Concrete Substrate Preparation Guidelines

The following guidelines for preparing concrete substrate should be used as a tool to help owners, specifiers, and contractors establish the best means to prepare concrete and achieve a reliable substrate for a quality MTT terrazzo installation.

Proper Substrate Preparation

Substrate preparation for all concrete slabs should meet basic criteria before the installation of the thin-set epoxy terrazzo flooring:

1. **Concrete slab shall have an efficient moisture vapor barrier** (Minimum 15 mils thickness) directly underneath and in direct contact with the concrete slab when placed on grade, and shall conform to ASTM E-1745 Class “A”

2. **Concrete shall have a cure of at least 28 days**

3. **Saw cutting of control joints** must be done between 12 and 24 hours after placement of structural concrete

4. **Subfloor shall be flat** in accordance with NTMA standard (Maximum variance not to exceed ¼” in 10 foot span) and shall have a steel troweled finish

5. **Removal of Bond Inhibiting Contaminants** shall include, but not be limited to, removal of oils, greases, waxes, sealers, curing compounds and other hydrocarbon based materials. This will assure that a good chemical bond takes place between the terrazzo flooring and the concrete substrate.

6. **Repair of Surface Irregularities** including but not limited to bug holes, cracks, scaling, spalls, fins, and honeycombs is required to provide a consistent, uniform finish in the thin-set epoxy terrazzo flooring installation. Consult your MTT contractor prior to installation to review irregularities to be repaired by others.

7. **Patching / leveling of slab must be made using materials compatible with the Morricite system** (contact MTT or your MTT contractor for details)

8. **Replacement of Structurally Deteriorated Concrete** shall comply with The International Concrete Repair Institute (ICRI) Bulletin Surface Preparation for the Repair of Deteriorated Concrete. Thin-set epoxy terrazzo flooring cannot perform when applied over weak, deteriorated, or punky concrete. Flash patch or gypsum based patching cements are not acceptable. Patching manufacturer shall specify minimum cure time before installation of the thin-set epoxy terrazzo flooring. MTT contractors are qualified to complete these repairs and should be contracted whenever possible to assure that a quality, timely and compatible repair occurs.

9. **Creation of Concrete Profile** is required to achieve mechanical bond of the new terrazzo floor. The profile shall be a CSP3 to CSP5 according to the International Concrete Repair Institute (ICRI) Technical Guideline #03732 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays.

Methods of Surface Preparation

**Vacuum-Grit Blasting** or **Shot Blasting** has become the preferred method of surface preparation for most installations of seamless resinous flooring. Centrifugal vacuum blasting utilizes recycled metal shot in a confined metal chamber. Shot blasters remove surface contamination, profile, and vacuum clean the concrete in one process. The size of shot and speed of the machine can be adjusted. Shot blasting is a dry preparation process allowing for the floor installation to begin immediately after completion. The mechanical
Concrete Substrate Preparation Guidelines

Blasting will also identify weak areas in the surface of the concrete (i.e. Concrete pours that were rained on, poorly finished concrete, etc.) Shot blasting will also remove curing compounds.

**Suggestion:** Specify shot blasting as a standard means of preparation on all projects to receive thin-set epoxy terrazzo flooring.

**Acid Etching, High Pressure Water Blasting and Sand Blasting** are not acceptable means of substrate preparation for application of thin-set epoxy terrazzo. **Diamond Grinding** should only be utilized in areas where shot blasting is impractical (Edges, vertical applications, etc.).

**Removal of Adhesives, Mastics and Membranes**

In many retrofit projects, existing tile, VCT or sheet goods are being replaced with thin-set epoxy terrazzo flooring. Removal of the floor finish will often leave a layer of some type of mastic, adhesive or membrane. In thin applications, these materials can often be totally cleaned up by shot blasting the concrete. In thicker applications, the steel shot will tend to bounce, requiring additional preparation with the use of scarifying equipment or possibly even the use of chemical strippers. Some mastic removers, such as soy-based products are not acceptable. Wherever possible, consult with your local MTT representative or contractor and schedule a site visit to investigate the best removal methods. On bid projects, it is often better to bid the demolition and removal of adhesives as a separate item. Identifying the extent and location of these areas will help assure that proper surface preparation is performed.

