Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD, P.E.
SECRETARY

June 21, 2011

Monica Gourdine
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section **938**
Proposed Specification: **9380402 Post-Tensioning Grout.**

Dear Ms. Gourdine:

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

These changes were proposed by Susan Blazo of the State Materials Office to modify the limit and test method for chloride for post-tensioning grout. The current requirement for total chloride ions is expressed in percentage of the weight of the cementitious materials as determined by ASTM C 1152. The correct value should be in pounds per cubic yard of grout as determined by FM 5-516, which is consistent with other specifications that limit chlorides.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965RP or rudy.powell@dot.state.fl.us.

If you have any questions relating to this specification change, please call Rudy Powell, State Specifications Engineer at 414-4280.

Sincerely,

Signature on file

Rudy Powell, Jr., P.E.
State Specifications Engineer

RP/dt
Attachment
cc: Gregory Jones, Chief Civil Litigation
Florida Transportation Builders' Assoc.
State Construction Engineer

POST-TENSIONING GROUT.
(REV 4-28-11)

SUBARTICLE 938-4.2 (of the Supplemental Specifications) is deleted and the following substituted:

938-4.2 Laboratory Test: The grout shall meet or exceed the specified physical properties stated herein as determined by the following standard and modified ASTM *and FM* test methods conducted at normal laboratory temperature (65-78°F) and conditions. Conduct all grout tests with grout mixed to produce the minimum time of efflux. Establish the water content to produce the minimum and maximum time of efflux.

Property	Test Value	Test Method
Total Chloride Ions	Max. ~~0.08% by weight of cementitious material~~*0.4 lbs/yd^3*	~~ASTM C 1152~~*FM 5-516*
Fine Aggregate (if utilized)	99% passing the No. 50 Sieve (300 micron)	ASTM- C- 136*
Hardened Height Change @ 24 hours and 28- days	0.0% to + 0.2%	ASTM- C- 1090**
Expansion	≤ 2.0% for up to 3- hours	ASTM- C- 940
Wet Density - Laboratory	Report maximum and minimum obtained test value lb/ft^3	ASTM- C- 185
Wet Density - Field	Report maximum and minimum obtained test value lb/ft^3	ASTM- C- 138
Compressive Strength 28- day (Average of 3- cubes)	≥7,000-psi	ASTM- C- 942
Initial Set of Grout	Min. 3- hours Max. 12- hours	ASTM- C- 953
Time of Efflux***	***	***
(a) Immediately after mixing	Min. 20- Sec. Max. 30- Sec.	ASTM- C- 939
	or Min. 9- Sec. Max. 20- Sec.	ASTM- C- 939****
(b) 30- minutes after mixing with remixing for 30- sec	Max. 30- Sec.	ASTM- C- 939
	or Max. 30- Sec.	ASTM- C- 939****
Bleeding @ 3- hours	Max. 0.0- percent	ASTM- C- 940*****

Property	Test Value	Test Method
Permeability @ 28- days	Max. 2,500- coulombs at 30- V for 6- hours	ASTM- C- 1202

