Anchors, Connectors and Fasteners

By Steven Fechino
WE USE ANCHORING AND REINFORCEMENT ON EVERY PROJECT, WHETHER RESTORATION OR NEW CONSTRUCTION. The types of anchors generally are based on what veneer we are anchoring, the weight of the veneer, the condition of the substrate and challenges that are present in installing the anchors. Our choices for anchoring may vary, but when we can select the product with which we are most familiar, our choices usually are limited to a just a few common anchors – those we find easy to work with. In writing this article, I spoke with several industry leaders. Everyone I spoke to had a different “anchor of choice.” Following is a brief look at some of the anchors that work; what we may not have considered as an option; what may be new; and a few that should no longer be used.
Years ago, before the cavity wall, multi-wythe walls were successfully constructed with between two to 11 courses of brick (11 is the most I have ever seen). Even though many of them still stand, using a header brick as a wythe tie isn’t recommended. This is due to thermal movement that occurs within the wall. The movement between the wythes of brick can cause some of the header brick to snap, resulting in a wythe-to-wythe tie that has different characteristics from when it was constructed.

Though this is common among older walls, this characteristic demonstrates the importance of selecting the correct wall anchoring and reinforcing for your project. What we have learned from repairing this type of wall has assisted in the development of different types of masonry reinforcing and anchoring.

Wall reinforcing wire has two basic configurations when embedded within a concrete masonry unit (CMU) wall, truss and ladder wire, which have become the standard. Wall wire typically is comprised of a three-wire system. The outer wires are usually larger than the interior wires.

Ladder wire generally is used with vertically reinforced walls. Truss wire normally is not used with walls that are vertically reinforced and grouted, unless specifically specified. Reinforcing wire has several commercial types available. In locations where moisture is an extreme constant, such as a natatorium, stainless steel wall wire is available.

In exterior walls, hot-dipped galvanized or fusion-bonded epoxy is available. Standard mil-galvanized wall wire is available for interior walls. The use of wall wire with the hook-and-eye pintles allows the contractor who is constructing both the inner and outer masonry wythes to reinforce and anchor them in a simple set of steps.

The hook-and-eye design allows for proper veneeranchoring, whether or not the bed joints of each wythe align in the same plane. The hook-and-eye allows for differential movement between the different wythes of materials, such as the shrinkage of CMU and the expansive characteristics of brick. This ability to self-adjust stabilizes the cavity wall system for a safe installation, while controlling lateral forces on the veneer. This is an economical use of wall wire, and it hooks to properly support the wall and veneer to provide quality reinforcement for standard construction.

**Anchoring precast**

*In anchoring precast, you will have a few choices, based on the size of the unit you are setting. Precast panels that are 30,000 pounds or more typically are anchored with a combination of expansion anchors and welded attachments. Once set into place, the bolted connections can be tightened, and the welded connections can be made. Welding is a big part of the process.*

Today arc welding is the only approved site welding technique, and it must be performed by a certified welder. A certified welder must complete a series of test welds that are x-rayed by an independent laboratory. Once certified, a stone setter or pre-cast erector adds to the quality and complexity of the projects that can be installed by a contractor.

When welding larger precast that requires aerial access, many equipment rental companies offer the “suitcase welders” that plug directly into the work basket. This eliminates the need for the crew to run long lead lines, fueling welders through the day and providing multiple welding units for larger projects.

Smaller precast units, stone and cast stone units are usually dimensional units that allow for a more standard anchoring. Again, depending on weight of the unit and the anchor choice, the anchor location can be either in the top and bottom, or on the sides, of each unit. In many cases, the anchor is in four locations to support the top and bottom of the unit evenly.

Anchors are usually set into a kerf that can be detailed and manufactured, or field cut. Either way it is important to fit the anchor, so it tightly supports the unit and will not hold water that could create spalls at a later time. Split tail anchors, made with 304 stainless steel in various forms and configurations, are usually used for this application.

