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| OFFICE OF STATE AID ROAD CONSTRUCTION | | | S.O.P. NO. SA II-3-14 |
| STANDARD OPERATING PROCEDURES | | | Page 1 of 6 |
| Subject: S.O.P. HYDRAULIC CEMENT | | | Distribution A, B, C, D, E |
| EFFECTIVE July 1, 2005 | ISSUED July 1, 2005 | SUPERSEDES Page 1 of 6 S.O.P. NO. SAD II-3-14 EFFECTIVE: July 1, 1981 | APPROVED J. Brooks Miller, Sr. STATE AID ENGINEER |

PURPOSE: To Establish Uniform Procedures For The Sampling, Testing, Reporting of Tests And Evaluation of Hydraulic Cement.

1. GENERAL:

Acceptance of hydraulic cement for use in concrete or soil-cement produced for county contracts usually shall be based on certification by the producer that the cement complies in all respects with the applicable specifications. Check samples will be obtained from cement delivered to the concrete plant or project site and submitted to the MDOT Central Laboratory for testing in accordance with established sampling frequencies as set forth in the S.O.P. No. SAD II-3-5.

This standard operating procedure is applicable to all hydraulic cement delivered to projects administered by State Aid, to ready-mix concrete plants producing concrete for work administered by State Aid, to plants producing precast units and prestressed or post-tensioned concrete members, and to all work administered by State Aid.

It shall be the responsibility of the Contractor to ascertain that the cement company from whom he purchases cement complies with provisions of this Standard Operating Procedure.

2. SAMPLING, TESTING, AND CERTIFICATION BY CEMENT PRODUCERS:

2.1. Each cement company proposing to furnish cement for work administered by State Aid shall be included on the MDOT Approved Sources of Materials Products List (APL).

2.2. Each cement mill proposing to produce cement for highway work shall certify in a letter addressed to the MDOT Materials Engineer that the rate of sampling and testing at the cement mill is in accordance with the latest revision of AASHTO Designation: T-127 and referenced specifications. This letter shall remain in effect until retracted by the cement mill. A cement mill is required to have a letter as above described on file with the MDOT Materials Engineer in order to qualify as a source of cement for highway work.

In testing cement for highway work, a cement mill shall comply with the "Normal Testing Rate" outlined in AASHTO Designation: T-127 unless it furnishes documentary evidence of its quality history as required by the reference, in which case the mill may use the "Reduced Testing Rate". Such evidence shall be furnished to the MDOT Materials Engineer; the evidence should consist of test reports by the mill over a period of approximately two years.

2.2.1. AASHTO Designation: T-127 gives the purchaser the option to specify the rate of testing for alkali content of the cement. MDOT and State Aid specifications both require low alkali cement, and it is required that each test sample be tested for alkali content.

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2.2.2. It is not required that railroad cars or transports of cement be sealed at the mill or the terminal. However, the cement company shipping the cement may elect to seal the car or transport for its own protection.

2.3. Since there are several conditions under which cement is delivered, producers for each condition are outlined separately as follows:

2.3.1. Case 1: Cement delivered directly from a pretested storage silo to a project site.

Certified mill test reports shall be furnished to the MDOT Materials Engineer, including all tests made on the stored cement. The test reports shall include the following data:

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| Brand Name | Test Results |
| Cement Mill Location | Kind and Type of Cement |
| Silo Number | Number of Barrels Represented |
| Laboratory Number | Certificate of Compliance |
| Date Sampled | |

The certificate of compliance shall contain the following or similar wording:

"The undersigned certifies that the sample (or samples) represented by this report was obtained from cement loaded into the bin (or silo) indicated above, that the tests were made in accordance with the latest AASHTO standard methods (if other methods used, so designate), and that the cement complies with the MDOT or State Aid specifications for (kind and type)."

The format of the report may be the same as that normally used by the mill; the above certificate may be printed or stamped on the test report.

