

2022 California Building Standards Code

- Part 1 – Administrative Code
- Part 2 – Volume 1 (Non-structural) Building Code
- Part 2 – Volume 2 (Structural) Building Code – major changes/IOR related items**
- Part 3 – Electrical Code – Housekeeping Items and Alignment with CBC and 2020 NEC
- Part 4 – Mechanical Code – More Alignment with ASHRAE 170
- Part 5 – Plumbing Code – Housekeeping Items
- Part 10 – Existing Building Code – SPC-4D

2022 California Building Code Part 2, Volume 2

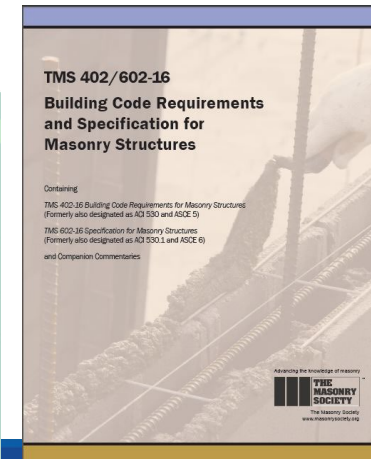
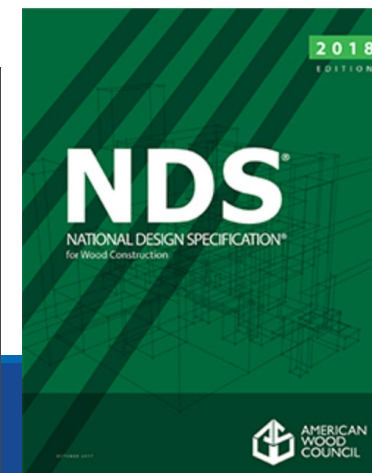
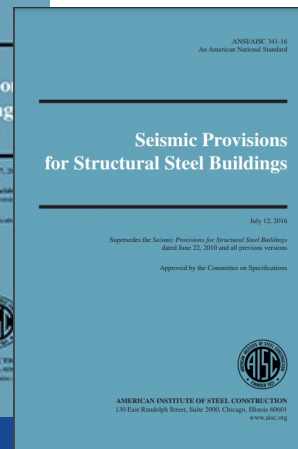
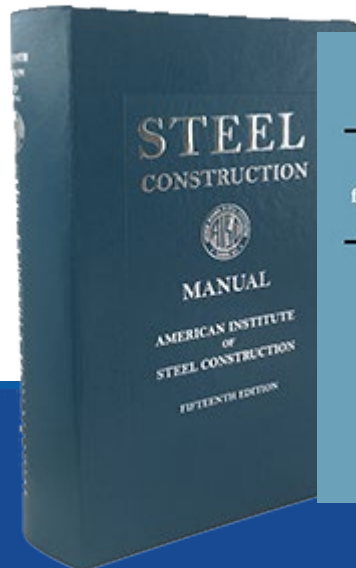
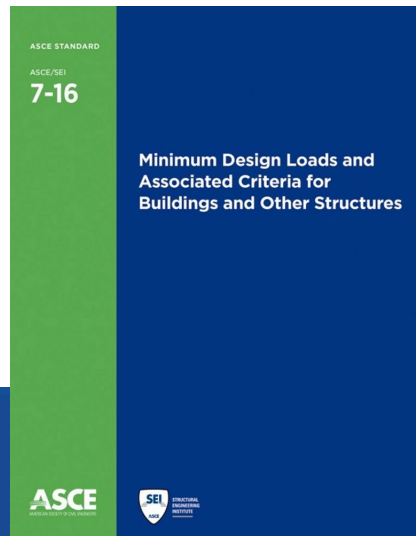
Part 2, Volume 2 – Overview of Changes

- Adopt the 2021 IBC and associated reference standards
- Carried forward existing amendments
- Added new amendments where existing language was revised in model code



Major Reference Standards not Updated

- **ASCE 7-16** but included Supplement 3.
- **ANSI/AISC 360-16** Specifications for Structural Steel Buildings
- **ANSI/AISC 341-16** Seismic Provisions for Structural Steel Buildings
- **TMS 402/602 – 16** Building Code for Masonry Structures
- **ANSI/AWC NDS-2018** National Design Specification (NDS) for Wood Construction – with 2018 NDS Supplement



Major Reference Standards Updated

- **ACI 318-19** Building Code Requirements for Structural Concrete
- **ANSI/AISC 358-16/s1-18** Prequalification for Special and Intermediate Steel Moment Frames for Seismic Applications, Including Supplement 1
- **AISI** Code of Standard Practice cold form steel
 - **S100-16 s/S1-18 & w/S2-20 (2020), S202-20, S220-20, S240-20, S400-20**
- **ANSI/AWC SDPWS -2021** Seismic Design Provisions for Wind and Seismic
- **AWS D1.4/D1.4M – 2018** Structural Welding Code – Steel Reinforcing bars



Part 2 – Volume 2 – HCAI Amendments

Major Changes to Part 2 Volume 2

- Chapter 16/16A Structural Design
- Chapter 17/17A Special Inspections and Tests
- Chapter 18/18A Soils and Foundations
- Chapter 19/19A Concrete
- Chapter 21/21A Masonry
- Chapter 22A Steel
- Chapter 35 Reference Standards

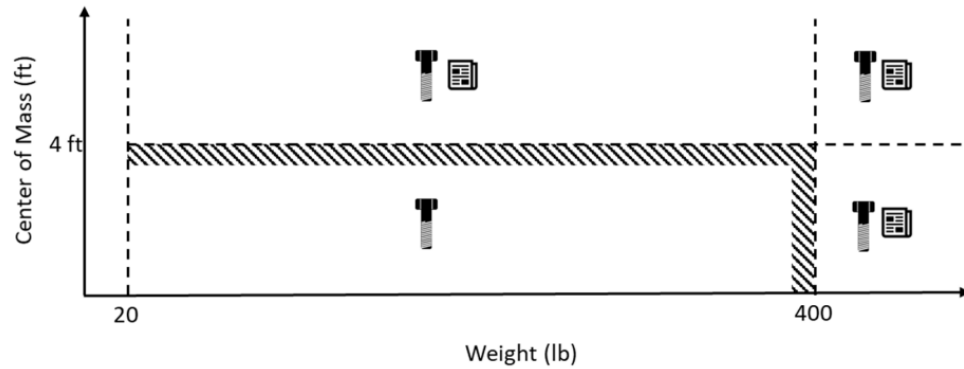
2019 Mid Cycle - Chapter 16/16A: Section 1617A.1.18

- **New Definitions for Equipment: List includes**
 - Fixed
 - Movable
 - Mobile
 - Countertop
 - Temporary
 - Interim
 - Hazardous Materials
 - Other
 - Wall roof or floor hung equipment

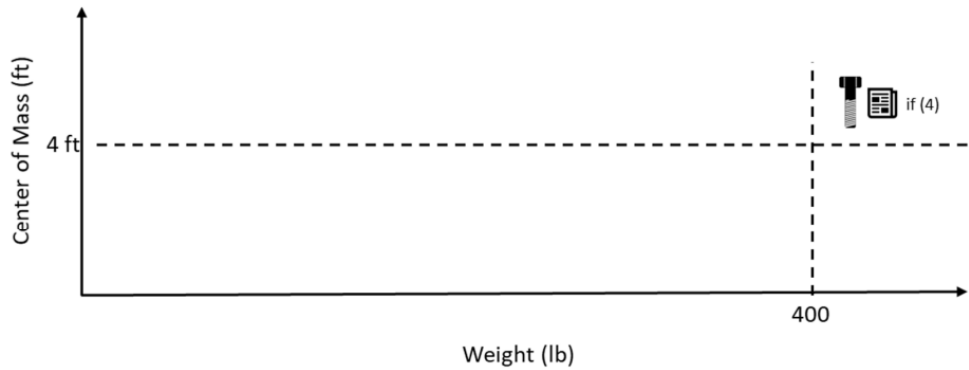
Chapter 16A STRUCTURAL DESIGN

Pin 68

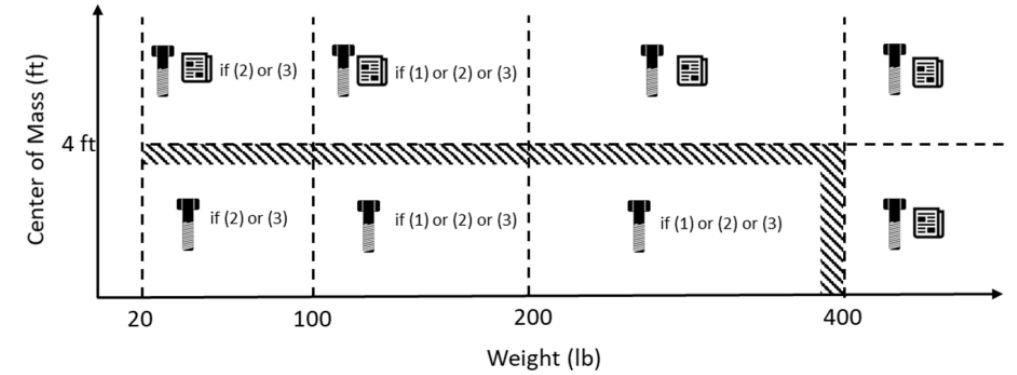
Fixed or Movable



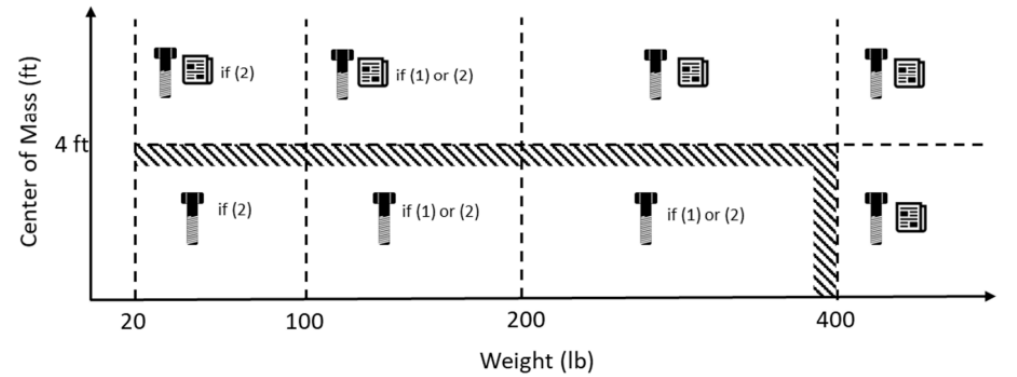
Mobile



Countertop



Other



Chapter 16A STRUCTURAL DESIGN

Notes:

