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

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

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 underline, strikeout, 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* Repealed model code language appears ~~upright and in strikeout~~
* Repealed California amendments appear in *~~italic and strikeout~~*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, DSA-SS amendment language in Sections 1903A through 1905A appears in *italics and underline*.
* Existing amendments in Chapter 19A: Deletion of existing DSA-SS amendment language in Sections 1903A through 1905A appears in *~~italics, underline and strikeout.~~*  DSA-SS amendment language in Sections 1903A through 1905A that was included in the previous Code Adoption Cycles is shown for clarity only.  This language appears in *italics, underline and highlight*.
* 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.*
* Amended model code made by OSHPD and accepted by DSA as proposed amendment appear in purple font.
* Change proposed by DSA to DSA/OSHPD common language appear in purple font.

# INITIAL EXPRESS TERMS

# Chapter 1 SCOPE AND ADMINISTRATION

**CHAPTER 1**

**SCOPE AND ADMINISTRATION**

Carry forward existing California amendments in Chapter 1, Scope and Administration, from the 2019 California Building Code for adoption into the 2022 California Building Code with DSA proposed revisions as shown below. All existing California amendments that are not revised below shall continue without change.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt only those sections that are listed below | **X** | **X** |  |
| … |  |  |  |
| 110.3.5 | X | X |  |
| ~~110.3.6~~110.3.7 | X | X |  |
| … |  |  |  |

…

**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 essential service 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.~~*

…

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **X** | **X** |  |
| *~~Mass Timber~~*Mass Timber | X | X |  |

…

***~~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. ***~~FIXED EQUIPMENT~~*** *~~includes items that are permanently affixed to the building or permanently connected to a service distribution system that is designed and installed for the specific use of the equipment.~~*
2. ***~~MOVABLE EQUIPMENT~~*** *~~means equipment, 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.~~*
3. ***~~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 structure 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.~~*

***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 fixed, 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 essential services building 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.*

***[OSHPD] ESSENTIAL EQUIPMENT*** *means equipment that failure of which will significantly impair operations during or after a disaster. The facility shall determine which equipment is essential. Essential equipment shall also include equipment that is required to provide the eight basic services of the hospital as defined in Section 1224.3 of the California Building Code (CBC).*

1. ***FIXED EQUIPMENT*** *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.*
2. ***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.*
3. ***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.* ***[DSA-SS, DSA-SS/CC]*** *Mobile equipment includes items that require floor space or electrical and/or mechanical connections but are portable, such as wheeled items, portable items, and office-type furnishings.*
4. ***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.*
5. ***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.*
6. ***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 of the California Building Code (CBC).*

*...*

***~~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.~~*

**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.

…

# Chapters 3-10, 12, 14

**CHAPTER 3**

**USE AND OCCUPANCY CLASSIFICATION**

Adopt Chapter 3 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 4**

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

Adopt Chapter 4 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 5**

**GENERAL BUILDING HEIGHTS AND AREAS**

Adopt Chapter 5 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 6**

**TYPES OF CONSTRUCTION**

Adopt Chapter 6 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 7**

**FIRE AND SMOKE PROTECTION FEATURES**

Adopt Chapter 7 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 8**

**INTERIOR FINISHES**

Adopt Chapter 8 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 9**

**FIRE PROTECTION AND LIFE SAFETY SYSTEMS**

Adopt Chapter 9 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 10**

**MEANS OF EGRESS**

Adopt Chapter 10 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 12**

**INTERIOR ENVIRONMENT**

Adopt Chapter 12 of the 2021 IBC without amendment.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

**CHAPTER 14**

EXTERIOR WALLS

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

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **X** | **X** |  |
| *1404.1.1* | X | X |  |
| *1410* | X | X |  |

# 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 other existing California amendments that are not revised below shall be moved forward without change.

**SECTION 1511**

**ROOFTOP STRUCTURES**

(Formerly 1510.7.2) ***[DSA-SS, DSA-SS/CC] 1511.9 Photovoltaic (PV) panel systems.*** *Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 7103 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.*

# 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 be moved forward without change.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | - | **X** |  |
| *1601.1.1* |  | X |  |
| *1601.1.2* |  | X |  |
| *1601.1.3* |  | X |  |
| *1601.1.4* |  | X |  |
| *1601.2* |  | X |  |
| *1617* |  | X |  |

...

**1607.19 Seating for assembly uses.** Bleachers, folding and telescopic seating and grandstands shall be designed for the loads specified in ICC 300 ***[DSA-SS]*** *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.

...

*1617.3.2 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 evaluating elements supporting the handrail/guard provided those elements do not also support L.*

***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.~~*

...

***1617.6 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 13.6.12.*

...

***1617.11.3 ASCE 7, Table 12.2-1.*** *Modify ASCE 7 Table 12.2-1 as follows:*

***A. BEARING WALL SYSTEMS***

*5. Intermediate Precast Shear Walls – Not permitted by DSA-SS/CC.*

*...*

***B. BUILDING FRAME SYSTEMS***

*8. Intermediate Precast Shear Walls – Not permitted by DSA-SS/CC.*

*...*

(Relocated 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, 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, C~~~~d~~~~, and the system over strength factor, Ω~~~~0~~ ~~, 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 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 replacing Item a and adding Items f, g, and h, as follows:*

*a. 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, dxe, 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.*

*f. 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.*

*g. 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, in addition to amplification required by Item d.*

*h.* (Relocated from 1617.11.5) *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.*

(Relocated to 1617.11.4.3, Item h)***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.***

*~~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.~~*

...

***1617.11.9 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 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:*** *~~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, r, of 1.3 as defined in ASCE 7 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 12.5.3.1.*

***...***

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

(Relocated from 1617.11.14)***~~1617.11.14~~ 1617.11.13 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:*

*For structural design, loads induced by differential settlements need not be considered concurrently with earthquake-induced loads resulting from inertial response of the structure, determined according to Section 12.4.*

***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:~~*

*~~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. *~~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:~~*

*~~a. 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~~*

*~~b. 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. 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, movable, mobile or other equipment as applicable.*

*5. Temporary Equipment: Equipment for uses greater than 30 days but less than or equal to 180 days and where this section requires supports and attachments, the following shall apply:*

*a. Seismic design for supports and attachments for temporary equipment shall meet the requirements of Chapter 13; however, the calculated Fp may be reduced by 50%.**It is acceptable to use ballasts for seismic bracing supports and attachments and to limit the design criteria to overturning unless directly or indirectly supported by the building structure.*

*b. Temporary piping, conductors and ductwork shall be supported. Seismic design for supports and attachments of temporary piping, conductors and ductwork is not required.*

*6. Interim Equipment:*

*a. Seismic design for supports and attachments for interim equipment shall meet the requirements of Chapter 13. It is acceptable to use ballasts for seismic or wind bracing supports and attachments.*

*b. Piping, conductors and ductwork shall be supported. Seismic design for supports and attachments of piping, conductors and ductwork is not required.*

*7. Other Equipment: Equipment shall be anchored where any of the following apply:*

*a. 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 essential services building 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.*

*b. Could fall and block a required means of egress.*

*c. 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.*

*8. Equipment with hazardous contents.*

*9. Other architectural, mechanical and electrical components stated in Chapter 13.*

*10. Wall/Ceiling/Roof or Floor Hung Equipment: Seismic design and seismic details shall be provided for wall, ceiling, 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. Temporary equipment that will be in use for 30 days or less.*

*3. 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*.**

*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 Ip 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*

…

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

***13.6.11.4 Retainer plates.*** *…*

*...*

*3. 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 from below. Delete table number and title)*

|  |  |  |
| --- | --- | --- |
| ***RAIL SIZE***  ***(weight per foot***  ***of length,* pounds)** | ***WIDTH OF***  ***MACHINED***  ***SURFACE* (inches)** | ***ALLOWABLE RAIL DEFLECTION***  **(inches)** |
| *8* | *11/4* | *0.20* |
| *11* | *11/2* | *0.30* |
| *12* | *13/4* | *0.40* |
| *15* | *131/32* | *0.50* |
| *18½* | *131/32* | *0.50* |
| *22½* | *2* | *0.50* |
| *30* | *21/4* | *0.50* |

*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.*

*...*

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

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

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

|  |  |  |
| --- | --- | --- |
| ***~~RAIL SIZE~~***  ***~~(weight per foot~~***  ***~~of length,~~* ~~pounds)~~** | ***~~WIDTH OF~~***  ***~~MACHINED~~***  ***~~SURFACE~~* ~~(inches)~~** | ***~~ALLOWABLE RAIL DEFLECTION~~***  **~~(inches)~~** |
| *~~8~~* | *~~1~~~~1~~~~/4~~* | *~~0.20~~* |
| *~~11~~* | *~~1~~~~1~~~~/2~~* | *~~0.30~~* |
| *~~12~~* | *~~1~~~~3~~~~/4~~* | *~~0.40~~* |
| *~~15~~* | *~~131/32~~* | *~~0.50~~* |
| *~~18½~~* | *~~131/32~~* | *~~0.50~~* |
| *~~22~~~~1~~~~/2~~* | *~~2~~* | *~~0.50~~* |
| *~~30~~* | *~~2~~~~1~~~~/4~~* | *~~0.50~~* |

*~~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.~~*

# Chapter 16A STRUCTURAL DESIGN

**CHAPTER 16*A***

**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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter | **X** | - |  | |

…

**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 con-structed in accordance with the conventional light-frame construction provisions of Section 2308~~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 1604A.4  
MAXIMUM HORIZONTAL DIAPHRAGM SPAN AND SPAN-DEPTH RATIOS1, 3, 4, 5* (Add footnote 5)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***MAXIMUM DIAPHRAGM*** | ***DIAPHRAGM SPAN-DEPTH LIMITATION*** | | | |
| ***FLEXIBILITY*** | ***SPAN FOR MASONRY*** |
| ***Rotation (torsion) Not Considered in Diaphragm*** | | ***Rotation (torsion) Considered in Diaphragm*** | |
| ***FACTOR(F)****2* | ***OR CONCRETE WALLS*** |
| ***Masonry or Concrete Walls*** | ***Flexible Walls*** | ***Masonry or Concrete Walls*** | ***Flexible Walls*** |
| **(Footnote 2)** | ***(feet)*** |
| *More than 150* | *Not to be used* | *Not to be used* | *2:1* | *Not to be used* | *11/2:1* |
| *70**150* | *200* | *2:1 or as required for deflection* | *3:1* | *Not to be used* | *2:1* |
| *10**70* | *400* | *21/2:1 or as required for deflection* | *4:1* | *As required for deflection* | *21/2:1* |
| *1**10* | *No limitation* | *3:1 or as required for deflection* | *5:1* | *As required for deflection* | *3:1* |
| *Less than 1* | *No limitation* | *As required for deflection* | *No limitation* | *As required for deflection* | *31/2:1* |

*For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 plf = 14.594 N/m, 1 psi = 6894 Pa*

*1. Diaphragms shall satisfy span-depth limitations based on flexibility.*

*2. Flexibility factor (F) is the average deflection in micro inches (10-6) or µm of the diaphragm web per foot (m) of span stressed with a shear of 1 pound per foot (N/m).*

*3. Diaphragms supporting masonry or concrete walls are to have their deflections limited to the following amount:*

*H2 fc*

*Dwall = --------------------* **(This equation should be underlined as a new amendment)**

*0.01 Et*

*Where:*

*H = Unsupported height of wall in feet.*

*T = Thickness of wall in inches.*

*E = Modulus of elasticity of wall material for deflection determination in pounds per square inch.*

*fc = Allowable compression strength of wall material in flexure in pounds per square inch.*

*For concrete, fc = 0.45 f’c. For masonry, fc = Fb = 0.33 f’m.*

*~~3~~ 4. The total deflection D* *of the diaphragm may be computed from the equation: D* *= Df + Dw.*

*Where:*

*Df = Flexural deflection of the diaphragm determined in the same manner as the deflection of beams. The flexural stiffness of the web of diaphragms consisting of bare steel decking shall be neglected.*

*Dw = Web deflection of the diaphragm may be determined solving the following equation:*

*Dw x106*

*F = ------------------*

*qaveL*

*Where:*

*L = Distance in feet (m) between the vertical resisting element (such as a shear wall) and the point to which the deflection is to be determined.*

*qave = Average shear in the diaphragm in pounds per foot (N/m) over length L.*

*4 5. When applying these limitations to cantilevered diaphragms, the allowable span-depth ratio will be half of that shown.*

…

**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. *[DSA-SS] 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 evaluating elements supporting the handrail/guard provided those elements do not also support L.*

...

***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) | Fixed seats (fastened to floor) | 60a | — | — |
| Follow spot, projections and control rooms | 50 |
| Lobbies | 100a |
| Movable seats | 100a |
| Stage floors | 150b |
| Platforms (assembly) | 100a |
| 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) |
| Other assembly areas | 100a |
| … | … | | … | … | … |
| 20. | Libraries*~~n~~* (Delete footnote n) | Corridors above first floor | 80 | 1,000 | — |
| Reading rooms | 60 | 1,000 | — |
| Stack rooms | 150b | 1,000 | Section 1607*A*.18 |
| … | … | | … | … | … |
| 23. | Office buildings*~~n~~b*  (Delete footnote n) | Corridors above first floor | 80 | 2,000 | — |
| File and computer rooms shall be designed for heavier loads based on anticipated occupancy | — | — |
| Lobbies and first-floor corridors | 100 | 2,000 |
| Offices | 50 | 2,000 |  |
| … | … | | … | … | … |
| 28. | Schools*~~p~~d*  (Delete footnote p) | Classrooms | 40*~~r~~f*  (Delete footnote r) | 1,000 | — |
| Corridors above first floor | 80 | 1,000 |
| First-floor corridors | 100 | 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.~~d. 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.*  *~~q.~~e.* ***[DSA-SS]*** *The following minimum loads for stage accessories apply:*   1. *Gridirons and fly galleries: 75 pounds per square foot uniform live load.* 2. *Loft block wells: 250 pounds per lineal foot vertical load and lateral load.* 3. *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.* 4. *Scenery beams where there is no gridiron: 300 pounds per lineal foot vertical load and lateral load.* 5. *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.*   *~~r.~~f.* ***[DSA-SS]*** *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~~ 1607A.12 apply.*  *~~s.~~g.* ***[DSA-SS]*** *The minimum uniform live load for a press box floor or accessible roof with railing is 100 psf.*  *~~t.~~h.* ***[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.*

...

**1607A.19 Seating for assembly uses.** Bleachers, folding and telescopic seating and grandstands shall be designed for the loads specified in ICC 300 ***[DSA-SS]*** *as modified by Section 1605A.3 load combinations*. Stadiums and arenas with fixed seats shall be designed for the horizontal sway loads in Section 1607.19.1.

...

**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~~

|  |  |
| --- | --- |
| **~~LOCATION~~** | **~~POUNDS PER SQUARE FOOT~~** |
| ~~Adak~~ | ~~30~~ |
| ~~Anchorage~~ | ~~50~~ |
| ~~Angoon~~ | ~~70~~ |
| ~~Barrow~~ | ~~25~~ |
| ~~Barter Island~~ | ~~35~~ |
| ~~Bethel~~ | ~~40~~ |
| ~~Big Delta~~ | ~~50~~ |
| ~~Cold Bay~~ | ~~25~~ |
| ~~Cordova~~ | ~~100~~ |
| ~~Fairbanks~~ | ~~60~~ |
| ~~Fort Yukon~~ | ~~60~~ |
| ~~Galena~~ | ~~60~~ |
| ~~Gulkana~~ | ~~70~~ |
| ~~Homer~~ | ~~40~~ |
| ~~Juneau~~ | ~~60~~ |
| ~~Kenai~~ | ~~70~~ |
| ~~Kodiak~~ | ~~30~~ |
| ~~Kotzebue~~ | ~~60~~ |
| ~~McGrath~~ | ~~70~~ |
| ~~Nenana~~ | ~~80~~ |
| ~~Nome~~ | ~~70~~ |
| ~~Palmer~~ | ~~50~~ |
| ~~Petersburg~~ | ~~150~~ |

 (**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:**

1. ~~Detached one- and two-family dwellings, assigned to Seismic Design Category A, B or C, or located where the mapped short-period spectral response acceleration, SS, is less than 0.4 g.~~
2. ~~The seismic-force-resisting system of wood-frame buildings that conform to the provisions of Section 2308 are not required to be analyzed as specified in this section.~~
3. ~~Agricultural storage structures intended only for incidental human occupancy.~~
4. ~~Structures that require special consideration of their response characteristics and environment that are not addressed by this code or ASCE 7 and for which other regulations provide seismic criteria, such as vehicular bridges, electrical transmission towers, hydraulic structures, buried utility lines and their appurtenances and nuclear reactors.~~
5. ~~References within ASCE 7 to Chapter 14 shall not apply, except as specifically required herein.~~

...

