



Installation of Tile or Stone on Stairs

TDS 181

With the increased use of tile and stone over the past decade, there has been an increase in demand for installing tile or stone on stairs. Historically, these types of installations presented some unique challenges when the appropriate materials and methods were not used. The following information provides methods for installing tile or stone on stairs constructed of concrete, metal, wood, or concrete in a metal pan and the various types of materials that are required for a successful installation. For details and complete specifications please refer to the LATICRETE Architectural Guidebook available at www.laticrete.com/ag.

No matter which installation method below is chosen, the following are requirements as stated in the Tile Council of North America (TCNA) Handbook for Ceramic, Glass, and Stone Tile Installation;

Systems, including the framing system and panels, over which tile or stone will be installed 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 project design should include the intended use and necessary allowances for the expected live load, concentrated load, impact load, and dead load including the weight of the finish and installation materials. In addition to deflection considerations, above-ground installations are inherently more susceptible to vibration. Consult grout, mortar, and membrane manufacturer to determine appropriate installation materials for above-ground installations. A crack isolation and higher quality setting materials can increase the performance capabilities of above-ground applications. However, the upgraded materials cannot mitigate structural deficiencies including floors not meeting code requirements and/or over loading or other abuse of the installation in excess of design parameters

For thick bed (mortar bed) ceramic and stone tile installations and self-leveling methods: maximum allowable variation in the installation substrate to be $\frac{1}{4}$ " in 10' (6mm in 3m).

For thin-bed ceramic tile installations when a cementitious bonding material will be used, including medium bed mortar: maximum allowable variation in the tile substrate – for tiles with edges shorter than 15" (375mm), maximum allowable variation is $\frac{1}{4}$ " in 10' (6mm in 3m) from the required plane, with no more than $\frac{1}{16}$ " variation in 12" (1.5mm variation in 300mm) when measured from the high points in the surface. For tiles with at least one edge 15" (375mm) in length, maximum allowable variation is $\frac{1}{8}$ " in 10' (3mm in 3m) from the required plane, with no more than $\frac{1}{16}$ " variation in 24" (1.5mm variation in 600mm) when measured from the high points in the surface. For modular substrate units, such as exterior glue plywood panels or adjacent concrete masonry units, adjacent edges cannot exceed $\frac{1}{32}$ " (0.8mm) difference in height. Should the architect/designer require a more stringent finish tolerance (e.g. $\frac{1}{8}$ " in 10' [3mm in 3m]), the subsurface specification must reflect that tolerance, or the tile specification must include a specific and separate requirement to bring the subsurface tolerance into compliance with the desired tolerance.

CONCRETE STAIRS:

The use of a bonded mortar bed is recommended for installing tile or stone on the treads of concrete stairs. Please refer to LATICRETE ES- S151 Concrete for more complete information.

Note: Prior to installing tile or stone, ensure that surfaces to be covered are sound, clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil, loose plaster, paint, and any other bond breaking material or debris.

Before placing 3701 Fortified Mortar, 3701 Lite Mortar or 3701 Lite Mortar R, apply a slurry bond coat made of 254 Platinum, 257 TITANIUM™ or, MULTIMAX™ LITE onto the horizontal surface. While the slurry bond coat is wet, spread the mortar and compact well and allow the mortar to cure. If placing tile immediately (wet setting as per ANSI A108.1A)), apply a slurry bond coat of 254 Platinum, 257 TITANIUM or MULTIMAX LITE onto the back of the tile or stone. While the slurry bond coat is wet and sticky, place the tile and beat in well. (Please refer to TDS 143 "Slurry Bond Coats" for more information on slurry bond coats)

To place a mortar or render on the risers and/or stringers, mix the 3701 Fortified Mortar, 3701 Lite Mortar, or 3701 Lite Mortar R to a wetter consistency (see specific mortar data sheet for mixing ratios) and apply to properly prepared concrete surface. The vertical render/mortar bed can be applied in thicknesses up to ½" (12mm) at a time, and installations requiring more than ½" (12mm) must be done in separate lifts, with the subsequent lift scratched to provide better adhesion.

For installation of tile or stone over a cured 3701 Fortified Mortar (as per ANSI A108.1B) use 254 Platinum, 257 TITANIUM™ or, MULTIMAX™ LITE. Apply mortar to the substrate with the flat side of the trowel, pressing firmly to work it into the surface. Comb on additional mortar with the notched side. Use proper sized notched trowel to ensure full bedding of the tile. Back butter large tiles >8" x 8" (>200 mm x 200 mm) to provide full bedding and firm support. Place tiles into wet, sticky thin-set mortar and beat in using a beating block and rubber mallet to fully embed tile. Check mortar for complete coverage by periodically removing a tile and inspecting bedding mortar transfer onto back of tile. If mortar is skinned over (not sticky), remove and replace with fresh mortar. Clean excess thin set mortar from tile or stone face and joints between pieces. Allow to set until firm.

Once the mortar has set firm, grout the joints with SPECTRALOCK® PRO Premium Grout*, SPECTRALOCK PRO Grout, SPECTRALOCK 1, PERMACOLOR® Select^, or PERMACOLOR Grout.

A flexible sealant, such as LATASIL™, should be used at any changes of plane (e.g. treads/risers, treads/stringers, stringers/risers) to allow for any anticipated and unanticipated movement stresses.

