



Designation: C1870 – 18 (Reapproved 2024)

Standard Test Method for Determination of Impact Diameter from Falling Ball on Ceramic Tile¹

This standard is issued under the fixed designation C1870; 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 procedures for measuring impact properties of ceramic tile, bonded to a standardized concrete substrate, from a falling 2-in. steel ball.

1.2 This test method is intended solely for evaluating standardized laboratory test specimens and does not purport to simulate actual installed performance.

1.3 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *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.*

1.5 *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 *ISO Standards:*

ISO 13007-2 Ceramic tiles – Grouts and adhesives – Part 2: Test methods for adhesives

3. Summary of Test Method

3.1 A 2-in. steel ball is dropped from a specified height onto a bonded tile assembly, and the diameter of the impact area is measured and reported.

4. Significance and Use

4.1 Impact diameter may be used to interpret impact resistance.

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.

Current edition approved Feb. 1, 2024. Published February 2024. Originally approved in 2018. Last previous edition approved in 2018 as C1870 – 18. DOI: 10.1520/C1870-18R24.

4.2 Maximum impact diameter may be a specified requirement for tile.

5. Apparatus

5.1 *Steel Ball*—A grade 25 chrome steel ball bearing which is 2 in. $\pm$ 0.1 in. (50.8 mm) in diameter with a mass of 1.2 lb $\pm$ 0.1 lb (540 g).

5.2 *Ball Drop Device*—A suitable means of holding and releasing the steel ball from a predetermined height. A section of pipe, with an inside diameter at least $\frac{1}{32}$ in. (0.8 mm) larger than that of the steel ball, and with holes drilled at 1 in. (25.4 mm) increments has been known to work. The device may be fixed to a table or cabinet and a pin may be placed through the previously drilled holes to act as a release for the steel ball. (See Fig. 1.)

6. Sample Preparation

6.1 *Concrete Substrate*—Prepare six 6 in. $\pm$ 0.3 in. by 6 in. $\pm$ 0.3 in. (152.4 mm by 152.4 mm) substrate blocks. The test substrate shall be 1.6 in. $\pm$ 0.2 in. (40.6 mm) thick, have a moisture content of less than 3 % by mass and have a water absorption at the surface after four hours of testing in range of 0.03 in.³ – 0.09 in.³ (0.5 cm³ – 1.5 cm³). The cohesive strength shall be at least 218 psi (1.5 N/mm²). A method for manufacturing a suitable concrete substrate may be found in informative Annex A of ISO 13007 Ceramic Tiles: Products for Installation Part 2 Adhesives – Test Methods.

6.2 *Test Specimens*—Prepare three test assemblies for the 36-in. (914.4 mm) drop and three test assemblies for the 48-in. (1219.2 mm) drop. Each test assembly shall be comprised of a 6 in. $\pm$ 0.3 in. by 6 in. $\pm$ 0.3 in. (152.4 mm by 152.4 mm) piece of tile (which may be cut at random from a larger tile) and a concrete substrate block. The tile shall be bonded to a clean, dry concrete test substrate block using a bonding adhesive recommended by the manufacturer or supplier of the product(s) being tested. Cure all test assemblies in accordance with the recommendation by the manufacturer or supplier of the product(s) being tested.

7. Procedure

7.1 *36-in. Drop*—Position the test assembly under the ball drop device so that the steel ball will impact the center of the