Wood Porch With A Tile Deck

A membrane installed between the tile and the substrate helps waterproof the assembly and keeps the tile from cracking

by John Carroll

In 2012, some long-term customers asked me if I could install a tile floor on their wood-framed porch. I've installed tile over wood-framed floors in interior wet locations such as bathroom and shower floors many times using Schluter's Kerdi waterproofing membrane. So for this project, I decided to try a similar membrane—called Ditra—from Schluter that can be used in exterior tile applications over wood substrates.

For decks built over occupied living space, Schluter's specifications require a roofing membrane to be installed on a plywood deck, followed by a drainage mat and a 1½-inch-thick reinforced mortar bed. A Schluter-Ditra membrane is then installed over the hardened mortar bed prior to tile installation. This approach is well-nigh bulletproof but would obviously be expensive to install.

Four years ago, however, when I was doing this project, Schluter also provided a less expensive detail for building over unoccupied spaces. This detail merely called for the installation of cement backerboard over the plywood, with the Schluter-Ditra membrane installed on top of the backerboard. Because the porch was over unoccupied space and was in a very sheltered location, we decided to go with this less expensive design.

In this application, the Ditra membrane serves several functions. In addition to being a waterproofing membrane, the polyethylene material acts as an "uncoupling" layer that allows for the differential movement that occurs between the plywood and the more-rigid masonry. And unlike Kerdi, Ditra has dovetail-shaped recesses that provide

PHOTOS BY BARBARA LEHENBAUER

Figure 1. To prep the porch for tile, the author first installed a new plywood subfloor, followed by cement backerboard set in unmodified thinset adhesive and fastened to the subfloor with 1½-inch roofing nails.

Figure 2. Before installing the Schluter-Ditra waterproofing membrane, the author cut and dry-fit all the pieces, marking their position on the floor with a pencil before rolling them back up.

Figure 3. Working quickly, the author spread unmodified thinset mortar to the lines drawn on the floor, combed it with a ¼-inch notched trowel, then rolled the membrane back into place.

Figure 4. Wooden hand floats were used to press the membrane into the mud, working from the inside out to make it easier to avoid bubbles in the membrane.

a mechanical bond between the thinset and the membrane and enhance the support of the tile layer.

Prepping the Floor System

The porch floor system, which was about 10 feet above a concrete patio, had been framed with treated lumber as part of a major three-story addition. With a temporary plywood deck, the porch had served for several years as a makeshift shop and staging area for finishing the rest of the addition. Built within a 10-foot-by-22-foot inset, the porch was protected by walls on three sides and covered by a roof, the eaves of which extended about a foot beyond the single open side of the deck. Very little rain fell on the deck in this sheltered location.

The Schluter specs required that the floor be sloped at least 1.5 degrees—which works out to 5/16 inch per foot—and that deflection be limited to 1/360 of the span. The floor system of treated 2x10 southern-yellow-pine joists installed 16 inches on-center met both of these requirements.

Subfloor. The manufacturer's specifications called for "exterior grade" sub-floor panels, but I couldn't find that grade anywhere. Though several suppliers suggested using treated plywood instead, I decided to check with a Schluter technical representative. While treated plywood won't rot, it is dimensionally unstable, which could cause problems with the materials above. The tech rep assured me that ¾-inch APA-rated Georgia-Pacific Sturd-I-Floor plywood, which is widely available and far more dimensionally stable than treated plywood, would work fine.

Figure 5. After embedding the first half of each strip of membrane in the thinset, the author rolled back the second half and repeated the process.

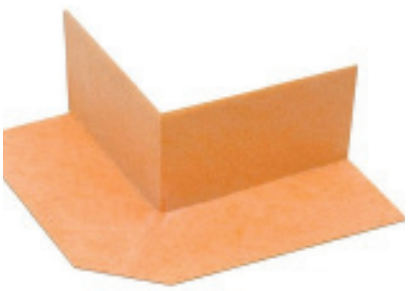

Figure 6. Membrane seams were taped with 5-inch Schluter Kerdi-Band embedded in unmodified thinset, in a process much like taping drywall (above left). Schluter Kerdi-Kereck preformed outside corners (above right) were used to flash the post-to-membrane intersection.

Figure 7. To finish the open edge of the porch, the author installed Schluter's Rondec-Step metal trim, first spreading a bed of thinset over the membrane (above left). After pressing the trim into place in the mud (above right), he placed a concrete block at each end to hold it in place while the mud set up.

After removing the old, temporary plywood, I attached the new tongue-and-groove sheathing to the framing using 2-inch deck screws and construction adhesive. When I'm applying adhesive, I always place just enough for one sheet at a time to prevent the adhesive from drying and "skinning" over before I'm able to put the sheet in place. I'm also careful to lower the sheet into position without sliding it over the top face of the joist—sliding the panels often knocks most of the adhesive off the joists.

