Designation: ~~C373 – 16ε1~~ C373 – 17

Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products[1]

This standard is issued under the fixed designation C373; 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.

~~ε[1] NOTE—Section 5.3.1 was revised editorially in December 2016.~~

1. Scope*

1.1 These test methods covers procedures for determining water absorption, bulk density, apparent porosity, and apparent specific gravity of non-tile fired unglazed ceramic whiteware[2] products, glazed or unglazed ceramic tiles, and glass tiles.

1.2 The values stated in metric units are normative. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not normative.

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.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Significance and Use

3.1 Measurement of density, porosity, and specific gravity is a tool for determining the degree of maturation of a ceramic body, or for determining structural properties that may be required for a given application.

4. Apparatus and Materials

4.1 *Balance or scale,* of adequate capacity, suitable to weigh accurately to 0.01 g (0.00002 lb).

4.2 *Oven,* capable of maintaining a temperature of 150 ± 5°C (302 ± 9°F).

4.3 *Wire Loop, Halter, or Basket,* capable of supporting specimens under water for making suspended mass measurements.

4.4 *Suspended Mass Container (if Determination of Suspended Mass is Desired)*—A glass beaker or similar container of such size and shape that the sample, when suspended from the balance by the wire loop, specified in ~~3.3~~4.3, is completely immersed in water with the sample and the wire loop completely free of contact with any part of the container.

4.5 *Stainless Steel Boiling Container,* suitable for boiling water and with sufficient capacity to hold the test specimens and quantity of water specified in ~~5.2~~6.2. The container shall be equipped with a loose removable cover which does not allow pressure to build.

4.6 *Deionized (DI) or Distilled Water.*

[1] These test methods is under the jurisdiction of ASTM Committee C21 on Ceramic Whitewares and Related Products and is the direct responsibility of Subcommittee C21.03 on Methods for Whitewares and Environmental Concerns.

Current edition approved ~~Aug. 1, 2016~~Sept. 1, 2017. Published ~~August 2016~~September 2017. Originally approved in 1955. Last previous edition approved in ~~2014~~2016 as ~~C373 – 2014a.~~C373 – 16ε1. DOI: ~~10.1520/C0373-16E01.~~10.1520/C0373-17.

[2] Non-tile ceramic whitewares are ceramic whitewares as defined in ASTM Terminology Standard C242, excluding ceramic tiles.

***A Summary of Changes section appears at the end of this standard**

4.7 *Microfiber Cloth.*

4.8 *Heat Source,* such as a hot plate, burner, or equivalent to heat the water to boiling.

4.9 *Desiccator*—a sealed chamber containing desiccants which is of sufficient size and capacity to allow specimens to cool while preventing the specimens from absorbing moisture from ambient air.

4.10 *Pressure Vessel,* capable of holding a vacuum of 91 ± 5 kPa (26.9 ± 1.5 inHg) below standard atmospheric pressure. The vessel shall be large enough to hold the required number of tile samples and the necessary volume of water to cover the tiles during testing. A modified 41.5 quart pressure cooker has been found to meet these requirements.

4.11 *Vacuum Pump,* capable of achieving and holding the required vacuum.

4.12 *Gauge,* capable of measuring the required vacuum. Gauge shall be installed on a manifold connected directly to the pressure vessel. Readings from any gauges present on the pump are not acceptable forms of measurement.

4.13 *Hoses, fittings, valves, solenoids, or combinations thereof,* assembled in such a way to allow manually or automatic operation.

4.14 *Timer,* accurate to 1 second.

5. Test Specimens:

5.1 *Non-tile Fired Ceramic Whitewares:*

5.1.1 At least five representative test specimens shall be selected that have not been previously tested. The specimens shall be unglazed and shall have as much of the surface freshly fractured as is practical. Sharp edges or corners shall be removed. The specimens shall contain no cracks. The individual test specimens shall weigh at least 50 g (0.11 lb).

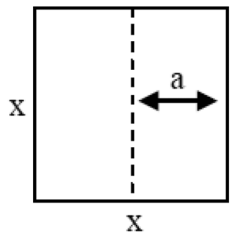
5.2 *Ceramic Tiles and Glass Tiles:*

5.2.1 Sampling shall be carried out in accordance with Sections ~~4.2.2~~5.2.2 – ~~4.2.9~~5.2.9 (for irregularly shaped tiles, see Note 1). Tiles and relevant specimens must contain no visible damage or cracks prior to testing and have not been previously tested. Any loose or contaminating material shall be removed. This includes any mesh, paper and adhesive that has been applied to mosaics. Cutting of specimens, as described in the following sections, shall consist of scoring and snapping, or sawing when impossible to score and snap with conventional tile scoring equipment (as can be the case with some glass tiles and textured and structured porcelain tiles).

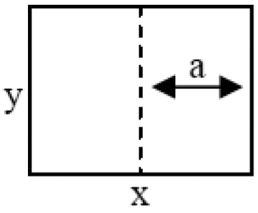
NOTE 1—For irregularly shaped tiles (hexagons, circles, and so forth), consider the area of the minimum rectangle in which the tile can be fit.

5.2.2 For tiles less than or equal to 205 × 205 mm (8 × 8 in.), at least five representative test specimens shall be selected. Specimens shall be cut in half, within 10 mm (0.4 in). Specimens shall be cut perpendicular to the longest side if the specimen has unequal sides. Select one half at random from each specimen for testing (see Fig. 1a and Fig. 1b).

5.2.3 For tiles greater than 205 × 205 mm (8 × 8 in.) and less than or equal to 410 × 410 mm (16 × 16 in.) at least five representative test specimens shall be selected. Each specimen shall be cut into four equal quadrants, within 10 mm (0.4 in). Select one quadrant at random from each specimen for testing (see Fig. 2).



(a.) Equal Sides: x ≤ 205 mm, , a = ½ x (within 10 mm)



(b.) Unequal Sides: x ≤ 205 mm, y ≤ 205 mm, x > y, a = ½ x (within 10 mm)

FIG. 1 (a) & FIG. 1 (b)