

CECW-EG

Regulation
No. 1110-1-2002

30 September 1998

**Engineering and Design
CEMENT, SLAG, AND POZZOLAN
ACCEPTANCE TESTING**

1. Purpose

This regulation sets forth policy and responsibilities for acceptance testing of cementitious materials including portland cement, blended cement, pozzolan, and ground granulated blast-furnace slag (hereinafter referred to as slag).

2. Applicability

This regulation applies to all USACE Commands having military programs and/or civil works engineering and design responsibilities.

3. References

American Society for Testing and Materials (ASTM).

a. ASTM C 91. "Specification for Masonry Cement."

b. ASTM C 150. "Specification for Portland Cement."

c. ASTM C 183. "Practice for Sampling and the Amount of Testing of Hydraulic Cement."

d. ASTM C 311. "Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete."

e. ASTM C 595. "Specification for Blended Hydraulic Cements."

f. ASTM C 618. "Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete."

g. ASTM C 845. "Specification for Expansive Hydraulic Cement."

h. ASTM C 989. "Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars."

i. ASTM C 1157. "Performance Specification for Blended Hydraulic Cement."

j. ASTM C 1328. "Specification for Plastic (Stucco) Cement."

k. ASTM C 1329. "Specification for Mortar Cement."

l. ASTM C 1240. "Specification for Silica Fume for Use in Hydraulic-Cement Concrete and Mortar."

Copies of ASTM Standards are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

4. Distribution Statement

Approved for public release; distribution is unlimited.

This regulation supersedes ER 1110-1-2002, dated 31 January 1993.

5. Policy

This regulation shall be followed in all cases where Corps project specifications require that cementitious materials (cement, slag, or pozzolan) be tested by and at the expense of the Government and in cases where another Federal or other governmental agency requests that such acceptance testing be performed by the U.S. Army Corps of Engineers. This regulation is not applicable where Corps project specifications require that cementitious materials be tested by and at the expense of the Contractor. Cement, slag, and pozzolan acceptance testing by the Government will be performed only by the U.S. Army Engineer Waterways Experiment Station (WES), except that Transatlantic Programs Center and Pacific Ocean Divisions are authorized to arrange for such acceptance testing as may be appropriate.

6. Types of Acceptance Testing

a. Cement/pozzolan quality management system (CQMS/PQMS). The CQMS/PQMS is designed to provide a means by which cement and/or pozzolan can be purchased from a qualified producer's regular production with a reasonable assurance that it will meet specification requirements. Use of slag is covered under the CQMS. Establishing a qualified source involves a combination of review of a producer's quality control data and testing at WES to verify between-laboratory agreement on critical test results. Following this initial evaluation, grab samples are taken from the project and tested at WES to verify compliance with specification requirements, but every lot of cement is not necessarily tested prior to use, as in sealed-bin testing (paragraph 6b). Complete descriptions of the procedures governing the CQMS and PQMS are found in Appendices A and B, respectively.

b. Sealed-bin testing. Sealed-bin testing offers an acceptance-testing program that provides assurance that material meets specification requirements. Samples of the material are tested prior to use, and the bin is sealed by a Government inspector exclusively for Government use. Loading of material into tankers is witnessed by the inspector, and the

tanker is sealed prior to departure for the job site. Seals are removed and seal numbers logged in at the job site prior to unloading. Details of procedures required for this type of testing are found in Appendix C.

c. Single-sample testing. With this type of testing, samples are analyzed and compared with specification requirements, but there is no interpretation of the results representing anything other than the properties of that sample.

7. Responsibilities of Using Agencies

a. General. Personnel at the district, area, or residency level or other Federal or governmental agency (hereafter referred to as the using agency) shall be responsible for requesting cement, slag, or pozzolan acceptance testing (when it is a requirement of the project specifications), determining the type of acceptance testing, and providing the required funding document to WES. When cement or pozzolan is being supplied from a qualified source, the using agency shall request WES to develop the required history and shall be responsible for sampling material at the project, as described in Appendices A and B. Using-agency personnel shall be responsible for ensuring that the cement, slag, and pozzolan reaching the project site have not been contaminated in transit and are properly handled and stored at the project site. If project personnel suspect that pretested cement or pozzolan is deviating from the project requirements, additional samples of this material shall be taken for testing.

b. Requesting cement, slag, and pozzolan acceptance testing.

