

Large format tile installations: background, surface prep, adhesives, installation, grouting, and curing

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January 21, 2009

Art & Decorative Tile Techniques

Technology has allowed porcelain tile to grow from its humble origins as 1- or 2-inch mosaics to tiles exceeding 24- and 36-inches. Even larger tiles are available and on the drawing board from many tile companies. Large tiles are great because they reduce grout joints and provide a look that is incomparable, but not all large format tiles are alike, with some being so deformed as to render them almost impossible to install without excessive lippage.



Photo 1: With a single tile from front to back, and a grout joint only every two feet, 24-inch porcelain tiles are ideal for a low-maintenance, high performance countertop.

Unlike smaller tiles that can more easily conform to a less-than-smooth surface, large format tiles require a very flat surface for a smooth finish, and as the tile size increases, so, too, must the degree of flatness.

For example, the industry standard of 1/4- inch in 10-feet is fine for 4-, 6-, or 8-inch tiles, but for 10- to 14-inch tiles, the standard should be improved to 1/8-inch in 10-feet.

For tiles 16- to 24-inches, the setting bed surface should be flat, level, plumb, and smooth to within 1/16-inch in 10-feet. As a matter of policy, I generally specify a self-leveling underlayment for all floors finished with tiles larger than 14-inches.

In addition to a flatter surface, large format tiles also require a thicker layer of adhesive for full and complete bonding.

Layout, Ordering, and Waste

All tile installations need materials lists that include sealer, sealant, grout, adhesive, membrane systems, backer boards, and tiles. Ordering tiles less than 10-inches is a relatively simple process because the small tile modules easily adapt to varying sizes. For example, with one-inch tiles, it is not difficult to have full-tile-only installations, but unless a structure has been designed and sized for full-tile units, achieving full-tile-only installations with large format tiles may be difficult or impossible. Time spent on the drawing board is essential for optimizing the layout of large format tiles. The countertop supporting the 24-inch porcelain tiles shown in Photo 1 was designed so that full tiles could be paired with companion cove tiles.

Breakage of large format tiles, during shipping or cutting, can have a significant effect on tile stocks. Unlike smaller tiles, whose per-unit cost is relatively small, the per-unit cost of large format tiles can be significant, and old rules of thumb such as ordering a blanket 5- or 10-percent extra don't work very well. I inspect all tiles at the showroom, distributor, or jobsite, and accept only whole, unbroken tiles. I work carefully when cutting and handling, and depending on the size of the installation, opt for a rather small number of extra tiles. I try to purchase enough full boxes of tile to cover a specific area, using any leftovers to fill in for any tile broken during installation. If I have to re-order, purchasing stock with

the original lot numbers is critical to color matching.

Large format tiles are able to distribute compressive loads better than smaller tiles, but they still require the same stable base as other ceramic tiles. The L/360 minimum deflection standard for ceramic tiles can always be upgraded to L/480, L/720, or even higher, to match increased load-carrying capacity, or meet higher customer expectations for a solid, low deflection floor. Since backer boards do not increase structural strength, it is especially important to ensure that both whole-floor (uniform deflection) and between-joist deflection (concentrated deflection) meet the desired standard. Deflection should not be a problem on concrete slab-on-grade installations, but on upper floor or suspended installations, deflection is such that a crack isolation membrane system is usually required.



Photo 2: The author

spreads medium bed thinset mortar with a ¾-inch U-notch trowel.

On wood floor systems, my strategy is simple: I prefer to visually inspect the structural under-pinnings of any wood floor system, to look for joist size, joist spacing, pier spacing and other details, and make corrections or shim as needed to provide solid support to the subflooring. I avoid the industry minimums whenever possible, and prefer to specify and install ¾-inch exterior-grade plywood subflooring, and follow this layer with another layer of ¾-inch plywood – oriented perpendicular to the subfloor – as the underlayment.



Photo 3: Each tile is

back buttered with a ¾-inch U-notch trowel

To maximize the strength of this two-layer plywood combination, I use a Type III waterproof glue, and secure the boards with flooring screws set every six-inches. To reduce an installation's profile, I may use 5/8-inch ply for installations that do not require maximum performance, but never use plywood thinner than 5/8-inch (Nom.).

On installations where a self-leveling underlayment (SLU) is desired, a perimeter barrier of 1/4-inch thick foam provides the required movement joint space that is necessary for such installations to endure – especially when large format tiles are installed. A perimeter movement joint is required for all tile installations regardless of size, location, type of installation, or materials used.

