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American Association State Highway and Transportation Officials Standard
AASHTO No.: T 32-70

Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile[1]

This standard is issued under the fixed designation C67/C67M; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 These test methods cover procedures for the sampling and testing of brick and structural clay tile. Although not necessarily applicable to all types of units, tests include modulus of rupture, compressive strength, absorption, saturation coefficient, effect of freezing and thawing, efflorescence, initial rate of absorption and determination of weight, size, warpage, length change, and void area. (Additional methods of test pertinent to ceramic glazes include imperviousness, chemical resistance, opacity, and resistance to crazing.

1.2 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

NOTE 1—The testing laboratory performing this test method should be evaluated in accordance with Practice C1093.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.4 These test methods include the following sections:

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *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:*[2]

C150/C150M Specification for Portland Cement
C1093 Practice for Accreditation of Testing Agencies for Masonry
C1232 Terminology for Masonry
E4 Practices for Force Calibration and Verification of Testing Machines
E6 Terminology Relating to Methods of Mechanical Testing
E177 Practice for Use of the Terms Precision and Bias in

[1] These test methods are under the jurisdiction of Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.02 on Brick and Structural Clay Tile.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

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

3. Terminology

3.1 *Definitions*—For definitions relating to sampling and testing brick, refer to Terminology E6 and Terminology C1232.

4. Sampling

4.1 *Selection and Preparation of Test Specimens*—For the purpose of these tests, full-size brick, tile, or solid masonry units shall be selected by the purchaser or by the purchaser's authorized representative. Specimens shall be representative of the lot of units from which they are selected and shall include specimens representative of the complete range of colors, textures, and sizes. Specimens shall be free of or brushed to remove dirt, mud, mortar, or other foreign materials unassociated with the manufacturing process. Brushes used to remove foreign material shall have bristles of plastic (polymer) or horsehair. Wire brushes shall not be used for preparing specimens for testing. Specimens exhibiting foreign material that is not removed by brushing shall be discarded to ensure that damaged or contaminated specimens are not tested.

4.2 *Number of Specimens:*

4.2.1 *Brick*—For the modulus of rupture, compressive strength, abrasion resistance, and absorption determinations, at least ten individual brick shall be selected for lots of 1 000 000 brick or fraction thereof. For larger lots, five additional specimens shall be selected from each additional 500 000 brick or fraction thereof. Additional specimens are taken at the discretion of the purchaser.

4.2.2 *Structural Clay Tile*—For the weight determination and for compressive strength and absorption tests, at least five tile shall be selected from each lot of 250 tons [250 mt] or fraction thereof. For larger lots, five additional specimens shall be tested for each 500 tons [500 mt] or fraction thereof. In no case shall less than five tile be taken. Additional specimens are taken at the discretion of the purchaser.

4.2.3 *Ceramic Glazed Units*—For imperviousness, chemical resistance, crazing, and opacity tests, select a representative of 10 units for lots of 1 000 000 units, or fraction thereof. For larger lots, select five additional specimens from each additional 500 000 units, or fraction thereof. Do not use specimens selected for 4.2.1 or 4.2.2.

4.3 *Identification*—Each specimen shall be marked so that it is identifiable at any time. Markings shall cover not more than 5 % of the superficial area of the specimen.

5. Specimen Preparation

5.1 *Drying and Cooling:*

5.1.1 *Drying*—Dry the test specimens in a ventilated oven at 221 to 239°F [105 to 115°C] for not less than 24 h and until two successive weighings at intervals of 2 h show an increment of loss not greater than 0.2 % of the last previously determined weight of the specimen.

5.1.2 *Cooling*—After drying, cool the specimens in a drying room maintained at a temperature of 75 ± 15°F [24 ± 8°C], with a relative humidity between 30 and 70 %. Store the units free from drafts, unstacked, with separate placement, for a period of at least 4 h and until the surface temperature is within 5°F [2.8°C] of the drying room temperature. Do not use specimens noticeably warm to the touch for any test requiring dry units. The specimens shall be stored in the drying room with the required temperature and humidity maintained until tested.

5.1.2.1 An alternative method of cooling the specimens to approximate room temperature is permitted as follows: Store units, unstacked, with separate placement, in a ventilated room maintained at a temperature of 75 ± 15°F [24 ± 8°C], with a relative humidity between 30 and 70 % for a period of 4 h and until the surface temperature is within 5°F [2.8°C] of the ventilated room temperature, with a current of air from an electric fan passing over them for a period of at least 2 hours. The specimens shall be stored in the ventilated room with the required temperature and humidity maintained until tested.

5.2 *Weight Determination:*

5.2.1 Weigh five full size specimens that have been dried and cooled (see 5.1). The scale or balance used shall have a capacity of not less than 3000 g and shall be sensitive to 0.5 g.

5.2.2 Report results separately for each specimen to the nearest 0.1 g, with the average of all specimens tested to the nearest 0.1 g.

5.3 *Removal of Silicone Coatings from Brick Units*—The silicone coatings intended to be removed by this process are any of the various polymeric organic silicone compounds used for water-resistant coatings of brick units. Heat the brick at 950 ± 50°F [510 ± 28°C] in an oxidizing atmosphere for a period of not less than 3 hours. The rate of heating and cooling shall not exceed 300°F [149°C] per hour.

NOTE 2—Additional specimen preparation requirements for specific tests are indicated in the individual test methods.

6. Modulus of Rupture (Flexure Test)

6.1 *Test Specimens*—The test specimens shall consist of whole full-size units that have been dried and cooled (see 5.1). Five such specimens shall be tested.

6.2 *Procedure:*

6.2.1 Support the test specimen flatwise unless specified and reported otherwise (that is, apply the load in the direction of the depth of the unit) on a span approximately 1 in. [25 mm] less than the basic unit length and loaded at midspan. Specimens having recesses (panels or depressions) shall be placed so that such recesses are on the compression side. Apply the load to the upper surface of the specimen through a steel bearing plate ¼ in. [6 mm] in thickness and 1½ in. [38 mm] in width and of a length at least equal to the width of the specimen.

6.2.2 Make sure the supports for the test specimen are free to rotate in the longitudinal and transverse directions of the test specimen and adjust them so that they will exert no force in these directions.

6.2.3 *Speed of Testing*—The rate of loading shall not exceed 2000 lbf [9000 N]/min. This requirement is considered as being met when the speed of the moving head of the testing machine immediately prior to application of the load is not more than 0.05 in. [1.25 mm]/min.