

Surface Preparation Requirements

Tile & Stone Installation Systems



REFERENCE GUIDE RGT0309

Revised November 30, 2015

ENVIRONMENTAL REQUIREMENTS

- Maintain environmental conditions and protect work during and after installation. Comply with trade and industry standards and manufacturer's printed recommendations.
- Refer to MAPEI's current Technical Data Sheets (TDSs) for the recommended application temperature range for all MAPEI products used in the installation.
- Turn off all forced ventilation and radiant heating systems, and protect the work against drafts during installation and for at least 72 hours after completion.
- When necessary, build a temporary shelter and use indirect auxiliary heaters to maintain an adequate temperature level in the working environment and surfaces.
- Exhaust temporary heaters to the exterior to prevent damage to the work or injury to personnel from carbon monoxide emissions.
- Maintain substrate and ambient temperatures in tiled areas at between 50°F and 95°F (10°C and 35°C) during installation and for at least 7 days after completion, unless otherwise indicated in the product instructions and/or ANSI A108 installation standards.

JOBSITE EXAMINATION

Before work commences, examine the areas to be covered and report any deficiency or adverse condition in writing to the general contractor, owner, developer, architect or engineer. Do not proceed with the work until surfaces and conditions comply with the requirements indicated in the manufacturer's instructions; applicable industry standards; federal, state, provincial and local regulations; and good work practices. By beginning work, the applicator/user acknowledges that the conditions are acceptable for installation.

Reference applicable industry standards such as the TCNA Handbook for Ceramic, Glass and Stone Tile Installation; TTMAC Specifications Guide Tile Installation Manual; ANSI Specifications for the Installation of Ceramic Tile; ANSI Specifications for Glass Tile; ISO 13007 Classifications Standards Product Classifications; and NTCA Reference Manual.

SURFACE PREPARATION

1. General

- 1.1 All supporting surfaces should be structurally sound, solid, stable, flat, plumb and true. Maximum substrate variation for tiles less than 15" (38 cm) on any side is 1/4" in 10 feet (6 mm in 3,05 m). Maximum substrate variation for tiles 15" (38 cm) or greater on any side is 1/8" in 10 feet (3 mm in 3,05 m). (See TCNA Handbook or TTMAC specification guideline and ANSI guidelines for details.) Surfaces should be clean and free of dust, oil, grease, paint, tar, wax, curing agent, primer, sealer, concrete color stains, old adhesive residues (unless otherwise recommended by MAPEI), form release agent and any deleterious substance or debris that may prevent, reduce or affect adhesion or performance.

- 1.2 Completely remove all paint, loosely bonded topping, loose particles and construction debris by mechanical means (that is, shotblasting, scarification, sanding or grinding). When preparing surfaces containing silica sand, use a dust mask or respirator approved by the National Institute for Occupational Safety and Health (NIOSH).

Warnings: A) Do not install over vinyl asbestos tile (VAT) or any flooring, substrate or substance that may contain asbestos (consult the Website of the Environmental Protection Agency [EPA] for proper handling of materials containing asbestos). Do not install over any adhesives, including asphalt cutback residue, that may have been used to install flooring containing asbestos. Do not sand or remove any existing resilient floors or cutback adhesive that contains asbestos fibers or crystalline silica. Follow all local, state and federal regulations and industry standards when mechanical removal is required. **B)** Certain paints may contain lead. Exposure to excessive amounts of lead presents a health hazard. For additional information on requirements for handling lead-based paints, refer to <http://www2.epa.gov/lead/lead-regulations-for-the-United-States> or http://www.hc-sc.gc.ca/ewh-semt/contaminants/lead-plomb/asked_questions-questions_posees-eng.php for Canada.

- 1.3 Acid etching or using harsh chemicals to prepare the surface is not recommended.
- 1.4 All substrates should be dry and free of standing water.
- 1.5 All recommendations and guarantees regarding any material used as a substrate for flooring are the sole responsibility of the manufacturer of said underlayment material.
- 1.6 Consult MAPEI's Technical Services Department for installation recommendations regarding substrates and conditions not listed in this guide.