For each shipment of cement, a certificate shall be furnished with the following data:

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| Brand Name | Date Shipped |
| Cement Mill Location | Project, or Work Order, Number |
| Kind and Type of Cement | Name of Purchaser |
| Silo Number | Destination |
| Number of Barrels Shipped | |

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The above certification shall contain the following or similar wording:

"The undersigned certifies that the cement in this shipment was loaded from the pretested bin (or silo) indicated above and that it complies with MDOT or State Aid specifications for (Kind and type). The cement was tested under laboratory numbers _____, and no cement not covered by a certified test report has been added to the silo."

When cement is delivered by truck transport, the certificate shall accompany each transport and shall be delivered to the appropriate MDOT or State Aid representative, except that the copies for the MDOT Materials Engineer and the MDOT District Materials Engineer shall be mailed.

The shipping certificate shall hereinafter be called "Certificate A".

- 2.3.2. Case 2: Cement delivered directly from a pretested storage silo to a recognized commercial ready-mixed concrete plant which produces concrete for MDOT and State Aid work.

Certified mill test reports shall be furnished the ready-mix concrete plant and the MDOT Testing engineer. The reports are described under Case 1 above.

A Certificate "A" (except the project number) is to be furnished the ready-mixed concrete plant and the MDOT Materials Engineer for each shipment of cement.

A copy of Certificate "A" shall be furnished by the ready-mixed concrete plant to the County/LSBP Engineer(s) or MDOT District personnel supervising projects being furnished concrete.

- 2.3.3. Case 3: Cement delivered from a pretested silo or by barge to an intermediate terminal for trans-shipments to projects or ready-mixed concrete plants.

Certified mill test reports shall be furnished the MDOT Materials Engineer. A Certificate "A", as described in Subsection 2.3.1 above (reworded as necessary) shall be furnished the MDOT Materials Engineer and the terminal management for each shipment to the terminal.

- 2.3.4. Case 4: Cement delivered from an intermediate terminal to a project.

A certificate, hereafter called "Certificate B", shall be furnished for each shipment, with the original to a representative of the MDOT or County/LSBP Engineer and copies or prints mailed to the MDOT District Materials Engineer and to the MDOT Materials Engineer. This certificate shall contain the following data:

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Terminal Designation
Terminal Silo Number
Brand Name
Cement Mill Location
(from which cement was
obtained)
Date Shipped

Kind and Type of Cement
Number of Barrels Shipped
Project, or Work Order, Number
Name of Purchaser
Destination

This certificate shall contain the following or similar wording:

"The undersigned certifies that the cement in this shipment was loaded from the terminal silo indicated above, that it is the same cement covered by certificate numbers _____, issued by (cement mill), that no cement not covered by certified test reports has been added to the silo, and that the cement complies with MDOT or State Aid specifications for the kind and type indicated above".

- 2.3.5. Case 5: Cement delivered from an intermediate terminal to a recognized commercial ready-mixed concrete plant which produces concrete for MDOT and State Aid work.

A Certificate "B", as described in Subsection 2.3.4 above, reworded as necessary, shall be furnished with each shipment to the ready-mix plant and to the MDOT Materials Engineer. A copy of Certificate "B" shall be furnished by the ready-mix plant to the County/LSBP Engineer(s) or MDOT District personnel supervising projects being furnished concrete.

- 2.4. Each cement mill shall number Certificates "A" consecutively. The certificates shall be signed by an authorized official of the cement company.
- 2.5. Each intermediate terminal shall number Certificates "B" consecutively. The certificates shall be signed by an authorized representative of the cement company owning or operating the terminal.

3. RESPONSIBILITIES OF COMMERCIAL READY-MIXED CONCRETE PLANTS:

All cement purchased by a ready-mixed concrete plant for use in concrete produced for any State Aid work shall be covered by certified mill test reports and Certificates "A", or Certificates "B", as applicable, and as described in Subsections 2.3.2 and 2.3.5 above.

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4. RESPONSIBILITIES OF COUNTY/LSBP ENGINEER SUPERVISORY PERSONNEL:

- 4.1. Cement delivered to the project site may be used provided a Certificate "A" or a Certificate "B", as applicable, has been received. Concrete produced by an approved commercial ready-mixed concrete plant may be accepted, insofar as the cement is concerned, provided the concrete plant has furnished the required data as outlined in Subsections 2.3.2 and 2.3.5 above.

