
Standard Method of Test for Uncompacted Void Content of Coarse Aggregate (As Influenced by Particle Shape, Surface Texture, and Grading)

AASHTO Designation: T 326-22¹

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 coarse aggregate. When measured on any aggregate of a known grading, void content provides an indication of the aggregate's angularity, sphericity, and surface texture compared with other coarse aggregates tested in the same grading.
- 1.2. Three procedures are included for the measurement of void content. Two use graded coarse 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 coarse aggregate grading that is obtained by combining individual sieve fractions from the maximum density curve drawn from the maximum coarse aggregate size. (See Section 8.)
 - 1.2.2. *Individual Size Fractions (Method B)*—This method uses each of three coarse aggregate size fractions: (a) 19 mm ($\frac{3}{4}$ in.) to 12.5 mm ($\frac{1}{2}$ in.); (b) 12.5 mm ($\frac{1}{2}$ in.) to 9.5 mm ($\frac{3}{8}$ in.); and (c) 9.5 mm ($\frac{3}{8}$ in.) to 4.75 mm (No. 4). For this method, each size is tested separately.
 - 1.2.3. *As-Received Grading (Method C)*—This method uses that portion of the coarse aggregate retained on the 4.75-mm (No. 4) sieve.
- 1.3. *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 establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to its use.*
- 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 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- 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 85, Specific Gravity and Absorption of Coarse Aggregate

2.2. *ASTM Standards:*

- 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. *International Electrotechnical Commission Standard:*

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

3. SUMMARY OF TEST METHODS

3.1. A calibrated cylindrical measure is filled with coarse aggregate of prescribed grading by allowing the sample to flow through a funnel from a fixed height into the measure. The coarse 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 coarse aggregate collected in the measure. Uncompacted void content is calculated using the bulk dry specific gravity of the coarse aggregate as received without special grading except as noted in Section 4.3.1. Two runs are made on each sample and the results are averaged.

3.1.1. For a graded sample (Test Method A or C) the percent void content is determined directly, and the average value from two runs is reported.

3.1.2. For the individual size fractions (Test Method B), the mean percent void content is calculated using the results from tests of each of the three individual size fractions.

4. SIGNIFICANCE AND USE

4.1. Methods A and B provide percent void content determined under standardized conditions, which depends on the particle shape and texture of a coarse aggregate. An increase in void content by these procedures indicates greater angularity, less sphericity, or rougher surface texture, or some combination of the three factors. A decrease in void content results is associated with more rounded, spherical, or smooth-surfaced coarse aggregates, or a combination of these factors.

4.2. Method C measures the uncompacted void content of the fraction retained on a 4.75-mm (No. 4) sieve of the as-received material. This void content depends on grading as well as particle shape and texture.