspection, survey monitoring and observation.***

1. *The shoring design engineer or his designee shall make periodic ~~inspections of~~ visits to the job site for the purpose of observing the installation of shoring system, testing of tie-back anchors, and monitoring of survey.*

…

***1812A.7 Monitoring of existing ~~DSA-SS, DSA-SS/CC, and OSHPD 1 and 4~~ structures.***

1. *The contractor shall complete a written and photographic log of all existing ~~DSA-SS, DSA-SS/CC, and OSHPD 1 & 4~~ structures within 100 ft or three times depth of shoring, prior to construction. A licensed surveyor shall document all existing substantial cracks in adjacent existing structures.*

…

***1813A.3 Shallow foundations.*** *VSCs under the shallow foundation shall be located symmetrically around the centroid of the footing or load.*

1. *There shall be a minimum of four stone columns under each isolated or continuous/combined footing or approved equivalent.*
2. *The VSCs ~~or deep foundation elements~~ shall not be used to resist tension or overturning uplift from the shallow foundations.*

…

***1813A.5 Construction documents.*** *Construction documents for VSCs, as a minimum, shall include the following:*

…

1. *A note indicating foundation construction shall not commence until the final verified report specified in Section 1813A.2 item 9 has been submitted to and approved by the enforcement agency.*

…

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 19 CONCRETE, Sections

**CHAPTER 19**

**CONCRETE**

Adopt Chapter 19 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

***1909.2.7.5 Test acceptance criteria.*** *Acceptance criteria for post-installed anchors shall be based on an approved evaluation report using criteria adopted in this code. Field tests shall satisfy the following minimum requirements.*

1. *Hydraulic ram method:*

*Anchors tested with a hydraulic jack or spring loaded apparatus shall maintain the test load for a minimum of 15 seconds and shall exhibit no discernible movement during the tension test, e.g., as evidenced by loosening of the washer under the nut.*

*~~For adhesive anchors, where other than bond is being tested,~~ ~~t~~The testing apparatus support locations shall not be ~~located~~ within 1.5 times the anchor’s embedment depth to avoid restricting the concrete shear cone type failure mechanism from occurring.*

***Exception:*** *When denoted accordingly on the approved construction documents, adhesive anchors complying with ACI 318 Equation 17.8.2a and for which concrete breakout does not control the design tensile strength may be tested with apparatus support locations closer than 1.5 times the anchor embedment depth.*

…

…

***1909.2.8 Flat wall insulating concrete form (ICF) systems.*** *ICF systems shall be considered alternative systems. Concrete constructed using ICF systems and attachments to ICF shall be designed for loads in accordance with this code and shall comply with manufacturer’s instructions and industry standards determined applicable by the enforcement agency. Calculations and drawings shall be submitted to the enforcement agency for review and approval prior to construction.*

…

***1909.3.1 ACI 318, Section 11.9.*** *Modify ACI 318 by adding Section 1~~4~~1.9 as follows: …*

…

***1909.3.6 ACI 318, Table 21.2.2.*** *Replace Table 21.2.2 as follows:*

TABLE 21.2.2

STRENGTH REDUCTION FACTOR ϕ FOR MOMENT, AXIAL FORCE, OR COMBINED MOMENT AND AXIAL FORCE

| Net tensile strain (εt) | Classification | ϕ | | | |
| --- | --- | --- | --- | --- | --- |
| Types of transverse reinforcement | | | |
| Spirals conforming to 25.7.3 | | Other | |
| εt < εty | Compression-controlled | 0.75 | (a) | 0.65 | (b) |
| εty < εt < ~~0.005~~(εty+0.003) | Transition1,2 | 0.75 + 0.15 | (c) | 0.65 + 0.25 | (d) |
| εt > ~~0.005~~(εty+0.003) | Tension-controlled3 | 0.9 | (e) | 0.9 | (f) |

1. For sections classified as transition, it shall be permitted to use ϕ corresponding to compression-controlled sections.
2. *et\* is the greater of net tensile strain calculated for P = 0.1Agf’c and ~~0.005~~(εty + 0.003).*
3. *For sections with factored axial compression force Pu ≥ 0.1Agf’c,* ϕ *shall be calculated using equation (c) or (d) for sections classified as transition, as applicable.*

***1909.3.7 ACI 318, Section 25.2.10.*** *Replace ACI 318 Section 25.2.10 by the following:*

25.2.10 - For ties and hoops in columns to be placed with shotcrete, minimum clear spacing shall be 3 in. *Shotcrete shall not be applied to spirally tied columns.*

***1909.3.8 ACI 318, Section 26.5.2.*** *Modify ACI 318 Section 26.5.2.1 by replacing items (l), (m), and (n) and adding item (q) as follows:*

(l) Shotcrete surfaces intended to receive subsequent shotcrete placement *following an interruption of 30 minutes or more* shall be roughened to a full amplitude of approximately ¼ in. before the shotcrete has reached final set. *The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or a mechanical method acceptable to the enforcement agency.*

(m) Before placing additional material onto hardened shotcrete, laitance shall be removed, joints shall be cleaned, and the surface shall be dampened. *Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.*

(n) In-place fresh concrete that exhibits sags, sloughs, segregation, honeycombing, sand pockets, or other obvious defects shall be removed and replaced. *Shotcrete above sags and sloughs shall be removed and replaced while still plastic.*

…

*(q) Surface preparation: Concrete or masonry to receive shotcrete shall have the entire surface thoroughly cleaned and roughened by a mechanical method acceptable to the enforcement agency, and just prior to receiving shotcrete, shall be thoroughly cleaned of all debris, dirt and dust. Concrete and masonry shall be brought to a saturated surface-dry (SSD) before shotcrete is deposited.*

***1909.3.~~7~~9 ACI 318, Section 26.12.2.1(a).*** *…*

…

***1909.4.1 General.*** *Shotcrete shall also conform to the provisions of ACI 506.2 and ACI 506R. The specified compressive strength of shotcrete shall not be less than 4,000 psi (27.6 MPa). The use of a shotcrete mockup panel to qualify bar clearance dimensions in accordance with ACI 318 Section 25.2.7.1 or contact lap splices in accordance with ACI 318 Section 25.5.1.7 is subject to the approval of the building official. Tolerances for shotcrete construction shall be defined by the construction documents.*

***1909.4.2 ~~Preconstruction t~~Tests and Inspections.*** *Preconstruction tests of one or more ~~A test~~ shotcrete mockup panels prepared in accordance with Section ~~1908.5~~ 1705A.3.9.2 ~~is~~ are required. ~~Approval from the enforcement agency must be obtained prior to performing test panels.~~ In addition to testing requirements in ACI 318, special inspection and testing shall be in accordance with Section 1705A.3.9.*

***~~1909.4.3 Aggregate.~~*** *~~For structural walls, when total rebar in any direction is more than 0.31 in~~~~2~~~~/ft. or rebar size is larger than No. 5, shotcrete shall conform to coarse aggregate grading No. 2 in accordance with Table 1.1.1 of ACI 506R.~~*

***~~1909.4.4 Surface preparation.~~*** *~~Concrete or masonry to receive shotcrete shall have the entire surface thoroughly cleaned and roughened by a mechanical method acceptable to the enforcement agency, and just prior to receiving shotcrete, shall be thoroughly cleaned of all debris, dirt and dust. Concrete and masonry shall be brought to a saturated surface-dry (SSD) before shotcrete is deposited.~~*

***~~1909.4.5 Joints.~~*** *~~The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or a mechanical method acceptable to the enforcement agency. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.~~*

***~~1909.4.6 Curing.~~*** *~~Shotcrete shall be maintained above 50°F (10°C) during the curing periods specified in Section 1908.9.~~*

***1909.4.~~7~~3 Forms and ground wires for shotcrete.*** *…*

***~~1909.4.8 Placing.~~*** *~~Shotcrete shall be placed in accordance with ACI 506.2 and ACI 506R. In addition to testing requirements in Section 1908, special inspection and testing shall be in accordance with Section 1705A.19.~~*

…

**Notation:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 19*A* CONCRETE, Sections

**CHAPTER 19*A***

**CONCRETE**

Adopt Chapter 19 of the 2021 IBC as Chapter 19*A* of the 2022 CBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

**1901*A*.2 ~~Plain and r~~*R*einforced concrete.** Structural concrete shall be designed and constructed in accordance with the requirements of this chapter and ACI 318 as amended in Section 1905*A* of this code*, except that plain concrete is not permitted*. Except for the provisions of Sections 1904*A* and 1907*A*, the design and construction of slabs on grade shall not be governed by this chapter unless they transmit vertical loads or lateral forces from other parts of the structure to the soil.

…

**1901*A*.7.1 Cast-in-place concrete tolerances.** Structural tolerances for cast-in-place concrete structural elements shall be in accordance with ACI 117.

**Exceptions:**

1. Group R-3 detached one- or two-family dwellings are not required to comply with this section.
2. Shotcrete is not required to comply with this section. ***[DSA-SS]*** *Tolerances for shotcrete construction shall be defined by the construction documents.*

…

**1903*A*.2 Special inspections.** *Where required,* special inspections *and tests shall be in accordance with Chapter 17A and Section 1910A.*

**…**

**1903A.4 Flat wall insulating concrete form (ICF) systems.** *Insulating concrete form material used for forming flat concrete walls shall conform to ASTM E2634.* [Reserved for OSHPD] ***[DSA-SS]*** *ICF systems shall be considered alternative systems. Concrete constructed using ICF systems and attachments to ICF shall be designed for loads in accordance with this code and shall comply with manufacturer’s instructions and industry standards determined applicable by the enforcement agency. Calculations and drawings shall be submitted to the enforcement agency for review and approval prior to construction.*

**…**

***1903A.8 Welding of reinforcing bars.****Modify ACI 318 Section ~~26.6.4.1(b)~~ 26.6.4.2(b) by adding the following: …*

**…**

**1904*A*.1 Structural concrete.** Structural concrete shall conform to the durability requirements of ACI 318.

***~~Exception: ...~~***(Existing deletion of exception)

**…**

**1905*A*.1 General.** The text of ACI 318 shall be modified as indicated in Sections 1905*A.1.1* through *1905A.1.~~15~~17.*

**~~1905.1.1 ACI 318 Section 2.3. …~~** (Existing deletion of IBC Section 1905.1.1)

**~~1905.1.2 ACI 318, Section 18.2.1. …~~** (Existing deletion of IBC Section 1905.1.2)

**~~1905.1.3 ACI 318, Section 18.5. …~~** (Existing deletion of IBC Section 1905.1.3)

***1905A.1.3 ACI 318, Section 9.6.1.3.*** *Modify ACI 318, Section 9.6.1.3 by adding the following:*

*This section shall not be used for members that resist seismic loads, except for either of the following conditions: ~~that reinforcement provided for foundation elements for one-story wood-frame or one-story light steel buildings need not be more than one-third greater than that required by analysis for all loading conditions~~.*

1. *Foundation ~~elements~~ members for one-story wood-frame or one-story light steel buildings.*
2. *Foundation members designed for seismic load combinations including the overstrength factor.*

**~~1905.1.4 ACI 318, Section 18.11.~~****~~…~~**(Existing deletion of IBC Section 1905.1.4)

**~~1905.1.5 ACI 318 Section 18.13.1.1. …~~** (Existing deletion of IBC Section 1905.1.5)

***~~1905.1.6 ACI 318, Section 14.6. …~~*** (Existing deletion of IBC Section 1905.1.6)

***~~1905.1.7 ACI 318, Section 14.1.4. …~~*** (Existing deletion of IBC Section 1905.1.7)

**…**

***1905A.1.~~10~~9 ACI 318, Section 18.5.* …**

***1905A.1.~~11~~10 ACI 318, Section 18.10.6.5. …***

***1905A.1.~~12~~11 ACI 318, Section 18.12.6. …***

**…**

Note to Publisher: The following sub-section includes text and a table whose origin is a new adopted material standard of this code (ACI 318). This new standard has revised the section and table this amendment pertains to such that inclusion of the source language is necessary. The base language from ACI 318 is shown here in vertical text (not italicized, underlined, nor highlighted) even though it is not continued from the prior version. This text should be printed along with the amendment text, which is formatted in accordance with the legend at the beginning of this document.