**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 1613A.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** |
| A | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| B | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| C | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 |
| D | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 1.0 |
| E | 2.4 | 1.7 | 1.3 | ~~Note b~~ *1.2c* | ~~Note b~~ *1.2c* | ~~Note b~~ *1.2c* |
| F | Note b | Note b | Note b | Note b | Note b | Note b |

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

c. 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~~**

|  |  |  |  |
| --- | --- | --- | --- |
| **~~VALUE OF S~~~~DS~~** | **~~RISK CATEGORY~~** | | |
| **~~I or II~~** | **~~III~~** | **~~IV~~** |
| ~~S~~~~DS~~ ~~<  0.167g~~ | ~~A~~ | ~~A~~ | ~~A~~ |
| ~~0.167g ≤ S~~~~DS~~ ~~< 0.33g~~ | ~~B~~ | ~~B~~ | ~~C~~ |
| ~~0.33g ≤ S~~~~DS~~ ~~< 0.50g~~ | ~~C~~ | ~~C~~ | ~~D~~ |
| ~~0.50g ≤ S~~~~DS~~ | ~~D~~ | ~~D~~ | ~~D~~ |

**~~TABLE 1613.2.5(2) - SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION~~**

|  |  |  |  |
| --- | --- | --- | --- |
| **~~VALUE OFS~~~~D1~~** | **~~RISK CATEGORY~~** | | |
| **~~I or II~~** | **~~III~~** | **~~IV~~** |
| ~~S~~~~D1~~ ~~<  0.067g~~ | ~~A~~ | ~~A~~ | ~~A~~ |
| ~~0.067g ≤ S~~~~D1~~ ~~< 0.133g~~ | ~~B~~ | ~~B~~ | ~~C~~ |
| ~~0.133g ≤ S~~~~D1~~ ~~< 0.20g~~ | ~~C~~ | ~~C~~ | ~~D~~ |
| ~~0.20g ≤ S~~~~D1~~ | ~~D~~ | ~~D~~ | ~~D~~ |

**1613*A*.2.5.1 Alternative seismic design category determination.** *Not permitted by DSA-SS.*  ~~Where S~~~~1~~ ~~is less than 0.75, the seismic design category is permitted to be determined from Table 1613.2.5(1) alone where all of the following apply:~~

1. ~~In each of the two orthogonal directions, the approximate fundamental period of the structure, T, in each of the two orthogonal directions determined in accordance with Section 12.8.2.1 of ASCE 7, is less than 0.8 T~~~~s~~ ~~determined in accordance with Section 11.8.6 of ASCE 7.~~
2. ~~In each of the two orthogonal directions, the fundamental period of the structure used to calculate the story drift is less than T~~~~s~~~~.~~
3. ~~Equation 12.8-2 of ASCE 7 is used to determine the seismic response coefficient, C~~~~s~~~~.~~
4. ~~The diaphragms are rigid or are permitted to be idealized as rigid in accordance with Section 12.3.1 in ASCE 7 or for diaphragms permitted to be idealized as flexible in accordance with Section 12.3.1 of ASCE 7, the distance between vertical elements of the seismic-force-resisting system does not exceed 40 feet (12 192 mm).~~

**1613*A*.2.5.2 Simplified design procedure.** *Not permitted by DSA-SS.* ~~Where the alternate simplified design procedure of ASCE 7 is used, the seismic design category shall be determined in accordance with ASCE 7.~~

...

**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 13.6.12.*

…

***1617A.1.4 ASCE 7, Table 12.2 -1.*** *Modify ASCE 7 Table 12.2-1 as follows:*

***A. BEARING WALL SYSTEMS***

*5. Intermediate Precast Shear Walls – Not permitted by DSA-SS.*

*...*

***B. BUILDING FRAME SYSTEMS***

*...*

*8. Intermediate Precast Shear Walls – Not permitted by DSA-SS.*

*...*

(Relocated 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, 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, C~~~~d~~~~, and the system over strength factor, Ω~~~~0~~ ~~, 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 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 replacing Item a and adding Items f, g, and h, as follows:*

*a. 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, dxe, 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.*

*f. 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.*

*g. 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, in addition to amplification required by Item d.*

*h.* (Relocated from 1617A.1.6) *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.*

(Relocated to 1617A.1.5.3, Item h)***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.***

*~~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.1.10 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:*** *~~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, r, of 1.3 as defined in ASCE 7 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 12.5.3.1.*

...

***1617A.1.14 [Reserved for OSHPD]***

***~~1617A.1.16~~ 1617A.1.15* (Formerly Reserved for OSHPD) *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:*

*For structural design, loads induced by differential settlements need not be considered concurrently with earthquake-induced loads resulting from inertial response of the structure, determined according to Section 12.4.*

...

***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:~~*

*~~a. 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~~*

*~~b. 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.* ***[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. 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, movable, mobile or other equipment as applicable.*

*5. Temporary Equipment: Equipment for uses greater than 30 days but less than or equal to 180 days and where this section requires supports and attachments, the following shall apply:*

*a. Seismic design for supports and attachments for temporary equipment shall meet the requirements of Chapter 13; however, the calculated Fp may be reduced by 50%.**It is acceptable to use ballasts for seismic bracing supports and attachments and to limit the design criteria to overturning unless directly or indirectly supported by the building structure.*

*b. Temporary piping, conductors and ductwork shall be supported. Seismic design for supports and attachments of temporary piping, conductors and ductwork is not required.*

*6. Interim Equipment:*

*a. Seismic design for supports and attachments for interim equipment shall meet the requirements of Chapter 13. It is acceptable to use ballasts for seismic or wind bracing supports and attachments.*

*b. Piping, conductors and ductwork shall be supported. Seismic design for supports and attachments of piping, conductors and ductwork is not required.*

*7. Other Equipment: Equipment shall be anchored where any of the following apply:*

*a.* ***[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 essential services building 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.*

*b. (Reserved for OSHPD)*

*c. Could fall and block a required means of egress.*

*d.* ***[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)*

*8. Equipment with hazardous contents.*

*9. Other architectural, mechanical and electrical components stated in Chapter 13.*

*10. Wall/Ceiling/Roof or Floor Hung Equipment: Seismic design and seismic details shall be provided for wall, ceiling, 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. Temporary equipment that will be in use for 30 days or less.*

*3. 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.1.26 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 Ip 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*

…

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter | **X** | **X** |  | |

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 official* for construction as specified in Section 105, the owner ~~or the owner’s authorized agent, other than the contractor,~~ shall employ one or more *approved agencies* to provide *special inspections* and 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 official* that are identified in Section 110.

**Exceptions:**

* 1. *Special inspections* and tests are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as *approved* by 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:~~** ~~A statement of special inspections is 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.~~

***[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~~*approved 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 inspection* of 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.**~~Special inspections~~* ~~during fabrication are not~~~~required where the work is done on the premises of a fabricator approved~~~~to perform such work without~~ *~~special inspection~~*~~. Approval shall be based on review of the fabricator’s written procedures and quality control manuals that provide a basis for control of materials and workmanship, with periodic auditing of fabrication and quality control practices by an~~ *~~approved~~* ~~agency or the~~ *~~building official~~*~~. At completion of fabrication, the~~ *~~approved~~* ~~fabricator shall submit a~~ *~~certificate of compliance~~* ~~to the owner or owner’s authorized agent for submittal to the~~ *~~building official~~* ~~as specified in Section 1704.5~~~~stating that the work was performed in accordance with the~~ *~~approved construction documents~~*~~.~~

…

**1704*A*.3.2 Seismic requirements in the statement of special inspections.** Where Section 1705.13 or 1705.14 specifies *special inspections* or 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 systems* that 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 official* and 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 inspections* and 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 official* for 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 compliance* for the ~~seismic qualification~~ *manufacturer’s certification* of nonstructural components, supports and attachments in accordance with Section 1705*A*.14.2.
3. *2. Certificates of compliance* for *~~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 compliance* for open web *steel joists* and 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 systems* in 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 observation* does not include or waive the responsibility for the inspections in Section 110 or the *special inspections* in 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 official* a 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.~~**

*~~Structural observations~~* ~~shall be provided for those structures where one or more of the following conditions exist:~~

1. ~~The structure is classified as~~ *~~Risk Category III or~~* ~~IV.~~
2. ~~The structure is a~~ *~~high-rise building~~*~~.~~
3. ~~The structure is assigned to~~ *~~Seismic Design Category~~* ~~E, and is greater than two stories above the grade plane.~~

**~~3.~~**~~4. Such observation is required by the~~ *~~registered design professional~~* ~~responsible for the structural design.~~

1. ~~5. Such observation is specifically required by the~~ *~~building official~~*~~.~~

…

(Relocated from Part 10 Section 319.10.2.1) **1704*A*.6.1 *[DSA-SS, DSA-SS/CC] Construction documents.*** *The requirement for structural observation on rehabilitation projects shall be noted and prominently displayed on the front sheet of the approved plans and incorporated into the general notes on the approved plans.*

(Relocated from Part 10 Section 319.10.2.2) **1704*A*.6.2 *[DSA-SS, DSA-SS/CC] Preconstruction meeting.*** *A preconstruction meeting is mandatory for all rehabilitation projects which require structural observation. The meeting shall include, but is not limited to, the registered design professional, structural observer, general constructor, affected subcontractors, the project inspector and a representative of the enforcement agency (designated alternates may attend if approved by the structural observer). The structural observer shall schedule and coordinate this meeting. The purpose of the meeting is to identify and clarify all essential structural components and connections that affect the lateral and vertical load systems and to review scheduling of the required observations for the project’s structural system retrofit.*

…

**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:* | | | | |
| *a. Identification markings to conform to ASTM standards specified in the approved construction documents.* | *─* | *X* | *RCSC: 1.5,*  *AISC 360: A3.3 & J3.1 and applicable ASTM material standards* | *2202A.1, [DSA-SS/CC] 2202.1* |
| *b. Manufacturer’s certificate of compliance required.* | *─* | *X* | *RCSC: 1.5 & 2.1; AISC 360:*  *A3.3 & N3.2* | *─* |
| *c. Testing of high-strength bolts, nuts and washers.* | *─* | *─* | *RCSC: 7.2, Applicable ASTM material standards* | *~~2213A.1, [DSA-SS/CC] 2212.6.1~~1705A.2.6* |
| *2. Inspection of high-strength bolting:* | | | | |
| *a. Snug-tight joints.* | *─* | *X* | *RCSC: 7-9,*  *AISC 360:*  *J3.1, J3.2, M2.5 & N5.6* | *1705A.2.6, 2204A.2, [DSA-SS/CC] 2204.2* |
| *b. Pretensioned and slip-critical joints using turn-of-nut with matchmarking, twist-off bolt or direct tension indicator methods of installation.* | *─* | *X* |
| *c. Pretensioned and slip-critical joints using turn-of-nut without matchmarking or calibrated wrench methods of installation.* | *X* | *─* |
| *3. Material identification and testing of structural steel and cold-formed steel deck:* | | | | |
| *a. For structural steel, identification markings to conform to AISC 360.* | *─* | *X* | *AISC 360:*  *A3.1* | *2202A.1, [DSA-SS/CC] 2202.1* |
| *b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents.* | *─* | *X* | *Applicable ASTM material standards* | *2202A.1, [DSA-SS/CC] 2202.1* |
| *c. Manufacturer's certified test reports.* | *─* | *X* | *AISC 360: A3.1& N3.2* | *─* |
| *d. Testing of unidentified steel.* | *─* | *─* | *Applicable ASTM material standards* | *2202A.1, [DSA-SS/CC] 2202.1* |
| *4. Material identification of welding consumables and testing of welded elements:* | | | | |
| *a. Identification markings to conform to AWS specification in the approved construction documents.* | *─* | *X* | *AISC 360:*  *A3.5 & N3.2 and applicable AWS A5 documents* | *─* |
| *b. Manufacturer's certificate of compliance required.* | *─* | *X* | *AISC 360:*  *N3.2* | *─* |
| *c. Nondestructive testing of welded joints.* | *─* | *─* | *AISC 360:*  *N5.5* | *─ (Add dash here)* |
| *5. Inspection of welding:* | | | | |
| *a. Structural steel and cold-formed steel deck:* |  |  |  |  |
| *1) Complete and partial joint penetration groove welds.* | *X* | *─* | *AISC 360:*  *J2, M2.4, & M4.5, AWS D1.1,*  *AWS D1.8* | *1705A.2.1, 1705A.2.5* |
| *2) Multipass fillet welds.* | *X* | *─* |
| *3) Single-pass fillet welds > 5/16″* | *X* | *─* |
| *4) Plug and slot welds.* | *X* | *─* |
| *5) Single-pass fillet welds ≤ 5/16″* | *─* | *X* |
| *6) Floor and roof deck welds.* | *─* | *X* | *AWS D1.3, SDI QA/QC* | *1705A.2.1, 1705A.2.2, 1705A.2.5* |
| *7) End-welded studs.* | *─* | *X* | *AWS D1.1* | *1705A.2.5, ~~2213A.2, [DSA-SS/CC] 2212.6.2~~* |
| *8) Welded sheet steel for cold-formed framing members* | *─* | *X* | *AWS D1.3.* | *1705A.2.5, 1705A.2.4.1* |
| *b. Reinforcing steel~~:~~* | *─* | *─* | *─* | *Table 1705A.3, Item 2* |
| *~~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~~* |
| *6. Inspection of steel frame joint details for compliance:* | | | | |
| *a. Details such as bracing and stiffening.* | *─* | *X* | *AISC 360:*  *N5.8* | *1705A.2.1* |
| *b. Member locations.* | *─* | *X* |
| *c. Application of joint details at each connection.* | *─* | *X* |

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

…

*a. Where applicable, see also Section 1705A.~~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 tests of end-welded stud shear connectors is in accordance with the requirements of AWS D1.1, Sections 7.7 and 7.8 ~~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)~~.*

***[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 inspections* and tests of concrete construction shall be performed in accordance with this section and Table 1705*A*.3.

**Exception:** *Special inspections and tests* shall 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* | *~~1908A.3, 1908A.4,~~* *~~1910A.2,~~ 1705A.3.2.2 ~~1910A.3;~~ 1705A.3.4.1*  *~~[DSA-SS/CC] 1909.2.4, 1909.2.5~~*  *1705A.3.9* |
| 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,~~ 1705A.3.2.1, [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, ~~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 ~~1908A.5, 1908A.6, 1908A.7, 1908A.8, 1908A.10, 1908A.12, [DSA-SS/CC] 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*. *~~Test of reinforcing bars shall be in accordance with 1910A.2 ([DSA-SS/CC] 1909.2.4).~~*

***(Relocated from 1910A.1/1909.2.3) 1705A.3.2.1 Cementitious material.*** *The concrete supplier shall furnish to the enforcement agency certification …*

***(Relocated from 1910A.2/1909.2.4) 1705A.3.2.2 Tests of reinforcing bars.*** *Samples shall be taken from bundles as delivered from the …*

…

***1705A.3.4 Inspection and testing of prestressed concrete.*** *Inspections and tests for prestressed concrete work shall be in accordance with this section. ~~Tests for prestressing steel and anchorage shall be per Section 1910A.3 ([DSA-SS/CC] 1909.2.5).~~ Inspection shall be in accordance with the following:*

*1. In addition to the general inspection required for concrete work, all plant fabrication of prestressed concrete members or tensioning of posttensioned members constructed at the site shall be continuously inspected by an inspector specially approved for this purpose by the enforcement agency.*

***Exception:*** *The special inspector need not be continuously present for the placement of prestress or posttensioned cables or tendons.*

***[DSA-SS, DSA-SS/CC]*** *Special inspector approval by the enforcement agency shall occur when specified in the California Administrative Code.*

***(Relocated from 1910A.3/1909.2.5) 1705A.3.4.1 Tests for prestressing steel and anchorage.*** *All wires or bars of each size from each mill heat and all strands from each manufactured reel to be shipped to the site …*

…

***1705A.3.7 Composite construction cores****. Composite construction cores shall be taken and tested in accordance with this ~~S~~section ~~1910A.4 ([DSA-SS/CC] 1909.2.6)~~.* ***(Relocated from 1910A.4/1909.2.6) ~~Composite construction cores.~~*** *Cores of the completed composite concrete construction shall be taken to demonstrate …*

***1705A.3.8 Special Inspections and tests for post-installed anchors in concrete****. Special inspections and tests for post-installed anchors in concrete shall be in accordance with Table 1705A.3 and this ~~S~~section ~~1910A.5 ([DSA-SS/CC] 1909.2.7)~~.*

***(Relocated from 1910A.5/1909.2.7) 1705A.3.8.1 Tests for post-installed anchors in concrete.*** *When post-installed anchors are used in lieu of cast-in place bolts, the installation verification test loads, frequency, and acceptance criteria shall be in accordance with this section.*

***(Relocated from 1910A.5.1/1909.2.7.1) 1705A.3.8.1.1 General.*** *Test loads or torques and acceptance criteria shall be shown …*

***(Relocated from 1910A.5.2/1909.2.7.2) 1705A.3.8.1.2 Testing Procedure.*** *The test procedure shall be as permitted by an approved evaluation report using criteria adopted in this code. All post-installed anchors shall be tension tested.*

***Exception******[DSA-SS, DSA-SS/CC]****: Torque controlled post installed anchors and screw type anchors shall be permitted to be tested using torque based on an approved evaluation report using criteria adopted in this code.*

*Alternatively, manufacturer’s recommendation for testing may be approved by the enforcement agency based on an approved ~~test~~evaluation report using criteria adopted in this code.*

***(Relocated from 1910A.5.3/1909.2.7.3) 1705A.3.8.1.3 Test Frequency.*** *When post-installed anchors are used for sill plate bolting …*

***(Relocated from 1910A.5.4/1909.2.7.4) 1705A.3.8.1.4 Test loads.*** *Required test loads shall be determined by one of the following methods:*

*1. Twice the maximum allowable tension load or one and a quarter (1¼) times the maximum design strength of anchors as provided in an approved evaluation report using criteria adopted in this code or determined in accordance with Chapter 17 of ACI 318.*

*Tension test load need not exceed 80 percent of the nominal yield strength of the anchor element (= 0.8 Asefya).*

*2. The manufacturer's recommended installation torque based on an approved evaluation report using criteria adopted in this code.*

***(Relocated from 1910A.5.5/1909.2.7.5) 1705A.3.8.1.5 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, the testing apparatus support 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.*

*2. Torque wrench method:*

*Torque-controlled post-installed anchors tested with a calibrated torque wrench shall attain the specified torque within 1/2 turn of the nut; or one-quarter (1/4) turn of the nut for a 3/8 inch sleeve anchor only.*

***[DSA-SS, DSA-SS/CC]*** *Screw-type anchors tested with a calibrated torque wrench shall attain the specified torque within one-quarter (1/4) turn of the screw after initial seating of the screw head.*

***~~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. Approval from the enforcement agency must be obtained prior to performing shotcrete mockup panels. 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.*

**1705*A*.4 Masonry construction.** *Special inspections* and 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:~~ *~~Special inspections~~* ~~and tests shall not be required for:~~

1. ~~Empirically designed masonry,~~ *~~glass unit masonry~~* ~~or masonry~~ *~~veneer~~* ~~designed in accordance with Section 2109}, Section 2110 or Chapter 14, respectively, where they are part of a structure classified as~~ *~~Risk Category~~* ~~I, II or III.~~
2. ~~Masonry foundation walls constructed in accordance with Table 1807.1.6.3(1), 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4).~~
3. ~~Masonry fireplaces, masonry heaters or masonry chimneys installed or constructed in accordance with Section 2111, 2112 or 2113, respectively.~~

**1705*A*.4.1 Glass unit masonry and masonry veneer in Risk ~~Category~~*Categories II, III or* IV.** *Special inspections* and tests for glass unit masonry or masonry *veneer* designed in accordance with Section 2110 or Chapter 14, respectively, where they are part of a structure classified as *Risk ~~Category~~**Categories II, III or* IV shall be performed in accordance with TMS 602 *Tables 3 and 4,* Level 2.

