Designation: C 1437 – 01

# Standard Test Method for Flow of Hydraulic Cement Mortar[1]

This standard is issued under the fixed designation C 1437; 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 flow of hydraulic cement mortars.

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 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)[2]

C 185 Test Method for Air Content of Hydraulic Cement Mortar[2]

C 230 Specification for Flow Table for Use in Tests of Hydraulic Cement[2]

## 3. Significance and Use

3.1 This test method is intended to be used to determine the flow of hydraulic cement mortars, and of mortars containing cementitious materials other than hydraulic cements.

3.2 While flow is not usually included in hydraulic cement specifications, it is commonly used in standard tests that require the mortar to have a water content that provides a specified flow level.

## 4. Apparatus

4.1 *Flow Table, Flow Mold,* Conforming to the requirements of Specification C 230.

4.2 *Caliper,* Conforming to the requirements of Specification C 230. Alternatively, any outside-measuring caliper constructed of corrosion-resistant material may be used, provided that it is incremented in millimetres and its maximum extent of measuring is at least 260 mm (10¼ in.).

4.3 *Tamper,* conforming to the requirements of Test Method C 109.

4.4 *Trowel,* having a steel blade 100 to 150 mm (4 to 6 in.) in length, with straight edges. The edges when placed on a plane surface shall not depart from straightness by more than 1 mm (0.04 in.) (Note 1).

4.5 *Straightedge,* made of steel, shall be at least 200 mm (8 in.) long and not less than 1.5 mm (0.06 in.) nor more than 3.5 mm (0.14 in.) in thickness. Its edge shall not depart from a plane surface by more than 1 mm (0.04-in.) (Note 1).

NOTE 1—The trowel specified in Test Method C 109 and the straightedge specified in Test Method C 185 may be used for this purpose, providing they comply with the planeness indicated.

## 5. Temperature and Humidity

5.1 The temperature of the air in the laboratory shall be maintained between 20 and 28°C (68 and 82°F) and its relative humidity shall not be less than 50 %.

## 6. Materials

6.1 *Hydraulic Cement Mortar*—A mortar for which the determination of flow is specified or desired.

## 7. Procedure

7.1 *Determination of Flow*:

7.1.1 Carefully wipe the flow table clean and dry, and place the flow mold at the center. Place a layer of mortar about 25 mm (1 in.) in thickness in the mold and tamp 20 times with the tamper. The tamping pressure shall be just sufficient to ensure uniform filling of the mold. Then fill the mold with mortar and tamp as specified for the first layer. Cut off the mortar to a plane surface flush with the top of the mold by drawing the straightedge or the edge of the trowel with a sawing motion across the top of the mold. Wipe the table top clean and dry, being especially careful to remove any water from around the edge of the flow mold. Lift the mold away from the mortar 1 min after completing the mixing operation. Immediately drop the table 25 times in 15 s, unless otherwise specified.

7.1.2 If using the caliper specified in Specification C 230, measure the diameter of the mortar along the four lines scribed in the table top, recording each diameter as the number of caliper divisions, estimated to one tenth of a division. If some other caliper is being used, measure the diameter of the mortar

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

along the four lines scribed in the table top, recording each diameter to the nearest millimetre.

## 8. Calculation

8.1 The flow is the resulting increase in average base diameter of the mortar mass, expressed as a percentage of the original base diameter.

8.2 If using the caliper specified in Specification C 230, add the four readings, and record the total. This gives the flow in percent. If using some other caliper, compute the flow in percent by dividing "*A*" by the original inside base diameter in millimetres and multiplying by 100.

where:

*A* = average of four readings in millimetres, minus the original inside base diameter in millimetres.

Report the flow to the nearest 1 %.

## 9. Precision and Bias

9.1 *Precision*—The single-operator, within-laboratory standard deviation has been found to be 4 % flow. Therefore, results of two properly conducted tests by the same operator on similar batches should not differ by more than 11 % (Note 2).

9.1.1 The multilaboratory standard deviation has been found to be 11 %. Therefore, results of two different laboratories on similar batches should not differ by more than 31 % flow (Note 2).

NOTE 2—Data produced when water content is being varied to obtain a given flow is not applicable for this purpose. Only data where flow has been determined using a given cement and fixed water content is applicable. Consequently, the only data currently available is that extracted from the CCRL Proficiency Sample Program for CS Flow on C 109 mortars (dropping the flow table 25 times in 15 s). The data for Sample Nos. 109, 110, 111, and 112 have been used to develop the precision statements given.

9.2 *Bias*—Since there is no accepted reference material suitable for determining flow available, no statement on bias is made.

## 10. Keywords

10.1 flow; hydraulic cement; mortar