Tile Council of North America (TCNA) Statement on Deflection Criteria

Floor systems, including the framing system and subfloor panels, over which tile will be installed should be in conformance with the IRC [International Residential Code] for residential applications, the IBC [International Building Code] for commercial applications, or applicable building codes.

Note: The owner should communicate in writing to the project design professional and general contractor the "intended use" of the tile installation, in order to enable the project design professional and general contractor to make necessary allowances for the expected live load, concentrated loads, impact loads, and dead loads including the weight of the tile and setting bed. The tile installer shall not be responsible for any floor framing or subfloor installation not compliant with applicable building codes, unless the tile installer or tile contractor designs and installs the floor framing or subfloor.

2. Concrete

- 2.1 Concrete surfaces should be dry, at least 28 days old, and free of standing water, hydrostatic pressure and excessive moisture.
 - 2.1.1 See the respective TDSs of individual products for maximum permissible moisture-vapor emissions. Some products – such as crack-isolation, sound-reduction and waterproofing membranes and epoxies – require a compatible moisture-reduction barrier.
 - 2.1.2 The quality of concrete must permit direct tensile bond of greater than 175 psi (1,21 MPa).
- 2.2 On-grade and below-grade concrete slabs must be installed over an acceptable and effective vapor barrier per industry standards.
- 2.3 New concrete surfaces should be wood-floated or broom-finished. Mechanically prepare concrete substrates to a minimum International Concrete Repair Institute (ICRI) concrete surface profile (CSP) of #2 to #3 for setting mortars. Steel-troweled slabs are not acceptable.
- 2.4 Bonding issues may exist with concrete floors containing a supplementary cementitious material such as – but not limited to – fly ash with a content of 20% or higher, with concrete containing admixtures and with concrete that has a hard-troweled finish. For these reasons, a bond test should always be performed to confirm an adequate bond. If an adequate bond cannot be achieved, the concrete surface should be abraded by mechanical means. Additional bond tests should be conducted; if an adequate bond cannot be achieved, contact MAPEI's Technical Services Department.
- 2.5 Concrete slabs consisting of concrete that has been mixed with a silicate-based admixture – including silicate-based admixtures for moisture reduction – should be mechanically abraded to a CSP of #2 to #3. Confirm porosity with a water-drop test.
- 2.6 Concrete slabs with liquid-applied topical curing agents, curing compounds, topical sealers or silicate-based hardeners must be mechanically abraded in order to completely remove the curing agent, curing compound, sealer or hardener. Confirm porosity with a water-drop test.
- 2.7 Chemical residue may reside in concrete slabs that have been chemically treated to aid in the removal of floor coverings and adhesives during asbestos abatement procedures. Two options exist for dealing with chemically abated concrete: Remove the contaminated area, or clean it and encapsulate it.
 - 2.7.1 Remove all areas of contaminated concrete by mechanical abrasion. This should be achievable by ensuring the removal of at least 1/8" (3 mm) of the thickness of the concrete's top layer.
 - 2.7.2 As an alternative method, MAPEI offers a two-step system to clean and encapsulate the concrete. Consult MAPEI's Technical Services Department for product recommendations, and refer to current TDSs for details.
- 2.8 For excessively dry porous concrete, keep the concrete substrate continuously moist for at least 24 hours before work begins. Remove all excess water and standing water, allowing the surface to become almost dry to provide a saturated surface-dry (SSD) condition before installing the leveling mortar or setting mortar.
- 2.9 For interior self-leveling, use an appropriate MAPEI self-leveling underlayment to level a properly prepared concrete floor. Always prime the concrete substrate with a recommended primer before installing an underlayment. Consult Reference Guide RGC0609, "Primers for Self-Leveling Materials – Product Selection Guide," for primer selection. Refer to current TDSs for details.
- 2.10 For interior concrete repair, use an appropriate MAPEI repair mortar to build up, slope or level a concrete substrate when the required thickness is between 1/4" and 4" (6 mm and 10 cm). For interior/ exterior repair, use a mixture of Portland cement, sand and MAPEI's *Planicrete*® AC to screed, build up, slope or level a concrete substrate when the required thickness is between featheredge and 4" (10 cm). MAPEI also offers several exterior-approved concrete repair products.