…

***(Relocated from 2105A.2 exception) 1705A.4.3 Compressive strength tests for f’m greater than 2000 psi.*** *Compliance with the requirements for the specified strength of constructed masonry shall be provided using prism test ~~method in accordance with Section 2105A.5~~. Substantiation for 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~~.*

***(Relocated from 2115.8.1) 1705A.4.4 Mortar and grout tests.*** *These tests are to establish whether the masonry components meet the specified component strengths. At the beginning of all masonry work, at least one test sample of the mortar 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 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. Test specimens for mortar shall be made as set forth in ASTM C1586. Mortar sampling and testing is not required for preblended mortars in conformance with ASTM C270 with a valid evaluation report.*

*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. Test specimens for grout shall be made as set forth in 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.*

***(Relocated from 2105A.4/2115.8.2) 1705A.4.5 Masonry core testing.*** *Not less than two cores shall be taken from each building for each 5,000 square feet …*

…

**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** |
| **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 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~~* |

**…**

(Relocated from Section 1811A.3, Item #8) ***1705A.6.2******Rock and soil anchors.*** *Performance test shall be at a minimum of 1.6 times the design loads …*

***1705A.6.~~2~~3******Earth retaining shoring.*** *~~Special inspections and tests of earth retaining shoring shall be in accordance with applicable portions of Section 1812A.~~* (Relocated from Section 1812A.6, Item #2) *Testing, inspection and observation shall be in accordance with testing, inspection and observation requirements approved by the building official. The following activities and materials shall be tested, inspected, or observed by the special inspector and geotechnical engineer:*

* 1. *~~a.~~ Sampling and testing of concrete in soldier pile and tie-back anchor shafts.*
  2. *~~b.~~ Fabrication of tie-back anchor pockets on soldier beams*
  3. *~~c.~~ Installation and testing of tie-back anchors.*
  4. *~~d.~~ Survey monitoring of soldier pile and tie-back load cells.*
  5. *~~e.~~ Survey monitoring of existing buildings.*

(Relocated from Section 1812A.4.1, Item #7) ***1705A.6.3.1******Tie-back Anchors.*** *Performance test for the anchors shall be at a minimum of two (2) times the design loads …*

(Relocated from Section 1812A.4.3, Item #4) ***1705A.6.3.1.1*** *The shoring designengineer shall specify design loads for each anchor.*

(Relocated from Section 1812A.4.3, Item #1) ***1705A.6.3.1.2*** *The geotechnical engineer shall keep a record at job site of all test loads, total anchor movement, and report their accuracy.*

(Relocated from Section 1812A.6, Item #3) ***1705A.6.3.2*** *A complete and accurate record of all soldier pile locations, depths, concrete strengths …*

(Relocated from Section 1812A.6, Item #4) ***1705A.6.3.3*** *Calibration data for each test jack, pressure gauge and master pressure gauge …*

(Relocated from Section 1812A.6, Item #5) ***1705A.6.3.4*** *Monitoring points shall be established at the top and …*

(Relocated from Section 1812A.6, Item #6) ***1705A.6.3.5*** *Control points shall be established outside the area of influence of the shoring system to ensure the accuracy of the monitoring readings.*

(Relocated from Section 1812A.6, Item #7) ***1705A.6.3.6*** *The periodic basis of shoring monitoring, as a minimum, shall be as follows:*

* 1. *~~a.~~ Initial monitoring shall be performed prior to any excavation.*
  2. *~~b.~~ Once excavation has begun, the periodic readings shall be taken weekly until excavation reaches the estimated subgrade elevation and the permanent foundation is complete.*
  3. *~~c.~~ If performance of the shoring is within established guidelines, shoring design engineer may permit the periodic readings to be bi-weekly. Once initiated, bi-weekly readings shall continue until the building slab at ground floor level is completed and capable of transmitting lateral loads to the permanent structure. Thereafter, readings can be monthly.*
  4. *~~d.~~ Where the building has been designed to resist lateral earth pressures, the periodic monitoring of the soldier piles and adjacent structure can be discontinued once the ground floor diaphragm and subterranean portion of the structure is capable of resisting lateral soil loads and approved by the shoring design engineer, geotechnical engineer and building official.*
  5. *~~e.~~ Additional readings shall be taken when requested by the special inspector, shoring design engineer, geotechnical engineer or building official.*

(Relocated from Section 1812A.6, Item #8) ***1705A.6.3.7*** *Monitoring reading shall be submitted to the shoring design engineer …*

(Relocated from Section 1812A.6, Item #9) ***1705A.6.3.8*** *If the total cumulative horizontal or vertical movement (from start of construction) of the existing buildings reaches ½ inch or …*

(Relocated from Section 1812A.6, Item #10) ***1705A.6.3.9*** *If the total cumulative horizontal or vertical movement (from start of construction) of the existing buildings reaches ¾ inch or …*

(Relocated from Section 1812A.6, Item #11) ***1705A.6.3.10*** *Monitoring of tie-back anchor loads:*

1. *~~a.~~ Load cells shall be installed at the tie-back heads adjacent to buildings at maximum interval of 50 feet, with a minimum of one load cells per wall.*
2. *~~b.~~ Load cell readings shall be taken once a day during excavation and once a week during the remainder of construction.*
3. *~~c.~~ Load cell readings shall be submitted to the geotechnical engineer, shoring design engineer, engineer in responsible charge and building official.*
4. *~~d.~~ Load cell readings can be terminated once the temporary shoring no longer provides support for the buildings.*

***1705A.6.~~3~~4******Vibro stone columns.*** *Special inspections and tests of vibro stone columns for ground improvement shall be in accordance with the enforcement agency approved construction documents including requirements specified in ~~applicable portions of~~ Section 1813A.5.*

**…**

**1705*A*.12 Special inspections for wind resistance.** *Special inspections* for wind resistance specified in Sections 1705*A*.12.1 through 1705*A*.12.3, unless exempted by the exceptions to Section 1704*A*.2, are required for buildings and structures constructed in the following areas:

1. In wind Exposure Category B, where *V*asd is 150 miles per hour (67 m/sec) or greater.
2. In wind Exposure Category C or D, where *V*asd is 140 mph (62.6 m/sec) or greater.

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:~~***~~Special inspections~~* ~~are not required for wood~~ *~~shear walls~~*~~, shear panels and~~ *~~diaphragms~~* ~~, including nailing, bolting, anchoring and other fastening to other elements of the~~ *~~main windforce-resisting system~~*~~, where the~~ ~~lateral resistance is provided by structural sheathing and the specified fastener spacing at panel edges is more than 4 inches (102 mm) on center.~~

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:~~ *~~Special inspections~~* ~~are not required for cold-formed steel light-frame shear walls and~~ *~~diaphragms~~* ~~, including screwing, bolting, anchoring and other fastening to components of the windforce-resisting system, where either of the following applies:~~

* 1. ~~The sheathing is~~ *~~gypsum board~~* ~~or~~ *~~fiberboard~~* ~~.~~
  2. ~~The sheathing is~~ *~~wood structural panel~~* ~~or steel sheets on only one side of the~~ *~~shear wall~~*~~, shear panel or~~ *~~diaphragm~~* ~~assembly and the~~ ~~specified~~ ~~fastener spacing of~~ ~~at~~ ~~the~~ ~~panel or sheet edges~~ ~~is more than 4 inches (102 mm) on center (o.c.).~~

**…**

1705*A*.13 Special inspections for seismic resistance. *Special inspections* for 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: The~~ *~~special inspections~~* ~~specified in Sections 1705.13.1 through 1705.13.9 are not required for structures designed and constructed in accordance with one of the following:~~

1. ~~The structure consists of~~ *~~light-frame construction~~* ~~; the design spectral response acceleration at short periods, SDS, as determined in Section 1613.2.4, does not exceed 0.5; and the~~ *~~building height~~* ~~of the structure does not exceed 35 feet (10 668 mm).~~
2. ~~The~~ *~~seismic force-resisting system~~* ~~of the structure consists of~~ *~~reinforced masonry~~* ~~or reinforced concrete; the design spectral response acceleration at short periods, SDS, as determined in Section 1613.2.4, does not exceed 0.5; and the~~ *~~building height~~* ~~of the structure does not exceed 25 feet (7620 mm).~~
3. ~~The structure is a detached one- or two-family dwelling not exceeding two~~ *~~stories above grade plane~~* ~~and does not have any of the following horizontal or vertical irregularities in accordance with Section 12.3 of ASCE 7:~~
   1. ~~Torsional or extreme torsional irregularity.~~
   2. ~~Nonparallel systems irregularity.~~
   3. ~~Stiffness-soft story or stiffness-extreme soft story irregularity.~~
   4. ~~Discontinuity in lateral strength-weak story irregularity.~~

1705*A*.13.1 Structural steel. *Special inspections* for 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 Section1705A.2.1 of this code*.

~~Exceptions:~~

1. ~~In buildings and structures assigned to~~ *~~Seismic Design Category~~* ~~B or C,~~ *~~special inspections~~* ~~are not required for structural steel~~ *~~seismic force-resisting systems~~* ~~where the response modification coefficient, R, designated for “Steel systems not specifically detailed for seismic resistance, excluding cantilever column systems” in ASCE 7, Table 12.2-1, has been used for design and detailing.~~
2. ~~In structures assigned to~~ *~~Seismic Design Category~~* ~~D, E, or F,~~ *~~special inspections~~* ~~are not required for structural steel~~ *~~seismic force-resisting systems~~* ~~where design and detailing in accordance with AISC 360 is permitted by ASCE 7, Table 15.4-1.~~

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:~~

1. ~~In buildings and structures assigned to~~ *~~Seismic Design Category~~* ~~B or C,~~ *~~special inspections~~* ~~of~~ *~~structural steel elements~~* ~~are not required for~~ *~~seismic force-resisting systems~~* ~~with a response modification coefficient, R, of 3 or less.~~
2. ~~In structures assigned to~~ *~~Seismic Design Category~~* ~~D, E, or F,~~ *~~special inspections~~* ~~of~~ *~~structural steel elements~~* ~~are not required for~~ *~~seismic force-resisting systems~~* ~~where design and detailing other than AISC 341 is permitted by ASCE 7, Table 15.4-1.~~ *~~Special inspection~~* ~~shall be in accordance with the applicable referenced standard listed in ASCE 7, Table 15.4-1.~~

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*.

~~Exception:~~ *~~Special inspections~~* ~~are not required for wood~~ *~~shear walls~~* ~~, shear panels and~~ *~~diaphragms~~* ~~, including nailing, bolting, anchoring and other fastening to other elements of the~~ *~~seismic force-resisting system~~* ~~, where the~~ ~~lateral resistance is provided by structural sheathing, and the specified fastener spacing~~ ~~at the~~  ~~panel edges is more than 4 inches (102 mm) on center~~.

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*.

**~~Exception:~~***~~Special inspections~~* ~~are not required for cold-formed steel light-frame shear walls and~~ *~~diaphragms~~*~~, including screw installation, bolting, anchoring and other fastening to components of the~~ *~~seismic force-resisting system~~*~~, where either of the following applies:~~

* 1. ~~The sheathing is gypsum board or~~ *~~fiberboard~~*~~.~~
  2. ~~The sheathing is~~ *~~wood structural panel~~* ~~or steel sheets on only one side of the~~ *~~shear wall~~*~~, shear panel or~~ *~~diaphragm~~* ~~assembly and the~~ ~~specified fastener spacing~~ ~~at the panel or sheet edge~~ ~~is more than 4 inches (102 mm) on center.~~

**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 inspection* is 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 Category* D, E or F.

**~~Exceptions:~~***~~Periodic special inspection~~* ~~is not required for the following:~~

~~1. Exterior cladding, interior and exterior nonbearing walls and interior and exterior veneer 30 feet (9144 mm) or less in height above grade or walking surface.~~

~~2.~~ *~~E~~*~~xterior cladding and interior and exterior veneer weighing 5 psf (24.5 N/m~~~~2~~~~) or less.~~

~~3. Interior nonbearing walls weighing 15 psf (73.5 N/m~~~~2~~~~) or less.~~

**…**

***1705A.13.5.2* *Structural sealant glazing.*** *Periodic special inspection is required during sealant application and anchorage of support framing.*

**1705*A*.13.6 Plumbing, mechanical and electrical components.** *Periodic*s*pecial inspection* of 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 documents* require 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:

6.1. Minimum clearances have been provided as required by Section 13.2.3 ASCE/SEI 7.

6.2. 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 inspections* by 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 *as modified by Section 1705A.2.1 of this code*.

**~~Exceptions:~~**

1. ~~In buildings and structures assigned to~~ *~~Seismic Design Category~~* ~~B or C, nondestructive testing is not required for structural steel~~ *~~seismic force-resisting systems~~* ~~where the response modification coefficient, R, designated for “Steel systems not specifically detailed for seismic resistance, excluding cantilever column systems” in ASCE 7, Table 12.2-1, has been used for design and detailing.~~
2. ~~In structures assigned to~~ *~~Seismic Design Category~~* ~~D, E, or F, nondestructive testing is not required for structural steel~~ *~~seismic force-resisting systems~~* ~~where design and detailing in accordance with AISC 360~~

~~} is permitted by ASCE 7, Table 15.4-1.~~

**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 *as modified by Section 1705A.2.1 of this code*.

**~~Exceptions:~~**

1. ~~In buildings and structures assigned to~~ *~~Seismic Design Category~~* ~~B or C, nondestructive testing of~~ *~~structural steel elements~~* ~~is not required for~~ *~~seismic force-resisting systems~~* ~~with a response modification coefficient, R, of 3 or less.~~
2. ~~In structures assigned to~~ *~~Seismic Design Category~~* ~~D, E or F, nondestructive testing of~~ *~~structural steel elements~~* ~~is not required for~~ *~~seismic force-resisting systems~~* ~~where design and detailing other than AISC 341 is permitted by ASCE 7, Table 15.4-1. Nondestructive testing of~~ *~~structural steel elements~~* ~~shall be in accordance with the applicable referenced standard listed in ASCE 7, Table 15.4-1.~~

**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.

*Seismic sway bracing satisfying requirements of FM 1950 or using an alternative testing protocol approved by the building official shall be deemed to satisfy the requirements of this section.*

(Relocated from former 2410.1.2 item i and j and modified as shown) ***1705A.14.2.1* *Structural sealant glazing testing.*** *Manufacturer’s certification shall be in accordance with Section 2410.1.2. In addition, ~~Q~~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. 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.*

**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.

# Chapter 18A SOILS AND FOUNDATIONS*.*

**CHAPTER 18*A***

**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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter | **X** | **X** |  |

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.}~~

…

**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: A subsurface soil investigation to determine the location of the ground-water table shall not be required where waterproofing is provided in accordance with {Section 1805}.~~

…

**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.* ~~Rubble stone foundation walls. Foundation walls of rough or random rubble stone shall be not less than 16 inches (406 mm) thick. Rubble stone shall not be used for foundation walls of structures assigned to Seismic Design Category C, D, E or F.~~

**1807*A*.1.4 Permanent wood foundation systems.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* ~~Permanent wood foundation systems shall be designed and installed in accordance with AWC PWF. Lumber and plywood shall be preservative treated in accordance with AWPA U1 (Commodity Specification A, Special Requirement 4.2) and shall be identified in accordance with Section 2303.1.9.1.~~

**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:~~** ~~Concrete and masonry foundation walls shall be permitted to be designed and constructed in accordance with Section 1807.1.6.~~

**~~1807.1.6 Prescriptive design of concrete and masonry foundation walls.~~** ~~Concrete and masonry foundation walls that are laterally supported at the top and bottom shall be permitted to be designed and constructed in accordance with this section.~~

**~~1807.1.6.1 Foundation wall thickness.~~** ~~The thickness of prescriptively designed foundation walls shall be not less than the thickness of the wall supported, except that foundation walls of not less than 8-inch (203 mm) nominal width shall be permitted to support brick-veneered frame walls and 10-inch-wide (254 mm) cavity walls provided that the requirements of Section 1807.1.6.2 or 1807.1.6.3 are met.~~

**~~1807.1.6.2 Concrete foundation walls.~~** ~~Concrete foundation walls shall comply with the following:~~

* + 1. ~~The thickness shall comply with the requirements of Table 1807.1.6.2.~~
    2. ~~The size and spacing of vertical reinforcement shown in Table 1807.1.6.2 are based on the use of reinforcement with a minimum yield strength of 60,000 pounds per square inch (psi) (414 MPa). Vertical reinforcement with a minimum yield strength of 40,000 psi (276 MPa) or 50,000 psi (345 MPa) shall be permitted, provided that the same size bar is used and the spacing shown in the table is reduced by multiplying the spacing by 0.67 or 0.83, respectively.~~
    3. ~~Vertical reinforcement, where required, shall be placed nearest the inside face of the wall a distance, d, from the outside face (soil face) of the wall. The distance, d, is equal to the wall thickness, t, minus 1.25 inches (32 mm) plus one-half the bar diameter, db, [d = t - (1.25 + db / 2)]. The reinforcement shall be placed within a tolerance of ±~~ ~~3~~~~/8 inch (9.5 mm) where d is less than or equal to 8 inches (203 mm) or ±~~ ~~1~~~~/2 inch (12.7 mm) where d is greater than 8 inches (203 mm).~~
    4. ~~In lieu of the reinforcement shown in Table 1807.1.6.2, smaller reinforcing bar sizes with closer spacings that provide an equivalent cross-sectional area of reinforcement per unit length shall be permitted.~~
    5. ~~Concrete cover for reinforcement measured from the inside face of the wall shall be not less than~~ ~~3~~~~/4 inch (19.1 mm). Concrete cover for reinforcement measured from the outside face of the wall shall be not less than 1~~~~1~~~~/2 inches (38 mm) for No. 5 bars and smaller, and not less than 2 inches (51 mm) for larger bars.~~
    6. ~~Concrete shall have a specified compressive strength, f ′~~~~c~~~~, of not less than 2,500 psi (17.2 MPa).~~
    7. ~~The unfactored axial load per linear foot of wall shall not exceed 1.2 t f ′~~~~c~~ ~~where t is the specified wall thickness in inches.~~

