Designation: C 596 – 01

Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement[1]

This standard is issued under the fixed designation C 596; 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 determines the change in length on drying of mortar bars containing hydraulic cement and graded standard sand.

1.2 The values stated in SI units are to be regarded as the standard. Values given 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.* (**Warning**—*Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure).*[2]

2. Referenced Documents

2.1 *ASTM Standards:*

C 157/C 157M Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete[3]

C 219 Terminology Relating to Hydraulic Cement[4]

C 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency[4]

C 490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete[4]

C 511 Specification for Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes[4]

C 778 Specification for Standard Sand[4]

C 1005 Specification for Reference Masses and Devices for Determining Mass for Use in the Physical Testing of Hydraulic Cements[4]

C 1437 Test Method for Flow of Hydraulic Cement Mortar[3]

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods[5]

3. Terminology

3.1 The term "drying shrinkage" is defined as the decrease in length of the test specimen, where the decrease is caused by any factor other than externally applied forces under stated conditions of temperature, relative humidity and evaporation rate in the environment; the term includes the net effect of a variety of phenomena tending to bring about both increases and decreases in length during the period in which the test specimens under consideration are stored in the environment and in which a number of processes, including hydration of the cement, are taking place at a variety of rates.

3.2 Other terms used in this test method are defined in Terminology C 219.

4. Significance and Use

4.1 This test method establishes a selected set of conditions of temperature, relative humidity and rate of evaporation of the environment to which a mortar specimen of stated composition shall be subjected for a specified period of time during which its change in length is determined and designated "drying shrinkage".

4.2 The drying shrinkage of mortar as determined by this test method has a linear relation to the drying shrinkage of concrete made with the same cement and exposed to the same drying conditions.[6] Hence this test method may be used when

[1] This test method is under the jurisdiction of ASTM Committee C01 on Cement and is the direct responsibility of Subcommittee C01.31 on Volume Change.

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[2] Section on Safety, *Manual of Cement Testing, Annual Book of Standards,* Vol 04.01.

[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.

[6] Data pertaining to the relation of the drying shrinkage of mortar test specimens and of the drying shrinkage of concrete test specimens as affected by the cement under specified laboratory test conditions, may be found in RR/120:C-1, available from ASTM Headquarters; in a report of the California Division of Highways. "Significance of the Test for Contraction of Mortar in Air with Respect to Performance of Cements in Concrete," Oct. 18, 1961; and in the paper by Mardulier, F. J., Schneider, A. M., and Stockett, A. L., "An Analysis of Drying Shrinkage. Data for Portland Cement Mortar and Concrete," *Journal of Materials,* JMLSA, Am. Soc. Testing Mats., Vol 2, No. 4, 1967, pp. 829–842. A relevant paper by H. T. Arni entitled "The Significance of the Correlation Coefficient for Analyzing Engineering Data" was published in *Materials Research and Standards,* MTRSA, Am. Soc. Testing Mats., Vol. 11, No. 5, 1971, pp. 16–19.