



Minnesota Department of Transportation  
Certified Fly Ash Program  
June 27, 2019

The Minnesota Department of Transportation (MnDOT) will only accept fly ash from the MnDOT Certified Sources List. This applies to all fly ash sold to contractors for use on MnDOT projects.

For a fly ash to be certified by MnDOT, a Producer must demonstrate an ability to produce fly ash meeting the requirements of MnDOT Specification 3115.

Certification of any source of fly ash is based on the Supplier testing samples at the plant, with comparison sampling by MnDOT.

Acceptances of fly ash is judged on the basis of certified sources and upon satisfactory test results from verification/spot check samples from the fly ash at the time of incorporation into the concrete.

Approval is based upon fly ash production while a power plant is utilizing specific materials, equipment, and processes. Approval requires identification of the specific sources of the coal from which the ash is derived. Any changes in materials, equipment and processes will void any source approval and requires a new approval.

The Producer/Supplier must comply with the following:

A. Certification Procedures

Send the submittal package to:

MnDOT Assistant Concrete Engineer  
MnDOT Office of Materials and Research  
1400 Gervais Avenue  
Maplewood, MN 55109

The submittal package shall include:

- Quality Control Program
- 20 lb sample of the material for verification testing
- Mill sample test result of the submitted sample
- Monthly Mill sample test results for the previous 12 months
- EPA 1311 TCLP method test results as indicated in Section E

The Quality Control Program shall outline, as a minimum, the following:

- Sampling Procedures
- Testing Procedures
- Quantity of fly ash for each lot
- Testing Frequency per lot
- Normal Testing or Reduced Testing Rates
- Noncompliance Procedures for Failing Materials
- Type of equipment used in the burn process to produce the fly ash
- Raw Coal Source Location

- Layout of Power Plant and Process
- Production schedule of the power plant (Is the plant “base loaded” which operates continuously at steady state)
- Target Specific Gravity representing the fly ash at the Power Plant (this value is used for Verification testing)
- A MnDOT Certified Source Companion Testing rate

Address any discrepancies from AASHTO, ASTM, or other standard methods or procedures. The program shall also outline what steps to take when samples tested fall outside the Specifications.

The following minimum testing rates and procedures shall apply:

- Test two samples representing not more than 48 hours production at the power plant for the loss of ignition (LOI) and percent retained on the 45µm (No. 325) mesh sieve.

The MnDOT Concrete Engineer may require an inspection of the plant to verify the equipment and the manufacturing process prior to certification or at any time during the manufacturing of fly ash.

All Suppliers at the power plants that produce fly ash shall have test records available for study by MnDOT personnel for at least three years following production of a fly ash lot.

**B. Companion Sampling and Testing Program**

The certified source and MnDOT shall agree on a rate and procedure for sampling and shipping a companion sample to the MnDOT Office of Materials Laboratory for companion testing. The minimum sampling rate is once per week for every week of production. The Supplier’s personnel shall take the sample for companion testing during production in accordance with AASHTO T 127 or ASTM C 183 and retain those samples for a maximum of 6 months.

The Supplier shall randomly select one weekly sample per month, split the sample and test one portion (“mill test”) by an approved laboratory as outlined in Section D. Submit the other portion of the split sample (companion sample), at least 20 lb in size, to:

MnDOT Office of Materials and Research  
 Attn: Fly Ash Companion Sample  
 1400 Gervais Avenue  
 Maplewood, MN 55109

Include the following information with the companion sample:

- Date sampled
- Companion sample number and mill sample number
- Lot number of the sample
- Power plant
- Supplier
- Class of fly ash
- Mill sample test results from the quality control laboratory.

MnDOT will report the results of the Companion Sampling to the Supplier. If nonconformance is found, MnDOT will attempt to resolve the discrepancy as quickly as possible. Continued approval of the Laboratory will depend on the comparison of its test results with those of MnDOT's Laboratory. If major differences are found, a third party may arbitrate the difference.

C. Specifications and Testing

Fly ash specifications and testing shall comply with MnDOT Standard Specification 3115, AASHTO, ASTM, and the following:

<u>AASHTO</u>	<u>ASTM</u>	<u>TEST</u>
T 106	C 109	Test Method for Compressive Strength of Hydraulic Cement Mortar
T 105	C 114	Methods for Chemical Analysis of Hydraulic Cement
T 98	C 115	Test Method for fineness of Portland Cement by Turbidimeter
T 107	C 151	Test Method for Autoclave Expansion of Portland Cement
-	C 157	Test Method for Length Change of Hardened Cement Mortar and Concrete
T 137	C 185	Test Methods for Air Content of Hydraulic Cement
-	C 186	Test Method for Heat of Hydration of Portland Cement
T 131	C 191	Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle
T 153	C 204	Test Method for Fineness of Portland Cement by Air Permeability Apparatus
-	C 265	Test Method for Calcium Sulfate in Hydrated Portland Cement
T 154	C 266	Test Method for Time of Setting of Hydraulic Cement by Gillmore Needles
T 186	C 451	Test Method for Early Stiffening of Portland Cement (Paste Method)
-	C 452	Test Method for Potential Expansion of Portland Cement Mortars Exposed to Sulfate
-	C 465	Specifications for Processing Additions for Use in Manufacture of Hydraulic Cement
-	C 563	Test Method for Optimum SO <sub>3</sub> in Portland Cement

Acceptance is judged on the basis of time of set, false set, fineness, soundness, air content of the mortar, chemical analysis, and compressive strength. MnDOT may require additional testing if these tests do not continuously meet the requirements. They may also require additional testing of the product prior to shipment due to special considerations on that project. When required, special testing provisions are stated in the Contract documentation for the project.

