Florida Department of Transportation

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605 Suwannee Street
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JIM BOXOLD
SECRETARY

July 7, 2015

Khoa Nguyen
Director, Office of Technical Services
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: State Specifications Office
Section **921**
Proposed Specification: **9290000 Pozzolans and Slag.**

Dear Mr. Nguyen:

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

The changes are proposed by Donnie Bagwell of the State Materials Office (SMO) to update the language for consistency with current industry practice.

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

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

Sincerely,

Signature on file

Daniel Scheer, P.E.
State Specifications Engineer

DS/dt
Attachment
cc: Florida Transportation Builders' Assoc.
State Construction Engineer

POZZOLANS AND SLAG.
(REV 5-57-7-15)

SECTION 929 is deleted and the following substituted:

SECTION 929
POZZOLANS AND SLAG

929-1 Basis for Source Approval.

929-1.1 General: The cementitious materials supplier shall submit the proposed Quality Control (QC) Plan, certified test reports from an approved independently approved laboratory acceptable to the State Materials Office, and a sample of the material for Department verification. The Quality Control Program of a cementitious materials supplier shall conform to Section 105. Continuance of Department qualifications is subject to satisfactory results from periodic verification evaluations. A verification sample may be taken at the manufacturer's plant, distribution facility or at the concrete producer's plant.

Upon review of the QC Plan and satisfactory verification of the test results, the plant will be placed on the Department's list of Cementitious Materials Sources with accepted Quality Control Programs. The cementitious materials supplier shall utilize a QC Plan accepted by the State Materials Office. The Department reserves the right to withdraw QC Plan acceptance and to require cementitious material shipments to be individually tested prior to incorporation into Department work. QC Plans may be suspended when the performance of cementitious material is in question, including problems with concrete quality, inconsistent QC data, or failure of QC or verification test results.

Repulpable bags may be accepted by the Engineer, provided a successful demonstration by the producer has indicated complete degradation of the repulpable bags during the mixing operation and before the mix is discharged.

929-1.2 Approved Laboratory: The cementitious materials supplier's testing A laboratory must maintainthat is currently inspected by the Cement and Concrete Reference Laboratory (CCRL) accreditation, be currently inspected by the CCRL, beis actively participating in the CCRL proficiency program and haves corrected all deficiencies noted at the time of inspection corrected. The laboratory must authorize the CCRL to send a copy of the final inspection report and proficiency sample results to the State Materials Office.

929-2 Fly Ash.

929-2.1 General: Sampling and testing of fly ash shall follow the requirements of ASTM C311. Fly ash shall not include the residue resulting from the burning of municipal garbage or any other refuse with coal, or the burning of industrial or municipal garbage in incinerators.

929-2.2 Fly Ash (Class F): Fly ash derived from the combustion of ground or powdered coal shall meet the requirements of ASTM C618 Class F fly ash.

929-2.2.1 Petroleum Coke Class F: Fly ash resulting from the combustion of coal and petroleum coke shall meet the physical and chemical requirements of ASTM C618 Class F fly ash. When petroleum coke Class F fly ash is used in concrete, the test results shall verify improved or comparable strength, sulfate resistance, corrosion protective properties and other durability requirements of concrete, as compared to ASTM C618 Class F fly ash concrete.

The strength and durability tests of concrete shall be performed in accordance with ASTM C39, ASTM C157, ~~ASTM~~FM C1012, ~~ASTM C1202, ASTM G109,~~ FM 5-516 and FM 5-5~~22~~78.

929-2.2.2 Bark Ash Class F: Fly ash resulting from the combustion of timber bark ash and coal shall meet the physical and chemical requirements of ASTM C618 Class F fly ash. When bark ash is used in concrete, test results shall verify~~the strength and durability of the bark ash concrete shall be~~ improved or comparable ~~to the~~ strength, sulfate resistance, corrosion protective properties, and ~~the~~ other durability ~~properties~~ requirements of concrete, as compared to ASTM C618 Class F fly ash concrete. The tests shall be performed as specified in 929-2.2.1.

929-2.3 Fly Ash (Class C): Fly ash derived from the combustion of ground or powdered coal shall meet the requirements of ASTM C618 Class C fly ash. When Class C fly ash is used in concrete, the test results shall verify improved or comparable strength, sulfate resistance, ~~and improved or comparable~~ corrosion protective properties, and other durability requirements of concrete, as compared to ASTM C618 Class F fly ash concrete. The durability tests of concrete shall be performed ~~in accordance with FM 3-C-1012~~as specified in 929-2.2.1.

929-2.4 Exceptions: Fly ash shall not be used in conjunction with Type IP or Type IS cements.

