
Standard Method of Test for Lightweight Particles in Aggregate

AASHTO Designation: T 113-22

Technically Revised: 2022

Technical Subcommittee: 1c, Aggregates

ASTM Designation: C123/C123M-12



**American Association of State Highway and Transportation Officials
555 12th Street NW, Suite 1000
Washington, D.C. 20004**

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1. SCOPE

- 1.1. This method covers the determination of the percentage of lightweight particles in aggregate by means of sink–float separation in a heavy liquid of suitable specific gravity.
- 1.2. The values stated in SI units are to be regarded as the standard.
- 1.3. *This standard involves hazardous materials, operations, or equipment. This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to its use.* For a specific hazard statement, see Note 2. Use of chemicals must conform to the requirements of 29 CFR 1910.1200.
- 1.4. *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 6, Fine Aggregate for Hydraulic Cement Concrete
 - M 80, Coarse Aggregate for Hydraulic Cement Concrete
 - M 231, Weighing Devices Used in the Testing of Materials
 - 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 76, Reducing Samples of Aggregate to Testing Size
 - R 90, Sampling Aggregate Products
 - T 27, Sieve Analysis of Fine and Coarse Aggregates
 - T 84, Specific Gravity and Absorption of Fine Aggregate
 - T 85, Specific Gravity and Absorption of Coarse Aggregate
- 2.2. *ASTM Standards:*

- D3665, Standard Practice for Random Sampling of Construction Materials
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E100, Standard Specification for ASTM Hydrometers
- E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E2877, Standard Guide for Digital Contact Thermometers

2.3. *Federal Standard:*

- Fed. Std. No. 29, CFR 1910.1200 OSHA Hazard Communication Standard; see also Permissible Exposure Limits—Annotated Tables, available from <https://www.osha.gov/dsg/annotated-pels/>

2.4. *International Electrotechnical Commission Standard:*

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

3. SIGNIFICANCE AND USE

- 3.1. This method is used to determine conformance with provisions of M 6 and M 80 pertaining to the amount of lightweight material in fine and coarse aggregates. A heavy liquid with a specific gravity of 2.0 is used to separate particles, which may be classified as coal or lignite. Heavier liquids are used to check the percentages of other lightweight particles, such as chert having a specific gravity less than 2.40.

Note 1—The method is useful in identifying porous aggregate particles in research activities or in petrographic analyses.

4. APPARATUS

- 4.1. *Balance*—The balance shall have sufficient capacity, be readable to 0.1 percent of the sample mass or better, and conform to the requirements of M 231.
- 4.2. *Containers*—Suitable for drying the aggregate sample, and containers suitable for holding the heavy liquid during the sink–float separation.
- 4.3. *Skimmer*—A piece of 300- μ m (No. 50) sieve cloth, conforming to ASTM E11, of suitable size and shape for separating the floating particles from the heavy liquid.
- 4.4. *Hot Plate or Oven*—Of appropriate size capable of maintaining a uniform temperature of $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$). Oven(s) or hot plate(s) for heating and drying shall be capable of operation at the temperatures required, between 100 to 120°C (212 to 248°F), within $\pm 5^\circ\text{C}$ ($\pm 9^\circ\text{F}$), as corrected, if necessary, by standardization. More than one device may be used, provided each is used within its proper operating temperature range. The thermometer for measuring the temperature, regardless of drying apparatus used, shall meet the requirements of M 339M/M 339 with a temperature range of at least 90 to 130°C (194 to 266°F), and an accuracy of $\pm 1.25^\circ\text{C}$ ($\pm 2.25^\circ\text{F}$) (see Note 2).
- Note 2**—Thermometer types suitable for use include ASTM E1 mercury thermometers; ASTM E2877 digital metal stem thermometer; ASTM E230/E230M thermocouple thermometer, Type J or K, Special Class, Type T any Class; IEC 60584 thermocouple thermometer, Type J or K, Class 1, Type T any Class; or dial gauge metal stem (bi-metal) thermometer.
- 4.5. *Sieves*—300- μ m (No. 50) and 4.75-mm (No. 4) conforming to ASTM E11.