Fly ash incorporated into MnDOT projects which fail the above-mentioned tests, is subject to MnDOT Specification 1503.

D. Laboratory Acceptance

A laboratory is considered approved if:

1. It is properly equipped and staffed to perform the tests required for an accepted quality control program and is accredited by a national laboratory certification program approved by MnDOT, or
2. Comparison samples with the Cement and Concrete Reference Laboratory (CCRL) are within acceptable tolerances.

Continued approval of the Laboratory depends on the comparison of its test results with those of MnDOT's Office of Materials Laboratory. If major differences are found, it is imperative that they are resolved as quickly as possible. Continued unresolved differences in test results are considered a basis for discontinuing laboratory approval.

#### E. Environmental Acceptance

Submit the EPA TCLP leach test results for review by the MnDOT Office of Environmental Services for acceptance determination.

A fly ash producer submitting fly ash for the Approved Products List should choose a laboratory that can perform the EPA 1311 TCLP method leach on their fly ash to produce a leachate. The laboratory should analyze the leachate by EPA Method 6010 or 6020 or equivalent method for the eight RCRA metals which includes arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Sample results should be reported on laboratory letterhead along with method detection limits and the method used.

The laboratory chosen should have an established Quality Assurance program and at least one years' experience conducting these tests. Laboratory analytical reports should be on laboratory letterhead and should report the results of Quality Control samples which includes laboratory blanks, duplicates and spikes.

#### F. Non-Compliance

The MnDOT Concrete Engineer may remove a Supplier of fly ash from the list of certified fly ash sources based on the following:

1. If the project verification samples or companion samples fail and a review of the Supplier's records indicate that there is a cause for concern as to the quality of the fly ash.
2. If a Supplier does not supply Minnesota's state or county projects during a three consecutive year period.
3. If the power plant changes sources of coal or equipment for use in the manufacturing fly ash or the power plant changes its operation that may cause the consistency of the fly ash to change without notifying MnDOT.

MnDOT 1601 prohibits mixing of fly ash from different sources or of different classes in one storage bin or silo is not acceptable. At ready mix plants and paving batch plants, empty the fly ash storage bin, as far as practical, prior to refilling from a different source.

#### G. Verification Sampling and Testing

MnDOT will take verification/spot check samples periodically at the ready-mix plant or at the paving batch plant. Test results that do not comply with the Specifications are subject to MnDOT

Specification 1503, and continued out of tolerance results is considered sufficient cause to rescind approval to furnish fly ash and removal from the list of certified sources.

**H. Re-certification**

The MnDOT Concrete Engineer will re-certify the fly ash source upon written documentation from the Supplier that the area of concern as outlined in section F is corrected. This may require a re-submittal of all or a portion of section A requirements.

**I. Documentation, Record Keeping and Tracking**

The Producer/Supplier of certified fly ash shall furnish with each shipment an invoice or bill-of-lading for the project records. Each copy shall indicate the class of fly ash, quantity, date of shipment, a project number if available, and a means of tracking the fly ash shipment to the corresponding test data. It shall also bear the following certification statement with a signature of a responsible company representative (i.e. Manager of the Supplying Company or Quality Control Supervisor).

**Fly Ash Certification Statement**

***Insert Company Name* certifies that the fly ash produced at insert plant and location conforms to ASTM and MnDOT Specifications for Class insert Class fly ash.**

For truck shipments, these copies of the bills-of-lading or invoice shall accompany each load, and the Project Engineer shall retain them at the project or ready-mix plant. For rail shipments, the Supplier shall mail these copies to the Project Engineer or ready-mix plant.

When more than one project is supplied by a ready-mix plant, the plant shall furnish the Project Engineer, for each project, either a copy of each bill-of-lading or invoice, or a listing of the bills-of-lading or invoices representing the fly ash incorporated in the project. This listing shall bear the signature of the plant representative.

Copies of all invoices, bills-of-lading and Mill Test Reports shall remain on file at the manufacturing plant, distribution terminal or ready-mix plant, batch plant or pre-cast production plant for a period of 3 years. MnDOT may require copies of these reports at any time. Storage of the certified Mill Test Data on a CD is encouraged.

**J. Approved Products List**

The list of approved products may be found on the MnDOT Concrete website at <http://www.dot.state.mn.us/products/concrete/concretelyashsources.html>