Designation: C1090/C1090M – 23

Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout[1]

This standard is issued under the fixed designation C1090/C1090M; 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 measurement of the changes in height of hydraulic-cement grout by the use of 75 mm by 150 mm [3 in. by 6 in.] cylinders, when the cylinders are protected so that the tendency to change in height does not include evaporation so as to cause drying, uptake of moisture, carbonation, or exposure to temperatures outside the range 23 °C ± 2.0 °C [73 °F ± 3.5 °F] or, optionally, to another specified temperature controlled within ±2.0 °C [±3.5 °F].

1.2 If desired, this test method can be adapted to studies of changes in height involving either schedules or environmental treatment different from the standard procedures prescribed by this test method.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

NOTE 1—Sieve size is identified by its standard designation in Specification E11. The alternative designation given in parentheses is for information only and does not represent a different standard sieve size.

1.4 The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of this standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* (**Warning—**Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to exposed skin and tissue upon prolonged exposure.[2])

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

C125 Terminology Relating to Concrete and Concrete Aggregates

C172/C172M Practice for Sampling Freshly Mixed Concrete

C219 Terminology Relating to Hydraulic and Other Inorganic Cements

C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

C511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes

C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

C827/C827M Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures

C939/C939M Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this test method, refer to Terminologies C125 and C219.

3.2 *Definitions of Terms Specific to This Standard:*

[1] This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.68 on Volume Change.

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[2] See Section on Safety Precautions, Manual of Aggregate and Concrete Testing, Annual Book of ASTM Standards, Vol. 04.02.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

3.2.1 *change in height*—either an increase or decrease in the vertical dimension of a test specimen, provided the change has been caused by factors other than externally applied forces, changes in ambient temperature not conforming to the specified range, drying caused by evaporation, carbonation, or uptake of moisture.

4. Significance and Use

4.1 This test method is intended to provide a means of assessing the ability of a hydraulic-cement grout to retain a stable volume during the stipulated testing period of 28 days, provided that the tendency to change height does not include the effects of drying caused by evaporation, uptake of moisture, carbonation, or exposure to temperatures outside the range 23.0 °C ± 2.0 °C [73 °F ± 3.5 °F] (Note 2). An exception is made when the options described in the section on test conditions are exercised.

NOTE 2—This test method does not measure the change in height before setting (see Test Method C827/C827M).

5. Apparatus

5.1 *Cylinder Molds,* steel cylindrical molds with dimensions as shown in Fig. 1 and Table 1, fitted with clamp assemblies for closing, fitted with a removable 6 mm [¼ in.] thick steel base plate that can be clamped in place with the cylinder molds, top edge machined to a narrow rim as shown in Fig. 1.

NOTE 3—Satisfactory molds can be made from lengths of steel tubing or pipe that is slit on one side parallel to the longitudinal axis and fitted with a means of closing the vertical slit as well as a means of attaching a base plate.

TABLE 1 Dimensions and Tolerances for Cylinder Mold (Fig. 1) and Micrometer Bridge (Fig. 2)

Dimensions	SI units	Inch-Pound Units	Tolerance
A	150 mm	6 in.	±2 %
B	75 mm	3 in.	±1 %
C	8 mm	5⁄16 in.	±20 %
D	75 mm	3 in.	±1 %
E	150 mm	6 in.	±2 %
F	1 mm	3⁄64 in.	±30 %
G	180 mm	7 in.	±2 %
H	10 mm	3⁄8 in.	±2 %
I	6 mm	¼ in.	±2 %
J	185 mm	7¼ in.	±2 %
K	30 mm	1¼ in.	±20 %
L	50 mm	2 in.	±25 %

5.2 *Glass Plate,* approximately 100 mm [4 in.] square by 6 mm [¼ in.] thick, thinly coated on one surface with a silicone-base spray or other inert material such as mineral oil, and permitted to dry before use.

5.3 *Hold-Down Weight,* having a mass of 1.5 kg [3 lb] ± 1%.

5.4 *Micrometer Bridge,* designed to support and hold one cylinder in a level, firm position (Fig. 2) with dimensions as shown in Table 1, with steel rods, and a top made of noncorroding metal with 4 equally spaced holes from the center of the hold-down device, not more than 1 mm [3⁄64 in.] larger than the diameter of the measuring shaft of the micrometer depth gage, and numbered 1 to 4.

5.5 *Micrometer Depth Gage,* having a range from 25 mm to 50 mm [1.0 in. to 2.0 in.] graduated in units not larger than

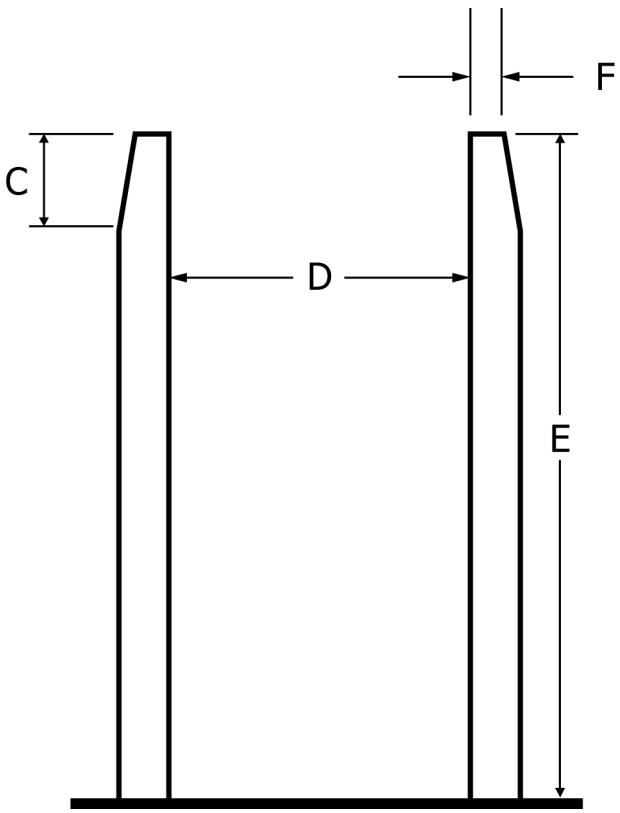

FIG. 1 Cylinder Mold with Machined (Tapered) Top Edge (see Table 1 for dimensions)