**~~TABLE 1807.1.6.2~~**

**~~CONCRETE FOUNDATION WALLS~~~~b,~~~~c~~**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **~~MAXIMUM WALL HEIGHT~~**  **~~(feet)~~** | **~~MAXIMUM UNBALANCED BACKFILL HEIGHT~~~~e~~ ~~(feet)~~** | **~~MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)~~** | | | | | | | | |
| **~~Design lateral soil load~~~~a~~ ~~(psf per foot of depth)~~** | | | | | | | | |
| **~~30~~~~d~~** | | | **~~45~~~~d~~** | | | **~~60~~** | | |
| **~~Minimum wall thickness (inches)~~** | | | | | | | | |
| **~~7.5~~** | **~~9.5~~** | **~~11.5~~** | **~~7.5~~** | **~~9.5~~** | **~~11.5~~** | **~~7.5~~** | **~~9.5~~** | **~~11.5~~** |
| ~~5~~ | ~~4~~  ~~5~~ | ~~PC PC~~ | ~~PC PC~~ | ~~PC~~  ~~PC~~ | ~~PC PC~~ | ~~PC PC~~ | ~~PC PC~~ | ~~PC PC~~ | ~~PC PC~~ | ~~PC PC~~ |
| ~~6~~ | ~~4~~  ~~5~~  ~~6~~ | ~~PC PC PC~~ | ~~PC PC PC~~ | ~~PC~~  ~~PC~~  ~~PC~~ | ~~PC PC PC~~ | ~~PC PC PC~~ | ~~PC PC PC~~ | ~~PC PC PC~~ | ~~PC PC PC~~ | ~~PC PC PC~~ |
| ~~7~~ | ~~4~~  ~~5~~  ~~6~~  ~~7~~ | ~~PC PC PC PC~~ | ~~PC PC PC PC~~ | ~~PC~~  ~~PC~~  ~~PC~~  ~~PC~~ | ~~PC PC PC~~  ~~#5 at 46~~ | ~~PC PC PC PC~~ | ~~PC PC PC PC~~ | ~~PC PC~~  ~~#5 at 48~~  ~~#6 at 48~~ | ~~PC PC PC PC~~ | ~~PC PC PC PC~~ |
| ~~8~~ | ~~4~~  ~~5~~  ~~6~~  ~~7~~  ~~8~~ | ~~PC PC PC PC~~  ~~#5 at 47~~ | ~~PC PC PC PC PC~~ | ~~PC~~  ~~PC~~  ~~PC~~  ~~PC~~  ~~PC~~ | ~~PC PC PC~~  ~~#5 at 41~~  ~~#6 at 43~~ | ~~PC PC PC PC PC~~ | ~~PC PC PC PC PC~~ | ~~PC PC~~  ~~#5 at 43~~  ~~#6 at 43~~  ~~#6 at 32~~ | ~~PC PC PC PC~~  ~~#6 at 44~~ | ~~PC PC PC PC PC~~ |
| ~~9~~ | ~~4~~  ~~5~~  ~~6~~  ~~7~~  ~~8~~  ~~9~~~~d~~ | ~~PC PC PC PC~~  ~~#5 at 41~~  ~~#6 at 46~~ | ~~PC PC PC PC PC PC~~ | ~~PC~~  ~~PC~~  ~~PC~~  ~~PC~~  ~~PC~~  ~~PC~~ | ~~PC PC PC~~  ~~#5 at 37~~  ~~#6 at 38~~  ~~#7 at 41~~ | ~~PC PC PC PC~~  ~~#5 at 37~~  ~~#6 at 41~~ | ~~PC PC PC PC PC PC~~ | ~~PC PC~~  ~~#5 at 39~~  ~~#6 at 38~~  ~~#7 at 39~~  ~~#7 at 31~~ | ~~PC PC PC~~  ~~#5 at 37~~  ~~#6 at 39~~  ~~#7 at 41~~ | ~~PC PC PC PC~~  ~~#4 at 48~~  ~~#6 at 39~~ |
|  | ~~4~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ |
|  | ~~5~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ |
|  | ~~6~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~#5 at 37~~ | ~~PC~~ | ~~PC~~ |
| ~~10~~ | ~~7~~ | ~~PC~~ | ~~PC~~ | ~~PC~~ | ~~#6 at 48~~ | ~~PC~~ | ~~PC~~ | ~~#6 at 35~~ | ~~#6at 48~~ | ~~PC~~ |
|  | ~~8~~ | ~~#5 at 38~~ | ~~PC~~ | ~~PC~~ | ~~#7 at 47~~ | ~~#6 at 47~~ | ~~PC~~ | ~~#7 at 35~~ | ~~#7at 47~~ | ~~#6at 45~~ |
|  | ~~9~~~~d~~ | ~~#6 at 41~~ | ~~#4 at 48~~ | ~~PC~~ | ~~#7 at 37~~ | ~~#7 at 48~~ | ~~#4 at 48~~ | ~~#6 at 22~~ | ~~#7at 37~~ | ~~#7at 47~~ |
|  | ~~10~~~~d~~ | ~~#7 at 45~~ | ~~#6 at 45~~ | ~~PC~~ | ~~#7 at 31~~ | ~~#7 at 40~~ | ~~#6 at 38~~ | ~~#6 at 22~~ | ~~#7at 30~~ | ~~#7at 38~~ |

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/m.~~

* + - 1. ~~For design lateral soil loads, see Section 1610.~~
      2. ~~Provisions for this table are based on design and construction requirements specified in Section 1807.1.6.2.~~
      3. ~~PC = Plain Concrete.~~
      4. ~~Where unbalanced backfill height exceeds 8 feet and design lateral soil~~ *~~loads~~* ~~from Table 1610.1 are used, the requirements for 30 and 45 psf per foot of depth are not applicable (see Section 1610 ).~~
      5. ~~For height of unbalanced backfill, see Section 1807.1.2.~~

**~~1807.1.6.2.1 Seismic requirements.~~** ~~Based on the seismic design category assigned to the structure in accordance with Section 1613, concrete foundation walls designed using Table 1807.1.6.2 shall be subject to the following limitations:~~

1. ~~Seismic Design Categories A and B. Not less than one No. 5 bar shall be provided around window, door and similar sized openings. The bar shall be anchored to develop fy in tension at the corners of openings.~~
2. ~~Seismic Design Categories C, D, E and F. Tables shall not be used except as allowed for plain concrete members in Section 1905.1.7.~~

**~~1807.1.6.3 Masonry foundation walls.~~** ~~Masonry foundation walls shall comply with the following:~~

1. ~~The thickness shall comply with the requirements of Table 1807.1.6.3(1) for plain masonry walls or Table 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4) for masonry walls with reinforcement.~~
2. ~~Vertical reinforcement shall have a minimum yield strength of 60,000 psi (414 MPa).~~
3. ~~The specified location of the reinforcement shall equal or exceed the effective depth distance, d, noted in Tables 1807.1.6.3(2), 1807.1.6.3(3) and 1807.1.6.3(4) and shall be measured from the face of the exterior (soil) side of the wall to the center of the vertical reinforcement. The reinforcement shall be placed within the tolerances specified in TMS 602, Article 3.4.B.11, of the specified location.~~
4. ~~Grout shall comply with Section 2103.3.~~
5. ~~Concrete masonry units shall comply with ASTM C90.~~
6. ~~Clay masonry units shall comply with ASTM C652 for hollow brick, except compliance with ASTM C62 or ASTM C216 shall be permitted where solid masonry units are installed in accordance with Table 1807.1.6.3(1) for plain masonry.~~
7. ~~Masonry units shall be laid in running bond and installed with Type M or S mortar in accordance with Section 2103.2.1.~~
8. ~~The unfactored axial load per linear foot of wall shall not exceed 1.2 tf ′~~~~m~~ ~~where t is the specified wall thickness in inches and f ′~~~~m~~ ~~is the specified compressive strength of masonry in pounds per square inch.~~
9. ~~Not less than 4 inches (102 mm) of solid masonry shall be provided at girder supports at the top of hollow masonry unit foundation walls.~~
10. ~~Corbeling of masonry shall be in accordance with Section 2104.1. Where an 8-inch (203 mm) wall is corbeled, the top corbel shall not extend higher than the bottom of the floor framing and shall be a full course of headers not less than 6 inches (152 mm) in length or the top course bed joint shall be tied to the vertical wall projection. The tie shall be W2.8 (4.8 mm) and spaced at a maximum horizontal distance of 36 inches (914 mm). The hollow space behind the corbelled masonry shall be filled with mortar or grout.~~

**~~1807.1.6.3.1 Alternative foundation wall reinforcement.~~** ~~In lieu of the reinforcement provisions for masonry foundation walls in Table 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4), alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per linear foot (mm) of wall shall be permitted to be used, provided that the spacing of reinforcement does not exceed 72 inches (1829 mm) and reinforcing bar sizes do not exceed No. 11.~~

**~~TABLE 1807.1.6.3(1)~~**

**~~PLAIN MASONRY FOUNDATION WALLS~~~~a,~~~~b,~~~~c~~**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **~~MAXIMUM WALL HEIGHT (feet)~~** | **~~MAXIMUM UNBALANCED BACKFILL HEIGHT~~~~e~~ ~~(feet)~~** | **~~MINIMUM NOMINAL WALL THICKNESS (inches)~~** | | |
| **~~Design lateral soil load~~~~a~~ ~~(psf per foot of depth)~~** | | |
| **~~30~~~~f~~** | **~~45~~~~f~~** | **~~60~~** |
|  | ~~4 (or less)~~ | ~~8~~ | ~~8~~ | ~~8~~ |
| ~~7~~ | ~~5~~  ~~6~~ | ~~8~~  ~~10~~ | ~~10~~  ~~12~~ | ~~10~~  ~~10 (solid~~~~c~~~~)~~ |
|  | ~~7~~ | ~~12~~ | ~~10 (solid~~~~c~~~~)~~ | ~~10 (solid~~~~c~~~~)~~ |
|  | ~~4 (or less)~~ | ~~8~~ | ~~8~~ | ~~8~~ |
|  | ~~5~~ | ~~8~~ | ~~10~~ | ~~12~~ |
| ~~8~~ | ~~6~~ | ~~10~~ | ~~12~~ | ~~12 (solid~~~~c~~~~)~~ |
|  | ~~7~~ | ~~12~~ | ~~12 (solid~~~~c~~~~)~~ | ~~Note d~~ |
|  | ~~8~~ | ~~10 (solid~~~~c~~~~)~~ | ~~12 (solid~~~~c~~~~)~~ | ~~Note d~~ |
|  | ~~4 (or less)~~ | ~~8~~ | ~~8~~ | ~~8~~ |
|  | ~~5~~ | ~~8~~ | ~~10~~ | ~~12~~ |
| ~~9~~ | ~~6~~  ~~7~~ | ~~12~~  ~~12(solid~~~~c~~~~)~~ | ~~12~~  ~~12 (solid~~~~c~~~~)~~ | ~~12 (solid~~~~c~~~~)~~  ~~Note d~~ |
|  | ~~8~~ | ~~12(solid~~~~c~~~~)~~ | ~~Note d~~ | ~~Note d~~ |
|  | ~~9~~~~f~~ | ~~Note d~~ | ~~Note d~~ | ~~Note d~~ |

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/m.~~

* 1. ~~For design lateral soil loads, see Section 1610.~~
  2. ~~Provisions for this table are based on design and construction requirements specified in Section 1807.1.6.3.~~
  3. ~~Solid grouted hollow units or solid masonry units.~~
  4. ~~A design in compliance with Chapter 21 or reinforcement in accordance with Table 1807.1.6.3(2) is required.~~
  5. ~~For height of unbalanced backfill, see Section 1807.1.2.~~
  6. ~~Where unbalanced backfill height exceeds 8 feet and design lateral soil loads from Table 1610.1 are used, the requirements for 30 and 45 psf per foot of depth are not applicable (see Section 1610 ).~~

**~~TABLE 1807.1.6.3(2)~~**

**~~8-INCH MASONRY FOUNDATION WALLS WITH REINFORCEMENT WHERE d ≥ 5 INCHES~~~~a,~~~~b,~~~~c~~**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **~~MAXIMUM WALL HEIGHT~~**  **~~(feet-inches)~~** | **~~MAXIMUM UNBALANCED BACKFILL HEIGHT~~~~d~~**  **~~(feet-inches)~~** | **~~MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)~~** | | |
| **~~Design lateral soil load~~~~a~~ ~~(psf per foot of depth)~~** | | |
| **~~30~~~~e~~** | **~~45~~~~e~~** | **~~60~~** |
| ~~7-4~~ | ~~4-0 (or less)~~  ~~5-0~~  ~~6-0~~  ~~7-4~~ | ~~#4 at 48~~  ~~#4 at 48~~  ~~#4 at 48~~  ~~#5 at 48~~ | ~~#4 at 48~~  ~~#4 at 48~~  ~~#5 at 48~~  ~~#6 at 48~~ | ~~#4 at 48~~  ~~#4 at 48~~  ~~#5 at 48~~  ~~#7 at 48~~ |
|  | ~~4-0 (or less)~~ | ~~#4 at 48~~ | ~~#4 at 48~~ | ~~#4 at 48~~ |
|  | ~~5-0~~ | ~~#4 at 48~~ | ~~#4 at 48~~ | ~~#4 at 48~~ |
| ~~8-0~~ | ~~6-0~~ | ~~#4 at 48~~ | ~~#5 at 48~~ | ~~#5 at 48~~ |
|  | ~~7-0~~ | ~~#5 at 48~~ | ~~#6 at 48~~ | ~~#7 at 48~~ |
|  | ~~8-0~~ | ~~#5 at 48~~ | ~~#6 at 48~~ | ~~#7 at 48~~ |
|  | ~~4-0 (or less)~~ | ~~#4 at 48~~ | ~~#4 at 48~~ | ~~#4 at 48~~ |
|  | ~~5-0~~ | ~~#4 at 48~~ | ~~#4 at 48~~ | ~~#5 at 48~~ |
| ~~8-8~~ | ~~6-0~~ | ~~#4 at 48~~ | ~~#5 at 48~~ | ~~#6 at 48~~ |
|  | ~~7-0~~ | ~~#5 at 48~~ | ~~#6 at 48~~ | ~~#7 at 48~~ |
|  | ~~8-8~~~~e~~ | ~~#6 at 48~~ | ~~#7 at 48~~ | ~~#8 at 48~~ |
|  | ~~4-0 (or less)~~ | ~~#4 at 48~~ | ~~#4 at 48~~ | ~~#4 at 48~~ |
|  | ~~5-0~~ | ~~#4 at 48~~ | ~~#4 at 48~~ | ~~#5 at 48~~ |
| ~~9-4~~ | ~~6-0~~  ~~7-0~~ | ~~#4 at 48~~  ~~#5 at 48~~ | ~~#5 at 48~~  ~~#6 at 48~~ | ~~#6 at 48~~  ~~#7 at 48~~ |
|  | ~~8-0~~ | ~~#6 at 48~~ | ~~#7 at 48~~ | ~~#8 at 48~~ |
|  | ~~9-4~~~~e~~ | ~~#7 at 48~~ | ~~#8 at 48~~ | ~~#9 at 48~~ |
|  | ~~4-0 (or less)~~ | ~~#4 at 48~~ | ~~#4 at 48~~ | ~~#4 at 48~~ |
|  | ~~5-0~~ | ~~#4 at 48~~ | ~~#4 at 48~~ | ~~#5 at 48~~ |
|  | ~~6-0~~ | ~~#4 at 48~~ | ~~#5 at 48~~ | ~~#6 at 48~~ |
| ~~10-0~~ | ~~7-0~~ | ~~#5 at 48~~ | ~~#6 at 48~~ | ~~#7 at 48~~ |
|  | ~~8-0~~ | ~~#6 at 48~~ | ~~#7 at 48~~ | ~~#8 at 48~~ |
|  | ~~9-0~~~~e~~ | ~~#7 at 48~~ | ~~#8 at 48~~ | ~~#9 at 48~~ |
|  | ~~10-0~~~~e~~ | ~~#7 at 48~~ | ~~#9 at 48~~ | ~~#9 at 48~~ |

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/m.~~

1. ~~For design lateral soil loads, see Section 1610.~~
2. ~~Provisions for this table are based on design and construction requirements specified in Section 1807.1.6.3.~~
3. ~~For alternative reinforcement, see Section 1807.1.6.3.1.~~
4. ~~For height of unbalanced backfill, see Section 1807.1.2.~~
5. ~~Where unbalanced backfill height exceeds 8 feet and design lateral soil loads from Table 1610.1 are used, the requirements for 30 and 45 psf per foot of depth are not applicable. See Section 1610.~~

**~~TABLE 1807.1.6.3(3)~~**

**~~10-INCH MASONRY FOUNDATION WALLS WITH REINFORCEMENT WHERE d ≥ 6.75 INCHES~~~~a,~~~~b,~~~~c~~**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **~~MAXIMUM WALL HEIGHT~~**  **~~(feet-inches)~~** | **~~MAXIMUM UNBALANCED BACKFILL HEIGHT~~~~d~~**  **~~(feet-inches)~~** | **~~MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)~~** | | |
| **~~Design lateral soil load~~~~a~~ ~~(psf per foot of depth)~~** | | |
| **~~30~~~~e~~** | **~~45~~~~e~~** | **~~60~~** |
| ~~7-4~~ | ~~4-0 (or less)~~  ~~5-0~~  ~~6-0~~  ~~7-4~~ | ~~#4 at 56~~  ~~#4 at 56~~  ~~#4 at 56~~  ~~#4 at 56~~ | ~~#4 at 56~~  ~~#4 at 56~~  ~~#4 at 56~~  ~~#5 at 56~~ | ~~#4 at 56~~  ~~#4 at 56~~  ~~#5 at 56~~  ~~#6 at 56~~ |
|  | ~~4-0 (or less)~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#4 at 56~~ |
|  | ~~5-0~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#4 at 56~~ |
| ~~8-0~~ | ~~6-0~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#5 at 56~~ |
|  | ~~7-0~~ | ~~#4 at 56~~ | ~~#5 at 56~~ | ~~#6 at 56~~ |
|  | ~~8-0~~ | ~~#5 at 56~~ | ~~#6 at 56~~ | ~~#7 at 56~~ |
|  | ~~4-0 (or less)~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#4 at 56~~ |
|  | ~~5-0~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#4 at 56~~ |
| ~~8-8~~ | ~~6-0~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#5 at 56~~ |
|  | ~~7-0~~ | ~~#4 at 56~~ | ~~#5 at 56~~ | ~~#6 at 56~~ |
|  | ~~8-8~~~~e~~ | ~~#5 at 56~~ | ~~#7 at 56~~ | ~~#8 at 56~~ |
|  | ~~4-0 (or less)~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#4 at 56~~ |
|  | ~~5-0~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#4 at 56~~ |
| ~~9-4~~ | ~~6-0~~  ~~7-0~~ | ~~#4 at 56~~  ~~#4 at 56~~ | ~~#5 at 56~~  ~~#5 at 56~~ | ~~#5 at 56~~  ~~#6 at 56~~ |
|  | ~~8-0~~ | ~~#5 at 56~~ | ~~#6 at 56~~ | ~~#7 at 56~~ |
|  | ~~9-4~~~~e~~ | ~~#6 at 56~~ | ~~#7 at 56~~ | ~~#7 at 56~~ |
|  | ~~4-0 (or less)~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#4 at 56~~ |
|  | ~~5-0~~ | ~~#4 at 56~~ | ~~#4 at 56~~ | ~~#4 at 56~~ |
|  | ~~6-0~~ | ~~#4 at 56~~ | ~~#5 at 56~~ | ~~#5 at 56~~ |
| ~~10-0~~ | ~~7-0~~ | ~~#5 at 56~~ | ~~#6 at 56~~ | ~~#7 at 56~~ |
|  | ~~8-0~~ | ~~#5 at 56~~ | ~~#7 at 56~~ | ~~#8 at 56~~ |
|  | ~~9-0~~~~e~~ | ~~#6 at 56~~ | ~~#7 at 56~~ | ~~#9 at 56~~ |
|  | ~~10-0~~~~e~~ | ~~#7 at 56~~ | ~~#8 at 56~~ | ~~#9 at 56~~ |

