Designation: C232/C232M – 14

Standard Test Method for Bleeding of Concrete[1]

This standard is issued under the fixed designation C232/C232M; 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 the relative quantity of mixing water that will bleed from a sample of freshly mixed concrete.

1.2 When various concretes are to be compared, if the batches are of similar unit weight, the sample masses shall not differ by more than 1 kg [2 lb].

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 may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard. Some values have only SI units because the inch-pound equivalents are not used in practice.

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 which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the 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 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:*[3]

C29/C29M Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

C125 Terminology Relating to Concrete and Concrete Aggregates

C138/C138M Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

C172/C172M Practice for Sampling Freshly Mixed Concrete

C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory

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

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 Terminology C125.

4. Significance and Use

4.1 This test method provides procedures to be used for determining the effect of variables of composition, treatment, environment, or other factors in the bleeding of concrete. It is also permitted to be used to determine the conformance of a product or treatment with a requirement relating to its effect on bleeding of concrete.

4.2 A specimen consolidated by rodding and tested without further disturbance simulates conditions in which the concrete is not subjected to intermittent vibration after placement.

5. Apparatus

5.1 *Container*—A cylindrical container of approximately 14-L [½-ft^3] capacity, having an inside diameter of 255 ± 5 mm [10 ± ¼ in.] and an inside height of 280 ± 5 mm [11 ± ¼ in.]. The container shall conform to the requirements for a measure in Test Method C29/C29M. The inside shall be free of corrosion, coatings, or lubricants.

5.2 *Scale,* of sufficient capacity to determine the mass of the load required with an accuracy of 0.5 %. Balances or scales shall be calibrated at least annually or whenever there is reason to question the accuracy of the equipment.

[1] These test methods are under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregatesand are the direct responsibility of Subcommittee C09.60 on Testing Fresh Concrete.

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[2] 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**

5.3 *Pipet,* or similar instrument, for drawing off free water from the surface of the test specimen.

5.4 *Glass Graduate,* 100-mL capacity for collecting and measuring the quantity of water withdrawn.

5.5 *Tamping Rod*—A round, straight steel rod, 16 mm [⅝ in.] in diameter and approximately 610 mm [24 in.] in length, having the tamping end rounded to a hemispherical tip, the diameter of which is 16 mm [⅝ in.].

5.6 The apparatus listed in 5.7, 5.8, and 5.9 are required if the procedure of measuring the amount of bleed water recovered is one involving weighing, evaporation, and reweighing.

5.7 *Metal Beaker (Optional)*—A 1000-mL metal beaker for collecting the decanted supernatant water and sludge.

5.8 *Balance (Optional)*—A balance sensitive to 1 g for determining the mass of the decanted water and sludge.

5.9 *Hot Plate (Optional)*—A small electric hot plate or other source of heat for evaporating decanted water.

6. Test Specimen

6.1 For concrete made in the laboratory, prepare as described in Practice C192/C192M. For concrete made in the field, sample the concrete as described in Practice C172/C172M. The apparatus described in this test method is permitted to be used with samples of concrete containing any size of aggregate graded up to and including a nominal maximum size of 50 mm [2 in.]. Concrete containing aggregate larger than 50 mm [2 in.] in nominal maximum size shall be wet sieved over a 37.5 mm [1½-in.] sieve and the test performed on a portion of the sample that passes through the sieve.

6.2 Determine the proportion of net mixing water (total water minus water absorbed by the aggregates) in the batch of concrete being tested from the batch weights data.

6.3 Determine the mass of the empty container. Fill the container with the concrete in accordance with Test Method C138/C138M except that the container shall be filled to a height of 255 ± 3 mm [10 ± ⅛ in.]. Level the top surface of the concrete using no more than three passes of a trowel. Determine the mass of the container and concrete.

7. Procedure

7.1 During the test, maintain the ambient temperature between 18 and 24 °C [65 and 75 °F]. Immediately after troweling the surface of the specimen, record the time. Place the specimen and container on a level platform or floor free of noticeable vibration and cover the container to prevent evaporation of the bleed water. Keep the cover in place throughout the test, except when drawing off the water. Draw off (with pipet or similar instrument) the water that has accumulated on the surface at 10-min intervals during the first 40 min and at 30-min intervals thereafter until cessation of bleeding, recording the time of last observation. To facilitate the collection of bleed water, tilt the specimen carefully by placing a block approximately 50 mm [2 in.] thick under one side of the container 2 min prior to each time the water is withdrawn.

