

FEBRUARY 2004 MEETING

February 18, 2004

TECHNICAL PROGRAM

Post-Installed Anchors in Concrete Foundations

Speaker: Mark Bartlett, P.E. Tel. No. 214-507-1996 - Simpson Strong-Tie Co. McKinney TX.

PRESENTATION SUMMARY

Mr. Bartlett, a structural engineer with a BSCE degree from Lehigh University and Anchor Systems Field Engineer with Simpson Strong-Tie gave a PowerPoint presentation on post-installed concrete anchors to a room of about 25.

Mr. Bartlett's presentation included:

- Different types of post-installed anchors and how they work
- Factors affecting post-installed anchor performance
- Potential problems with post-installed anchors

Mr. Bartlett discussed four different types of post-installed anchors:

1) Torque Controlled Expansion Anchors

These are more commonly known as wedge anchors or expansion bolts and are inserted into a pre-drilled hole. The wedges activate by tightening a nut against the concrete surface. They tend to split the concrete if installed too close to the edge. Also, they also tend to loosen under vibratory loads. They come in sizes up to 1.25" and have allowable capacities of 12 kips in tension and 7 kips in shear.

2) Deformation Controlled Anchors

These are partially split sleeves that are hammered into a pre-drilled hole. A plug is inserted which is forced in by hammering a setting tool and then a threaded rod is screwed into the sleeve. They are normally used as hanger anchors in concrete ceilings, come in sizes up to 0.75" and have allowable capacities up to 2.7 kips in tension and 4.0 kips in shear.

3) Friction Screw Anchors

These anchors look like masonry bits but with a large thread pitch. They have a bolt head, are installed into a pre-drilled hole, work well with vibratory loads, and are often used to bolt down sill plates because they can be used closer to the concrete edge than can wedge anchors. They derive their holding power by cutting threads into the concrete as they are screwed in. The threads are not much larger than the shank, so a common installation problem is over drilling the hole diameter, even by just leaning on the drill. They come in sizes up to 0.75" with allowable capacities up to 4.7 kips in tension and 6.2 kips in shear.

4) Adhesive (Bonded) Anchors

These are threaded rods or rebar inserted into an oversized pre-drilled hole and bonded with epoxy or another adhesive. They are sensitive to a clean hole and demand a special cleaning procedure be followed. They are also sensitive to water, temperature variations and mixing of the epoxy. They have the highest load capacities (when epoxy is used) of the post-installed anchors. They come in sizes up to 1.25" with allowable capacities up to 31 kips in tension and 17 kips in shear.

Other points presented on the four systems:

- All the post-installed anchors discussed have group effect limitations on their capacities if installed too close to each other.
- Greater embedment depth than specified usually will not increase the documented capacities.
- Safety factors used were 3.0 for the steel and 4.0 for the concrete. The 28-day compressive strength used was 2000 psi. Higher capacities may result for higher concrete strengths.
- Hole cleaning is imperative prior to inserting the anchor to ensure full embedment. Drilling a 6-inch hole makes about 2 inches of debris in the bottom of the hole.

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