(1) Requests for acceptance testing by the using agency shall be addressed to:

**Structures Laboratory
U.S. Army Engineer Waterways Experiment
Station
ATTN: CEWES-SC-E
3909 Halls Ferry Road
Vicksburg, Mississippi 39180-6199
601-634-3261, FAX 601-634-3262**

(2) The request shall include the following information:

(a) Name and location of cement mill and/or pozzolan or slag source.

(b) Specification under which tests are to be made. (Indicate special tests desired under specification exceptions and options and whether retesting of cement, slag, or pozzolan will be required due to storage time in excess of 6 months.)

(c) Appropriate funding documents.

(d) Distribution for test reports.

(e) Type of acceptance testing.

(3) The following information is helpful but not mandatory:

(a) Contract number.

(b) Name of Contractor (and subcontractor, if applicable).

(c) Contractor's (or subcontractor's) purchase order number.

(d) Name, location, and mailing address of project.

(e) Types of concrete construction (e.g., conventional concrete or roller-compacted concrete (RCC)).

(f) Quantity of cement, slag, or pozzolan (if bulk, number of tons; if bagged, number of bags and quantity (mass) per bag).

(g) Storage conditions required by the project specifications.

(h) Estimated date of first shipment and shipping schedule, if known.

(i) Distribution of test reports, mailing addresses, and number of copies to each address.

(j) Complete information or requirements, including appropriate parts of project specifications.

(k) Information on whether shipment of "excess" quantities of cement, slag, or pozzolan is anticipated (paragraph 9d).

(4) The using agency shall urge its contractors to place orders well in advance of needs and shall submit requests for sampling, inspection, and testing promptly.

c. Additional responsibility of the using agency.

(1) Inspection at ready-mixed concrete plants. The using agency shall be responsible for monitoring use of tested cement, slag, or pozzolan from qualified sources at ready-mixed concrete plants.

(2) Project samples. When cement, slag, or pozzolan is being furnished under the CQMS or PQMS from a qualified source, the using agency shall be responsible for periodic and supplementary sampling of the product delivered to the job site as described in paragraphs A-4 and B-4 of Appendices A and B, respectively.

(3) Cement, slag, or pozzolan that fails tests and retests. Cement, slag, or pozzolan that has failed to meet specification requirements on the basis of tests and retests of the original samples may be resampled and retested. The using agency may initiate such a request upon notification from WES that the cement, slag, or pozzolan tested failed to meet specification requirements. Such materials shall be resampled and retested at no cost to the Government. The using agency is responsible for recovering and funding the resampling and retesting costs incurred by WES.

(4) Inspection at transfer facilities. Inspection at transfer facilities may be performed by the using agency or through arrangements made by the using agency with other users, in the event several users of tested cement, slag, or pozzolan are drawing from the same bin at the transfer facility. The using

agency may make arrangements with WES for such inspection, with the additional costs for inspection being chargeable by WES to the using agency.

8. Responsibilities of WES

a. Sampling, testing, and inspection. WES will be responsible for the sampling, testing, and inspection of cement, slag, and pozzolan at mill or source locations within the CONUS. Sampling of cementitious materials will be performed in accordance with ASTM C 183, ASTM C 311, or ASTM C 989. WES will maintain the capability for testing in accordance with ASTM C 91, ASTM C 150, ASTM C 595, ASTM C 618, ASTM C 845, and ASTM C 989.

b. Point of contact, WES. The Director, WES, will select an individual directly responsible for the cement, slag, and pozzolan testing function with whom representatives of the using agencies may deal directly. The using agencies shall be informed in writing of the name of the responsible individual, and all requests for sampling, inspection, and testing shall be marked to the attention of that individual.

c. Technical surveillance. The Director, WES, is assigned responsibility for the technical surveillance of the cement, slag, and pozzolan acceptance-testing function. This responsibility includes performing laboratory investigations into improving specification, sampling procedures, test methods, and equipment. These activities shall be coordinated with the applicable committees and subcommittees of ASTM and, when necessary, with using or other agencies.

