
Standard Method of Test for Uncompacted Void Content of Fine Aggregate

AASHTO Designation: T 304-22

Technically Revised: 2022

Technical Subcommittee: 1c, Aggregates



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

- 1.1. This method describes the determination of the loose uncompacted void content of a sample of fine aggregate. When measured on any aggregate of a known grading, void content provides an indication of that aggregate's angularity, sphericity, and surface texture compared with other fine aggregates tested in the same grading. When void content is measured on an as-received fine aggregate grading, it can be an indicator of the effect of the fine aggregate on the workability of a mixture in which it may be used.
- 1.2. Three procedures are included for the measurement of void content. Two use graded fine aggregate (standard grading or as-received grading), and the other uses several individual size fractions for void content determinations:
- 1.2.1. *Standard Graded Sample (Method A)*—This method uses a standard fine aggregate grading that is obtained by combining individual sieve fractions from a typical fine aggregate sieve analysis. See Section 9, Preparation of Test Samples, for the grading.
- 1.2.2. *Individual Size Fractions (Method B)*—This method uses each of three fine aggregate size fractions: (a) 2.36 mm (No. 8) to 1.18 mm (No. 16); (b) 1.18 mm (No. 16) to 600 μm (No. 30); and (c) 600 μm (No. 30) to 300 μm (No. 50). For this method, each size is tested separately.
- 1.2.3. *As-Received Grading (Method C)*—This method uses that portion of the fine aggregate finer than a 4.75-mm (No. 4) sieve.
- 1.2.4. See Section 5, Significance and Use, for guidance on the method to be used.
- 1.3. The values stated in SI units shall be regarded as the standard.
- 1.4. *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.*
- 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 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- μ m (No. 200) Sieve in Mineral Aggregates by Washing
- T 19M/T 19, Bulk Density ("Unit Weight") and Voids in Aggregate
- T 27, Sieve Analysis of Fine and Coarse Aggregates
- T 84, Specific Gravity and Absorption of Fine Aggregate

2.2. *ASTM Standards:*

- C125, Standard Terminology Relating to Concrete and Concrete Aggregates
- C778, Standard Specification for Standard Sand
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E2877, Standard Guide for Digital Contact Thermometers

2.3. *American Concrete Institute Document:*

- ACI 116R, Cement and Concrete Terminology¹

2.4. *International Electrotechnical Commission Standard:*

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

3. TERMINOLOGY

- 3.1. Terms used in this standard are defined in ASTM C125 or ACI 116R.

4. SUMMARY OF TEST METHOD

- 4.1. A nominal 100-mL calibrated cylindrical measure is filled with fine aggregate of prescribed grading by allowing the sample to flow through a funnel from a fixed height into the measure. The fine aggregate is struck off, and its mass is determined by weighing. Uncompacted void content is calculated as the difference between the volume of the cylindrical measure and the absolute volume of the fine aggregate collected in the measure. Uncompacted void content is calculated using the bulk dry specific gravity of the fine aggregate. Two runs are made on each sample and the results are averaged.
- 4.1.1. For a graded sample (Method A or Method C), the percent void content is determined directly, and the average value from two runs is reported.
- 4.1.2. For the individual size fractions (Method B), the mean percent void content is calculated using the results from tests of each of the three individual size fractions.