***1905A.1.~~9~~12 ACI 318, Section 19.2.1.1 and Table 19.2.1.1.*** *Modify ACI 318, Section 19.2.1.1 and Table 19.2.1.1 as follows:*

*~~For concrete designed and constructed in accordance with this chapter, f’~~~~c~~ ~~shall not be less than 3,000 psi (20.7 MPa). Reinforced normal weight concrete with specified compressive strength higher than 8,000 psi (55 MPa) shall require prior approval of structural design method and acceptance criteria by the enforcement agency.~~*

19.2.1.1 - The value of f’c shall be in be in accordance with (a) through *(e)*:

1. Limits for f’c in Table 19.2.1.1. Limits apply to both normalweight and lightweight concrete.
2. Durability requirements in Table 19.3.2.1
3. Structural strength requirements
4. f’c for lightweight concrete in special moment frames and special structural walls, and their foundations, shall not exceed 5000 psi, unless demonstrated by experimental evidence that members made with lightweight concrete provide strength and toughness equal to or exceeding those of comparable members made with normalweight concrete of the same strength.
5. (Relocated from body of the section to sub-section e) *Concrete with specified compressive strength higher than 8,000 psi (55 MPa) shall require prior approval of structural design method and acceptance criteria by the enforcement agency.*

| **Application** | **Minimum**  **fc’, psi** |
| --- | --- |
| General (Relocated from body of the section to the table) | *3000* |
| ~~Foundations for structures assigned to SDC A, B, or C~~ | ~~2500~~ |
| *~~Foundations for Residential and Utility use and occupancy classification with stud bearing wall construction two stories or less assigned to SDC D, E, or F~~* | ~~2500~~ |
| *~~Foundations for structures assigned to SDC D, E, or F other than Residential and Utility use and occupancy classification with stud bearing wall construction two stories or less~~* | ~~3000~~ |
| Special moment frames  Special structural walls with Grade 60 or 80 reinforcement | 3000 |
| Special structural walls with Grade 100 reinforcement | 5000 |
| Precast-nonprestressed driven piles  Drilled shafts | 4000 |
| Precast-prestressed driven piles | 5000 |
| *Shotcrete* | *4000* |

…

Note to Publisher: The following sub-section includes a table whose origin is a new adopted material standard of this code (ACI 318). This new standard has revised a term the term “0.005” to “εty+0.003” in each of the last two rows of the first column. This change (highlighted below) should be included in the printing of this section but should not be italicized nor underlined, as it is neither a model code revision nor a California amendment.

***1905A.1.13 ACI 318, Table 21.2.2.*** *Replace Table 21.2.2 as follows:*

TABLE 21.2.2

STRENGTH REDUCTION FACTOR ϕ FOR MOMENT, AXIAL FORCE, OR COMBINED MOMENT AND AXIAL FORCE

| Net tensile strain (εt) | Classification | ϕ | | | |
| --- | --- | --- | --- | --- | --- |
| Types of transverse reinforcement | | | |
| Spirals conforming to 25.7.3 | | Other | |
| εt < εty | Compression-controlled | 0.75 | (a) | 0.65 | (b) |
| εty < εt < ~~0.005~~εty+0.003 | Transition1,2 | 0.75 + 0.15 | (c) | 0.65 + 0.25 | (d) |
| εt > ~~0.005~~εty+0.003 | Tension-controlled3 | 0.9 | (e) | 0.9 | (f) |

1. For sections classified as transition, it shall be permitted to use ϕ corresponding to compression-controlled sections.
2. *et\* is the greater of net tensile strain calculated for P = 0.1Agf’c and ~~0.005~~εty + 0.003.*
3. *For sections with factored axial compression force Pu ≥ 0.1Agf’c,* ϕ *shall be calculated using equation (c) or (d) for sections classified as transition, as applicable.*

…

Note to Publisher: The following sub-sections include text whose origin is a new adopted material standard of this code (ACI 318). Amendments previously located in Section 1908A are relocated here because of their relevance to these ACI 318 sections and the deletion of model code Section 1908 with which they were previously associated. The base language from ACI 318 is shown here in vertical text (not italicized, underlined, nor highlighted) even though it is not continued from the prior version. This text should be printed along with the amendment text, which is formatted in accordance with the legend at the beginning of this document.

***1905A.1.15 ACI 318, Section 25.2.10.*** *Replace ACI 318 Section 25.2.10 by the following:*

25.2.10 - For ties and hoops in columns to be placed with shotcrete, minimum clear spacing shall be 3 in. *Shotcrete shall not be applied to spirally tied columns.*

***1905A.1.16 ACI 318, Section 26.5.2.*** *Modify ACI 318 Section 26.5.2.1 by replacing items (l), (m), and (n) and adding item (q) as follows:*

1. Shotcrete surfaces intended to receive subsequent shotcrete placement *following an interruption of 30 minutes or more* shall be roughened to a full amplitude of approximately ¼ in. before the shotcrete has reached final set. *The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or a mechanical method acceptable to the enforcement agency.*
2. Before placing additional material onto hardened shotcrete, laitance shall be removed, joints shall be cleaned, and the surface shall be dampened. *Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.*
3. In-place fresh concrete that exhibits sags, sloughs, segregation, honeycombing, sand pockets, or other obvious defects shall be removed and replaced. *Shotcrete above sags and sloughs shall be removed and replaced while still plastic.*

…

1. *Surface preparation: Concrete or masonry to receive shotcrete shall have the entire surface thoroughly cleaned and roughened by a mechanical method acceptable to the enforcement agency, and just prior to receiving shotcrete shall be thoroughly cleaned of all debris, dirt and dust. Concrete and masonry shall be brought to a saturated surface-dry (SSD) condition before shotcrete is deposited.*

…

***1905A.1.~~15~~17 ACI 318, Section 26.12.2.1(a).*** …

…

Note to Publisher: Sections 1908.2 through 1908.10.3 of the previous version of the model code have been removed from the current version. Prior amendments associated with those deleted sections have been relocated herein to the associated sections to which they apply. Those prior amendments should no longer be printed in Section 1908A except as noted below.

**1908*A*.1 General.** Shotcrete shall be in accordance with the requirements of ACI 318 *and the provisions of ACI 506R. ~~The specified compressive strength of shotcrete shall not be less than 4,000 psi (27.6 MPa)~~*~~.~~*The use of a shotcrete mockup panel to qualify bar clearance dimensions in accordance with ACI 318 Section 25.2.7.1 or contact lap splices in accordance with ACI 318 Section 25.5.1.7, is subject to the approval of the building official.*

***[DSA-SS] Exception:*** *The reference to ACI 506R shall be to ACI 506.2, unless otherwise approved by the enforcing agent.*

(Following paragraph relocated to Section 1905A.1.16) *Concrete or masonry…*

***1908A.2 Tests and Inspections.*** *Preconstruction tests of one or more shotcrete mockup panels prepared in accordance with Section 1705A.3.9.2 are required. In addition to testing requirements in ACI 318, special inspection and testing shall be in accordance with Section 1705A.3.9.*

…

***1908A.~~11~~3 Forms and ground wires for shotcrete.*** *…*

***~~1908A.12 Placing.~~*** *~~Shotcrete shall be placed in accordance with ACI 506R. In addition to testing requirements in Section 1908A, special inspection and testing shall be in accordance with Section 1705A.19.~~*

***~~[DSA-SS] Exception:~~*** *~~The reference to ACI 506R shall be to ACI 506.2 and ACI 506R.~~*

…

***1910A.5.5 Test acceptance criteria.*** *Acceptance criteria for post-installed anchors shall be based on an approved evaluation report using criteria adopted in this code. Field tests shall satisfy the following minimum requirements.*

* 1. *Hydraulic ram method:*

*Anchors tested with a hydraulic jack or spring loaded apparatus shall maintain the test load for a minimum of 15 seconds and shall exhibit no discernible movement during the tension test, e.g., as evidenced by loosening of the washer under the nut.*

*~~For adhesive anchors, where other than bond is being tested,~~ ~~t~~The testing apparatus support locations shall not be ~~located~~ within 1.5 times the anchor’s embedment depth to avoid restricting the concrete shear cone type failure mechanism from occurring.*

***Exception:*** *When denoted accordingly on the approved construction documents, adhesive anchors complying with ACI 318 Equation 17.8.2a and for which concrete breakout does not control the design tensile strength may be tested with apparatus support locations closer than 1.5 times the anchor embedment depth.*

…

…

**Notation:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

# Chapter 20 ALUMINUM

**CHAPTER 20**

**ALUMINUM**

Adopt Chapter 20 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

# Chapter 21 MASONRY

**CHAPTER 21**

**MASONRY**

Adopt Chapter 21 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

***2115.1.1 Prohibition:*** *The following design methods, systems, and materials in TMS402/602 are not permitted by DSA:*

1. *Unreinforced Masonry.*
2. *Autoclaved Aerated Concrete (AAC) Masonry.*
3. *Empirical Design of Masonry and prescriptive design of masonry partition walls.*
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*

**…**

***2115.3 Air entrainment.*** *Air-entraining substances shall not be used in grout ~~unless tests are conducted to determine compliance with the requirements of this code~~.*

**…**

***2115.5 Reinforced Grouted Masonry***

***~~2115.5.1 General conditions~~****~~.~~ ~~Prior to grouting, the grout space shall be clean so that all spaces to be filled with grout do not contain mortar projections~~ (Relocate to 2115.5.1; TMS 602 3.3 B.2.c) greater than 1/4 inch (6.4 mm)~~, mortar droppings and other foreign material.~~*

*(Relocate to 2115.5.5; TMS 602 3.5 B.2) All cells shall be solidly filled with grout.*

***Exception:*** *Reinforced hollow-unit masonry laid in running bond used for freestanding site walls or interior nonbearing non-shear wall partitions may be grouted only in cells containing vertical and horizontal reinforcement.*

*(Relocate to 2115.5.2; TMS 602 3.4 B.1) Reinforcement and embedded items shall be clean, properly positioned and securely anchored against moving prior to grouting. (Relocate to 2115.5.3; TMS 602 3.4 D.3 and D.6 (Bolts)) Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent dislocation during grouting. (Relocate to 2115.5.2; TMS 602 3.4 B.3 (Reinforcement) and 2115.5.3; TMS 602 3.4 D.3 and D.6 (Bolts)) Reinforcement, embedded items and bolts shall be solidly embedded in grout. (Relocate to 2115.5.3; TMS 602 3.4 D.3 and D.6 (Bolts)) Anchor bolts in the face shells of hollow masonry units shall be positioned to maintain a minimum of 1/2 inch of grout between the bolt and the face shell.*

*(Relocate to 2115.5.4; TMS 602 3.5 A.3) The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour. ~~At the time of laying, all masonry units shall be free of dust and dirt.~~*

*~~Grout pours greater than 12 inches (300 mm) in height shall be consolidated by mechanical vibration during placement to fill the grout space~~ (Relocate to 2115.5.6; TMS 602 3.5 E.1.b) before loss of plasticity~~, and reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours less than 12 inches in height may be puddled.~~*

*(Relocate to 2115.5.7; TMS 602 3.5 F.1) 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 11/2 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.*

*~~The construction documents shall completely describe~~*

*~~grouting procedures, subject to approval of DSA.~~*

***2115.5.1 TMS 602, Article 3.3 B Placing Mortar and Units.***  *Modify TMS 602 Article 3.3 B.2.c**as follows:*

c. Remove masonry protrusions extending (Relocated from Section 2115.5.1) *greater than* *¼* ~~½~~in. (~~12.7~~ *6.4* mm) ~~or more~~ into cells or cavities to be grouted.

