



Minnesota Department of Transportation
Certified Cement, Granulated Blast Furnace Slag,
and Blended Cement Program
December 18, 2017

Minnesota Department of Transportation (MnDOT) will only accept cementitious materials from the MnDOT Certified Sources List. This applies to all cement, ground granulated blast furnace slag (GGBFS), and blended cement sold to contractors for use on MnDOT projects.

Certification of any type of portland cement, blended cement, or GGBFS is based on testing of samples at the manufacturing plant, the distribution terminal, or at the port of entry with comparison sampling by MnDOT.

Only fly ash and GGBFS from certified sources are allowed for use in the manufacturing of blended cements (See MnDOT Certified Sources List). The Supplier shall provide proper documentation regarding each shipment of fly ash or GGBFS. In manufacturing blended cement, the alkali content of the clinker shall not exceed the company's quality control criteria used for regular Type I cement. If the fly ash or GGBFS is blended or inter-ground with the cement, the cement shall comply with the Specifications and the requirements stated in this procedure.

Mixing of Portland cement, blended cements, or GGBFS from different sources or of different types in one storage bin or silo is NOT PERMITTED. The Manufacturer shall empty storage bins containing cementitious materials at ready-mix plants, batch plants, and precast production plants, as far as practical, prior to refilling from a different source. The Manufacturer shall store and dispense blended cement from separate storage bins.

The Manufacturer must comply with the following:

A. Mill Test Report Program

The cement manufacturing plant or cement distribution terminal (certified source) shall submit to the MnDOT Assistant Concrete Engineer a copy of the proposed Mill Test Report Program. This program is submitted for approval, prior to certification, in writing to:

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

The Mill Test Report Program shall outline, as a minimum, the following:

- Sampling Procedures
- Testing Procedures
- Quantity of Cementitious for Mill Test Report
- Statement of Failing Test Procedures
- Proof of CCLR Laboratory participation or MnDOT Laboratory Approval
- The proposed (MnDOT – Certified Source) Companion Testing rate
- Laboratory Name and Location
- Source of GGBFS and Blast Furnace Plant Location

Address any variations from MnDOT Specifications 3101, 3102, 3103, 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 at the certified source:

1. Obtain a 2 kg (5 lb.) grab sample representing not more than 400 metric tons (tons) at the manufacturing plant or distribution terminal.
2. Obtain 1 composite sample representing not more than 4800 metric tons (tons) at the manufacturing plant or at the distribution center representing a given Mill Test Report to include, but not limited to soundness, air content, fineness, time of set, cube strength, and chemical analysis.

Make all certified source Mill Test Reports available for study by MnDOT personnel for at least 3 years after testing of the cement represented is completed. The Agency may require copies of these reports at any time.

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 comparison sample is obtained at a minimum rate of once per month for every month of production or one sample per shipment, whichever is less.

At the manufacturing plant, port of entry, or distribution terminal, the sample for companion testing is taken by host State personnel (if available) or plant personnel at the time of manufacture or time of discharge. Take samples in accordance with AASHTO T 127 or ASTM C 183 and split into two samples. Test one portion by an approved laboratory as outlined in section E and ship the other portion (companion sample), at least 10 kg (20 lb.) in size, to:

MnDOT Office of Materials and Research
Attn: Cementitious 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
- Name of Certified Source (Manufacturing Plant or Distribution Terminal)
- Companion Mill Test Report results found at the quality control laboratory, including 3-day, ASTM C 109 test result.

MnDOT will report the result of the companion sampling to the Manufacturer of the Certified Source. 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. ASTM C 917 Sampling and Documentation

The Manufacturer shall use an ongoing compressive strength sampling program for uniformity and take and test samples at the rate and by the procedures outlined in ASTM C 917.

The Manufacturer shall furnish the Agency with a tabular report as outlined in ASTM C 917. Submit the report quarterly to the MnDOT Assistant Concrete Engineer.

D. Specifications and Testing

Cement specifications and testing shall comply with MnDOT Standard Specification 3101 and AASHTO M 85. GGBFS specifications and testing shall comply with MnDOT Standard Specification 3102 and AASHTO M 302. Blended cement specifications and testing shall comply with MnDOT Standard Specification 3103 and AASHTO M 240. Cement, GGBFS and Blended cement shall also comply with 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 107	C 151	Test Method for Autoclave Expansion of Portland Cement
T 137	C 185	Test Methods for Air Content of Hydraulic Cement
T 129	C 187	Test Method for Normal Consistency of Hydraulic 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
T 154	C 266	Test Method for Time of Setting of Hydraulic Cement by Gillmore Needles

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.

Cement, blended cement, or GGBFS incorporated into MnDOT projects which fail the above-mentioned tests, is subject to MnDOT Specification 1503.

E. 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.

F. 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 cement, blended cement, or GGBFS and removal from the list of certified sources.

G. Non-Compliance

The MnDOT Concrete Engineer may remove a Manufacturer from the list of certified cement, blended cement, or GGBFS sources based on the following:

1. If the project verification samples or companion samples fail and a review of the certified source's records indicate that there is a cause for concern as to the quality of the cementitious material.
2. If a Manufacturer does not supply Minnesota's state or county projects during a three consecutive year period.
3. Failure to comply with the certification program approved by MnDOT.

