Designation: C 115 – 96a (Reapproved 2003)

Standard Test Method for Fineness of Portland Cement by the Turbidimeter[1]

This standard is issued under the fixed designation C 115; 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 determination of the fineness of portland cement as represented by a calculated measure of specific surface, expressed as square centimetres of total surface area per gram, or square metres of total surface area per kilogram, of cement, using the Wagner turbidimeter.[2]

1.2 *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.*

1.3 The values stated in SI units are to regarded as the standard. The inch-pound equivalents may be approximate.

2. Referenced Documents

2.1 *ASTM Standards:*

C 114 Test Methods for Chemical Analysis of Hydraulic Cement[3]

C 430 Test Method for Fineness of Hydraulic Cement by the 45-µm (No. 325) Sieve[3]

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials[4]

3. Significance and Use

3.1 The purpose of this test method is to determine whether or not the hydraulic cement under test meets the Wagner turbidimetric fineness requirements of the applicable hydraulic cement specification for which the test is being made. Fineness of the cement component is only one of the many characteristics that influence the strength capabilities of concrete.

4. Apparatus

4.1 *Nature of Apparatus*—The Wagner turbidimeter consists essentially of a source of light maintained at constant intensity and adjusted so that approximately parallel rays of light pass through a suspension of the cement to be tested and impinge upon the sensitive plate of a photoelectric cell. The current generated in the cell is measured by means of a microammeter and the indicated reading is a measure of the turbidity of the suspension. General considerations indicate that turbidity is in turn a measure of the surface area of the suspended sample of cement. The apparatus shall consist specifically of the parts described in 4.2-4.7 and shall be constructed in accordance with the detailed design and dimensional requirements shown in Fig. 1 and Table 1, except that the case may be either of wood or of metal.

4.2 *Turbidimeter*, mounted in a suitable wood or metal case including the following features:

4.2.1 *Source of Light*—The source of light (Fig. 1) shall consist of a concentrated-filament electric lamp of between 3 and 6 cd operated by a source of constant emf. The lamp shall be mounted rigidly in the socket. A clean, bright parabolic metallic reflector shall be rigidly mounted behind the lamp, focused so that approximately parallel rays of light will pass through the sedimentation tank and impinge upon the photoelectric cell. The light intensity shall be regulated by two rheostats of approximately 6 and 30 Ω, respectively, and they shall possess such characteristics that uniform changes in light intensity may be obtained over the full range of resistance. The rheostats shall be mounted in parallel with each other and in series with the lamp.

4.2.2 *Heat-Absorbing Device*—The light shall pass through a suitable heat absorbing device before entering the sedimentation tank in order that radiant heat from the beam shall be absorbed, the device being either (*1*) a water cell or (*2*) a special heat-absorbing glass filter. The water cell shall be made from 76-mm (3-in.) outside diameter seamless brass tubing, 3-mm (⅛-in.) thick wall, 102-mm (4 in.) in length with glass windows sealed in the ends. The cell shall contain a hole for filling with distilled water. The hole shall be sealed with a metal plug. The cell, when mounted on the movable shelf, may have the plug in either the top or bottom position. The heat-absorbing device shall be so arranged that essentially all

[1] This test method is under the jurisdiction of ASTM Committee C01 on Cement and is the direct responsibility of Subcommittee C01.25 on Fineness.

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[2] This turbidimeter was developed by L. A. Wagner, Research Associate of the Cement Reference Laboratory, National Institute of Standards and Technology, Washington, DC. A description of the apparatus and the original mathematical derivations of formulas used are given in the paper: Wagner, L. A., "A Rapid Method for the Determination of the Specific Surface of Portland Cement," *Proceedings*, ASTM, ASTEA, Vol 33, Part II, 1933, p. 553.

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

[4] *Annual Book of ASTM Standards*, Vol 04.02.

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