

DMS-4600

Hydraulic Cement

Effective Date: **October 2024**



1. DESCRIPTION

This Specification establishes requirements and test methods for hydraulic cement and the Hydraulic Cement Quality Monitoring Program (HCQMP). Hydraulic cement is cement that sets and hardens by chemical interaction with water and is capable of doing so under water.

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.

3. MATERIAL PRODUCER LIST

The Materials and Tests Division (MTD) maintains the MPL of all materials conforming to the requirements of this Specification. Materials appearing on the MPL, entitled "[Hydraulic Cement](#)," require no further sampling and testing before use, unless deemed necessary by the Project Engineer or MTD.

4. BIDDERS' AND SUPPLIERS' REQUIREMENTS

Hydraulic cement must be pre-qualified and accepted into the Hydraulic Cement Quality Monitoring Program (HCQMP) in accordance with the requirements listed in Article 5., "Qualification Procedure," and Article 6., "Material Requirements," of this Specification.

Use of qualified product does not relieve the Contractor of the responsibility to provide product that meets this Specification. The Department may inspect or test material at any time and reject any material that does not meet the specifications.

Suppliers with multiple products will ensure that the materials in the HCQMP are not contaminated by other approved or non-approved products.

5. QUALIFICATION PROCEDURE

5.1. **Qualification Request.** Submit a written request on company letterhead for evaluation under DMS-4600 to DMS_Prequal@txdot.gov.

Include the following information in the request:

- company name;
- physical and mailing addresses of the plant (and the storage facility in Texas for **foreign** imports);
- capacity of the storage facilities;
- phone number and email address of the Quality Control Manager;
- six months of physical and chemical **supplier** test data meeting Article 6., "Material Requirements," of this Specification;
- information about the laboratory that the Cement and Concrete Reference Laboratory (CCRL) inspects and performs all tests required in Article 6., "Material Requirements;" and

- a copy of the **supplier's** Quality Control Program (QCP). General guidelines can be found in AASHTO R38. For **foreign** imports, the QCP of the supplier's facility in Texas is also required. At minimum, the QCP shall include:
 - production or distribution facility information including contact information, physical address, storage capacity, and photographs of the major areas;
 - QCP roles, responsibilities, training requirements, and certifications;
 - sampling plan;
 - current AASHTO accreditation certificate for the laboratory performing the tests in Article 6., "Material Requirements;"
 - hauling, handling, and storage processes for **foreign** imported sources;
 - plan for labeling of supersacks to include company name, source, type, and production date and
 - plan for non-conforming materials.

5.2. **AASHTO Product Evaluation and Audit Solutions.** All suppliers will be required to participate in the AASHTO Product Evaluation and Audit Solutions for Portland and Blended Cement program. The supplier will be required to participate in both the onsite audit and the quality management system desktop review, and maintain a compliant status. AASHTO Product Evaluation and Audit Solutions will perform initial and annual audits of each facility listed on the MPL. A desktop review of the Manufacturer's QMS is performed prior to the initial audit and every 5 years thereafter. It will be the responsibility of the supplier to register for the audit by the deadline stated in the program. For information regarding this program, see <https://transportation.org/product-evaluation-and-audit-solutions/technical-committees/portland-and-blended-cement-pbc/>. For additional information, registration, and submission deadlines see <https://transportation.org/product-evaluation-and-audit-solutions/faq/>.

The Department will provisionally list new suppliers meeting the qualification requirements listed in Section 5.1 (excluding the AASHTO Audit), on the MPL when submitting for qualification after the audit submission deadline. Failure to apply for the next AASHTO audit cycle will result in disqualification from the Hydraulic Cement Quality Monitoring Program.

5.3. **Sampling and Testing.** Sampling will be in accordance with [Tex-300-D](#). Testing will be in accordance with the requirements of Article 6., "Material Requirements," of this Specification. Sampling is at the mutual convenience of the Department and the supplier. All materials for qualification will be at no cost to the Department.

The Department or a designated Department representative will take qualification samples to place cements on the HCQMP. For cement, not on the HCQMP, the Department will sample the hydraulic cement during the course of a project to ensure continued specification compliance. For cement on the HCQMP or approved for a specific project, **suppliers** will submit monthly samples at the beginning of each month for all certified cements. 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 6., "Material Requirements," of this Specification.

5.4. **Evaluation.** MTD will notify prospective bidders and suppliers after completion of material evaluation.

5.4.1. **Qualification.** If approved for use by the Department, MTD will accept the material to the HCQMP and add to the MPL.

Report changes in the composition or in the manufacturing process of any material to MTD. Significant changes reported by the **supplier** may require a re-evaluation of performance. The Department reserves the right to conduct whatever tests it deems necessary to identify a qualified material and determine if there is a change in the composition, manufacturing process, or quality that may affect its durability or performance. In case of variance, the Department's tests will govern.

5.4.2. **Failure.** Suppliers not qualified under this Specification may not furnish materials for use on Department projects.

Suppliers failing to qualify may submit a request for re-evaluation after 12 mo. have elapsed from the date of the original request. MTD may modify this time limit at its discretion. In the request for re-evaluation, document the cause of the issue and corrective action taken.

The Department normally bears the costs of sampling and testing; however, the supplier will bear the costs associated with materials failing to conform to the requirements of this Specification and any re-evaluation testing. MTD will assess this cost at the time of testing and amounts due will be billed to the supplier.