929-2.5 Acceptance Testing of Fly Ash: Acceptance of fly ash from sources operating under an approved QC Plan shall be based on the monthly certified test report meeting the chemical and physical requirements of ASTM C618. When the loss on ignition exceeds 5%, the Supplementary Optional Physical Requirements shall be mandatory except that the Effectiveness in Controlling Alkali-Silica Reaction will not be required. An approved laboratory shall perform the monthly QC tests and a copy of their certified test reports shall be sent to the State Materials Office when the material is in use on Department projects. The certification shall indicate that the fly ash meets the requirements of this Specification. Also, the corresponding samples along with certified test reports shall be submitted to the Department, upon request.

929-3 Silica Fume.

929-3.1 General: Silica Fume shall meet the requirements of ASTM C1240 using the referenced test methods and frequencies.

929-3.2 Acceptance Testing of Silica Fume: Acceptance of silica fume from sources operating under an approved QC Plan shall be based on certification that the material meets the requirements of ASTM C1240 and this Specification.

929-4 Metakaolin.

929-4.1General: Metakaolin shall meet the requirements of ASTM C618 Class N with the following modifications:

1. The sum of $SiO_2 + Al_2O_3 + Fe_2O_3$ shall be at least 85%. ~~The material safety data sheet (MSDS) shall indicate that the amount of crystalline silica, as measured by National Institute of Occupation Safety and Health (NIOSH) 7500 method, after removal of the mica interference, is less than 1.0%.~~
2. The loss on ignition shall be less than 3.0%.
3. The available alkalies, as equivalent Na_2O, shall not exceed 1.0%.
4. The amount of material retained on a No. 325 mesh sieve shall not exceed 1.0%.
5. The strength activity Index, at 7 days, shall be at least 85%.
6. When metakaolin is used in concrete, the test results shall verify improved or comparable strength, sulfate resistance, corrosion protective properties and other durability

performance properties of concrete, as compared to the performance of silica fume concrete. The comparison strength and durability tests shall be performed in accordance with ASTM C39, ASTM C157, ~~ASTM~~FM C1012, ~~ASTM C1202, ASTM G109,~~ FM 5-516 and FM 5-5~~22~~78, by an ~~approved~~ independent~~ly~~ approved testing laboratory. Sampling and testing of metakaolin shall follow the requirements of ASTM C311.

929-4.2 Acceptance Testing of Metakaolin: Acceptance of metakaolin from sources operating under an approved QC Plan shall be based on the monthly certified test report meeting the chemical and physical requirements of ASTM C618 Class N, as modified herein. An approved laboratory shall perform the monthly QC tests and a copy of their certified test reports shall be sent to the State Materials Office, when the material is in use on Department projects. Also, the corresponding samples along with certified test reports shall be submitted to the Department, upon request. The certification shall indicate that the metakaolin meets the requirements of this Specification.

929-5 Slag.

929-5.1 General: Slag shall meet the requirements of ASTM C989. Sampling and testing procedures shall follow the requirements of ASTM C989.

929-5.2 Special Requirements: Only ground granulated blast-furnace slag Grade 100 and 120 will be permitted.

929-5.3 Exceptions: Slag shall not be used in conjunction with Type IP or Type IS cements.

929-5.4 Acceptance Testing: Acceptance of slag from sources operating under an approved QC Plan shall be based on the monthly certified QC tests meeting the chemical and physical requirements of ASTM C989. An approved laboratory shall perform the monthly QC tests and a copy of their mill certificates shall be sent to the State Materials Office when the material is in use on Department projects. Reference cement used for determination of slag activity shall meet the requirements of ASTM C989. The certification shall indicate that the slag meets the requirements of this Specification. Also, the corresponding samples along with mill certificates shall be submitted to the Department, upon request.

929-6 Ultra Fine Fly Ash.

929-6.1 General: Sampling and testing of the ultra fine fly ash shall follow the requirements of ASTM C311. Ultra fine fly ash derived from the combustion of ground or powdered coal shall meet the requirements of ASTM C618 as a Class F fly ash with the following modifications:

1. The pozzolanic activity index, at 7 days, shall be at least 85% of the control and the pozzolanic activity index, at 28 days, shall be at least 95% of the control.
2. Particles less than 3.25 microns shall be at least 50% of the particle size distribution, as measured by laser particle size analyzer. Particles less than 8.50 microns shall be at least 90% of the particle size distribution, as measured by laser particle size analyzer.
3. The amount of material retained when wet-sieved on a 45-µm sieve shall be less than 6.0%.
4. The moisture content shall be less than 1.0%.
5. The loss on ignition shall be less than 2.0%.

929-6.2 Exceptions: Ultra fine fly ash shall not be used in conjunction with Type IP or Type IS cements.

929-6.3 Acceptance Testing of Ultra Fine Fly Ash: Acceptance of fly ash from sources operating under an approved QC Plan shall be based on the monthly certified test report meeting the chemical and physical requirements of ASTM C618. When the loss on ignition exceeds 2.0%, the Uniformity Requirements in the Supplementary Optional Physical Requirements shall be mandatory. An approved laboratory shall perform the monthly QC tests and a copy of their certified test reports shall be sent to the State Materials Office when the material is in use on Department projects. The certification shall indicate that the fly ash meets the requirements of this Specification. Also, the corresponding samples along with certified test reports shall be submitted to the Department, upon request.

