Tile/Stone Talk

Successful Large Format Tile Installations

By Gregory Mowat

In the 1970s into the 1980s, the tile trade was seemingly simple: A-137.1-1980 American National Standard Specifications For Ceramic Tile (17 pages) included standards for unglazed ceramic mosaic tiles; unglazed quarry tile; unglazed paver tile; glazed wall tile, glazed ceramic mosaic tile; glazed quarry tile; glazed paver tile; decorative thin wall tile; and special purpose tile.

Later, ANSI A137.1-1988 was updated with the same number of pages. In 2008, ANSI A137.1-2008 was updated with 33 pages, doubling in size from 1988, not including inserts and inside and outside of front and back covers. "Large Format Tile" was not defined in the ANSI A137.1 referenced documents.

Larger size tiles visually change the perception of a room's size, offer an open look, and promote easier maintenance with a lesser volume of grout to clean.

Similarly, the ANSI A108-1976 American National Standard Specifications for the Installation of Ceramic Tile publication was 40 pages and included five assembly methods for installation including A108.1, A108.4, A108.5, A108.6 and A108.7, as well as five material specifications A118.1, A118.2, A118.3, A118.4, and A136.1. The current ANSI A108 is comprised of 151 pages, has 16 installation methods, and 12 material specifications.

In 1970, the Tile Council of America published the 23-page *Handbook for Ceramic Tile Installation* with 36 assembly methods. The 2011 and 2012 Tile Council of North America (TCNA) *Handbook for Ceramic, Glass and Stone Tile Installation* publication is now over 300 pages, including inserts. The inclusions of assembly methods for glass tiles and stone tiles has eliminated many previous ambiguities, and made the handbook an awesome tool for the entire industry.

In the 1970s and early 1980s, 8″x8″ nominal size and 12″x12″ nominal sizes were understood to be large format tiles. During the 1980s, the European manufacturers were introducing larger tile sizes, including a 4′x4′ (Buchtal) size.

The most common failure is not achieving complete bedding of the large format tile with the proper adhesive. Spot setting is not recommended for installation of large format tiles.

Porcelain tiles came on the market as both import and domestic products. Through innovative machinery, the world market of tile was developing larger sizes of tile. Larger size tiles visually change the perception of a room's size, offer an open look, and promote easier maintenance with a lesser volume of grout to clean.

As the world market was developing larger size tiles, the adhesive manufacturers were continuously working on improving formulas and setting materials, like medium bed mortars, lightweight mortars,

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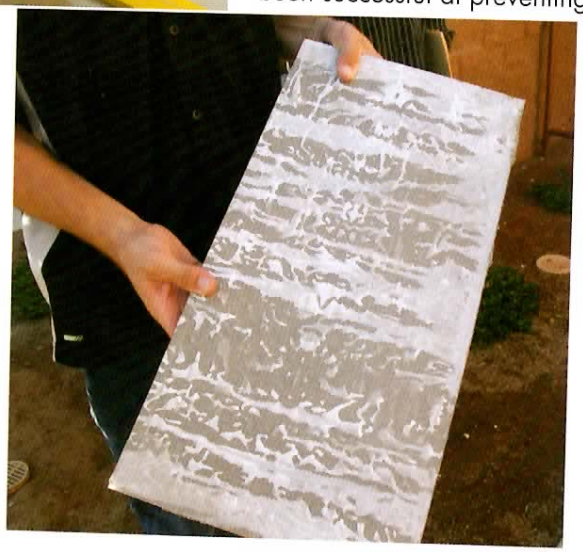
rapid-setting mortars, along with developments in waterproofing membranes, crack isolation membranes, sound reducing mats, radiant heat assemblies, self-leveling underlayments, and improved grout technology. Constant education has been provided by adhesive manufacturers in the form of articles and seminars, including educational sessions at Surfaces/StonExpo, Coverings, and Total Solutions. The National Tile Contractors Association (NTCA) and Marble Institute of America (MIA) have also presented regional and local seminars regarding large format tiles.

