



Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements¹

This standard is issued under the fixed designation C1708; 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 These test methods are appropriate to evaluate the performance of self-leveling mortars containing hydraulic cements that are used to improve the levelness, smoothness, and flatness of existing floors. These materials may be used as an underlayment to receive floor finishes, or as an overlayment to serve as the wear surface. The self-leveling mortars covered by these test methods consist of proprietary blends of hydraulic cements, along with fine aggregate, polymers, fillers, and other additives.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard. Some values have only SI units because the inch-pound equivalents are not used in practice.

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. (Warning—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.)*²

2. Referenced Documents

2.1 *ASTM Standards*:³

C109/C109M Test Method for Compressive Strength of

Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

C125 Terminology Relating to Concrete and Concrete Aggregates

C157/C157M Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

C191 Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle

C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

C348 Test Method for Flexural Strength of Hydraulic-Cement Mortars

C490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete

C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

C778 Specification for Sand

C928/C928M Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs

C1005 Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements

C1107/C1107M Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

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

3. Terminology

3.1 *Definitions*—For definitions of terms used in these test methods, refer to Terminology C125.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *flow, n—of self-leveling mortars*, the ability of a freshly-mixed, self-leveling mortar to spread under its own weight.

3.2.2 *healing, n*—the ability of a self-leveling mortar to return to its original state of levelness and smoothness after being disturbed.

¹ These test methods are under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and are the direct responsibility of Subcommittee C09.43 on Packaged Dry Combined Materials.

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² Section on Safety Precautions, Manual of Aggregate and Concrete Testing, *Annual Book of ASTM Standards*, Vol 04.02.

³ 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.

3.2.3 *mortar, self-leveling, n*—mortar containing hydraulic cement that, in the fresh state, exhibits flow sufficient to seek gravitational leveling.

3.2.4 *overlayment, n—in flooring*, a layer of material usually placed upon the sub-floor that provides a smooth, even surface to be left exposed as the wear surface of the floor.

3.2.5 *time, healing, n*—the period of time from initial contact of a self-leveling mortar with mixing water just prior to the time at which the self-leveling mortar no longer heals but instead leaves a visible indentation or ridge in the surface after being disturbed.

3.2.6 *time, starting, n—in self-leveling mortars*, the time when water is brought into contact with the dry ingredients of a self-leveling mortar.

3.2.7 *underlayment, n—in flooring*, a layer of material usually placed upon the sub-floor that provides a smooth, even base for flooring.

4. Significance and Use

4.1 The test methods in this standard are used to evaluate freshly mixed properties such as the initial flow, flow retention, and healing time as well as hardened properties such as compressive strength, setting time, and flexural strength, of self-leveling mortars.

4.2 Tests are conducted under standardized conditions for comparative purposes and results are not intended to be representative of performance under field conditions.

5. Standard Laboratory Conditions

5.1 Unless otherwise specified, curing and testing of specimens shall be conducted at standard laboratory conditions which are defined as 23.0 ± 2.0 °C [73.5 ± 3.5 °F] and the relative humidity of the laboratory shall be not less than 50 %. For optional tests at the manufacturer's stated temperature extremes, the curing and testing temperatures must be within ± 2.0 °C [± 3.5 °F] of the stated extreme temperatures.

6. Sampling

6.1 Sample according to the Sampling section of Specification [C1107/C1107M](#).

7. Mixing

7.1 Apparatus

7.1.1 Use the mixer and scraper as specified in Practice [C305](#). The standard batch size is 3000 g (See [Note 1](#)) of dry self-leveling mortar. Use a splash guard to prevent excessive splashing.

Warning—The clearances between the paddle and the bowl specified in Practice [C305](#) are suitable when using mortar made with standard sand as described in Specification [C778](#). To permit the mixer to operate freely and to avoid serious damage to the paddle and bowl when coarser aggregates are used, it may be necessary to set the clearance adjustment bracket to provide greater clearances than those specified in 4.1 of Practice [C305](#).

7.1.2 Weighing devices used in determining the mass of materials shall conform to Specification [C1005](#).

7.1.3 A timer accurate to 1 s with a range of at least 60 min.

NOTE 1—This batch size is used for self-leveling mortars with a typical freshly mixed density of approximately 1920 kg/m³ [120 lb/ft³]. Adjust the batch size as needed to accommodate densities significantly different from the typical value.

7.2 Procedure

7.2.1 Mix the self-leveling mortar with liquid as prescribed by the manufacturer.

7.2.2 Add the entire quantity of mixing liquid to the bowl. Start the mixer on speed 1 and start the timer. Mix times are to be observed within ± 5 s of the recommended times.

7.2.3 Add the dry self-leveling mortar to the mixer while mixing at speed 1 during the first 30 s. (0-30 s on timer)

7.2.4 Mix for an additional 30 s period, at speed 1. (30-60 s on timer)

7.2.5 Stop the mixer and quickly scrape down into the batch any mortar that may have collected on the side of the bowl or blade. This must be completed within 30 s (60-90 s on timer)

7.2.6 Mix at speed 2 for 240 s. (90-330 s on timer)

7.2.7 In any case requiring a remixing interval, any mortar adhering to the side of the bowl shall be quickly scraped down into the batch with the scraper prior to remixing.

8. Initial Flow, Flow Retention, and Healing Time

8.1 *Scope*—This test method measures the flow of freshly-mixed, self-leveling mortar by releasing it from a rigid tube after a given time. The diameter of the spread mixture is measured after a specified time. Flow retention is measured by repeating the test on aged material.

8.2 *Significance and Use*—The flow of a self-leveling mortar is a measure of its placeability. Establishing an acceptable flow range for the self-leveling mortar is critical to the proper use of the self-leveling mortar. If the flow is too low, the self-leveling mortar will not be self-leveling and if the flow is too high, the designed properties of the self-leveling mortar will be compromised. A proper flow range must be established in order to determine the proper water content to use when evaluating the physical properties of the mortar. The flow retention and healing time provide an indication of the useful working time of the mortar.

8.3 Apparatus

8.3.1 Flow Ring: A tube made of smooth, non-corrosive material of 30.0 ± 0.1 mm [$1\frac{1}{4} \pm \frac{1}{16}$ in.] internal diameter and 50.0 ± 0.1 mm [$2 \pm \frac{1}{16}$ in.] high.

8.3.2 A clean, dry $400 \times 400 \times 6$ mm [16 in. \times 16 in. \times $\frac{1}{4}$ in.] square glass plate.

8.3.3 A timer accurate to 1 s with a range of at least 60 min.

8.3.4 A length-measuring device such as a ruler or tape measure divided into 1 mm [$\frac{1}{16}$ in.] divisions at least 300 mm [12 in.] long.

8.3.5 Rectangular pan with inside dimensions of at least 210 mm \times 210 mm [$8\frac{1}{2} \times 8\frac{1}{2}$ in.] with a nominal depth of at least 9 mm [$\frac{3}{8}$ in.] made of metal or glass not attacked by the self-leveling mortar.

8.3.6 A metal bar 6 mm [$\frac{1}{4}$ in.] thick, with square edges, and at least 150 mm [6 in.] long.

NOTE 2—The side of a mold used to prepare specimens for Test Method [C157/C157M](#) is acceptable for this purpose.

8.4 Procedure