***2115.5.2 TMS 602, Article 3.4 B Reinforcement.***  *Modify TMS 602 Article 3.4 B.1 and Article 3.4 B.3**as follows:*

1. Support reinforcement to prevent displacement caused by construction loads or by placement of grout or mortar, beyond the allowable tolerances. (Relocated from Section 2115.5.1) *Reinforcement and embedded items shall be clean, properly positioned and securely anchored against movement prior to grouting.*

***…***

3. Maintain a clear distance between reinforcing bars and the interior of masonry unit or formed surface of at least 1/4 in. (6.4 mm) for fine grout and 1/2 in. (12.7 mm) for coarse grout, except where cross webs of hollow units are used as supports for horizontal reinforcement. (Relocated from Section 2115.5.1) *Reinforcement and embedded items shall be solidly embedded in grout.*

***…***

***2115.5.3 TMS 602, Article 3.4 D Anchor Bolts.***  *Replace TMS 602 Article 3.4 D.3 and add Articles 3.4 D.5 and 3.4D.6 as follows:*

***…***

*3.* Relocated from Section 211.5.5.1) *Anchor bolts in the wythe or face shells of hollow masonry units shall be positioned to maintain a minimum of ½ in. of grout between the bolt circumference, the wythe or ~~and~~ the face shell. For the portion of the bolt that is within the grouted cell, maintain a clear distance between the bolt and the face of masonry unit and between the head of the bolt and the formed surface of grout of at least 1/4 in. (6.4 mm) when using fine grout and at least 1/2 in. (12.7 mm) when using coarse grout.* (Relocated from Section 2115.5.1) *Bolts shall be solidly embedded in grout.*

***…***

*5.* (Relocated from Section 2115.9.1.3) *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.*

*6.* (Relocated from Section 2115.5.1) *Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent dislocation during grouting.*

***2115.5.4 TMS 602, Article 3.5 A Placing time*** *Modify TMS 602, Article 3.5 A by adding Article 3.5 A.3 as follows:*

***…***

*3.* (Relocated from Section 2115.5.1) *The grouting of any section of a wall between control barriers shall be completed in one day with no interruptions greater than one hour.*

***2115.5.5 TMS 602, Article 3.5 B Confinement.***  *Add the following to TMS 602, Article 3.5 B:*

*2.* (Relocated from Section 2115.5.1) *All cells shall be solidly filled with grout in reinforced hollow unit masonry.* *(Reserved for OSHPD 1 &4)*

***Exception:***(Relocated from Section 2115.5.1) *Reinforced hollow-unit masonry laid in running bond for freestanding site walls or interior nonbearing non-shear wall partitions may be grouted only in cells containing vertical and horizontal reinforcement.*

***2115.5.6 TMS 602, Article 3.5 E Consolidation.***  *Modify TMS 602, Article 3.5 E.1.b**as follows:*

***…***

b. Consolidate pours exceeding 12 in. (305 mm) in height by mechanical vibration, and reconsolidate by mechanical vibration after initial water loss and settlement has occurred~~.~~*,* (Relocated from Section 2115.5.1) *but before plasticity is lost*.

***2115.5.7 TMS 602, Article 3.5 F.1 Grout key.*** *Replace TMS 602, Article 3.5 F.1**as follows:*

1.(Relocated from Section 2115.5.1) *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~~ terminating grout 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~~ terminated a minimum of 1/2 inch (12.7 mm) below the ~~top of the masonry~~ mortar joint.*

***2115.6 ~~Aluminum equipment~~ TMS 602, Article 3.5 Grout placement.***  *Add the following to TMS 602, Article 3.5:*

***3.5 I.*** *Additional Grouting Requirements:*

*1. Grout shall be placed by pumping or an approved alternate method before initial set of hardening occurs.*

*2. Grout shall be placed so that all spaces to be grouted do not contain voids.*

*3. The grout placing time limitation of 1-1/2 hours given in TMS 602 Article 3.5 A shall not be exceeded without a retarding admixture in the grout sufficient to extend workability of the grout for the needed time period.*

*4. 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.*

**…**

***2115.7 ~~Specified c~~Compressive strength, f’m.*** *The minimum specified compressive strength, f'm, ~~assumed~~ in the design shall be ~~2000~~ 1500 psi (~~13.79~~ 10.34* *MPa) for all structural* *masonry construction using materials and details of construction required herein. The value of f’m used to determine nominal strength value in this chapter shall not ~~In no case shall the f 'm assumed in design~~ exceed 3,000 psi (20.7 MPa)* *for concrete masonry and shall not exceed 4,500 psi (31.03 MPa) for clay masonry.*

**…**

***2115.8 Additional testing requirements***

***2115.8.1 Mortar and grout tests. TMS 602, Article 1.4 B Compressive Strength Determination.***  *Modify TMS 602 Article 1.4 B as follows by adding:*

1. *Additional testing requirements:*

*a. At the beginning of all masonry work, at least one test sample of the mortar shall be taken on three successive working days and at least at one-week intervals thereafter. Where mortar is based on a proportion specification, mortar shall be sampled and tested during construction in accordance with ASTM C780, including Annex 4, ~~and 5~~ to verify the proportions specified in ASTM C270, Table 2. Where mortar is based on a property specification, mortar shall be laboratory prepared and tested prior to construction in accordance with ASTM C780 to verify the properties specified in ASTM C270, Table 1 and field sampled and tested during construction in accordance with ASTM C780 to verify the proportions with the laboratory tests. Mortar sampling and testing is not required for preblended mortars in conformance with ASTM C270 with a valid evaluation report.*

*b. 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. The grout shall meet the minimum strength requirement given in ASTM C476/TMS 602 Section 2.2 ~~for mortar and grout~~, or greater as specified.*

*c. Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official.*

*d. Test specimens for mortar and grout shall be made as set forth in ASTM C780/C1586 and ASTM C1019. ~~Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official.~~ When the prism test method is used in accordance with TMS 602 Article 1.4 B.3 ~~or 1.4 B.4~~ during construction, the tests in this section are not required.*

***Exception:*** *For nonbearing nonshear masonry walls not exceeding total wall height of 12 feet above the top of the foundation, mortar test shall be permitted to be limited to those at the beginning of masonry work for each mix design.*

**…**

***2115.8.2******Masonry core testing****.**(Proposal to change 2000 to 1500 in Exception 1, is withdrawn)*

**…**

***2115.9 Modifications to TMS 402.***

***2115.9.1*** *~~Modify TMS 402, Section 7.4.4 as follows:~~*

***~~1~~****~~.~~* (Relocate to 2115.9.2; TMS 402 7.4.4.1)***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.*

***Exception:*** *Reinforced hollow-unit masonry used for freestanding site walls or interior nonbearing nonshear wall partitions shall have horizontal reinforcing spaced not more than 4 feet on center, except as required by TMS 402 Section 7.4.5 when applicable.*

(Relocate to 2115.9.2; TMS 402 7.4.4.1.1) *The minimum reinforcing shall be No. 4, except that No. 3 bars may be used for ties and stirrups. 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 shall be considered as continuous reinforcement.*

(Relocate to 2215.9.2; TMS 402 7.4.4.1.2) *Horizontal reinforcing 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.*

(Relocate to 2115.9.2; TMS 402 7.4.4.1.3) *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.*

(Relocate to 2115.9.2; TMS 402 7.4.4.1.4) *When the reinforcement in bearing walls is designed, placed and anchored in position as for columns, the allowable stresses shall be as for columns.*

(Relocate to 2115.9.2; TMS 402 7.4.4.1.5) *Joint reinforcement shall not be used as principal reinforcement in masonry.*

*~~2.~~* ***~~Minimum reinforcement for masonry columns.~~***(Relocate to 2115.9.1; TMS 402 5.3.1.4(b)) *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.*

(Relocate to 2115.9.1; TMS 402 5.3.1.4(a)) Ties *shall be at least 3/8 inch (10 mm) 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.* ***~~Anchor bolts.~~***(Relocate to 2115.5.3; TMS 602 3.4 D.5) *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 (25 mm) diameter for 12-inch (304.8 mm) nominal masonry.*

***2115.9.1 TMS 402 Sections 5.3.1.4(a) and 5.3.1.4(b).*** *Replace**TMS 402 Sections 5.3.1.4(a) and 5.3.1.4(b) as follows:*

(a)(Relocated from Section 2115.9.1.2) *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.*

(b)(Relocated from Section 2115.9.1.2) *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, or 8 inches (203 mm) for the full column height.*

***2115.9.2 2106A.1.3 TMS 402 Sections 7.4.4.1, and 7.4.5.1.*** *Replace TMS 402 Section 7.4.4.1 as follows and delete Section 7.4.5.1:*

***7.4.4.1*** (Relocated from Section 2115.9.1.1) ***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.*

***Exception:*** *Reinforced hollow-unit masonry used for freestanding site walls or interior non-bearing non-shear wall partitions shall have horizontal reinforcing spaced not more than 4’-0” on center, except for locations in Seismic Design Category F ~~as required by TMS 402 Section 7.4.5 when applicable~~.*

***7.4.4.1.1*** (Relocated from Section 2115.9.1.1) *The minimum reinforcing shall be No. 4, except that No. 3 bars may be used for ties and stirrups. 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 shall be considered as continuous reinforcement.*

***7.4.4.1.2*** (Relocated from Section 2115.9.1.1) *Horizontal reinforcing 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.*

***7.4.4.1.3*** (Relocated from Section 2115.9.1.1) *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.*

***7.4.4.1.4*** (Relocated from Section 2115.9.1.1) *When the reinforcement in bearing walls is designed, placed and anchored in position as for columns, the allowable stresses shall be as for columns.*

***7.4.4.1.5*** (Relocated from Section 2115.9.1.1) *Joint reinforcement shall not be used as principal reinforcement in masonry.*

***…***

***2115.10 Additional requirements for allowable stress design.***

***2115.10.1 TMS 402~~.~~*** *~~Modify by adding Section 8.3.8 as follows:~~****, Section 8.3.4.4 Walls*** *Modify TMS 402, Section 8.3.4.4 as follows by adding:*

*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 themasonry, 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 m~~Masonry walls shall not exceed the height or length-to-thickness ratio nor be less than the minimum thickness as specified in this chapter and as set forth in Table ~~2115.10.1~~ 8.3.4.4.*

***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 ~~2115.10.1~~ 8.3.4.4***  ***MINIMUM THICKNESS OF MASONRY WALLS1,2*** | | |
| --- | --- | --- |
| ***TYPE OF MASONRY*** | ***MAXIMUM RATIO UNSUPPORTED HEIGHT OR LENGTH TO THICKNESS2,3*** | ***NOMINAL MINIMUM THICKNESS (inches)*** |
| *BEARING OR SHEAR WALLS:* | | |
| *1. Stone masonry* | *14* | *16* |
| *2. Reinforced grouted masonry* | *25* | *6* |
| *3. Reinforced hollow-unit masonry* | *25* | *6* |
| *NONBEARING WALLS:* | | |
| *4. Exterior reinforced walls* | *30* | *6* |
| *5. Interior partitions reinforced* | *36* | *4* |

1. *For walls of varying thickness. use the least thickness when determining the height or length to thickness ratio.*
2. *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.*
3. *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.*

*…*

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 21A MASONRY

**CHAPTER 21A**

**MASONRY**

Adopt Chapter 21 of the 2021 IBC as Chapter 21A of the 2022 CBC as amended below. All existing California amendments that are not revised below shall continue without change.

**…**

**SECTION 2101*A***

**GENERAL**

**…**

***2101A.1.3 Prohibition:*** *The following design methods, systems, and materials in TMS402/602 are not permitted by DSA:*

1. *Unreinforced Masonry.*
2. *Autoclaved Aerated Concrete (AAC) Masonry.*
3. *Empirical Design of Masonry and prescriptive design of masonry partition walls.*
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.*

**…**

**2101*A*.2 Design methods.** Masonry shall comply with the provisions of TMS 402, ~~TMS 403~~ or TMS 404 as well as applicable requirements of this chapter.

