



## SECTION 1019

### CEMENT

**1019.1 Scope.** This specification covers Portland cement, hydraulic cement and blended hydraulic cement.

**1019.2 General.** All Portland cement shall be in accordance with the following requirements. The basis of acceptance will be as described in [Sec 1019.3](#).

**1019.2.1 Portland Cement.** All Portland cement shall be in accordance with AASHTO M 85 with the following modifications:

(a) Specific surface, fineness, for all Type I Portland cements shall not exceed 430 m<sup>2</sup>/kg using Air permeability test. Maximum fineness limits do not apply if the sum of C3S + 4.75C3A is less than or equal to 90.

(b) When slag cement is used as an inorganic processing addition, loss on ignition shall be corrected in accordance with ASTM C 114 and reported on mill test reports.

**1019.2.2 Hydraulic Cement.** All hydraulic cement shall be in accordance with ASTM C 1157.

**1019.2.3 Blended Hydraulic Cement.** All blended hydraulic cement shall be in accordance with Type IP, IS or IT of AASHTO M 240 with the following modification that chemical composition shall be provided and tolerances checked in accordance with Section 7.2 of AASHTO M240 and allowable constituent amounts of Type IP, IS and IT cements are within the specified limits listed below:

- (a) Type IP cement shall have a pozzolan constituent up to 25 percent by mass of the blended cement. Type IP cements, in which the pozzolan constituent is metakaolin or silica fume, shall be a maximum of 15 or 8 percent, respectively.
- (b) Type IS cement shall have a slag cement constituent up to 25 percent by mass of the blended cement.
- (c) Type IT cement shall have a slag cement and pozzolan constituent up to 40 percent by mass of the ternary blended cement. The maximum constituent requirements shall be in accordance with [Sec 1019.2.3](#) (a) and (b) in some combination up to 40 percent. Insoluble residue requirements do not apply for Type IT cements.

**1019.2.4 Other Cements.** White Portland cement shall meet the requirements for Type I. Air-entraining Portland cement shall be used only when specified in the contract. Different types of cement shall not be mixed nor shall different types be used in the same unit of construction.

**1019.2.5 Sack or Bag.** A sack or bag of cement will be considered to be 94 pounds net.

**1019.3 Sampling, Testing and Acceptance Procedures.** All manufacturers and terminals furnishing cement to MoDOT projects shall be qualified as herein described. All cement will be subject to inspection and sampling by MoDOT at the source of manufacture, an intermediate shipping terminal or destination. MoDOT shall be allowed unlimited access to all facilities and records as required to conduct inspection and sampling.

**1019.3.1 Manufacturer Qualification.** In order to become qualified, a written request shall be sent by the manufacturer to Construction and Materials, along with a copy of the QC plan. In order to maintain qualification, the manufacturer shall submit additional information, as listed, to MoDOT. The plant may be inspected to verify the information and to establish personal contact with the QC personnel.

**1019.3.1.1** The following information shall be included in the request for qualification:

(a) An outline of the QC program from the quarry to the point where the product is relinquished to the purchaser. The QC program shall cover all tests required by the specification and shall include the testing frequency for each test.

(b) A copy of the most recent Cement and Concrete Reference Laboratory (CCRL) inspection report and the latest CCRL proficiency sample report. The CCRL inspection shall cover all tests required by the specification. Documentation showing satisfactory resolution of all inspection deficiencies shall be included.

(c) The physical layout of the plant, including the number and capacity of finish mills and silos and the type of cement stored in each silo.

(d) A copy of a typical bill of lading with the required certification statement.

(e) A split sample of each type of cement proposed for use. Manufacturer test results for the split sample shall also be submitted.

**1019.3.1.2** In order to maintain qualification, the following will be required:

(a) Monthly QC test results covering the production of cement types proposed for use in MoDOT projects, including the high, low and average results for each type shall be forwarded to MoDOT upon manufacturer completion.

(b) A copy of the most recent CCRL inspection and proficiency sample reports and any deficiency resolutions shall be forwarded promptly to MoDOT.

(c) Semi-annual split samples for each type of approved cement will be obtained by MoDOT for joint testing by the manufacturer. Manufacturer test results on the split samples shall be furnished to MoDOT when completed.

(d) All QC test results shall be available for a minimum of three years, for MoDOT review upon request.

(e) Only cement in compliance with these specifications shall be allowed into a silo destined for MoDOT projects.

**1019.3.2 Terminal Qualification.** In order to become a qualified terminal, a written request shall be sent from terminal personnel to Construction and Materials. The request shall be accompanied by a letter from each affected and qualified manufacturer, advising of the intent to ship through the respective terminal. Any changes in cement source shall be updated in the

same manner. Terminals will be inspected to ensure adequacy to accept, retain and ship cement from qualified manufacturers.

**1019.3.3 Failure to Comply.** Failure to fulfill any of these requirements may result in disqualification of the cement manufacturer or a terminal. In cases of dispute, test results obtained by MoDOT will control.

**1019.3.4 Disqualified Manufacturers.** If a manufacturer has been disqualified, the manufacturer will be required to designate the silo, bin or storage facility from which they propose to furnish cement for MoDOT projects. Each silo, bin or storage facility designated shall be sampled, tested, sealed and approved by MoDOT prior to shipment. The manufacturer shall also sample, test and report the test results for each designated silo, bin or storage facility. This procedure shall continue until adequate QC has been established.

**1019.3.5 Foreign Cement.** All tests on foreign cement shall be performed by a qualified domestic manufacturer.

**1019.4 Acceptance.** The supplier shall certify that the material complies with the specification requirements. When a qualified manufacturer or terminal is shipping cement for, or purchasing cement from, another qualified manufacturer, the bill of lading or delivery receipt shall be from the shipping company. The certification statement showing the actual manufacturer shall be prominently placed on the bill of lading or delivery receipt. A copy of the bill of lading or delivery receipt shall accompany each shipment and shall be furnished to MoDOT at the shipping and destination points.

**1019.4.1 Certification.** The bill of lading or delivery receipt for each shipment to MoDOT projects shall carry the following certification statement:

"This is to certify this Type \_\_\_ cement originated from a MoDOT qualified manufacturer, has been maintained to meet MoDOT specifications and was loaded from silo number \_\_\_\_\_."

\_\_\_\_\_  
Name and Location of Manufacturer

\_\_\_\_\_  
Name and Location of Shipping Facility

By \_\_\_\_\_  
Signature and Name of Marketing Entity