6. QUALITY MONITORING

6.1. **Reporting Requirements.** For each type of cement on the HCQMP, submit:

- monthly mill certificate that shows:
 - the cement meets the requirements of this Specification;
 - the minimum, maximum, and average values for equivalent alkalis obtained from quality control tests or a calculated value for maximum total alkali, based on a 95% confidence level; and
 - the average tricalcium aluminate (C₃A) content for Type III(MS) cement meets the requirements of ASTM C150 Table 2;
- for imported foreign cement sources, monthly test report from laboratory, that the Cement and Concrete Reference Laboratory (CCRL) inspects, that shows:
 - the cement meets the requirements of this Specification;
 - the minimum, maximum, and average values for equivalent alkalis obtained from quality control tests; and
 - the average tricalcium aluminate (C₃A) content for Type III(MS) cement meets the requirements of ASTM C150 Table 2;
- a 1 gal. sample of cement sampled in accordance with [Tex-300-D](#);
- written notification of changes in clinker source or other major production changes;
- annual test reports, if applicable, for:
 - ASTM C563,
 - ASTM C1038, and
 - ASTM C265; and
- test reports, if applicable,

Mill Certificates and monthly test reports will be submitted electronically to MTD_TxDOTCementMillCerts@txdot.gov.

For cement on the HCQMP or approved for a specific project, suppliers will submit monthly samples at the beginning of each month for all certified cements. Monthly QM samples should be received by the 15th of each month.

6.2. **Periodic Evaluation.** The Department reserves the right to conduct random sampling and testing of qualified materials to verify performance, Specification compliance, and to perform random audits of documentation. Department representatives may sample material from the manufacturing plant, the project site, and the warehouse.

Failure of materials to comply with the requirements of this Specification, as a result of periodic evaluation, may be cause for removal of those materials from the HCQMP. In case of variance, the Department's tests will govern.

All supplier's mill and foreign import terminal locations listed on the MPL must participate in the AASHTO Product Evaluation and Audit Solutions for Portland and Blended Cement program.

The Department will also review the AASHTO Product Evaluation and Audit Solution's audit documents upon completion to determine if corrective action responses, if any, have been implemented. The Department will base continued approval status on this review.

- 6.3. **Disqualification.** Causes for disqualification and removal from the HCQMP may include, but are not limited to:
- failure to supply cement to any Department project for 1 yr.,
 - failure to meet the reporting requirements of the HCQMP,
 - failure to supply monthly samples to the Department as required by Article 5., "Qualification Procedure,"
 - failure of two consecutive samples to meet the material requirements of this Specification,
 - failure of the supplier to adhere to its Quality Control Program,
 - falsification of documentation,
 - supplier fails to report any change in material composition or manufacturing process to MTD,
 - failure to participate in the AASHTO Product Evaluations and Audit Solutions' Portland and Blended Cement Program,
 - results of the AASHTO Product and Evaluations Audit Solutions Portland and Blended Cement Program are deemed non-compliant. ,or
 - supplier has unpaid charges for failing samples.

MTD will remove disqualified suppliers from the MPL and will not allow submission of material for re-qualification for up to 12 mo., at the discretion of the Department or until the supplier obtains a compliant report from AASHTO Product Evaluation and Audit Solutions, whichever is sooner.

- 6.4. **Re-Qualification.** Once the disqualification period established by MTD has elapsed, supplier disqualified and removed from the HCQMP may begin the re-qualification process by submitting a request in accordance with Section 5, 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 5., "Qualification Procedure."

The Department normally bears the costs of sampling and testing; however, the disqualified supplier will bear the costs associated with re-qualification. MTD will assess this cost at the time of re-evaluation and amounts due will be billed to the supplier.

7. MATERIAL REQUIREMENTS

- 7.1. All types of cement must meet the requirements of ASTM C150 or ASTM C595, with the following additions.

7.2. Additions to ASTM C595.

- 7.2.1. **Type IP.** Type IP portland-pozzolan cements must be blended with at least the minimum percentage of coal ash or natural pozzolan listed in the most updated MPL's. Use of lower percentages of coal ash or natural pozzolan will be allowed if ASTM C1567 test data is provided showing the proposed percentage of coal ash or natural pozzolan will limit the expansion to <0.10% at 14 days when tested using a fine aggregate with an ASTM C1260 expansion $\geq 0.30\%$ at 14 days. Use of coal ash or natural pozzolan not on the MPL's will be allowed if the above ASTM C1567 requirements are met. Laboratory performing ASTM C 1567 must be listed on the Department's list of Commercial Laboratories Certified for ASTM C 1260/1567 Test Methods.

- 7.2.2. **Type IS.** Type IS portland blast-furnace slag cements must be Type IS (>35).

- 7.2.3. **Type IT.** Type IT ternary blended cements must contain 35% to 50% supplementary cementitious materials, with no more than 10% silica fume. Type IT cements containing less than 35% supplementary cementitious materials or containing limestone as one of the constituents, must provide ASTM C1567 test data showing the proposed Type IT cement will limit the expansion to <0.10% at 14 days when tested using a fine aggregate with an ASTM C 1260 expansion $\geq 0.30\%$ at 14 days.

Note 1—When performing ASTM C1567 using Type IP or Type IT cements, use the proposed blended cement, and do not replace any of the proposed blended cement with additional supplementary materials.

8. ARCHIVED VERSIONS

- 8.1. Archived versions are available.