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 1.157 kPa/m.~~

1. ~~For design lateral soil loads, see Section 1610.~~
2. ~~Provisions for this table are based on design and construction requirements specified in Section 1807.1.6.3.~~
3. ~~For alternative reinforcement, see Section 1807.1.6.3.1.~~
4. ~~For height of unbalanced backfill, see Section 1807.1.2.~~
5. ~~Where unbalanced backfill height exceeds 8 feet and design lateral soil~~ *~~loads~~* ~~from Table 1610.1 are used, the requirements for 30 and 45 psf per foot of depth are not applicable. See Section 1610.~~

**~~TABLE 1807.1.6.3(4)~~**

**~~12-INCH MASONRY FOUNDATION WALLS WITH REINFORCEMENT WHERE d ≥ 8.75 INCHES~~~~a,~~~~b,~~~~c~~**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **~~MAXIMUM WALL HEIGHT~~**  **~~(feet-inches)~~** | **~~MAXIMUM UNBALANCED BACKFILL HEIGHT~~~~d~~**  **~~(feet-inches)~~** | **~~MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)~~** | | |
| **~~Design lateral soil load~~~~a~~ ~~(psf per foot of depth)~~** | | |
| **~~30~~~~e~~** | **~~45~~~~e~~** | **~~60~~** |
| ~~7-4~~ | ~~4 (or less)~~  ~~5-0~~  ~~6-0~~  ~~7-4~~ | ~~#4 at 72~~  ~~#4 at 72~~  ~~#4 at 72~~  ~~#4 at 72~~ | ~~#4 at 72~~  ~~#4 at 72~~  ~~#4 at 72~~  ~~#5 at 72~~ | ~~#4 at 72~~  ~~#4 at 72~~  ~~#5 at 72~~  ~~#6 at 72~~ |
|  | ~~4 (or less)~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#4 at 72~~ |
|  | ~~5-0~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#4 at 72~~ |
| ~~8-0~~ | ~~6-0~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#5 at 72~~ |
|  | ~~7-0~~ | ~~#4 at 72~~ | ~~#5 at 72~~ | ~~#6 at 72~~ |
|  | ~~8-0~~ | ~~#5 at 72~~ | ~~#6 at 72~~ | ~~#8 at 72~~ |
|  | ~~4 (or less)~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#4 at 72~~ |
|  | ~~5-0~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#4 at 72~~ |
| ~~8-8~~ | ~~6-0~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#5 at 72~~ |
|  | ~~7-0~~ | ~~#4 at 72~~ | ~~#5 at 72~~ | ~~#6 at 72~~ |
|  | ~~8-8~~~~e~~ | ~~#5 at 72~~ | ~~#7 at 72~~ | ~~#8 at 72~~ |
|  | ~~4 (or less)~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#4 at 72~~ |
|  | ~~5-0~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#4 at 72~~ |
| ~~9-4~~ | ~~6-0~~  ~~7-0~~ | ~~#4 at 72~~  ~~#4 at 72~~ | ~~#5 at 72~~  ~~#5 at 72~~ | ~~#5 at 72~~  ~~#6 at 72~~ |
|  | ~~8-0~~ | ~~#5 at 72~~ | ~~#6 at 72~~ | ~~#7 at 72~~ |
|  | ~~9-4~~~~e~~ | ~~#6 at 72~~ | ~~#7 at 72~~ | ~~#8 at 72~~ |
|  | ~~4 (or less)~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#4 at 72~~ |
|  | ~~5-0~~ | ~~#4 at 72~~ | ~~#4 at 72~~ | ~~#4 at 72~~ |
|  | ~~6-0~~ | ~~#4 at 72~~ | ~~#5 at 72~~ | ~~#5 at 72~~ |
| ~~10-0~~ | ~~7-0~~ | ~~#4 at 72~~ | ~~#6 at 72~~ | ~~#6 at 72~~ |
|  | ~~8-0~~ | ~~#5 at 72~~ | ~~#6 at 72~~ | ~~#7 at 72~~ |
|  | ~~9-0~~~~e~~ | ~~#6 at 72~~ | ~~#7 at 72~~ | ~~#8 at 72~~ |
|  | ~~10-0~~~~e~~ | ~~#7 at 72~~ | ~~#8 at 72~~ | ~~#9 at 72~~ |

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/m.~~

1. ~~For design lateral soil loads, see Section 1610.~~
2. ~~Provisions for this table are based on design and construction requirements specified in Section 1807.1.6.3.~~
3. ~~For alternative reinforcement, see Section 1807.1.6.3.1.~~
4. ~~For height of unbalanced backfill, see Section 1807.1.2.~~
5. ~~Where unbalanced backfill height exceeds 8 feet and design lateral soil loads from Table 1610.1 are used, the requirements for 30 and 45 psf per foot of depth are not applicable. See Section 1610.~~

**~~1807.1.6.3.2 Seismic requirements.~~** ~~Based on the seismic design category assigned to the structure in accordance with Section 1613, masonry foundation walls designed using Tables 1807.1.6.3(1) through 1807.1.6.3(4) shall be subject to the following limitations:~~

1. ~~Seismic Design Categories A and B. No additional seismic requirements.~~
2. ~~Seismic Design Category C. A design using Tables 1807.1.6.3(1) through 1807.1.6.3(4) is subject to the seismic requirements of Section 7.4.3 of TMS 402.~~
3. ~~Seismic Design Category D. A design using Tables 1807.1.6.3(2) through 1807.1.6.3(4) is subject to the seismic requirements of Section 7.4.4 of TMS 402.~~
4. ~~Seismic Design Categories E and F. A design using Tables 1807.1.6.3(2) through 1807.1.6.3(4) is subject to the seismic requirements of Section 7.4.5 of TMS 402.~~

…

**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:~~** ~~Where concrete footings supporting walls of light-frame construction are designed in accordance with Table 1809.7, a specific design in accordance with Chapter 19 is not required.~~

…

**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:~~**

~~Detached one- and two-family dwellings of~~ *~~light-frame construction~~* ~~and two stories or less above~~ *~~grade plane~~* ~~are not required to comply with the provisions of Section 18.13 of ACI 318.~~

~~Section 18.13.4.3(a) of ACI 318 shall not apply.~~

…

**1809*A*.7 Prescriptive footings for light-frame construction.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* ~~Where a specific design is not provided, concrete or masonry-unit footings supporting walls of light-frame construction shall be permitted to be designed in accordance with Table 1809.7.~~

**~~TABLE 1809.7~~**

**~~PRESCRIPTIVE FOOTINGS SUPPORTING WALLS OF LIGHT-FRAME CONSTRUCTION~~ ~~a,~~~~b,~~~~c,~~~~d,~~~~e~~**

|  |  |  |
| --- | --- | --- |
| **~~NUMBER OF FLOORS SUPPORTED BY THE FOOTING~~~~f~~** | **~~WIDTH OF FOOTING (inches)~~** | **~~THICKNESS OF FOOTING (inches)~~** |
| ~~1~~ | ~~12~~ | ~~6~~ |
| ~~2~~ | ~~15~~ | ~~6~~ |
| ~~3~~ | ~~18~~ | ~~8~~~~g~~ |

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.~~

* + 1. ~~Depth of footings shall be in accordance with Section 1809.4.~~
    2. ~~The ground under the floor shall be permitted to be excavated to the elevation of the top of the footing.~~
    3. ~~Interior stud-bearing walls shall be permitted to be supported by isolated footings. The footing width and length shall be twice the width shown in this table, and footings shall be spaced not more than 6 feet on center.~~
    4. ~~See Section 1905 for additional requirements for concrete footings of structures assigned to Seismic Design Category C, D, E or F.~~
    5. ~~For thickness of foundation walls, see Section 1807.1.6.~~
    6. ~~Footings shall be permitted to support a roof in addition to the stipulated number of floors. Footings supporting roof only shall be as required for supporting one floor.~~
    7. ~~Plain concrete footings for Group R-3 occupancies shall be permitted to be 6 inches thick.~~

**1809*A*.8 Plain concrete footings.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* ~~The edge thickness of plain concrete footings supporting walls of other than~~ *~~light-frame construction~~* ~~shall be not less than 8 inches (203 mm) where placed on soil or rock.~~

**~~Exception:~~** ~~For plain concrete footings supporting Group R-3 occupancies, the edge thickness is permitted to be 6 inches (152 mm), provided that the footing does not extend beyond a distance greater than the thickness of the footing on either side of the supported wall.~~

**1809*A*.9 Masonry-unit footings.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* ~~The design, materials and construction of masonry-unit footings shall comply with Sections 1809.9.1 and 1809.9.2, and the provisions of Chapter 21.~~

**~~Exception:~~** ~~Where a specific design is not provided, masonry-unit footings supporting walls of light-frame construction shall be permitted to be designed in accordance with Table 1809.7.~~

**~~1809.9.1 Dimensions.~~** ~~Masonry-unit footings shall be laid in Type M or S mortar complying with Section 2103.2.1 and the depth shall be not less than twice the projection beyond the wall, pier or column. The width shall be not less than 8 inches (203 mm) wider than the wall supported thereon.~~

**~~1809.9.2 Offsets.~~** ~~The maximum offset of each course in brick foundation walls stepped up from the footings shall be 1½ inches (38 mm) where laid in single courses, and 3 inches (76 mm) where laid in double courses.~~

**1809*A*.10 Pier and curtain wall foundations.** *Reserved.*~~Except in Seismic Design Categories D, E and F, pier and curtain wall foundations shall be permitted to be used to support light-frame construction not more than two stories above grade plane, provided that the following requirements are met:~~

1. ~~All load-bearing walls shall be placed on continuous concrete footings bonded integrally with the exterior wall footings.~~
2. ~~The minimum actual thickness of a load-bearing masonry wall shall be not less than 4 inches (102 mm) nominal or 3~~ ~~5~~~~/8 inches (92 mm) actual thickness, and shall be bonded integrally with piers spaced 6 feet (1829 mm) on center (o.c.).~~
3. ~~Piers shall be constructed in accordance with Chapter 21 and the following:~~
   1. ~~The unsupported height of the masonry piers shall not exceed 10 times their least dimension.~~
   2. ~~Where structural clay tile or hollow concrete masonry units are used for piers supporting beams and girders, the cellular spaces shall be filled solidly with concrete or Type M or S mortar .~~

**~~Exception:~~** ~~Unfilled hollow piers shall be permitted where the unsupported height of the pier is not more than four times its least dimension.~~

* 1. ~~Hollow piers shall be capped with 4 inches (102 mm) of solid masonry or concrete or the cavities of the top course shall be filled with concrete or grout.~~

1. ~~The maximum height of a 4-inch (102 mm) load-bearing masonry foundation wall supporting wood frame walls and floors shall not be more than 4 feet (1219 mm) in height.~~
2. ~~The unbalanced fill for 4-inch (102 mm) foundation walls shall not exceed 24 inches (610 mm) for solid masonry, nor 12 inches (305 mm) for hollow masonry.~~

…

**1809*A*.12 Timber footings.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* ~~Timber footings shall be permitted for buildings of Type V construction and as otherwise approved by the building official. Such footings shall be treated in accordance with AWPA U1 (Commodity Specification A, Use Category 4B). Treated timbers are not required where placed entirely below permanent water level, or where used as capping for wood piles that project above the water level over submerged or marsh lands. The compressive stresses perpendicular to grain in untreated timber footings supported on treated piles shall not exceed 70 percent of the allowable stresses for the species and grade of timber as specified in the ANSI/AWC NDS.~~

…

***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 Sections 1705A.9.1 and 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~~.* (Stricken text relocated to Section 1705A.9.1)

…

**~~1810.3.2.1.2 ACI 318 Equation (25.7.3.3).~~** ~~Where this chapter requires detailing of concrete deep foundation elements in accordance with Section 18.7.5.4 of ACI 318, compliance with Equation (25.7.3.3) of ACI 318 shall not be required.~~

…

**1810*A*.3.2.4 Timber.** *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.* ~~Timber~~ *~~deep foundation~~* ~~elements shall be designed as piles or poles in accordance with ANSI/AWC NDS. Round timber elements shall conform to ASTM D25. Sawn timber elements shall conform to DOC PS-20.~~

**~~1810.3.2.4.1 Preservative treatment.~~** ~~Timber~~ *~~deep foundation~~* ~~elements used to support permanent structures shall be treated in accordance with this section unless it is established that the tops of the untreated timber elements will be below the lowest ground-water level assumed to exist during the life of the structure. Preservative and minimum final retention shall be in accordance with AWPA U1 (Commodity Specification E, Use Category 4C) for round timber elements and AWPA U1 (Commodity Specification A, Use Category 4B) for sawn timber elements. Preservative- treated timber elements shall be subject to a quality control program administered by an~~ *~~approved~~* ~~agency. Element cutoffs shall be treated in accordance with AWPA M4.~~

…

**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*.3.5.3.3 Structural steel sheet piling.** Individual sections of structural steel sheet piling shall conform to the profile indicated by the manufacturer and shall conform to the general requirements specified by ASTM A6.

*Installation of sheet piling shall satisfy inspection, monitoring, and observation requirements in Sections 1705A.6.3, 1812A.6 and 1812A.7.*

…

**1810*A*.3.6 Splices.** Splices shall be constructed so as to provide and maintain true alignment and position of the component parts of the deep foundation element during installation and subsequent thereto and shall be designed to resist the axial and shear forces and moments occurring at the location of the splice during driving and for design load combinations. Where deep foundation elements of the same type are being spliced, splices shall develop not less than 50 percent of the bending strength of the weaker section. Where deep foundation elements of different materials or different types are being spliced, splices shall develop the full compressive strength and not less than 50 percent of the tension and bending strength of the weaker section. Where structural steel cores are to be spliced, the ends shall be milled or ground to provide full contact and shall be full-depth welded.

**~~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 or OSHPD.* ~~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 Sections 1705A.8.1 and 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~~.* (Stricken text relocated to Section 1705A.8.1)

*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.* ~~Any substantial sudden change in rate of penetration of a timber pile shall be investigated for possible damage. If the sudden change in rate of penetration cannot be correlated to soil strata, the pile shall be removed for inspection or rejected.~~

…

***1811A.2 Adoption.*** *Except for the modifications as set forth in Sections 1705A.6.2, 1811A.3 and 1811A.4, all prestressed rock and soil foundation anchors shall comply with PTI Recommendations for Prestressed Rock and Soil Anchors.*

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

1. *Minimum diameter and minimum spacing for the anchors including consideration of group effects.*
2. *Maximum unbonded length and minimum bonded length of the tendon.*
3. *Maximum recommended anchor tension capacity based upon the soil or rock strength/grout bond and anchor depth/spacing.*
4. *Allowable bond stress at the ground/grout interface and applicable factor of safety for ultimate bond stress.*
5. *Anchor axial tension stiffness recommendations at the anticipated anchor axial tension displacements, when required for structural analysis.*
6. *Minimum grout pressure for installation and post-grout pressure.*
7. *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.*
8. *Testing requirements additional to those required by PTI Recommendations for Prestressed Rock and Soil Anchors and Section 1705A.6.2. ~~Performance test shall be at a minimum of 1.6 times the design loads, but shall not exceed 80 percent of the specified minimum tensile strength of the tendons. There shall be a minimum of two preproduction test anchors. Preproduction test anchors shall be tested to ultimate load or maximum of 0.80 times the specified minimum tensile strength of the tendon. A creep test is required for all prestressed anchors with greater than 10 kips of lock-off prestressing load.~~* (Stricken text relocated to Section 1705A.6.2)

…

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

1. *Tendons shall be thread-bar anchors conforming to ASTM A722.*
2. *The anchors shall be placed vertical.*
3. *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.1 General.*** *The requirements of this section shall apply to temporary and permanent earth retaining shoring using soldier piles and lagging with or without tie-back anchors in soil or rock, only when existing or new facilities are affected. Shoring used as construction means and methods only, which does not affect existing or new facilities, are not regulated by this section and shall satisfy the requirements of the authorities having jurisdiction. Design, construction, testing and inspection shall satisfy the requirements of this code except as modified in Sections 1705A.6.3 and 1812A.2 through 1812A.8.*

…

***1812A.4 Design and testing:*** *Except for the modifications as set forth in Sections 1705A.6.3 and 1812A.4.1 through 1812A.4.3, all Prestressed Rock and Soil Tie-back Anchors shall comply with PTI Recommendations for Prestressed Rock and Soil Anchors.*