Contact MAPEI's Technical Services Department for product recommendations, and refer to current TDSs at www.mapei.com for details.

Note: Application over cleavage membranes should be at least 1-3/8" (3,5 cm). Consult MAPEI's CAD Manual at www.mapei.com for details.

3. Cement Backer Units (CBUs)

The CBU should conform to the quality standard requirements of ANSI A118.9. It must be installed according to the CBU manufacturer's instructions and in strict accordance with ANSI A108.11 standards for interior installation of CBUs.

4. Cement Mortar Beds and Cement Screeds

- 4.1 MAPEI's Tile & Stone Installation Systems (TSIS) products may be installed over cement screeds and cement mortar beds when they are sound and durable, securely bonded, stable, clean and dry.
- 4.2 When using MAPEI liquid-applied waterproofing membranes over new cement mortar beds and cement screeds, allow at least 72 hours of curing time before application of the membrane.
- 4.3 MAPEI also offers several rapid-curing mortars for fast-track installations. Contact MAPEI's Technical Services Department for product recommendations, and refer to current TDSs for details.

5. Heated Floors

- 5.1 Install electric and hydronic radiant-heat systems in strict accordance with the written instructions of the radiant-heat system manufacturer.
- 5.2 Turn off radiant-heat systems at least 72 hours before installation of MAPEI's TSIS products, and keep the systems off during installation. Wait at least 72 hours after the installation before turning on the systems.
- 5.3 When using a tile mortar to encapsulate electric radiant heat wires, use a mortar designed for large and heavy tile (formally known as a "medium-bed" mortar).

6. Exterior Wall Surfaces

The Uniform Building Code requires mechanical fasteners for individual tiles larger than 720 sq. in. (0,46 m²) or weighing more than 15 lbs. (6,80 kg) per square foot (0,09 m²). Other restrictions may apply; consult state/provincial and local building codes.

For exterior waterproofing, use a trowel or roller to apply an appropriate MAPEI thin load-bearing waterproofing membrane. Or, when surface waterproofing is not required, trowel a 1/8" (3 mm) leveling coat of an appropriate MAPEI premium flexible mortar system to cover the entire concrete, masonry or CBU substrate before installing tiles. Allow at least 24 hours to dry before the tile installation. See the respective TDSs at www.mapei.com for details.

7. Gypsum-Based Concrete, Existing Gypsum-Based Poured Underlayments, Existing Gypsum-Based Self-Leveling Underlayments and Gypsum Wall Board (wall installations)

- 7.1 The surface of the gypsum-based substrate must be thoroughly and completely primed. Refer to MAPEI Technical Bulletin #010313-TB, "Gypsum-Based Floors and Walls: Which MAPEI Products Can Be Applied?"
- 7.2 Approved gypsum-based floor substrates must be clean, dry, fully cured, intact, well-bonded, stable and free of existing cracks. Refer to MAPEI Technical Bulletin #010313-TB for details.
- 7.3 Gypsum wallboard must be clean, dry, stable and undamaged with paper intact. Refer to MAPEI Technical Bulletin #010313-TB for details.
 - 7.3.1 Wallpaper, vinyl wall coverings, laminates and similar nonporous surfaces must be removed.
 - 7.3.2 Replace gypsum wallboards if they are damaged or if the gypsum core is exposed.

8. Cutback Adhesive Residue

8.1 MAPEI's TSIS products may be used over cutback adhesive residue when it is listed as an acceptable substrate with certain specific MAPEI primers and mortars. Consult MAPEI's Technical Services Department for product recommendations. Refer to current TDSs for details.

Note: Cutback adhesive residue by definition is the black/brown stain remaining in the concrete/plywood after all areas have been completely scraped.