- 1) Required if equipment is essential to hospital operations
- 2) Required if the equipment could fall within the patient care vicinity as defined in Article 517.2 of the CEC. Required if the equipment could fall and block a required means of egress.
- 3) Equipment shall be anchored regardless of the classification 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. Equipment that is connected to the building plumbing system with a shut-off valve in proximity to the equipment shall not be considered as permanently attached provided the inside diameter of the pipe is less than ½ inches.
- 4) Not stored in equipment storage room: Provide support and attachment details on the drawings and submit seismic design calculations.

Chapter 16A STRUCTURAL DESIGN

Equipment Anchorage or Restraint

To Anchor/Restrain or not anchor?



Chapter 16A STRUCTURAL DESIGN

- Example of hard plumbed Countertop equipment restraint.



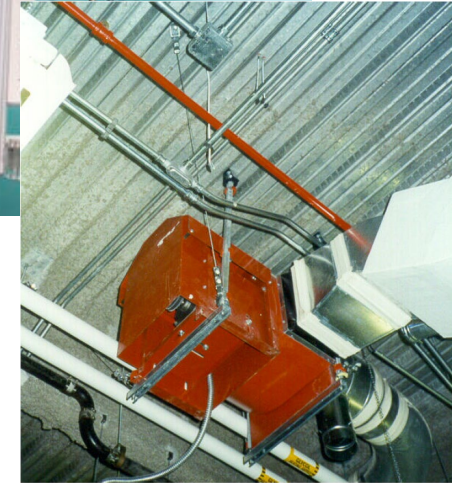
Chapter 16A STRUCTURAL DESIGN

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

...
13.1.4.a [OSHPD 1, 1R, 2, 4 & 5]. 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.

...
10. Wall, Roof or Floor Hung Equipment: Seismic design and seismic details shall be provided for wall, roof or floor hung nonstructural components and equipment when the component weighs more than 20 lb. or, in the case of a distributed system, more than 5 lb./ft.

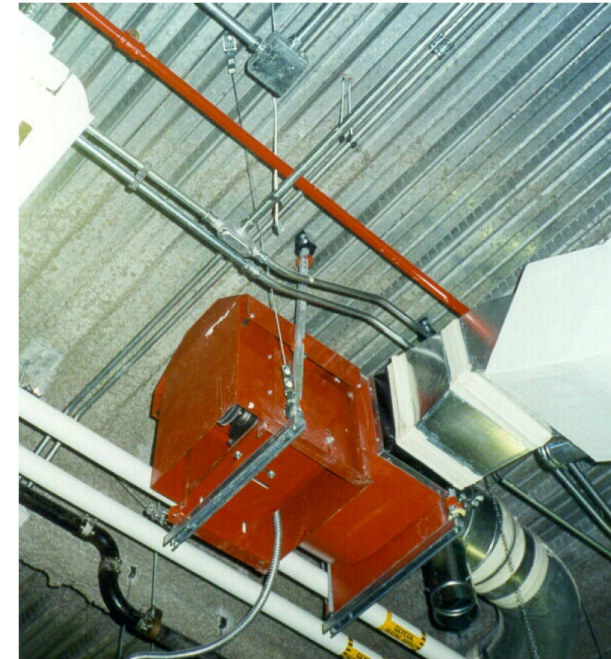
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Amendments to Chapter 16A Structural Design

- **Distribution Systems:**

Permit with some modifications, exemptions in ASCE 7-16 to seismic bracing permitted only for systems having $I_p = 1.0$ to also apply to systems with $I_p > 1.0$.



ASCE 7-16 Errata - What has changed

13.1.4 Exemptions

6. Discrete mechanical and electrical components in Seismic Design Categories D, E, or F that are positively attached to the structure, provided that either
 - a. The component weighs 400 lb (1,779 N) or less, the center of mass is located 4 ft (1.22 m) or less above the adjacent floor level, flexible connections are provided between the component and associated ductwork, piping, and conduit, and the component Importance Factor, I_p , is equal to 1.0; or
 - b. The component weighs 20 lb (89 N) or less ~~or, in the case of a distributed system, 5 lb / ft (73 N / m) or less; and.~~

Requirement in the 2019 CBC – 1617A.1.18

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

...

- 3. Discrete architectural, mechanical and electrical components and fixed equipment in Seismic Design Category D, E or F that are positively attached to the structure and anchorage is detailed on the plans, provided that

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.

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.

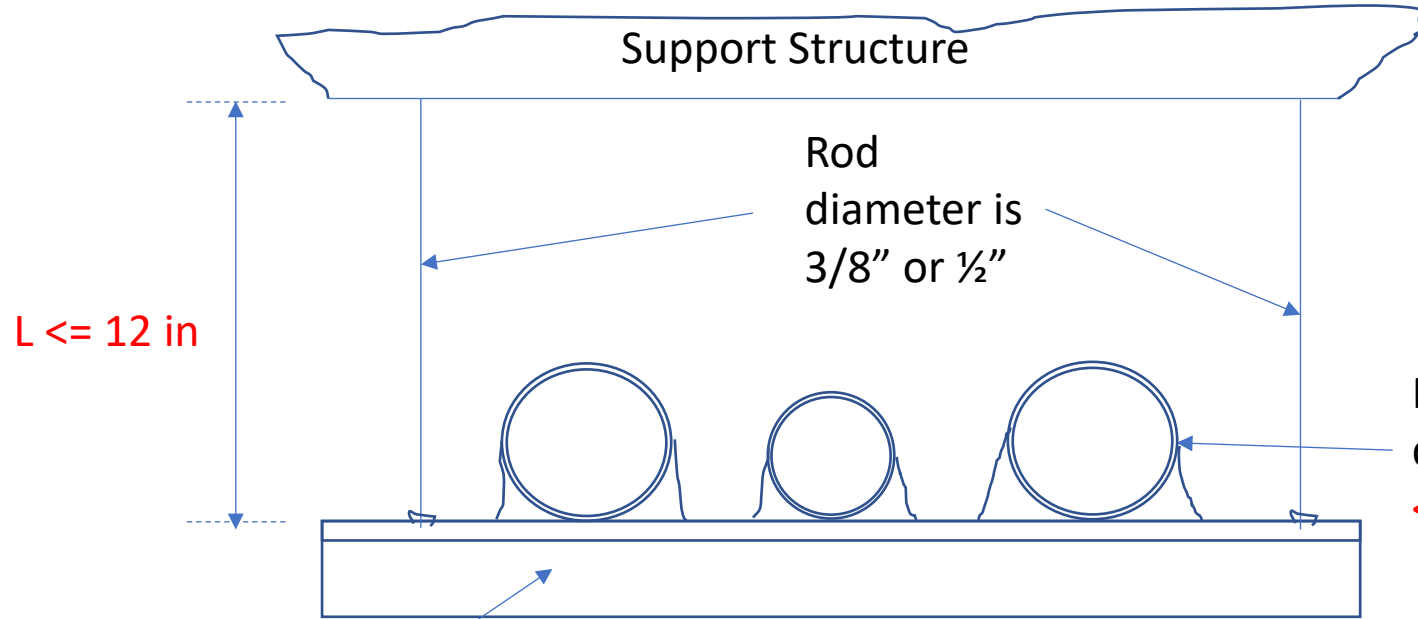
ASCE 7-16 - What has changed

13.6.7.3 Exceptions. 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 one of the following apply:

- ~~1. Trapeze assemblies are used to support piping whereby no single pipe exceeds the limits set forth in 5a, 5b, or 5c below and the total weight of the piping supported by the trapeze assemblies is less than 10 lb/ft (146 N/m).~~
2. Trapeze assemblies are supported by 3/8-in. (10-mm) diameter rod hangers not exceeding 12 in. (305 mm) in length from the pipe support point to the connection at the