**…**

**SECTION 2103*A***

**MASONRY CONSTRUCTION MATERIALS**

**2103*A*.1 Masonry units.** Concrete masonry units, clay or shale masonry units, stone masonry units *and* glass unit masonry ~~and AAC masonry units~~ shall comply with Article 2.3 of TMS 602. Architectural cast stone shall conform to ASTM C 1364 and TMS 504. Adhered manufactured stone masonry veneer units shall conform to ASTM C1670. (Relocated from Section 2104A.1) *Architectural cast stone construction shall be considered as an alternative system.* **…**

**2103*A*.4 Metal reinforcement and accessories*.*** Metal reinforcement and accessories shall conform to Article 2.4 of TMS 602. Where unidentified reinforcement*, or bar reinforcement without mill certification,* is approved for use, not less than three tension and three bending tests shall be made on representative specimens of the reinforcement from each shipment and grade of reinforcing steel proposed for use in the work. *Alternatively, the frequency of sampling for unidentifiable reinforcing bars specified in Section 1910A.2 can be used.*

***2103A.5 Air entrainment.*** *Air-entraining substances shall not be used in grout ~~unless tests are conducted to determine compliance with the requirements of this code~~.*

**SECTION 2104*A***

**CONSTRUCTION**

**SECTION 2104*A* CONSTRUCTION**

**2104*A*.1 Masonry construction.** Masonry construction shall comply with the requirements of Sections 2104*A*.1.1 *through 2104A.1.3* and with the requirements of TMS 602 or TMS 604. (Relocated to Section 2103*A*.1) *Architectural cast stone construction shall be considered as an alternative system.*

…

***2104A.1.3 Reinforced Grouted Masonry.***

**Note to Reviewer**: Existing amendments in 2104.A.1.3.1 through 2104.A.1.3.1.2.3 have been rearranged and relocated as modifications to TMS 402/602 in different subsections of this Chapter. Existing amendment language with the same regulatory effect as the provisions in TMS 402/602 is proposed to be repealed to avoid duplication, in conformance with the Nine-Point Criteria.

***~~2104A.1.3.1 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~~* (Relocated to Section 2104A.1.3.2) *greater than 1/4 inch (6.4 mm)~~, mortar droppings and other foreign material~~.* (Relocated to Section 2104A.1.3.9) *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.~~*

(Relocated to Section 2104A.1.3.3) *Reinforcement and embedded items shall be clean, properly positioned and securely anchored against movement prior to grouting.* (Relocated to Section 2104A.1.3.4) *Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent dislocation during grouting.* (Relocated to Section 2104A.1.3.3 and Section 2104A.1.3.4) *Reinforcement, embedded items and bolts shall be solidly embedded in grout.* (Relocated to Section 2104A.1.3.4) *Anchor bolts in the face shells of hollow masonry units shall be positioned to maintain a minimum of ½ in. of grout between the bolt and the face shell.*

(Relocated to Section 2104A.1.3.5) *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.~~*

(Relocated to Section 2104A.1.3.8) *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.*

(Relocated to Section 2104A.1.3.9) *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~~*** (Relocated to Section 2104A.1.3.10) ***Reinforced grouted multi-wythe masonry.***

***~~2104A.1.3.1.1.1~~*** (Relocated to Section 2104A.1.3.10.1) ***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 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.~~ (Relocated to Section 2104A.1.3.10.2) Masonry headers shall not project into the grout space.*
2. *(Relocated to Section 2104A.1.3.10.6) The minimum clear width of 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. Clear width is defined in TMS 602, Table 6, footnote 3. The thickness of the grout between masonry units~~ (Relocated to Section 2104A.1.3.3) 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. *(Relocated to Section 2104A.1.3.10.3) Toothing of masonry walls is prohibited. Racking is to be held to a minimum.*

***~~2104A.1.3.1.1.1.2 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. *(Relocated to Section 2104A.1.3.10.4) The two wythes shall be bonded together with wall ties. Ties shall not be less than No. 9 (W1.7) 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. *(Relocated to Section 2104A.1.3.1) 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. *(Relocated to Section 2104A.1.3.10.6) The clear width of grout space in high-lift grouted masonry shall be a minimum of 3 1/2 inches (89 mm). ~~Clear width is defined in TMS 602, Table 6, footnote 3. 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. *(Relocated to Section 2104A.1.3.10.5) 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. *(Relocated to Section 2104A.1.3.5(b)) 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,~~ (Relocated to Section 2104A.1.3.7) but before plasticity is lost. (Relocated to Section 2104A.1.3.5) 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 Reinforced hollow-unit masonry.~~***

***~~2104A.1.3.1.2.1 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.~~* (Relocated to Section 2104A.1.3.11.2) *All cells shall be solidly filled with grout in reinforced hollow-unit masonry [OSHPD 1 & 4] and shall be constructed using single or double open-end units, except single open-end units shall be used at wall intersections, corners and similar conditions.*

***Exception:*** *Reinforced hollow-unit masonry laid in running bond used for freestanding site walls or interior nonbearing non-shear wall partitions may be grouted only in cells containing vertical and horizontal reinforcement.*

*~~Construction shall be one of the two following methods: The low-lift method per Section 2104A.1.3.1.2.2, or the high-lift method per Section 2104A.1.3.1.2.3.General requirements for construction shall be as follows:~~*

1. *~~Bond shall be provided by lapping units in successive vertical courses.~~* (Relocated to Section 2106A.1.3) *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. (Relocated to Section 2104A.1.3.11.2) *Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear grout space dimension of 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), as determined in accordance with TMS 602 Table 7, footnote 3~~.*
3. *~~Grout shall be a workable mix suitable for placing without segregation and shall be thoroughly mixed.~~* (Relocated to Section 2104A.1.3.9) *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.~~* (Relocated to Section 2104A.1.3.3) *The space between masonry unit surfaces and reinforcement shall be a minimum of one bar diameter.*
5. (Relocated to Section 2104A.1.3.8) *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.* (Relocated to Section 2104A.1.3.11.1) *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 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.~~*

(Relocated to Section 2104A.1.3.6) ***Exception:*** *The 4 feet maximum wall construction may be increased to 5 feet 4 inches for 10-inch nominal and larger hollow-unit masonry.*

***~~2104A.1.3.1.2.3 High-lift grouted construction~~****~~. Where high-lift grouting is used, the method shall be approved by the enforcement agency.~~* (Relocated to Sections 2104A.1.3.1 and 2104A.1.3.5) *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.~~*

***2104A.1.3.1*** ***~~General Conditions. …~~TMS 602, Article 3.2 F Cleanouts.*** *Replace TMS 602, Article 3.2 F**with the following:*

1. *(Relocated from Section 2104A.1.3.1.2.3) Cleanout openings in hollow unit masonry 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.*
2. *(Relocated from Section 2104A.1.3.1.1.1.2) Cleanouts in multi-wythe masonry shall be provided for each pour by leaving out every other unit in the bottom tier wythe of the section being poured or by cleanout openings in the foundation.*
3. *(Relocated from Section 2104A.1.3.1.1.1.2) The foundation or other horizontal construction joints at the cleanouts shall be cleaned of all loose material and mortar droppings before each pour. The cleanouts shall be sealed after inspection and before grouting.*

***2104A.1.3.2 TMS 602, Article 3.3 B Placing Mortar and Units.***  *Modify TMS 602 Article 3.3 B.2.c**as follows:*

c. Remove masonry protrusions extending (Relocated from Section 2104A.1.3.1) *greater than* *¼* ~~½~~in. (~~12.7~~ *6.4* mm) ~~or more~~ into cells or cavities to be grouted.

***2104A.1.3.3 TMS 602,*** ***Article 3.4 B Reinforcement.***  *Modify TMS 602 Article 3.4 B.1 and Article 3.4 B.3**as follows:*

1. Support reinforcement to prevent displacement caused by construction loads or by placement of grout or mortar, beyond the allowable tolerances. (Relocated from Section 2104A.1.3.1) *Reinforcement and embedded items shall be clean, properly positioned and securely anchored against movement prior to grouting.*

***…***

3. Maintain a clear distance between reinforcing bars and the interior of masonry unit or formed surface of at least 1/4 in. (6.4 mm) for fine grout and 1/2 in. (12.7 mm) for coarse grout, *and* (Relocated from Section 2104A.1.3.1.2.1.4) *~~T~~the space between masonry unit surfaces and reinforcement shall be a minimum of one bar diameter*, except where cross webs of hollow units are used as supports for horizontal reinforcement. (Relocated from Section 2104A.1.3.1) *Reinforcement and embedded items shall be solidly embedded in grout.*

***…***

***2104A.1.3.4 TMS 602, Article 3.4 D Anchor Bolts.***  *Replace TMS 602 Article 3.4 D.3 and add Articles 3.4 D.5 and 3.4D.6 as follows:*

***…***

*3.* Relocated from Section 2104A.1.3.1) *Anchor bolts in the wythe or face shells of hollow masonry units shall be positioned to maintain a minimum of ½ in. of grout between the bolt circumference, the wythe or ~~and~~ the face shell.* *For the portion of the bolt that is within the grouted cell, maintain a clear distance between the bolt and the face of masonry unit and between the head of the bolt and the formed surface of grout of at least 1/4 in. (6.4 mm) when using fine grout and at least 1/2 in. (12.7 mm) when using coarse grout.* (Relocated from Section 2104A.1.3.1) *Bolts shall be solidly embedded in grout.*

***…***

1. *(Relocated from Section 2106A.1.1.) 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.*
2. *(Relocated from Section 2104A.1.3.1) Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent dislocation during grouting.*

***2104A.1.3.5*** ***TMS 602, Article 3.5 C Grout pour height*** *Add to TMS 602, Article 3.5 C**the following:*

1. *For grout pours not greater than 4 feet (1219 mm) or 5 feet-4 inches (1651 mm) for 10-inch (254 mm) nominal or wider hollow unit masonry, the top of grout pour shall be at the top of constructed masonry, or within 8 inches (200 mm) of the top of the constructed masonry. Grout pours not terminated at the top of constructed masonry shall comply with TMS 602 Articles 3.5 C.3.a through 3.5 C.3.e.*
2. *Grout pours in excess of 4 feet (1219 mm) or 5 feet-4 inches (1651 mm) for 10-inch (254 mm) nominal or wider hollow unit masonry shall be subject to approval of the enforcement agency.*
3. *Grout pours in excess of 4 feet (1219 mm) or 5 feet-4 inches (1651 mm) for 10-inch (254 mm) nominal or wider hollow unit masonry shall be subject to the following:*
4. *Grouting shall be done in a continuous pour in lifts not exceeding 4 feet (1219 mm) or 5 feet-4 inches (1651 mm) for 10-inch (254 mm) nominal or wider hollow unit masonry.*
5. (Relocated from Section 2104A.1.3.1.1.1.2) *An approved admixture of a type that reduces early water loss and produces an expansive action shall be used.*
6. (Relocated from Section 2104A.1.3.1) *The grouting of any section of a wall between control barriers shall be completed in one day with no interruptions greater than one hour.*
7. *For multiple grout lifts within a grout pour, each grout lift height of wall, column, pier or beam shall be inspected before placement of additional units.*
8. (Relocated from Section 2104A.1.3.1.2.3) *Cleanout openings shall be provided ~~in every cell~~ at the bottom of each pour of grout.*

***2104A.1.3.6 TMS 602, Article 3.5 D Grout lift height.***  *Modify TMS 602, Article 3.5 D**as follows:*

*3. In no case shall lifts exceed 4 feet (1219 mm) in height.*

(Relocated from Section 2104A.1.3.1.2.2) ***Exception:*** *The 4 feet maximum ~~wall construction~~ lift height may be increased to 5 feet 4 inches for 10-inch nominal and larger hollow-unit masonry.*

***2104A.1.3.7 TMS 602, Article 3.5 E Consolidation.***  *Modify TMS 602, Article 3.5 E.1.b**as follows:*

b. Consolidate pours exceeding 12 in. (305 mm) in height by mechanical vibration, and reconsolidate by mechanical vibration after initial water loss and settlement has occurred~~.~~*,* (Relocated from Section 2104A.1.3.1.1.1.2) *but before plasticity is lost*.