During 2009, with input from adhesive manufacturer's representatives and tile manufacturer's representatives, definitions were finally developed and adopted for medium bed mortars and large format tiles. In the 2011, and subsequently in the 2012 TCNA Handbook, "Setting Material Selection Guide," the following definition is included: "Medium bed mortars are designed to minimize slump and facilitate thicker bond coats, as compared with non-medium bed mortars.

Successful installation of large format tiles includes: using the appropriate sized notched trowel; burning of the adhesive into the substrate; and backbuttering of the tile with the adhesive.



These characteristics make them useful for setting heavy tiles and/or ungauged thickness and for setting tiles where at least one side greater than 15" where the final embedded thickness of the mortar will exceed 3/16" under the tile. They are intended to be used as bond coats 3/16"- to 3/4"-thick after the tile is embedded; they are designed as direct bond adhesives and are not intended to be used in truing or leveling underlying substrates or the work of others.

Medium-bed mortars are defined as such by their manufacturers. These mortars do not have unique ANSI or ISO standards to characterize them."

Investigating tile, glass and stone tile installations failures reminds us to continue to educate, and/or reaffirm to the tile contractors the steps for successful installations with large format tile installations.

Forensic investigations have found problems when investigating indent fractured floor tiles which were caused by using thinset mortars thicker than 3/8" and or mortars thicker than 3/4" without wire reinforcing. Due to the shrinkage of the thinset mortar or shrinkage of the mortar, cracks would transfer up through the tile and cause the tile to lose bond or indent, followed in time by the fracturing/cracking of the tile. The most common installation failure has occurred over unleveled floors due to the thickness of the mortars.

Installation of a waterproof membrane meeting ANSI A118.10, a crack isolation membrane meeting ANSI A118.12, a radiant heat assembly, a sound control mats, and tile, should all be installed after the floor is level (trued, corrected, joining) to 1/8" in 10' for large format tile installation.

Bonding large format tiles directly to concrete slabs on-grade can be performed successfully with the understanding that when the concrete slab cracks and fractures during the curing process or from improper (using too much water, of lack of proper reinforcing) installation of the concrete, any large format tile installed directly above the crack/fracture in the concrete slab, will result in cracked/fractured tiles.

Reducing tile cracking failures by installation of ANSI A118.12 crack isolation membranes and/or installation of A118.10 waterproof membranes have been successful at preventing minor shrinkage cracking of the concrete slab from transferring up through the tile finish.

As stone tiles are also available in large format sizes, the MIA recommends all stone tile installations over concrete slab installations separate the stone tile from the concrete slab with a waterproof membrane to reduce moisture problems for non-sensitive stone tile.

Sensitive stone tiles include, but are not limited to: resin-backed stone tiles; agglomerate tiles; cultured marble tiles; white onyx tile; jade tile; red, black, and green marble tiles; green granite tiles; and serpentine tiles. For each of the sensitive stone tiles, please consult with your preferred adhesive manufacturer for the proper or affirmed setting materials.

For installations over wood floors, consult the TCNA Handbook for acceptable assemblies that meet the minimum deflection requirements. Our forensic investi-

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gations of large format tiles, including stone tiles, have found deficiencies which contribute to failures. The most common failure is not achieving complete bedding of the large format tile with the proper adhesive. Spot setting is not recommended for installation of large format tiles.

Successful installation of large format tiles includes: using the appropriate sized notched trowel; burning of the adhesive into the substrate; backbuttering of the tile with the adhesive; and combing the bonding mortar with parallel ridges into the substrate followed by pressing the large format tile perpendicular to the comb marks.

In essence, know the required cure time for the setting material prior to grouting, coordinate for location of all expansion joints, and install grout following the grout manufacturer's recommendations.

If in doubt, read the ANSI instructions and the label on the setting materials bag. Backbuttering may be omitted only when not required by the adhesive manufacturer. This may occur when the adhesive formulation has nanostructures or other technological advances. **PROINSTALLER**

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