1617A.1.26 – Exemption from Bracing when $I_p > 1.0$

Pipes supported on a Trapeze

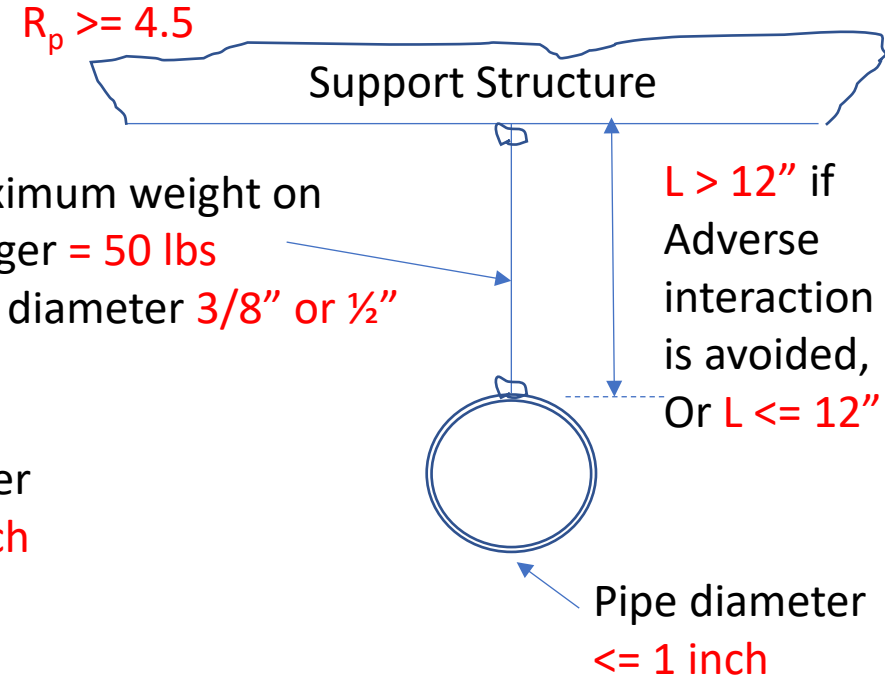


$L \leq 12$ in

Rod diameter is $3/8$ " or $1/2$ "

Pipe diameter ≤ 2 inch

Single hung pipes



$R_p \geq 4.5$

Maximum weight on hanger = 50 lbs
Rod diameter $3/8$ " or $1/2$ "

$L > 12$ " if Adverse interaction is avoided, Or $L \leq 12$ "

Pipe diameter ≤ 1 inch

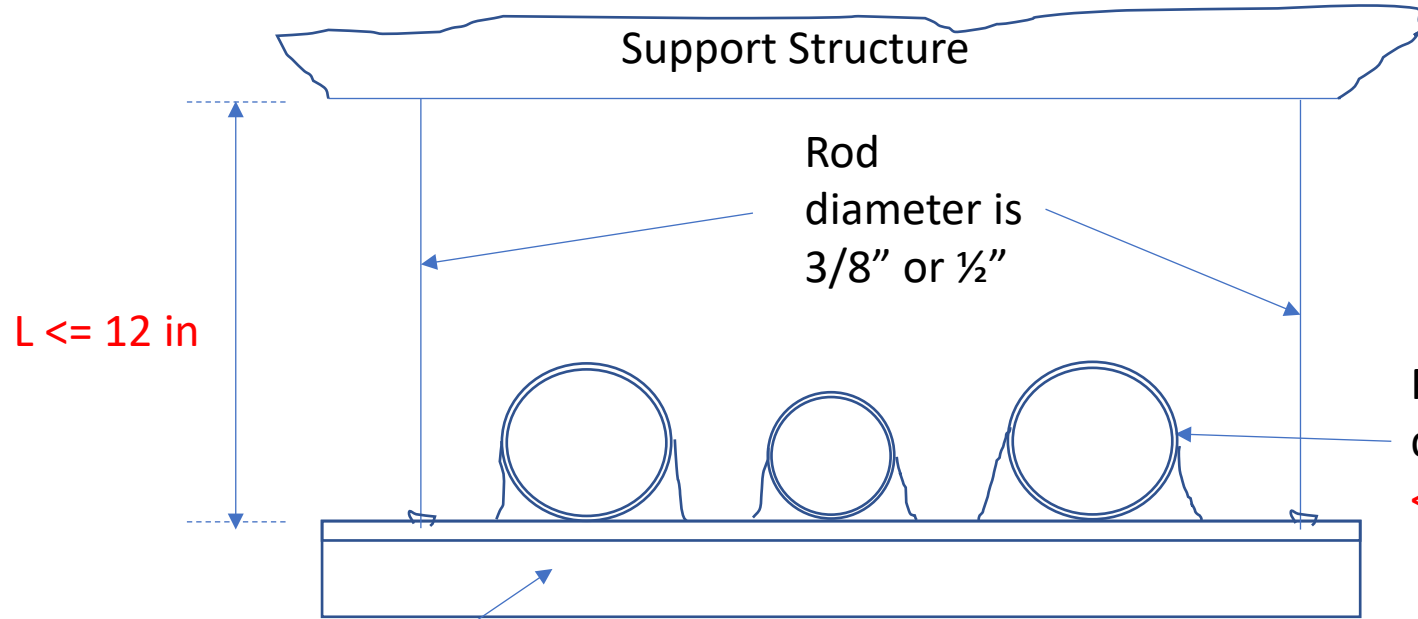
Maximum weight on trapeze = 100 lbs

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.

Where weight < 5 plf, R_p , and rod length do not apply, but adverse interaction does

1617A.1.26 – Exemption from Bracing when $I_p = 1.0$

Pipes supported on a Trapeze



$L \leq 12$ in

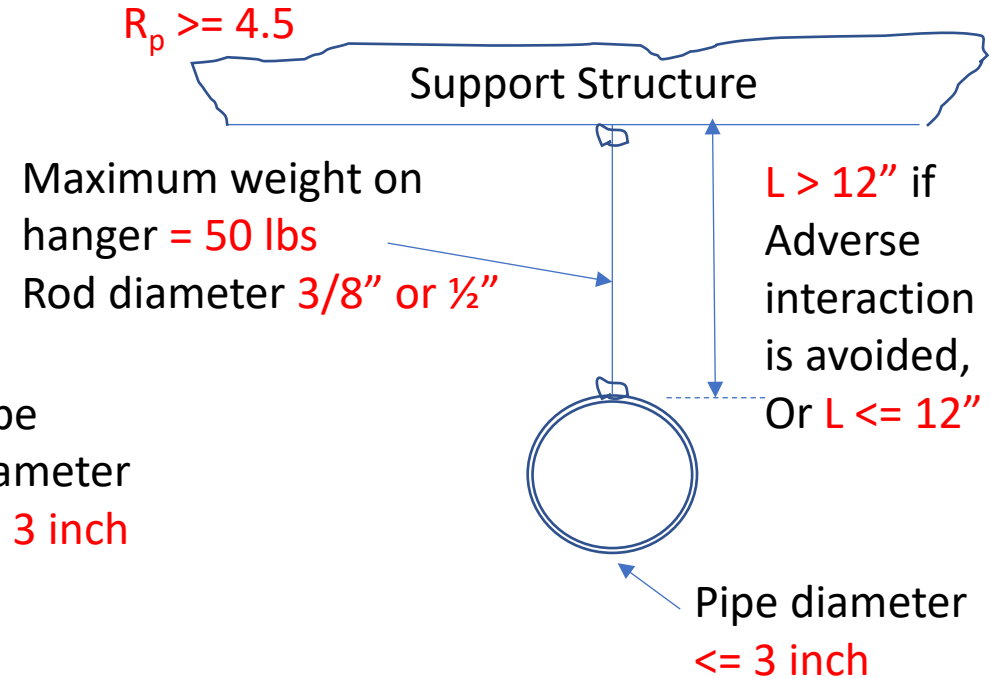
Rod diameter is $3/8$ " or $1/2$ "

Pipe diameter ≤ 3 inch

Maximum weight on trapeze = 100 lbs

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.

Single hung pipes



$R_p \geq 4.5$

Maximum weight on hanger = 50 lbs
Rod diameter $3/8$ " or $1/2$ "

$L > 12$ " if Adverse interaction is avoided, Or $L \leq 12$ "

Pipe diameter ≤ 3 inch

Where weight < 5 plf, R_p , and rod length do not apply, but adverse interaction does

Chapter 17 & 17A SPECIAL INSPECTIONS AND TESTS

1705.3.9.2 Preconstruction tests

Requirements for shotcrete were deleted from model code as they are now incorporated in ACI 318-19 which is adopted by the IBC. Similar language in ACI 506R is not written in as mandatory language. Existing amendments are carried forward.



Chapter 17 & 17A SPECIAL INSPECTIONS AND TESTS

1705A.3.9.2 Preconstruction tests



1705A.3.9.2 Preconstruction tests. A shotcrete mockup panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project. The mockup panel shall be representative of the project and simulate job conditions as closely as possible. The mockup panel thickness and reinforcing shall reproduce the thickest and most congested area specified in the structural design. It shall be shot at the same angle, using the same nozzleman and with the same concrete mix design that will be used on the project. Adequate encasement of bars larger than No. 5 shall be demonstrated by the mockup panel. The equipment used in preconstruction testing shall be the same equipment used in the work requiring such testing, unless substitute equipment is approved by the building official. Reports of preconstruction tests shall be submitted to the building official as specified in Section 1704A.5. Approval from the enforcement agency must be obtained prior to performing shotcrete mockup panels.