***2104A.1.3.******8 TMS 602, Article 3.5 F.1 Grout key.*** *Replace TMS 602, Article 3.5 F.1**as follows:*

1. (Relocated from Section 2104A.1.3.1) *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~~* *terminating grout 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~~ terminated a minimum of 1/2 inch (12.7 mm) below the ~~top of the masonry~~ mortar joint.* (Relocated from Section 2104A.1.3.1.2.1) *Horizontal reinforcement shall be placed in bond beam units with a minimum grout cover of 1 inch (25 mm) above reinforcing steel for each grout pour.*

***2104A.1.3.9 TMS 602, Article 3.5 Grout placement.***  *Add the following to TMS 602, Article 3.5:*

***3.5 I.*** *Additional Grouting Requirements:*

* + - 1. (Relocated from Section 2104A.1.3.1.2.1) *Grout shall be placed by pumping or an approved alternate method ~~and shall be placed~~ before initial set of hardening occurs.*
      2. (Relocated from Section 2104A.1.3.1) *Grout shall be placed so that all spaces to be grouted do not contain voids.*
      3. *The grout placing time limitation of 1-1/2 hours given in TMS 602 Article 3.5 A shall not be exceeded without a retarding admixture in the grout sufficient to extend workability of the grout for the needed time period.*
      4. (Relocated from Section 2104A.1.3.1) *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.1.3.10*** ***~~2104A.1.3.1.1~~ Reinforced grouted*** ***multi-wythe masonry.***

***2104A.1.3.10.1 ~~2104A.1.3.1.1.1~~ General.*** *Reinforced grouted multi-wythe**masonry is that form of composite construction made with clay or shale brick or made with solid concrete building brick in which interior ~~joints~~ spaces of masonry are filled by pouring grout around reinforcement therein as the work progresses.*

***2104A.1.3.10.2 TMS 402 Section 5.1.4.2.2 Masonry headers.***  *Replace TMS 402 Section 5.1.4.2.2 as follows:*

**5.1.4.2.2**(Relocated from Section 2104A.1.3.1) *Masonry headers shall not project into the grout space and shall not be permitted to bond wythes of masonry.*

***2104A.1.3.10.3 TMS 602, Article 3.3 B.5 Placing masonry units – Solid units.*** *Add the following to TMS 602, Article 3.3 B.5:*

*d.* (Relocated from Section 2104A.1.3.1.1.1.1) *Toothing of masonry walls is prohibited. Racking is to be held to a minimum.*

***2104A.1.3.10.4 TMS 602, Article 3.4 C.2 Wall ties*** *Replace TMS 602, Article 3.4 C.2 as follows:*

2.(Relocated from Section 2104A.1.3.1.1.1.2) *The two wythes shall be bonded together with wall ties. Ties shall not be less than No. 9 (W1.7) 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~~ wythe of the wall shall be built up not more than 16 inches (406 mm) ahead of the other ~~tier~~ wythe. 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.*

***2104A.1.3.10.5 TMS 602, Article 3.5 B Confinement*** *Add the following to TMS 602, Article 3.5 B:*

*1.* (Relocated from Section 2104A.1.3.1.1.1.2) *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 be spaced not more than 30 feet (9.1 m) apart.*

***2104A.1.3.10.6 TMS 602, Article 3.5 C Grout pour******height.*** *Add the following to TMS 602, Article 3.5 C:*

*4.* (Relocated from Section 2104A.1.3.1.1.1.1) *The minimum clear width of grout space for multiwythe masonry* *~~low-lift grout masonry~~ for pours not exceeding 4 feet (1.2 m) shall be 2½ inches (64 mm).* (Relocated from Section 2104A.1.3.1.1.1.2) *The clear width of grout space ~~in high-lift grouted masonry~~ for pours exceeding 4 feet (1.2 m) shall be a minimum of 3½ inches (89 mm).*

***2104A.1.3.11 ~~2104A.1.3.1.2~~ Reinforced hollow unit masonry.***

***2104A.1.3.11.1 TMS 602, Article 2.3 A & 2.3 B Masonry unit materials.***  *Add the following to TMS 602, Articles 2.3 A and 2.3 B:*

*1.* (Relocated from Section 2104A.1.3.1.2.1) *The depth of the bond beam channel below the top of the unit in hollow-unit masonry shall be ~~a minimum of~~ 1 ½ inches (38 mm) minimum and the width shall be 3 inches (76 mm) minimum.*

***2104A.1.3.11.2 TMS 602, Article 3.5 B Confinement.***  *Add the following to TMS 602, Article 3.5 B:*

1. *(Relocated from Section 2104A.1.3.1.2.1) All cells shall be solidly filled with grout in reinforced hollow unit masonry.*  ***[OSHPD 1 & 4]*** *and shall be constructed using open end units except single open-end units shall be used at will intersections, corners and similar conditions.*

***Exception:*** *Reinforced hollow-unit masonry laid in running bond for freestanding site walls or interior nonbearing non-shear wall partitions may be grouted only in cells containing vertical and horizontal reinforcement.*

1. *(Relocated from Section 2104A.1.3.1.2.1) Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear grout space dimension of not less than ~~2 inches by 3 inches (51 mm by 76 mm)~~ that given in Section 2103A.3.1.*

**…**

**SECTION 2105A**

**QUALITY ASSURANCE**

**…**

***2105A.2 Compressive strength, f’m.*** *The minimum specified compressive strength, f 'm, ~~assumed~~ in the design shall be ~~2000~~ 1500 psi (~~13.79~~10.34 MPa) for all structural masonry construction using materials and details of construction required herein.* *Testing of ~~the constructed~~ masonry shall be provided in accordance with ~~Section 2105A.5 or Section 2105A.6.~~ TMS 602, Article 1.4 B.*

***Exception:*** *~~Subject to the approval of the enforcement agency, higher~~ Where values of f'm greater than 2000 psi (13.79MPa) are ~~may be~~ used in the design of reinforced grouted multi-wythe masonry and reinforced hollow-unit masonry~~. The approval~~ theyshall be based on prism test results in accordance with TMS 602 Article 1.4 B.3 submitted by the architect or engineer to the enforcement agency 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~~* (Relocated to Sections 2107A.6 and 2108A.4) *exceed 3,000 psi (20.7MPa).*

*~~Where an f'~~~~m~~ ~~greater than 2000 psi (13.79MPa) is approved, t~~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~~ documents. Verification of c~~C~~ompliance with the requirements for the specified strength of ~~constructed~~ masonry during construction shall be provided using prism test method in accordance with ~~Section 2105A.5~~ TMS 602 Article 1.4 B.3. ~~Substantiation for~~ Verification of c~~C~~ompliance with the specified compressive strength prior to the start of construction shall be obtained by using prism test method ~~in Section 2105A.5 and Section 2105A.3~~ in accordance with TMS 602 Article 1.4 B.3.*

**…**

***2105A.3 Mortar and grout tests.*** *~~These tests are to establish whether the masonry components meet the specified component strengths~~.* ***TMS 602, Article 1.4B Compressive Strength Determination.***  *Modify TMS 602 Article 1.4 B as follows by adding:*

1. *Additional testing requirements:*
2. *At the beginning of all masonry work, at least one test sample of the mortar shall be taken on three successive working days and at least at one-week intervals thereafter.* (Relocated from Section 2105A.3, Exception 2) *Where mortar is based on a proportion specification, mortar shall be sampled and tested during construction in accordance with ASTM C780, including Annex 4, to verify the proportions specified in ASTM C270, Table 2. Where mortar is based on a property specification, mortar shall be laboratory prepared and tested prior to construction in accordance with ASTM C780 to verify the properties specified in ASTM C270, Table 1 and field sampled and tested during construction in accordance with ASTM C780 to verify the proportions with the laboratory tests.* ***[DSA-SS]*** *Mortar sampling and testing is not required for preblended mortars in conformance with ASTM C270 with a valid evaluation report.*
3. *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 ~~ASTM C270 Table 1 and~~ ASTM C476/TMS 602 Section 2.2 ~~for mortar and grout respectively~~, or greater as specified.*
4. *Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official. ~~When the prism test method is used during construction, the tests in this section are not required.~~*
5. *Test specimens for mortar and grout shall be made as set forth in ASTM C780/C1586 and ASTM C1019.* *When the prism test method is used in accordance with TMS 602 Article 1.4 B.3 during construction, the tests in this section are not required.*

***Exception:***

1. *For nonbearing nonshear masonry walls not exceeding total wall height of 12 feet above top of foundation, mortar tests shall be permitted to be limited to those at the beginning of masonry work for each mix design.*
2. *(Relocate Exception 2 language to body of 2105A.3)*

**…**

***2105A.4******Masonry core testing****.**(Proposal to change 2000 to 1500 in Exception 1 is withdrawn)*

***~~2105A.5 Masonry prism method testing.~~*** *~~Prism test method performed prior to the start or during construction shall be in accordance with TMS 602 Section 1.4 B.3. Prism test method~~*

*~~performed on constructed walls shall be in accordance with TMS 602 Section 1.4 B.4.~~*

***~~2105A.6 Unit strength method testing.~~*** *~~Unit strength method testing shall be performed in accordance with TMS 602 Section 1.4 B.2.~~*

**…**

**SECTION 2106*A***

**SEISMIC DESIGN**

**2106*A*.1 Seismic design requirements for masonry.** Masonry structures and components shall comply with the requirements in Chapter 7 of TMS 402 depending on the structure’s *Seismic Design Category.*

***~~2106A.1.1~~*** ***~~Modifications to TMS 402.~~*** *~~Modify TMS 402 Section 7.4.4 as follows:~~*

***~~1.~~*** (Relocated to Section 2106A.1.3) ***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.*

(Relocated to Section 2106A.1.3) ***Exception:*** *Reinforced hollow-unit masonry used for freestanding site walls or interior non-bearing non-shear wall partitions shall have horizontal reinforcing spaced not more than 4’-0” on center, except as required by TMS 402 Section 7.4.5 when applicable.*

(Relocated to Section 2106A.1.3) *The minimum reinforcing shall be No. 4, except that No. 3 bars may be used for ties and stirrups. 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 shall be considered as continuous reinforcement.*

(Relocated to Section 2106A.1.3) *Horizontal reinforcing 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.*

(Relocated to Section 2106A.1.3) *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.*

(Relocated to Section 2106A.1.3) *When the reinforcement in bearing walls is designed, placed and anchored in position as for columns, the allowable stresses shall be as for columns.*

(Relocated to Section 2106A.1.3) *Joint reinforcement shall not be used as principal reinforcement in masonry.*

***~~2.~~*** ***~~Minimum reinforcement for masonry columns~~****~~.~~* (Relocated to new Section 2106A.1.1) *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.* (Relocated to new Section 2106A.1.1) *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.~~*** (Relocated to Section 2106A.1.2) *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.~~***(Relocated to Section 2104A.1.3.4) *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.*

***2106A.1.1*** ***~~Modifications to TMS 402. …~~ TMS 402 Sections*** ***5.3.1.4(a) and 5.3.1.4(b).*** *Replace**TMS 402 Sections 5.3.1.4(a) and 5.3.1.4(b) as follows:*

1. (Relocated from Section 2106A.1.1) *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.*
2. (Relocated from Section 2106A.1.1) *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, or 8 inches (203 mm) for the full column height.*

***2106A.1.2 TMS 402 Chapter 5.*** *Add TMS 402 Section 5.6 as follows:*

***5.6 – Lateral Support of Members***

*5.6.1* (Relocated from Section 2106A.1.1) *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.*

***2106A.1.3*** ***TMS 402 Sections 7.4.4.1, and 7.4.5.1.*** *Replace TMS 402 Section 7.4.4.1 as follows and delete Section 7.4.5.1:*

***7.4.4.1*** (Relocated from Section 2106A.1.1) ***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.* (Relocated from Section 2104A.1.3.1.2.1) *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.*

(Relocated from Section 2106A.1.1)

***Exception:*** *Reinforced hollow-unit masonry used for freestanding site walls or interior non-bearing non-shear wall partitions shall have horizontal reinforcing spaced not more than 4’-0” on center, except for locations in Seismic Design Category F ~~as required by TMS 402 Section 7.4.5 when applicable~~.*

