

## **921 PORTLAND CEMENT AND BLENDED CEMENT.**

**(REV 1-9-02) (FA 1-10-02) (7-02)**

SECTION 921 (Pages 829-832) 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 0.6% alkali, or less, calculated as  $\text{Na}_2\text{O}$  (%  $\text{Na}_2\text{O}$  plus 0.658 %  $\text{K}_2\text{O}$ ), shall be used.

**921-1.3 Heat of Hydration:** Ensure that the heat of hydration of the cement does not exceed 80 cal/g [335 kJ/kg] at seven days measured as the average of three samples, and that no individual measurement exceeds 90 cal/g [375 kJ/kg].

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 [370 kJ/kg] at seven days measured as the average of three samples, and ensure that no individual measurement exceeds 96 cal/g [400 kJ/kg].

Do not apply these requirements to Type III cement.

#### **921-2 Terminology.**

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

A source of supply shall be the 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 indicate a cement supplier that has been qualified by the State Materials Office. A list of Approved Cement Sources will be maintained by the State Materials Engineer.

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

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

Approved Laboratory - An approved laboratory is a laboratory acceptable to the State Materials Engineer and which has been currently inspected by the Cement and Concrete Reference Laboratory (CCRL) and which has corrected all deficiencies noted at the time of inspection. The laboratory must also authorize CCRL to send copies of inspection reports to the State Materials Engineer.

### **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. Cement suppliers shall submit a proposed quality control plan to the State Materials Engineer 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 cement certifications, 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 400 ton [360 metric ton] LOT and a copy of their mill certificates shall be sent to the State Materials Engineer when the material is in use on Department projects. The certification shall indicate that the cement meets the requirements of this Specification. Also, the corresponding samples along with mill certificates shall be submitted to the Department, upon request.

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 meeting the requirements of the applicable AASHTO and FDOT Specifications. Certification of these test results shall be provided upon request to the District

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 will 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 approval may be withdrawn with respect to further use of that cement and reinstated only when the deficiency is adequately resolved and such reinstatement is made by the State Materials Engineer.

**921-5.4 Quality Control Plan Approval Control:** The Department 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, the failure shall initiate the Department to collect an additional sample from the location of the original failure. Failure of this sample 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 additional sample will 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 [4.5 kg] 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.