



## SECTION 1018

### FLY ASH FOR CONCRETE

**1018.1 Scope.** This specification covers fly ash for use in Portland cement concrete.

**1018.2 General.** Only fly ash from sources qualified in accordance with these specifications will be permitted. The mixing of different classes and sources of fly ash will not be permitted. All fly ash shall be in accordance with AASHTO M 295, Class C or F, except as herein specified.

**1018.2.1** Class C fly ash shall meet either (a) or (b) of the following requirements:

(a) The 7-day Strength Activity Index with Portland cement shall be at a minimum of 85 percent of the control.

(b) The Calcium oxide content shall be 23 percent, minimum.

**1018.2.1.1** All Class C fly ash shall have a minimum Strength Activity Index with Portland cement of 85 percent of the control at 28 days.

**1018.2.2** The percent each of silicon dioxide ( $\text{SiO}_2$ ), aluminum oxide ( $\text{Al}_2\text{O}_3$ ) and iron oxide ( $\text{Fe}_2\text{O}_3$ ) shall be reported in addition to the total of the three.

**1018.2.3** Loss on Ignition shall not exceed 1.5 percent unless supplies provide test data verifying performance and durability in fly ash concrete applications for sources exceeding this requirement.

**1018.2.4** The term "manufacturer", as used in this specification, will be the actual manufacturer of the fly ash. The term, "marketing entity", as used in this specification, will be the supplier or broker of the fly ash. The marketing entity shall be responsible to be in accordance with these specifications.

**1018.2.5** Cement used for testing fly ash shall be in accordance with AASHTO M85.

**1018.2.6** All marketing entities, terminals, and independent testing laboratories shall be qualified prior to acceptance of any material.

#### **1018.3 Laboratory Qualification.**

**1018.3.1** Laboratories approved prior to 10/01/06 shall maintain qualification based on continued compliance with all of the of all requirements specified herein.

**1018.3.2** In order to become qualified, a written request shall be sent by the marketing entity to Construction and Materials, along with a copy of the independent laboratory's most recent Cement and Concrete Reference Laboratory (CCRL) certification and the latest CCRL Pozzolan proficiency sample report. The CCRL inspection shall cover all tests required by the specification. Documentation showing satisfactory resolution of all inspection deficiencies shall be included.

**1018.3.3 Failure to Comply.** Failure to comply with any of these requirements and/or specified herein may result in the issuance of a strike. If a laboratory accumulates three strikes, the laboratory shall be disqualified. For every year a laboratory does not receive a strike, a strike will be removed from the laboratory's accumulated total. In cases of dispute, test results obtained by MoDOT will control.

**1018.3.4 Disqualified Facilities.** If a laboratory has been disqualified, the marketing entity must utilize an existing MoDOT approved laboratory or qualify a laboratory fulfilling MoDOT requirements. A disqualified laboratory will be unable to maintain qualification based on requirements governed in this specification. Laboratories found to not be operating independent of qualified marketing entities shall be disqualified.

**1018.4 Marketing Entity Qualification.** In order to become qualified, a written request shall be sent by the marketing entity to Construction and Materials, along with a copy of the marketing entity's QC plan and the following information. The power plant and terminals may be inspected to verify the information and to establish personal contact with the QC personnel.

**1018.4.1.** The following information shall be included in the request for qualification:

(a) An outline of the QC program from the coal yard to the point where the product is relinquished to the purchaser. The QC program shall cover all tests required by the specification, and shall include the testing frequency for each test. The name of the testing laboratory shall also be included.

(b) A copy of the testing laboratory's most recent Cement and Concrete Reference Laboratory (CCRL) inspection report and the latest CCRL proficiency sample report. The CCRL inspection shall cover all tests required by the specification. Documentation showing satisfactory resolution of all inspection deficiencies shall be included.

(c) Complete name and address of the fly ash source and owner. If located in an area without precise address identification, a complete map description shall be furnished.

(d) Complete name and address or map location of the coal mine. If more than one source of coal is used, all sources shall be listed.

(e) Type of coal used.

(f) Class of fly ash produced.

(g) A description of production procedures including, but not limited to, any additives mixed with the coal during production, any additive or dust suppressant used to collect the fly ash, ash collection methods, production capacity in tons (Mg) per day, and the proportions and proportioning procedures of any blended coals.

(h) Description of storage facilities, including capacities and set-aside capabilities.

(i) A copy of a typical bill of lading in accordance with the certification statement.