MnDOT 1601 prohibits mixing of cement, blended cement, or GGBFS materials from different sources or of different classes in one storage bin or silo. At ready-mix plants, batch plants, and precast production plants, empty the cementitious storage bin, as far as practical, prior to refilling from a different source.

H. Re-certification

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

I. Documentation, Record Keeping and Tracking

Incorporation into MnDOT projects prior to MnDOT receiving certified Mill Test Data and any cementitious material that fails the above mentioned testing, is subject to MnDOT Specification 1503.

The certified source shall furnish with each shipment from the manufacturing plant (or the point of certification) to the distribution terminal and finally to the ready-mix plant, batch plant or pre-cast production plant, an invoice or bill-of-lading, and all available mill test data for the cement shipped. Each copy shall indicate the Manufacturer of the cementitious material, manufacturing plant location, type of cementitious material, quantity, approximate date the product arrived from manufacturing to the distribution terminal, and the state project number, if available.

The invoice or bill-of-lading shall also bear the following certification statement.

Cement Certification Statement

Insert Company Name certifies that the cement manufactured at insert plant and location conforms to ASTM and MnDOT Specifications for Type insert Type Portland cement.

Blended Cement Certification Statement

Insert Company Name certifies that the blended cement manufactured at insert plant and location conforms to ASTM and MnDOT Specifications for Type insert Type blended cement.

GGBFS Certification Statement

Insert Company Name certifies that the slag manufactured at insert plant and location conforms to ASTM and MnDOT Specifications for Grade insert Grade GGBFS.

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 Manufacturer 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 cementitious material 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 and ASTM C 917 data on a compact disk is encouraged.

J. Certified Sources List

The list of certified sources may be found on the MnDOT Approved Products website at <http://www.dot.state.mn.us/products/concrete/certifiedcbcs.html>

K. Certification by Other States for Cement and Cement Blends

MnDOT will accept cement and cement blends certified in other States providing the process complies with the following agreement:

1. The host state agency that performs testing for acceptance of hydraulic cement plants within its boundaries shall have a laboratory meeting the requirements of ASTM C1222, "Standard Practice for Evaluation of Laboratories Testing Hydraulic Cement."
 - a. The host state agency laboratory shall be accredited through the AASHTO Accreditation program. The laboratory in authority will perform applicable testing on cement produced in accordance to:
 - i. Standard Specification for Portland Cement (ASTM C150/AASHTO M85)
 - ii. Standard Specification for Blended Hydraulic Cements (ASTM C595/AASHTO M240)
 - iii. Standard Performance Specification for Hydraulic Cements (ASTM C1157)
 - b. Agency laboratories used for verification testing must meet the same criteria as prescribed in paragraph 1.a.
2. The host state agency will require the cement plant within its boundaries to issue mill test report at least semiannually
 - a. The certified mill analysis report shall include the following:
 - i. Mill Location
 - ii. Type of Cement
 - iii. Production Period
 - iv. Manufacturer

- v. Product Name
 - vi. A statement that (a) cement conforms to ASTM C150/AASHTO M85, (b) blended cements conforms to ASTM C595/AASHTO M240, or (c) performance specification cements conforms to ASTM C1157.
3. The host state agency shall require the cement manufacturer to comply with ASTM C 1222, "Standard Practice for Sampling and the Amount of Testing of Hydraulic Cement."
 - a. The host state agency shall require the cement manufacturer to submit a written quality control plan. This plan shall include the following:
 - i. Type and associated product name of cement produced
 - ii. Location, procedure and frequency of sampling
 - iii. Report standard specification used in testing
 - b. The host state agency will verify compliance with the quality control plan for the production of cements used by state agency
 - c. The manufacturer's plan must include commitments to comply with sampling and testing of the host state.
 4. The host state agency will require the cement producer to submit two split samples of a portland cement (ASTM C150/AASHTO M85) and a blended cement (ASTM C595/AASHTO M240) or a performance specification cement (ASTM C 1157) if produced, semiannually for verification testing. The second sample shall be retained for independent analysis as needed.
 5. The host state agency will require the cement producer submit reports for ASTM C 917, "Standard Test Method for Evaluation of Cement Strength Uniformity from a Single Source," for both regular portland cement and blended cement, if produced, at least semiannually. In lieu of ASTM C 917 sampling and testing, production data may be analyzed and reported for the non-predominant cements manufactured at a cement plant.
 6. The host state agency will require the cement producer maintain production and quality control/quality assurance records for at least seven years and make those records available if requested.
 7. The host state agency will review submittals from the cement producer along with agency test results. If deficiencies are discovered, the state agency will monitor corrective actions taken by the producer until the deficiencies are corrected. The reciprocal agreement state agency is notified of the deficiencies and of each occurrence.
 8. Any test results or submittals collected by the host state agency are made available to the reciprocal agreement state agency upon request.
 9. All cement plant information and data is confidential within the limits of a public agency and is for state agencies information and inspection only.

10. Quality assurance test results of field samples, performed by a reciprocal state, shall be reported to the host state agency when a non-compliance occurs. The reciprocal state agency will deal directly with the cement producer. The host state agency shall notify all reciprocal agreement state agencies when a non-compliance occurs.
11. This agreement shall be reviewed once every 5 years or when a change occurs in the source, type, or brand name or upon request by either the host state or/and reciprocal state agencies.
12. Cement tests or requirements beyond the standards stated above may be provided to reciprocal state agencies by agreement between the host state and reciprocal state agencies.