ASTM INTERNATIONAL

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Standard Test Method for
Determination of Breaking Strength of Ceramic Tiles by Three-Point Loading[1]

This standard is issued under the fixed designation C 1505; 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 covers the determination of breaking strength of ceramic tiles by three-point loading.

1.2 *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. Referenced Documents

2.1 *ASTM Standards:*
C 242 Terminology of Ceramic Whitewares and Related Products[2]

3. Terminology

3.1 For the definitions of terms used on this test method, refer to Terminology C 242.

4. Summary of Test Method

4.1 This test method consists of determining the breaking strength of ceramic tiles using a three-point loading method. The tiles are supported on two cylindrical support rods positioned to provide an appropriate span. A load is applied at a uniform rate using a third central cylindrical rod positioned at the midpoint between the support rods. The breaking strength is calculated by multiplying the load at which the tile breaks by the ratio of the span between support rods divided by the width of the specimen.

5. Significance and Use

5.1 This test method is intended for determining the breaking strength of ceramic tiles for compliance with requirements that may appear in specifications.

6. Apparatus

6.1 *Testing Machine*, capable of loading at a uniform rate sufficient to increase the stress in the specimen at a rate of 1 ±

0.2 N/mm^2 (145 ± 29 psi) per second. The rod support table of the testing machine shall be indexed such that the cylindrical support rods are positioned at 4 mm increments.

6.2 *Cylindrical Support Rods*, 2, of length, w, with a steel core of diameter, d, and a rubber bearing surface of 55 ± 3 Shore A durometer hardness and thickness, t (see Table 1). One rod shall be permitted to pivot slightly relative to its length and the other shall be permitted to rotate slightly relative to its axis (see Fig. 1).

6.3 *Central Cylindrical Rod*, of length, w, with a steel core of diameter, d, and a rubber bearing surface of 55 ± 3 Shore A durometer hardness and thickness, t. The rod shall be permitted to pivot slightly relative to its axis.

7. Sampling

7.1 The test sample shall consist of ten whole tiles, selected at random from the lot to be tested. Tiles too large to be tested whole may be cut; however, the cut specimens shall be square and as large as possible, though not larger than the rod length. The centerpoint of the cut specimen shall coincide with the original centerpoint of the whole tile.

8. Procedure

8.1 Position the cylindrical support rods (6.2) on the rod support plate (6.2) with an appropriate span, L, to the nearest 4 mm so that the specimens will overhang each support rod by length, l (see Table 1). Place each specimen face up on the support rods. In the case of reversible tile, such as unglazed ceramic mosaic tile, it is immaterial which side of the specimen is up. If applicable, position each specimen so that the longer side or the directional back-pattern is at right angles to the supports. In the case were both conditions exist, the orientation of the longer side shall take precedence.

8.2 Position the central cylindrical rod (6.3) on the face of the specimen at the midpoint between the support rods. Load the specimen with the central rod at a uniform rate sufficient to increase the stress in the specimen at a rate of 1 ± 0.2 N/mm^2 (145 ± 29 psi) per second. The load rate in N/s can be determined by the following equation:

$$r = 2bh^2/3L \qquad (1)$$

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

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[2] *Annual Book of ASTM Standards*, Vol 15.02.