If a membrane system is required for sound reduction, crack isolation, or waterproofing, special care must be used to ensure a smooth, flat finish wherever the membrane sheet or reinforcing fabric overlaps.

Adhesives

Only medium-bed, latex, or 100% solids epoxy thinset mortars should be considered for adhering large format porcelain tiles. Regular, unmodified thinset mortars develop very low strength values when cured to the thickness required for some large format tiles. Latex mortars offer potentially higher strength over unmodified, but they may also require a longer curing time, especially when covered by the large format canopy, and when used at the increased thickness required for larger tiles.

Organic mastics, in my opinion, are totally inappropriate for large format tiles. Under large format tiles, large amounts of organic mastic may remain soft and uncured for months or years, leading to an eventual loss of compressive strength and subsequent cracking, disbonding, etc. There are also adhesion problems with porcelain tiles and mastic.

In addition to the question of quality is quantity: large format tiles eat up a lot of thinset mortar. In Photo 2, I am using a deep, 3/4-inch U-notch trowel to spread a layer of thinset over a shower wall. In Photo 3, I am using the same trowel to back-butter the back of the tile, using the industry recommended method of keying the adhesive into the back of the tile with the smooth edge of the trowel, and gauging a uniform amount with the trowel's notched edge. Notice that the adhesive ridges of the tile's back are aligned with the adhesive ridges spread on the wall. As a tile is shimmed away from a wall with thinset, its resistance to sagging decreases; consequently, firm support is required until the adhesive sets up firm (Photo 4).

Installation

Fundamentally, there is no difference between the installation of large and small tiles. Each tile needs to be fully supported in a bed of adhesive, aligned with its neighbors, and finished with grout or movement joints, as needed. With large format tiles, this can be a challenge, but like any other tiles, it helps to have a level foundation.



Photo 4: Deflection-

free spacers, designed for framing, are used to temporarily hold the tiles in place until the thinset hardens.

For these 24-inch porcelain tiles, the foundation is a row of cove tiles. With these trim tiles aligned and installed, I can concentrate on aligning the faces of the tiles into a single, plumb plane. Air pockets and voids within the layer of thinset mortar reduce bond and compressive strengths, and invite the intrusion of moisture, mold, and mildew.

To ensure each tile is in-plane with no adhesive voids, I apply thinset to the wall, back-butter and install the tile, adjust it for plumb and plane, and then remove it to check the adhesive “signature” on the back of the tile. Normally, a flick of the trowel is all it takes to remove a small tile, but to remove this large format tile — because its broad expanse presents a very powerful adhesive grip — I use a wooden wedge and tension with a margin trowel to gradually pry the tile away from the grip of the wall (Photo 5).



Photo 5:

To reduce stress on the tile, the author uses a wood wedge and tension provided by the margin trowel to remove the tile for inspection.

A quick read of the adhesive ridges provides the necessary clues: ridges that are not completely flattened require additional mortar. I add a liberal amount of thinset, usually enough to assure some squeeze-out, then replace, and realign the tile. After alignment, the tile face is cleaned, and excess thinset removed from around the tile's edges (Photo 6). This process is repeated until each wall is finished. Spacers are a requirement for wall installations, but normal tile spacers are too soft to support the weight of a large format tile; instead, I position spacers, normally used for wood framing, that won't deflect under the weight.

Large format tiles are appropriate for any location. I especially like tiling countertops with 24-inch tiles backed with cove tiles at the backsplash. Photo 7 shows how excess thinset mortar is removed from the space occupied by the cove tile. After the field tiles are installed, I install the single-row cove tile backsplash, then the V-cap tiles, using a bridge made from straightedges to help align and support these trims.

Because of the unusually thick layer of thinset mortar, and the fact that large format tiles slow down the evaporation of moisture from the adhesive layer, I give the tiles at least 48 hours to rest and harden before grouting (Photo 8). Since there are so few grout joints, this portion of the installation should be relatively simple. The grout should cure at least 72 hours before filling the movement joints with sealant or caulk.



Photo 6: To reduce

squeeze-out through the joints, excess thinset is removed from around the tile.

Large format tiles present a clean, modern look with built-in low maintenance. Just keep in mind that large format tiles require extra materials and labor to install.

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Photo 7: To clean out

the space occupied by the cove tile, the author uses a narrow margin trowel to remove the excess thinset mortar.



Photo 8: Because there are so

few joints to fill, grouting large format tiles takes less time than smaller tiles.