***7.4.4.1.1*** (Relocated from Section 2106A.1.1) *The minimum reinforcing shall be No. 4, except that No. 3 bars may be used for ties and stirrups. 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 shall be considered as continuous reinforcement.*

***7.4.4.1.2*** (Relocated from Section 2106A.1.1) *Horizontal reinforcing 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.*

***7.4.4.1.3*** (Relocated from Section 2106A.1.1) *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.*

***7.4.4.1.4*** (Relocated from Section 2106A.1.1) *When the reinforcement in bearing walls is designed, placed and anchored in position as for columns, the allowable stresses shall be as for columns.*

***7.4.4.1.5*** (Relocated from Section 2106A.1.1) *Joint reinforcement shall not be used as principal reinforcement in masonry.*

**…**

**SECTION 2107*A***

**ALLOWABLE STRESS DESIGN**

**…**

***~~2107A.4 TMS 402.~~*** *~~Modify by adding Section 8.3.8 as follows:~~*

*~~8.3.8- Walls and piers.~~*

***2107A.4 TMS 402, Section 8.3.4.4 Walls*** *Modify TMS 402, Section 8.3.4.4 as follows by adding:*

***8.3.4.4.1*** *The minimum ~~T~~thickness of walls is given in this section. ~~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 themasonry, with consideration for reduction, such as raked joints.*

***8.3.4.4.2*** *The thickness of masonry walls shall be designed so that allowable maximum stresses specified in this chapter are not exceeded. ~~Also, no m~~Masonry walls shall not exceed the height or length-to-thickness ratio nor be less than the minimum thickness as specified in this chapter and as set forth in Table ~~2107A.4~~ 8.3.4.4.*

***8.3.4.4.3 ~~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.4~~ 8.3.4.4***  ***MINIMUM THICKNESS OF MASONRY WALLS1,2*** | | |
| --- | --- | --- |
| ***TYPE OF MASONRY*** | ***MAXIMUM RATIO UNSUPPORTED HEIGHT OR LENGTH TO THICKNESS2,3*** | ***NOMINAL MINIMUM THICKNESS (inches)*** |
| *BEARING OR SHEAR WALLS:* | | |
| 1. *Stone masonry* | *14* | *16* |
| 1. *Reinforced grouted masonry* | *25* | *6* |
| 1. *Reinforced hollow-unit masonry* | *25* | *6* |
| *NONBEARING WALLS:* | | |
| 1. *Exterior reinforced walls* | *30* | *6* |
| 1. *Interior partitions reinforced* | *36* | *4* |

1. *For walls of varying thickness. use the least thickness when determining the height or length to thickness ratio.*
2. *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.*
3. *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 Masonry Compressive Strength.***  *The specified compressive strength of structural masonry, f’m, shall be equal to or exceed 1,500 psi (10.34 MPa). The value of f’m used to determine nominal strength value in this chapter shall not* (Relocated from Section 2105A.2) *exceed 3,000 psi (20.7 MPa) for concrete masonry and shall not exceed 4,500 psi (31.03 MPa) for clay masonry.*

**…**

**SECTION 2108A**

**STRENGTH DESIGN OF MASONRY**

**2108A.1 General.** The design of masonry structures using strength design shall comply with Section 2106*A* and the requirements of Chapters 1 through 7 and Chapter 9 of TMS 402, except as modified by Sections 2108*A*.2 through 2108*A*.3.

**~~Exception:~~**~~AAC masonry shall comply with the requirements of Chapters 1 through 7 and Chapter 11 of TMS 402/ACI 530/ASCE 5.~~

**…**

***2108A.4 TMS 402, Section 9.1.9.1.1.*** *Modify TMS 402, Section 9.1.9.1.1 as follows:*

**9.1.9.1.1**Masonry Compressive Strength*.* The specified compressive strength of *structural* masonry, f’m, shall be equal to or exceed 1,500 psi (10.34 MPa). The value of f’m used to determine nominal strength values in this chapter shall not exceed ~~4,000~~ ~~(41.37 MPa)~~ (Relocated from Section 2105A.2) *3,000* psi *(20.7 MPa)* for concrete masonry and shall not exceed ~~6000~~ *4,500* psi (~~41.37~~ *31.03* MPa) for clay masonry.

**…**

**SECTION 2109A**

**EMPIRICAL DESIGN OF ADOBE MASONRY**

***Not permitted by DSA*.**

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

**…**

**Notation for [DSA-SS]:**

Authority: Education Code Section 17310 and 81142, and Health and Safety Code Section 16022.

Reference(s): Education Code Sections 17280 through 17317, and 81130 through 81147, and Health and Safety Code Sections 16000 through 16023.

# Chapter 22 STEEL

**CHAPTER 22**

**STEEL**

Adopt Chapter 22 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

***2212.5.3 Limitations on shear wall assemblies.*** *Shear wall assemblies in accordance with Sections E5, E6 and E7 of AISI-S400 are not permitted within the seismic force-resisting system of buildings or structures assigned to ~~Occupancy~~ Risk Category II, III, IV, or buildings designed to be relocatable.*

...

***2212.6 Testing.***

***2212.6.1 Tests of high-strength bolts, nuts and washers.*** *High-strength bolts, nuts and washers shall be sampled and tested ~~by an approved independent testing laboratory for conformance with the requirements of Section 2205~~ in accordance with Section 1705A.2.6.*

***2212.6.2* (Withdrawn)**

*…*

**Notation:**

Authority: Education Code section 81053.

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 22A STEEL

**CHAPTER 22A**

**STEEL**

Adopt Chapter 22 of the 2021 IBC as Chapter 22A of the 2022 CBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

**2205*A*.2 Seismic Design**. Where required, the seismic design, fabrication and erection of buildings, structures and portions thereof shall be in accordance with Section 2205*A*.2.1 or 2205*A*.2.2, as applicable.

**2205*A*.2.1 Structural steel seismic force-resisting system.** The design, detailing, fabrication and erection of structural steel seismic force-resisting systems shall be in accordance with the provisions of Section 2205*A*.2.1.1 or 2205*A*.2.1.2, as applicable.

**2205*A*.2.1.1 Seismic Design Category B or C.** *Not permitted by DSA-SS.* (Existing deletion of IBC Section 2205.2.1.1)

**2205*A*.2.1.2 Seismic Design Category D, E or F.** Structures assigned to Seismic Design CategoryD, E or F shall be designed and detailed in accordance with AISC 341. ~~, except as permitted in ASCE 7, Table 15.4-1.~~ Beam-to-column moment connections in special moment frames and intermediate moment frames shall be prequalified in accordance with AISC 341, Section K1, qualified by testing in accordance with AISC 341, Section K2, or shall be prequalified in accordance with AISC 358.

**2205*A*.2.2 Structural steel elements.** The design, detailing, fabrication and erection of structural steel elements in seismic force-resisting system other than those covered in Section 2205*A*.2.1, including struts, collectors, chords and foundation elements, shall be in accordance with AISC 341.~~, where either of following applies:~~

1. ~~The structure is assigned to seismic design category D, E or F, except as permitted in ASCE 7, Table 15.4-1.~~
2. ~~A response modification coefficient, R, greater than 3 in accordance with ASCE 7, Table 12.2-1, is used for the design of structure assigned to seismic design category B or C.~~

...

**2207*A.*4 Steel joist drawings.** Steel joist placement plans shall be provided to show the steel joist products as specified on the approved construction documents and are to be utilized for field installation in accordance with specific project requirements as stated in Section 2207*A.*2.  Steel joist placement plans shall include, at a minimum, the following:

…

~~Steel joist placement plans do not require the seal and signature of the joist manufacturer's registered design professional.~~

...

**2210*A*.1 General.** The design of cold-formed carbon and low alloy steel structural members shall be in accordance with AISI S100. The design of cold-formed stainless-steel structural members shall be in accordance with ASCE 8. Cold formed steel light-frame construction shall also comply with Section 2211*A*. Where required, the seismic design of cold formed steel structures shall be in accordance with the additional provisions of Section 2210*A*.2.

(The item below was included as a DSA-SS amendment in the Express Terms for the 2018 Triennial Code Adoption Cycle, but was missed in the printed version. Please add this item, and remove banners from this section accordingly since it is adopted by both DSA-SS and OSHPD.) *Modify AISI S100 Chapter J (Connections and Joints, Section J7.2) by the following: Power –actuated fastener available strength shall not exceed those strengths determined in accordance with Section 1617A.1.20 of this code.*

**2210*A*.2 Seismic requirements for cold-formed steel structures.** Where a response modification coefficient, *R*, in accordance with ASCE 7, Table 12.2-1 is used for the design of cold-formed steel structures, the structures shall be designed and detailed in accordance with the requirements of AISI S100~~,~~ *~~ASCE 8~~*~~, or, for cold-formed steel special-bolted moment frames,~~ *and* AISI S400.

...

**2211*A*.1.1.1 Seismic Design Categories B and C.** *Not Permitted by DSA-SS.*(Existing deletion of IBC Section 2211.1.1.1)

…

**2211*A*.1.2 Prescriptive framing.** *Not Permitted by DSA-SS.*(Existing deletion of IBC Section 2211.1.2)

**2211*A*.1.3 Truss design.** Cold-formed steel trusses shall comply with the additional provisions of Sections 2211*A*.1.3.1 through 2211*A*.1.3.3.

(The following item is an existing amendment that was missed in the printed version of the 2019 CBC and should be added back into the 2022 CBC.) *Complete engineering analysis and truss design drawings shall accompany the construction documents submitted to the enforcement agency for approval. When load testing is required, the test report shall be submitted with the truss design drawings and engineering analysis to the enforcement agency.*

...

***2212A.1.2 Design, fabrication and erection.*** *The design, fabrication and erection of light modular steel moment-frame buildings shall be in accordance with the AISC Specification for Structural Steel Buildings (ANSI/AISC 360) and the AISI North American Specification for the Design of Cold-Formed Steel Structural Members (AISI~~/COS/ NASPEC~~ S100), ...*

...

***2212A.2.1 Base materials.*** *Beams, columns and connection materials shall be limited to those materials permitted under the AISC Specification for Structural Members (ANSI/AISC 360) and the AISI North American Specification for the Design of Cold-Formed Steel Structural Members (AISI~~/COS/ NASPEC~~ S100), ...*

...

***2213A.1 Tests of High-strength Bolts, Nuts and Washers****. High-strength bolts, nuts and washers shall be sampled and tested ~~by an approved agency for conformance with the requirements of applicable ASTM standards~~ in accordance with Section 1705A.2.6.*

***[Reserved for OSHPD]***

***2213A.2* (Withdrawn)**

**Notation:**

Authority: Education Code § 17310 and 81142, and Health and Safety Code §16022.

