



## Where and Wear

**W**hen tile is selected for a project, one critical component that should be considered is the ability of the tile to resist wear. Of course, where it is installed is also important. Tile appropriate for bathroom traffic does not need to be as scratch resistant as tile suitable for an entranceway – unless you live near the beach and are likely to track sand into your bath.

Similarly, tile suitable for airport traffic requires a greater resistance to abrasion than tile suitable for your entranceway. It's also important to consider if the tile is glazed or unglazed. Of course nowadays, as pressing technology and glazing technology have both become increasingly sophisticated, many tiles have both glazed and unglazed properties – but that is a discussion for another day.

Fortunately, three tests exist to provide reassurance to the buyer regarding wear. Two of these tests (ASTM C501 & ASTM C1027) are sufficiently important that they are referenced in the tile manufacturing standard, A137.1. The third test, Mohs'

Hardness, while not addressed in the standard, is sufficiently common that most manufacturers specify values.

**Unglazed Tile: ASTM C501 – “Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser”**

This test examines the amount of weight lost when a sample is subjected to a specified number of revolutions under abrasive

wheels of specified coarseness under a defined load. The result of this test establishes an abrasive wear index which is reported simply as a whole number value. The tile standard, A137.1, lists the minimum index values for various types of tile: 100 for porcelain pavers (floor tile), 50 for natural clay tile, and 35 for quarry tile. When making a purchase, make sure that the tile being considered meets the relevant minimum guideline; or if a tile in place is wearing unacceptably, consider having the “taber value” checked.

**Glazed Tiles: ASTM C1027 – “Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile”**

This test measures the resistance of a tile's surface to abrasion. The glazed surface of a tile is subjected to a rotating wet abrasive load and a visual comparison is made between the abraded tile and an original tile



**Right: The ASTM C-1027 test procedure for glazed tile surfaces entails four-inch tile squares subjected to swirling abrasive media on the tile's surface. A calibrated light box is used to visually compare the center tile to the surrounding unabraded tiles for surface damage. Surface wear is detected visually from a designated distance and viewing angle.**

under specified lighting, at a specified distance, after a specified number of revolutions. A stain may be applied in order to determine if the abraded tile surface will entrap dirt. In total the test runs from 100 – 12,000 revolutions and depending on the number of revolutions passed, the result is classified from 0 to 5 (or Class 0 to Class V). Often, this value is mistakenly referred to as

a PEI (Porcelain Enamel Institute) rating, referring incorrectly to a system for evaluating enamel surfaces. The correct reference is to C1027 or ISO 10545-7 (the equivalent test method under the International Standards Organization). A value of 4 is common for most commercial spaces and 3 for most interior residential areas.

Since many tiles have glazed and



**Above:** This picture shows the mechanical device used to present swirling abrasive media to the glazed surface of the tiles.

unglazed properties, sometimes both tests will be run to better assess their resistance to abrasion.

### Mohs' Hardness

This test, developed in 1822 by Friedrich Mohs, compares the relative scratch resistance of 10 common minerals. If a tile can be scratched by a mineral from the list, it is softer than that mineral. Tiles are evaluated by testing them against increasingly harder minerals, ranging from talc (1) to diamond (10). Since quartz sand has a Mohs' value of 7, tiles measuring 7 or better are commonly specified if resistance to sandy soils is desired. Please note though that Mohs' scratch resistance does not correlate with abrasion resistance and the range from 1 to 10 is not linear. In fact, some materials measure very differently depending on the direction in which they are scratched so the Mohs' test is a useful indicator but not an exacting analytical tool.

### Conclusion

These tests address how a tile will perform with respect to wear and tear and reveal that there are multiple aspects to consider. They are useful indicators to guide you when deciding how a tile will wear and should be considered when decided where it should be installed. **TILE**

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