**Resurfacing Quarry or Ceramic Tile**

Quarry tile and ceramic tile have been successfully resurfaced on many projects without removal of tile and setting bed. Before any decision to go over tile is made, a site investigation along with core sample analysis through the entire slab will be required. The cores will help identify the type of setting bed, the existence of any waterproofing membranes, additional toppings or other unusual existing conditions. If the setting bed was dry packed with sand and cement in a wet environment, MTT recommends full removal down to the structural slab. Water trapped within a floor assembly will create long-term performance and sanitation problems. If the tile is well bonded and placed over an unsaturated latex or cement setting bed, the floor may be resurfaced, following the general guidelines for proper preparation. Consult with your local MTT representative or contractor for these applications.

**Testing for Moisture Content on or Below Grade**

The presence of excessive moisture in or below concrete slabs can lead to both short-term installation problems as well as long-term adhesion problems with epoxy terrazzo floors. Water vapor will travel through concrete from an area of high humidity to low humidity. This vapor transmission, when impeded under an epoxy terrazzo floor, may eventually cause blistering or delamination of the epoxy terrazzo. This same “vapor drive” may cause the resinous materials, while in their liquid state, to bubble and blister. This phenomenon is commonly referred to as "outgassing." Water vapor problems are particularly prevalent with slabs on-grade where no vapor barrier exists between the slab and the soil.

All slabs should be checked for moisture content prior to installation of epoxy terrazzo. Master Terrazzo Technologies recommends:

**ASTM F2170 : Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes**

Consult your MTT representative or terrazzo contractor for moisture vapor remediation procedures, which may include a moisture vapor remediation system such as Master Terrazzo Technologies’ MasterGard MVR1.
Please Note: Unfortunately, this test is not 100% conclusive since they are applied to a given spot at a specific point in time.

Testing For Chemical Contamination in Existing Concrete

The presence of chemical contamination in concrete can also lead to premature failure of thin-set epoxy terrazzo flooring. These contaminants include:

**Salt** contaminated slabs that contain steel reinforcement are very susceptible to corrosion of the reinforcing steel. As this steel corrodes it expands, causing cracking, delamination of concrete and any toppings bonded to it, and eventually the structural failure of the slab. Obvious signs of chloride or salt contamination are spalled concrete with exposed, rusted reinforcing steel. Testing is recommended to determine the depth of contamination and the extent of corrosion activity.

**Acid** contamination in concrete, like salt, lowers the pH, increasing the potential for electrochemical corrosion activity. In addition, acids can attack and break down the cement paste that binds all aggregates in concrete. Moisture vapor transmission can activate residual acids at the interface of the terrazzo floor and concrete slab. The acid attack on the cement eventually weakens the bond line, causing premature delamination of the thin-set epoxy terrazzo flooring. The testing for acid contamination is the same as for salts. A titration test can also be performed to determine the presence of specific contaminants.

**Oil Based** contaminants (aka Hydrocarbons) tend to migrate in concrete through the capillary channels. Oils and animal fats will inhibit the bond of any surface treatment.

Relevant Test Methods

**ASTM F710: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring** determines pH

**X-Ray Diffraction Analysis (XRD)** - Allows for the identification of crystalline mineral phases that can contribute to the presence and concentration of water soluble ions in condensate solutions.

**Ion Chromatography Analysis (IC)** - Utilized to identify concentrations of key water soluble ionic phases for the recognition of un-reacted metasilicate residues. (Na, K, SO4 & Cl - 0-3 mm & 3-5 mm below the top surface of the core)

**Infrared Spectroscopy Analysis (IR)** - Provides a quantitative assessment of the concentration and type of organic constituents present within specific depth profiles of the concrete.

**Thin Section Petrographic Analysis (TS)** - Standard analytical method for the assessment of concrete mineralogy, fabric and pore system attributes. Problems that can be diagnosed with Thin Section Petrographic analysis include: Alkali Silica Aggregate Reactions (ASR), cohesive degradation related to sulfate mineral crystallization, severity and nature of fracture distributions, concrete surface profile characteristics, and carbonation depth.
Concrete Substrate Preparation Guidelines

Important Notice

This document has been prepared as general information to assist owners, design professionals and construction managers design, specify and complete successful projects. While the information in this document is based on sources and procedures which MTT believes reliable, construction project results depend upon the specific circumstances of each project and cannot be guaranteed. This document is not intended to replace the knowledge and experience of design professionals, nor does this document constitute an assumption by MTT of responsibility for the design and preparation of concrete surfaces, nor any warranty or any other contract on MTT's part.