I installed the plywood with a 1/8-inch gap between the ends of the panels, placing the screws 6 inches apart at the ends and 8 inches apart in the field. Around the perimeter of the porch, I left a 3/4-inch gap between the plywood deck and the wall frames.

Exterior-rated cement backerboard. The Schluter specs called for an "exterior-rated cement backerboard." The backerboard I usually use, PermaBase, met the requirements. As per the specifications, I offset the seams of the backerboard from the joists and from the seams in the plywood below. Using a 1/4-inch square-notched trowel, I spread unmodified (that is, without a latex additive) thinset on the plywood (**Figure 1**), then set the backerboard panel on the furrowed mud and attached it to the plywood with 1 1/2-inch roofing nails.

I placed the nails about 8 inches apart and—following the backerboard manufacturer's advice—avoided nailing into the underlying joists (the objective being, I think, to allow the cement-board layer to float slightly rather than be rigidly attached to the frame, which might move in response to changes in humidity).

As with the plywood, I did not butt the backerboard panels tightly together; instead, I left a 1/4-inch gap between all panel edges. I also maintained a 3/4-inch gap between the edge of the panels and the three walls that formed the inside perimeter of the porch. After I installed all the panels, I filled the gaps between them

Figure 8. The author installed the porcelain tile in a pinwheel pattern, which required two different sizes of square tiles. Usually (but not always), the dimensions of one tile in this pattern are twice the dimensions of the other. In this case, the large tile was 11¾ inches square and the small tile was 5¾ inches square. With a ¼-inch mortar joint, the size of the increments for the layout ended up an even 12 inches and 6 inches.

with more thinset and applied alkali-resistant mesh tape, which I embedded in the thinset. Taping these joints is similar to taping the joints between drywall panels and, in fact, I used my drywall tools for this job.

Schluter-Ditra Membrane

To adhere the Ditra membrane to the backerboard, I used unmodified thinset mortar applied with a ¼-inch square-notched trowel. The membrane is 1 meter (39 inches) wide, and to avoid unnecessary seams, I installed it in strips that were the full length of the porch (21 feet). This made for fairly large sheets of membrane.

To keep the thinset from drying before I was able to embed the membrane in it, I prepared everything before I mixed it up. First, I rolled out and dry-fit the strip (**Figure 2**). Before rolling the cut piece back up, I also marked along the edge so that I'd know where to stop the thinset as I spread it over the backerboard. Being careful not to move the membrane, I set concrete blocks on top of half of it to anchor it in position. Then I rolled the other half up.

I mixed up half of a 50-pound bag of thinset, which was just enough to install the rolled-up half of the strip. Working quickly, I spread the mortar to the line I had drawn and combed it with a notched trowel (**Figure 3**). After getting the mortar evenly spread, I rolled the membrane back over it. Starting in the middle of the section, I used two hand floats to press the membrane into the mud (**Figure 4**). Doing this from the inside out makes it easier to avoid bubbles in the membrane. After embedding the first half of the strip, I rolled back the second half and repeated the process (**Figure 5**).

After I finished installing the membrane, there were several details to attend to before I could begin laying tile on it. First, I had to tape the seams with 5-inch Schluter Kerdi-Band embedded in unmodified thinset (**Figure 6**). Made of the same material as Kerdi membrane, Kerdi-Band comes in rolls up to 33 feet long. As with the backerboard, the process of taping these seams is a lot like that of taping drywall seams.

To flash the intersection of the floor and the walls, I used 10-inch-wide strips of Kerdi-Band. First, I applied a swath of

Figure 9. The author set the tile in unmodified thinset applied with a 1/2-inch-by-1/2-inch notched trowel.

Figure 10. To ensure enough coverage over the waffled surface of the Schluter-Ditra membrane, the author also back-buttered every tile.

thinset on the perimeter of the floor and at the base of the wall. Then I folded the Kerdi-Band in half along its length and embedded it in the thinset.

I also used a Kerdi product to flash the most vulnerable spot on this deck for water intrusion—the base of the single post along the open side of the porch. Water that happens to blow into the area above the post flows down the surface of the tile and into the post, so it was imperative to make the flashing there watertight. To achieve this goal, I used four preformed Kerdi outside corners. As with the wall flashing, I embedded these seamless corners in thinset spread over the Schluter-Ditra membrane and up the side of the post. I later covered the vertical leg of the flashing with the cladding I used to finish the post.

The final task to get the membrane ready for the tile was to install a metal edge along the open side of the porch. Schluter Systems offers several profiles for the outside edge of balconies, but the one I chose—called the Schluter Rondec-Step profile—is usually used to finish the nosing on tiled steps. I picked this one because it wrapped down over the exposed edges of the plywood, the backerboard, and the membrane, and because it did not project too far beyond the outside edge of the porch, which worked well with the post.

