

**DMS - 4610****FLY ASH****EFFECTIVE DATE: MARCH 2009**

**4610.1. Description.** This Specification establishes the requirements, test methods, and the Fly Ash Quality Monitoring Program (FAQMP) for Class C, Class F, Ultra-Fine (UFFA), and Modified F (MFFA) fly ash used in concrete products. Fly ash is the finely divided residue or ash that remains after burning finely pulverized coal at high temperatures.

**4610.2. Units of Measurements.** The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

**4610.3. Material Producer List.** The Materials and Pavements Section of the Construction Division (CST/M&P) maintains the material producer list (MPL) of all materials conforming to the requirements of this Specification. Materials appearing on the MPL, entitled "[Fly Ash](#)," require no further testing, unless deemed necessary by the Project Engineer or CST/M&P.

**4610.4. Bidders' and Suppliers' Requirements.** The fly ash must be pre-qualified and accepted into the FAQMP in accordance with the requirements of this Specification before supplying to a contract.

**4610.5. Pre-Qualification Procedure.**

**A. Pre-Qualification Request.** Prospective producers interested in submitting their product for evaluation must submit a written request to participate in the FAQMP to the Texas Department of Transportation, Construction Division, Materials and Pavements Section (CP51), Cement Laboratory, 125 East 11th Street, Austin, Texas 78701-2483

Include the following information with the request:

- name, address, and contact information of the supplier;
- name and location of the power plant;
- coal origin and classification being used by the power plant;
- class of fly ash being collected;
- capacity of the storage facilities;
- six months of weekly physical and chemical test data meeting ASTM C 618 or AASHTO M 295 and Article 4610.6 of this Specification; and
- details of the supplier's Quality Control Program, including measures taken to ensure that fly ash meeting the requirements of this Specification is kept separate from fly ash that does not, including, but not limited to, fly ash produced during power plant shutdown, start-up, or other transient operational periods.

Fly ash sources will be pre-qualified for the specific class of fly ash as stated in the written request. Any change in the class of the fly ash produced will require re-qualification of the source under the new class.

- B. Sampling and Testing.** Sampling will be in accordance with Tex-733-I. Testing will be in accordance with the requirements of ASTM C 618 and the additional requirements specified in Article 4610.6. Sampling is at the mutual convenience of the Department and the supplier.

The Department or a designated Department representative will take pre-qualification samples at a frequency of at least one sample per week for 5 weeks. For each fly ash on the FAQMP, producers will submit monthly composite samples at the beginning of each month. Monthly QM samples should be received by the 15th of each month. The Department reserves the right to conduct random sampling of materials for testing and to perform random audits of test reports.

Department representatives may sample material from the plant, terminal, transportation containers, and concrete plants to verify compliance with Article 4610.6.

- C. Criteria for Acceptance.** The laboratory or laboratories performing the physical and chemical tests for the supplier must participate in the Cement and Concrete Reference Laboratory Pozzolan Proficiency Program.

The supplier must have a permanent location and:

- be located in the State of Texas,
- maintain an established terminal within Texas through which all fly ash must pass, or
- agree to reimburse the Department for all sampling expenses based on mileage and per diem costs for Department personnel traveling outside the State or for direct costs of sampling and shipping when sampling is accomplished through third-party agreements.

- D. Evaluation.** CST/M&P will notify prospective bidders and suppliers after completion of material evaluation.

1. **Qualification.** If approved for use by the Department, the material will be accepted to the FAQMP and added to the MPL.
2. **Failure.** Producers not qualified under this Specification may not furnish materials for Department projects and must show evidence of correction of all deficiencies before reconsideration for qualification.

Costs of sampling and testing are normally borne by the Department; however, the producer will bear the costs associated with materials failing to conform to the requirements of this Specification. The Director of CST/M&P will assess this cost at the time of testing.

Amounts due the Department will be deducted from monthly or final estimates on contracts or from partial or final payments on direct purchases by the State.

**E. Reporting Requirements.** Submit the following:

- monthly mill certificate that shows the fly ash complies with the Specification requirements;
- monthly test report with the following information:
  - coal origin,
  - test date, and
  - results of all specified physical and chemical requirements, except available alkalis, but including the requirements of Article 4610.6; and
- monthly split sample from the same material used to generate the monthly test report.

**Note**—The split sample size must be approximately 1 pt., or 2.5 lb., of fly ash. Mail the sample with a Safety Data Sheet (SDS) to the Texas Department of Transportation, Construction Division, Materials and Pavements Section, Cement Laboratory (CP51), 9500 Lake Creek Parkway, Austin, Texas 78717.

Notify the Department when a change in production occurs. This includes, but is not limited to, changes in a coal source or major alteration of plant operations.

**F. Periodic Evaluation.** The Department reserves the right to conduct random sampling of pre-qualified materials for testing and to perform random audits of test reports and material management records. Department representatives may sample material from the plant, terminal, transportation containers, and concrete plants to verify compliance with Article 4610.6 of this Specification.

**G. Disqualification.** The Department may remove the source or supplier from the FAQMP for any of the following reasons:

- any change in production procedures impacting fly ash quality or composition,
- failure of any sample to meet Specification requirements,
- failure to meet reporting and testing requirements as detailed in Article 4610.6 of this Specification, or
- inactivity or not supplying fly ash to Department projects for a period of 1 year.

**H. Re-Qualification.** Once the disqualification period established by CST/M&P has elapsed, producers disqualified and removed from the FAQMP and MPL may begin the re-qualification process by submitting a request in accordance with Section 4610.5.A, including additional documentation identifying the cause of the problem and corrective action taken. The re-qualification process will then follow all subsequent Sections of Article 4610.5 If approved, the producer will bear all costs of pre-qualification sampling.

**4610.6. Material Requirements.**

**A. Class C and Class F.** Base classification of the fly ash on chemical composition. Both classes of fly ash must meet all the physical and chemical requirements of both ASTM C 618 and Table 1.

**Table 1**  
**Supplementary Specification Requirements**

Item	Limit
Calcium oxide (CaO) variation in percentage points of CaO from the average of the last 10 samples (or less, provided 10 have not been tested) must not exceed $\pm$	4.0
Moisture content, maximum, %	2.0
Loss on ignition, maximum, %	3.0
Increase of drying shrinkage of mortar bars at 28 days, maximum, %	0.03

**B. Ultra Fine.** Ultra-fine fly ash must conform to the requirements listed above for Class F fly ash with the exceptions and additions listed in Table 2.

**Table 2**  
**Additional Ultra-Fine Specification Requirements**

Item	Limit
Pozzolanic activity index	
▪ 7-day, minimum, % of control	85
▪ 28-day, minimum, % of control	95
Particle size distribution, as measured by laser particle size analyzer	
▪ particles less than 3.25 microns, minimum, %	50.0
▪ particles less than 8.50 microns, minimum, %	90.0
Fineness, amount retained when wet-sieved on 45- $\mu$ m sieve, maximum, %	6.0
Moisture content, maximum, %	1.0
Loss on ignition, maximum, %	2.0

**C. Modified F.** Modified F fly ash must consist of Class F fly ash blended by grinding with no more than 10% cementitious material with or without approved accelerating and water-reducing admixtures and conform to the requirements listed above for Class F Fly Ash, with the exceptions and additions listed in Table 3.

**Table 3**  
**Additional Modified F Specification Requirements**

Item	Limit
Pozzolanic activity index	
▪ 3-day, minimum, % of control	70
▪ 28-day, minimum, % of control	95
Alkali Content, maximum, %	1.5

**4610.7. Archived Versions.** Archived versions are available.