

# Material Selection Guide: **Tilt-up hardware**

By William D. Palmer Jr.

**T**ilt-up construction is hot. “There will be about 2000 tilt-up buildings built this year,” says Meadow Burke’s David Kelly. “That’s up about 25% over 2004, and that was up about 30% over 2003. Owners like the look of the new formliners and the brick or block finishes we can provide. And of course they like the speed of construction.”

In the world of tilt-up hardware, there are four players—but only two provide the hardware for the vast majority of the tilt-up panels in the United States. Meadow Burke and Dayton/Rich-

mond (a division of Dayton Superior) are the main players, providing hardware for all but a handful of the tilt-up buildings built each year. Don De Cristo and Universal Form Clamp also provide tilt-up hardware and expertise on some projects.

Selecting tilt-up hardware is not as simple as going to a catalog. Tilt panels are highly engineered structures, and the hardware must be specified by a professional engineer with extensive tilt-up construction experience. Both Meadow Burke and Dayton/Richmond provide engineering services as part of the tilt-up hardware package. There are a few other qualified tilt-up engineers in the

United States, including Joe Steinbicker (see “Minimizing Risks When Lifting and Bracing Today’s Tilt-Up Structures,” *CONCRETE CONSTRUCTION*, Jan. 2005, p. 52, by Joe Steinbicker and Jim Baty).

Tilt-up hardware is normally sold by dealers. Both Meadow Burke and Dayton/Richmond will certify a dealer as knowledgeable in tilt-up systems. To call themselves certified, dealers have to have at least one account manager on staff who has gone through training and passed a test. “At one time we were having problems with safety,” said Dayton/Richmond’s Roy Edgar, “and that was the impetus for the certification programs. Certified



**Tilt-up hardware**

**Lifting**

**Embedded recessed anchor—either edge lift or face lift:** embedded into the panel and tied into the reinforcement; has a safety factor of 2 to 2.5.

**Quick connect/disconnect lifting hardware or eye:** attached to the anchor to lift panels then disconnected with a rope from the ground after the panel is placed and braced; a safety pin prevents accidental release; is reusable; has an OSHA mandated safety factor of 5.

**Coil inserts and lifting plates:** swivel lifting plates bolted to the face of panels or solid lifting plates bolted to edges; bolts are removed after panel is braced; lifting plates must be tightly connected to concrete.

**Bracing**

**On panel:** embedded coil inserts bolted to bracing hardware; has a safety factor of 2.

**On floor slab:** post-installed anchor that is designed to handle cyclic loading.

dealers have the knowledge needed to sell the products and take care of problems.” One major certified dealer for both Meadow Burke and Dayton/Richmond is White Cap, which has 90 certified locations in the United States for tilt-up products.

The lifting and bracing hardware for most tilt-up projects is designed by Meadow Burke or Dayton/Richmond. “If the dealers can’t do the calculations, then they send the whole package to the hardware supplier,” said Edgar. “We use our own proprietary software and input the sizes of the panels and other special considerations. We send back to the dealer a detailed drawing of each panel showing the number and location of lifting inserts, the location of the bracing inserts, the size, location, and spacing of the reinforcing steel, the location of the floor anchors for the bracing, and the entire lifting rigging to make sure the panel is lifted as it was analyzed.”

Lifting is the critical operation in tilt-up construction—both from a worker safety viewpoint and from an economic viewpoint. “Each and every component of a tilt-up building has been load tested

during lifting,” said Kelly. “The stress during erection is three times what the panel is likely to ever experience in service. If a panel gets broken during lifting, that can cost a contractor \$10 to \$20 thousand. Getting the panels properly designed by the hardware supplier is a good deal.”

These two critical operations are accomplished with different inserts. Typically, lifting inserts are embedded and recessed “pins” that must be carefully tied into the reinforcing steel. A plastic recessing plug is part of the assembly positioned prior to pouring. But again, a contractor can’t just pick lifting inserts; edge-lift inserts are different from face-lift inserts. Whether the panel can be lifted from the end or must be lifted with inserts in the panel’s face, depends on the size of the panel and the configuration of the panel in the finished structure. Face-lift inserts are designed to allow the panel to rotate to nearly vertical (about 85 degrees), but if the panel must be placed at 90 degrees, such as next to an obstruction or another building, then edge-lift inserts must be used.

Today, most tilt-up lifting inserts are designed to be released from the ground after the panel has been plumbed and braced. “Many tilt-up construction injuries were from workers falling off ladders while unbolting lifting cables,” said Edgar. “The ground-release system eliminates that problem.” When the panel is in place and braced, workers

**Hardware**

There are several pieces of hardware required to lift and brace tilt-up panels. An important distinction here is the difference between lifting and bracing

pull ropes from the ground that disconnect the lifting hardware from the recessed insert. A pin in the hardware prevents any possibility of the attachment being released while it is being used for lifting. Old-style bolted lifting hardware is also available.

Bracing anchors on the panels are cast-in coil inserts. Prior to lifting the panels, the braces are attached with 3/4-inch bolts. Once the panels are in place, but still supported by the crane, the braces are positioned and the location of the anchor on the floor is determined. Workers then drill and install a floor anchor. Edgar notes that “these post-installed anchors are designed specifically for wall braces. Some contractors don’t realize this and use standard anchors. While those may be good enough to handle the static load, they may not be able to handle the cyclic loading that a panel is subjected to by winds while it’s still braced. We don’t recommend post-installed anchors on the panel, though, because all post-installed anchors should be checked and retightened every day, and if workers have to get up on a ladder or lift to check the anchors, that’s more difficult and might not happen.”

All inserts are placed into the panel prior to pouring. To prevent the metal feet of the support from being exposed on the finished panel, the suppliers have three different options. The feet can be stainless steel, the least popular option. Or the feet can be completely plastic or wire with plastic tips. “The wire base is easier to tie,” said Edgar, “but the plastic base doesn’t tip over as easily during concrete placement. It’s a regional choice. Contractors in some areas like the wire and in other areas they like the plastic.”

Tilt-up construction seems destined to continue and grow in popularity. “On small short walls, block construction is very competitive,” said Kelly. “But on anything higher than 12 feet, the scaffolding kills them, and tilt-up is the way to go.” ■