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# **Standard Specification for Lightweight Aggregates for Structural Concrete**

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**AASHTO Designation: M 195-22<sup>1</sup>**

**Technically Revised: 2022**

**Technical Subcommittee: 1c, Aggregates**

**ASTM Designation: C330/C330M-09**



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## 1. SCOPE

- 1.1. This specification covers lightweight aggregates intended for use in structural concrete in which the prime considerations are reducing the density while maintaining compressive strength of the concrete. Procedures covered in this specification are not intended for job control of concrete.
- 1.2. The values stated in SI units are to be regarded as the standard. The values shown in parentheses are for information purposes only.
- 1.3. The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.
- Note 1**—This specification is regarded as adequate to ensure satisfactory lightweight aggregates for most concrete. It is recognized that it may be either more or less restrictive than needed for some conditions and for special purposes, such as fire resistance, fill, and concrete constructions, the use of which is based on load tests rather than conventional design procedures.

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## 2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 6, Fine Aggregate for Hydraulic Cement Concrete
  - M 339M/M 339, Thermometers Used in the Testing of Construction Materials
  - R 39, Making and Curing Concrete Test Specimens in the Laboratory
  - R 76, Reducing Samples of Aggregate to Testing Size
  - R 90, Sampling Aggregate Products
  - R 100, Making and Curing Concrete Test Specimens in the Field
  - T 19M/T 19, Bulk Density (“Unit Weight”) and Voids in Aggregate
  - T 21M/T 21, Organic Impurities in Fine Aggregates for Concrete
  - T 22M/T 22, Compressive Strength of Cylindrical Concrete Specimens
  - T 27, Sieve Analysis of Fine and Coarse Aggregates
  - T 105, Chemical Analysis of Hydraulic Cement
  - T 107M/T 107, Autoclave Expansion of Hydraulic Cement
  - T 112, Clay Lumps and Friable Particles in Aggregate

- T 160, Length Change of Hardened Hydraulic Cement Mortar and Concrete
- T 161, Resistance of Concrete to Rapid Freezing and Thawing
- T 198, Splitting Tensile Strength of Cylindrical Concrete Specimens

2.2. *ASTM Standards:*

- C567/C567M, Standard Test Method for Determining Density of Structural Lightweight Concrete
- C641, Standard Test Method for Iron Staining Materials in Lightweight Concrete Aggregates
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E230/M230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E879, Standard Specification for Thermistor Sensors for General Purpose and Laboratory Temperature Measurements
- E1137/E1137M, Standard Specification for Industrial Platinum Resistance Thermometers
- E2877, Standard Guide for Digital Contact Thermometers

2.3. *International Electrotechnical Commission Standards:*

- IEC 60584-1: 2013 Thermocouples - Part 1: EMF Specifications and Tolerances
- IEC 60751: 2008 Industrial Platinum Resistance Thermometers and Platinum Temperature Sensors

2.4. *ACI Standard:*

- ACI 211.2, Standard Practice for Selecting Proportions for Structural Lightweight Concrete

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### 3. GENERAL CHARACTERISTICS

3.1. *Two general types of lightweight aggregates are covered by this specification, as follows:*

- 3.1.1. Aggregates prepared by expanding, pelletizing or sintering products such as blast-furnace slag, clay, diatomite, fly ash, shale, or slate; and
- 3.1.2. Aggregates prepared by processing natural materials, such as pumice, scoria, or tuff.
- 3.2. The aggregates shall be composed predominately of lightweight cellular and granular inorganic material.

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### 4. CHEMICAL COMPOSITION

4.1. *Lightweight aggregates shall not contain excessive amounts of deleterious substances, as determined by the following limits:*

- 4.1.1. *Organic Impurities*—T 21M/T 21. Lightweight aggregates that, upon being subjected to test for organic impurities, produce a color darker than the standard shall be rejected, unless it is demonstrated that the discoloration is due to small quantities of materials not harmful to the concrete.
- 4.1.2. *Staining*—ASTM C641. An aggregate producing a heavy stain index 60 or higher shall be rejected when the deposited stain is found on chemical analysis to contain an iron content, expressed as Fe<sub>2</sub>O<sub>3</sub>, equal to or greater than 1.5 mg/200 g of sample.