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Anchor Channels & Hanger Installations

Introduction

Anchor channels are metal insert channels with a C-shaped section which are cast into the underside of a concrete slab to allow for the attachment of hangers at any point along their length. Anchor channels reduce the need for traditional attachment methods (such as individual embeds, hammer drilling, or powder-actuated anchors), which facilitate hanger installation during initial construction and for the life of the building. This article will focus on the use of anchor channels and hanger installation systems for mechanical, electrical, and plumbing installations.

Case Study

Building 40A, a six-story addition to the Vaccine Research Center on NIH's Bethesda campus, was recently installed with an anchor channel system and hanger installation system (see Figure 1). The use of anchor channels has enabled faster installation of pipes, conduits, and other suspended MEP system components, and is expected facilitate the modification of these systems for the life of the building. The success of the anchoring channel system at Building 40A will serve as the model for future projects utilizing anchor channel systems at NIH.

Figure 1: Anchor channels in Building 40A

Key Benefits

Anchor channels are cost effective if they are planned into the design early. Anchor channel and hanger installation systems provide improved function and added features compared to traditional anchoring systems, simplifying workflow and reducing installation time. Anchor channels benefits include but are not limited to the following:

- Faster hanger installations
- Immediate load-carrying capability
- Easy positional adjustment
- Adjustability without drilling or welding
- Ease of maintenance
- Adaptability for future attached components

Design Considerations

The engineer of record (EOR) must account for embedded anchor channels, along with the weight of suspended systems, in the design of slabs, including slab thickness and reinforcing. Design criteria include the American Concrete Institute (ACI) Code 318, *Building Code Requirements for Structural Concrete and Commentary,* and AC232, *Acceptance Criteria for Anchor Channels in Concrete Elements*, published by the International Code Council Evaluation Service (ICC-ES).[1]

The EOR must specify and detail the anchor channel system, in conjunction with the slab, to accommodate the hangers and loads of the initial design, with capacities for anticipated future loading. Installation details, including stud/anchor embedment depth, shall comply with ACI criteria and product manufacture regarding design, specifications, and installation to ensure warranty compliance.

When specifying anchor channel systems, the EOR must consider the following factors: minimum substrate requirements, appropriate channel size for the application, T-bolt selection (standard, heavy duty, stainless steel, slotted, etc.), and strength of the T-bolt for the applied load, geometrical properties, and lead time.

NIH *Design Requirements Manual* (*DRM*) Requirements

The next *DRM* update will include requirements for the incorporation of anchor channels in new NIH buildings and building additions where the following conditions are met:

- Tensioned slab construction
- Containing utility-intensive functions (e.g., data centers, research, procedure, imaging, fabrication, testing)
- Containing facilities subject to renovation or upgrade due to technological advancement or program evolution (e.g., laboratory, vivarium, clinical)

Where the above conditions are not met, the use of anchor channels will not be required but recommended for all other new buildings and building additions. The A/E and NIH stakeholders shall assess the building's structure, density of suspended utilities, likelihood of future renovations, and other relevant factors to determine whether anchor channels are of long-term value for the building. A summary of the assessment shall be included in the BOD.

Installation shall be determined by the BIM model based on the anchors needed to support suspended utilities. 2'-0" OC channel anchor spacing is recommended in areas with primary utility distribution and highest density (mechanical rooms, interstitial spaces, utility corridors, other high-utility areas) and 4'-0" OC for lower-density, terminal use areas.

Conclusion

Anchor channels provide an efficient cast-in anchoring system that facilitates hanger installation during initial construction and for the life of the building. Their use helps avoid post-occupancy renovations that would ordinarily involve installing new embeds, generating significant levels of vibrations, noise, and cost as well as challenges in the vicinity of previously hung utilities. Future *DRM* updates will enforce and provide additional guidance relating to applicability, use, and design of anchor channels and hanger installation systems at NIH labs and clinical facilities. Given the dynamic nature of biomedical research and the need to co-evolve science and buildings, this life cycle flexibility is indispensable.

References

1. Christopher Mahrenholtz, "Robust Anchorages to Concrete Structures," Structure Magazine, September 9, 2022, https://www.structuremag.org/article/robust-anchorages-to-concrete-structures/#:~:text=Anchor%20channels%20with%20channel%20bolts,fatigue%20loads%20in%20any%20direction.