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

* 1. *Minimum diameter and minimum spacing for the anchors including consideration of group effects.*
  2. *Maximum unbonded length and minimum bonded length of the tie-back anchors.*
  3. *Maximum recommended anchor tension capacity based upon the soil or rock strength/grout bond and anchor depth/spacing.*
  4. *Allowable bond stress at the ground/grout inter-face and applicable factor of safety for ultimate bond stress for the anchor. For permanent anchors, a minimum factor of safety of 2.0 shall be applied to ground soil interface as required by PTI Recommendations for Prestressed Rock and Soil Anchors Section 6.6.*
  5. *Minimum grout pressure for installation and post-grout pressure for the anchor. The presumptive post grout pressure of 300 psi may be used for all soil type.*
  6. *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.*
  7. *Testing requirements additional to those required by PTI Recommendations for Prestressed Rock and Soil and Section 1705A.6.3.1. ~~Performance test for the anchors shall be at a minimum of two (2) times the design loads and shall not exceed 80 percent of the specified minimum tensile strength of the anchor rod. A creep test is required for all prestressed anchors that are performance tested. All production anchors shall be tested at 150 percent of design loads and shall not be greater than 70 percent of the specified minimum tensile strength of the anchor rod.~~* (Stricken text relocated to Section 1705A.6.3.1)

…

***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****: Tests shall be in accordance with Section 1705A.6.3.1.* (Stricken items #1 and #4 relocated to Section 1705A.6.3.1. Stricken items #2 and #3 relocated to Section 1812A.5)

1. *~~The geotechnical engineer shall keep a record at job site of all test loads, total anchor movement, and report their accuracy.~~*
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.~~*
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.~~*
4. *~~The shoring design engineer shall specify design loads for each anchor.~~*

…

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

1. *Holes drilled for piles/tie-back anchors shall be done without detrimental loss of ground, sloughing or caving of materials and without endangering previously installed shoring members or existing foundations.*
2. *Drilling of earth anchor shafts for tie-backs shall occur when the drill bench reaches two to three feet below the level of the tie-back pockets.*
3. *Casing or other methods shall be used where necessary to prevent loss of ground and collapse of the hole.*
4. *The drill cuttings from earth anchor shaft shall be removed prior to anchor installation.*
5. *Unless tremie methods are used, all water and loose materials shall be removed from the holes prior to installing piles/tie-backs.*
6. *Tie-back anchor rods with attached centralizing devices shall be installed into the shaft or through the drill casing. Centralizing device shall not restrict movement of the grout.*
7. *After lagging installation, voids between lagging and soil shall be backfilled immediately to the full height of lagging.*
8. *The soldier piles shall be placed within specified tolerances in the drilled hole and braced against displacement during grouting. Fill shafts with concrete up to top of footing elevation, rest of the shaft can generally be filled with lean concrete. Excavation for lagging shall not be started until concrete has achieved sufficient strength for all anticipated loads as determined by the shoring design engineer.*
9. *Where boulders and/or cobbles have been identified in the geotechnical reports, contractor shall be prepared to address boulders and/or cobbles that may be encountered during the drilling of soldier piles and tie-back anchors.*
10. *The grouting equipment shall produce grout free of lumps and indispensed cement. The grouting equipment shall be sized to enable the grout to be pumped in continuous operation. The mixer shall be capable of continuously agitating the grout.*
11. *The quantity of grout and grout pressure shall be recorded. The grout pressure shall be controlled to prevent excessive heave in soils or fracturing rock formations.*
12. *If post-grouting is required, post-grouting operation shall be performed after initial grout has set for 24 hours in the bond length only. Tie-backs shall be grouted over a sufficient length (anchor bond length) to transfer the maximum anchor force to the anchor grout.*
13. *Testing of anchors in accordance with Section 1705A.6.3.1 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.*
14. *Anchor rods shall be tensioned straight and true. Excavation directly below the anchors shall not continue before those anchors are tested.*
15. (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.*
16. (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~~.~~:*** *Tests and inspections shall be in accordance with Section 1705A.6.3.* (Stricken text relocated to Section 1705A.6.3)

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 in accordance with section 1704A.6~~, testing of tie-back anchors and monitoring of survey~~.*
2. *~~Testing, inspection and observation shall be in accordance with testing, inspection and observation requirements approved by the building official. The following activities and materials shall be tested, inspected, or observed by the special inspector and geotechnical engineer:~~*
   1. *~~Sampling and testing of concrete in soldier pile and tie-back anchor shafts.~~*
   2. *~~Fabrication of tie-back anchor pockets on soldier beams~~*
   3. *~~Installation and testing of tie-back anchors.~~*
   4. *~~Survey monitoring of soldier pile and tie-back load cells.~~*
   5. *~~Survey monitoring of existing buildings.~~*
3. *~~A complete and accurate record of all soldier pile locations, depths, concrete strengths, tie-back locations and lengths, tie-back grout strength, quantity of concrete per pile, quantity of grout per tie-back and applied tie-back loads shall be maintained by the special inspector and geotechnical engineer. The shoring design engineer shall be notified of any unusual conditions encountered during installation.~~*
4. *~~Calibration data for each test jack, pressure gauge and master pressure gauge shall be verified by the special inspector and geotechnical engineer. The calibration tests shall be performed by an independent testing laboratory and within 120 calendar days of the data submitted.~~*
5. *~~Monitoring points shall be established at the top and at the anchor heads of selected soldier piles and at intermediate intervals as considered appropriate by the geotechnical engineer.~~*
6. *~~Control points shall be established outside the area of influence of the shoring system to ensure the accuracy of the monitoring readings.~~*
7. *~~The periodic basis of shoring monitoring, as a minimum, shall be as follows:~~*
   1. *~~Initial monitoring shall be performed prior to any excavation.~~*
   2. *~~Once excavation has begun, the periodic readings shall be taken weekly until excavation reaches the estimated subgrade elevation and the permanent foundation is complete.~~*
   3. *~~If performance of the shoring is within established guidelines, shoring design engineer may permit the periodic readings to be bi-weekly. Once initiated, bi-weekly readings shall continue until the building slab at ground floor level is completed and capable of transmitting lateral loads to the permanent structure. Thereafter, readings can be monthly.~~*
   4. *~~Where the building has been designed to resist lateral earth pressures, the periodic monitoring of the soldier piles and adjacent structure can be discontinued once the ground floor diaphragm and subterranean portion of the structure is capable of resisting lateral soil loads and approved by the shoring design engineer, geotechnical engineer and building official.~~*
   5. *~~Additional readings shall be taken when requested by the special inspector, shoring design engineer, geotechnical engineer or building official.~~*
8. *~~Monitoring reading shall be submitted to the shoring design engineer, engineer in responsible charge, and building official within three working days after they are conducted. Monitoring readings shall be accurate to within 0.01 feet. Results are to be submitted in tabular form showing at least the initial date of monitoring and reading, current monitoring date and reading and difference between the two readings.~~*
9. *~~If the total cumulative horizontal or vertical movement (from start of construction) of the existing buildings reaches ½ inch or soldier piles reaches 1 inch all excavation activities shall be suspended. The geotechnical and shoring design engineer shall determine the cause of movement, if any, and recommend corrective measures, if necessary, before excavation continues.~~*
10. *~~If the total cumulative horizontal or vertical movement (from start of construction) of the existing buildings reaches ¾ inch or soldier piles reaches 1~~~~1~~~~/~~~~2~~ ~~inches all excavation activities shall be suspended until the causes, if any, can be determined. Supplemental shoring shall be devised to eliminate further movement and the building official shall review and approve the supplemental shoring before excavation continues.~~*
11. *~~Monitoring of tie-back anchor loads:~~*
    1. *~~Load cells shall be installed at the tie-back heads adjacent to buildings at maximum interval of 50 feet, with a minimum of one load cells per wall.~~*
    2. *~~Load cell readings shall be taken once a day during excavation and once a week during the remainder of construction.~~*
    3. *~~Load cell readings shall be submitted to the geotechnical engineer, shoring design engineer, engineer in responsible charge and building official.~~*
    4. *~~Load cell readings can be terminated once the temporary shoring no longer provides support for the buildings.~~*

…

***1813A.1 General.*** *This section shall apply to vibro stone columns (VSCs) for ground improvement using unbounded aggregate materials. Vibro stone column provisions in this section are intended to increase bearing capacity, reduce settlements and mitigate liquefaction for shallow foundations. These requirements shall not be used for grouted or bonded stone columns, ground improvement for deep foundation elements, or changing site class. VSCs shall not be considered a deep foundation element. Ground improvement shall be installed under the entire building/structure footprint and not under isolated foundation elements only. Design, construction, testing and inspection shall satisfy the requirements of this code except as modified in Sections 1705A.6.4 and 1813A.2 through 1813A.5.*

…

***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 conspicuous note on the construction documents indicating foundation construction shall not commence until the final verified report specified in Section 1813A.2 item 9 has been submitted to the enforcement agency and CGS has issued their final acceptance letter.*

…

# Chapter 19 CONCRETE, Sections

**CHAPTER 19**

**CONCRETE**

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

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **-** | **X** |  |
| 1901.1.1 |  | X |  |
| 1901.1.2 |  | X |  |
| 1901.1.3 |  | X |  |
| 1901.1.4 |  | X |  |
| 1906 |  | X |  |
| 1909 |  | X |  |

…

**1901.7.1 Cast-in-place concrete tolerances.** Structural tolerances for cast-in-place concrete structural elements shall be in accordance with ACI 117.

**Exceptions:**

Group R-3 detached one- or two-family dwellings are not required to comply with this section.

* 1. Shotcrete is not required to comply with this section. ***[DSA-SS/CC]*** *Tolerances for shotcrete construction shall be defined by the construction documents.*

…

**SECTION 1906**

**FOOTINGS FOR LIGHT-FRAME CONSTRUCTION**

***[OSHPD 1R, 2 & 5, DSA-SS/CC]*** *Not permitted by OSHPD and DSA-SS/CC.*

…

***1909.2 Tests and materials.*** *Where required, special inspections and tests shall be in accordance with Chapter 17A ~~and this section~~.*

…

***1909.2.3 Cementitious material.*** *Inspection and tests shall be in accordance with Section 1705A.3.2.1.* (Stricken text relocated to Section 1705A.3.2.1)*~~The concrete supplier shall furnish to the enforcement agency certification that the cement proposed for use on the project has been manufactured and tested in compliance with the requirements of ASTM C150 for portland cement and ASTM C595 or ASTM C1157 for blended hydraulic cement, whichever is applicable. When a mineral admixture or ground granulated blast-furnace slag is proposed for use, the concrete supplier shall furnish to the enforcement agency certification that they have been manufactured and tested in compliance with ASTM C618 or ASTM C989, whichever is applicable. The concrete producer shall provide copies of the cementitious material supplier's certificate of compliance that represents the materials used by date of shipment for concrete. Cementitious materials without certification of compliance shall not be used.~~*

***1909.2.4 Tests of reinforcing bars.*** *Tests shall be in accordance with Section 1705A.3.2.2.* (Stricken text relocated to Section 1705A.3.2.2) *~~Samples shall be taken from bundles as delivered from the mill, with the bundles identified as to heat number and the accompanying mill certificate. One tensile test and one bend test shall be made from a sample from each 10 tons (9080 kg) or fraction thereof of each size of reinforcing steel.~~*

*~~Where positive identification of the heat number cannot be made or where random samples are to be taken, one series of tests shall be made from each 2½ tons (2270 kg) or fraction thereof of each size of reinforcing steel.~~*

*~~Tests of reinforcing bars may be waived by the structural engineer with the approval of the Building Official for one-story buildings or non-building structures provided they are identified in the construction documents and certified mill test reports are provided to the inspector of record for each shipment of such reinforcement.~~*

***1909.2.5 Tests for prestressing steel and anchorage.*** *Tests shall be in accordance with Section 1705A.3.4.1.* (Stricken text relocated to Section 1705A.3.4.1) *~~All wires or bars of each size from each mill heat and all strands from each manufactured reel to be shipped to the site shall be assigned an individual lot number and shall be tagged in such a manner that each lot can be accurately identified at the job site. Each lot of tendon and anchorage assemblies and bar couplers to be installed shall be likewise identified. The following samples of materials and tendons selected by the engineer or the designated testing laboratory from the prestressing steel at the plant or job site shall be furnished by the contractor and tested by an approved independent testing agency:~~*

1. *~~For wire, strand or bars, 7-foot-long (2134 mm) samples shall be taken of the coil of wire or strand reel or rods. A minimum of one random sample per 5,000 pounds (2270 kg) of each heat or lot used on the job shall be selected.~~*
2. *~~For prefabricated prestressing tendons other than bars, one completely fabricated tendon 10 feet (3048 mm) in length between grips with anchorage assembly at one end shall be furnished for each size and type of tendon and anchorage assembly.~~*

*~~Variations of the bearing plate size need not be considered.~~*

*~~The anchorages of unbonded tendons shall develop at least 95 percent of the minimum specified ultimate strength of the prestressing steel. The total elongation of the tendon under ultimate load shall not be less than 2 percent measured in a minimum gage length of 10 feet (3048 mm).~~*

*~~Anchorages of bonded tendons shall develop at least 90 percent of the minimum specified strength of the prestressing steel tested in an unbonded state. All couplings shall develop at least 95 percent of the minimum specified strength of the prestressing steel and shall not reduce the elongation at rupture below the requirements of the tendon itself.~~*

1. *~~If the prestressing tendon is a bar, one 7-foot (2134 mm) length complete with one end anchorage shall be furnished and, in addition, if couplers are to be used with the bar, two 4-foot (1219 mm) lengths of bar fabricated to fit and equipped with one coupler shall be furnished.~~*
2. *~~Mill tests of materials used for end anchorages shall be furnished. In addition, at least one Brinnell hardness test shall be made of each thickness of bearing plate.~~*

***1909.2.6 Composite construction cores.*** *Tests shall be in accordance with Section 1705A.3.7.* (Stricken text relocated to Section 1705A.3.7)  *~~Cores of the completed composite concrete construction shall be taken to demonstrate the shear strength along the contact surfaces. The cores shall be tested when the cast-in-place concrete is approximately 28 days old and shall be tested by a shear loading parallel to the joint between the precast concrete and the cast-in-place concrete. The minimum unit shear strength of the contact surface area of the core shall not be less than 100 psi (689 kPa).~~*

*~~At least one core shall be taken from each building for each 5,000 square feet (465 m2) of area of composite concrete construction and not less than three cores shall be taken from each project. The architect or structural engineer in responsible charge of the project or his or her representative shall designate the location for sampling.~~*

***1909.2.7 Tests for post-installed anchors in concrete.*** *Tests shall be in accordance with Section 1705A.3.8.* (Stricken text relocated to Section 1705A.3.8.1) *~~When post-installed anchors are used in lieu of cast-in-place bolts, the installation verification test loads frequency and acceptance criteria shall be in accordance with this section.~~*

***~~1909.2.7.1 General.~~*** *~~Test loads or torques and acceptance criteria shall be shown on the construction documents.~~*

*~~If any anchor fails testing, all anchors of the same type shall be tested, which are installed by the same trade, not previously tested until twenty (20) consecutive anchors pass, then resume the initial test frequency.~~*

***~~1909.2.7.2 Testing procedure.~~*** *~~The test procedure shall be as permitted by an approved evaluation report using criteria adopted in this code. All post-installed anchors shall be tension tested.~~*

***~~Exception:~~*** *~~Torque-controlled post-installed anchors and screw type anchors shall be permitted to be tested using torque based on an approved evaluation report using criteria adopted in this code.~~*

*~~Alternatively, the manufacturer’s recommendation for testing may be approved by the enforcement agency based on approved evaluation report using criteria adopted in this code.~~*

***~~1909.2.7.3 Test frequency.~~*** *~~When post-installed anchors are used for sill plate bolting applications, 10 percent of the anchors shall be tested.~~*

*~~When post-installed anchors are used for other structural applications, all such anchors shall be tested.~~*

*~~When post-installed anchors are used for nonstructural applications such as equipment anchorage, 50 percent or alternate bolts in a group, including at least one-half the anchors in each group, shall be tested.~~*

*~~The testing of the post-installed anchors shall be done in the presence of the special inspector and a report of the test results shall be submitted to the enforcement agency.~~*

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

1. *~~Undercut anchors that allow visual confirmation of full set shall not require testing.~~*
2. *~~Where the design tension on anchors is less than 100 pounds and those anchors are clearly noted on the approved construction documents, only 10 percent of those anchors shall be tested.~~*
3. *~~Where adhesive anchor systems are used to install reinforcing dowel bars in hardened concrete, only 25 percent of the dowels shall be tested if all the following conditions are met:~~*
   1. *~~The dowels are used exclusively to transmit shear forces across joints between existing and new concrete.~~*
   2. *~~The number of dowels in any one member equals or exceeds 12.~~*
   3. *~~The dowels are uniformly distributed across seismic force resisting members (such as shear walls, collectors and diaphragms).~~*

*~~Anchors to be tested shall be selected at random by the special inspector/inspector of record (IOR).~~*

1. *~~Testing of shear dowels across cold joints in slabs on grade, where the slab is not part of the lateral force-resisting system shall not be required.~~*
2. *~~Testing is not required for power actuated fasteners used to attach tracks of interior non-shear wall partitions for shear only where there are at least three fasteners per segment of track.~~*

***~~1909.2.7.4 Test loads.~~*** *~~Required test loads shall be determined by one of the following methods:~~*

1. *~~Twice the maximum allowable tension load or one and a quarter (1¼) times the maximum design strength of anchors as provided in an approved test report using criteria adopted in this code or determined in accordance with Chapter 17 of ACI 318.~~*

*~~Tension test load need not exceed 80 percent of the nominal yield strength of the anchor element (= 0.8 A~~~~se~~ ~~f~~~~ya~~~~).~~*

1. *~~The manufacturer's recommended installation torque based on an approved test report using criteria adopted in this code.~~*

***~~1909.2.7.5 Test acceptance criteria.~~*** *~~Acceptance criteria for post-installed anchors shall be based on an approved test 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, the testing apparatus support 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.~~*

1. *~~Torque wrench method:~~*

*~~Torque-controlled post-installed anchors tested with a calibrated torque wrench shall attain the specified torque within 1/2 turn of the nut; or one-quarter (1/4) turn of the nut for a 3/8-inch sleeve anchor only.~~*

*~~Screw-type anchors tested with a calibrated torque wrench shall attain the specified torque within one-quarter (1/4) turn of the screw after initial seating of the screw head.~~*

…

***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 RACTOR f FOR MOMENT, AXIAL FORCE, OR COMBINED MOMENT AND AXIAL FORCE

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

1. For sections classified as transition, it shall be permitted to use f corresponding to compression-controlled sections.
2. *et\* is the greater of net tensile strain calculated for P = 0.1Agf’c and ~~0.005~~(ety + 0.003).*
3. *For sections with factored axial compression force Pu ≥ 0.1Agf’c,* f *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 by replacing items (l), (m), and (n) with the following:*