Chapter 17 & 17A SPECIAL INSPECTIONS AND TESTS

OSP Labeling

- “OSP” is OSHPD’s Special Seismic Certification (SSC) Preapproval Program.
- Equipment that requires SSC is often (but not always) certified through the OSP program.
- OSP requirements are described in PIN 55.

1705A.14.3 Special seismic certification. For structures assigned to Seismic Design Category D, E or F *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 as specified therein. Certificates of compliance documenting that the requirements are met shall be submitted to the building official as specified in Section 1704A.5.

Chapter 17 & 17A SPECIAL INSPECTIONS AND TESTS

OSP Labeling

From PIN 55:



19. Each equipment/component shall have a label as required by CBC Section 1703.5 or 1703A.5.
20. In accordance with CBC Section 1705.12.4 or 1705A.12.4, the special inspector shall verify:
 - a. **Label** for conformance with the certificate of compliance.
 - b. **Anchorage and mounting** for conformance with the certificate of compliance and construction documents.

Chapter 17 & 17A SPECIAL INSPECTIONS AND TESTS

OSP Labeling

This equipment has been certified through the OSP program.

This label, however, does NOT comply with CBC 1703A.5.3.

1703A.5.3 Label information. The label shall contain the manufacturer's identification, model number, serial number or definitive information describing the performance characteristics of the product, material or assembly and the approved agency's identification.





Chapter 17 & 17A SPECIAL INSPECTIONS AND TESTS

OSP Labeling



Examples of Labels that comply with CBC 1703A.5.3.

SEISMIC CERTIFICATION LABEL

Mfg. Series: 3000/3200
 Product type: Single and Dual Duct VAV
 Mounting method: Rigid Rod Hung, Cable brace
 Seismic Performance: $S_{DS}=2.5$; $z/h=1.0$; $I_p=1.5$; $F_D/W_p=1.88$
 Code: IBC 2009, 2012, 2015; CBC 2010, 2013, 2016
 Mfg Model: i.e. 30RWQ OSP#: 0xxx-##
 Mfg ID.#: ##### COC#: N101-COC-1701

Seismic Certification Label
 California Building Code (CBC-2010)
 OSHPD Special Seismic Certification
 OSP-0187-10
 PHOENIX POWER PRODUCTS

Product Information

Name	Type	I.D. #
Day Tank	DD-200	B882 95700

Maximum Seismic Performance Data

S _{ds} (g)	z/h	I _p
2.5	0.0	1.5

Minimum Anchorage Requirements

Type of Bolts	# of Bolts	Anchor Diameter	Embedment	Edge Distance	Concrete Depth	Concrete Strength	Special Inspection
Hilti KWIK Bolt TZ	4	3/4"	4 3/4"	8"	8"	3000 psi	YES

Chapter 17 & 17A SPECIAL INSPECTIONS AND TESTS

OSP Labeling

This equipment has been certified through the OSP program.

1703A.5.4 Method of labeling. Information required to be permanently identified on the product, material or assembly shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

Chapter 17 & 17A SPECIAL INSPECTIONS AND TESTS

1705.5.45 Structural glued laminated and cross-laminated timber. [OSHPD 1R, 2B & 5]
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.*

Chapter 18 & 18A SOILS AND FOUNDATIONS

1810.3.3.1.9 Helical piles.

The allowable axial design load, P_a , of helical piles shall be determined as follows:

$$P_a = 0.5 P_u$$

where P_u is the least value of:

...

Ultimate capacity determined from well-documented correlations with installation torque.

Ultimate capacity determined from load tests where required by { Section 1810.3.3.1.2 }. **[OSHPD 1R, 2 & 5]**
Load tests are required to determine the ultimate capacity.



Amendments - Chapter 18 & 18A

1810.3.11.2 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:

...

- **Exceptions:**
 - 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.
 - 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.
[OSHPD 1R, 2 & 5] not permitted by OSHPD.

Amendments - Chapter 18 & 18A

1810.3.12 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 } **[OSHPD 1R, 2 & 5]** need not comply with Section 18.13.3 of ACI 318.

Amendments - Chapter 18 & 18A

SECTION 1811 PRESTRESSED ROCK AND SOIL FOUNDATION ANCHORS [OSHPD 1R, 2 & 5]

...

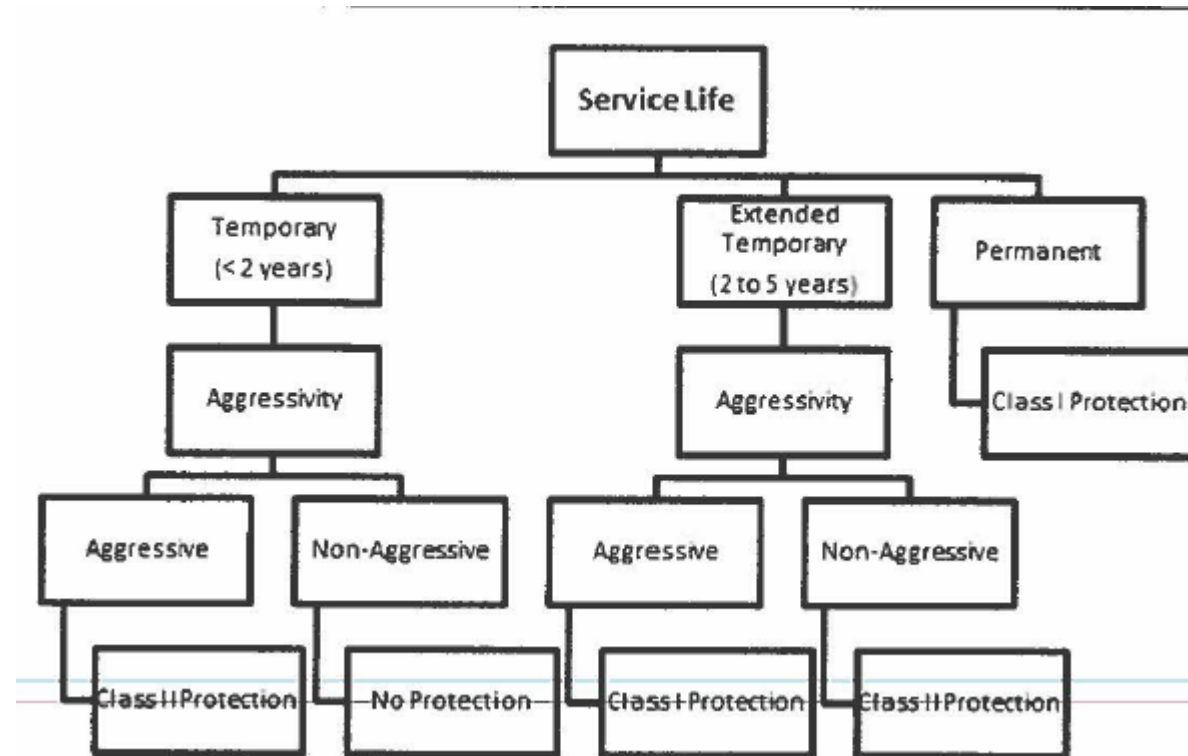
- **1811.3 Geotechnical requirements.** *Geotechnical report for the prestressed rock and soil foundation anchors shall address the following:*

...

- *7. Class I Corrosion Protection is required for all permanent and extended temporary anchors in service more than 2 years. A minimum of Class II Corrosion Protection is required for temporary anchors in service less than or equal to 2 years.*

Amendments - Chapter 18 & 18A

SECTION 1811 PRESTRESSED ROCK AND SOIL FOUNDATION ANCHORS [OSHPD 1R, 2 & 5]



Amendments - Chapter 18 & 18A

SECTION 1812 EARTH RETAINING SHORING [OSHPD 1R, 2 & 5]

...

- ***1812.4.1 Geotechnical requirements:*** *The geotechnical report for the earth retaining shoring shall address the following:*

...

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

Amendments - Chapter 18A – Soils and Foundations

SECTION 1813A VIBRO STONE COLUMNS FOR GROUND IMPROVEMENT

...

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

...

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

...

Amendments - Chapter 19 & 19A - Concrete

1901.3.4.5 Test acceptance criteria. ...

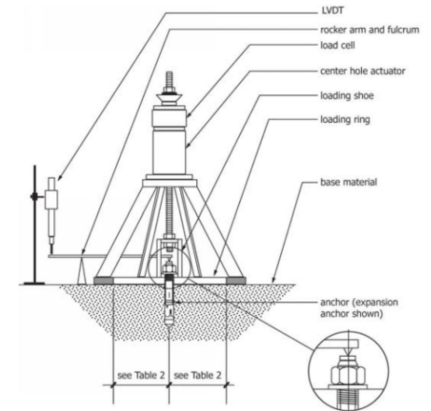
1. Hydraulic ram method:

Anchors tested with a hydraulic jack or spring-loaded devices

...

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

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



ASTM E3121
Unconfined Test

Confined Test

Post-Installed Anchor Tests – torque vs. tension

- CBC 1910A.5.2 allows anchors to be tested in torque only if they are described as “torque-controlled” in the ICC-ESR report for the anchor (expansion anchors, for example).

