

ORINATION FORM

THE INFORMATION BELOW IS TO BE PROVIDED BY THE ORIGINATOR

Specification: 938
Subject: Post-Tensioning Grout
Origination date: April 21, 2011
Originator: Bouzid Choubane
Office/Phone: State Materials Office/(352) 955-6620

Problem statement: The current requirement for total chloride ions is expressed in percentage of the weight of the cementitious materials determined by ASTM C 1152. The correct expression should be in pounds per cubic yard of grout as determined by FM 5-516 which is in line with other specifications that limit chlorides such as Section 346. In this expression, the current chloride requirements for post-tensioning grout far exceeds the amount the Department has determined should be required to ensure the seventy-five year life service of elements using this material. *All grouts currently listed on the QPL meet these chloride limits.*

Proposed solution: The table in 938-4.2 has been revised to reflect the correct limit and test method.

Information source: For additional information, contact Mario Paredes, State Materials Office at (352) 955-6690 or Mike Bergin, State Materials Office at (352)955-6666.

Recommended Usage Note: All contracts

Estimated fiscal impact, if implemented: *No fiscal impact is anticipated because all grouts currently listed on the QPL meet these chloride limits.* ~~Due to the nature of the wording of the current language, this is allowing eight times more chlorides than is permitted for any other cementitious material. If the chloride content is not revised to reflect the same requirements as all other materials, it will affect the service life of elements where these post-tensioning grouts are used resulting in less service life and greater maintenance and replacement costs for the Department.~~

Implementation of these changes, if and when approved, will begin with the January 2012 letting.



Florida Department of Transportation

RICK SCOTT
GOVERNOR

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ANANTH PRASAD, P.E.
SECRETARY

MEMORANDUM

DATE: May 16, 2011
TO: Specification Review Distribution List
FROM: Rudy Powell, Jr., P.E., State Specifications Engineer
SUBJECT: Proposed Specification: **9380402 Post-Tensioning Grout.**

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

This change was proposed by Susan Blazo of the State Materials Office to modify the limit and test method for chloride for post-tensioning grout. Grouts on the QPL currently meet this requirement.

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 to my attention via e-mail at SP965RP or rudy.powell@dot.state.fl.us. Comments received after **June 14, 2011**, may not be considered. Your input is encouraged.

RP/dt
Attachment

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*****
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.*

Property	Test Value	Test Method
<p><i>***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.</i></p> <p><i>***Modify the ASTM C 939 test by filling the cone to the top instead of to the standard level.</i></p> <p><i>****Modify ASTM C 940 to conform with the wick induced bleed test as follows:</i></p> <p><i>(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.</i></p> <p><i>(b) Condition the dry ingredients, mixing water, prestressing strand and test apparatus overnight at 65 to 75°F.</i></p> <p><i>(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.</i></p> <p><i>(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.</i></p> <p><i>(e) Store the mixed grout at the temperature range listed above in (b).</i></p> <p><i>(f) Measure the level of the bleed water every 15 minutes for the first hour and hourly for two successive readings thereafter.</i></p> <p><i>(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.</i></p>		

~~*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 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.~~