**Use ASTM C 117 procedure modified to use a #50- sieve. Determine the percent passing the #50 sieve after washing the sieve.*
***Modify ASTM C 1090 to include verification at both 24 hours and 28 days.*
****Adjustments to flow rates will be achieved by strict compliance with the manufacturer's recommendations. The time of efflux is the time to fill a one liter container placed directly under the flow cone.*
*****Modify the ASTM C 939 test by filling the cone to the top instead of to the standard level.*
******Modify ASTM C 940 to conform with the wick induced bleed test as follows:*
(a) Use a wick made of a 20 inch length of ASTM A 416 seven wire 0.5 inch diameter strand. Wrap the strand with 2 inch wide duct or electrical tape at each end prior to cutting to avoid splaying of the wires when it is cut. Degrease (with acetone or hexane solvent) and wire brush to remove any surface rust on the strand before temperature conditioning.
(b) Condition the dry ingredients, mixing water, prestressing strand and test apparatus overnight at 65 to 75°F.
(c) Mix the conditioned dry ingredients with the conditioned mixing water and place 800 ml of the resulting grout into the 1,000 ml graduate cylinder. Measure and record the level of the top of the grout.
(d) Completely insert the strand into the graduated cylinder. Center and fasten the strand so it remains essentially parallel to the vertical axis of the cylinder. Measure and record the level of the top of the grout.
(e) Store the mixed grout at the temperature range listed above in- (b).
(f) Measure the level of the bleed water every 15 minutes for the first hour and hourly for two successive readings thereafter.
(g) Calculate the bleed water, if any, at the end of the ~~three~~ 3 hour test period and the resulting expansion per the procedures outlined in ASTM C940, with the quantity of bleed water expressed as a percent of the initial grout volume. Note if the bleed water remains above or below the top of the original grout height. Note if any bleed water is absorbed into the specimen during the test.

~~*Use ASTM C 117 procedure modified to use a #50 sieve. Determine the percent passing the #50 sieve after washing the sieve.~~
~~**Modify ASTM C 1090 to include verification at both 24 hours and 28 days.~~
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~~(b) Condition the dry ingredients, mixing water, prestressing strand and test apparatus overnight at 65 to 75°F.~~
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~~(e) Store the mixed grout at the temperature range listed above in (b).~~

~~(f) Measure the level of the bleed water every 15 minutes for the first hour and hourly for two successive readings thereafter.~~

~~(g) Calculate the bleed water, if any, at the end of the three hour test period and the resulting expansion per the procedures outlined in ASTM C940, with the quantity of bleed water expressed as a percent of the initial grout volume. Note if the bleed water remains above or below the top of the original grout height. Note if any bleed water is absorbed into the specimen during the test.~~

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Bleeding @ 3 hours	Max. 0.0 percent	ASTM C 940*****
Permeability @ 28 days	Max. 2,500 coulombs at 30 V for 6 hours	ASTM C 1202

*Use ASTM C 117 procedure modified to use a #50 sieve. Determine the percent passing the #50 sieve after

Property	Test Value	Test Method
washing the sieve. **Modify ASTM C 1090 to include verification at both 24 hours and 28 days. ***Adjustments to flow rates will be achieved by strict compliance with the manufacturer's recommendations. The time of efflux is the time to fill a one liter container placed directly under the flow cone. ****Modify the ASTM C 939 test by filling the cone to the top instead of to the standard level. *****Modify ASTM C 940 to conform with the wick induced bleed test as follows: (a) Use a wick made of a 20 inch length of ASTM A 416 seven wire 0.5 inch diameter strand. Wrap the strand with 2 inch wide duct or electrical tape at each end prior to cutting to avoid splaying of the wires when it is cut. Degrease (with acetone or hexane solvent) and wire brush to remove any surface rust on the strand before temperature conditioning. (b) Condition the dry ingredients, mixing water, prestressing strand and test apparatus overnight at 65 to 75°F. (c) Mix the conditioned dry ingredients with the conditioned mixing water and place 800 ml of the resulting grout into the 1,000 ml graduate cylinder. Measure and record the level of the top of the grout. (d) Completely insert the strand into the graduated cylinder. Center and fasten the strand so it remains essentially parallel to the vertical axis of the cylinder. Measure and record the level of the top of the grout. (e) Store the mixed grout at the temperature range listed above in (b). (f) Measure the level of the bleed water every 15 minutes for the first hour and hourly for two successive readings thereafter. (g) Calculate the bleed water, if any, at the end of the 3 hour test period and the resulting expansion per the procedures outlined in ASTM C940, with the quantity of bleed water expressed as a percent of the initial grout volume. Note if the bleed water remains above or below the top of the original grout height. Note if any bleed water is absorbed into the specimen during the test.		