

INSTALLATION CHALLENGES AND SOLUTIONS: LARGE FORMAT PORCELAIN TILE AT AUTO DEALERSHIPS

Note: The recommendations within this document are common industry standards and Custom Building Products' requirements. Additional limitations or specific recommendations may be listed within the Technical Data Sheets of products used in an installation assembly. When those instructions conflict with this document, the most stringent requirements and limitations shall apply.*

Large format Porcelain tiles are the finish of choice under the latest models of cars and trucks in an auto dealership! Not only do they enhance the design of project, they're durable for the types of traffic in the showroom. Traffic includes cars and trucks placed on the tiles, indoor-outdoor customer foot traffic in all types of weather conditions, and foot traffic with oils and dirt from service areas that would ruin other types of flooring.

In addition to the cosmetic concerns of auto dealership flooring, to specify and install a long lasting and trouble-free assembly, design considerations must address potential site conditions, typical concrete slab behavior and building usage for product and design choices. Please consider some of the installation challenges and solutions below.



Installation Challenges

New concrete slabs cure for over an extended period (~41 days/inch @75°F/23.88°C) and through most of the construction, climate controls are not in place. At the time of the flooring installation, the slab will likely have elevated moisture levels that could produce high alkalinity and expansive mineral growth (efflorescence). These conditions can affect the concrete surface and products bonding to the slab, or at the least, lead to grout discoloration. While adhesive mortars and self-leveling products allow passage of moisture through them, large tile formats can trap moisture for an extended period. While most crack isolation and waterproofing membranes are suitable at 85% RH levels, some can be affected as these levels increase due to the large format tiles and small grout joints. When curing compounds are used to retain moisture in the slab, they may create a barrier for adhesives even if considered dissipating compounds. Mechanical removal will likely be required.

Concrete can deform during the curing period and curl upward at joints as it shrinks, so slab flatness at the time of placement may be very different when the flooring is scheduled. Some surface preparation is to be expected. (Note [Division 3 versus Division 9 Floor Flatness Tolerances Position Statement #6](#)) Large format tiles require flatter planes to avoid lippage (height variation between tiles.) The American National Standards Institute (ANSI) designates 1/8" in 10' and no more than 1/32" per ft as the minimum flatness requirement. Beware of the most damaging effect of slab curling and relaxation (as shown). Relaxation occurs when a tile floor has been installed before moisture levels equilibrate within the slab. When the slab returns to a flat state, the assembly experiences severe compression. Slab shrinkage can also lead to cracks. At times, these cracks can reflect through installed tiles. Control joints placed in the concrete to relieve the shrinkage can also reflect cracks through tiles. Tile pattern layout and movement joint details should be addressed to accommodate these joints or use products to help isolate the joint from affecting the tile.



Vehicular traffic is not a concern for certified Porcelain tiles when installed correctly with a suitable mortar. However, when placing cars over the tile, it's very common for employees to turn wheels either to fit into tight spaces or slant them to create a "sporty" effect while the cars are not moving. Torque stress of this kind may affect tile bonds, so installation material manufacturer's specifications recommend membranes with extra heavy service ratings and adequate movement joints.

Most auto showrooms exterior walls are designed with ceiling to floor glass walls to display the new vehicles. This increased UV exposure leads to greater thermal expansion of the tile assembly; therefore, the Tile Council of North America Handbook recommends movement joint placement equal to an exterior application to manage these effects. Refer to the handbook's section EJ171 Movement Joint Guidelines for Ceramic, Glass and Stone for calculating movement joint frequency and dimensions. Accommodating thermal growth using a membrane is also recommended.

An ideal Porcelain tile for customer foot traffic easily meets the ANSI 326.3 requirements for Dynamic Coefficient of Friction (DCOF) to reduce the possibility of slip and fall accidents. As tile manufacturers design tile surfaces to have more friction, be aware that these profiled or micro-pored products can also trap fine particles of cement and pigments from grouts. These conditions more likely occur with unglazed Porcelain and polished Porcelain tiles and may require complete tile replacement.

Maintaining a clean tiled floor appearance is essential to the reputation of the dealership. With indoor-outdoor traffic and service bay foot traffic, grouts can be permanently discolored. Grout stain resistance varies greatly and although cement grout is not required to be sealed, it would benefit from the use of a quality sealer treatment. Other types of grout are available that are highly stain resistant for consideration.

Solutions

All of the above "challenges" should be considered and detailed in the project specification. As precautions for addressing concrete slab deformation, a well-placed vapor retarder, proper irrigation and drainage around the building should be well detailed. Refraining from using concrete curing compounds or confirming suitability approval from the compound and installation material manufacturers before placement will prevent last minute warranty disputes and unplanned costs to obtain an absorptive compatible surface for adhering tile adhesives or membranes.

