

Hydraulic Cement – 21

1. REFERENCED DOCUMENTS

1.1 ASTM Standards:

ASTM C 150 Standard Specification for Portland Cement

ASTM C 183 Standard Practice for Sampling and the Amount of Testing of Hydraulic Cement

ASTM C 219 Standard Terminology Relating to Hydraulic Cement

ASTM C 595 Standard Specification for Blended Hydraulic Cement

ASTM C 1157 Standard Performance Specification for Hydraulic Cement

2. TERMINOLOGY

2.1 See ASTM C 219 Standard Terminology Relating to Hydraulic Cement.

2.2 Supplier – In this Standard, a *Cement Supplier* shall be defined as one who manufactures hydraulic cement.

2.3 Supplier – In this Standard, a *Concrete Supplier* shall be defined as one who manufactures concrete mix. Among the ingredients of a concrete mix is hydraulic cement.

2.4 Contractor – The Company under contract with CDOT to produce products using hydrated cement.

3. SIGNIFICANCE AND USE

3.1 This Standard specifies requirements and procedures for a certification system that shall apply to all Cement Suppliers providing hydraulic cement. These provisions apply to the plant manufacturing the hydraulic cement. These provisions apply to the Contractor, after delivery of the hydraulic cement, for use on CDOT projects.

3.2 This Standard specifies procedures intended to minimize the disruption of hydraulic cement shipments. This is accomplished by a certification system that evaluates quality control and specification compliance tests performed by the Cement Supplier according to their quality control plans.

4. SAMPLING

4.1 All test samples shall be obtained per ASTM C 183. The use of a random sampling procedure is mandatory for the establishment of a valid quality assurance program.

5. TESTING REQUIREMENTS

- 5.1 Testing shall be performed by a laboratory currently accredited by the Cement and Concrete Reference Laboratory (CCRL). Any satellite laboratory of a Cement Supplier that performs required testing under this Standard shall be identified in the submitted Quality Control Plan (Section 7).

6. SUPPLIER CERTIFICATION REQUIREMENTS

- 6.1 Cement Suppliers shall submit to the CDOT Product Evaluation Coordinator (PEC), CDOT Form 595, Pre-Approved Product Evaluation Request & Summary for each type of hydraulic cement intended for use on CDOT projects. Instructions for completing and submitting the CDOT Form 595 can be located within the Notice to Manufacturers at <https://www.codot.gov/business/apl>
- 6.2 In addition to completing CDOT Form 595, the following shall be supplied to the PEC:
- 6.2.1 A brief outline of the procedures used to evaluate the finished product including sampling and testing frequency and the sample preparation employed, including chemical analysis methods used such as X-ray, atomic absorption spectroscopy, and/or wet chemistry.
- 6.2.2 The results of all applicable chemical and/or physical tests required by ASTM C 150, C 595, or C 1157 on the most recent 40 samples (20 pairs) tested. The results shall be submitted in the format outlined in ASTM C 183, in particular the table entitled "Test Data" with the critical limits calculated as described.
- 6.2.3 A copy of the CCRL certification for the laboratory performing testing.
- 6.2.4 A copy of the Cement Supplier's Quality Control Plan, which complies with the requirements of Section 7, if one has not been supplied to CDOT for previously submitted products.
- 6.3 A sample of the proposed hydraulic cement shall be shipped to the PEC at the Materials and Geotechnical Branch, 4670 North Holly Street, Unit A, Denver, Colorado 80216-6408.
- 6.4 The Cement Supplier shall allow CDOT to visit the production and/or shipping site during normal business hours to observe the Cement Supplier's quality control activities, to inspect the facilities, and to obtain samples for tests.
- 6.5 The Cement Supplier shall follow the procedures described in the CDOT approved quality control plan.
- 6.6 The Cement Supplier shall establish a continuing test record for every test required and for each type of hydraulic cement included in the written request as prepared to satisfy the requirements of Subsection 6.1.
- 6.7 The Cement Supplier shall submit to CDOT all reports required by this standard in a format approved by CDOT.

6.8 The Cement Supplier shall have a satisfactory record of compliance with CDOT project specifications. Decisions by CDOT concerning this requirement shall be based on the test results furnished by the Cement Supplier's tests.