Reference(s): Education Code §§ 17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

# Chapter 23 WOOD

**CHAPTER 23**

**WOOD**

Adopt Chapter 23 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

***2303.1.3.1* (Withdrawn)**

…

***~~2304.10.1.2 Connection fire-resistance rating~~****~~. Fire-resistance ratings for connections in Type IV-A, IV-B, or IV-C construction shall be determined by one of the following:~~*

1. *~~Testing in accordance with Section 703.2 where the connection is part of the fire-resistance test.~~*
2. *~~Engineering analysis that demonstrates that the temperature rise at any portion of the connection is limited to an average temperature rise of 250°F (139°C) and a maximum temperature rise of 325° F (181°C) for a time corresponding to the required fire-resistance rating of the structural element being connected. For the purposes of this analysis, the connection includes connectors, fasteners and portions of wood members included in the structural design of the connection.~~*

**…**

***2304.10.2~~1~~.1 Additional requirements.***

***[DSA-SS]*** *Fasteners used for attachment of exterior wall coverings…*

**…**

**Associated Items: Chapter 17A**

**Notation [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 24 GLASS AND GLAZING, Section 2410

**CHAPTER 24**

**GLASS AND GLAZING**

Adopt Chapter 24 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

***2410.1.2 Testing and inspection.*** *Testing and inspection of SSG shall satisfy the following requirements:*

1. *~~a.~~ The seismic drift capability of SSG shall be determined by tests in accordance with AAMA 501.6~~,~~ and AAMA 501.4 ~~and ASCE 7, Section 13.5.9.2~~. Analysis as an alternative to testing is not acceptable for the purposes of satisfying the seismic drift requirements of the SSG system.*

***Exception: [DSA-SS, DSA-SS/CC]*** *In Risk Category I, II, and III buildings the seismic drift capacity can be determined by engineering analysis in accordance with ASCE 7 Section 13.5.9 for two-sided SSG systems in which the other two sides of each glazing unit are mechanically captured by mullions such that glass fallout is prevented even in the event of the structural sealant failure.*

1. *~~b.~~ The applicability of the specific AAMA 501.6 and AAMA 501.4 testing shall be subject to approval by the building official.*
2. *~~c.~~ The panel test specimens used in the AAMA 501.6 and AAMA 501.4 testing shall include all glass types (annealed, heat strengthened, laminated, tempered) and insulated glass units that comprise more than 5 percent of the total glass curtain wall area used in the building.*
3. *~~d.~~ AAMA 501.4 test specimen shall include the same materials, sections, connections, and attachment details to the test apparatus as used in the building.*
4. *~~c.~~ Serviceability tests of SSG test specimen shall be performed in accordance with AAMA 501.4 after seismic displacement tests to the design story drift.*
5. *~~f.~~ The window wall system using structural sealant by different manufacturer/product category shall be qualified in accordance with AAMA 501.6 and AAMA 501.4 testing for the seismic drift required. ~~Analysis as an alternative to testing is not acceptable for the purposes of satisfying the seismic drift requirements of the SSG system.~~*
6. *~~g.~~ Where unitized SSG is used with horizontal stack joints at each floor level and split vertical mullions that can move independently, only a story height single unit need ~~to~~ be tested under AAMA 501.6. Where continuous horizontal bands of SSG are used in the building, either two or four sided, the aspect ratio (height-to-length) of the test specimen shall be less than 1.0, contain not less than two interior vertical joints and all joints (vertical in the case of two sided), including the perimeter of the glass, shall be glazed with SSG.*
7. *~~h.~~ Where SSG continues around corners, the AAMA 501.4 test specimen shall include one corner panel to verify the kinematics of the corner condition under seismic drift.*
8. *~~i.~~ Quality assurance and inspection requirements shall include formalized post-installation tests using the point load testing procedure in accordance with ASTM C1392. The point load tests shall be done after the initial installation.*
9. *~~j.~~ Where the SSG is field assembled, hand pull tab tests in accordance with ASTM C1401, Section X2.1, one test every 100 linear feet, but not less than one test for each building elevation view shall be required.*

…

***2410.1.3 Monitoring.*** *Short- and long-term periodic performance monitoring shall be provided in accordance with ASTM C1401, C1392 and C1394. Inspection frequencies recommended in ASTM C~~1392~~1394 ~~Section 5.1~~ shall be followed.*

…

***2410.1.4 Construction documents.*** *Complete design of the SSG system for gravity, wind and seismic forces shall be subject to review by the enforcement agency. Construction documents shall show descriptive notes and structural details of glass and curtain wall system including:*

…

*15. Monitoring requirements per Section 2410.1.3.*

…

**Notation [DSA-SS]:**

Authority: Education Code Section 17310 and 81142, and Health and Safety Code Section 16022.

Reference(s): Education Code Sections 17280 through 17317, and 81130 through 81147, and Health and Safety Code Sections 16000 through 16023.

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code Section 81053

Reference(s): Education Code Sections 81052, 81053, and 81130 through 81147.

# Chapter 25 GYPSUM BOARD, GYPSUM PANEL PRODUCTS AND PLASTER

**Chapter 25**

**GYPSUM BOARD, Gypsum panel products AND PLASTER**

Adopt Chapter 25 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

**Notation for [DSA-SS/CC]:**

Authority: Education Code section 81053.

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 26 PLASTIC

**CHAPTER 26**

**PLASTIC**

Adopt Chapter 26 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

**Notation for [DSA-SS/CC]:**

Authority: Education Code section 81053.

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 30 ELEVATORS AND CONVEYING SYSTEMS

**CHAPTER 30**

**ELEVATORS AND CONVEYING SYSTEMS**

Adopt Chapter 30 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

**Notation for [DSA-SS/CC]:**

Authority: Education Code section 81053.

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 31 SPECIAL CONSTRUCTION

**CHAPTER 31**

**SPECIAL CONSTRUCTION**

Adopt Chapter 31 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

…

**3102.3 Type of construction.** Noncombustible membrane structures shall be classified as Type IIB construction. Noncombustible frame or cable-supported structures covered by an approved membrane in accordance with Section 3102.3.1 shall be classified as Type IIB construction. Heavy timber frame-supported structures covered by an approved membrane in accordance with Section 3102.3.1 shall be classified as Type IV-HT*~~HT~~* construction. Other membrane structures shall be classified as Type V construction.

…

**3102.6.1.1 Membrane.** A membrane meeting the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall be permitted to be used as the roof or as a skylight on buildings of Type IIB, III, IV-HT *~~HT~~* and V construction, provided that the membrane is not less than 20 feet (6096 mm) above any floor, balcony or gallery.

**…**

**3111.1.1 Wind resistance.** Rooftop-mounted photovoltaic (PV) panel systems and solar thermal collectors shall be designed in accordance with Section 1609.

***Exception: [DSA-SS, DSA-SS/CC]*** *Rooftop-mounted photovoltaic (PV) panel~~s~~ systems~~and modules~~ and solar thermal collectors shall be designed in accordance with Section ~~1510.7~~1511.9 of this code.*

**…**

**3111.3 Photovoltaic solar energy systems.** Photovoltaic solar energy systems shall be designed and installed in accordance with this section, the ~~International~~*California Fire Code*, NFPA 70 and the manufacturer's installation instructions**~~[DSA-SS and DSA-SS/CC]~~**~~, and Section 1512 of this code~~.

**…**

**SECTION 3115**

**INTERMODAL SHIPPING CONTAINERS**

**3115.1 General.** The provisions of Section 3115 and other applicable sections of this code shall apply to intermodal shipping containers that are repurposed for use as buildings or structures, or as part of buildings or structures.

**Exceptions: *[DSA-SS & DSA-SS/CC]*** *Not permitted by DSA.*

...

**3115.6 Roof assemblies.** Intermodal shipping container roof assemblies shall comply with the applicable requirements of Chapter 15.

**Exception:** Single-unit, stand-alone intermodal shipping containers not attached to, or stacked vertically over, other intermodal shipping containers, buildings or structures. ***[DSA-SS & DSA-SS/CC]*** *Not permitted by DSA.*

...

**3115.8.2 Welds.** New welds and connections shall be equal to or greater than the original connections.

***[DSA-SS & DSA-SS/CC]*** *The strength of new welds and connections shall be no less than the strength provided by the original connections. All new welds and connections shall be designed and constructed in accordance with Chapters 16, 17, and 22.*

...

**3115.8.4.1 Material properties.** Structural material properties for existing intermodal shipping container steel components shall be established by material testing where the steel grade and composition cannot be identified by the manufacturer's designation as to manufacture and mill test. ***[DSA-SS & DSA-SS/CC]*** *Not permitted by DSA.*

**3115.8.4.2 Seismic design parameters.** The seismic force-resisting system shall be designed and detailed in accordance with ***[DSA-SS & DSA-SS/CC]*** *ASCE 7 and* one of the following:

1. Where all or portions of the corrugated steel container sides are considered to be the seismic force-resisting system, design and detailing shall be in accordance with the ASCE 7, Table 12.2-1 requirements for light-frame bearing-wall systems with shear panels of all other materials. ***[DSA-SS and DSA-SS/CC]*** *Not permitted by DSA.*

...

**3115.8.4.3 Allowable shear value.** The allowable shear values for the intermodal shipping container corrugated steel sheet panel side walls and end walls shall be demonstrated by testing and analysis *in* accordance with Section 104.11. Where penetrations are made in the side walls or end walls designated as part of the lateral force-resisting system, the penetrations shall be substantiated by rational analysis.

**3115.8.5 Simplified structural design of single-unit containers.** Single-unit intermodal shipping containers conforming to the limitations of Section 3115.8.5.1 shall be permitted to be designed in accordance with the simplified structural design provisions of Section 3115.8.5.2. ***[DSA-SS and DSA-SS/CC]*** *Not permitted by DSA.*

...

***3115.9 Additional Requirements.******[DSA-SS and DSA-SS/CC]***

***3115.9.1 General.***

1. *Intermodal shipping containers shall not have been manufactured earlier than 24 months from the date of DSA approval of the site-specific or stockpile building design drawings.*
2. *Intermodal shipping containers shall be undamaged and have no previous repairs. The acceptable tolerances shall not exceed those given in the ANSI/AISC 303—16: Code of Standard Practice for Steel Buildings and Bridges.*
3. *Intermodal shipping container type shall be standard dry cargo container, used for the transportation of dry goods only. Container shall not have been used for transporting hazardous materials. Container shall not have been painted with paint containing lead.*
4. *All structural elements and details shall be justified through engineering calculations in accordance with the California Administrative Code (Title 24, Part 1, CCR) Section 4-317(d).*

***3115.9.2 Structural integrity verification.*** *Each intermodal shipping container shall have selection, structural integrity verification, general condition assessment, inspection, and testing as enforced by the enforcement agency.*

***3115.9.3 Seismic design requirements.***

1. *The container steel frame contribution to the lateral force resistance shall be neglected even in cases where the container siding is removed.*
2. *Deformation compatibility of structural elements that are not included in the seismic force-resisting system shall be considered in the analysis and when evaluating stiffness irregularities.*
3. *The total length of siding (less openings) along a line in a lower story shall not be less than 80 percent of the total length of siding (less openings) along the same line in the story immediately above.*

**Notation** **for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022.

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections 16000 through 16023.

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code section 81053.

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147.

# Chapter 32 ENCROACHMENTS INTO THE PUBLIC RIGHT-OF-WAY

**CHAPTER 32**

**ENCROACHMENTS INTO THE PUBLIC RIGHT-OF-WAY**

Adopt Chapter 32 of the 2021 IBC without amendment.

**Notation for [DSA-SS]:**

Authority: Education Code sections 17310, 81142, and Health and Safety Code section 16022

Reference(s): Education Code sections 17280 through 17317, 81130 through 81147, and Health and Safety Code sections16000 through 16023

**Notation for [DSA-SS/CC]:**

Authority: Education Code section 81053

Reference(s): Education Code sections 81052, 81053, and 81130 through 81147

# Chapter 35 REFERENCED STANDARDS

**CHAPTER 35**

**REFERENCED STANDARDS**

Adopt Chapter 35 of the 2021 IBC as amended below. All existing California amendments that are not revised below shall continue without change.

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 102.4.