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Repulpable bags may be accepted by the Engineer, provided a successful demonstration by the producer has indicated complete degradation of the repulpable bags during the mixing operation and before the mix is discharged.

929-1.2 Approved Laboratory: A laboratory that is currently inspected by the Cement and Concrete Reference Laboratory (CCRL), is actively participating in the CCRL proficiency program and has corrected all deficiencies noted at the time of inspection. The laboratory must authorize the CCRL to send a copy of the final inspection report and proficiency sample results to the State Materials Office.

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The strength and durability tests of concrete shall be performed in accordance with ASTM C39, ASTM C157,FM C1012, FM 5-516 and FM 5-578.

929-2.2.2 Bark Ash Class F: Fly ash resulting from the combustion of timber bark ash and coal shall meet the physical and chemical requirements of ASTM C618 Class F fly ash. When bark ash is used in concrete, test results shall verify improved or comparable strength, sulfate resistance, corrosion protective properties, and other durability requirements of concrete, as compared to ASTM C618 Class F fly ash concrete. The tests shall be performed as specified in 929-2.2.1.

929-2.3 Fly Ash (Class C): Fly ash derived from the combustion of ground or powdered coal shall meet the requirements of ASTM C618 Class C fly ash. When Class C fly ash is used in concrete, the test results shall verify improved or comparable strength, sulfate resistance, corrosion protective properties, and other durability requirements of concrete, as compared to ASTM C618 Class F fly ash concrete. The durability tests of concrete shall be performed as specified in 929-2.2.1.

929-2.4 Exceptions: Fly ash shall not be used in conjunction with Type IP or Type IS cements.

929-2.5 Acceptance Testing of Fly Ash: Acceptance of fly ash from sources operating under an approved QC Plan shall be based on the monthly certified test report meeting the chemical and physical requirements of ASTM C618. When the loss on ignition exceeds 5%, the Supplementary Optional Physical Requirements shall be mandatory except that the Effectiveness in Controlling Alkali-Silica Reaction will not be required. An approved laboratory shall perform the monthly QC tests and a copy of their certified test reports shall be sent to the State Materials Office when the material is in use on Department projects. The certification shall indicate that the fly ash meets the requirements of this Specification. Also, the corresponding samples along with certified test reports shall be submitted to the Department, upon request.

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2. The loss on ignition shall be less than 3.0%.
3. The available alkalies, as equivalent Na_2O, shall not exceed 1.0%.
4. The amount of material retained on a No. 325 mesh sieve shall not exceed 1.0%.
5. The strength activity Index, at 7 days, shall be at least 85%.
6. When metakaolin is used in concrete, the test results shall verify improved or comparable strength, sulfate resistance, corrosion protective properties and other durability performance properties of concrete, as compared to the performance of silica fume concrete. The comparison strength and durability tests shall be performed in accordance with ASTM C39,

ASTM C157,FM C1012, FM 5-516 and FM 5-578, by an independently approved testing laboratory. Sampling and testing of metakaolin shall follow the requirements of ASTM C311.

929-4.2 Acceptance Testing of Metakaolin: Acceptance of metakaolin from sources operating under an approved QC Plan shall be based on the monthly certified test report meeting the chemical and physical requirements of ASTM C618 Class N, as modified herein. An approved laboratory shall perform the monthly QC tests and a copy of their certified test reports shall be sent to the State Materials Office, when the material is in use on Department projects. Also, the corresponding samples along with certified test reports shall be submitted to the Department, upon request. The certification shall indicate that the metakaolin meets the requirements of this Specification.

929-5 Slag.

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929-5.2 Special Requirements: Only ground granulated blast-furnace slag Grade 100 and 120 will be permitted.

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3. The amount of material retained when wet-sieved on a 45-µm sieve shall be less than 6.0%.
4. The moisture content shall be less than 1.0%.
5. The loss on ignition shall be less than 2.0%.

929-6.2 Exceptions: Ultra fine fly ash shall not be used in conjunction with Type IP or Type IS cements.

929-6.3 Acceptance Testing of Ultra Fine Fly Ash: Acceptance of fly ash from sources operating under an approved QC Plan shall be based on the monthly certified test report meeting the chemical and physical requirements of ASTM C618. When the loss on ignition exceeds 2.0%, the Uniformity Requirements in the Supplementary Optional Physical Requirements shall

be mandatory. An approved laboratory shall perform the monthly QC tests and a copy of their certified test reports shall be sent to the State Materials Office when the material is in use on Department projects. The certification shall indicate that the fly ash meets the requirements of this Specification. Also, the corresponding samples along with certified test reports shall be submitted to the Department, upon request.