CITY OF VANCOUVER

PLANNING AND DEVELOPMENT SERVICES
Office of the Chief Building Official

BULLETIN 2016-003-BU

March 2, 2016
(Revised June 01, 2016)

Post-Installed Concrete Anchors (VBBL Article 4.1.8.18.)

The intent of this bulletin is to clarify that the use of power actuated fasteners and drop-in anchors used to attach building components, services, and equipment, shall not be used to resist suspended tension loads in combination with seismic forces, regardless of their listing.

Power Actuated Fasteners and Drop-in Anchors

Previously drop-in inserts have been used for suspended loads including mechanical equipment and piping. Sentence 4.1.8.18.(8)(d) of the VBBL identifies that the use of powder actuated and drop-in anchors are not appropriate in this application.

The clarifying appendix to Article 4.1.8.18., makes reference to appropriate design complying with the NBC 2010 Structural Commentaries (Part 4). Commentary J, Article 4.1.8.18.(8) (ref. item 233.) identifies a specific concern that power actuated fasteners (such as nails, bolts, and shallow "drop-in" anchors) are unable to withstand cyclic tensile loading. Consequently, it remains the City of Vancouver's position that drop-in anchors are not to be permitted.

Background

It is generally recognized that the City of Vancouver is a high-risk seismic zone and the suitability of post installed anchors has been questioned. The BC Building Code Interpretation Committee has previously provided an interpretation stating that power-actuated fasteners and drop-in anchors are not permitted to be used for seismic tensile loading. Similarly, the VBBL and its reference documentation prohibit the use of power actuated fasteners for generalized suspended building components, but this does differ from the requirements of some of its referenced standards.

In most installations, sprinklers and sprinkler piping are installed below building services and equipment within the floor areas, consequently, the proper function of the sprinkler system may be jeopardized by the complete or partial collapse of building services located above following a seismic event. As these are essential life safety systems, it is essential that these remain functional. Therefore, a consistent policy to harmonize performance requirements of the means of attachment of suspended building components is required.

Post-installed Anchors

Where post-installed anchors are utilized, designers are required to review the adequacy of the proposed support system for not only the specified gravity loads; but also the differential movement and vibration of equipment and services in accordance with good engineering practice. While this consideration applies to building equipment and services identified in items 11 through 21 of Table T-4.1.8.18. of the VBBL, designers are still required to consider the adequacy of the form of attachment of other suspended building elements. Special attention is required for suspended ceilings, light fixtures, or other attachments in building exits, post-disaster buildings, and public buildings with designated post disaster functions where in which the failure of the suspended ceiling may affect the ability of the building to perform its intended function.

The potential failure of the selected method of attachment must be considered in the specification of appropriate means to attach building elements, equipment, services, and non-structural components. This is described in the 2014 VBBL, Appendix A-6.2.1.3., which identifies that designers should consider an appropriate consideration of movement and vibration of the installed mechanical components and services through compliance with the CSA A23.3 standard. In turn, this should be extended to include consideration of the UL203 requirements if there is a reason to believe that the failure of the mechanical system could have an impact on the performance of fire suppression system components.

Consequently, post-installed anchors used to resist load combinations which include earthquake loads and/or effects imposed by seismic response should be qualified for earthquake loading in accordance with the requirements of ACI 355.2/ACI 355.2R for mechanical anchors or ACI 355.4M for adhesive anchors in accordance with good engineering practice.

Registered professionals who complete a Schedule B for structural capacity including anchorage and seismic restraint (all disciplines) and contractors must ensure that the proper fasteners and anchors are being used and that they comply with Part 4 of the VBBL. These anchors and fasteners shall be inspected, listed (e.g. sprinkler), and field reviewed where required.

Fire Protection

Where fire protection systems are being designed and installed, the specific requirements of NFPA 13 - 2013, Article 6.1.1. and 9.1.1. identify that all components intended for use as part of a fire suppression system must be listed for such use. Owing to the importance of this system, NFPA 13 demands compliance to UL 203 “Pipe Hangar Equipment for Fire Protection Service” in addition to the generally applicable design standards, as well as selection of components that will accommodate a vertical load for 5 times the weight of the water filled pipe plus 114 kg (250 lbs).

Due to the potentially significant impact of this of policy, enforcement of these requirements will take effect July 1, 2016. The requirements of this bulletin supercede the previously issued Bulletin 2014-003-BU/EL identifying the City’s interim position on this matter.

For additional clarification see also BOABC’s code interpretation committee’s bulletin:
http://boabc.org/wp-content/uploads/2015/10/201403191335.pdf

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