



Florida Department of Transportation

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GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

STEPHANIE KOPELOUSOS
SECRETARY

December 26, 2007

Dr. Leslie McCarthy, PhD, P.E.
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section 921
Proposed Specification :9210000 Portland Cement and Blended Cement

Dear Dr. McCarthy:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Portland Cement and Blended Cement.

This change was proposed by Tom Malerk of the State Materials Office to update the specification with new information and requirements from the recently revised AASHTO M-85 test method allowing cement producers to use limestone in cement.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Signature on File

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/ft
Attachment

cc: Gregory Jones, General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

PORTLAND CEMENT AND BLENDED CEMENT.**(REV 10-04-2007)**

SECTION 921 (Pages 787-789) is deleted and the following substituted:

**SECTION 921
PORTLAND CEMENT AND BLENDED CEMENT**

921-1 General.

921-1.1 Type of Cement: Cement shall conform to the requirements of the following AASHTO designations except where a particular type of cement is specified on the plans or Specifications, and as specifically restricted in Section 346, cement may be Types I, II, III, IV, V (AASHTO M 85), or IP, IP (MS), IS (AASHTO M 240). Different brands of cement, cement of the same brand from different facilities, or different types of cement shall be stored separately and shall not be mixed.

921-1.2 Alkali Content: Only Portland cement containing a maximum of 0.60% alkali, or less, calculated as Na₂O (% Na₂O plus 0.658% K₂O), ~~shall may~~ be used *with no further testing. When tests performed in accordance with ASTM C-33 XI.3 on coarse and fine aggregate indicate the aggregate to be non-reactive to alkalis, cements exceeding 0.60% alkali is allowed, but a supplementary cementitious material meeting the requirements of Section 929 shall be used.*

921-1.3 Heat of Hydration: ~~Ensure that the heat of hydration of the cement does not exceed 80 cal/g at seven days measured as the average of three samples, and that no individual measurement exceeds 90 cal/g.~~

~~Where fly ash is 18% or greater or slag is 50% or greater of the total cementitious material, ensure that the heat of hydration of the cement does not exceed 88 cal/g at seven days measured as the average of three samples, and ensure that no individual measurement exceeds 96 cal/g. When the cement heat of hydration is 80 cal/g or less at seven days, the cement may be used in moderately and slightly aggressive environments without pozzolans or slag. If the heat of hydration at 7 days is between 81 and 88 cal/gm at 7 days, pozzolans or slag meeting the requirements of Section 929 shall be used. If the heat of hydration is greater than 88 cal/gm at 7 days, use cement in slightly aggressive environments only.~~

Do not apply these requirements to Type *I or III* cement.

921-2 Terminology.

The following definitions are applicable to the production and quality control of cement:

~~Sources of Supply:~~

~~A source~~ *Source of supply* - ~~shall be the~~ *indicates a* cement supplier responsible for supplying the final product. Where the supplier has more than one manufacturing facility, the source of supply may be designated as the manufacturer/facility.

Approved Source - ~~The term Approved Source shall~~ *indicates a* cement supplier, *including but not limited to a plant, a terminal, or a transfer facility,* that has

been qualified by the State Materials Office. A list of Approved Cement Sources will be maintained by the State Materials ~~Engineer~~Office.

~~Current~~Quality Control Plan ~~Approval~~Status - ~~A current indication indicates~~ of quality control approval status, for each cement supplier ~~and~~, will be maintained by the State Materials ~~Engineer~~Office in conjunction with the Approved Source List.

Purchaser - The term “purchaser” in the AASHTO Specifications shall be taken as the Department.

Approved Laboratory -- ~~indicates a~~ ~~An approved~~laboratory ~~is a~~ ~~laboratory~~ acceptable to the ~~State Director~~,~~State Materials Office~~ ~~of Materials Engineer~~ ~~and~~ which has been currently inspected by the Cement and Concrete Reference Laboratory (CCRL), ~~is actively participating in their proficiency program~~ and which has ~~corrected~~all deficiencies noted at the time of inspection ~~corrected~~. The laboratory must also authorize CCRL to send copies of ~~final~~ inspection reports to the State Materials ~~Engineer~~Office.

