
Standard Method of Test for Air Content of Hydraulic Cement Mortar

AASHTO Designation: T 137-22¹

Technically Revised: 2022

Technical Subcommittee: 3a, Cement, Lime, and Concrete Materials

ASTM Designation: C185-20



**American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This test method covers the determination of the air content of hydraulic cement mortar under the conditions hereinafter specified.
- 1.2. The values stated in SI units are to be regarded as the standard.
- 1.3. Values in SI shall be obtained by measurement in SI units or by appropriate conversion, using the Rules for Conversion and Rounding in IEEE/ASTM SI 10, of measurements made in other units.
- 1.4. *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 on prolonged exposure.
- 1.5. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 85, Portland Cement
 - M 152M/M 152, Flow Table for Use in Tests of Hydraulic Cement
 - M 201, Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
 - M 240M/M 240, Blended Hydraulic Cement
 - M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
 - R 71, Sampling and Amount of Testing of Hydraulic Cement

- T 106M/T 106, Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in. Cube Specimens)
- T 162, Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

2.2. *ASTM Standards:*

- C91/C91M, Standard Specification for Masonry Cement
- C219, Terminology Relating to Hydraulic and Other Inorganic Cements
- C778, Standard Specification for Standard Sand
- C1005, Standard Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E230, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E438, Standard Specification for Glasses in Laboratory Apparatus
- E694, Standard Specification for Laboratory Glass Volumetric Apparatus
- E2877, Standard Guide for Digital Contact Thermometers

2.3. *IEEE/ASTM Standard:*

- SI 10, American National Standard for Metric Practice

2.4. *International Electrotechnical Commission Standard:*

- IEC 60584-1:2013, Thermocouples - Part 1: EMF Specifications and Tolerances

3. TERMINOLOGY

3.1. *Definitions:*

- 3.1.1. The terms in this test method are defined in ASTM C219.

4. SUMMARY OF TEST METHOD

- 4.1. Prepare a mortar with standard sand and the cement to be tested using a water content sufficient to give a required flow. Compact the mortar into a measure of known volume and determine mass. Calculate the air content from the measured density of the mortar, the known densities of the constituents, and the mixture proportions.

5. SIGNIFICANCE AND USE

- 5.1. The purpose of this test method is to determine whether the hydraulic cement under test meets the air-entraining or non-air-entraining requirements of the applicable hydraulic cement specification for which the test is being made. The air content of concrete is influenced by many factors other than the potential of the cement for air entrainment.

6. APPARATUS

- 6.1. *Flow Table, Flow Mold, and Caliper*—Conforming to the requirements of M 152M/M 152.
- 6.2. *Measure*—A cylindrical measure having an inside diameter of 76 ± 2 mm and a depth (approximately 88 mm) adjusted by standardization with water to contain 400 ± 1 mL at $23.0 \pm$