Testing and Specifications for ThinBrick

This will be the first in a series of articles designed to explain the testing data requirements used in the selection of architectural thin brick for commercial construction.

Many tests are required and standards set to ensure the success of architectural thin brick used in commercial construction. ASTM C-1088, the standard specification for thin veneer brick units made from clay or shale, is the standard for Type TBX exterior grade thin brick.

Within this standard are requirements relating to moisture and thin brick. In this short article we are going to attempt some explanation of the three critical tests and standards relating to moisture when using thin brick for exterior applications. These three specifications are Absorption, Freeze-Thaw, and Freeze-Thaw Brick in Concrete.

Absorption ASTM C-67
This test is important primarily for products that are to be used in areas subject to moisture. This can be exterior areas or interior areas such as indoor fountains, areas subject to wash down or splashing, and restrooms. Products with high absorption (greater than 6%) may contribute to failures in these types of environments. Thin bricks or sawed facing bricks with high absorption rates are subject to failure when temperatures reach freezing and the water in the pores of the brick expands. This can cause spalling, cracking, delamination or even a dislodging of the brick from the substrate. Highly absorptive materials may also experience moisture expansion that can weaken the adhesion to the substrate.

![Image of spalling and cracking](image)
The image above shows spalling and cracking as the result of higher than acceptable absorption rates in a cold climate application.

Freeze-Thaw ASTM C-67
Testing thin bricks for freeze-thaw resistance ensures that the material does not have large enough voids within its structure and that the material has the physical strength to resist failing when water freezes in the pores. A driving rain on an exposed wall system WILL absorb water. Ensuring that the brick can endure numerous freeze-thaw cycles without failure is critical for most applications. Even structures in areas that do not experience severe freeze-thaw temperature variations by thermometer reading may experience numerous building panel freeze-thaw cycles on southern and western exposed walls. Radiant heat from the sun can warm a building during daylight hours only to freeze during the night. This is, of course, directly related to the absorption testing as products with lower absorption rates will generally experience fewer freeze-thaw related problems.

Freeze-Thaw Brick in Concrete ASTM C-666
The use of thin brick in precast and tilt-up panels is becoming popular as both free standing walls such as in parking structures, as well as building envelopes for schools, office buildings, hospitals, etc. By testing the entire concrete/brick assembly, we ensure that there is a sufficient bond between the thin brick and the concrete. A small panel is subjected to 300 Freeze-Thaw cycles while completely saturated with water after every cycle. Pull-out testing is performed both before and after the freeze-thaw testing in order to assess any deterioration of bond strength. Assemblies passing this rigorous testing will give decades of maintenance free performance. With the use of 5,000 to 7,000 psi self consolidating concrete and a mechanically locking dove-tail thin brick backing, specifiers are assured of the best possible systems available.

![Image of thin brick cast in concrete](image)

In a wide variety of climates, enduring freeze-thaw cycles is critical to a thin brick installation’s success.