

Tile Specifications STANDARDS & REGULATIONS

Developed by Nature Pebble 12 in. x 24 in.
tile shown in corridor horizontal pattern

PORCELAIN/CERAMIC TEST RESULTS

Marazzi has always been proud to support solutions that better our industry. That's why we're among the first to join the Tile Council of North America in testing our products with DCOF AcuTestsm, a new industry standard used to measure dynamic coefficient of friction (DCOF). DCOF AcuTestsm assesses a product's suitability for the commercial environment and the specific usability needs of the application.

A Measure of Friction

Friction is the force that resists the sliding motion of one surface against another. Contaminants, such as liquids, can alter the measurement of friction. There are two types of friction: static (SCOF) and dynamic (DCOF). SCOF is the ratio of forces necessary to start two surfaces sliding. This is what the former American Society for Testing and Materials (ASTM) C1028 static test measured. DCOF is the ratio of forces necessary to keep two surfaces sliding.

Continually Pushing the Envelope

Marazzi, in partnership with the Tile Council of North America (TCNA), is proud to endorse the DCOF AcuTestsm because it's the most accurate method for determining whether or not a product is suitable for a commercial environment.

- Similar to measuring the speed of a car in both mph and kph, friction can also be measured on two scales (DCOF and SCOF). The new 0.42 wet (DCOF) is replacing the old reference of 0.60 COF wet, which has long been the benchmark for friction in commercial applications.
- The new, more stringent DCOF AcuTestsm uses a portable robot that, unlike ASTM C1028, gives realistic values on very smooth surfaces.

While the industry standard is changing, the quality you can count on from us remains the same.

Water Absorption, ASTM C373-88

Water absorption is measured using ASTM C373-88. Individual tiles are weighed, saturated with water, then weighed again. The percent difference between the two conditions is referred to as the water absorption value. Tiles are classified according to water absorption percentages as follows:

Impervious	Tiles exhibiting 0.5% or less.
Vitreous	Tiles exhibiting more than 0.5%, but not more than 3.0%.
Semi-Vitreous	Tiles exhibiting more than 3.0%, but not more than 7.0%.
Non-Vitreous	Tiles exhibiting more than 7.0%.

Scratch Hardness – Mohs Scale Ratings

The relative hardness of glazed tile is an important issue that should be addressed when selecting a tile. The test is performed by scratching the surface of the tile with different minerals and subjectively assigning a "Mohs Scale of Mineral Hardness" number to the glaze. The softest mineral used is talc ("1" rating)—the hardest is a diamond ("10" rating). Other minerals of varying hardness providing Mohs Scale of Mineral Hardness values of 5 or more are suitable for most residential floor applications. A value of 7 or greater is normally recommended for commercial applications.

Breaking Strength Ceramic Tile, ASTM C648-04

Ceramic tiles used on floors and walls must be able to withstand the expected load bearing capacity of various

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installations. The tile industry uses ASTM C648-04 to determine the strength and durability of the tile. A force is applied to an unsupported portion of the tile specimen until breakage occurs. The ultimate breaking strength is then recorded in pounds. Final selection of the tile should be based upon the breaking strength and the appropriate installation method. Tile integrity is critically dependent upon proper installation. Marazzi recommends strict adherence to industry installation guidelines set forth in ANSI A108, A118 and A136.

Chemical Resistance, ASTM C650-04

Chemical resistance is measured using ASTM C650-04. A tile sample is placed in continuous contact with a variety of chemicals for 24 hours, rinsing the surface and then examining the surface for visible variation.

Shade Variations

Tiles range from complete consistency to a more random appearance. Here's an overview of color and shading of individual tile selections:

Shade variation V0	Monochromatic appearance	Pieces of the same shade value are very uniform and smooth in texture.
Shade variation V1	Low variation	Differences among pieces from the same production run are minimal.
Shade variation V2	Medium variation	Clearly distinguishable differences in texture and/or pattern within similar colors.
Shade variation V3	High variation	While the colors and/or texture present on a single piece of tile will be indicative of the color and/or texture to be expected on the other tiles, the amount of color and/or texture on each piece may vary significantly. It is recommended that the entire range be viewed before selection.
Shade variation V4	Random variation	Random color and/or texture differences from tile to tile, so that one tile may have totally different colors and/or textures from that on other tiles. Thus, the final installation will be unique. It is recommended that the entire range be viewed before selection.

Frost Resistance

Industry criteria dictate that tile shall not exceed 5% water absorption to be recognized as frost resistant. To be recognized as Porcelain tile, the water absorption rate cannot exceed 0.50% (impervious). Wall tile must not exceed 20% water absorption and is not frost resistant.

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Abrasion Resistance, ASTM C1027-99

The durability of glazed tile is measured subjectively by observing the visible surface abrasion of the tile when subjected to the ASTM C1027-99 testing procedure. Marazzi evaluates glazed tile recommended for floor applications using this test method which includes the following classification system:

CLASS ONE

Tile in this class may withstand soft-soled foot traffic, provided that dirt and/or other abrasives are not present on the wear surface. Class I tile should not be used in areas with direct access to the outside or large amounts of foot traffic. See Frost Resistance for installation-specific details.

CLASS TWO

Tile in this class may withstand soft-soled and some normal foot traffic provided the dirt and/or other abrasives are kept to a minimum. Class II tile should not be used in areas with direct access to the outside, large amounts of foot traffic, or areas exposed to abnormal footwear. See Coefficient of Friction and Frost Resistance for installation-specific details.

CLASS THREE

Tile in this class may withstand normal footwear and regular traffic, with some dirt and/or other abrasives present in limited quantities. Tile in this class may be used in light commercial installations with limited foot traffic and with no direct access to the outside including residential kitchens and hallways, with limited traffic from the outside. See Coefficient of Friction and Frost Resistance for installation-specific details.

CLASS FOUR

Tile in this class may withstand heavier amounts of traffic with greater amounts of dirt and/or other abrasives present including commercial kitchens and areas with regular traffic from the outside. See Coefficient of Friction and Frost Resistance for installation-specific details.

CLASS FIVE

Tile in this class may withstand constant foot traffic with larger amounts of dirt and/or other abrasives including airports, malls, and other commercial walkways subject to high volumes of foot traffic and constant traffic from the outside. See Coefficient of Friction and Frost Resistance for installation-specific details.

Coefficient of Friction, DCOF Wet Areas (Minimum 0.42)

Water, oil, grease or other fluids create slippery conditions. When installing floors in areas with exposure to these conditions, a minimum DCOF value of 0.42 is required. Additionally, extra caution is required with regards to product selection and proper maintenance. Visit www.tcnatile.com for complete information regarding the DCOF Acutestsm test method and values.

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Industry Standards

The American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI) are nationally recognized organizations, which identify and develop industry test methods and technical standards.

Neither ASTM nor ANSI establish an industry standard identifying a minimum COF value whereby ceramic tile may be labeled "slip resistant". All Standard Grade ceramic tile products manufactured by or for Marazzi meet or exceed the requirements of ANSI A137.1. See product pages for series-specific technical data.