



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

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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:

C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)²

C 230/C 230M Specification for Flow Table for Use in Tests of Hydraulic Cement²

C 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency²

C 490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete²

C 511 Specification for Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes²

C 778 Specification for Standard Sand²

C 1005 Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements²

C 1437 Test Method for Flow of Hydraulic Cement Mortar²

D 1193 Specification for Reagent Water³

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 C 1005. 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 C 490.

4.3 *Moist Cabinet or Room*, conforming to the requirements of Specification C 511.

4.4 *Mixer, Bowl, and Paddle*, conforming to the requirements of Practice C 305.

4.5 *Trowel and Tamper*, conforming to the requirements of Test Method C 109.

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 $23.0 \pm 4.0^\circ\text{C}$, 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 D 1193.

6.2 *Graded Sand*—Sand for making the test specimens shall conform to the requirements for graded standard sand in Specification C 778.

7. Procedure

7.1 *Number and Dimensions of Test Specimens*—Make four 25 by 25 by 285-mm, or 1 by 1 by 11¼-in. test specimens for each cement. The effective gage length of these specimens is 125 mm or 5 in. respectively.

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 *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 11.01.