3.0 DESCRIPTION

3.1 KB-TZ2:

KB-TZ2 anchors are torque-controlled, mechanical expansion anchors. KB-TZ2 anchors consist of a stud (anchor body), wedge (expansion elements), nut, and washer. The anchor (carbon steel version) is illustrated in Figure 1. The stud is manufactured from carbon steel or AISI Type 304 or Type 316 stainless steel materials. Carbon steel KB-TZ2 anchors have a minimum 5 μm (0.0002 inch) zinc-nickel plating. The expansion elements for the carbon

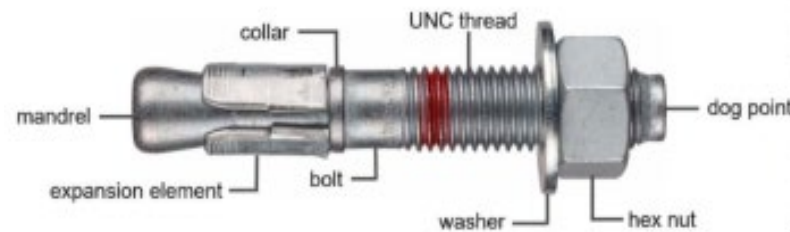


FIGURE 1—HILTI CARBON STEEL KWIK BOLT TZ (KB-TZ2)

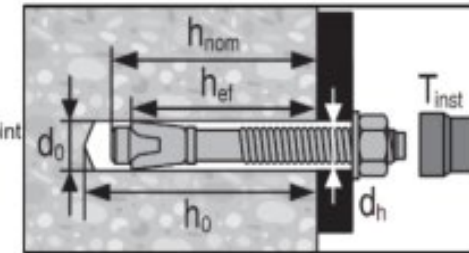
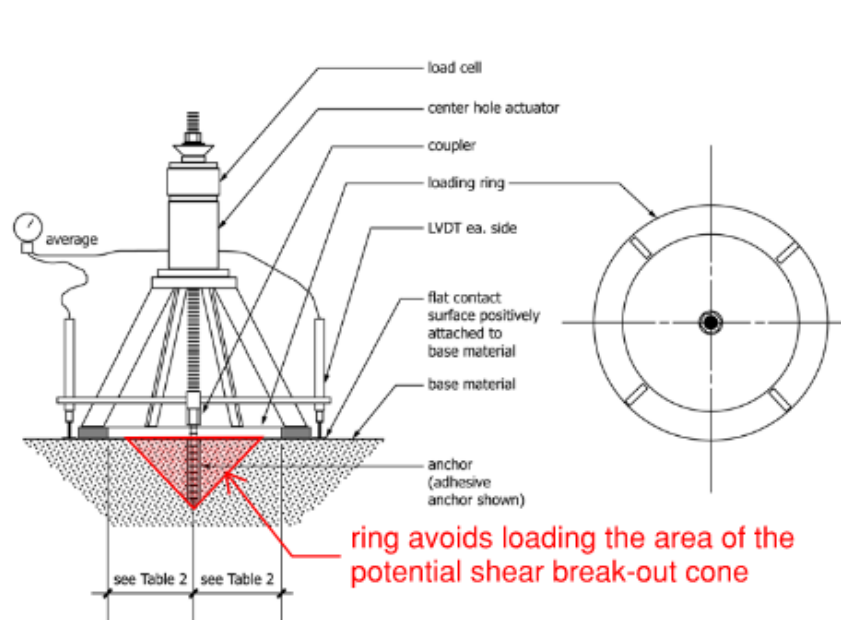


FIGURE 2—HILTI KB-TZ2 INSTALLED

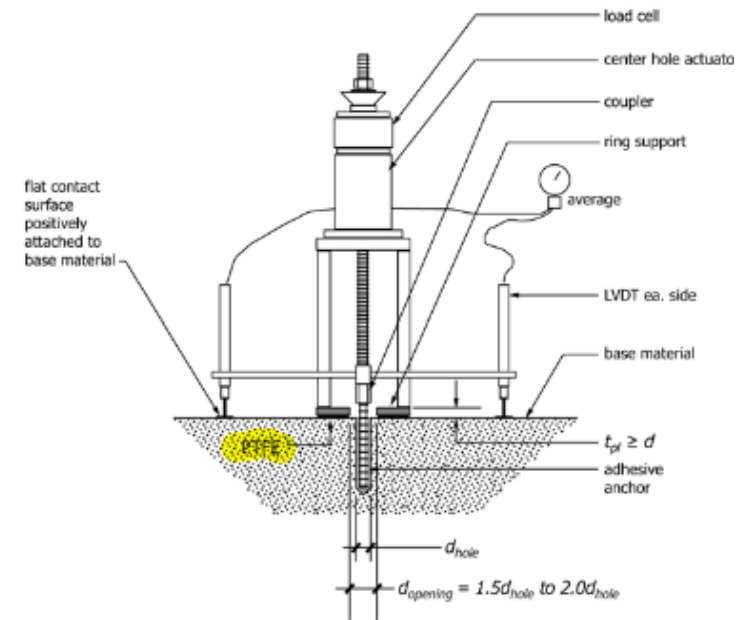
- Torque-controlled anchors shall be tested in torque to the installation torque specified in the ESR.
- Adhesive (epoxy) anchors and screw anchors may only be tested in tension.

Adhesive and Screw Anchor Tests - Tension

- CBC 1910A.5.2: tension tests are in accordance with ASTM E3121, which explains unconfined vs. confined testing conditions.

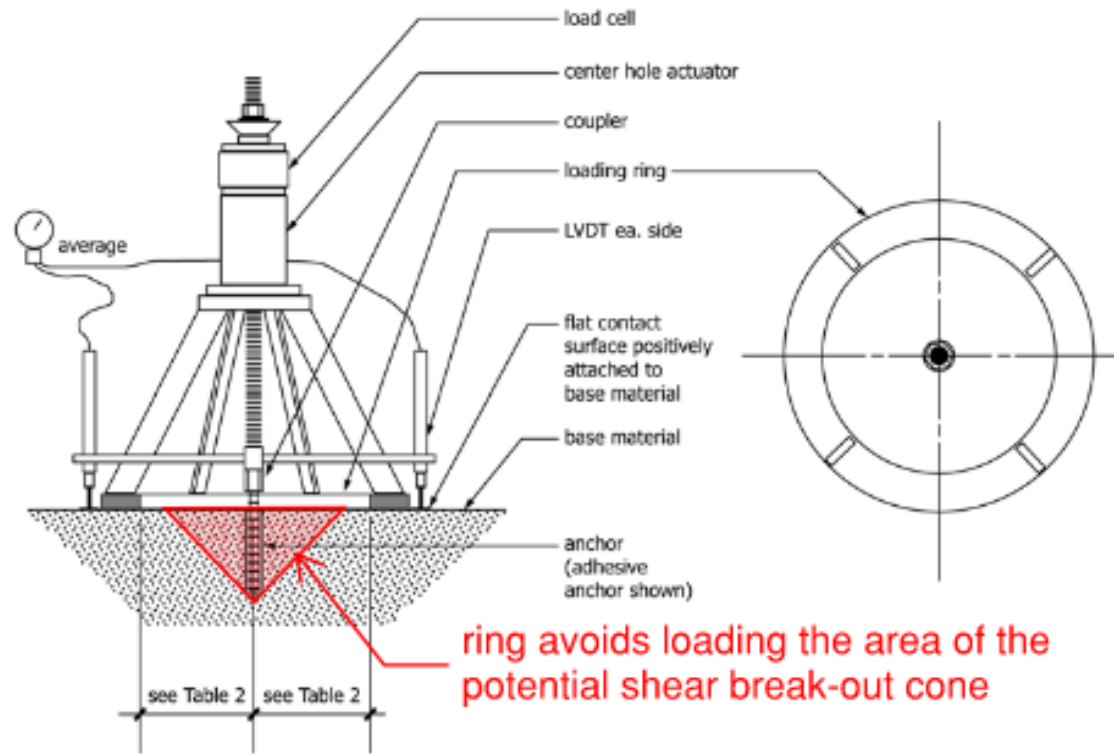


UNCONFINED



CONFINED

Adhesive and Screw Anchor Tests - Tension



UNCONFINED

- CBC 1910A.5.5 governs over ASTM E3121

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.

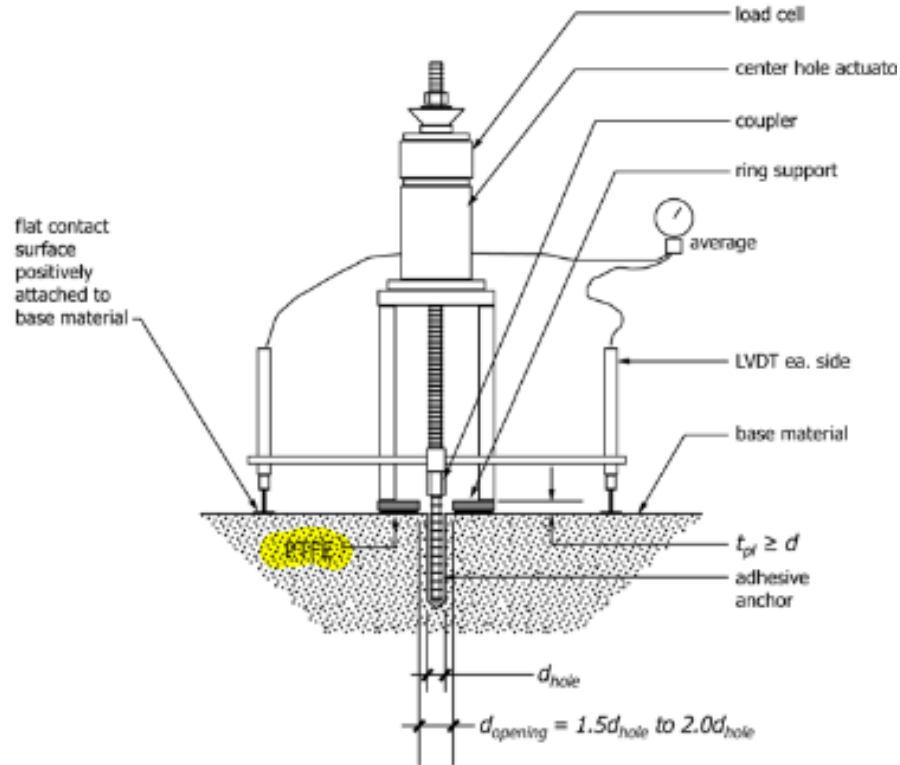
1. Hydraulic ram method:

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.