Mill Test Report – indicates a certification from the cement supplier identifying that the cement meets Section 921 and AASHTO M-85, the Type, the production period the sample represents and the chemical and physical analyses of the cement, and the silo number(s) where the cement is stored. The mill test report must identify that there is limestone in the cement, if limestone is included. An acceptable mill test report is found in the appendix of AASHTO M-85.

921-3 Packing Handling and Storing.

Cement may be delivered in bags or in bulk. The storage building, bin or silo shall be weatherproof and shall be located convenient to the work. On small jobs, storage in the open may be permitted by the Engineer in which case raised platforms and adequate waterproof coverings shall be provided.

921-4 Rejection.

The entire contents of the sack or bulk container which contains cement that does not meet the requirements of this Specification or has been damaged, is partially set, lumpy or caked shall be rejected.

Bagged cement which varies more than 5% from the designated weight, or if the average weight of 50 sacks, taken at random, is less than the designated weight, the cement shall be rejected.

921-5 Quality Control Plan.

921-5.1 General: The quality control program of a cement supplier shall conform to ~~Section 6-8~~~~105-3~~. Cement suppliers shall submit a proposed quality control plan to the State Materials ~~Engineer~~Office for plan approval. In addition to the quality control plan, the supplier must submit test reports from an approved laboratory which certifies that the cement in current production or supply conforms to these Specifications. Upon initial quality control plan approval and receipt of ~~the~~ cement ~~certifications~~ ~~mill test report~~, the suppliers will be placed in an approved source status with an approved quality control plan. An approved laboratory shall perform one quality control test per ~~day~~~~400-ton LOT~~. ~~and~~Submit a copy of their ~~monthly~~ mill ~~certificate~~~~test report~~ ~~shall be sent~~ to the State Materials ~~Office~~Engineer ~~when the material is in use on~~ Department projects. The

~~certification~~-*mill test report* shall indicate that the cement meets the requirements of this Specification. Also, the corresponding samples along with mill ~~certificates~~-*test reports* shall be submitted to the Department, upon request.

Producers intending to use limestone as a component material in the production of cement shall describe the type and source of the limestone. In addition, the producer shall supply the Department with a sample of the limestone, a sample of the cement prior to the limestone being added and a sample of the cement after the limestone has been added. The analysis of these materials will be used as a baseline for information. In the event that the source of limestone used by the cement producer changes, additional samples of both the limestone and the cement with the limestone added shall be provided to the State Materials Office for evaluation.

Representatives² from the Department may take samples from the cement production facility at a minimum of once per year to verify compliance with the producer's quality control plan.

The supplier's quality control plan shall be sufficient to insure that more than 97% of all cement delivered for FDOT work shall meet all Specification requirements. Upon request of the Department, the supplier shall provide split samples of the cement collected for quality control testing. Split samples shall be delivered to the State Materials Office and shall be identified as representing a designated LOT of cement.

921-5.2 Acceptance of Portland Cement: Portland Cement from an approved source with a current quality control plan approval may be accepted on the basis of ~~certified~~-*mill analysis*-~~test results~~-*reports* meeting the requirements of the applicable AASHTO and FDOT Specifications *and a delivery ticket printed on the producer's letterhead and traceable to the mill test report. Certification of these Mill test results reports* shall be provided upon request to the ~~District~~-*State* Materials Office and corresponding samples for verification testing. Quality ~~Control~~-*control* testing shall be performed by an approved laboratory.

921-5.3 Cement Ownership and Responsibility: For purposes of ~~Q~~*quality* ~~C~~*control* ~~P~~*plan* approval status, the cement supplier ~~will~~-*shall* be responsible for cement quality until the cement is accepted by the concrete producer. Where the cement has been accepted by a concrete producer and is subsequently found deficient, the concrete plant *quality control plan* approval may be withdrawn with respect to further use of that cement and reinstated only when the deficiency is adequately resolved. ~~and such reinstatement~~-*Reinstatement* is made by the State Materials ~~Office~~-*Engineer*.

921-5.4 Quality Control Plan Approval Control: The ~~Department~~-*State Materials Office* may withdraw quality control plan approval and may require cement shipments to be individually tested prior to incorporation into Department work. Quality control plan approvals may be rescinded when the performance of cement is in question, including problems with concrete quality, inconsistent quality control data, or failure of quality control or verification test results. Discontinuance of approval may be based on testing at the point of use, testing by the manufacturer or proven poor performance of the cement in concrete.