Many stone setters with whom I have worked prefer to use the Strapmaster by Krando. This tool is useful in creating the exact anchor that you need, when you need it. Simply mount the Strapmaster to a retired walk board; place it in your work area; and cut, bend, twist and punch the anchor that is needed for the spot required. This tool is not the choice tool for production veneer anchors, but is a useful tool for custom, random and dimensional stone and precast units.
Lighter gauge corrugated ties are available from commercial suppliers, but these ties should not be considered for any exterior veneers. These are said to be marketed for interior commercial brick veneers. The corrugated ties are so flimsy and incapable of handling the exterior lateral loading of a brick veneer, this anchor should probably be avoided completely.

Thermal break anchors are becoming increasingly important to veneer work across the country. They have a simple concept, but are complicated to design. The idea is to interrupt the transmission of cold or heat across the metal tie to the substrate of the building. Two popular double-pintle, single-post ties are available, but with very different methods for installation.

One tie is a single-post screw that supports the double pintle as a single anchor. The tie is installed using a 5/16-

**Pins and ties**

*THE DRIVE PIN*, also called the lead anchor, zinc anchor, hammer pin, Nailon anchor or Zamac Nail-in Anchor, is used for light-duty applications. However, it should not be a consideration for overhead attachments under any circumstances. This anchor is tamper proof once installed, and it can be used for light-duty static anchoring for strapping, securing and anchor fastening.

The drive pin is used for attaching termination bars for masonry flashing installations. This anchor is not recommended for anchoring sealed termination bars as the hammering of the drive pin creates uneven pressure. This can bow the term bar and create gaps where water can penetrate behind the flashing and contribute to leaks or water damage.

Corrugated wall ties, which many have used for a first anchoring system, can be bent into place by hand; nailed into place easily without much thought; and have held millions of square feet of veneers across the country. One problem exists with corrugated wall ties, however. In the current building environment, the 22-gauge corrugated tie is only legally used for wood frame commercial and residential brick veneer that has a maximum of a one-inch cavity space. You can go several stories with the anchors, but only on a stick-built building.

Precast panels that are 30,000 pounds or more typically are anchored with a combination of expansion anchors and welded attachments.
inch nut driver. This tie was first introduced to the crew I was working with in early-2014 in Las Vegas. The anchor, for the most part, went in well.

The second type of double-pintle, single-post anchor is an updated version of the commonly used and familiar Posi-Tie. The Posi-Tie is installed using the setting bit and a plastic double-pintle insulating cap is snapped or clicked into place. This Posi-Tie anchor is easier and more adaptable for other uses such as scaffolding ties and other project utility anchoring, due to the loop that is available as the base part of the anchor.

Spiral ties have been around for a while and are an option if you have a lot of veneer to anchor either temporarily or permanently. The anchor is a good choice for restoration and demolition contractors. The anchor can be installed to support an existing veneer prior to removal of veneer below the anchors, when repairing either shelf angles or masonry opening lintels.

The anchors placed above a repair can remain in place after the work is complete as they can be nearly invisible in the final work. A setting tool that increases the production of the installer has a pilot bit with a removable cover that actually hammer-drives the anchor into place. This tool allows the installer to use a single hammer drill without changing bits during the installation.

The spiral ties have different configurations. The most common includes a center core surrounded by spiral flanges. Dowel pins are used in masonry when setting coping stones, cast stone and small precast units; when applying stone patches; and for many other uses. There are a few things to consider. The dowel pin should be at least 304 stainless steel. A threaded rod offers increased surface area for setting resins and epoxies. This assists in the chemical bonding of the dowel pin to the substrate.

When patching mortars are used, the dowel pin should be bent at least 45 degrees to assist in securing the patch, and patches should cover the dowel pin by a minimum of one-quarter inch. Epoxies that allow for setting the pins should be matched to the substrate material for bonding. Epoxy odor should be evaluated if working in an occupied building, and ambient working temperatures should be considered when calculating setting times.

Anchors and reinforcing are not items we spend a lot of time considering, but they are on every project. Getting them right is extremely important. When it is up to you to choose, plan your submittals wisely. IMAS

Steven Fechino is engineering and construction manager for Mortar Net Solutions.
CONNECTORS, ANCHORS AND FASTENERS
CONNECTORS, ANCHORS AND FASTENERS