After the water is removed, return the container to a level position without jarring. After each withdrawal, transfer the water to a 100-mL graduated cylinder. Record the accumulated quantity of water after each transfer. If it is desired to determine the mass of the bleed water and to exclude the material present other than the water, carefully decant the contents of the cylinder into a metal beaker. Determine the mass and record the mass of the beaker and its contents. Dry the beaker and its contents to constant mass and record the final mass. The difference between the two masses, D, is equal to the mass of the bleed water. The mass of the sludge shall also be obtained, if desired, by initially determining the tare mass of the beaker.

8. Calculation

8.1 Calculate the volume of bleed water per unit area of surface, V, as follows:

$$V = V_1/A \tag{1}$$

where:

V_1 = volume of bleed water measured during the selected time interval, mL, and
A = area of exposed concrete, cm^2.

The comparative rate of bleeding shall be determined as the test progresses by comparing the volume of bleed water for each equal time interval.

8.2 Calculate the accumulated bleed water, expressed as a percentage of the net mixing water contained within the test specimen, as follows:

$$C = (w/W) \times S \tag{2}$$

$$\text{Bleeding, } \% = (D/C) \times 100$$

where:

C = mass of net mixing water in the test specimen, g,
W = total mass of the batch, kg,
w = mass of net mixing water in the batch (the total amount of water minus the water absorbed by the aggregates), kg,
S = mass of the specimen, g, and
D = accumulated mass of the bleed water, g, (total volume withdrawn from the test specimen in mL multiplied by 1 g/mL).

9. Report

9.1 Concrete mixture proportions,

9.2 Source and identification of each material used,

9.3 The volume of bleed water per unit area of surface, and the accumulated bleed water, expressed as a percentage of the net mixing water contained within the test specimen, and

9.4 Elapsed time required for cessation of bleeding.

10. Precision and Bias

10.1 *Precision:*

10.1.1 Data are available to evaluate the precision of the test method for concrete consolidated by vibration. The values given shall be used as maximum precision limits for concrete consolidated by rodding.

NOTE 2—In earlier versions of this test method, there were two

consolidation procedures: Method A by rodding and Method B by using a vibrating platform. Precision data had been obtained for Method B and because both methods used the same procedures for determining the amount of bleed water the precision for Method B is applicable to Method A. In 2013, Method B was deleted from the test method. The precision statement is based on consolidation using a vibrating platform and is provided to give the user information on the magnitude of the variation that is expected for concrete consolidated by rodding.

10.1.2 The single operator-day-multibatch standard deviation (1s) has been found to be 0.71 % for a bleeding range from 0 to 10 %, 1.06 % for a bleeding range from 10 to 20 %, and 1.77 % for more than 20 %. Therefore, results of two properly conducted tests by the same operator on the same day on different batches of the same mixture are not expected to differ by more than 2.0 % (d2s) for a bleeding range from 0 to 10 %, 3.0 % for a range from 10 to 20 %, and 5.0 % for more than 20 %. (See Note 3.)

NOTE 3—These numbers represent, respectively, the (1s) and (d2s) limits as described in Practice C670.

10.2 *Bias*—The test method has no bias because the values determined can be defined only in terms of the test method.

11. Keywords

11.1 bleeding; concrete, bleeding of

SUMMARY OF CHANGES

Committee C09 has identified the location of selected changes to these test methods since the last issue, C232/C232M – 13c, that may impact the use of these test methods. (Approved April 1, 2014.)

(1) Revised section 10.1.1 and added Note 2.

Committee C09 has identified the location of selected changes to these test methods since the last issue, C232/C232M – 13b, that may impact the use of these test methods. (Approved December 15, 2013.)

(1) Revised sections 6.2, 6.3, and 7.1.

Committee C09 has identified the location of selected changes to these test methods since the last issue, C232/C232M – 13a, that may impact the use of these test methods. (Approved October 1, 2013.)

(1) Revised sections 1.3, 2.1, 5.2, 6.1, and 8.2. *(2)* Added Section 3, Terminology.

Committee C09 has identified the location of selected changes to these test methods since the last issue, C232/C232M – 13, that may impact the use of these test methods. (Approved August 1, 2013.)

(1) Revised 4.1 to remove the description of smooth.