d. Procurement of items required for sampling and sample shipping. WES shall be responsible for procurement of items required by mill or plant inspectors in the performance of sampling and sample shipping. WES will supply shipping materials and supplementary instructions for properly obtaining representative project samples.

e. Maintenance of CQMS and PQMS. WES shall maintain files of the current statistical test data furnished by participating producers on their quality

control procedures to determine qualification or continuance as an acceptable source under the CQMS or PQMS. CQMS and PQMS status will only be established and maintained for those sources that have been requested by a using agency.

f. Administrative. Administrative support for procurement, fiscal, and contractual matters in connection with the cement, slag, and pozzolan acceptance-testing service shall be provided by appropriate elements at WES.

g. Resampling and retesting. Resampling and retesting of previously failed material shall be performed only when authorized by the using agency.

h. Inspection of WES testing facilities. Cement testing facilities shall be inspected by the Cement and Concrete Reference Laboratory (CCRL), National Institute of Standards and Technology, Washington, DC 20324. Copies of all reports which result from the inspection will be forwarded to CDR USACE CECW-EG, WASHINGTON, DC 20314-1000. WES will participate in the CCRL proficiency-sample program for portland cement, blended cement, and pozzolan. Performance will be monitored as part of the WES quality assurance practice.

i. Reporting.

(1) Notification. Upon completion of testing, WES shall notify the using agency, supplier, and mill or plant inspector whether or not the cement, slag, or pozzolan met the requirements. Results of 7-day tests will be available no later than 14 days after receipt of the sample (more rapid results are possible if prior arrangements are made). Results of 28-day tests will be available no later than 35 days after receipt of the sample. The using agency will receive a completed test report, for tests through 7 days, within 21 days of receipt of the sample. If there are 28-day tests, a preliminary test report will be issued after 7-day results are completed. Results can be transmitted by telephone or by FAX upon request.

(2) Noncompliance. Test results that indicate noncompliance with a specification requirement

shall be communicated to the using agency as soon as noted. Noncompliance will be verified by duplicate testing for the property or component in question. If the duplicate test result agrees with the original test result within the limit expected from the precision of the method, then a mean will be calculated and considered to be the definitive test result. If the duplicate test result does not agree within the limit of the precision of the method, additional testing will be performed until two results that do agree within these limits are obtained. The mean of these two results will be reported as the definitive test result. Results of such duplicate testing will be transmitted to the using agency as soon as available.

(3) Status. For cement, slag, or pozzolan furnished under the CQMS or PQMS, WES shall not alter the status of a qualified producer without prior notice to agencies currently being supplied by that producer and without arranging for an alternate sampling and testing system for materials to satisfy contract specification requirements.

(4) Test results. Test results of project samples submitted in accordance with paragraphs A-4 and B-4 of Appendices A and B, respectively, shall be furnished to the using agency.

9. Charges for Acceptance Testing

a. Charges for testing. Charges for testing will be based on a per-sample rate, regardless of the type

of acceptance testing requested. An additional one-time fee will be charged to establish a source as a qualified source under CQMS or PQMS or to set up a seal-bin inspection program. The rate will depend on the work involved and will be negotiated between WES and the using agency.

b. Retesting of cement, slag, and pozzolan at contractor's request. The costs of resampling and retesting shall be identified and billed to the using agency. In the event the bin or silo in question involves more than one using agency and more than one using agency requests resampling and retesting, the costs shall be prorated among the using agencies requesting resampling and retesting.

c. Inspection at transfer facilities. The cost of transfer facility inspection requested by the using agency shall be identified and billed directly to the using agency.

d. Inspection and testing of cement, slag, and pozzolan in quantities exceeding project requirements. In a sealed-bin testing program, tested cement or pozzolan will sometimes be used by the Contractor for purposes other than those described in the contract with the using agency. It is the responsibility of the using agency to recover the cost of testing this material.

FOR THE COMMANDER:

3 Appendices
APP A - Cement Quality
Management System
APP B - Pozzolan Quality
Management System
APP C - Sealed-Bin Testing


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