



Tile Abrasion: ASTM C1027 and Possible Upcoming Changes

The mosaics of San Vitale in Ravenna, Italy, date from 522 A.D. While most consumers aren't concerned if their tile projects will last 1,500 years, they do want to know if the tile will change after five, 10, 15 or more years. The good news is many ceramic tiles can literally last a lifetime, but how can one be sure of this before purchasing?

The ASTM C1027 test method for evaluating glazed tiles for resistance to abrasion classifies tiles on a scale of 0 to 5, depending on the point at which abrasion is first visible. This classification is often incorrectly referred to as the “PEI rating”. The correct term is visible abrasion classification.¹ The newest version of the ANSI A137.1 specification for ceramic tile, released in 2008, includes a chart with the maximum recommended use for each classification (**Figure 2**) and examples of where each class of tile can be installed. Although this information makes it seem very simple to specify where a tile can

be used, with the evolution of more sophisticated glazes, research shows the ASTM C1027 test method now may not appropriately predict “real life” wear of tiles, especially dark-colored tiles.

The ASTM C1027 method calls for steel ball bearings and coarse aluminum oxide grit to abrade the tile surface. With aluminum oxide scoring 9 on the MOHs hardness scale (diamond scoring 10), its use results in obvious abrasion, especially on dark-colored glazes. When

the C1027 method was developed more than two decades ago, ceramic tile glazes and glazing techniques were very different from those currently in use. While these glazes showed obvious wear with the aggressive media used in C1027, this correlated with the wear that occurred in an installation over time.

Many manufacturers produce higher performing tiles now, including those with darker colors, which are easily suitable for heavy commercial applications (Class 5). But many are rated lower by the C1027 method, because even these higher performing tiles glazes are chewed up by the coarse aluminum oxide grit of the current method.

Multiple studies have been run with such tiles installed in heavy commercial applications over many years, often with very little evidence of wear after many years of heavy foot traffic, although some of the darker tiles scored as low as class 2 in the C1027 test.



Right: Mosaic tile installation at San Vitale in Ravenna, Italy, dating back to 522 A.D.

Table 12: Visible Abrasion Classification

Class	Maximum Recommended Use
O	Not recommended for floors
I	Light Residential
II	Residential
III	Heavy Residential or Light Commercial
IV	Commercial
V	Heavy Commercial

Figure 2: Table 12 from ANSI A137.1-2008 includes the maximum recommended use for each classification from ASTM C1027.

What is being done to make improvements?

For the past few years, researchers from all over the world have been working to develop a more appropriate abrasion test method using abrasive materials that better represent “real world” abrasives. A new method has been proposed that uses rubber material and silica sand. The rubber is comparable to a person’s shoe sole, and the sand is similar to the dirt tracked in from outdoors.

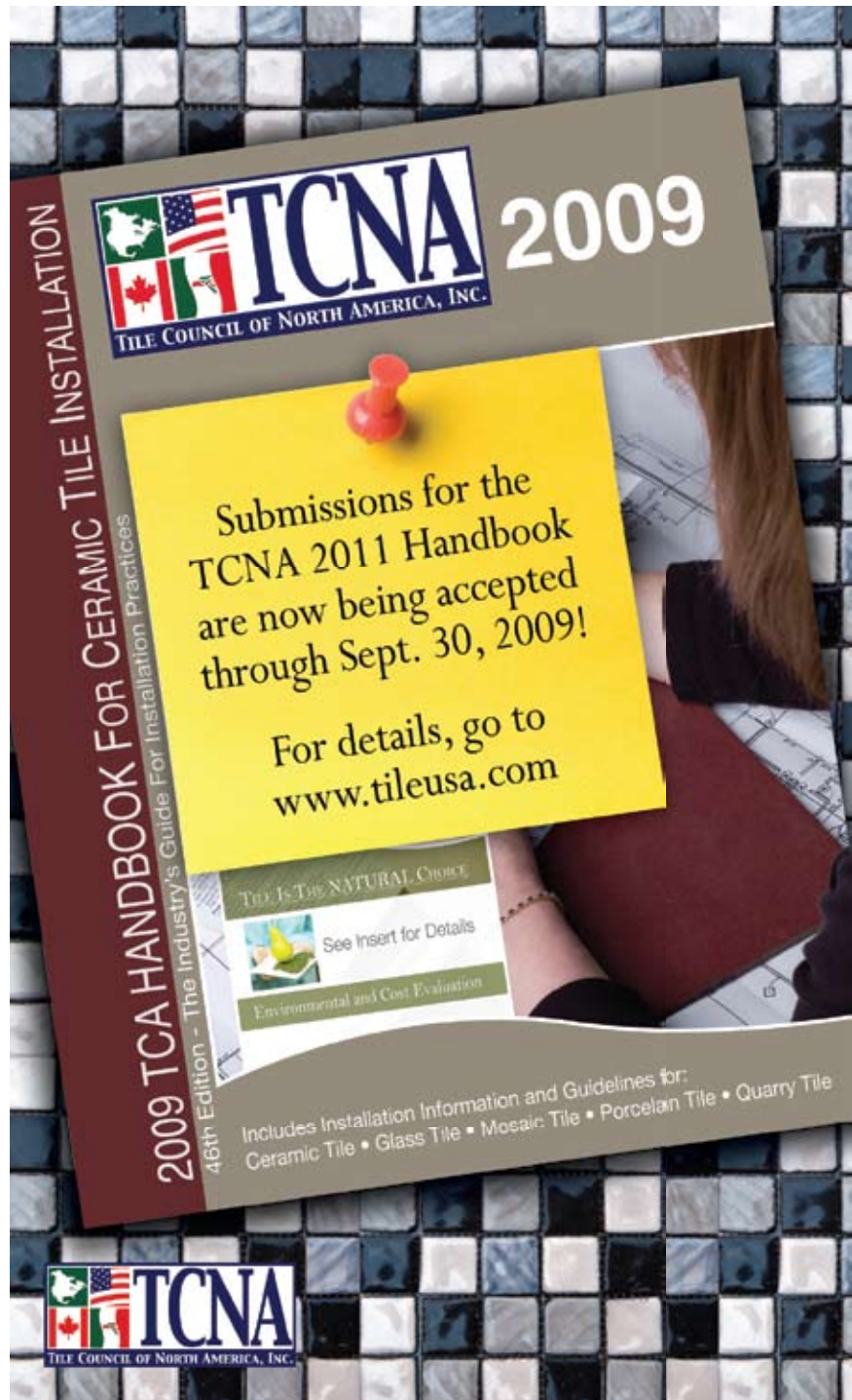
The Tile Council of North America (TCNA) is evaluating this new method, both for suitability in the U.S. and possibly for development as an international standard. To be an international standard, TCNA is carefully working to specify all of the materials used and compare materials obtained from various sources. With U.S. representatives serving on the ISO committee for tile standards (TC-189) in both the Secretariat and Chairman roles, TCNA is well positioned to provide leadership in the standardization of this important test. The goal is for one worldwide method that will better characterize the tiles being manufactured today, and provide all end-users a more accurate way to assess a tile’s expected performance. **TILE**

¹ The term “PEI rating” is associated with the Porcelain Enamel Institute and not the tile industry. The appropriate term would be Visible Abrasion Classification as stated in ANSI A137.1.



About the Author

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