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Standard Test Method for Flow of Fine Aggregate Concrete for Fabric Formed Concrete (Flow Cone Method)[1]

This standard is issued under the fixed designation D6449; 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 a procedure, used both in the laboratory and in the field, for determining the time of efflux of a specified volume of the fine aggregate concrete through a standardized flow cone and used for fabric formed concrete (FFC); however, the test method may also be used for other fluid concrete.

1.2 It is for use with fine aggregate concrete containing fine aggregate as define in Specification C33.

1.3 This test method is intended for use with fine aggregate concrete having an efflux time 9 to 15 s.

1.4 The values stated in SI units are to be regarded as 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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C33 Specification for Concrete Aggregates

C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens

C94/C94M Specification for Ready-Mixed Concrete

C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

C1064/C1064M Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

3. Summary of Test Method

3.1 The time of efflux of a specified volume of fine aggregate concrete from a standardized flow cone is measured.

4. Significance and Use

4.1 This test method is applicable to the determination of the fluidity of various fluid fine aggregate concrete mixtures.

5. Interferences

5.1 The presence of solid particles retained on the 9.53 mm (⅜ in.) sieve or lumps of unmixed material in the fine aggregate may cause the fine aggregate concrete to flow unevenly through the discharge tube of the flow cone or stop the flow completely. Uneven flow will result in slower transit of the fine aggregate concrete, thereby indicating a false consistency.

6. Apparatus

6.1 *Flow Cone,* the dimensions as shown in Fig. 1. The body and discharge tube can be stainless steel, cast aluminum, or other essentially noncorroding metal.

6.2 *Receiving Container,* capacity 2000 mL (2.114 qt), minimum.

6.3 *Ring Stand* or other devise, capable of supporting the flow cone in a vertical, steady position over the received container.

6.4 *Level,* carpenter's or similar.

6.5 *Stop Watch,* least reading of not more than 0.2 s.

6.6 *Thermometer,* having a range from [–18 to 49°C (0 to 120°F)] and conforming to the requirements for ASTM thermometer No. 36 degrees C. Other thermometers of the required accuracy, including the metal immersion type, are acceptable.

7. Test Sample

7.1 The fine aggregate concrete test sample shall be in excess of 1725 mL (1.823 qt) and shall be representative of the fine aggregate concrete in the mixer.

7.2 When sampling and testing is being done for the purpose of proportioning or comparing mixes or for qualifying

[1] This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.25 on Erosion and Sediment Control Technology.

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[2] 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.

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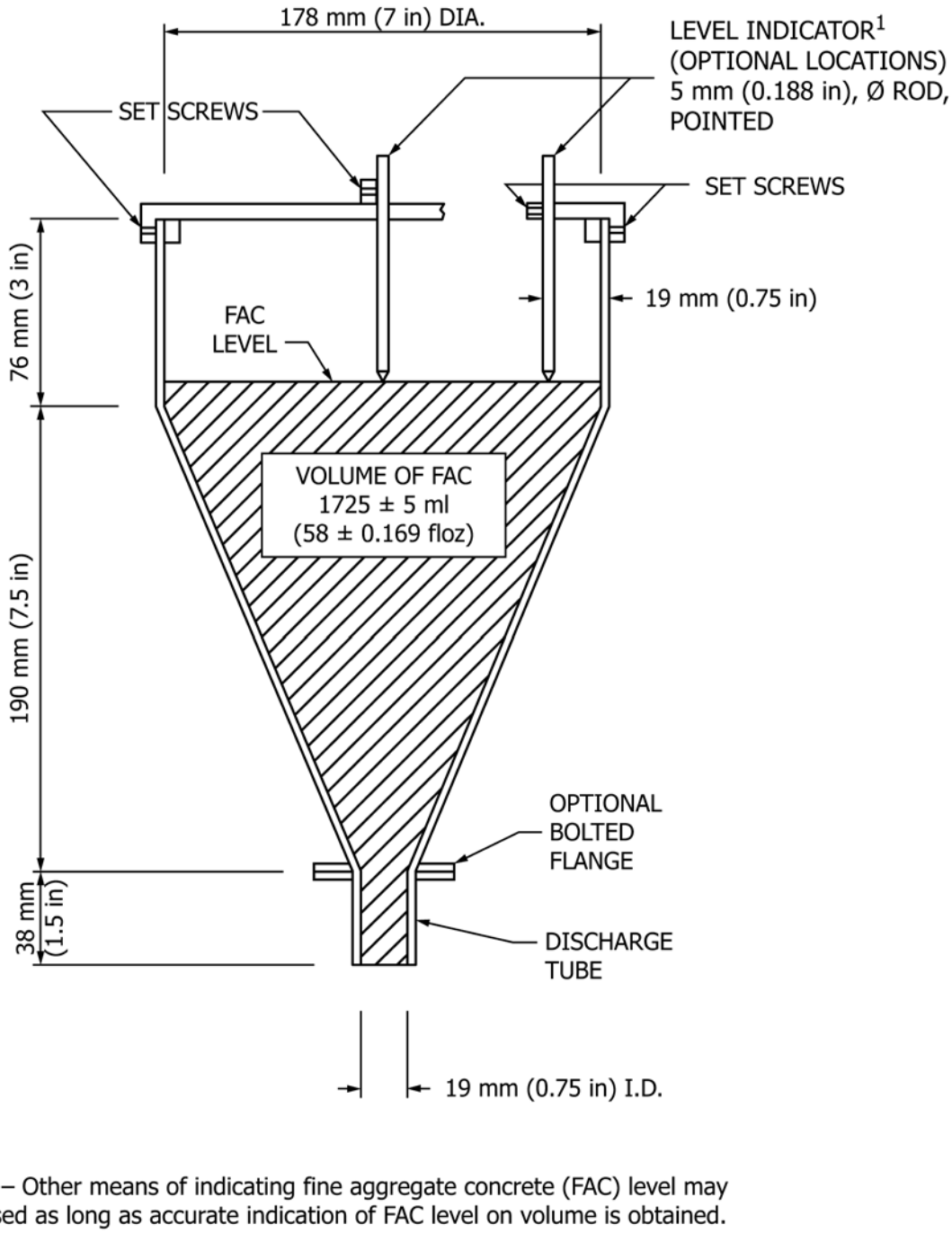