In the specific instance of a failing cement sample taken by the Department, *at the cement source*, the failure shall initiate the Department to ~~collect an additional~~-*retest the* sample ~~from the location of the original failure~~. Failure of ~~this~~

~~sample~~*the retest* will be considered adequate evidence to withdraw the ~~q~~Quality ~~c~~Control ~~p~~Plan of the Cement Supplier.

Notification of failing test results will be distributed to the cement supplier (and concrete producers if applicable) as designated in the ~~A~~approved ~~Q~~quality ~~E~~control ~~P~~plan. Split samples of the ~~additional~~*initial* sample ~~will~~*may* be provided to the cement supplier and concrete producer upon request.

Reinstatement of the ~~Q~~quality ~~E~~control ~~P~~plan will occur when the cement producer identifies and corrects the specific cause of the failures or that a statistical analysis indicates that the current cement production meets or exceeds the requirements of this Specification.

921-5.5 Sampling of Cement: The verification samples may be taken at the manufacturer's plant, distribution facility or at the concrete production facility. Samples shall be obtained by one of the methods in Florida Methods FM 5-503. Samples shall be a minimum of 10 pounds in size. At the concrete production facility, cement samples shall be jointly obtained by the Department Inspector and the concrete producer's representative. ~~The concrete producer may select a preferred sampling method and shall provide safe access and the necessary equipment to collect the required samples.~~

PORTLAND CEMENT AND BLENDED CEMENT.**(REV 12-26-07)**

SECTION 921 (Pages 787-789) is deleted and the following substituted:

**SECTION 921
PORTLAND CEMENT AND BLENDED CEMENT**

921-1 General.

921-1.1 Type of Cement: Cement shall conform to the requirements of the following AASHTO designations except where a particular type of cement is specified on the plans or Specifications, and as specifically restricted in Section 346, cement may be Types I, II, III, IV, V (AASHTO M 85), or IP, IP (MS), IS (AASHTO M 240). Different brands of cement, cement of the same brand from different facilities, or different types of cement shall be stored separately and shall not be mixed.

921-1.2 Alkali Content: Only Portland cement containing a maximum of 0.60% alkali, or less, calculated as Na_2O (% Na_2O plus 0.658% K_2O), may be used with no further testing. When tests performed in accordance with ASTM C-33 X1.3 on coarse and fine aggregate indicate the aggregate to be non-reactive to alkalis, cements exceeding 0.60% alkali is allowed, but a supplementary cementitious material meeting the requirements of Section 929 shall be used.

921-1.3 Heat of Hydration: When the cement heat of hydration is 80 cal/g or less at seven days, the cement may be used in moderately and slightly aggressive environments without pozzolans or slag. If the heat of hydration is between 81 and 88 cal/gm at 7 days, pozzolans or slag meeting the requirements of Section 929 shall be used. If the heat of hydration is greater than 88 cal/gm at 7 days, use cement in slightly aggressive environments only.

Do not apply these requirements to Type I or III cement.

921-2 Terminology.

The following definitions are applicable to the production and quality control of cement:

Source of Supply - indicates a cement supplier responsible for supplying the final product. Where the supplier has more than one manufacturing facility, the source of supply may be designated as the manufacturer/facility.

Approved Source - indicates a cement supplier, including but not limited to a plant, a terminal, or a transfer facility, that has been qualified by the State Materials Office. A list of Approved Cement Sources will be maintained by the State Materials Office.

Quality Control Plan Status - indicates quality control approval status, for each cement supplier and will be maintained by the State Materials Office in conjunction with the Approved Source List.

Purchaser - The term "purchaser" in the AASHTO Specifications shall be taken as the Department.

Approved Laboratory – indicates a laboratory acceptable to the State Materials Office which has been currently inspected by the Cement and Concrete Reference Laboratory (CCRL), is actively participating in their proficiency program and which has all deficiencies noted at the time of inspection corrected. The laboratory must also authorize CCRL to send copies of final inspection reports to the State Materials Office.

Mill Test Report – indicates a certification from the cement supplier identifying that the cement meets Section 921 and AASHTO M-85, the Type, the production period the sample represents and the chemical and physical analyses of the cement, and the silo number(s) where the cement is stored. The mill test report must identify that there is limestone in the cement, if limestone is included. An acceptable mill test report is found in the appendix of AASHTO M-85.

921-3 Packing Handling and Storing.

