
SAMPLING AND TESTING OF HIGH STRENGTH BOLTS, NUTS, AND WASHERS

IR 17-8

References:

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California Code of Regulations (CCR), Title 24, Part 2: California Building Code (CBC)
2007 CBC, Sections 2212A.2
2010 CBC, Sections 2212A.1, 2211.5.1*

Discipline: Structural

This Interpretation of Regulations (IR) is intended for use by the Division of the State Architect (DSA) staff, and as a resource for design professionals, to promote more uniform statewide criteria for plan review and construction inspection of projects within the jurisdiction of DSA which includes State of California public elementary and secondary schools (grades K-12), community colleges, and state-owned or state-leased essential services buildings. This IR indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered by DSA.

This IR is reviewed on a regular basis and is subject to revision at any time. Please check the DSA web site for currently effective IRs. Only IRs listed in the document at <http://www.dgs.ca.gov/dsa/Resources/IRManual.aspx> at the time of plan submittal to DSA are considered applicable.

* Indicates alternative 2010 CBC sections that community colleges may use, per 2010 CBC, Section 1.9.2.2

Purpose: The purpose of this Interpretation of Regulations (IR) is to clarify the requirements for sampling and testing of high strength bolts, nuts and washers used in steel frame connections on projects under DSA jurisdiction. It is intended to outline the material identification and required certificates, sampling frequency and specific tests required.

Scope: Section 2212A.1, 2211.5.1* (Section 2212A.2 in the 2007 CBC) requires sampling and testing of high strength bolts, nuts and washers to be conducted by a DSA approved testing laboratory. This IR is applicable to high strength fastener assembly components having ASTM designations A 325, A 490, and F 1852 (bolts), A 563 (nuts), and F 436 (washers).

Foundation anchor bolts are outside the scope of this IR.

1. Material Identification: Material identification of high strength fasteners shall be conducted by the project inspector and verified by the special inspector. Bolts that meet all of the following criteria shall be considered identified and shall be sampled and tested per Sections 3.1 and 3.3 below.

- 1.1 Verification that all fasteners delivered to the project are in containers sealed by the manufacturer.
- 1.2 Verification that all fastener containers are readily identifiable and traceable to the manufacturer's Material Test Report (MTR) and or certificate of compliance that must be provided with the shipment.
- 1.3 Verification that the MTR clearly states that the material conforms to the appropriate ASTM designation as described in the project specifications.

Bolts not meeting one or more of the above criteria shall be considered unidentifiable and shall be sampled and tested per Sections 3.2 through 3.4 below.

2. Fastener Sampling: All high strength bolts, nuts and washers sampled for testing shall be selected by a designated representative of a DSA accepted testing laboratory.

Visually inspect all sampled fastener assemblies for proper markings, condition and manufacturer's defects (e.g.: "head burst").

3. Frequency of Sampling

Fasteners and components shall be sampled at the frequencies listed below unless approved otherwise by the DSA field engineer.

- 3.1** For fasteners and components found to be identifiable in accordance with Section 1 above, sample one (1) complete fastener assembly for every four hundred (400) or fraction thereof for each type of fastener assembly to be installed in the project. Type of fastener assembly refers to manufacturer, ASTM specification and grade, diameter, head configuration, or coatings, without respect to length.
- 3.2** For unidentifiable fastener assemblies, sample three (3) complete fastener assemblies for every one hundred (100) or fraction thereof for each type of bolt to be installed in the project.
- 3.3** For projects requiring 1,500 fastener assemblies or more, for each type of bolt to be installed in the project sample identifiable fastener assemblies at a rate of one (1) per 1,200 (or fraction thereof) and for unidentifiable assemblies sample at the rate listed in Section 2.2 above.
- 3.4** A minimum of two (2) fastener assemblies shall be sampled and tested for each type of bolt on each project.

4. Fastener Testing: Testing of high strength bolts, nuts and washers shall be conducted by a laboratory approved by DSA. Each fastener assembly shall be tested in accordance with ASTM standard F 606 as follows.

- 4.1** Bolts (A 325, A 490 and F 1852): Proof load, wedge tension, and hardness.
- 4.2** Nuts (A 563): Proof load, hardness.
- 4.3** Washers (F 436): Hardness.

5. Reporting:

- 5.1** Test reports shall be distributed by the laboratory facility to the school district, project architect, structural engineer, project inspector and DSA within fourteen days (14) of the testing. Nonconforming results must be conveyed immediately. A sample report form ([DSA-208](#)) is available on the DSA web site.