



Designation: C 332 – 99

Standard Specification for Lightweight Aggregates for Insulating Concrete¹

This standard is issued under the fixed designation C 332; 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 approval. 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 specification covers lightweight aggregates intended for use in concrete not exposed to the weather, in which the prime consideration is the thermal insulating property of the resulting concrete.

1.2 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.3 With regard to sieve size and the size of aggregate as determined by the use of testing sieves, the values in inch-pound units are shown for the convenience of the user; however, the standard sieve designation shown in parentheses is the standard value as stated in Specification E 11.

1.3.1 With regard to other units of measure, the values stated in inch-pound units are to be regarded as standard.

1.4 The following precautionary caveat pertains only to the test method portion, Section 6, of the specification: *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:

C 29/C 29M Test Method for Unit Weight and Voids in Aggregate²

C 136 Method for Sieve Analysis of Fine and Coarse Aggregates²

C 177 Test Method for Steady-State Heat-Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus³

D 75 Practice for Sampling Aggregates⁴

E 11 Specification for Wire-Cloth and Sieves for Testing Purposes⁵

3. Classification

3.1 Two general types of lightweight aggregate are covered by this specification as follows:

3.1.1 *Group I*—Aggregates prepared by expanding products such as perlite or vermiculite.

NOTE 1—These aggregates generally produce concrete weighing from 15 to 50 lb/ft³ (240 to 800 kg/m³), the thermal conductivity of which may be expected to range from 0.45 to 1.50 Btu·in/h·ft²·°F (0.065 to 0.22 W/m·K).

3.1.2 *Group II*—Aggregates prepared by expanding, calcining, or sintering products such as blast-furnace slag, clay, diatomite, fly ash, shale, or slate; and aggregates prepared by processing natural materials, such as pumice, scoria, or tuff.

NOTE 2—These aggregates generally produce concrete weighing from 45 to 90 lb/ft³ (720 to 1440 kg/m³), the thermal conductivity of which may be expected to range from 1.05 to 3.00 BTU·in/h·ft²·°F (0.15 to 0.43 W/m·K).

3.2 The aggregate shall be composed predominantly of lightweight cellular and granular inorganic material.

4. Physical Properties

4.1 *Insulating Properties*—The thermal insulating properties of concrete made from the lightweight aggregate under test shall conform to the following limits:

Maximum Average 28-Day Oven-Dry Unit Weight, lb/ft ³ (kg/m ³)	Maximum Average Thermal Conductivity, Btu·in/h·ft ² ·°F (W/m·K)
50 (800)	1.50 (0.22)
90 (1440)	3.00 (0.43)

4.2 *Grading*—The grading shall conform to the requirements shown in Table 1.

4.2.1 *Uniformity of Grading*—To ensure reasonable uniformity in the gradation of successive shipments of lightweight

¹ This specification is under the jurisdiction of ASTM Committee C-9 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.21 on Lightweight Aggregates.

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² *Annual Book of ASTM Standards*, Vol 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.06.

⁴ *Annual Book of ASTM Standards*, Vol 04.03.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.