Q&A

Q. Attaching Deck Ledgers to I-Joist Cantilevers

When I-joists are cantilevered over the foundation wall rather than directly supported at the sill plate, can a deck ledger be safely attached to the engineered rim joist?

A. *Frank Woeste, P.E., professor emeritus in the Department of Biological Systems Engineering at Virginia Tech University, Blacksburg, responds:* While most I-joist companies publish fastener schedules and details for attaching deck ledgers to code-approved engineered rim boards, these details assume that the I-joists and rim boards are continuously supported and bear directly on a sill plate. But to my knowledge, no I-joist manufacturer has a detail for connecting a deck to an I-joist cantilever, for two main reasons. First, design loads from both the entire structure *and* the deck that loads the cantilever have to be accounted for when specifying I-joists and calculating their load-bearing capacity at the foundation wall. But since it's impossible to publish design tables and other design rules without knowing actual deck loads, I-joist industry literature is based on the assumption that decks (and other structures) are *not* connected to cantilevers. Second, nail and screw connections into the end grain of I-joist flanges don't provide adequate strength in this critical application.

Whenever floor framing projects beyond the sill, deck loads that would otherwise be carried by the supported rim joist and sill plate are carried instead by the fasteners that connect the rim joist to the ends of the cantilevered I-joists. Hence the loads are strictly limited by those fasteners' capacity. As the photo at left shows, even when blocking has been used to beef up that connection, end-grain fastening is a woefully inadequate method for transferring deck design loads.

Of course, the problem occurs with dimensional lumber as well, which is why the Prescriptive Residential Wood Deck Construction Guide (awc.org) prohibits attachment of decks to house overhangs and other dimensional lumber cantilevers. As with code-approved rim board and I-joists, an engineered solution would be required for a safe deck connection.

Another option in both cases would be to design the deck so that it is freestanding.

Frank Woeste

The 2-by blocking used to reinforce this cantilevered I-joist has been split by the lag screw connecting a PT deck ledger to an engineered rim joist. Under substantial load, the split blocking will tear off the bottom flange of the I-joist and cause the remaining I-joist section to fail.

Q. Glass Tile and Kerdi Membranes

The manufacturer of the glass tile my client chose for her shower recommends that it be installed with modified thinset mortar. But Schluter, maker of the Kerdi waterproofing membrane I typically use, specifies unmodified thinset mortar for both installing its membrane and setting tile. Does this mean that glass tile can't be used with Kerdi waterproofing membrane?

A. *Sean Gerolimatos, technical services manager for Schluter Systems, responds:* Glass tile has some special characteristics that make installing it over Kerdi and other types of waterproofing membranes problematic. One concern is ghosting, where a mottled — rather than uniform — bond coat appears through the translucent or transparent glass (see photo, next page). To avoid ghosting, some glass-tile manufacturers recommend skipping bonded waterproof membranes altogether and installing tiles over a substrate that can wick water away from the bond coat, such as cement backerboard or a traditional mortar bed.

Another issue is bond strength. For a variety of reasons, glass tiles are generally more difficult to bond to the substrate than ceramic or stone tiles. As a consequence, most glass-tile and setting-materials suppliers recommend

GOT A QUESTION?

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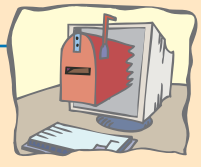

A mottled bond coat pattern may become visible through translucent or transparent glass tiles when they are installed over a waterproofing membrane.

that glass tile be installed with polymer-modified thinset mortar, which generally is stronger than unmodified thinset mortar. However, a polymer-modified thinset mortar must dry out to gain strength; sandwiching it between an impervious glass tile and a waterproof Kerdi membrane will slow down that process and may more than triple the mortar's curing time, leading to polymer leaching and unpredictable results. An unmodified thinset mortar, by contrast, cures through portland-cement hydration and actually depends on the presence of moisture to gain its strength, making it better suited for use with the Kerdi membrane.

What this means is that Schluter can only warrant the Kerdi membrane itself, which must be installed with unmodified thinset mortar. If you choose to use modified thinset mortar to set glass tile over the membrane, you do so at your own risk and should confirm with the setting-materials manufacturer that its thinset mortar will gain strength and remain stable for each type of application (for example, a shower, steam shower, or tub surround). Also, since the mortar cures more slowly with large tiles than with small ones, be sure to give the technical representative details about the size of the tile.

Finally, before installing any glass tile in a shower, confirm with the manufacturer that its product is suitable for use in wet areas and can be installed directly over a bonded waterproofing membrane.

Q. Mudsills and Out-of-Level Foundations

Recently we contracted to do a house with precast foundation walls that were set out of level — up to 3/4 inch over 30 feet, in some places. What's the best way to shim and air-seal the mudsill?

A. *Tim Uhler, a lead framer for Pioneer Builders in Port Orchard, Wash., responds:* Because out-of-level foundation walls really slow down production, I always make it a point to check new foundations before my crew begins framing; if there are problems, I immediately point them out to the foundation sub and general contractor. When the walls are more than 1/4 inch out of level, the foundation contractor typically should take care of the problem, either by grinding down the high spots or filling in the low spots.

Grinding down high spots isn't any fun, but filling in low spots isn't that difficult. One option is to use Quikrete's FastSet grout (800/282-5828, quikrete.com), a nonshrinking portland cement–based grout that can be mixed to a fluidlike consistency, making it a self-leveling product. If the foundation sub can't fix your problem, clamp 2x4s to both sides of the top of each out-of-level wall running the length of the foundation, snap level lines, and pour in the grout up to the lines. After a couple of hours, you can set your mudsills.

If the foundation is less than 1/2 inch out of level, we just set the mudsills normally — first installing a foam gasket underneath the sill — and tighten down the anchor-bolt nuts. If the low spot is longer than the rim stock we have available, we nail the rim together, set it and string the top, and then shim the rim to the line. If the low spot is localized, we just use a piece of rim long enough to span it. Then we install plastic or composite shims between the mudsill and the rim joist on the joist layout, leveling and supporting both the rim joist and floor joists at the same time. Expanding foam — from either a can or the insulation sub's spray gun — seals the cracks between the mudsill and the rim joist.

Another option is to leave out the foam gasket in the area that is out of level and shim between the mudsill and the foundation (though this may not work if the anchor bolts are set too low). Shim every 4 feet or so to level the sill and install shims under the ends of each joist. After the sill is shimmed straight, use expanding foam to seal the low spots between the concrete and the mudsill.