

INSPECTION REQUIREMENTS FOR ANCHORS IN CONCRETE SUPPORTING FIRE SPRINKLER SWAY BRACING TO RESIST SEISMIC FORCES

This bulletin clarifies the inspection requirements for anchor bolts in concrete used for fire sprinkler piping sway bracing to resist earthquake forces.

Inspection Requirements are based on Design Criteria for Anchor Bolts with Seismic Bracing Systems

There are two methods of designing anchor bolts for seismic bracing systems to support fire sprinkler systems in accordance with:

- Prescriptive Method per NFPA 13 (2016 edition) Section 9.3.1.1 **or**
- Engineered Method NFPA 13 (2016 edition) Section 9.3.1.2.

PRESCRIPTIVE DESIGN METHOD - NFPA 13 Section 9.3.1.1 states: Where water based fire protection systems are required to be protected against damage from earthquakes, the requirements of Section 9.3 shall apply, unless the requirements of 9.3.1.2 are met.

When the installer elects to use this Prescriptive Design Method for installing sprinklers in accordance with NFPA Section 9.3.1.1, then all support components shall be designed in accordance with the design tables for forces, spacing and materials in accordance with NFPA Section 9.3.5.2. NFPA 13 requires bracing and support components designed with the Prescriptive Design Method to be listed by an approved agency. Sprinkler sway bracing designed in accordance with NFPA 13 Section 9.3.1.1 are deemed to meet the force and displacement requirements of the American Society of Civil Engineers Standard 7-10 (ASCE 7-10) Section 13.6.8.2.

Inspection Criteria

- ✓ Anchor bolts installed into concrete shall be evaluated and approved by the International Code Council (ICC) Evaluation Service for compliance with ACI 355.2.
- ✓ NFPA 9.3.5.12.8.1 requires anchor bolts to be installed in accordance with the manufacturer's instructions.
- ✓ Bolts without ICC approval that have LADBS Research Report shall be installed with all conditions of approval, except that, special inspection will not be required.

ENGINEERED METHOD - NFPA 13 Section 9.3.1.2 states: Alternative methods of providing earthquake protection of sprinkler systems based on a seismic analysis certified by a registered professional engineer such that system performance will be at least equal to that of the building structure under expected seismic forces shall be permitted.

When the installer uses the Engineered Method of NFPA Section 9.3.1.2, such designs shall fully comply with the requirements of the Los Angeles Building Code, including the following:

- Design forces shall be in accordance with ASCE 7-10
- In addition to a Fire Sprinkler Permit, sway bracing and anchorage shall be approved through the LADBS Building Plan Check and Building Permit process
- Requirements for material components in designs shall comply with LABC Chapters 19, 20, 21, 22, and 23, for aluminum, concrete, masonry, steel and wood respectively.
- Bracing and support components shall be tested in accordance with testing criteria established by the International Code Council and approved by LADBS with a Los Angeles Research Report.

Inspection Criteria

- Special Inspection shall be required for anchor bolts and documented in accordance with LABC Section 1704 and the conditions of approval in LADBS's Research Reports.
- Sway bracing components may require approvals through the LADBS Research Report process. Information about acceptance process is found in Information Bulletin P/BC 2017-119 Policy on Accepting Alternate Building Materials or Products.

PRYING

Regardless of the design method used, prying shall be considered in sizing the anchor bolts using either of the following two ways:

- Minimize prying when the bracing strut centerline is aligned through the centerline of the anchor bolt at approximately the surface of the concrete
- Use the design procedures in the NFPA Annex A9.3.5.12.2.

Anchors installed with braces deviating from the angle specified on the plans by more than 5-degrees will not be approved without calculations substantiating the additional prying capacity of the anchor bolts. Plans may specify variations larger than 5-degrees, provided the consideration for prying was documented with the maximum allowed range of angles that the bracing struts may be installed.