In case a shipment is received without the proper certificate, the cement shall not be used until the required certificate has been furnished or until tests indicating compliance have been completed on samples submitted from the shipment.

- 4.2. Cement used in concrete or in soil-cement produced for work administered by State Aid will be sampled by a representative of the County/LSBP Engineer at the approximate frequencies outlined in Subsections 4.2.1 and 4.2.2 below. The frequencies shown apply to each source of cement and are minimum; additional samples will be obtained if there is a question concerning the quality of the cement.

Each sample will consist of approximately ten (10) pounds (approximately one gallon) and will be obtained in such a manner, and at such points, that the sample will: (1) be representative, (2) not be contaminated and (3) represent only one source and brand of cement.

The samples will be placed in triple-seal metal cans or other moisture-proof containers that will insure the samples against contamination.

The samples will be delivered, or will be mailed or shipped, pre-paid. Consideration should be given to multiple sample shipments in order to take advantage of minimum shipping charges, but in no case will a sample be retained for longer than fourteen (14) days before submission to the MDOT Central Laboratory.

- 4.2.1. Cement used by approved commercial ready-mix plants in production of concrete for State Aid work will be sampled at the rate of one sample for each five hundred (500) barrels, or fraction thereof, used. Insofar as possible, at least one sample shall be obtained for each project except that a sample will not be required if the project contains less than approximately 30 c.y. of concrete.

- 4.2.2. Cement delivered to a project site, or to a central concrete plant set up for a specific project, to be used in concrete paving, structural concrete, or soil-cement will be sampled at the rate of one sample for each one thousand (1000) barrels, or fraction thereof, received, except that at least one sample will be obtained each week during which concrete or soil-cement is produced. On a project containing less than approximately 30 c.y. of concrete, a sample will not be required.

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5. RESPONSIBILITY OF MDOT CENTRAL LABORATORY:

The Central Laboratory may composite samples from each project, each source, and each type, forming test samples to be tested by the MDOT Central Laboratory, or at the discretion of the MDOT Materials Engineer, a commercial laboratory. The Central Laboratory may composite individual samples from multiple projects provided the individual samples are from the same source and of the same type. Only individual samples having sampling dates from within thirty (30) days of each other will be composited. Results of these tests will be reported to the parties concerned. The individual samples from which the composite test sample is obtained will be retained until satisfactory test results on the test samples are received.

If a composite test sample fails to comply with specification requirements, each individual sample represented by the composite test sample shall be tested for the failing requirements. Upon receipt of results of these tests, the MDOT Materials Engineer shall evaluate the tests to determine action to be taken under Section 6 below.

A test sample, composite from individual samples, shall represent not more than four thousand (4000) barrels except that the MDOT Materials Engineer may decrease this maximum on any particular project if he deems it necessary or advisable due to lack of uniformity, borderline test results, or for other reasons.

6. NON-COMPLYING CEMENT SAMPLES:

When a sample of cement fails to comply with the specification requirements, the MDOT Materials Engineer will evaluate the failure and the probable effect of the failing requirement on the quality of the product produced with the cement and, if he deems the failure of sufficient seriousness to warrant such action, he may at his discretion order that the cement thus represented not be used in the work, or he may proceed with the check tests on individual samples as specified in Section 5 above for further evaluation. In the event the check tests on individual samples confirm the failure, the MDOT Materials Engineer will evaluate the failure and the probable effect on the quality of concrete produced with the cement. If he deems the confirmed failure of sufficient seriousness to warrant such action, the cement mill which produced the cement shall be required to suspend all shipments of cement until such time as the cause(s) of the failure have been corrected to the satisfaction of the MDOT Materials Engineer.

7. STORAGE CAPACITY:

In order to eliminate any possible delay in production because of non-conforming cement, it shall be the Contractor's responsibility to provide ample storage and shipments of cement or permit identification, sampling and testing, and appropriate actions as indicated above for failing samples.