Metal Stairs:

Tack weld or mechanically fasten 3.4# galvanized diamond metal lath over the steel surface in accord with ANSI A108.01-3.3. As an alternative to tack welding wire lath, a notched and hardened skim coat of LATAPOXY® 300 Adhesive or LATAPOXY BIOGREEN 300 Adhesive can be used over horizontal surfaces. Please refer to LATICRETE ES-S151 Metal for more complete information.

Note: Prior to installing tile or stone, ensure that surfaces to be covered are sound, clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil, loose plaster, paint, and any other bond breaking material or debris. Clean metal surfaces with a strong detergent to ensure that all manufacturing oils are removed, rinse completely and allow it to dry.

Apply a scratch and leveling coat of 3701 Fortified Mortar, 3701 Lite Mortar or 3701 Lite Mortar R to encapsulate and fill the lath or the notched and hardened skim coat of LATAPOXY 300 Adhesive or LATAPOXY BIOGREEN 300. Float the surface of scratch and leveling coat plumb and true and allow mortar to set until firm. Please note that vertical metal surfaces which require a mortar bed must have the 3.4# galvanized diamond metal lath tack welded to the metal. The vertical render/mortar bed can be applied in thicknesses up to ½" (12mm) at a time, and installations requiring more than ½" (12mm) must be done in separate lifts, with the subsequent lift scratched to provide better adhesion.

For installation of tile or stone over a cured 3701 Fortified Mortar use 254 Platinum, 257 TITANIUM™ or, MULTIMAX™ LITE. Apply mortar to the substrate with the flat side of the trowel, pressing firmly to work it into the surface. Comb on additional mortar with the notched side. Use the proper sized notched trowel for the tile or stone to ensure full bedding of the tile. Back butter large tiles >8" x 8" (>200 mm x 200 mm) to provide full bedding and firm support. Place tiles into wet, sticky thin-set mortar and beat in using a beating block and rubber mallet to fully embed tile. Check mortar for complete coverage by periodically removing a tile and inspecting bedding mortar transfer onto back of tile. If mortar is skinned over (not sticky), remove and replace with fresh mortar. Clean excess thin set mortar from tile or stone face and joints between pieces. Allow to set until firm.

Once the mortar has set firm, grout the joints with SPECTRALOCK® PRO Premium Grout*, SPECTRALOCK PRO Grout, SPECTRALOCK 1, PERMACOLOR Select, or PERMACOLOR Grout.

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Wood Stairs

For tile or stone installations on interior, dry areas over wood stairs, install a cleavage membrane such as 15 lb. builders felt or 4 mil polyethylene. Then mechanically fasten 3.4 lb. galvanized diamond metal lath to the wood stair construction. Please refer to LATICRETE ES-S151 Wood for more complete information.

Note: Installation of tile or stone over wood stairs is not recommended for exterior or wet applications.

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Apply 3701 Fortified Mortar, 3701 Lite Mortar or 3701 Lite Mortar R as a scratch and leveling coat over the properly installed wire lath. Float surface of scratch and leveling coat plumb and true. Allow mortar to set until firm.

For installation of tile or stone over a cured 3701 Fortified Mortar use 254 Platinum, 257 TITANIUM™ or, MULTIMAX™ LITE. Apply mortar to the substrate with the flat side of the trowel, pressing firmly to work it into the surface. Comb on additional mortar with the notched side. Use the proper sized notched trowel for the tile or stone to ensure full bedding of the tile. Back butter tiles >8" x 8" (>200 mm x 200 mm) to provide full bedding and firm support. Place tiles into wet, sticky thin-set mortar and beat in using a beating block and rubber mallet to fully embed tile. Check mortar for complete coverage by periodically removing a tile and inspecting bedding mortar transfer onto back of tile. If mortar is skinned over (not sticky), remove and replace with fresh mortar. Clean excess thin set mortar from tile or stone face and joints between pieces. Allow to set until firm.

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Concrete in Steel Tread Pan:

For installing tile or stone over a concrete filled steel tread pan, a combination of methods may be needed. Please refer to LATICRETE ES-S151 Metal for more complete information.

Note: Prior to installing tile or stone, ensure that surfaces to be covered are sound, clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil, loose plaster, paint, and any other bond breaking material or debris. Clean metal surfaces with a strong detergent to ensure that all manufacturing oils are removed, rinse completely and allow it to dry.

Where the tile or stone will be bonded to concrete, use 254 Platinum, 257 TITANIUM™ or, MULTIMAX™ LITE. Where tile or stone will be bonded to the steel pan use LATAPOXY® 300 Adhesive or LATAPOXY BIOGREEN™ 300. Apply mortar to the substrate with the flat side of the trowel, pressing firmly to work it into the surface. Comb on additional mortar with the notched side. Use the proper sized notched trowel for the tile or stone to ensure full bedding of the tile. Back butter large tiles >8" x 8" (>200 mm x 200 mm) to provide full bedding and firm support. Place tiles into wet, sticky thin-set mortar and beat in using a beating block and rubber mallet to fully embed tile. Check mortar for complete coverage by periodically removing a tile and inspecting bedding mortar transfer onto back of tile. If mortar is skinned over (not sticky), remove and replace with fresh mortar. Clean excess thin set mortar from tile or stone face and joints between pieces. Allow to set until firm.

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A flexible sealant, such as LATASIL™, should be used at any changes of plane (e.g. treads/risers, treads/stringers, stringers/risers) to allow for any anticipated and unanticipated movement stresses.

* United States Patent No.: 6,881,768 (and other Patents)

^ United States Patent No.: 6,784,229 (and other Patents)

Technical Data Sheets are subject to change without notice. For latest revision, check our website at www.laticrete.com
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