



Standard Test Method for Restrained Expansion of Expansive Cement Mortar¹

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1. Scope

1.1 This test method covers the determination of length changes of expansive cement mortar, while under restraint, due to the development of internal forces resulting from hydration of the cement.

1.2 The values stated in non-SI units are to be regarded as the standard.

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:

- A 307 Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength²
- C 157 Test Method for Length Change of Hardened-Hydraulic-Cement Mortar and Concrete³
- C 219 Terminology Relating to Hydraulic Cement⁴
- C 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency⁴
- C 490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete⁴
- C 778 Specification for Standard Sand⁴
- C 1005 Specification for Weights and Weighing Devices for Use in the Physical Testing of Hydraulic Cements⁴
- E 11 Specification for Wire-Cloth Sieves for Testing Purposes⁵
- F 606 Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets²

3. Terminology

3.1 Definitions of terms used in this test method are given in Terminology C 219.

4. Apparatus

4.1 *Molds*—The molds for casting test specimens, when used in conjunction with the restraining cage described in 4.2, shall provide for forming either 2 by 2 by 10-in. prisms having a 10-in. gage length, or 50 by 50 by 250-mm prisms having a 250-mm gage length. The molds shall otherwise conform to the requirements of Practice C 490, except that the gage stud holder, gage studs, and spacer screws described in that specification will not be used.

4.2 *Restraining Cage*, consisting of a threaded steel rod with steel end plates held in place by nuts as shown in Fig. 1. The rod shall be provided with cap nuts for prevention of corrosion. The rod shall conform to Specification A 307 Grade A except, it shall support 1180-lbf (5249 N) proof load when tested in accordance with Method 1 of Test Methods F 606.

4.3 *Length Comparator*—The length comparator for measuring length shall conform to and be used in accordance with the requirements of Practice C 490. If the terminals of the comparator are fitted with collars, they shall be such that the cap nuts on the ends of the threaded rod of the specimen do not rest on the collar during measuring.

4.4 *Tamper*—The tamper shall be made of nonabsorptive, nonabrasive material such as medium-hard rubber or seasoned oak wood, rendered nonabsorptive by immersion for 15 min in paraffin at approximately 392°F (200°C), and shall have a cross section of ½ by 1 in. (13 by 25 mm) and convenient length of about 6 in. (150 mm). The tamping face of the tamper shall be flat and at right angles to the length of the tamper.

4.5 *Apparatus for Demolding Specimens*—Apparatus similar to that described in the Apparatus section of Test Method C 157, may be found useful for demolding specimens.

4.6 *Weights and Weighing Devices*—Scales used shall comply with Specification C 1005.

NOTE 1—Generally defined, the sensibility reciprocal is the change in load required to change the position of rest of the indicating element or elements of a nonautomatic-indicating scale a definite amount at any load.

¹ This test method is under the jurisdiction of ASTM Committee C-1 on Cement and is the direct responsibility of Subcommittee C01.13 on Special Cements.

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² *Annual Book of ASTM Standards*, Vol 15.08.

³ *Annual Book of ASTM Standards*, Vol 04.02.

⁴ *Annual Book of ASTM Standards*, Vol 04.01.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.