The testing apparatus support locations shall not be within 1.5 times the anchor's embedment depth to avoid restricting the concrete shear cone type failure mechanism from occurring.

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

Adhesive and Screw Anchor Tests - Tension



CONFINED

NOTE: ASTM E3121 specifies that, for confined tests, a sheet of TFE, PTFE, FEP, or PFA be placed between the loading plate and the surface of the member.

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.

The testing apparatus support locations shall not be within 1.5 times the anchor's embedment depth to avoid restricting the concrete shear cone type failure mechanism from occurring.

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

Post-Installed Anchor Tests - Undercut

- Undercut anchors that allow visual confirmation of full set require **NO** testing.

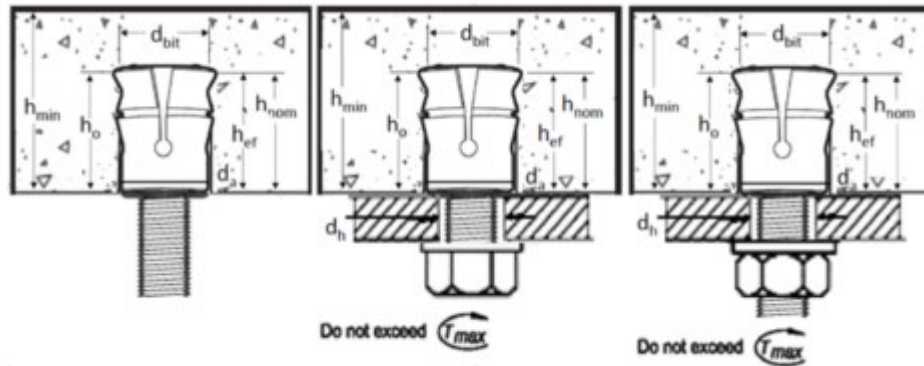


FIGURE 2—MINI-UNDERCUT+ ANCHOR INSTALLED WITH STEEL INSERT ELEMENT

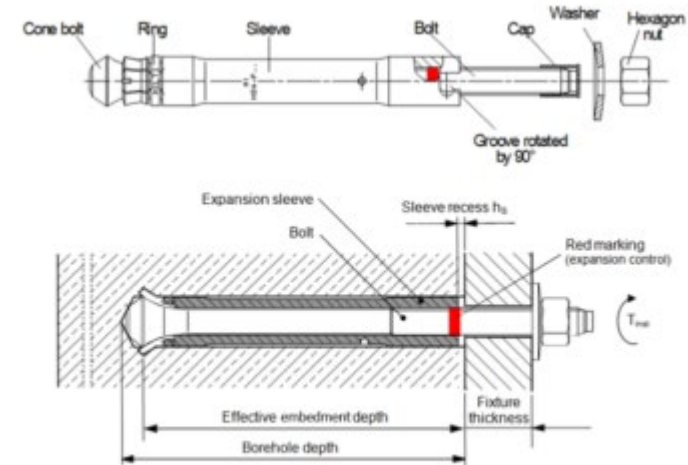


FIGURE 1—PRE-SETTING ANCHOR HDA-P AND HDA-PR (PRE-POSITIONING)

- But inspection during installation is still important (and required).
- Verify that the installer does not exceed the torque specified in the ICC-ESR. (This is also important for screw anchors.)

Amendments - Chapter 19 & 19A - Concrete

SECTION 1908 SHOTCRETE

...

1908.1 General. Shotcrete shall be in accordance with the requirements of ACI 318 *[OSHPD 1R, 2 & 5]* and the provisions of ACI 506R. ~~The specified compressive strength of shotcrete shall not be less than 4,000 psi (27.6 MPa).~~ The evaluation of the shotcrete mockup panel to qualify bar clearance dimensions in accordance with ACI 318 Section 25.2.7 or contact lap splices in accordance with ACI 318 Section 25.5.1.7 shall be in accordance with the requirements of 506.4R with a core quality category of Very Good given in ACI 506.6T.

...

Amendments - Chapter 19 & 19A - Concrete

SECTION 1908 SHOTCRETE

...

1908.1.

Table 1—Core evaluation category

	Criteria	Very good	Good	Satisfactory	Poor
a	Encapsulation of reinforcing steel as a percentage of the circumference of the reinforcement (any individual reinforcement cross section or total of all reinforcements in the core)*	Greater than 90 percent	Greater than 80 percent	Greater than 70 percent	Less than or equal to 70 percent
b	Maximum size [†] of any void touching the reinforcement, as a percentage of the cross section of that reinforcement	Less than 25 percent	Less than 30 percent	Less than 35 percent	Greater or equal to 35 percent

*When reinforcements are not centered in the core, an attempt should be made to determine the approximate length of the reinforcement's edge contact with shotcrete.

[†]Measured as approximate area of any voids touching the reinforcing steel on the cylindrical surface of the core.

Notes: Sand lenses should be measured as voids. Occasional scattered voids up to 1/4 in. (6.4 mm) diameter should be ignored.

Amendments - Chapter 19 & 19A - Concrete

SECTION 1908 SHOTCRETE

...

1908A.1

*Visual representation of
Core evaluation Criteria*

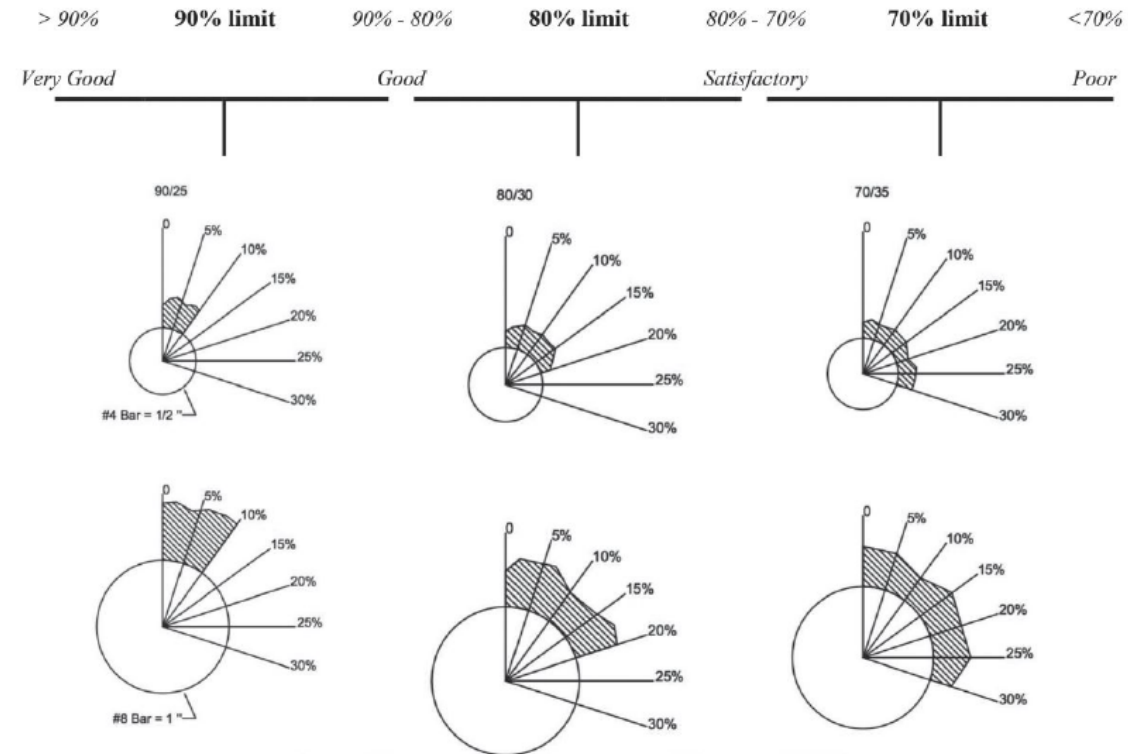


Fig. 1—Visual representation of Criteria (a and b) of Table 1. (Note: 1 in. = 25.4 mm)

Amendments - Chapter 19 & 19A - Concrete

- **1908.2 Tests and Inspections. [OSHPD 1R, 2 & 5] 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.**

Revisions to Masonry Chapters 21 & 21A

- Revisions made were initiated by public comments received from the Masonry Institute and consensus achieved in a collaborative effort with OSHPD, DSA and the Masonry Institute.
- Restructured and revised existing amendments rewritten as Modifications to TMS 402/602 and duplicate language has been deleted. Minimal net change in regulatory effect.

