By Noah Chitty

Ceramic Tile in an Exterior Installation

Should I be concerned about freeze/thaw problems with my exterior tile installation?

Most buildings in the United States will be in what is considered a freeze/thaw zone. Direct exposure to the sun and the effect of solar heating must be considered. Changes in ambient temperature must also be evaluated. Tile expands and contracts very little, but the larger the tile or the panel of tile, the more a substantial dimensional change can occur when temperature increases or decreases. In addition, buildings are subject to movement with the wind, settling, and other environmental phenomena.

What physical properties of a ceramic tile are important for use in an exterior installation?

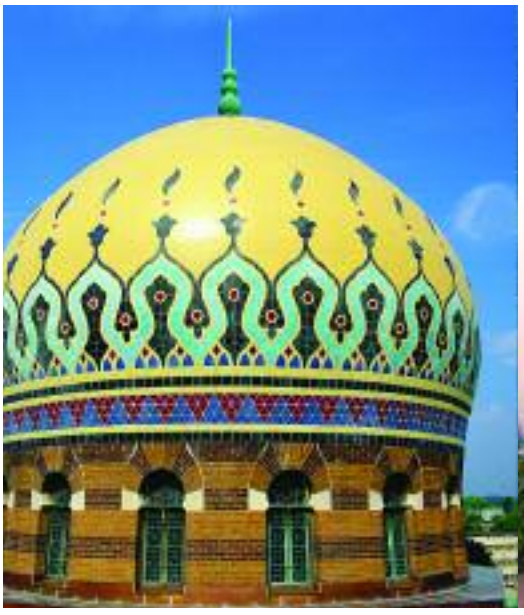
An important property of tile when dealing with a freeze/thaw situation will be how much water the body of the tile can absorb. A "rule of thumb" of 3 percent water absorption or less (when tested per ASTM C373) has often been referenced when talking about freeze/thaw suitability. However, in the lab, we have seen 3 percent water absorption tiles exhibit damage during the ASTM C1026 Freeze/Thaw Cycling test and in turn we have seen 5-7 percent water absorption tiles complete testing with no evidence of damage. While it is generally preferable to select a tile for outdoor use that has low water absorption (most manufacturers report the water absorption of their products), the water absorption percentage does not exclusively determine whether or not the product will be suitable for exterior applications. The manufacturer may run the ASTM C1026 test or other testing to determine if the product will perform in a given environment. In addition, other qualities such as surface texture, wear resistance, and cleanability may be considered. Remember, only the manufacturer can state if the tile is designed and suitable for exterior use.

What other design considerations should be taken?

Correct installation of the product is as essential as choosing the right product when developing a long-lasting tile system. Following industry and manufacturers' guidelines for installation (including drainage, slope, flashing, sealers, etc.) will minimize the amount of water penetrating the tile body. Too much water could cause excess expansion of the tile body, which could lead to debonding or cracking of the body and/or glaze. Also, tile must be bonded in such a way as to minimize any voids underneath the tile, achieving as close to 100 percent coverage as possible (back-buttering may be necessary). Specifications for coverage are included in ANSI A108. If this is not done, water can penetrate the grout joints and fill the pockets left in the mortar, where it can expand and contract when exposed to changes in temperature.

Movement in the structure can also be a problem, as it may exceed the flexural abilities of the ceramic tile. These stresses can be accommodated by providing movement joints in the system. These joints may be over construction joints, control joints or expansion joints, but in this regard, they serve a singular purpose

Below: Domes, patios, and fountains are just a few illustrations of the many exterior applications for ceramic tile.



Photos provided by (left to right) Quarry Tile Co. and Surving Studios, Inc.

- to allow the system to move without translating stresses into the tile layer.

The Tile Council of North America's TCA Handbook for Ceramic Tile Installation, in conjunction with the American National Standard Institute's (ANSI) Standard Specifications for the Installation of Ceramic Tile, A108/118/136.1, provides guidelines for installation of movement joints. The guidelines state that it is the responsibility of the architect, builder, or design professional to specify type and location of movement joints. The tile installer should not bridge these joints with tile nor any non-flexible grouting material. These control joints must remain as "soft" joints through to the finished surface. Where tile meets a restraining surface, such as perimeter walls, dissimilar floors, window ledges, columns, corners, curbs, or doorways, a soft caulking material is required as opposed to grout. Long runs of tile also need a soft joint, spaced in such a way as to prevent the transfer of stress into the tile or the tile bond coat.

How do I select a tile for exterior use?

Selection of ceramic tile should be done using applicable manufacturing standards. These standards provide the criteria that manufacturers use to assure that the tile being produced meets the requirements of the intended use.

Just because tile is offered for sale in the United States, one should not assume that it meets a manufacturing standard. In the United States, ceramic tile is manufactured to meet or exceed the ANSI A137.1 standard. This standard sets important criteria for tile used in exterior applications.

The members of the Tile Council have made the development and publication of standards one of their highest priorities. Our members feel that the path to continued growth is to assure that the highest quality tile is properly manufactured, specified, and installed according to standards – this assures the consumer that their tile work will last a long time. For a copy of the TCA Handbook for Ceramic Tile Installation or ANSI standards, please contact us by phone at 864-646-8453, by fax at 864-646-2821, by email at literature@tileusa.com, or visit our web site: www.tileusa.com. **TILE**

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