(j) A split sample of the class of fly ash proposed for use, obtained from the autosampler over a minimum of one production day. The marketing entity's test results for the split sample shall also be submitted.

**1018.4.2** In order to maintain qualification, the following will be required:

(a) Quality control test results covering the production of all fly ash proposed for use in MoDOT projects, including the high, low and average results for each class shall be kept on file by the marketing entity. Sampling and testing frequency shall be in accordance with ASTM C 311. Results shall include the percent each of silicon dioxide (SiO<sub>2</sub>), aluminum oxide (Al<sub>2</sub>O<sub>3</sub>) and iron oxide (Fe<sub>2</sub>O<sub>3</sub>) in addition to a total of all three.

(b) A copy of the most recent CCRL inspection and proficiency sample reports and any deficiency resolutions shall be forwarded promptly to MoDOT.

(c) Semi-annual split samples for the class of approved fly ash shall be obtained by MoDOT for joint testing by the marketing entity. Marketing entity test results on the split samples shall be furnished to Construction and Materials when completed.

(d) All QC test results shall be available for a minimum of three years, for MoDOT review upon request.

(e) All monthly or each 3200-ton samples shall be available for a minimum of one year, for MoDOT testing upon request.

(f) Only fly ash in compliance with these specifications shall be allowed into a silo destined for MoDOT projects.

**1018.4.3 Failure to Comply.** Failure to comply with any of these requirements and/or specified herein may result in the issuance of a strike. If a marketing entity accumulates three strikes, the marketing entity shall be disqualified. For every year a marketing entity does not receive a strike, a strike will be removed from the marketing entities' accumulated total. In cases of dispute, test results obtained by MoDOT will control.

**1018.5 Terminal Qualification.** In order to become a qualified terminal, a written request shall be sent from terminal personnel to Construction and Materials. A letter shall accompany the request from each affected and qualified marketing entity, advising of the intent to ship through the respective terminal. Any changes in fly ash source shall be updated in the same manner. Terminals shall be inspected to ensure adequacy to accept, retain and ship fly ash from qualified marketing entities.

**1018.6 Sampling, Testing and Acceptance Procedures.** All fly ash will be subject to inspection and sampling by MoDOT at the power plant, an intermediate shipping terminal or destination. MoDOT shall be allowed unlimited access to all facilities and records in order to conduct inspection and sampling.

**1018.6.1 Failure to Comply.** Failure to fulfill any of these requirements may result in disqualification of the fly ash manufacturer, marketing entity or a terminal. In cases of dispute, test results obtained by MoDOT will control.

**1018.6.2 Disqualified Facilities.** If a facility has been disqualified, the marketing entity may elect to designate the silo, bin or storage facility from which the marketing entity proposes to furnish fly ash for MoDOT projects. If this option is used, each silo, bin or storage facility designated must be sampled, tested, sealed and approved by MoDOT prior to shipment. The marketing entity shall also sample, test and report the test results for each designated silo, bin or storage facility.

**1018.6.3 Shipping.** Fly ash shall be continually sampled and tested via autosamplers at a location, frequency and duration acceptable to MoDOT, and may be continuously shipped direct from a marketing entity or generating station silo.

**1018.6.4 Storage.** All fly ash intended for use shall be sampled, tested, and placed in designated silos or bins.

**1018.6.5 Coal Sources and Process.** Fly ash from each coal source at each plant shall be qualified separately. Coals from different sources may be blended prior to burning, but the qualification shall be based on the blend. When the production procedure or fuel source is changed, or when any change is made by the manufacturer that alters the properties or characteristics of the qualified fly ash, requalification may be required.

**1018.6.6 Acceptance.** The marketing entity shall certify that the material complies with the specification requirements. When a qualified marketing entity or terminal is shipping fly ash for, or purchasing fly ash from, another qualified marketing entity, the bill of lading or delivery receipt shall be from the shipping company. The certification statement showing the actual manufacturer shall be prominently placed on the bill of lading or delivery receipt. A copy of the bill of lading or delivery receipt shall accompany each shipment and shall be furnished to MoDOT at the shipping and destination points.

**1018.6.7** The bill of lading or delivery receipt for each shipment to MoDOT projects shall carry the following certification statement:

"This is to certify this Class \_\_\_ fly ash originated from a MoDOT qualified manufacturer, has been maintained to meet MoDOT specifications and was loaded from silo number \_\_\_\_\_."

\_\_\_\_\_  
Name and Location of Manufacturer

\_\_\_\_\_  
Name and Location of Shipping Facility

By \_\_\_\_\_  
Signature and Name of Marketing Entity