
Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

AASHTO Designation: M 295-24

Technically Revised: 2024

Technical Subcommittee: 3a, Cement, Lime, and Concrete Materials

ASTM Designation: C618-23



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1. SCOPE

- 1.1. This specification covers coal ash resulting from the combustion of coal and raw or calcined natural pozzolan for use in concrete where cementitious or pozzolanic action, or both, is desired or where other properties normally attributed to finely divided coal ash and raw or calcined natural pozzolans may be desired or where both objectives are to be achieved.
- Note 1**—Finely divided materials may tend to reduce the entrained air content of concrete. Hence, if a coal ash or natural pozzolan is added to any concrete for which entrainment of air is specified, provision should be made to ensure that the specified air content is maintained by air content tests and by use of additional air-entraining admixture or use of an air-entraining admixture in combination with air-entraining hydraulic cement.
- 1.2. The values stated in SI units are to be regarded as the standard.

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standard:*
- T 27, Sieve Analysis of Fine and Coarse Aggregates
 - R 80, Determining the Reactivity of Concrete Aggregates and Selecting Appropriate Measures for Preventing Deleterious Expansion in New Concrete Construction
- 2.2. *ASTM Standards:*
- C125, Standard Terminology Relating to Concrete and Concrete Aggregates
 - C311/C311M, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete

3. TERMINOLOGY

- 3.1. The terms used in this specification are defined in ASTM C125.
- 3.2. *Definitions of Terms Specific to This Standard:*
- 3.2.1. *coal ash*—Fly ash and bottom ash resulting from the process of combustion of ground or powdered coal obtained either from current power plant production or harvested from landfills or impoundments.

- 3.2.2. *bottom ash*—Ash that results from the process of combustion of ground or powdered coal that is not transported by flue gases.
- Note 2**—This definition of bottom ash does not include the residue resulting from (1) fluidized bed combustion; (2) the burning of municipal garbage or any other refuse with coal; or (3) the burning of industrial or municipal garbage in incinerators, commonly known as “incinerator ash.”

4. CLASSIFICATION

- 4.1. *Class N*—Raw or calcined natural pozzolans that comply with the applicable requirements for the class as given herein, such as some diatomaceous earths; opaline cherts and shales; tuffs and volcanic ashes or pumicites, calcined or uncalcined; and various materials requiring calcination to induce satisfactory properties, such as some clays and shales.
- 4.2. *Class F*—Coal ash that meets the applicable requirements for this class as given herein. This class coal ash has pozzolanic properties.
- 4.3. *Class C*—Coal ash that meets the applicable requirements for this class as given herein. This class of coal ash, in addition to having pozzolanic properties, also has some cementitious properties.
- Note 3**—Class F coal ash is typically produced from burning anthracite or bituminous coal but may also be produced from sub-bituminous coal and from lignite. Class C coal ash is typically produced from burning lignite or sub-bituminous coal and may also be produced by anthracite or bituminous coal.
- 4.4. It is permitted to process coal ash and natural pozzolans in order to meet the requirements of this specification.
- Note 4**—Processing may include but is not limited to one or more of the following unit operations: grinding, drying, sieving, deagglomeration, sizing, and carbon removal.

5. ORDERING INFORMATION

- 5.1. The purchaser shall specify any supplementary optional chemical and physical requirements.
- 5.2. The purchaser shall indicate which procedure, A or B, shall be used when specifying requirements for effectiveness in contribution to sulfate resistance under Table 4.

6. CHEMICAL COMPOSITION

- 6.1. Coal ash and natural pozzolans shall conform to the requirements as to chemical composition prescribed in Table 1.

Table 1—Chemical Requirements

	Coal Ash and Raw or Calcined Natural Pozzolan Class		
	N	F	C
Silicon dioxide (SiO ₂) plus aluminum oxide (Al ₂ O ₃) plus iron oxide (Fe ₂ O ₃), min percent	70.0	50.0	50.0
Calcium oxide, CaO, %	Report only	18.0 max	>18.0
Sulfur trioxide (SO ₃), max percent	4.0	5.0	5.0
Moisture content, max percent	3.0	3.0	3.0
Loss on ignition, max percent	5.0	5.0	5.0