***[DSA-SS, DSA-SS/CC] Reference to other chapters.*** *In addition to the code sections referenced, the standards listed in this chapter are applicable to the respective code sections in Chapters 16A, 17A, 18A, 19A, 21A and 22A.*

**…**

| **Standard Reference Number** | | | **Title** | **Referenced in Code Section Number** | |
| --- | --- | --- | --- | --- | --- |
| **AAMA** | | | **American Architectural Manufacturing Association**  **1827 Waldon Office Square, Suite 550**  **Schaumburg, IL 60173** |  | |
| **…** | | |  |  | |
| ***501.4-18~~09~~*** | | | ***Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts*** | *2410.1* | |
| ***501.6-18~~09~~*** | | | ***Recommended Dynamic Test Method For Determining The Seismic Drift Causing Glass Fallout From A Wall*** | *2410.1* | |
| **…** | | |  |  | |
| **ACI** | | | **American Concrete Institute**  **38800 Country Club Drive**  **Farmington Hills, MI 48331** |  | |
| **…** | | |  |  | |
| ***355.2—19~~07~~:*** | | | ***Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary*** | *1617A.1.19* | |
| ***355.4—19~~11~~*** | | | *Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary* | *1617A.1.19* | |
| **…** | | |  |  | |
| **AISC** | | | **American Institute of Steel**  **130 East Randolph Street, Suite 2000**  **Chicago, IL 60601-6219** |  | |
| **…** | | |  |  | |
| **ANSI/AISC 358—16/s1—18*/s2—20*: *~~358─16:~~*** | | | ***[DSA-SS, DSA-SS/CC]* Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications, Including Supplement No. 1 *and No. 2 ~~Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications~~*** | 2205.2.1.1, 2205.2.1.2, *2212.3*, 1705A.2.1, 2205A, 2206A.2*~~1705A.2.1,~~**~~2212.3, 2205A, 2206A~~*~~.2~~*~~, 3413A~~* | |
| **…** | | |  |  | |
| **APA** | | | **APA – Engineered Wood Association 7011 S 19th Street, Tacoma, WA 98466-7400** |  | |
| **…** | | |  |  | |
| **ANSI/APA PRG 320-2019: *~~ANSI/APA PRG 320-18:~~*** | | | **Standard for Performance-rated Cross-Laminated Timber *~~Standard for Performance-rated Cross-Laminated Timber~~*** | 602.4, 2303.1.4 *~~2303.1.4, 602.4~~* | |
| **…** | |  | | |  |
| **ASCE/SEI** | | **American Society of Civil Engineers**  **Structural Engineering Institute**  **1801 Alexander Bell Drive**  **Reston, VA 20191-4400** | | |  |
| **ASCE/SEI 7—16 with Supplements 1*, 2 and 3:*** | | **Minimum Design Loads and Associated Criteria for Buildings and Other Structures *~~with Supplement No. 1~~*** | | | …1602.1, *1603A.1.5, 1603A.2,* 1604.3, *1604.4*, … *1617, ~~1617.9, 1617.10, 1617.2~~,*…*1807A.2.5*,…*1811A.4,* …*3115.8.4.2* |
| **...** | |  | | |  |
| ***41—17:*** | | ***Seismic Evaluation and Retrofit of Existing Buildings*** | | | *1603A.2, ~~1617A.1.30, 1617A.1.34~~* |
| **...** | |  | | |  |
| **49—12*~~12~~*** | | **Wind Tunnel Testing for Buildings and Other Structures** | | | 1609.1.1 |
| **…** | |  | | |  |
| **ASTM** | | **ASTM International**  **100 Barr Harbor Drive, P.O. Box C700**  **West Conshohocken, PA 19428-2959** | | |  |
| **…** | |  | | |  |
| **A153/153M—2016A*~~16a~~*** | | **Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware** | | | *2304.10.2~~1~~.1,* 2304.10.6 |
| **…** | |  | | |  |
| **B695—2004(2016*~~2016~~*):** | | **Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel Strip for Building Construction** | | | *2304.10.2~~1~~.1,* 2304.10.6.1, 2304.10.6.3 |
| **…** | |  | | |  |
| **C94/C94M─2017A*~~17~~*** | | **Specification for Ready-Mixed Concrete** | | | *…1705A.3.3.1* |
| **…** | |  | | |  |
| **C595/C595M─2018*~~17~~*** | | **Specification for Blended Hydraulic Cements** | | | *…1909.2.3, 1910A.1, ...* |
| **…** | |  | | |  |
| ***C618─19~~17~~*** | | ***[DSA-SS, DSA-SS/CC]* *Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*** | | | *1909.2.3, ~~1909.3.4,~~ 1910A.1* |
| **…** | |  | | |  |
| **C635/C635M—2017*~~17~~*** | | ***~~[DSA-SS, DSA-SS/CC]~~* Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings** | | | 2506.2.1, *1617A.1.21* |
| **…** | |  | | |  |
| ***C989—18a~~17~~:*** | | ***[DSA-SS, DSA-SS/CC]* *Standard Specification for Slag Cement for Use in Concrete and Mortars*** | | | *1909.2.3, 1910A.1* |
| **…** | |  | | |  |
| ***C1019*─*16*** | | ***Test Method for Sampling and Testing Grout*** | | | *2105A.3, 2105.3, 2115.8.1* |
| **…** | |  | | |  |
| **C1157/C1157M─201*7~~17~~*** | | **Standard Performance Specification for Hydraulic Cement** | | | 1903.1, *1909.2.3,* 1910.2.1, *1910A.1,* Table 2507.2 |
| **…** | |  | | |  |
| ***C1249─18~~06a(2010)~~*** | | ***Standard Guide for Secondary Seal for Sealed Insulated Glass Units for Structural Sealant Glazing Applications*** | | | *2410.1.1* |
| **…** | |  | | |  |
| ***C1392─20~~00(2014)~~*** | | ***Standard Guide for Evaluating Failure of Structural Sealant Glazing*** | | | *2410.1.2, 2410.1.3* |
| ***C1394—20~~03(2012)~~:*** | | ***Standard Guide for In-Situ Structural Silicone Glazing Evaluation*** | | | *2410.1.3* |
| **…** | |  | | |  |
| ***D1586─20~~11~~*** | | ***Standard Test Method for Standard for Penetration Test (SPT) and Split-Barrel Sampling of Soils*** | | | *1813, 1813A.2* |
| **…** | |  | | |  |
| **D3498/D3498M—03(2011) *~~D3498/D3498M—03(2011)~~*** | | **Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems *~~Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems~~*** | | | 703.7 *~~703.9~~* |
| **…** | |  | | |  |
| ***D5778─201~~2~~*** | | ***Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils*** | | | *1813, 1813A.2* |
| **…** | |  | | |  |
| ***E580/E580M─17*** | | ***Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions*** | | | *1617.11~~10~~.16, 1617A.1.21* |
| **…** | |  | | |  |
| **E605/E605M—93(2015)e1** | | **Test Method for Thickness and Density of Sprayed Fire-resistive Material (SFRM) Applied to Structural Members** | | | 1705.15 |
| **…** | |  | | |  |
| **AWPA** | | **American Wood Protection Association**  **P.O. Box 361784**  **Birmingham. AL 35236-1784** | | |  |
| **…** | |  | | |  |
| **U1─20*~~17~~*** | | **USE CATEGORY SYSTEM: User Specification for Treated Wood Except Commodity Specification H** | | | *…1812.2, 1812A.2…* |
| **AWS** | | **American Welding Society**  **8669 NW 36th Street, #130**  **Miami, FL 33166** | | |  |
| ***D1.1/D1.1M*─*15*** | | ***Structural Welding Code─Steel*** | | | *Table 1705A.2.1, 1705A.2.5, 2204.1.1, 2204A.1.1, 2213.2, 2212.6.2, 2213A.2* |
| ***D1.2/D1.2M─14~~5~~*** | | ***Structural Welding Code─Aluminum*** | | | *2003.1* |
| **D1.4/D1.4M─2018** | | **Structural Welding Code─Steel Reinforcing Bars** | | | 1704.5, *1704A.5, Table 1705A.2.1, 1705A.2.5,* Table 1705.3,1705.3.1, *1705A.3.1,* 1903.8, *1903A.8,* 2107.3 |
| ***D1.8/D1.8M─2016*** | | ***Structural Welding Code─Seismic Supplement*** | | | *Table 1705A.2.1, 1705.2.5, 1705A.2.5* |
| ***QC1─2016*** | | ***Specification for AWS Certification of Welding Inspectors*** | | | *1705.2.5, 1705A.2.5* |
| **…** | |  | | |  |
| **FM** | | **FM Approvals**  **Headquarters Office**  **1151 Boston-Providence Turnpike**  **P.O. Box 9120**  **Norwood, MA 02062** | | |  |
| ***FM 1950─2016*** | | ***American National Standard for Seismic Sway Braces for Pipe, Tubing and Conduit*** | | | *~~1705A.13.2, 1705.13.2~~* *1705.14.2, 1705A.14.2* |
| **…** | |  | | |  |
| **ICC** | | **International Code Council, Inc.**  **500 New Jersey Ave NW**  **6th Floor**  **Washington, DC 20001** | | |  |
| **…** | |  | | |  |
| ***ICC-ES AC01─21~~18~~\**** | | ***Acceptance criteria for expansion anchors in Masonry elements*** | | | *1617A.1.19* |
| ***ICC-ES AC58─21~~18~~\**** | | ***Acceptance criteria for Adhesive anchors in Masonry elements*** | | | *1617A.1.19* |
| ***ICC-ES AC70─21~~18~~\**** | | ***Acceptance criteria for fasteners power-driven into Concrete, Steel and Masonry elements*** | | | *1617A.1.20* |
| ***ICC-ES AC106─21~~18~~\**** | | ***Acceptance criteria for predrilled fasteners (screw anchors) in Masonry*** | | | *1617A.1.19* |
| ***ICC-ES AC125─21~~18~~\**** | | ***Acceptance Criteria for Concrete~~,~~ and Reinforced and Unreinforced Masonry Strengthening Using Externally Bonded Fiber-Reinforced Polymer (FRP) Composite Systems.*** | | | *1911A.3, 1911.3* |
| ***ICC-ES AC156—21~~18~~\**** | | ***Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components*** | | | *1705A.14~~3~~.3* |
| ***ICC-ES AC178─21~~18~~\**** | | ***Acceptance Criteria for Inspection and Verification of Concrete~~,~~ and Reinforced and Unreinforced Masonry Strengthening Using Fiber-Reinforced Polymer (FRP) Composite Systems.*** | | | *1911A.3, 1911.3* |
| ***ICC-ES AC193─21~~18~~\**** | | ***Acceptance criteria for mechanical anchors in Concrete elements*** | | | *1617A.1.19* |
| ***ICC-ES AC232─21~~18~~\**** | | ***Acceptance criteria for anchor channels in Concrete elements*** | | | *1617A.1.19* |
| ***ICC-ES AC308─21~~18~~\**** | | ***Acceptance criteria for post-installed adhesive anchors in Concrete elements*** | | | *1617A.1.19* |
| **…** | |  | | |  |
| ***ICC-ES AC358─21~~18~~\**** | | ***Acceptance Criteria for Helical Foundation Systems and Devices*** | | | *1810A.3.1.5.1, 1810.3.1.5.1* |
| ***ICC-ES AC446─21~~18~~\**** | ***Acceptance criteria for headed cast-in specialty inserts in Concrete*** | | | | *1617A.1.19* |
| **…** |  | | | |  |
|  | *\* Refers to International Building Code, 2021~~18~~ as a reference standard.* | | | |  |
| **…** |  | | | |  |
| **TMS** | **The Masonry Society**  **105 South Sunset Street, Suite Q**  **Longmont, CO 80501** | | | |  |
| **…** |  | | | |  |
| **602─2016** | **Specification for Masonry Structures** | | | | *…2101A.1.3, …*~~2104A.1.3.1.1~~*~~,~~ 2104A.1~~.3.1.1~~, ~~2104A.1.3.1.2.1,~~ 2105.1, 2105A.1~~.3.1.2~~, 2105A.2,… ~~2105A.5,~~ ~~2105A.6,~~ 2115.1.1, 2115.8* |
| **…** |  | | | |  |
| **UL** | **UL LLC**  **333 Pfingston Road**  **Northbrook, IL 60062-2096** | | | |  |
| **…** |  | | | |  |
| ***857—13*** | ***Busways*** | | | | *1705A.14~~3~~.3.1* |
| **…** |  | | | |  |
| **61730-1—2017:** | **Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction** | | | | 1507.16.6, 1507.17.5, *1511.9,* 3111.3.1 |
| **61730-2—2017:** | **Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing** | | | | 1507.16.6, 1507.17.5, *1511.9,* 3111.3.1 |
| **…** |  | | | |  |

**…**

*(All existing amendments that are not revised above shall continue without any change)*

**Notation** **for [DSA-SS]:**

Authority: Education Code Section 17310 and 81142, and Health and Safety Code Section 16022

Reference(s): Education Code Sections 17280 through 17317, and 81130 through 81147, and Health and Safety Code Sections16000 through 16023

**Notation** **for [DSA-SS/CC]:**

Authority: Education Code Section 81053

Reference(s): Education Code Sections 81052, 81053, and 81130 through 81147