
Standard Specification for Silica Fume Used in Cementitious Mixtures

AASHTO Designation: M 307-13 (2017)¹

Technical Section: 3b, Fresh Concrete

Release: Group 1 (April 2017)

ASTM Designation: C1240-15



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1. SCOPE

- 1.1. This specification covers silica fume for use in concrete and other systems containing hydraulic cement.
- 1.2. In the cases of slurried or densified silica fume, perform the tests on the raw silica fume from which these products have been made.
- 1.3. The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.
- 1.4. The following safety hazards caveat pertains only to the test methods portions, Section 10, of this 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 to determine the applicability of regulatory limitations prior to use.* Read the material safety data sheets for materials used.
- 1.5. The text of this standard references notes and footnotes that provide explanatory information. These notes and footnotes (excluding those in tables) shall not be considered as requirements of this standard.

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
 - M 194M/M 194, Chemical Admixtures for Concrete
 - R 71, Sampling and Amount of Testing of Hydraulic Cement
 - T 105, Chemical Analysis of Hydraulic Cement
 - T 106M/T 106, Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in. Cube Specimens)
 - T 137, Air Content of Hydraulic Cement Mortar
 - T 192, Fineness of Hydraulic Cement by the 45- μ m (No. 325) Sieve
- 2.2. *ASTM Standards:*
 - C125, Standard Terminology Relating to Concrete and Concrete Aggregates
 - C135, Standard Test Method for True Specific Gravity of Refractory Materials by Water Immersion

- C219, Standard Terminology Relating to Hydraulic Cement
- C311/C311M, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
- C441/C 441M, Standard Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction
- C604, Standard Test Method for True Specific Gravity of Refractory Materials by Gas-Comparison Pycnometer
- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- C1005, Standard Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements
- C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution
- C1069, Standard Test Method for Specific Surface Area of Alumina or Quartz by Nitrogen Adsorption
- C1157/C1157M, Standard Performance Specification for Hydraulic Cement
- C1437, Standard Test Method for Flow of Hydraulic Cement Mortar

3. TERMINOLOGY

3.1. Definitions:

- 3.1.1. *silica fume*—a very fine pozzolanic material, composed mostly of amorphous silica produced by electric arc furnaces as a by-product of the production of elemental silicon or ferro-silicon alloys (also known as condensed silica fume and microsilica).
- 3.1.2. *silica fume, densified*—silica fume processed to increase bulk density to facilitate handling and shipping.
- 3.1.3. *silica fume, undensified*—silica fume in its raw, as produced or as collected, unprocessed form.
- 3.1.4. Other terms in this specification are defined in ASTM C125 and C219.

4. ORDERING INFORMATION

- 4.1. The purchaser shall specify any optional chemical or physical requirements.

5. CHEMICAL REQUIREMENTS

- 5.1. Silica fume shall conform to the requirements for chemical composition prescribed in Table 1.

Table 1—Chemical Requirements

| | |
|--|------|
| Silicon dioxide (SiO ₂), min percent | 85.0 |
| Moisture content, max percent | 3.0 |
| Loss on ignition, max percent | 6.0 |