7. SUPPLIER QUALITY CONTROL PLAN (MINIMUM REQUIREMENTS)

7.1 The Cement Supplier's Quality Control Plan shall identify the following:

7.1.1 Facility location (actual physical address).

7.1.2 Name and telephone number of a person at each production facility, responsible for quality control of the material shipped to CDOT projects.

7.1.3 Quality control tests and testing frequency to be performed on each hydraulic cement.

7.1.4 Name and location of the laboratory performing quality control tests on the hydraulic cement.

7.2 The Cement Supplier's Quality Control Plan shall include a declaration stating that if a test result indicates that a shipment of hydraulic cement does not comply with the purchase specifications, the Cement Supplier shall:

7.2.1 Identify the material in the shipment,

7.2.2 Immediately cease the shipment until the material complies with the specification,

7.2.3 Immediately notify CDOT regarding the shipment in question,

7.2.4 Immediately notify the Contractors and Concrete Suppliers scheduled to use the material from the shipment in question, notify CDOT before resuming shipment; and implement any mutually agreed-upon procedures for the disposition of the material.

7.3 The Cement Supplier's Quality Control Plan shall describe method and frequency for initial testing and quality control testing.

7.3.1 **Initial Testing** - For each type of hydraulic cement to be supplied, testing shall be performed and the results provided to CDOT, accompanied by a sample of the material represented by the test results.

7.3.2 **Quality Control Testing** – Tests to determine conformance with applicable ASTM standards shall be conducted as needed for quality control. The Cement Supplier's Quality Control Plan shall indicate the frequency of this testing.

7.4 The Cement Supplier's Quality Control Plan shall include a statement that the Cement Supplier will prepare and maintain summary reports for all quality control tests performed, and will submit them to CDOT on request.

7.5 The Cement Supplier's Quality Control Plan shall provide an outline of the procedure to be followed for checking transport vehicles before loading to prevent contamination of shipments. The outline shall be maintained in the Cement Supplier's records and will be made available to CDOT on request.

8. CDOT EVALUATION PROCEDURE

- 8.1 CDOT will verify that the Cement Supplier's Quality Control Plan is adequate. CDOT may visit the shipping site when required.
- 8.2 CDOT will notify the Cement Supplier whether or not the Cement Supplier's application has been granted.
- 8.3 CDOT may verify that the Cement Supplier's testing laboratory is currently CCRL accredited.
- 8.4 CDOT may perform split sample testing per Section 10.
- 8.5 CDOT may sample and perform testing on random samples.
- 8.6 CDOT may inspect the operations of the Cement Supplier's facility, including those related to shipments if required.
- 8.7 Products approved for use will be posted on the CDOT APL.

9. REQUIREMENTS FOR SHIPPING HYDRAULIC CEMENT BY AN APPROVED SUPPLIER

- 9.1 The Cement Supplier's Quality Control Plan as approved by CDOT (Section 7) shall be implemented.
- 9.2 Each shipment shall be accompanied by two copies of the bill of lading, which shall include:
 - 9.2.1 The name and location of the Cement Supplier,
 - 9.2.2 The Type of hydraulic cement shipped,
 - 9.2.3 The quantity of material shipped,
 - 9.2.4 The date of shipment,
 - 9.2.5 A certificate of compliance (COC) certifying that the material meets specification requirements
 - 9.2.6 A statement certifying that the transport vehicle was inspected before loading, and was found acceptable for the material shipped.
- 9.3 If the test results do not conform to the applicable ASTM standards, the Cement Supplier shall remove the non-compliant material from the shipping queue as outlined in Subsection 7.2.

10. SPLIT SAMPLE TESTING

- 10.1 CDOT may request split sample testing. The test results will be exchanged as soon as they are available.
- 10.2 If the split sample test data is not within the precision specified for that particular test a review of both sampling and testing procedures will be conducted by both the Cement Supplier and CDOT.

11. REPORT AND DATA SHEETS

- 11.1 Cement Supplier Reports - The Cement Supplier shall prepare the reports described in Subsections 6.1, 6.2, 9.2, and 9.3.

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