To address potential excessive alkalinity or high moisture vapor emissions, moisture testing per ASTM F2170 and ASTM F1869 should be conducted before the flooring installation. All assembly products must be suitable for the project conditions or treatments such as a moisture mitigation membrane should be specified. *See *ESL System option below*.

Concrete flatness is critical to provide a safe tiled walking surface and to prevent tile edge damage. All concrete surfaces will require some preparation to meet industry flatness requirements. Flowable hydraulic cement underlayment / self-leveling underlayment meeting ANSI A118.16 is the strongest thin repair material that cures fastest to keep the project on schedule. These products should be included in the specification.

To accommodate thermal movement and the effects of torque from wheels, specify an ANSI A118.12 Crack Isolation Membrane as these products are designed to elongate and lessen stress on the assembly. Adequate soft joints with sealant or pre-formed joint profiles for movement are to be specified along with these membranes.

Installation methods should be specified to meet ANSI A108.5 which covers the broad range of best practices. To achieve adequate mortar coverage ($\geq 80\%$ interior/ $\geq 95\%$ exterior & wet applications) the required troweling technique is well described in the National Tile Contractors Association's video [Trowel & Error](#). (Also available in [Spanish](#) and [Russian](#)). Mortars that meet ANSI A118.15 for high performance are best to hold Porcelain in place and most are rated for deformability (flexibility) with S1 or S2 High Performance ratings. These mortars manage bonding stresses best.

To address the maintenance of grout, consider using either a high performance cement grout and sealer or an epoxy grout. Cleaning solutions are to be per the manufacturers recommendations to maintain the warranty provisions. This should be noted in the specification.

Custom Building Products' **ESL (Early Stage Leveling) process incorporates the use of an ASTM F3010 membrane-forming moisture mitigation and self-leveling system that is installed within a few days of concrete placement. The concrete is not required to be troweled and finished to high levels of flatness thereby saving cost and time. The ESL process controls the slab's moisture evaporation to help prevent deformation, cracking and moisture vapor damage to flooring assemblies while producing a durable floor meeting the surface flatness needs of the flooring contractor.*

For best results on your project, specify the use of a qualified installation company as described below:

A. Installer Qualifications:

- 1) Company specializing in performing the work of this section with minimum five years documented experience.
- 2) Installer shall be a Five-Star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
- 3) Installer's on-site supervisor shall hold the International Masonry Institute's Foreman Certification.
- 4) Installer shall employ Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.
- 5) Installer employs at least one installer for Project that has completed the Advanced Certification for Tile Installers (ACT) certification for installation of **[mud floors] [mud walls] [membranes] [shower receptors] [gauged Porcelain tile/gauged Porcelain tile panels and slabs] [and] [large format tile]**.

Product Selections

CUSTOM® products have been successfully used in specifications for millions of tiles and have lasted for decades. Please consider these options for your project:

Moisture Mitigation

[TechMVCTM Moisture Vapor and Alkalinity Barrier](#) (No limit MVER)

[RedGard® Waterproofing and Crack Prevention Membrane](#) (Limited to 12lbs MVER)

Flowable Hydraulic Cement Underlayment /Self-leveling Underlayment with Primers

[TechPrime™ A Acrylic Primer](#)

[TechLevel™ 150 Self-Leveling Underlayment](#)

[TechLevel™ XP-1 Self-Leveling Underlayment](#)

Crack Isolation or Waterproofing

[Crack Buster® Pro Crack Prevention Mat Underlayment](#) (3/8" Movement)

[RedGard® Waterproofing and Crack Prevention Membrane](#) (1/8" Movement)

Adhesive Mortars

[MegaLite® Crack Prevention Mortar](#) (650-725 psi bond strength)

[ProLite® Tile & Stone Mortar](#) (400-500 psi bond strength)

- Both mortars available in rapid-setting versions

Grouts

[CEG-Lite™ 100% Solids Commercial Epoxy Grout](#)

[Prism® Ultimate Performance® Grout](#)

Sealant

[CUSTOM® Commercial 100% Silicone Sealant](#)

Maintenance Products

[Aqua Mix® Concentrated Stone & Tile Cleaner](#) (main showroom)

[Aqua Mix® 1 & 2 Deep Clean](#) (service area)

CUSTOM® Limited Installation System Warranties are available for assemblies using these products covering labor and material replacement.

Note: Project conditions will vary and may affect product recommendations. Consult individual product Technical Data Sheets for specific recommendations and limitations regarding project conditions. Assembly mockups can determine suitability for these conditions on specific projects. For project specification review, onsite technical assistance, product, specification & warranty details contact CUSTOM architectural services or technical support at (800) 282-8786 [Custom Building Products - Contact us](#)

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Technical Services 800-282-8786
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