8.2 Warning: All cutback adhesive should be tested for asbestos before removal. Do not sand any cutback adhesive that contains asbestos. Follow all local, state/provincial and federal regulations as well as industry standards when mechanical removal is required.

8.3 Cutback adhesive that does not contain asbestos must be fully and thoroughly scraped so that only a very thin layer of residue remains. The top surface of the concrete or plywood should be visible through the adhesive.

Note: Chemical removal methods are not recommended. If the concrete has already been chemically abated, refer to Section 2.7 in this guide.

9. Existing Flooring

9.1 MAPEI's TSIS products may be used over certain types of existing flooring only when the existing flooring is listed as an acceptable substrate with certain specific MAPEI membranes, primers and mortars. Consult MAPEI's Technical Services Department for product recommendations, and refer to current TDSs for details.

9.2 Warning: Do not install MAPEI's TSIS products over VAT or any flooring, adhesive, substrate or substance that may contain asbestos.

9.2.1 Existing flooring materials and existing flooring adhesives that were installed before 1981 should be tested for asbestos before removal. Follow all local, state/provincial and federal regulations as well as industry standards when removal is required.

9.3 Existing vinyl composition tile (VCT), non-cushioned paper-backed or felt-backed sheet vinyl, luxury vinyl tile (LVT) and luxury vinyl plank (LVP), ceramic tile, porcelain tile, quarry tile, natural-stone tile, glass tile and cement terrazzo must be securely bonded, stable, clean and dry.

9.3.1 A light sanding of the existing flooring may be required before the application of some MAPEI products. The area must then be vacuumed, mopped and allowed to dry completely. The grout lines must receive a thorough brush cleaning. Consult MAPEI's Technical Services Department for primer recommendations when sanding is not possible.

9.4 VCT must be limited to one layer only. A commercial-grade wax stripper must be used to remove any dirt, oil, grease, wax or sealer. The area must be rinsed well with clean water and allowed to dry completely.

9.5 Non-cushioned paper-backed or felt-backed sheet vinyl with a vinyl or urethane wear layer must be fully adhered (not perimeter-glued) and limited to one layer only. New vinyl and vinyl with a urethane wear layer must be slightly roughened to dull the finish (60-grit sandpaper is recommended). The wear layer must remain intact, and the underlying sheet-vinyl paper should not become exposed. The area must then be vacuumed, mopped and allowed to dry completely.

9.6 LVT and LVP must be slightly roughened to dull the finish (60-grit sandpaper is recommended). The area must then be vacuumed, mopped and allowed to dry completely.

9.7 Do not install MAPEI's TSIS products over solid vinyl sheet, linoleum, self-stick tile, laminate flooring, bamboo flooring, glue-down engineered wood flooring, glue-down solid wood flooring, or other dimensionally unstable and/or nonporous materials.

10. Plywood Underlayments (For interior residential floors and countertops in dry areas only)

10.1 Plywood underlayments must be a Group 1 exterior-grade plywood,

CC-plugged or better, conforming to APA classification and U.S. Product Standard PS 1-95 or a "SELECT" or (SEL-TF) CANPLY classified exterior-grade plywood conforming to CSA-0121 standard for Douglas fir for direct-bond applications.

10.2 Do not install MAPEI's TSIS products over presswood, particleboard, Luan plywood, fire-treated plywood, bamboo flooring, glue-down engineered wood flooring, glue-down solid wood flooring or similar types of dimensionally unstable materials.

10.3 MAPEI mortars may be used over oriented strand board (OSB) under specific conditions; use with MAPEI's *Mapelath™*, *ShowerPerfect™* system, to adhere *Mapeguard® UM* in addition as a bedding coat for cement board, and when the installation assembly meets TCNA standards.

10.4 Plywood surfaces should be installed smooth face-up with the face grain running perpendicular to the framing. Offset joints of subfloor and underlayment per industry standards.

10.5 Use exclusively new first-quality plywood that has not been subject to rain or water damage and has been properly acclimated per the manufacturer's instructions.