(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.*

***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.~~*

…

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter | **X** | **-** |  |

…

**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 17A ~~and Section 1910A~~.*

…

***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:~~*** *~~For Group R-2 and R-3 occupancies not more than three stories above grade plane, the specified compressive strength, f ′c, for concrete in basement walls, foundation walls, exterior walls and other vertical surfaces exposed to the weather shall be not less than 3,000 psi (20.7 MPa).~~*

…

**1905*A*.1 General.** The text of ACI 318 shall be modified as indicated in Sections 1905*A.1.1* through *1905A.1.~~15~~16.*

**~~1905.1.1 ACI 318 Section 2.3.~~** ~~Modify existing definitions and add the following definitions to ACI 318, Section 2.3.~~

**~~DETAILED PLAIN CONCRETE STRUCTURAL WALL.~~** ~~A wall complying with the requirements of Chapter 14, including 14.6.2.~~

**~~ORDINARY PRECAST STRUCTURAL WALL.~~** ~~A precast wall complying with the requirements of Chapters 1 through 13, 15, 16 and 19 through 26.~~

**~~ORDINARY REINFORCED CONCRETE STRUCTURAL WALL.~~** ~~A~~ *~~cast-in-place~~* ~~wall complying with the requirements of Chapters 1 through 13, 15, 16 and 19 through 26.~~

**~~ORDINARY STRUCTURAL PLAIN CONCRETE WALL.~~** ~~A wall complying with the requirements of Chapter 14,~~ *~~excluding~~* ~~14.6.2.~~

**~~1905.1.2 ACI 318, Section 18.2.1.~~** ~~Modify ACI 318 Sections 18.2.1.2 and 18.2.1.6 to read as follows:~~

~~18.2.1.2 –~~ *~~Structures assigned to Seismic Design Category A~~* ~~shall satisfy requirements of Chapters 1 through 17 and 19 through 26;~~ *~~Chapter 18 does not apply.~~* ~~Structures assigned to~~ *~~Seismic Design Category~~* ~~B, C, D, E or F shall satisfy 18.2.1.3 through 18.2.1.7, as applicable.~~ *~~Except for structural elements of plain concrete complying with Section 1905.1.7 of the California Building Code, structural elements of plain concrete are prohibited in structures assigned to Seismic Design Category C, D, E or F.~~*

~~18.2.1.6 – Structural systems designated as part of the seismic force-resisting system shall be restricted to those~~ *~~permitted by ASCE 7.~~* ~~Except for~~ *~~Seismic Design Category A~~*~~, for which Chapter 18 does not apply, the following provisions shall be satisfied for each structural system designated as part of the seismic force-resisting system, regardless of the~~ *~~seismic design category~~*~~:~~

~~(a) Ordinary moment frames shall satisfy 18.3.~~

~~(b) Ordinary reinforced concrete structural walls and~~ *~~ordinary precast structural walls~~* ~~need not satisfy any provisions in Chapter 18.~~

~~(c) Intermediate moment frames shall satisfy 18.4.~~

~~(d) Intermediate precast~~ *~~structural~~* ~~walls shall satisfy 18.5.~~

~~(e) Special moment frames shall satisfy 18.6 through 18.9.~~

~~(f) Special structural walls shall satisfy 18.10.~~

~~(g) Special structural walls constructed using precast concrete shall satisfy 18.11.~~

~~Special moment frames and special structural walls shall also satisfy 18.2.4 through 18.2.8.~~

**~~1905.1.3 ACI 318, Section 18.5.~~** ~~Modify ACI 318, Section 18.5, by adding new Section 18.5.2.2 and renumbering existing Sections 18.5.2.2 and 18.5.2.3 to become 18.5.2.3 and 18.5.2.4, respectively:~~

*~~18.5.2.2 - Connections that are designed to yield shall be capable of maintaining 80 percent of their design strength at deformation induced by the design displacement or shall use type 2 mechanical splices.~~*

~~18.5.2.3 - Elements of the connection that are not designed to yield shall develop at least 1.5 S~~~~y~~~~.~~

~~18.5.2.4 - In structures assigned to SDC D, E or F, wall piers shall be designed in accordance with 18.10.8 or 18.14 in ACI 318.~~

***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.~~** ~~Modify ACI 318, Section 18.11.2.1 to read as follows:~~

~~18.11.2.1 – Special structural walls constructed using precast concrete shall satisfy all the requirements of 18.10~~ *~~for cast-in-place special structural walls~~* ~~in addition to 18.5.2.~~

**~~1905.1.5 ACI 318 Section 18.13.1.1.~~** ~~Modify ACI 318, Section 18.13.1.1 to read as follows:~~

~~18.13.1.1 – Foundations resisting earthquake-induced forces or transferring earthquake-induced forces between a structure and ground shall comply with the requirements of 18.13 and other applicable provisions of ACI 318~~ *~~unless modified by Chapter 18 of the California Building Code.~~*

***~~1905.1.6 ACI 318, Section 14.6.~~*** *~~Modify ACI 318, Section 14.6 by adding new Section 14.6.2 to read as follows:~~*

*~~14.6.2 – Detailed plain concrete structural walls.~~*

*~~14.6.2.1 – Detailed plain concrete structural walls are walls conforming to the requirements of ordinary structural plain concrete walls and 14.6.2.2.~~*

*~~14.6.2.2 – Reinforcement shall be provided as follows:~~*

1. *~~Vertical reinforcement of at least 0.20 square inch (129 mm2) in cross-sectional area shall be provided continuously from support to support at each corner, at each side of each opening and at the ends of walls. The continuous vertical bar required beside an opening is permitted to substitute for one of the two No. 5 bars required by 14.6.1.~~*
2. *~~Horizontal reinforcement at least 0.20 square inch (129 mm2) in cross-sectional area shall be provided:~~*
3. *~~Continuously at structurally connected roof and floor levels and at the top of walls.~~*
4. *~~At the bottom of load-bearing walls or in the top of foundations where doweled to the wall.~~*
5. *~~At a maximum spacing of 120 inches (3048 mm).~~*

*~~Reinforcement at the top and bottom of openings, where used in determining the maximum spacing specified in Item 3 above, shall be continuous in the wall.~~*

***~~1905.1.7 ACI 318, Section 14.1.4.~~*** *~~Delete ACI 318, Section 14.1.4 and replace with the following:~~*

*~~14.1.4 – Plain concrete in structures assigned to Seismic Design Category C, D, E or F.~~*

*~~14.1.4.1 – Structures assigned to Seismic Design Category C, D, E or F shall not have elements of structural plain concrete, except as follows:~~*

1. *~~Structural plain concrete basement, foundation or other walls below the base as defined in ASCE 7 are permitted in detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls. In dwellings assigned to Seismic Design Category D or E, the height of the wall shall not exceed 8 feet (2438 mm), the thickness shall be not less than 71/2 inches (190 mm), and the wall shall retain no more than 4 feet (1219 mm) of unbalanced fill. Walls shall have reinforcement in accordance with 14.6.1.~~*
2. *~~Isolated footings of plain concrete supporting pedestals or columns are permitted, provided the projection of the footing beyond the face of the supported member does not exceed the footing thickness. Exception: In detached one- and two-family dwellings three stories or less in height, the projection of the footing beyond the face of the supported member is permitted to exceed the footing thickness.~~*
3. *~~Plain concrete footings supporting walls are permitted, provided the footings have at least two continuous longitudinal reinforcing bars. Bars shall not be smaller than No. 4 and shall have a total area of not less than 0.002 times the gross cross-sectional area of the footing. For footings that exceed 8 inches (203 mm) in thickness, a minimum of one bar shall be provided at the top and bottom of the footing. Continuity of reinforcement shall be provided at corners and intersections.~~*

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

1. *~~In Seismic Design Categories A, B and C, detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls are permitted to have plain concrete footings without longitudinal reinforcement.~~*
2. *~~For foundation systems consisting of a plain concrete footing and a plain concrete stemwall, a minimum of one bar shall be provided at the top of the stemwall and at the bottom of the footing.~~*
3. *~~Where a slab on ground is cast monolithically with the footing, one No. 5 bar is permitted to be located at either the top of the slab or bottom of the footing.~~*

…

***~~1905A.1.10 ACI 318, Section 18.5. [DSA-SS]~~*** ~~Modify ACI 318, Section 18.5, by~~ *~~replacing Section 18.5.2.1,~~* ~~adding new Section 18.5.2.2 and renumbering existing Sections 18.5.2.2 and 18.5.2.3 to become 18.5.2.3 and 18.5.2.4, respectively:~~

*~~18.5.2.1 - In connections between wall panels, yielding shall be restricted to steel elements or reinforcement. In connections between wall panels and the foundation, they shall be designed per Section 1617A.1.16.~~*

*~~18.5.2.2 - Connections that are designed to yield shall be capable of maintaining 80 percent of their design strength at deformation induced by the design displacement or shall use type 2 mechanical splices.~~*

*~~18.5.2.3~~* ~~- Elements of the connection that are not designed to yield shall develop at least 1.5 S~~~~y~~~~.~~

*~~18.5.2.4~~* ~~- In structures assigned to SDC D, E or F, wall piers shall be designed in accordance with 18.10.8 or 18.14 in ACI 318.~~

…

***1905A.1.~~11~~9 ACI 318, Section 18.10.6.5.*** *…*

***1905A.1.~~12~~10 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~~11 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)*:

(a) Limits for f’c in Table 19.2.1.1. Limits apply to both normalweight and lightweight concrete.

(b) Durability requirements in Table 19.3.2.1

(c) Structural strength requirements

(d) 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.

*(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 | *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 “ety+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~~12 ACI 318, Table 21.2.2.*** *Replace Table 21.2.2 as follows:*

TABLE 21.2.2

STRENGTH REDUCTION RACTOR f FOR MOMENT, AXIAL FORCE, OR COMBINED MOMENT AND AXIAL FORCE

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

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

***1905A.1.~~14~~13 ACI 318, Section 24.2.1.*** …

…

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.1.14 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.1.15 ACI 318, Section 26.5.2.*** *Modify ACI 318 Section 26.5.2.1 by replacing items (l), (m), and (n) with the following:*

(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) condition before shotcrete is deposited.*

***1905A.1.~~15~~16 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.*

*~~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.~~*

***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.1 Cementitious material.*** *Inspection and tests shall be in accordance with Section 1705A.3.2.1.* (Stricken text relocated to Section 1705A.3.2.1)*~~The concrete supplier shall furnish to the enforcement agency certification that the cement proposed for use on the project has been manufactured and tested in compliance with the requirements of ASTM C150 for portland cement and ASTM C595 or ASTM C1157 for blended hydraulic cement, whichever is applicable. When a mineral admixture or ground granulated blast-furnace slag is proposed for use, the concrete supplier shall furnish to the enforcement agency certification that they have been manufactured and tested in compliance with ASTM C618 or ASTM C989, whichever is applicable. The concrete producer shall provide copies of the cementitious material supplier's Certificate of Compliance that represents the materials used by date of shipment for concrete. Cementitious materials without Certification of Compliance shall not be used.~~*

***1910A.2 Tests of reinforcing bars.*** *Tests shall be in accordance with Section 1705A.3.2.2.* (Stricken text relocated to Section 1705A.3.2.2) *~~Samples shall be taken from bundles as delivered from the mill, with the bundles identified as to heat number and the accompanying mill certificate. One tensile test and one bend test shall be made from a sample from each 10 tons (9080 kg) or fraction thereof of each size of reinforcing steel.~~*

*~~Where positive identification of the heat number cannot be made or where random samples are to be taken, one series of tests shall be made from each 2½ tons (2270 kg) or fraction thereof of each size of reinforcing steel.~~*

*~~Tests of reinforcing bars may be waived by the structural engineer with the approval of the Building Official for one-story buildings or non-building structures provided they are identified in the construction documents and certified mill test reports are provided to the inspector of record for each shipment of such reinforcement.~~*

***1910A.3 Tests for prestressing steel and anchorage****. Tests shall be in accordance with Section 1705A.3.4.1.* (Stricken text relocated to Section 1705A.3.4.1) *~~All wires or bars of each size from each mill heat and all strands from each manufactured reel to be shipped to the site shall be assigned an individual lot number and shall be tagged in such a manner that each lot can be accurately identified at the jobsite. Each lot of tendon and anchorage assemblies and bar couplers to be installed shall be likewise identified.~~*

*~~The following samples of materials and tendons selected by the engineer or the designated testing laboratory from the prestressing steel at the plant or jobsite shall be furnished by the contractor and tested by an approved independent testing agency:~~*

1. *~~For wire, strand or bars, 7-foot-long (2134 mm) samples shall be taken of the coil of wire or strand reel or rods. A minimum of one random sample per 5,000 pounds (2270 kg) of each heat or lot used on the job shall be selected.~~*
2. *~~For prefabricated prestressing tendons other than bars, one completely fabricated tendon 10 feet (3048 mm) in length between grips with anchorage assembly at one end shall be furnished for each size and type of tendon and anchorage assembly.~~*

*~~Variations of the bearing plate size need not be considered.~~*

*~~The anchorages of unbonded tendons shall develop at least 95 percent of the minimum specified ultimate strength of the pre-stressing steel. The total elongation of the tendon under ultimate load shall not be less than 2 percent measured in a minimum gage length of 10 feet (3048 mm).~~*

*~~Anchorages of bonded tendons shall develop at least 90 percent of the minimum specified strength of the prestressing steel tested in an unbonded state. All couplings shall develop at least 95 percent of the minimum specified strength of the prestressing steel and shall not reduce the elongation at rupture below the requirements of the tendon itself.~~*

1. *~~If the prestressing tendon is a bar, one 7-foot (2134 mm) length complete with one end anchorage shall be furnished and, in addition, if couplers are to be used with the bar, two 4-foot (1219 mm) lengths of bar fabricated to fit and equipped with one coupler shall be furnished.~~*
2. *~~Mill tests of materials used for end anchorages shall be furnished. In addition, at least one Brinnell hardness test shall be made of each thickness of bearing plate.~~*

***1910A.4 Composite construction cores.*** *Tests shall be in accordance with Section 1705A.3.7.* (Stricken text relocated to Section 1705A.3.7)*~~Cores of the completed composite concrete construction shall be taken to demonstrate the shear strength along the contact surfaces. The cores shall be tested when the cast-in-place concrete is approximately 28 days old and shall be tested by a shear loading parallel to the joint between the precast concrete and the cast-in-place concrete. The minimum unit shear strength of the contact surface area of the core shall not be less than 100 psi (689 kPa).~~*

*~~At least one core shall be taken from each building for each 5,000 square feet (465m~~~~2~~~~) of area of composite concrete construction and not less than three cores shall be taken from each project. The architect or structural engineer in responsible charge of the project or his or her representative shall designate the location for sampling.~~*

***1910A.5 Tests for post-installed anchors in concrete.*** *Tests shall be in accordance with Section 1705A.3.8.* (Stricken text relocated to Section 1705A.3.8.1)*~~When post-installed anchors are used in lieu of cast-in place bolts, the installation verification test loads, frequency, and acceptance criteria shall be in accordance with this section.~~*

***~~1910A.5.1 General.~~*** *~~Test loads or torques and acceptance criteria shall be shown on the construction documents.~~*

*~~If any anchor fails testing, all anchors of the same type shall be tested, which are installed by the same trade, not previously tested until twenty (20) consecutive anchors pass, then resume the initial test frequency.~~*

***~~1910A.5.2 Testing procedure.~~*** *~~The test procedure shall be as permitted by an approved evaluation report using criteria adopted in this code. All post-installed anchors shall be tension tested.~~*

***~~Exception: [DSA-SS]~~*** *~~Torque-controlled post-installed anchors and screw type anchors shall be permitted to be tested using torque based on an approved evaluation report using criteria adopted in this code.~~*

*~~Alternatively, manufacturer's recommendation for testing may be approved by the enforcement agency, based on an approved test report using criteria adopted in this code.~~*

***~~1910A.5.3 Test frequency.~~*** *~~When post-installed anchors are used for sill plate bolting applications, 10 percent of the anchors shall be tested.~~*

*~~When post-installed anchors are used for other structural applications, all such anchors shall be tested.~~*

*~~When post-installed anchors are used for nonstructural components, such as equipment anchorage, 50 percent or alternate bolts in a group, including at least one-half the anchors in each group, shall be tested.~~*

*~~The testing of the post-installed anchors shall be done in the presence of the special inspector and a report of the test results shall be submitted to the enforcement agency.~~*

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

* 1. *~~Undercut anchors that allow visual confirmation of full set shall not require testing.~~*
  2. *~~Where the design tension on anchors is less than 100 lbs and those anchors are clearly noted on the approved construction documents, only 10 percent of those anchors shall be tested.~~*
  3. *~~Where adhesive anchor systems are used to install reinforcing dowel bars in hardened concrete, only 25 percent of the dowels shall be tested if all of the following conditions are met:~~*
     1. *~~The dowels are used exclusively to transmit shear forces across joints between existing and new concrete.~~*
     2. *~~The number of dowels in any one member equals or exceeds 12.~~*
     3. *~~The dowels are uniformly distributed across seismic force resisting members (such as shear walls, collectors and diaphragms).~~*

*~~Anchors to be tested shall be selected at random by the special inspector/inspector of record (IOR).~~*

* 1. *~~Testing of shear dowels across cold joints in slabs on grade, where the slab is not part of the lateral force-resisting system shall not be required.~~*
  2. *~~Testing is not required for power actuated fasteners used to attach tracks of interior non-shear wall partitions for shear only, where there are at least three fasteners per segment of track.~~*

***~~1910A.5.4 Test loads.~~*** *~~Required test loads shall be determined by one of the following methods:~~*

1. *~~Twice the maximum allowable tension load or one and a quarter (1¼) times the maximum design strength of anchors as provided in an approved evaluation report using criteria adopted in this code or determined in accordance with Chapter 17 of ACI 318.~~*

*~~Tension test load need not exceed 80 percent of the nominal yield strength of the anchor element (= 0.8A~~~~se~~~~f~~~~ya~~~~).~~*

1. *~~The manufacturer's recommended installation torque based on an approved evaluation report using criteria adopted in this code.~~*

***~~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, the testing apparatus support 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.~~*

1. *~~Torque wrench method:~~*

*~~Torque-controlled post-installed anchors tested with a calibrated torque wrench shall attain the specified torque within ½ turn of the nut; or one-quarter (¼) turn of the nut for a 3/8 inch sleeve anchor only.~~*

