



Standard Test Method for Determination of Resistance to Staining¹

This standard is issued under the fixed designation C 1378; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method is intended to determine the resistance to staining of ceramic tile surfaces.

1.2 The resistance to staining is determined by maintaining test solutions in contact with ceramic tile surfaces for a specified period of time. After exposure, the surface is cleaned in a defined manner, and the test specimens are inspected visually for change.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Staining Agents

2.1 *Contrasting Grout*, unsanded tile grout, applied as a neat paste.

2.2 *Carbon Lamp Black*.²

2.3 *Waterproof Ink Black*.³

2.4 *Washable Ink*.⁴

2.5 *Potassium Permanganate Solution, 1 %*, prepared from 99 % KMnO_4 crystals, dissolve 1g of reagent into 100 mL of distilled water.

2.6 *Methylene Blue Solution, 1 %*.⁵

2.7 This test method may be used for exposing tile to any staining agent deemed appropriate for the expected service conditions and may specify any reasonable combination of time and temperature for the exposure period. Exposure substances, time, and temperatures should be selected so as to either simulate service conditions, or accelerate staining that is possible under expected service conditions, or bear some other meaningful relation to expected service conditions.

3. Apparatus

3.1 *Test Tubes*, plain end glass test tubes with a diameter of 20 mm and a length of 150 mm.

3.2 *Pipets*, glass pipet with a volume of at least 50 mL with gradations in 1-mL increments.

3.3 *Oven*, capable of maintaining a constant temperature of $110 \pm 5^\circ\text{C}$.

3.4 *Cloths*, a supply of lintless, absorbent clothes or paper towels.

3.5 *Distilled or Deionized Water*, for preparation of the solutions.

3.6 *Light Source*, standard light source that supplies a 300 lux of illumination.

3.7 *Cleaning Agents*.

3.7.1 *Hot water*.

3.7.2 *Weak cleaning agent*, a commercial agent, not containing abrasive, with a pH of 6.5 to 7.5.

3.7.3 *Strong cleaning agent*, a commercial cleaning agent containing abrasive, with a pH of 9 to 10.

3.7.4 *Suitable solvents*:

3 % (v/v) HCl solution, prepared from 38 % hydrochloric acid by adding 79 mL of the reagent hydrochloride acid solution to 951 mL of distilled water.

20 % KOH solution (200 g/L), prepared by dissolving 200 g of 90 % potassium hydroxide into 1 L of distilled water. Acetone (technical grade).

4. Samples

4.1 *Number of Test Specimens*—One defect-free test specimen, which is representative of the entire surface, for each test solution is to be used. Test specimens shall be representative of the sample, and where tiles have different colors of decorative effects, care should be taken to include all distinctive parts. More test specimens may be necessary to incorporate all surface features.

4.2 *Size of Specimens*—The original tile for testing should be cut to 50- by 50-mm squares for testing with each cut piece labeled according to the testing solution to be applied.

4.3 The sample surfaces should be thoroughly cleaned with a suitable solvent, such as acetone and completely dried before testing.

¹ This test method is under the jurisdiction of ASTM Committee C21 on Ceramic Whitewares and Related Products and is the direct responsibility of Subcommittee C21.06 on Ceramic Tile.

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² Technical grade is available from Fischer Scientific, 2000 Park Lane, Pittsburgh, PA 15275.

³ Use permanent black ink, Quink by Parker, or an equivalent.

⁴ Use washable blue ink, Quink by Parker, or an equivalent.

⁵ Aqueous solution is available from Fischer Scientific, 2000 Park Lane, Pittsburgh, PA 15275.