10.6 Plywood subfloors and underlayments should consist of a minimum 2 layers of a combined total thickness of at least 1-1/4" (3,2 cm), or 1-1/2" (3,8 cm) for installations of natural stone. Both panels should be fastened per the manufacturer's recommendations over a joist span of 16" (41 cm) on center. (See product TDSs for any alternatives.) Leave a 1/8" (3 mm) wide space between panels and a 1/4" (6 mm) gap around drain pipes, conduits, posts and columns, and along wall and curb bases. (See TCNA Handbook or TTMAC specification guide and ANSI guidelines for details.) The plywood should be screwed 6" (15 cm) O.C. around the perimeter and 8" (20 cm) O.C. in each direction throughout the body of the panel. Consult MAPEI's Technical Services Department when joints are spaced greater than 16" (41 cm) O.C.

10.7 Plank-board or stripwood floors should be covered over with at least one layer of 3/4" (19 mm) thick exterior-grade plywood, each sheet to be fastened with screws 8" (20 cm) O.C. in all directions and around the perimeter. Leave proper spacing between the plywood sheets and between all materials that they abut. (See Section 10.6 above.)

10.8 Adjacent edges of the plywood underlayment sheets should not deviate more than 1/32" (1 mm) out of plane.

10.9 Under no circumstances should any floor material be laid over wood underlayment or subfloors that are under conditions that might cause buckling or rotting of wood. Always replace wood subfloors or underlayments that have been subjected to water damage.

10.10 All wood subfloors should be properly ventilated and acceptable to local codes and requirements.

11. Existing Plastic Laminate Surfaces (countertops and backsplashes only)

11.1 MAPEI's TSIS products may be used over an existing plastic laminate surface on countertops and backsplashes when it is listed as an acceptable substrate with certain specific MAPEI primers and mortars. Consult MAPEI's Technical Services Department for product recommendations, and refer to current TDSs for details.

11.2 Existing plastic laminate surfaces must be cleaned with a kitchen degreaser to remove any dirt, oil or grease. The area must be rinsed well with clean water and allowed to dry completely.

11.3 A light sanding of the existing plastic laminate surface is recommended before the application of some MAPEI products. The area must then be cleaned thoroughly so that all dust is completely removed.

12. Epoxy Poured Floors, Epoxy Terrazzo and Epoxy Moisture Barriers

12.1 MAPEI's TSIS products may be used over epoxy poured floors, epoxy terrazzo and epoxy moisture barriers when they are listed as acceptable substrates with certain specific MAPEI primers and

mortars. Consult MAPEI Technical Services Department for product recommendations, and refer to current TDSs for details.

- 12.2 Epoxy poured floors, epoxy terrazzo and epoxy moisture barriers must be securely bonded, stable, clean and dry.
- 12.3 Prepare existing epoxy terrazzo and epoxy poured floors by mechanical abrasion, such as using a sanding screen on a floor buffer. Do not abrade epoxy moisture barriers.

13. Steel

- 13.1 MAPEI products may be used over steel when it is listed as an acceptable substrate with certain specific MAPEI mortars. Consult MAPEI's Technical Services Department for product recommendations, and refer to current TDSs for details.
- 13.2 Steel substrates must be rigid, solidly fixed in place, and free of paint, primer, oil and corrosion.
- 13.3 Prepare steel surfaces with a light sandblast. Then wipe the surface clean with a residue-free solvent.

Contact MAPEI's Technical Services Department regarding installation of MAPEI's TSIS products over unique/special substrates and/or for any condition not listed above.

Using a total MAPEI installation system – including recommended MAPEI mortars and grouts in conjunction with recommended MAPEI waterproofing and crack-isolation membranes and surface-preparation products – ensures compatibility that will ultimately result in a reliable, long-term, successful installation.

For additional details, please refer to the latest edition of the TCNA Handbook for Ceramic Tile Installation and to a product's TDS. For further information about product application or installation, please contact MAPEI's Technical Services Department at 1-800-992-6273 (U.S. and Puerto Rico) or 1-800-361-9309 (Canada).