Cement may be delivered in bags or in bulk. The storage building, bin or silo shall be weatherproof and shall be located convenient to the work. On small jobs, storage in the open may be permitted by the Engineer in which case raised platforms and adequate waterproof coverings shall be provided.

921-4 Rejection.

The entire contents of the sack or bulk container which contains cement that does not meet the requirements of this Specification or has been damaged, is partially set, lumpy or caked shall be rejected.

Bagged cement which varies more than 5% from the designated weight, or if the average weight of 50 sacks, taken at random, is less than the designated weight, the cement shall be rejected.

921-5 Quality Control Plan.

921-5.1 General: The quality control program of a cement supplier shall conform to 105. Cement suppliers shall submit a proposed quality control plan to the State Materials Office for plan approval. In addition to the quality control plan, the supplier must submit test reports from an approved laboratory which certifies that the cement in current production or supply conforms to these Specifications. Upon initial quality control plan approval and receipt of the cement mill test report, the suppliers will be placed in an approved source status with an approved quality control plan. An approved laboratory shall perform one quality control test per day. Submit a copy of the monthly mill test report to the State Materials Office. The mill test report shall indicate that the cement meets the requirements of this Specification. Also, the corresponding samples along with mill test reports shall be submitted to the Department, upon request.

Producers intending to use limestone as a component material in the production of cement shall describe the type and source of the limestone. In addition, the producer shall supply the Department with a sample of the limestone, a sample of the cement prior to the limestone being added and a sample of the cement after the limestone has been added. The analysis of these materials will be used as a baseline for information. In the event that the source of limestone used by the cement producer changes, additional samples of both the limestone and the cement with the limestone added shall be provided to the State Materials Office for evaluation.

Representatives from the Department may take samples from the cement production facility at a minimum of once per year to verify compliance with the producer's quality control plan.

The supplier's quality control plan shall be sufficient to insure that more than 97% of all cement delivered for FDOT work shall meet all Specification requirements. Upon request of the Department, the supplier shall provide split samples of the cement collected for quality control testing. Split samples shall be delivered to the State Materials Office and shall be identified as representing a designated LOT of cement.

921-5.2 Acceptance of Portland Cement: Portland Cement from an approved source with a current quality control plan approval may be accepted on the basis of mill test reports meeting the requirements of the applicable AASHTO and FDOT Specifications and a delivery ticket printed on the producer's letterhead and traceable to the mill test report. Mill test reports shall be provided upon request to the State Materials Office and corresponding samples for verification testing. Quality control testing shall be performed by an approved laboratory.

921-5.3 Cement Ownership and Responsibility: For purposes of quality control plan approval status, the cement supplier shall be responsible for cement quality until the cement is accepted by the concrete producer. Where the cement has been accepted by a concrete producer and is subsequently found deficient, the concrete plant quality control plan approval may be withdrawn with respect to further use of that cement and reinstated only when the deficiency is adequately resolved. Reinstatement is made by the State Materials Office.

921-5.4 Quality Control Plan Approval Control: The State Materials Office may withdraw quality control plan approval and may require cement shipments to be individually tested prior to incorporation into Department work. Quality control plan approvals may be rescinded when the performance of cement is in question, including problems with concrete quality, inconsistent quality control data, or failure of quality control or verification test results. Discontinuance of approval may be based on testing at the point of use, testing by the manufacturer or proven poor performance of the cement in concrete.

In the specific instance of a failing cement sample taken by the Department, at the cement source, the failure shall initiate the Department to retest the sample. Failure of the retest will be considered adequate evidence to withdraw the quality control plan of the Cement Supplier.

Notification of failing test results will be distributed to the cement supplier (and concrete producers if applicable) as designated in the approved quality control plan. Split samples of the initial sample may be provided to the cement supplier and concrete producer upon request.

Reinstatement of the quality control plan will occur when the cement producer identifies and corrects the specific cause of the failures or that a statistical analysis indicates that the current cement production meets or exceeds the requirements of this Specification.

921-5.5 Sampling of Cement: The verification samples may be taken at the manufacturer's plant, distribution facility or at the concrete production facility. Samples shall be obtained by one of the methods in Florida Methods FM 5-503. Samples shall be

a minimum of 10 pounds in size. At the concrete production facility, cement samples shall be jointly obtained by the Department Inspector and the concrete producer's representative.