ORIGINATION FORM
Proposed Revisions to the Specifications
(Please provide all information - incomplete forms will be returned)

Date: 5/6/2021

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Office: Materials

Specification Section: 929

Article/Subarticle: 929-4

Associated Section(s) Revisions:

Will the proposed revision require changes to:

Publication	Yes	No	Office Staff Contacted
Standard Plans Index	○	◉	Rick Jenkins/Andre Pavlov
Traffic Engineering Manual	○	◉	Javier Ponce
FDOT Design Manual	○	◉	Bobby Bull
Construction Project Administration Manual	○	◉	Scott Arnold
Basis of Estimate/Pay Items	○	◉	Melissa Hollis
Structures Design Guidelines	○	◉	Ben Goldsberry
Approved Product List	○	◉	Karen Byram
Materials Manual	○	◉	Tim Counts

Will this revision necessitate any of the following:

Design Bulletin ☐ **Construction Bulletin** ☐ **Estimates Bulletin** ☐ **Materials Bulletin** ☐

Are all references to external publications current? **Yes** ◉ **No** ○

If not, what references need to be updated? (Please include changes in the redline document.)

Why does the existing language need to be changed?

To address concrete durability concerns related to the alumina content of slag cement based on recent Department sponsored research.

Summary of the changes:

Strengthened slag cement acceptance requirements based on recent Department sponsored research.

Are these changes applicable to all Department jobs? **Yes** ◉ **No** ○

If not, what are the restrictions?

Contact the State Specifications Office for assistance in completing this form.

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M E M O R A N D U M

DATE: June 3, 2021

TO: Specification Review Distribution List

FROM: Daniel Strickland, P.E., State Specifications Engineer

SUBJECT: Proposed Specification: **9290400 SUPPLEMENTARY CEMENTITIOUS MATERIALS.**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change.

The changes are proposed by Thomas Frank to address concrete durability concerns related to the alumina content of slag cement in the Standard Specification.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or online at http://fdotewp1.dot.state.fl.us/programmanagement/development/industryreview.aspx . Comments received after **July 1, 2021,** may not be considered. Your input is encouraged.

DS/dh

Attachment

SUPPLEMENTARY CEMENTITIOUS MATERIALS.
(REV 5-6-21)

ARTICLE 929-4 is deleted and the following substituted:

929-4 Slag Cement.

Slag cement (ground granulated blast furnace slag, GGBFS) is the quenched, ground by-product of the iron ore refinement process conducted in blast furnaces. It is primarily an amorphous material of calcium aluminosilicate constituents.

929-4.1 General: Slag cement and reference cement used for determination of slag activity tests shall meet the requirements of ASTM C989. Sampling and testing procedures shall follow the requirements of ASTM C989.

929-4.2 Acceptance Testing of Slag Cement: Acceptance of slag cement from sources operating under an accepted QC Plan shall be based on the monthly test reports meeting the chemical and physical requirements of ASTM C989 and this Section. The test report shall include:

1. For slag granules, provide X-ray Fluorescence (XRF) elemental analysis of the granules, presented in oxide form. Include CaO, SiO_2, Al_2O_3, MgO, Mn_2O_3, TiO_2, Fe_2O_3, and sulfur (as sulfide).

2. For slag cement, provide XRF elemental analysis, presented in oxide form. Include CaO, SiO_2, Al_2O_3, MgO, Mn_2O_3, TiO_2, Fe_2O_3, sulfur as sulfide (S), sulfate sulfur (SO_3), and total sulfur as sulfate (SO_3).

3. The results of all testing listed under Test Methods section of ASTM C989.

4. Indicate the amount of any additions introduced during grinding of the slag granules and report compliance with Section 6 of ASTM C989.

   a. Amount of limestone added and its $CaCO_3$ content.

   b. Amount of other inorganic processing addition.

5. For calcium sulfate additions, indicate:

   a. Amount of calcium sulfate added.

   b. Form of calcium sulfate.

   c. SO_3 content.

   d. Method used to determine the amount of calcium sulfate that was added.

929-4.2.1 Assessment of Sulfate Resistance: Provide ASTM C1012 data with a 50:50 portland cement-slag cement blend, using a Type II (MH) portland cement on the Department's Production Facility Listing, with an alkali content of no more than 0.6%, when:

1. The Al_2O_3 content exceeds 11%.

2. Slag granules from more than one source are ground to produce the slag cement. This applies to each different mass ratio blend of slag granules used to produce a slag cement.

The Department will consider the ASTM C1012 data acceptable when the results indicate no more than 0.10% expansion at 12 months.

The Department may grant provisional acceptance if the expansion does not exceed 0.05% at 6 months.

Based on the monthly results, retest ASTM C1012 when:

1. The Al_2O_3 content increases by 1.0% or greater than that measured during qualification of the sulfate resistance.

2. The sulfate sulfur (SO_3) content decreases by 0.25% less than that measured during qualification of the sulfate resistance.

3. The Blaine fineness increases by 50 m^2/kg greater than that measured during qualification of the sulfate resistance.

The Department may grant provisional acceptance of the slag cement source if ASTM C1012 data is required for any of the above retesting conditions.