
Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates

AASHTO Designation: T 27-24¹

Technically Revised: 2024

Technical Subcommittee: 1c, Aggregates

ASTM Designation: C136/C136M-19



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AASHTO

1. SCOPE
- 1.1.

This method covers the determination of the particle size distribution of fine and coarse aggregates by sieving.
- 1.2.

Some specifications for aggregates, which reference this method, contain grading requirements including both coarse and fine fractions. Instructions are included for sieve analysis of such aggregates. Analysis of aggregate extracted from asphalt mixtures is conducted in accordance with T 30.
- 1.3.

The values stated in SI units are to be regarded as the standard. The values in parentheses are provided for information purposes only.
- 1.4.

This standard may involve hazardous materials, operations, and 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 consult and establish appropriate safety and health practices and to determine the applicability of regulatory regulations prior to its use.
- 1.5.

The quality of the results produced by this standard is 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 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 11, Materials Finer Than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing
 - T 30, Mechanical Analysis of Extracted Aggregate

- T 255, Total Evaporable Moisture Content of Aggregate by Drying

2.2. *ASTM Standards:*

- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E2877, Standard Guide for Digital Contact Thermometers

2.3. *International Electrotechnical Commission Standard:*

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

3. SUMMARY OF METHOD

- 3.1. A sample of dry aggregate of known mass is separated through a series of sieves of progressively smaller openings for determination of particle size distribution.

4. SIGNIFICANCE AND USE

- 4.1. This method is used primarily to determine the grading of materials proposed for use as aggregates or being used as aggregates. The results are used to determine compliance of the particle size distribution with applicable specification requirements and to provide necessary data for control of the production of various aggregate products and mixtures containing aggregates. The data may also be useful in developing relationships concerning porosity and packing.
- 4.2. Accurate determination of material finer than the 75- μ m (No. 200) sieve cannot be achieved by use of this method alone. T 11 for material finer than the 75- μ m (No. 200) sieve by washing should be employed.

5. APPARATUS

- 5.1. *Balance*—The balance shall have sufficient capacity, be readable to 0.1 g, or better, and conform to the requirements of M 231.
- 5.2. *Sieves*—The sieve cloth shall be mounted on substantial frames constructed in a manner that will prevent loss of material during sieving. The sieve cloth and standard sieve frames shall conform to the requirements of ASTM E11. Nonstandard sieve frames shall conform to the requirements of ASTM E11 as applicable.
Note 1—It is recommended that sieves mounted in frames larger than standard 203.2 mm (8 in.) diameter be used for testing coarse aggregate to reduce the possibility of overloading the sieves. See Section 7.3.
- 5.3. *Mechanical Sieve Shaker*—A mechanical sieving device, if used, shall create motion of the sieves to cause the particles to bounce, tumble, or otherwise turn so as to present different orientations to the sieving surface. The sieving action shall be such that the criterion for adequacy of sieving described in Section A2 is met in a reasonable time period.
Note 2—Use of a mechanical sieve shaker is recommended when the size of the sample is 20 kg (44 lb) or greater, and may be used for smaller samples, including fine aggregate. Excessive time (more than approximately 10 min) to achieve adequate sieving may result in degradation of the

sample. The same mechanical sieve shaker may not be practical for all sizes of samples because the large sieving area needed for practical sieving of a large nominal size coarse aggregate very likely could result in loss of a portion of the sample if used for a smaller sample of coarse aggregate or fine aggregate.

- 5.4. *Oven*—An 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) 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 oven 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 3).

Note 3—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.

6. SAMPLING

- 6.1. Sample the aggregate in accordance with R 90. The mass of the field sample shall be the mass shown in R 90 or four times the mass required in Sections 6.4 and 6.5 (except as modified in Section 6.6), whichever is greater.
- 6.2. Thoroughly mix the sample and reduce it to an amount suitable for testing using the applicable procedures described in R 76. The sample for test shall be the approximate mass desired when dry and shall be the end result of the reduction. Reduction to an exact predetermined mass shall not be permitted.
- Note 4**—Where sieve analysis, including determination of material finer than the $75\text{-}\mu\text{m}$ (No. 200) sieve, is the only testing proposed, the size of the sample may be reduced in the field to avoid shipping excessive quantities of extra material to the laboratory.
- 6.3. *Fine Aggregate*—The size of the test sample of aggregate, after drying, shall be 300 g minimum (Note 5).
- 6.4. *Coarse Aggregate*—The mass of the test sample of coarse aggregate shall conform with the following (Note 5):

Nominal Maximum Size Square Openings, mm (in.)	Minimum Mass of Test Sample, kg (lb)
9.5 ($\frac{3}{8}$)	1 (2)
12.5 ($\frac{1}{2}$)	2 (4)
19.0 ($\frac{3}{4}$)	5 (11)
25.0 (1)	10 (22)
37.5 ($1\frac{1}{2}$)	15 (33)
50 (2)	20 (44)
63 ($2\frac{1}{2}$)	35 (77)
75 (3)	60 (130)
90 ($3\frac{1}{2}$)	100 (220)
100 (4)	150 (330)
125 (5)	300 (660)