



## Tile & Stone Installation Systems

# Installing tile on balconies and decks

The importance of outdoor living spaces – such as balconies, decks, verandas and patios – is becoming increasingly popular in both residential and commercial properties. The design professional should consider the construction requirements and environmental exposure recommendations as outlined by the Tile Council of North America. Listed below are the most common crucial considerations when designing and installing tile for this type of space.

### General design

The best practice is to consult a design professional for considering all design variables, such as the following.

- Climatic changes – including gradient temperature changes, rainfall and snowfall – can impact an installation. If inclement weather is expected during installation, can that installation be protected?
- Refer to local building codes and the TCNA's Handbook for Ceramic, Glass, and Stone Tile Installation to understand approved installation methods and products that will fit the specific project needs.
- Ensure that clearance is sufficient at doors, windows, sliders and other areas where adjacent surfaces intersect with the finished floor elevation to allow slope for drainage as well as all tile installation layers specified.
- Consider whether an engineer is needed to approve the installation's additional load as well as deflection. Typically, mortar bed applications of 1-1/4" (3,2 cm) in thickness can weigh 21 lbs. per square foot (9,53 kg per 0,09 m<sup>2</sup>); thicker mortar beds can be calculated by adding 3 lbs. per square foot (1,36 kg per 0,09 m<sup>2</sup>) for each 1/4" (6 mm) of mortar.
- Factor in whether the installation will take place over occupied living space and how waterproofing will be handled.

### Substrates

- Address any surface-preparation issues – such as treating existing cracks, allowing for expansion joints, removing surface contamination, and dealing with conditions that may prevent or affect proper product performance – and create a proper surface profile.
- Slope all substrates – whether wood, concrete, steel frame or another material – at a minimum of 1/4" (6 mm) of drop per foot (0,30 m) of horizontal run to accommodate proper drainage, and ensure that no standing water is

present. This may require the use of cement-based patching compounds or structural modification in the case of frame construction.

- Install any necessary drainage, scuppers, floor drains and linear gutters to direct water off the finished surface. This may include accommodation of water from other roof surfaces and/or downspouts.

### Membranes

Research and select the appropriate waterproofing materials.

- Primary vs. secondary waterproofing membranes:
  - Primary membranes are detailed under TCNA F103 and F103B as going directly on top of the supporting substrate over occupied space. They are typically designed for exterior roofing deck applications.
  - Secondary waterproofing membranes are optional and detailed under TCNA F103 and F103B as going directly over the reinforced mortar bed and under the finished tile. The same membranes can be used as the sole membrane if they are not going over an occupied space such as detailed in TCNA F104.
- Drainage layer types:
  - Gravel – Pea-gravel drainage stone is typically installed over the primary waterproofing membrane in a 1" (2,5 cm) layer with a filter fabric and adds a load of approximately 10 lbs. per square foot (4,54 kg per 0,09 m<sup>2</sup>) to the floor.
  - Drainage mat – This dimpled and perforated sheet material or textile is designed to allow drainage from the mortar bed layer to the primary waterproofing membrane. The layer is either laid loosely or bonded to the primary waterproofing membrane.
- Flashing and counterflashing details must be designed to accommodate the type of wall system (EFIS, stucco, siding, etc.) present on the job. Refer to the design professional to detail this area properly.

### Tile installation methods

The industry recommends three methods for installing tile over exterior balconies or decks: TCNA F103 (over occupied space with a drainage layer – typically gravel), F103B (over occupied space utilizing a drainage mat) and F104 (over unoccupied space). Systems for these methods typically include products from these categories.

- Mortar bed: The cement mortar must be designed to meet or exceed ANSI A108.1A guidelines. For improved performance, the mortar can be modified with a latex additive. However, a latex additive should be used wherever freeze/thaw cycles are expected.
- Cementitious bond coat (mortar): Make sure to use installation materials that are compatible with the tile or stone as well as with any surface-preparation materials or underlayments that are to be used. Tile and stone products used on exterior installations require a minimum of 95% mortar transfer to their backings. Typically, a mortar meeting a minimum ANSI A118.4 (or ANSI A118.15 for more extreme conditions) should be recommended.
- Grouts: The grout selected should be able to withstand exterior conditions. This can include cement-based grouts, high-performance cement-based grouts and epoxy grouts.
- Sealants: The sealant selected should be able to withstand foot traffic and exterior conditions. Sealant is recommended at all change of plane, perimeter joints, penetrations, and expansion/control joints per TCNA EJ171.
- Expansion joints and pre-fabricated expansion joints: Tile and stone expand and contract at a different rate than the substrate, because these solar-passive products release heat that they have stored during the day. The products used for installing and grouting tile/stone must coincide with designed movement joints (see most current TCNA EJ171 guidelines).
- Tile (ceramic, porcelain, stone): Not all tile and stone can be used for exterior installations. Make sure that the selections fit the intended purpose and use. Take into consideration the environmental conditions, type of traffic, traffic load, maintenance requirements and slip resistance (DCOF .42 per ASTM C1058 is recommended by TCNA) of the products that are selected, and obtain the manufacturer's written product information and recommendations.
- Sealers: Some tiles or stone types require the use of sealers or grout-release agents. Consult with the manufacturer and, before the installation begins, always test some loose pieces to confirm the desired results.

Jobsite conditions vary and may present installation issues not covered in this technical bulletin. For the most current product information, visit [www.mapei.com](http://www.mapei.com) or contact MAPEI's Technical Services Product Support Team.

MKT: 18-1163  
Edition Date: July 24, 2018



**MAPEI Headquarters of North America**  
1144 East Newport Center Drive  
Deerfield Beach, Florida 33442  
1-888-US-MAPEI (1-888-876-2734) /  
(954) 246-8888