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Conspectus's Tech Tips received the national Communications Award from the Construction Specifications Institute.

**ABSTRACT:**
The publication of 2011 versions of the TCNA Handbook and ANSI A108, A118, and A136 have addressed the challenges in large format tile installations. This Tech Tips will explore changes in the new TCNA Handbook and make a comparison to our 2009 Tech Tips on the same subject.

**FILING:**
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C3020 - Floor Finishes

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**KEYWORDS:**
Stone, tile, large format, mortar, grout, medium bed mortar, tolerances

**REFERENCES:**
ACI 318 - Building Code Requirements for Structural Concrete and Commentary
ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
ANSI A108 - For The Installation of Ceramic Tile
ANSI A118- For Dry Set Portland Cement Mortar.
ANSI A - For Organic Adhesives for Installation of Ceramic Tile.
ISO 13007 - Standards for Adhesives and Grouts.
TCNA - Tile Council of North America Handbook for Ceramic Tile Installation.
International Residential Code (IRC)
International Building Code (IBC)

# 2011 Large Format Tile Revisited

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## Industry Solutions

In 2009 Tech Tips Vol. 09.04.01, "Large Format Tile Installations" was published. It discussed potential installation problems with large format (LF) tile and suggested solutions. At the time there were gaping voids in related industry standards. Here is a brief exploration of the TCNA Handbook 2011 updates and a comparison to the 2009 Tech Tips.

## What's New

A review of Handbook reveals changes that address conditions particular to LF tile installations. The Handbook and other industry publications reiterate points made in the 2009 Tech Tips. (The reasons are discussed below.)
The Handbook has many revisions that address other, general areas of concern. For instance, floor installations have been divided between "on ground" and "above ground" categories, with guidelines for additional design considerations for above ground systems, such as vibration, deflection, and setting material deformation. Updates include expanded descriptions on recommended uses for each installation method.
Also new:

1. Standards on stone selection and installation have been added.
2. Updates include ANSI and ISO grout and mortar specifications. ISO designations provide more exacting product descriptions, and will be more prominent in the future.
3. Minimum width for grout joints and joint sizing.
4. Substrate preparation by other trades.
5. Service rating for each installation method.
6. Environmental Classifications take end use into consideration for service rating and suitability.
7. Typical weight of each installed system.
8. Limitations and membrane options are included for each installation method.
9. A guide to LEED rating systems and considerations.
10. A Specification writing guide.
11. The inclusion of medium-bed and other specialty mortars.
12. Options in setting methods for large format tile.
13. Specifications for tighter tolerance for floor flatness for particular installations.

## What's Different

What is different in the new Handbook is emphasis. Inclusion of both ANSI and ISO mortar and grout specifications, and guidance throughout the Handbook, places a very high value on selecting the MOST APPROPRIATE materials for each installation.
The discussion on substrate preparation, optional membranes, and limitations highlights the need to properly and thoroughly design and specify each system, rather than leave some aspects to the installer. Guides for setting materials, grouts, backer boards, membranes, and other accessories help designers to carefully consider every component of each system.

## Focus Areas

Mortars:
As recommended in our 2009 Tech Tips, the use of medium bed mortar is highly recommended in the Handbook for LF tile installations. The differences in the plane of large tiles can leave significant gaps between the back of the tile and the setting

mortar.
The use of a deeper bed of mortar with controlled shrinkage and anti-slump technologies assures a more complete bedding of each tile and minimizes cracking from traffic loads. Mortar technology has advanced, with many enhanced choices, including complete contact, lightweight, crack prevention, and rapid setting mortars. The Handbook discusses these products and provides recommendations on their use.
Originally mortars were enhanced with additives, creating a two part system which normally included a portland cement mortar and a liquid latex (used in place of water) the combination of which resulted in increased strength, workability, and bonding. However, advancements in the evolution of mortar have occurred almost exclusively in the development of single component mortars. These products are a single bag mix that reduces the possibilities of inconsistent batches and ensures more uniform properties of the mortar. At this time medium bed mortars do not have specific ANSI and ISO designations. These products exhibit anti-slump and low shrinkage properties and should be selected with the assistance of product reps.
Floor Flatness:
Our 2009 Tech Tips emphasized the importance of a flat substrate, suggesting variations of 1/8 inch in ten feet rather than the standard 1/4 inch in 10 feet TCNA recommendation at the time.
This tightened tolerance is required by the Handbook for LF tile set without a thick mortar bed. An example is method F115A-11, that requires 1/8 inch in 10 feet plus 1/16 inch in 24 inches as the maximum concrete substrate surface tolerance for LF tile. While the TCNA Handbook still calls out floor flatness using a straightedge method, concrete floor flatness is increasingly described using the Face Floor Profile Numbering System or "FF Numbers" (see Tech Tips "Floor Slab Flatness & Levelness". (Vol 10.07.01). Large Format Tile generally requires FF 40 to comply with the Handbook tolerances and to minimize potential problems. Be sure to coordinate with the structural engineer to ensure the proper flatness is specified for concrete slabs for areas receiving LF tile floor finishes.
Tolerances of Tile Products:
In our 2009 Tech Tips we defined large format tile as tiles over 12 inches square. Updated TCNA standards has designated LF tile as "tile having one side of 15 inches or greater". This allows for oddly shaped units. However, TCNA standards identify 8 inch square tiles as the maximum size before the challenges of LF tile can become problematic. Any installation involving tile over 8 inches square should take into consideration the difficulties of LF tile installation,
Other manufacturing advances have occurred in the tolerances of the tile itself. Manufacturing techniques and methods of "rectification", or machining of tiles to reduce warpage, have provided more consistent tile products.
Workmanship:
As in any art or trade, workmanship is of paramount importance. The best design can ultimately fail due to poor workmanship. In emphasizing the responsibility of the designer to consider all aspects of each floor system and clearly specify each component, the Handbook minimizes contractor improvisation.

## Our Scorecard

Our 2009 Tech Tips on LF tile installations compares very positively with new industry guidelines, and as much as we would love to take credit for the knowledge, there is a simple reason that our preemptive publication was so consistent with standards published two years later. That reason is because the Tech Tips was developed through discussions with product representatives. Reps deal with the successes and failures in systems where their products are used, and must often come up with solutions that may be outside the industry "norm". Many reps ultimately help develop new standards as well. In 2009, collaboration with these folks helped us develop a Tech Tips that was literally ahead of it's time.
A good product rep who is not just "selling", but is interested in providing service and being helpful, is **your very best resource** in developing floor systems that will appear beautiful and perform perfectly for extended lifetimes. Remember to consult them on every aspect of each floor system for maximum quality and performance.

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