
Standard Method of Test for Fineness of Portland Cement by the Turbidimeter

AASHTO Designation: T 98M/T 98-12 (2020)

Technical Subcommittee: 3a, Hydraulic Cement and Lime

Release: Group 1 (April)

ASTM Designation: [C115/C115M-10^{ε1}](#)



**American Association of State Highway and Transportation Officials
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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 centimeters of total surface area per gram or square meters of total surface area per kilogram of cement, using the Wagner turbidimeter.¹
- 1.2. 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 nonconformance with the standard. Values in SI units (or inch-pound units) shall be obtained by measurement in SI units (or inch-pound units) or by appropriate conversion, using the Rules for Conversion and Rounding given in IEEE/ASTM SI 10 of measurements made in other units. Values are stated in SI units when inch-pound units are not used in practice.
- 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. *AASHTO Standards:*
 - **T 105**, Chemical Analysis of Hydraulic Cement
 - **T 192**, Fineness of Hydraulic Cement by the 45-μm (No. 325) Sieve
- 2.2. *ASTM Standard:*
 - **C670**, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- 2.3. *IEEE/ASTM Standard:*
 - SI 10, American National Standard for Metric Practice

3. SIGNIFICANCE AND USE

- 3.1. The purpose of this test method is to determine whether 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 on 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 Sections 4.2 through 4.7, and shall be constructed in accordance with the detailed design and dimensional requirements shown in Figure 1 and Table 1, except that the case may be either of wood or of metal.

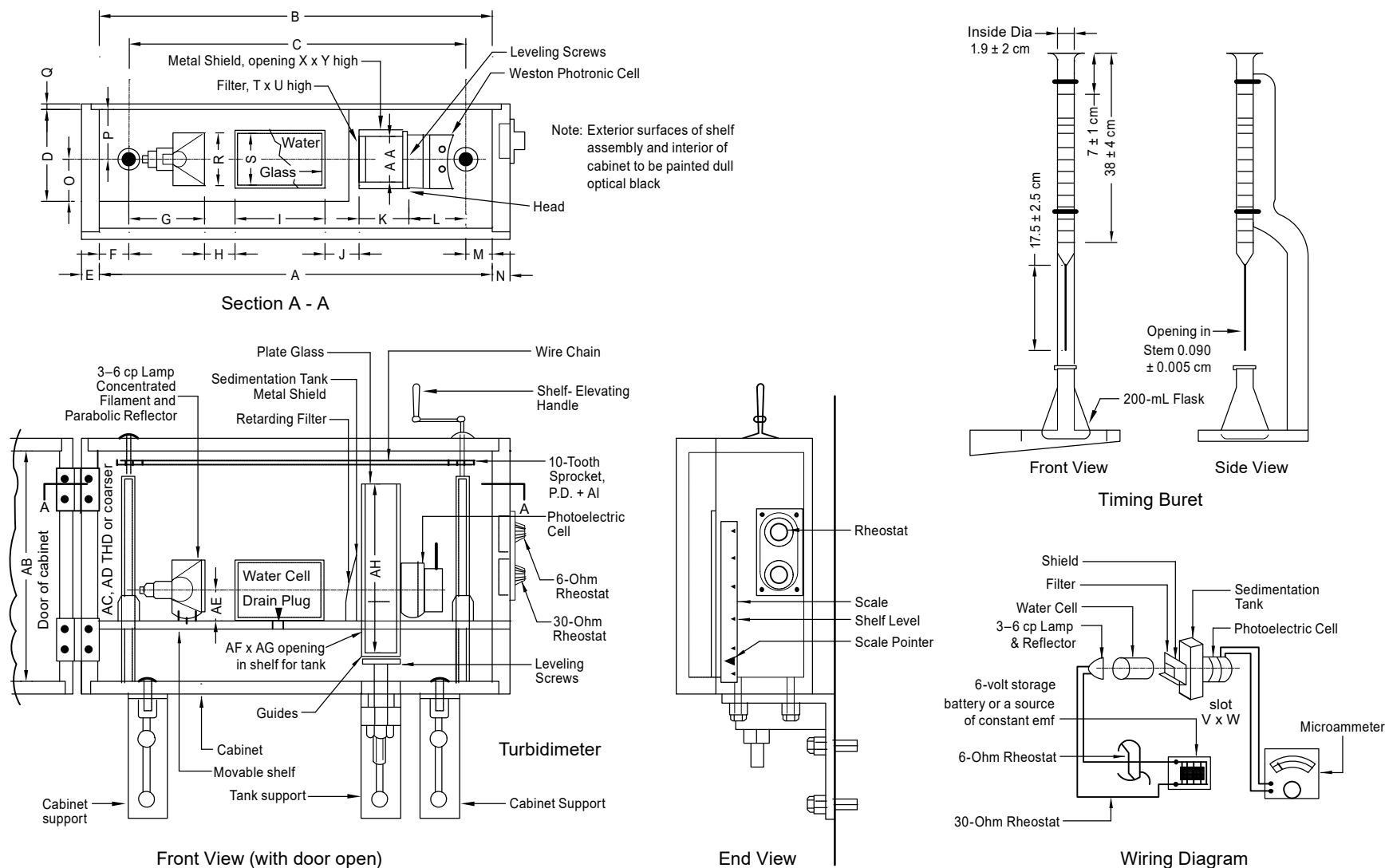


Figure 1—Dimensional Details of Turbidimeter Fineness Test Apparatus (see Table 1)

Table 1—Turbidimeter Apparatus Dimensions (see Figure 1)

Letter	mm	in.	Letter	mm	in.
A	445	17 ¹ / ₂	T	51	2
B	438	17 ¹ / ₄	U	22.2	⁷ / ₈
C	381	15	V	34.9	1 ³ / ₈
D	105	4 ¹ / ₈	W	13	¹ / ₂
E	3.0	¹ / ₈	X	38	1 ¹ / ₂
F	28.6	1 ¹ / ₈	Y	15.9	⁵ / ₈
G	85.7	3 ³ / ₈	Z	38 ± 0.76	1.5 ± 0.03
H	33.3	1 ⁵ / ₁₆	AA	51 ± 2.5	2 ± 0.10
I	102	4	AB	267	10 ¹ / ₂
J	39.7	1 ⁹ / ₁₆	AC	—	⁵ / ₈ ^a
K	55.6	2 ³ / ₁₆	AD	—	11 ^a
L	65.1	2 ⁹ / ₁₆	AE	39.7	1 ⁹ / ₁₆
M	28.6	1 ¹ / ₈	AF	55.6	2 ³ / ₁₆
N	3.0	¹ / ₈	AG	66.7	2 ⁵ / ₈
O	51	2	AH	203	8
P	51	2	AI	23.6	0.93
Q	3.0	¹ / ₈	AJ	1.38 ^a	3 ¹ / ₂ ^a
R	61.1	2 ¹³ / ₃₂	AK	cm ^a	in. ^a
S	69.8	2 ³ / ₄			

^a These are pure numbers such as part of a thread designation and numbers of links per unit; consequently, they do not correspond with column titles.

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 (see Figure 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 on 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 (¹/₈-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