



Designation: C1038 – 04

Standard Test Method for Expansion of Hydraulic Cement Mortar Bars Stored in Water¹

This standard is issued under the fixed designation C1038; 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 the expansion of mortar bars made using hydraulic cement, of which sulfate is an integral part.

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

1.2 The values stated in SI units are to be regarded as the standard. Values in parentheses are for information only.

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.*

2. Referenced Documents

2.1 *ASTM Standards*:²

C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

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

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

C511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes

C778 Specification for Standard Sand

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

C1437 Test Method for Flow of Hydraulic Cement Mortar
D1193 Specification for Reagent Water

3. Significance and Use

3.1 This test method is used to determine the amount of expansion of a mortar bar when it is stored in water. The amount of mortar-bar expansion may relate to the amount of sulfate in the cement; expansion may become excessive when the cement contains too much sulfate.

3.2 Some cement specifications limit the amount of sulfate contained in hydraulic cement by requiring that the amount of expansion in water not exceed a specified value.

4. Apparatus

4.1 *Reference Masses and Mass-Determining Devices*, conforming to the requirements of Specification **C1005**. Evaluate the device for precision and bias at a total load of 2 Kg.

4.2 *Glass Graduates, Molds, and Length Comparator*, conforming to the requirements of Specification **C490**.

4.3 *Moist Cabinet or Room*, conforming to the requirements of Specification **C511**.

4.4 *Mixer, Bowl, and Paddle*, conforming to the requirements of Practice **C305**.

4.5 *Trowel and Tamper*, conforming to the requirements of Test Method **C109/C109M**.

5. Temperature and Relative Humidity

5.1 *Molding Room, Dry Materials, and Mixing Water*—Maintain the temperature of the molding room, dry materials, and mixing water at 23.0 ± 4.0 °C, and maintain the relative humidity of the molding room at not less than 50 %.

6. Reagents and Materials

6.1 *Mixing Water*—Potable water is satisfactory for routine tests. For all cooperative tests and in case of dispute, use reagent water conforming to the numerical limits of Type III of Specification **D1193**.

6.2 *Graded Sand*—Sand for making the test specimens shall conform to the requirements for graded standard sand in Specification **C778**.

¹ This test method is under the jurisdiction of ASTM Committee **C01** on Cement and is the direct responsibility of Subcommittee **C01.28** on Sulfate Content.

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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.