Chapter 21 & 21A - MASONRY

- **2103.4 Metal reinforcement and accessories.** Metal reinforcement and accessories shall conform to Article 2.4 of TMS 602. Where unidentified reinforcement **[OSHPD 1R, 2 & 5]**, or *bar reinforcement without mill certification*, is approved for use, not less than three tension and three bending tests shall be made on representative specimens of the reinforcement from each shipment and grade of reinforcing steel proposed for use in the work. **[OSHPD 1R, 2 & 5]** *Alternatively, the frequency of sampling for unidentifiable reinforcing bars specified in Section 1910.2 can be used.*

Amendments - Chapter 21

- **2104.2.1 General conditions. ... TMS 602, Article 3.3 B Placing Mortar and Units. Modify TMS 602 Article 3.3 B.2.c as follows:**
- c. Remove masonry protrusions extending (Relocated from Section 2104.2.1) *greater than* $\frac{1}{4}$ $\frac{1}{2}$ in. (~~12.7~~ 6.4 mm) or more into cells or cavities to be grouted.

Amendments - Chapter 21

- **2104.2.2 TMS 602, Article 3.4 B Reinforcement.** Modify TMS 602 Article 3.4 B.1 and Article 3.4 B.3 as follows:
- 1. Support reinforcement to prevent displacement caused by construction loads or by placement of grout or mortar, beyond the allowable tolerances. (Relocated from Section 2104.2.1) *Reinforcement and embedded items shall be clean, properly positioned and securely anchored against movement prior to grouting.*
- ...
- 3. Maintain a clear distance between reinforcing bars and the interior of masonry unit or formed surface of at least 1/4 in. (6.4 mm) for fine grout and 1/2 in. (12.7 mm) for coarse grout, and the space between masonry unit surfaces and reinforcement shall be a minimum of one bar diameter, except where cross webs of hollow units are used as supports for horizontal reinforcement. (Relocated from Section 2104.2.1) *Reinforcement and embedded items shall be solidly embedded in grout.*

...



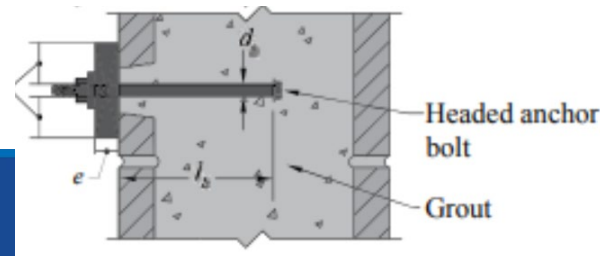
Amendments - Chapter 21

- 2104.2.3 TMS 602, Article 3.4 D Anchor Bolts. Replace TMS 602 Article 3.4 D.3 and add Articles 3.4 D.5 and 3.4D.6 as follows:

...

- 3. (Relocated from Section 2104.2.1) Anchor bolts in the wythe or face shells of hollow masonry units shall be positioned to maintain a minimum of ½ in. of grout between the bolt circumference, the wythe or ~~and~~ the face shell. For the portion of the bolt that is within the grouted cell, maintain a clear distance between the bolt and the face of masonry unit and between the head of the bolt and the formed surface of grout of at least 1/4 in. (6.4 mm) when using fine grout and at least 1/2 in. (12.7 mm) when using coarse grout. (Relocated from Section 2104.2.1) *Bolts shall be solidly embedded in grout.*

...



Amendments - Chapter 21 & 21A

2105.3 Mortar and grout tests. [OSHPD 1R, 2 & 5] ~~These tests are to establish whether the masonry components meet the specified component strengths.~~ TMS 602, Article 1.4 B Compressive Strength Determination. Modify TMS 602 Article 1.4 B as follows by adding:

- 5. Additional testing requirements:
 - a. At the beginning of all masonry work, at least one test sample of the mortar shall be taken on three successive working days and at least at one-week intervals thereafter. Where mortar is based on a proportion specification, mortar shall be sampled and tested during construction in accordance with ASTM C780, including Annex 4, 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.

...

Amendments - Chapter 21 & 21A

- ~~• 2105.5 Masonry prism method testing. [OSHDPD 1R, 2 & 5] 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.~~
- ~~• 2105.6 Unit strength method testing. [OSHDPD 1R, 2 & 5] Unit strength method testing shall be performed in accordance with TMS 602 Section 1.4 B.2.~~

Amendments - Chapter 21 & 21A

- **2107.7 Masonry Compressive Strength. [OSHPD 1R, 2 & 5]** The specified compressive strength of structural masonry, f'_m , shall be equal to or exceed 1,500 psi (10.34 MPa). The value of f'_m used to determine nominal strength value in this chapter shall not (Relocated from Section 2105.2) exceed 3,000 psi (20.7 MPa) for concrete masonry and shall not exceed 4,500 psi (31.03 MPa) for clay masonry.

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Amendments - Chapter 21 & 21A

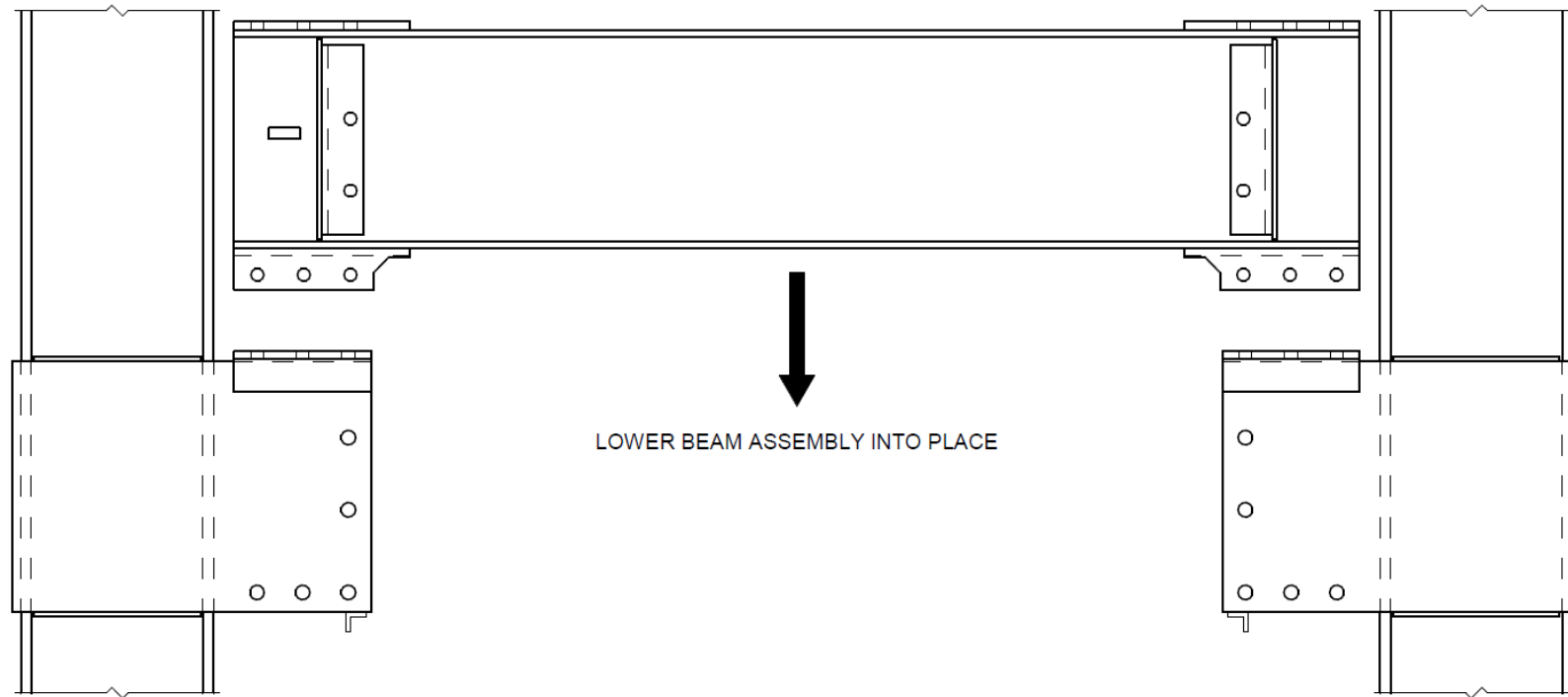
2108.4 [OSHPD 1R, 2 & 5] TMS 402, Section 9.1.9.1.1. Modify TMS 402, Section 9.1.9.1.1 as follows:

- **9.1.9.1.1** Masonry Compressive Strength. The specified compressive strength of structural masonry, f'_m , shall be equal to or exceed 1,500 psi (10.34 MPa). The value of f'_m used to determine nominal strength values in this chapter shall not exceed ~~4,000 (41.37 MPa)~~ (Relocated from Section 2105.2) 3,000 psi (20.7 MPa) for concrete masonry and shall not exceed ~~6,000~~ 4,500 psi (~~41.37~~ 31.03 MPa) for clay masonry.

