



Designation: C567 – 05a

Standard Test Method for Determining Density of Structural Lightweight Concrete¹

This standard is issued under the fixed designation C567; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method provides procedures to determine the oven-dry and equilibrium densities of structural lightweight concrete.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

C31/C31M Practice for Making and Curing Concrete Test Specimens in the Field

C88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

C125 Terminology Relating to Concrete and Concrete Aggregates

C138/C138M Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

C172 Practice for Sampling Freshly Mixed Concrete

C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory

C470/C470M Specification for Molds for Forming Concrete Test Cylinders Vertically

E104 Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions

3. Terminology

3.1 Terminology used in this test method is defined in Terminology **C125**.

¹ This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.21 on Lightweight Aggregates and Concrete.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *equilibrium density, n* —the density as determined in 8.2 reached by structural lightweight concrete after exposure to relative humidity of $50 \pm 5\%$ and a temperature of $23 \pm 2^\circ\text{C}$ ($73.5 \pm 3.5^\circ\text{F}$) for a period of time sufficient to reach constant mass.

3.2.2 *oven-dry density*—the density as determined in 8.3 reached by structural lightweight concrete after being placed in a drying oven at $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) for a period of time sufficient to reach constant mass.

4. Summary of Test Method

4.1 This test method provides procedures for determining the oven-dry and equilibrium densities of structural lightweight concrete, by calculation or measurement. The calculated oven-dry density is determined from batch quantities and volume of a given batch of concrete. The calculated equilibrium density is approximated by adding a fixed quantity to the oven-dry density. Measured densities are obtained from determinations of the mass of cylindrical specimens after specified treatments.

5. Significance and Use

5.1 The measured or calculated equilibrium density of structural lightweight concrete determines whether specified density requirements have been met. Unless otherwise specified, determine equilibrium density by calculation using the procedures in 9.2.

5.2 Test Method **C138/C138M** shall be used to determine the density of freshly mixed lightweight concrete for compliance with concrete placement specifications.

NOTE 1—The fresh density of lightweight aggregate concrete is a function of mixture proportions, air content, water demand, and the specific density and moisture content of the lightweight aggregate. Decrease in density of a specific lightweight concrete is due to moisture loss that, in turn, is a function of aggregate moisture content, ambient conditions, and the ratio of the surface area to the volume of the concrete member. For most structural lightweight concretes, equilibrium density is approached at about 90 days. For most high-strength lightweight concretes, equilibrium density is approached at about 180 days. Extensive tests demonstrate that despite variations in the initial moisture content of lightweight aggregate, the equilibrium density will be approximately 50 kg/m³ (3.0 lb/ft³) greater than the oven-dry density.