



Standard Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete¹

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1. Scope

1.1 This practice covers the requirements for the apparatus and equipment used to prepare specimens for the determination of length change in hardened cement paste, mortar, and concrete, the apparatus and equipment used for the determination of these length changes, and the procedures for its use.

1.2 Methods for the preparation and curing of test specimens, conditions of testing and curing, and detailed procedures for calculating and reporting test results are contained in applicable test methods.

1.3 The values stated in SI units or inch-pound units are to be regarded as standard. The values 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 nonconformance with the standard.

2. Referenced Documents

2.1 ASTM Standards:

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

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

3. Terminology

3.1 *length change*—an increase or decrease in the linear dimension of a test specimen, measured along the longitudinal axis, due to causes other than applied load.

4. Significance and Use

4.1 This practice is intended to provide standard requirements for apparatus common to many test methods used in connection with cement and concrete and standardized procedures for its use. The detailed requirements as to materials, mixtures, specimens, conditioning of specimens, number of specimens, ages at which measurements are to be made,

interpretation of results, and precision and bias are left to be dealt with in specific test methods.

5. Apparatus

5.1 *Reference Masses and Devices for Determining Mass and Volume*, shall conform to the requirements of Specification C 1005.

5.2 *Molds*, shall have either one or two compartments and shall be constructed as shown in Fig. 1 or Fig. 2. Molds for test specimens used in determining the length change of cement pastes and mortars shall provide for 25 by 25 by 285-mm prisms having a 250-mm gage length, or for 1 by 1 by 11¼-in. prisms having a 10-in. gage length. Molds for test specimens used in the length change of concretes shall provide for prisms of the desired cross section having a 10-in. or 250-mm gage length. In some routine tests, 25 by 25 by 160-mm specimens with a gage length of 125 mm, or 1 by 1 by 6¼-in. specimens with a gage length of 5-in. are permitted, but in case of dispute, results obtained with specimens of 250-mm [10-in.] gage length shall govern.

5.2.1 The gage length shall be considered as the nominal length between the innermost ends of the gage studs. The parts of the molds shall be tight fitting and firmly held together when assembled, and their surfaces shall be smooth and free of pits. The molds shall be made of steel or other hard metal not readily attacked by the cement paste, mortar, or concrete. The sides of the molds shall be sufficiently rigid to prevent spreading or warping. For the molds shown in Fig. 1, the tolerance on dimension A is ± 0.7 mm. For the molds shown in Fig. 2, the tolerance on dimension A is ± 0.03 in.

5.2.2 Each end plate of the mold shall be equipped to hold properly in place, during the setting period, one of the gage studs shown in Fig. 1 or Fig. 2. The gage studs shall be of American Iron and Steel Institute (AISI)³ Type 316 stainless steel or other corrosion-resistant metal of similar hardness. Gage studs of Invar or similar metal shall be used when specimens are tested at widely different temperatures. To prevent restraint of the gage studs before demolding of the specimen, the device for holding the gage studs in position shall be so arranged that, if necessary, it can be partially or

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² *Annual Book of ASTM Standards*, Vol 04.01.

³ Details on this material are available from the American Iron and Steel Institute, 1133 15th St. N.W., Washington, DC 20005.