



Surface Preparation for Tile and Stone Installations

This guide is specifically for tile and stone products from North American Adhesives (NAA).

ENVIRONMENTAL REQUIREMENTS

Refer to NAA's current Technical Data Sheets (TDSs) for the recommended application temperature range for all NAA products used in the installation. Maintain environmental conditions throughout the installation process. Control floor-heating systems so that the substrate is within the application temperature range. The use of floor-heating systems may reduce the working time of certain NAA tile and stone products.

Radiant floor-heating systems must be fully functional and in operation for 2 weeks before floor-covering installation.

JOBSITE EXAMINATION

Before work commences, examine the areas to be repaired and/or covered and report any deficiency or adverse condition in writing to the general contractor, owner, owner representative, developer, architect, engineer or designer. Do not proceed with the work until surfaces and conditions comply with the requirements that are indicated in the flooring manufacturer's written 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

General requirements

- 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 Technical Services), form release agent and any deleterious substance or debris that may prevent, reduce or affect adhesion or performance.
- Completely remove all paint, loosely bonded topping, loose particles and construction debris by mechanical means (e.g., shotblasting, scarification, grinding or sanding). When preparing surfaces containing silica sand, use a dust mask or respirator approved by the National Institute for Occupational Safety and Health (NIOSH).

- Acid etching or the use of chemicals to prepare surfaces is not recommended.
- Warnings:
 - ▶ 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. Follow all local, state and federal regulations and industry standards when mechanical removal is required.
 - ▶ 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.
 - ▶ Mixing and/or sanding of cement-based materials may expose the worker to crystalline silica. Long-term exposure to excessive amounts of crystalline silica presents a health hazard. For additional information on requirements for handling silica dust, refer to <https://www.osha.gov/silica/index.html> for the United States or http://www.ccohs.ca/oshanswers/chemicals/lungs_dust.html in Canada.
- All substrates should be dry and free of standing water.
- All recommendations and guarantees regarding any material used as a substrate for flooring are the sole responsibility of the manufacturer of said underlayment material.
- Consult Technical Services for installation recommendations regarding substrates and conditions not listed in this guide.

Tile Council of North America (TCNA) Maximum Allowable Deflection for Floor Systems and Substrates

Floor systems, whether wood framed or concrete, over which the tile will be installed using the appropriate TCNA method, according to the Floor Tiling Installation Guide, shall be in conformance with the International Residential Code (IRC) for residential applications, the International Building Code (IBC) for commercial applications, or applicable building codes.

The owner should communicate in writing to the project design professional and general contractor the intended uses of the tile installation, including in-service loads or information to allow a project design professional to calculate such.

The tile contractor shall not be responsible for problems resulting from any structural subfloor installation not compliant with applicable building codes, unless structural subfloor was designed and installed by tile contractor, nor for problems from overloading. Please reference the most current version of the TCNA Handbook for more complete substrate requirements.

Concrete

- The specific composition of the concrete should be in accordance with the guidelines and practices of American Concrete Institute (ACI) standards. All concrete substrates should be free of efflorescence, laitance, spalling and any other signs of surface weakness. If concrete shows any signs of surface weakness, consult a licensed engineer and make appropriate repairs before application of NAA products.
- Concrete surfaces should be dry, fully cured and free of excessive hydrostatic pressure and/or excessive moisture.
 - ▶ 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.
 - ▶ The quality of concrete must permit direct tensile bond of greater than 175 psi (1,21 MPa).
- On-grade and below-grade concrete slabs must be installed over an acceptable and effective vapor barrier per industry standards.
- New concrete surfaces should be wood-floated or broom-finished. Steel-troweled slabs are not acceptable.
- Concrete slabs that contain 20% or more of fly ash should be assessed and evaluated before application of NAA products. Confirm porosity with a water-drop test. The water droplet should not only wet the concrete but should dissipate onto the surface almost immediately. Perform a bond test to determine compatibility. If an adequate bond cannot be achieved, mechanically abrade the slab and conduct additional bond tests.
- Concrete slabs that consist of concrete that has been mixed with a silicate-based admixture should be assessed and evaluated before application of NAA products. Confirm porosity with a water-drop test. The water droplet should not only wet the concrete but should dissipate onto the surface almost immediately. Consult the Technical Services Department of the silicate-based admixture manufacturer for compatibility questions. The moisture protection claims that are made by the admixture manufacturer are the sole responsibility and domain of the admixture manufacturer. The bond performance warranty of NAA products to the concrete is also the sole responsibility and domain of the admixture manufacturer.
- 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. The water droplet should not only wet the concrete but should dissipate onto the surface almost immediately.
- Chemicals used in the removal of floor-covering adhesives may penetrate into concrete slabs. These residues will affect adhesive performance negatively and will cause subsequent tile and stone installations to fail. Completely remove all areas of contaminated concrete by mechanical abrasion.
- 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.

