Designation: C 1038 – 95

Standard Test Method for Expansion of Portland Cement Mortar Bars Stored in Water[1]

This standard is issued under the fixed designation C 1038; 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 from portland cement, of which sulfate is an integral part. This test method applies only to portland cements.

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 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency[2]

C 490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete[2]

C 511 Specification for Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes[2]

C 778 Specification for Standard Sand[2]

C 1005 Specification for Weights and Weighing Devices for Use in the Physical Testing of Hydraulic Cements[2]

D 1193 Specification for Reagent Water[3]

2.2 *National Standard of Canada:*

CAN 3-A5-M83 Portland Cements[4]

3. Significance and Use

3.1 This test method, when applied to portland cement containing calcium sulfate, determines the amount of expansion of a mortar bar when it is stored in water. The amount of mortar bar expansion is related to the amount of calcium sulfate in the cement; expansion becomes excessive when the cement contains too much calcium sulfate.

3.2 When desired, cement specifications may limit the amount of calcium sulfate contained in a portland cement by requiring that the amount of expansion in water not exceed a specified value.

NOTE 1—An expansion limit of 0.020 % in fourteen days of water immersion is in use in Canadian Standards document CAN 3-A5-M83.

4. Apparatus

4.1 *Weights and Weighing Devices*, conforming to the requirements of Specification C 1005. The weighing device shall be evaluated for precision and accuracy 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 Humidity

5.1 *Molding Room, Dry Materials, and Mixing Water*—The temperature of the molding room, dry materials, and mixing water shall be maintained between 20 and 28°C (68 and 82.4°F) and the relative humidity of the molding room shall not be 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, reagent water conforming to Type III B of Specification D 1193 shall be used.

6.2 *Graded Sand*—The graded 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 (1 by 1 by 11¼-in.) test specimens for each cement.

NOTE 2—In routine tests, 25 by 25 by 160-mm (1 by 1 by 6¼-in.) specimens may be used; however, in case of dispute, results obtained with 25 by 25 by 285-mm (1 by 1 by 11¼-in.) specimens shall govern.

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[1] This test method is under the jurisdiction of ASTM Committee C-1 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.

[4] Available from Canada Standards Association, 178 Rexdale Blvd., Rexdale, Ontario Canada M9W 143.