***~~[DSA-SS]~~*** *~~Screw-type anchors tested with a calibrated torque wrench shall attain the specified torque within one-quarter (¼) turn~~**~~of the screw after initial seating of the screw head.~~*

…

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **-** | **X** |  |
| *2003* |  | X |  |

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **-** | **X** |  |
| 2101.1.1 |  | X |  |
| 2101.1.2 |  | X |  |
| 2101.1.3 |  | X |  |
| 2101.1.4 |  | X |  |
| 2115 |  | X |  |

**2107.3 TMS 402, Section 6.1.6.1, splices of reinforcement.**

**Modify Section 6.1.6.1 as follows:**

* + - 1. **– Splices of reinforcement. Lap splices, welded splices or mechanical splices are permitted in accordance with the provisions of this section. Welding shall conform to AWS D1.4. Welded splices shall be of ASTM A706 steel reinforcement. Reinforcement larger than No. 9 (M #29) shall be spliced using mechanical connections in accordance with Section 6.1.6.1.3.**

**…**

***~~2115.8.1 Additional testing requirements~~***

***~~2115.8.1 Mortar and grout tests.~~*** (Stricken text relocated to Section 1705A.4.4) *~~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 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.~~*

*~~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. Test specimens for grout shall be made as set forth in 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.~~*** (Stricken text relocated to Section 1705A.4.5) *~~Not less than two cores shall be taken from each building for each 5,000 square feet (465 m2) of the masonry wall area or fraction thereof. The approved agency shall perform or observe the coring of the masonry walls and sample locations shall be subject to approval of the registered design professional.~~*

*~~Core samples shall comply with the following:~~*

*~~1. Cored no sooner than 7 days after grouting of the selected area;~~*

*~~2. Be a minimum of 3 ¾ inches in nominal diameter; and~~*

*~~3. Sampled in such a manner as to exclude any masonry unit webs, mortar joint, or reinforcing steel. If all cells contain reinforcement, alternate core locations or means to detect void or delamination shall be selected by the registered design professional and approved by the building official.~~*

*~~Visual examination of all cores shall be made by an approved agency and the condition of the cores reported as required by the California Administrative Code. Shear test both joints between the grout core and the outside wythes or face shell of the masonry 28 days after grouting of the sample area using a shear test apparatus acceptable to the enforcement agency. Core samples shall not be soaked before testing. Core samples to be tested shall be stored in sealed plastic bags or non-absorbent containers immediately after coring and for at least 5 days prior to testing. The average unit shear value for each pair of cores (4 shear tests) from each 5,000 square feet of wall area (or less) on the cross section of core shall not be less than 2.5 √f ′m psi.~~*

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

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

*~~1. Core sampling and testing is not required for nonbearing nonshear masonry walls, not exceeding a total wall height of 12 feet above top of foundation, built with single-wythe hollow unit concrete masonry that attaches opposite face shells using webs cast as single unit, when designed using an f′m not exceeding 2,000 psi (13.79 MPa).~~*

*~~2. An infrared thermographic survey or other nondestructive test procedures, shall be permitted to be approved as an alternative system to detect voids or delamination in grouted masonry in-lieu of core sampling and testing.~~*

# Chapter 21A MASONRY

**CHAPTER 21A**

**MASONRY**

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

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter | **-** | **X** |  |

**…**

**SECTION 2101*A***

**GENERAL**

**2101*A*.2 Design methods.** Masonry shall comply with the provisions of TMS402, ~~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. **…**

**SECTION 2105A**

**QUALITY ASSURANCE**

**2105A.1 General.** A quality assurance program shall be used to ensure that the constructed masonry is in compliance with the approved construction documents. The quality assurance program shall comply with the inspection and testing requirements of Chapter 17*A, TMS 602 and Section~~s~~ 2105A.2 ~~through 2105A.4~~.*

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

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

*Where an f'm greater than 2000 psi (13.79MPa) is approved, the architect or structural engineer shall establish a method of quality control of the masonry construction acceptable to the enforcement agency which shall be described in the contract specifications. Refer to Section 1705A.4.3 for compliance verification requirements.* (Stricken text relocated to Section 1705A.4.3) *~~Compliance with the requirements for the specified strength of constructed masonry shall be provided using prism test method in accordance with Section 2105A.5. Substantiation for 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~~.*

***~~2105A.3 Mortar and grout tests.~~*** (Stricken text relocated to Section 1705A.4.4) *~~These tests are to establish whether the masonry components meet the specified component strengths. At the beginning of all masonry work, at least one test sample of the mortar shall be taken on three successive working days and at least at one-week intervals thereafter. Samples of grout shall be taken for each mix design, each day grout is placed, and not less than every 5,000 square feet of masonry wall area. They shall meet the minimum strength requirement given in ASTM C270 Table 1 and ASTM C476/TMS 602 Section 2.2 for mortar and grout respectively. Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official. When the prism test method is used during construction, the tests in this section are not required.~~*

*~~Test specimens for mortar and grout shall be made as set forth in ASTM C1586 and ASTM C1019.~~*

*~~Exceptions:~~*

*~~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. Mortar sampling and testing shall be as follows: At the beginning of all masonry work, mortar test samples 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 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.~~*

***~~2105A.4 Masonry core testing.~~*** (Stricken text relocated to Section 1705A.4.5)

*~~Not less than two cores shall be taken from each building for each 5,000 square feet (465 m2) of the masonry wall area or fraction thereof. The approved agency shall perform or observe the coring of the masonry walls and sample locations shall be subject to approval of the registered design professional.~~*

*~~Core samples shall comply with the following:~~*

*~~1. Cored no sooner than 7 days after grouting of the selected area;~~*

*~~2. Be a minimum of 3 ¾ inches in nominal diameter; and~~*

*~~3. Sampled in such a manner as to exclude any masonry unit webs, mortar joint, or reinforcing steel. If all cells contain reinforcement, alternate core locations or means to detect void or delamination shall be selected by the registered design professional and approved by the building official.~~*

*~~Visual examination of all cores shall be made by an approved agency and the condition of the cores reported as required by the California Administrative Code. Shear test both joints between the grout core and the outside wythes or face shell of the masonry 28 days after grouting of the sample area using a shear test apparatus acceptable to the enforcement agency. Core samples shall not be soaked before testing. Core samples to be tested shall be stored in sealed plastic bags or non-absorbent containers immediately after coring and for at least 5 days prior to testing. The average unit shear value for each pair of cores (4 shear tests) from each 5,000 square feet of wall area (or less) on the cross section of core shall not be less than 2.5 √f ′m psi.~~*

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

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

*~~1. Core sampling and testing is not required for nonbearing nonshear masonry walls, not exceeding a total wall height of 12 feet above top of foundation, built with single-wythe hollow unit concrete masonry that attaches opposite face shells using webs cast as single unit, when designed using an f′~~~~m~~ ~~not exceeding 2,000 psi (13.79 MPa).~~*

*~~2. An infrared thermographic survey or other nondestructive test procedures, shall be permitted to be approved as an alternative system to detect voids or delamination in grouted masonry in-lieu of core sampling and testing.~~*

***~~2105A.5 Masonry 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 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.~~

**…**

**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)*

**…**

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **-** | **X** |  |
| *2201.1.1* |  | X |  |
| *2201.1.2* |  | X |  |
| *2201.1.3* |  | X |  |
| *2201.1.4* |  | X |  |
| *2212* (This item was listed out of order in the 2019 CBC) |  | X |  |

…

***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 Tests of end-welded studs.*** *End-welded studs shall be ~~sampled and~~ tested in accordance with ~~the requirements of the AWS D1.1~~ Section 1705A.2.5.*

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter | **X** | **-** |  | |

…

**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..* ~~Structures assigned to Seismic Design Category B or C shall be of any construction permitted in Section 2205. Where a response modification coefficient, R, in accordance with ASCE 7, Table 12.2-1 is used for the design of structural steel structures assigned to Seismic Design Category B or C, the structures shall be designed and detailed in accordance with the requirements of AISC 341. 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.~~

**~~Exception:~~** ~~The response modification coefficient, R, designated for “Steel systems not specifically detailed for seismic resistance, excluding cantilever column systems” in ASCE 7, Table 12.2-1 shall be permitted for systems designed and detailed in accordance with AISC 360, and need not be designed and detailed in accordance with AISC 341.~~

**2205*A*.2.1.2 Seismic Design Category D, E or F.** Structures assigned to *Seismic Design Category* D, 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.

...

**2211A.1.1.1 Seismic Design Categories B and C.** *Not Permitted by DSA-SS.*~~Where a response modification coefficient, R, in accordance with ASCE 7, Table 12.2-1 is used for the design of cold-formed steel light-frame construction assigned to Seismic Design Category B or C, the seismic force-resisting system shall be designed and detailed in accordance with the requirements of AISI S400.~~

**~~Exception:~~** ~~The response modification coefficient, R, designated for “Steel systems not specifically detailed for seismic resistance, excluding cantilever column systems” in ASCE 7, Table 12.2-1, shall be permitted for systems designed and detailed in accordance with AISI S240 and need not be designed and detailed in accordance with AISI S400.~~

…

**2211*A*.1.2 Prescriptive framing.** *Not Permitted by DSA-SS.* ~~Detached one- and two-family dwellings and townhouses, less than or equal to three stories above grade plane, shall be permitted to be constructed in accordance with AISI S230 subject to the limitations therein.~~

**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 Tests of end-welded studs.*** *End-welded studs shall be tested in accordance with ~~the requirements of the AWS D1.1, Sections 7.7 and 7.8~~ Section 1705A.2.5.*

# Chapter 23 WOOD

**CHAPTER 23**

**WOOD**

All existing California amendments that are not revised below shall continue without change.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **X** | **X** |  |
| *2301.1.1* | **X** | **X** |  |
| *2301.1.2* | **X** | **X** |  |
| *2301.1.3* | **X** | **X** |  |
| *2301.1.3.1* | **X** | **-** |  |
| *2301.1.3.2* | **-** | **X** |  |
| *2301.1.4* | **X** | **X** |  |
| *2303.1.3.1* | **X** | **X** |  |
| *2303.1.4.1* | **X** | **X** |  |
| *2303.4.1.4.1, Exception 3* | **X** | **X** |  |
| *2303.4.3.1* | **X** | **X** |  |
| *2304.3.4* | **X** | **X** |  |
| *2304.4.1* | **X** | **X** |  |
| *2304.10.1.1* | **X** | **-** |  |
| *2304.12.1.2 , Exception* | **X** | **-** |  |
| *2304.12.1.4.1* | **X** | **-** |  |
| *2305.1.2* | **X** | **X** |  |
| *2308.2.7* | **X** | **X** |  |
| *2309.1.1* | **X** | **X** |  |

…

*2303.1.3.1 Additional requirements. The construction documents shall indicate the following: …*

*Refer to Section 1705A.5.4 for special inspection requirements during fabrication of structural glued laminated timbers.*

…

**2304.10.1 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.

***~~2304.10.1.2 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.~~*

***2304.10.1.21 Additional requirements.*** *Fasteners used for attachment of exterior wall coverings…*

**…**

**…**

**2304.11.3 Floors.** Floors shall be without concealed spaces or with concealed spaces complying with Section 602.4.4.3. Wood floors shall be constructed in accordance with Section 2304.11.3.1 or 2304.11.3.2.

**…**

**2304.11.4 Roof decks.** Roofs shall be without concealed spaces for with concealed spaces complying with Section 602.4.4.3. Roof decks shall be constructed in accordance with Section 2304.11.4.1 or 2304.11.4.2. Other types of decking shall be an alternative that provides equivalent fire resistance and structural properties. Where supported by a wall, roof decks shall be anchored to walls to resist forces determined in accordance with Chapter 16. Such anchors shall consist of steel bolts, lags, screws or approved hardware of sufficient strength to resist prescribed forces.

**2304.12.2.3 Supporting member for permanent appurtenances.** Naturally durable or preservative-treated wood shall be utilized for those portions of wood members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances where such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering to prevent moisture or water accumulation on the surface or at joints between members.

**Exception:** Sawn lumber in buildings located in a geographical region where experience has demonstrated that climatic conditions preclude the need to use durable materials where the structure is exposed to the weather.

**…**

.

**2304.12.2.5 Ventilation beneath balcony or elevated walking surfaces.** Enclosed framing in exterior balconies and elevated walking surfaces that r have weather-exposed surfaces shall be provided with openings that provide a net free cross-ventilation area not less than 1/150 of the area of each separate space.

**…**

# Chapter 24 GLASS AND GLAZING, Section 2410

**CHAPTER 24**

**GLASS AND GLAZING**

Adopt Chapter 24 of the 2021 IBC as Chapter 24 of the 2022 CBC as amended below. All existing California amendments that are not revised below shall continue without change.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **X** | **X** |  |

…

***2410.1.2 Testing and inspection.*** *Qualification ~~T~~testing ~~and inspection~~ of SSG shall satisfy ~~the following requirements:~~ this section. Quality assurance inspection and testing shall be in accordance with Section 1705A.13.2 and 1705A.14.2.1, respectively.*

*~~a.~~1. 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. When ASCE 7 Section 13.5.9 Exception 1 is used in this engineering analysis, the clearance dimension (c1 or c2) shall be taken as zero at the glazing edges fastened with structural sealant.*

*~~b.~~2. The applicability of the specific AAMA 501.6 and AAMA 501.4 testing shall be subject to approval by the building official.*

*~~c.~~3. 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.*

*~~d.~~4. AAMA 501.4 test specimen shall include the same materials, sections, connections, and attachment details to the test apparatus as used in the building.*

*~~e.~~5. Serviceability tests of SSG test specimen shall be performed in accordance with AAMA 501.4 after seismic displacement tests to the design story drift.*

*~~f.~~6. 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.~~*

*~~g.~~7. 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.*

*~~h.~~8. 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.*

*~~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.~~* (Stricken text relocated to Section 1705A.14.2.1)

1. *~~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.~~* (Stricken text relocated to Section 1705A.14.2.1)
2. *Existing AAMA 501.4 and 501.6 test results satisfying the requirements of this section shall be permitted, in lieu of project specific tests, when approved by the building official.*

***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.*

…

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **X** | **X** |  |
| *2501.1.1* | X | X |  |
| *2501.1.2* | X | X |  |
| *2501.1.3* | X | X |  |
| *2503.2* | X | X |  |
| *2504.2* | X | X |  |
| *2504.2.1* | X | X |  |
| *2505.3* | X | X |  |
| *2507.3* | X | X |  |
| *2508.6.6* | X | X |  |
| *2514.1 Exception* | X | - |  |

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **X** | **X** |  | |
| *2601.1.1* | X | X |  | |
| *2601.1.2* | X | X |  | |
| *2603.11.1* | X | X |  | |
| *2603.12.3* | X | X |  | |
| *2603.13.3* | X | X |  | |

…

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter | **X** | **X** |  | |

…

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **X** | **X** |  |
| *~~3102.3~~* | ~~X~~ | ~~X~~ |  |
| *~~3102.6.1.1~~* | ~~X~~ | ~~X~~ |  |
| *3109.1* | X | X |  |
| *3111.1.1, Exception* | X | X |  |
| *~~3111.3~~* | ~~X~~ | ~~X~~ |  |
| *3112.3, Exception* | X | X |  |
| *3113.1* | *X* | *X* |  |
| *3113.1.1* | *X* | *X* |  |
| *3113.2, Exception* | *X* | *X* |  |
| *3113.3, Exception* | *X* | *X* |  |
| *3113.4, Exception* | *X* | *X* |  |

…

**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.*

1. Intermodal shipping containers previously approved as existing relocatable buildings complying with Chapter 14 of the ~~International~~*California Existing Building Code*.

2. Stationary storage battery arrays located in intermodal shipping containers complying with Chapter 12 of the ~~International~~*California Fire Code*.

3. Intermodal shipping containers that are listed as equipment complying with the standard for equipment, such as air chillers, engine generators, modular data centers, and other similar equipment.

4. Intermodal shipping containers housing or supporting experimental equipment are exempt from the requirements of Section 3115, provided that they comply with all of the following:

4.1 Such units shall be single stand-alone units supported at grade level and used only for occupancies as specified under Risk Category I in Table 1604.5.

4.2 Such units are located a minimum of 8 feet (2438 mm) from adjacent structures, and are not connected to a fuel gas system or fuel gas utility.

4.3 In hurricane-prone regions and flood hazard areas, such units are designed in accordance with the applicable provisions of Chapter 16.

**...**

**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.*

**3115.8.3 Structural design.** The structural design for the intermodal shipping containers repurposed for use as a building or structure, or as part of a building or structure, shall comply with Section 3115.8.4 or 3115.8.5.

**3115.8.4 Detailed design procedure.** A structural analysis meeting the requirements of this section shall be provided to the building official to demonstrate the structural adequacy of the intermodal shipping containers.

**Exception:** Intermodal shipping containers designed in accordance with Section 3115.8.5.

**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.*

...

**3115.8.5 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.*

**...**

# 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.

|  |  |  |  |
| --- | --- | --- | --- |
| PROPOSED ADOPTION | DSA-SS | DSA-SS/CC | Comments |
| Adopt entire chapter | **X** | **X** |  |

# 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.*

…

|  |  |  |  |
| --- | --- | --- | --- |
| Adopting Agency | **DSA-SS** | **DSA-SS/CC** | Comments |
| Adopt entire chapter as amended (amended sections listed below) | **X** | **X** |  |
| *~~ANSI/APA PRG 320-18~~* ANSI/APA PRG 320-19 | X | X |  |
| *ASCE/SEI 7—16* | *X* | *X* |  |
| *~~D3498-03(2011)~~*D3498-03(2011) | X | X |  |

…

APA

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***~~ANSI/APA PRG 320-18:~~*** *~~Standard for Performance-rated Cross Laminated Timber 2303.1.4~~*

**ANSI/APA PRG 320-19:** Standard for Performance-rated Cross Laminated Timber 602.4, 2303.1.4

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**~~ASCE/SEI 7-16:~~** ~~Minimum Design Loads and Associated Criteria for Buildings and Other Structures~~ *~~with Supplement No. 1~~*

**ASCE/SEI 7—16 with Supplement 1*, [DSA-SS, DSA-SS/CC] 2 and 3*: Minimum Design Loads and Associated Criteria for Buildings and Other Structures**

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***~~D3498-03(2011):~~*** *~~Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems~~*

**D3498-03(2011):** Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems

703.7