
Standard Method of Test for

Specific Gravity and Absorption of Coarse Aggregate

AASHTO Designation: T 85-21¹

Technically Revised: 2021

Editorially Revised: 2021

Technical Subcommittee: 1c, Aggregates

ASTM Designation: C127-12



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1. SCOPE

- 1.1. This method covers the determination of specific gravity and absorption of coarse aggregate. The specific gravity may be expressed as bulk specific gravity, bulk specific gravity (saturated surface-dry (SSD)), or apparent specific gravity. The bulk specific gravity (SSD) and absorption are based on aggregate after 15–19 h of soaking in water. This method is not intended to be used with lightweight aggregates.
- 1.2. The values stated in SI units are to be regarded as the standard.
- 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 consult and 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 43, Sizes of Aggregate for Road and Bridge Construction
 - M 80, Coarse Aggregate for Hydraulic Cement Concrete
 - M 231, Weighing Devices Used in the Testing of 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 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
- 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
- E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. TERMINOLOGY

3.1. *Definitions:*

- 3.1.1. *absorption*—the increase in the mass of aggregate due to water in the pores of the material, but not including water adhering to the outside surface of the particles, expressed as a percentage of the dry mass. The aggregate is considered “dry” when it has been maintained at a temperature of $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) for sufficient time to remove all uncombined water by reaching a constant mass.
- 3.1.2. *specific gravity*—the ratio of the mass (or weight in air) of a unit volume of a material to the mass of the same volume of gas-free distilled water at stated temperatures. Values are dimensionless.
- 3.1.2.1. *apparent specific gravity*—the ratio of the weight in air of a unit volume of the impermeable portion of aggregate at a stated temperature to the weight in air of an equal volume of gas-free distilled water at a stated temperature.
- 3.1.2.2. *bulk specific gravity*—the ratio of the weight in air of a unit volume of aggregate (including the permeable and impermeable voids in the particles, but not including the voids between particles) at a stated temperature to the weight in air of an equal volume of gas-free distilled water at a stated temperature.
- 3.1.2.3. *bulk specific gravity (SSD)*—the ratio of the mass in air of a unit volume of aggregate, including the mass of water within the voids filled to the extent achieved by submerging in water for 15–19 h (but not including the voids between particles) at a stated temperature, compared to the weight in air of an equal volume of gas-free distilled water at a stated temperature.

4. SUMMARY OF METHOD

- 4.1. A sample of aggregate is immersed in water to essentially fill the pores. It is then removed from the water, the water dried from the surface of the particles, and weighed. Subsequently the sample is weighed while submerged in water. Finally, the sample is oven-dried and weighed a third time. Using the mass and weight measurements thus obtained and formulas in the method, it is possible to calculate three types of specific gravity and absorption.

5. SIGNIFICANCE AND USE

- 5.1. Bulk specific gravity is the characteristic generally used for calculation of the volume occupied by the aggregate in various mixtures containing aggregate, including portland cement concrete, bituminous concrete, and other mixtures that are proportioned or analyzed on an absolute volume basis. Bulk specific gravity is also used in the computation of voids in aggregate in T 19M/T 19. Bulk specific gravity (SSD) is used if the aggregate is wet, that is, if its absorption has been