



Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

September 7, 2022

Khoa Nguyen
Director, Office of Technical Services
Federal Highway Administration
3500 Financial Plaza, Suite 400
Tallahassee, Florida 32312

Re: State Specifications Office
Section: **929**
Proposed Specification: **9290402 Supplementary Cementitious Materials.**

Dear Mr. Nguyen:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Thomas Frank from the State Materials Office to remove the Moderate Heat (MH) designation, for consistency with AASHTO M 85 in the Standard Specification. This revision includes additional minor editorial changes.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via email to daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at 850-414-4130.

Sincerely,

Signature on file

Daniel Strickland, P.E.
State Specifications Engineer

DS/dh

Attachment

cc: Florida Transportation Builders' Assoc.
State Construction Engineer

SUPPLEMENTARY CEMENTITIOUS MATERIALS.
(REV 6-23-22)

SUBARTICLE 929-4.2 is deleted and the following substituted:

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, SiO₂, Al₂O₃, MgO, Mn₂O₃, TiO₂, Fe₂O₃, and sulfur (as sulfide).
2. For slag cement, provide XRF elemental analysis, presented in oxide form. Include CaO, SiO₂, Al₂O₃, MgO, Mn₂O₃, TiO₂, Fe₂O₃, sulfur as sulfide (S), sulfate sulfur (SO₃), and total sulfur as sulfate (SO₃).
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 CaCO₃ 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. SO₃ content.
 - d. Method used to determine the amount of calcium sulfate that was added.

929-4.2.1 Assessment of Sulfate Resistance: Following guidance in ACI-233R-17 Guide to the Use of Slag Cement in Concrete and Mortar, slag cements with Al₂O₃ contents greater than 11% should be interground with calcium sulfate to avoid an undersulfated cementitious system. 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 any of the following conditions occur:

1. The Al₂O₃ content of the slag cement is equal to or greater than 12%.
2. The slag cement is a blend of slag granules from more than one source that are interground during production of the slag cement and for which one or more of the following are true:
 - a. The Al₂O₃ contents of both slag sources are equal to or greater than 12%.
 - b. The average Al₂O₃ content of the blend is equal to or greater than 12%.
 - c. One of the slag sources has an Al₂O₃ content that is equal to or greater than 14%.

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.

For any slag cements with Al_2O_3 content equal to or greater than 12%, perform a retest of ASTM C1012 if the monthly test report indicates that any of the following conditions have occurred:

1. The Al_2O_3 content increases by greater than or equal to 1.0% of the content 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.

SUPPLEMENTARY CEMENTITIOUS MATERIALS.**(REV 6-23-22)**

SUBARTICLE 929-4.2 is deleted and the following substituted:

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, SiO₂, Al₂O₃, MgO, Mn₂O₃, TiO₂, Fe₂O₃, and sulfur (as sulfide).
2. For slag cement, provide XRF elemental analysis, presented in oxide form. Include CaO, SiO₂, Al₂O₃, MgO, Mn₂O₃, TiO₂, Fe₂O₃, sulfur as sulfide (S), sulfate sulfur (SO₃), and total sulfur as sulfate (SO₃).
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 CaCO₃ 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. SO₃ content.
 - d. Method used to determine the amount of calcium sulfate that was added.

929-4.2.1 Assessment of Sulfate Resistance: Following guidance in ACI 233R-17 Guide to the Use of Slag Cement in Concrete and Mortar, slag cements with Al₂O₃ contents greater than 11% should be interground with calcium sulfate to avoid an undersulfated cementitious system. Provide ASTM C1012 data with a 50:50 portland cement-slag cement blend, using a Type II portland cement on the Department's Production Facility Listing, with an alkali content of no more than 0.6%, when any of the following conditions occur:

1. The Al₂O₃ content of the slag cement is equal to or greater than 12%.
2. The slag cement is a blend of slag granules from more than one source that are interground during production of the slag cement and for which one or more of the following are true:
 - a. The Al₂O₃ contents of both slag sources are equal to or greater than 12%.
 - b. The average Al₂O₃ content of the blend is equal to or greater than 12%.
 - c. One of the slag sources has an Al₂O₃ content that is equal to or greater than 14%.

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.

For any slag cements with Al_2O_3 content equal to or greater than 12%, perform a retest of ASTM C1012 if the monthly test report indicates that any of the following conditions have occurred:

1. The Al_2O_3 content increases by greater than or equal to 1.0% of the content 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.