[1]Note – Other means of indicating fine aggregate concrete (FAC) level may be used as long as accurate indication of FAC level on volume is obtained.

NOTE 1—Other means of indicating fine aggregate concrete level may be used as long as accurate indication of fine aggregate concrete level on volume is obtained.

FIG. 1 Cross Section of Flow Cone

materials, the temperature of the fine aggregate concrete shall be in accordance with Specification C94/C94M, unless otherwise specified.

8. Calibration of Apparatus

8.1 Mount the flow cone firmly in such a manner that it is free of vibration. Level the top to assure verticality. Close the outlet of the discharge tube with a finger or a stopper. Introduce 1725 ± 5 mL (1.823 qt ± 0.169 fluid oz) of water into the cone. Adjust the point gage to indicate the level of water surface. Then allow the water to drain.

8.2 Before first use of the flow cone with fine aggregate concrete and periodically thereafter, check the accuracy of the cone by filling it with water as described in 8.1. After checking

or adjusting the point gage, start the stop watch and simultaneously remove the finger. Stop the watch at the first break in the continuous flow of water. The time indicated by the stop watch is the time of efflux of water. If this time is 4.2 ± 0.2 s, the cone may be used for determining the time of efflux of fine aggregate concrete.

9. Procedure

9.1 Moisten the inside of the flow cone by filling the cone with water and, 1 min before introducing the fine aggregate concrete sample, allow the water to drain from the cone. Close the outlet of the discharge tube with a finger or a stopper. Introduce the fine aggregate concrete into the cone until the fine aggregate concrete surface rises to contact the point gage, start the stop watch, and simultaneously remove the finger or stopper. Stop the watch at the first break in the continuous flow of fine aggregate concrete from the discharge tube, then look into the top of the cone; if the fine aggregate concrete has passed sufficiently, such that light is visible through the discharge tube, the time indicated by the stop watch is the time of efflux of the fine aggregate concrete. If light is not visible through the discharge tube, then the use of the flow cone is not applicable for fine aggregate concrete of this consistency. At least two test having times of efflux within 1.8 s of their average shall be made for each fine aggregate concrete mixture.

9.2 The test for time of efflux shall be made within 1 min of drawing of the fine aggregate concrete from the mixer.

10. Report

10.1 Report the following information:

10.1.1 Identification of sample,

10.1.2 Identification of materials in the sample, the proportions, and whether laboratory-prepared or taken from the field production mix.

10.1.3 Average time of efflux to nearest 0.2 s and time interval from completion of mixing at which the test was made, and

10.1.4 Temperature, ambient and the sample at the time of test.

11. Precision and Bias

11.1 *Precision*—The following within-laboratory, multiple-operator precision applies. The single laboratory standard deviation has been found to be 0.88 s. Therefore, results from two properly conducted tests on the same material should not differ by more than 2.49 s.

11.2 *Bias*—No statement on bias can be prepared because there are no standard reference materials.

12. Keywords

12.1 fabric formed concrete; fine aggregate concrete; flow cone; time of efflux

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