To install the metal trim, I spread a swath of thinset and pressed the piece down into the mud (**Figure 7**). To hold it in place while the mud set up, I placed a concrete block at each end.

Finally, the Tile

The owners chose a porcelain tile that they wanted installed in a pinwheel pattern. This pattern requires two different sizes of square tiles; usually (but not always) the sides of one tile are twice the length of the other's. In this case, the large tile was 11 3/4 inches square and the small tile was 5 3/4 inches square. With a 1/4-inch mortar joint, the size of the increments for the layout ended up an even 12 inches and 6 inches (**Figure 8**).

Layout. The first step in laying out the pinwheel pattern was to establish a baseline along the bottom, open side of the porch. I marked the baseline at a distance equal to one large tile (11 3/4 inches) up from the metal edge I'd set at the bottom of the porch.

Next, I found the optimal starting point along the line. This point centers the layout between the side walls and ensures that the cut tiles along the walls are as big as possible. To accomplish this goal, I needed to create a reference at either the center point or a distance away from that center point that equaled half the width of the layout increment. Because the smaller tile was 6 inches wide, the layout had to be executed in 6-inch increments. So, if I needed to shift the reference point over, the amount of that shift would be 3 inches.

The distance between the two finished walls was 262 inches. Measured from the finished faces of the walls, the bottoms of which were cut off a few inches above the floor, my layout on both sides was 3/4 inch in from the sheathed walls of the frame. Following this layout maintained a healthy expansion joint around the perimeter of the tile floor. After finishing the tile work, we covered the gap around the floor's perimeter by building out the wall with a filler, and then we installed a baseboard. To allow for movement, we held both up slightly above the tile.

To find the center point, I divided the overall length (262 inches) in half and marked the resulting 131 inches in from one wall. To double-check my layout, I measured the distance from the opposite wall to verify that it was also 131 inches. Next, I divided the 131-inch layout by 6 inches to see whether to keep the reference point on the center or to move it over 3 inches. This simple computation revealed that there would be 21.83 six-inch increments in that distance.

Figure 11. After the tile was set and the thinset had cured, sanded grout was used to fill the joints.

Figure 12. Even after four years of use, the porch floor looks as good as the day the tile was installed (top), with no signs of leakage under the porch (above).

Because .83 is greater than one half, I left the reference point in the center.

Once the reference point was established, I had the option of moving it over in 6-inch increments and using any of those points as a guide to start the tile work. In this case, I moved over 20 increments—or 120 inches—to the right. After marking that starting point on the baseline, I marked a line running perpendicular to the baseline from that point. Next, I marked a second perpendicular line, 6 inches to the right of the first one.

Using the baseline and those two perpendicular lines—which I usually call vertical lines—as guides, I began running the tiles in roughly a diagonal pattern. The first tile I installed was a large tile. I cut the right side at 11 inches and installed the tile so that the left side was even with the first vertical line, the top was even with the baseline, and the bottom was against the metal nosing. For the second tile, I cut a large tile at 5¾ inches and installed it to the left of the first tile, with the long side against the metal nosing.

Next, I installed three 6-inch tiles—each of the first two to the left of a large tile. The third small tile, cut at 5 inches, went above the first large tile and between the second vertical line and the wall. On the next course, I installed five large tiles, cutting the top and bottom tiles to maintain the pattern.

Installation. Then I was off to the races. Alternating between a course of large tiles and a course of small tiles, I gradually built a large, stair-step-shaped pattern that ran the full width of the porch. To keep the pattern straight and orderly, I used ¼-inch tile spacers throughout.

In keeping with the manufacturer's recommendations, I set the tile in unmodified thinset mortar (**Figure 9**). The tile manufacturer recommended a ¼-inch-by-¼-inch notched trowel, but I found that this didn't provide enough coverage over the waffled surface of the Schluter-Ditra membrane. After some experimentation, I ended up using a ½-inch-by-½-inch notched trowel, and I also back-buttered every tile (**Figure 10**). After setting all the tile, I grouted the joints with a sanded grout (**Figure 11**).

Follow-up

The porch floor has been in use now for four years and looks as good today as the day I finished it, with no sign of water leakage anywhere underneath the deck (**Figure 12**). For this project, the Schluter specifications I followed have worked exceedingly well, but I've since learned that this detail is no longer included in Schluter's literature. A technical representative told me that the company dropped these specs because some installers experienced leaks, but in his opinion, the cause of the leaks was a failure by the installers to carefully execute vital flashing details.

Would I use this system again? I would—but only if the deck had a roof over it. If I were tiling a deck that was open to the weather, I would follow the more conservative (and more expensive) specifications, which are now the only ones that Schluter Systems provides for tiling over a wood-framed deck. ❖

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