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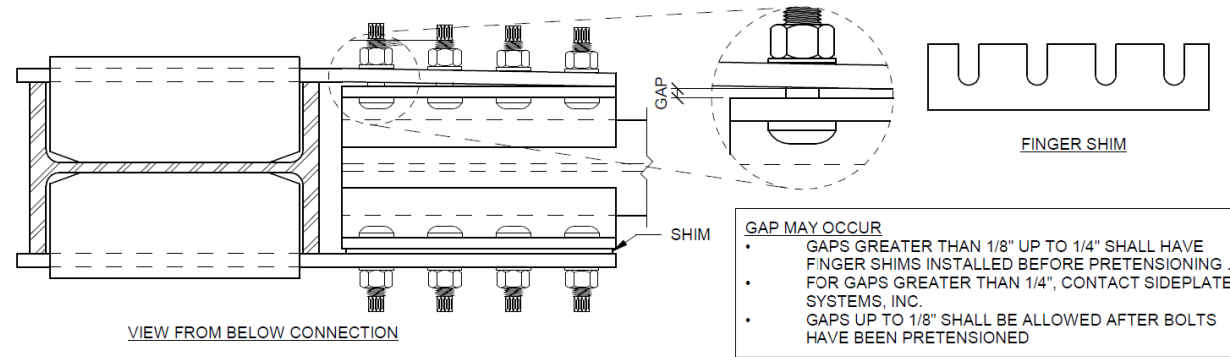
Chapter 22A – STEEL – SidePlate Bolted Connection

- **Section 2205A.5.3 Bolted Moment Connection - Chapter 11, Supplement No. 1 (AISC 358-16)**

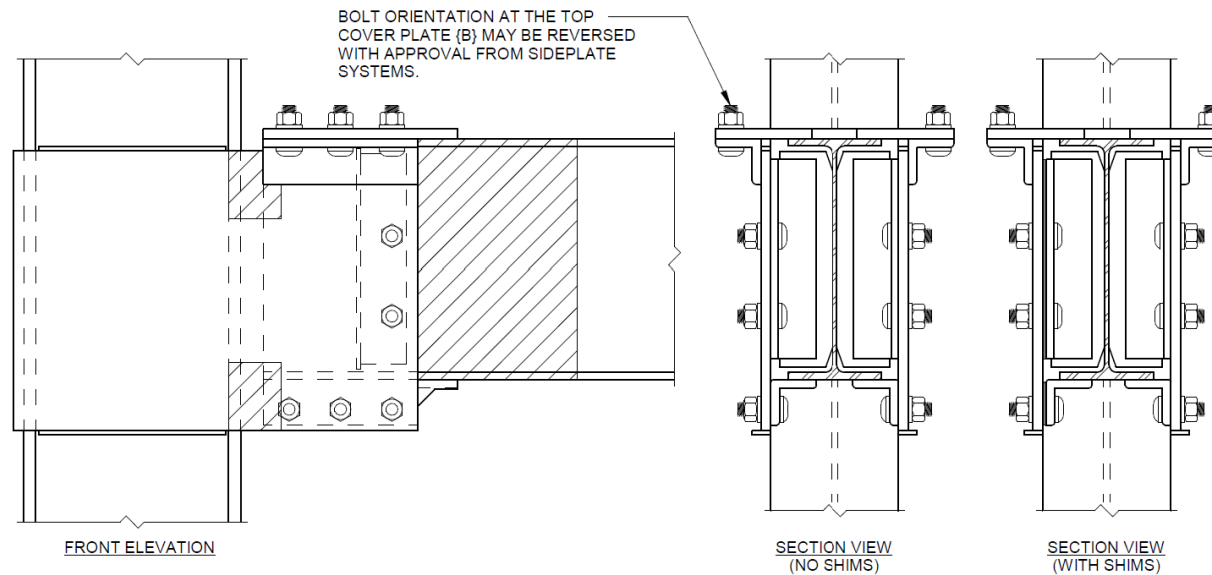


GRAPHIC NO. 9 - FIELD ERECTION OF SIDEPLATE BEAM ASSEMBLY

Chapter 22A – STEEL – SidePlate Bolted Connection

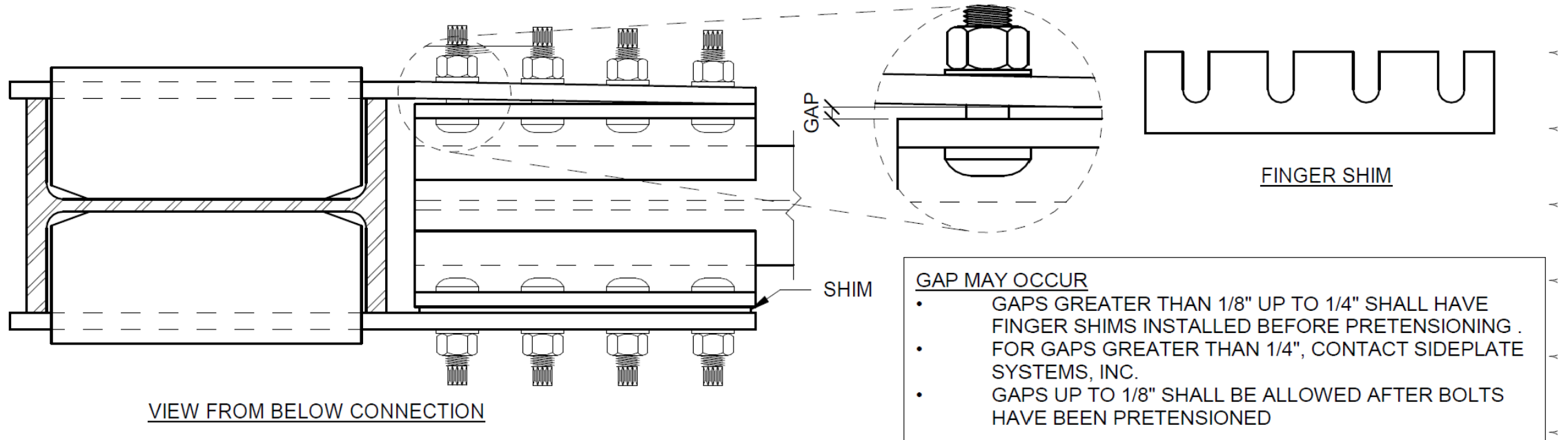


GRAPHIC NO. 12 - SNUG TIGHT CONDITION PRIOR TO PRETENSIONING BOLTS



GRAPHIC NO. 13 - COMPLETED SIDEPLATE BOLTED CONNECTION

Chapter 22A – STEEL – SidePlate Bolted Connection



GRAPHIC NO. 12 - SNUG TIGHT CONDITION PRIOR TO PRETENSIONING BOLTS

Chapter 22A – STEEL

Bolt Tests

2213A.1 Tests of high-strength bolts, nuts and washers. High-strength bolts, nuts and washers shall be sampled and tested in accordance with Section 1705A.2.6 [OSHPD 1 & 4] and this section.

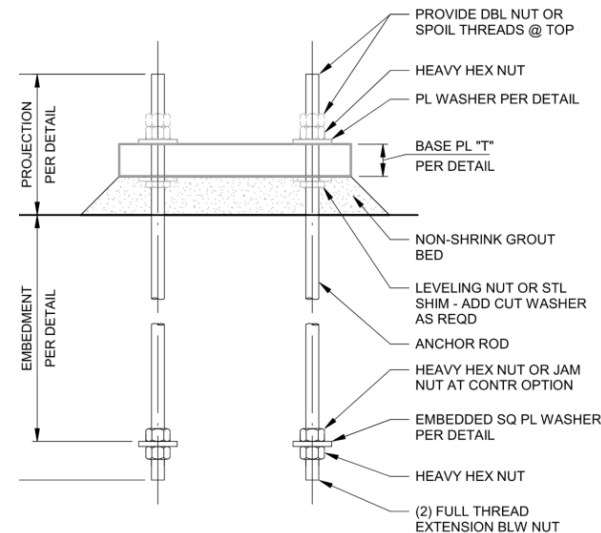
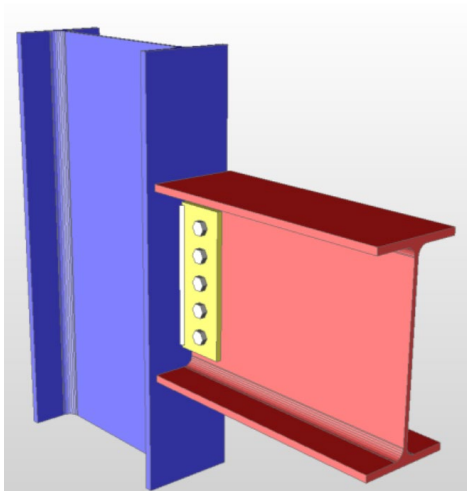
[OSHPD 1 and 4] A minimum of nine samples per lot, as defined in the ASTM standards for bolts [not nuts and washers], shall be tested for tensile properties in accordance with ASTM F606, but need not exceed three samples per 400 bolts.

Samples of high-strength bolts shall be taken and tested.

This is not the “Skidmore” test that verifies the tension produced in the “twist-off” type of bolt, but a tension test of the bolt to failure.

Includes:

- ASTM A325 and A490 bolts in steel connections between structural steel members
- Grade 105 anchor rods



Other Items to be aware of ...

Concrete mix designs – Are the appropriate ASTM standards being followed?

Structural Steel Welding – Are they being performed in accordance with the WPS?

Curtain Walls – Are the appropriate AAMA tests performed?

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What's Coming?

Screw anchors are now being permitted for building envelopes
Frequency of Anchor testing requirements for non-structural components is reduced

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