- For interior self-leveling, use the appropriate NAA self-leveling underlayment to level a properly prepared concrete floor. Always prime the concrete substrate with a recommended primer before installing an underlayment. Consult Technical Services for more information.
- For interior concrete repair, use an appropriate NAA repair mix to build up, slope or level a concrete substrate when the required thickness is between 1/4" and 4" (6 mm and 10 cm).

Application over cleavage membranes should be at least 1-1/4" (3,2 cm). Consult NAA's CAD listing "NF111" at www.na-adhesives.com for details.

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.

Cement mortar beds and cement screeds

- NAA products for tile and stone installations may be installed over cement screeds and cement mortar beds when they are sound and durable, securely bonded, stable, clean and dry.
- When using NAA 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.
- There are also several NAA rapid-curing mortars for fast-track installations. Contact Technical Services for product recommendations, and refer to current TDSs for details.

Heated floors

- Install electric and hydronic radiant-heat systems in strict accordance with the written instructions of the radiant-heat system manufacturer.
- 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).

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

Gypsum-based substrates

The surface of the gypsum-based substrate must be thoroughly and completely primed. Refer to NAA's "Gypsum-Based Floors and Walls: Which NAA Products Can Be Applied?" technical bulletin.

Flooring adhesive residue

- **Cutback adhesive residue:** Certain NAA products may be used over cutback adhesive residue when it is listed as an acceptable

substrate with certain specific NAA primers and mortars. Consult Technical Services for product recommendations. Refer to current TDSs for details.

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

- ▶ 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.
- ▶ 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.

Chemical removal methods are not recommended. If chemicals have already been used on the concrete slab, contaminated concrete should be completely removed by mechanical abrasion to prevent failure of tile and stone installations.

- **Carpet adhesive residue:** Certain NAA primers may be used over carpet adhesive residue when it is listed as an acceptable substrate.
 - ▶ Existing carpet adhesive 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. Contact Technical Services for product recommendations.
- **Urethane adhesive residue:** Certain NAA primers may be used over urethane adhesive residue when it is listed as an acceptable substrate.
 - ▶ Existing urethane adhesive must be fully and thoroughly scraped so that only a very thin layer of residue remains. Contact Technical Services for product recommendations.

Existing flooring

- NAA products may be used over certain types of existing flooring only when the existing flooring is listed as an acceptable substrate with certain specific NAA membranes, primers and mortars. Consult Technical Services for product recommendations, and refer to current TDSs for details.
- Warning: Do not install NAA products over VAT or any flooring, adhesive, substrate or substance that may contain asbestos.
 - ▶ Follow all local, state/provincial and federal regulations as well as industry standards when removal is required.
- 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.
 - ▶ A light sanding of the existing flooring may be required before the application of some NAA products. The area must then be vacuumed, mopped and allowed to dry completely. The grout lines must receive a thorough brush cleaning. Consult Technical Services for primer recommendations when sanding is not possible.
- 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.
- 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.
- 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.
- Do not install NAA's tile and stone 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.
- Existing cement terrazzo and terrazzo strips must be well bonded and in good condition. Prepare existing cement terrazzo floors by mechanical abrasion in order to remove any sealers and roughen the surface. The area must then be vacuumed, mopped and allowed to dry completely. Consult Technical Services for product recommendations when sanding is not possible.

Plywood underlayments (for interior residential floors and countertops in dry areas only)

- 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.
- Do not install NAA 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.
- 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.
- 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.
- 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 Technical Services when joints are spaced greater than 16" (41 cm) O.C.
- 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 the paragraph above.)

- Adjacent edges of the plywood underlayment sheets should not deviate more than 1/32" (1 mm) out of plane.
- 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.
- All wood subfloors should be properly ventilated and acceptable to local codes and requirements.

Existing plastic laminate surfaces (countertops and backsplashes only)

- NAA 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 NAA primers and mortars. Consult Technical Services for product recommendations, and refer to current TDSs for details.
- 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.

Epoxy poured floors, epoxy terrazzo and epoxy moisture barriers

- NAA products may be used over epoxy poured floors, epoxy terrazzo and epoxy moisture barriers when they are listed as acceptable substrates with certain specific NAA primers and mortars. Consult Technical Services for product recommendations, and refer to current TDSs for details.
- Epoxy poured floors, epoxy terrazzo and epoxy moisture barriers must be securely bonded, stable, clean and dry.
- 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.

Contact Technical Services regarding installation of NAA products over unique/special substrates and/or for any condition not listed above.

Using a total NAA installation system – including recommended NAA mortars and grouts in conjunction with recommended NAA 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 Technical Services at 1-800-637-7753 (U.S. and Puerto Rico) or 1-844-410-1212 (Canada).



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Edition Date: July 18, 2017
 MKT: 17-1375
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