

SPECIFICATION DEVELOPMENT PROCESS

THE INFORMATION BELOW IS TO BE PROVIDED BY THE ORIGINATOR

Modify Specification _____932_____.
Section/File number

New Section _____.
Section number

Subject: Low Modulus Silicone Sealant

Origination date: December 15, 2005

Originator: Karen Byram

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Userid:

Problem statement: The silicone sealants currently listed on the QPL are not suitable as an expansion joint. There is a miscellaneous category on the QPL for the expansion joints but no spec.

Information source: Karen Byram; Product Evaluation Administrator
Charles Boyd

Background data: Charles Boyd has created a drawing for the usage and requirements of silicone sealants for expansion joints. This change will support DI No. 21110. A survey was conducted with the Districts to identify the types of materials that work well. In addition, the Texas DOT has been using this material also and has written specs to cover them. This information was used to develop these changes.

**Desired
Implementation**

date: Beginning with the January 2007 letting.



Florida Department of Transportation

JEB BUSH
GOVERNOR

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DENVER J. STUTLER, JR.
SECRETARY

MEMORANDUM

DATE: February 6, 2006
TO: Specification Review Distribution List
FROM: Duane F. Brautigam, P.E., State Specifications Engineer

SUBJECT: Proposed Specification: 9320103 - Nonmetallic Accessory Materials For Concrete Pavement and Concrete Structures.

Attached for your review and comments is a copy of the subject Special Provision for Nonmetallic Accessory Materials For Concrete Pavement and Concrete Structures.

This change was proposed by Karen Byram to meet the usage and requirements of silicone sealants for expansion joints. This change will support DI No. 21110.

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 SP965DB or duane.brautigam@dot.state.fl.us. Comments received after March 6, 2006 may not be considered. Your input is encouraged.

DFB/jho

Attachment

COMMENTS:

Submitted by:

Phone #:

NONMETALLIC ACCESSORY MATERIALS FOR CONCRETE PAVEMENT AND CONCRETE STRUCTURES.

(REV ~~1-13-06~~-26-06)

Subarticle 932-1.3 thru 932-1.5 (Pages 831-834) is deleted and the following substituted:

932-1.3 Low Modulus Silicone Sealant *Materials:*

932-1.3.1 ~~General~~ *Low Modulus Silicone Sealants: Low Modulus*

Silicone sealant shall be furnished in a one part ~~silicone or pre-measured two part~~ formulation meeting the requirements specified herein. Manufacturers or distributors seeking approval of Low Modulus Silicone Sealants *Types A, B and C* shall demonstrate the performance of their products in accordance with FM 5-533.

Acetic acid cure sealants are not acceptable. A primer as specified in 932-1.4 for bonding sealant to concrete shall be used if required by the manufacturer. When a manufacturer's product is tested and approved by the Department using a primer, primer will be required for project installation.

~~Low modulus silicone sealants may be either a non self leveling or a self leveling type, unless specified otherwise in the plans or Specifications. Do not use Low Modulus Silicone Sealants Types A, B or C for bridge expansion joints.~~

Silicones shall be identified in the following manner:

Type A - A low modulus, non-sag (non-self-leveling) silicone formulation, used in sealing horizontal and vertical joints in cement concrete pavements and bridges (i.e., concrete-concrete joints). Tooling is required.

Type B - A very low modulus, self-leveling silicone formulation, used in sealing horizontal joints (including joints on moderate slopes) in cement concrete pavements and bridges (i.e., concrete-concrete joints). Tooling is not normally required.

Type C - An ultra-low modulus, self-leveling silicone formulation, used in sealing horizontal joints (including joints on moderate slopes) in cement concrete pavements and bridges (i.e., concrete-concrete joints). It can also be used to seal the joints between cement concrete pavements and asphalt concrete shoulders (including asphalt-asphalt joints). Tooling is not normally required.

Type D - An ultra-low modulus, self-leveling silicone formulation, cold-applied, rapid-cure, used to seal expansion joints that experience both thermal and/or vertical movements. The material must cure by chemical reaction and not be evaporation of solvent or fluxing of harder particles. Tooling shall not be required. Use according to Design Index number 21110.

932-1.3.2 Physical Requirements:

SILICONE SEALANT TYPE	<i>Test Method</i>	Type A	Type B	Type C	<i>Type D</i>
Flow (maximum)	<i>MIL S 8802</i>	0.3 inches [7.6 mm]			
Extrusion rate	<i>MIL S 8802</i>	1.25-4.2 g/s	1.7-11.0 g/s	4.58-9.2 g/s	<i>3.3 – 9.2 g/s</i>

SILICONE SEALANT TYPE	<i>Test Method</i>	Type A	Type B	Type C	<i>Type D</i>
Tack-free time at 77 ± 3°F [25 ± 1.5°C] and 45 to 55% Relative Humidity	<i>MIL S 8802</i>	20-75 minutes	120 minutes, maximum	60 minutes, maximum	<i>30 - 60 minutes</i>
Specific gravity	<i>ASTM D 792, Method A</i>	1.1 to 1.515	1.10 to 1.40	1.26 to 1.34	<i>1.26 to 1.34</i>
Durometer hardness, Shore A (Cured seven days at 77 ± 3°F [25 ± 1.5°C] and 50 ± 5% Relative Humidity)	<i>ASTM D 2240</i>	10-25			
Durometer hardness, Shore 00 (Cured 21 days at 77 ± 3°F [25 ± 1.5°C] and 50 ± 5% Relative Humidity)	<i>ASTM D 2240</i>		40-80	20-80	
Tensile stress (maximum) at 150% elongation	<i>ASTM D 412 (Die C)</i>	45 psi [300 kPa],	40 psi [275 kPa],	15 psi [100 kPa],	
Elongation (Cured seven days at 77 ± 3°F [25 ± 1.5°C] and 50 ± 5% Relative Humidity)	<i>ASTM D 412 (Die C)</i>	800% minimum			<i>600% Minimum</i>
Elongation (Cured 21 days at 77 ± 3°F [25 ± 1.5°C] and 50 ± 5% Relative Humidity)	<i>ASTM D 412 (Die C)</i>		800% minimum	1400% minimum	
Ozone and Ultraviolet Resistance	<i>ASTM C 793</i>	No chalking, cracking or bond loss after 5,000 hours, minimum.			
Bond to concrete mortar briquets (primed if required) (Cured	<i>AASHTO T 132</i>	50 psi [350 kPa] minimum			

SILICONE SEALANT TYPE	<i>Test Method</i>	Type A	Type B	Type C	<i>Type D</i>
seven days at 77 ± 3°F [25 ± 1.5°C] and 50 ± 5% Relative Humidity)					
Bond to concrete briquets (Cured 21 days at 77 ± 3°F [25 ± 1.5°C] and 50 ± 5% Relative Humidity)	<i>AASHTO T 132</i>		40 psi [275 kPa], minimum	35 psi [240 kPa], minimum (includes bond to asphalt)	
Movement Capability	<i>ASTM C 719</i>	No adhesive or cohesive failure and adhesion, 10 cycles at -50 to +100%			<i>No adhesive or cohesive failure and adhesion, 10 cycles at +100/-50 % (joints 2" wide)</i>

932-1.3.3 Methods of Test:

Flow	MIL S 8802
Extrusion Rate.....	MIL S 8802
Tack-Free Time.....	MIL S 8802
Specific Gravity	ASTM D 792, Method A
Durometer Hardness	ASTM D 2240
Tensile Stress	ASTM D 412 (Die C)
Elongation.....	ASTM D 412 (Die C)
Ozone and Ultraviolet.....	ASTM C 793
Movement capability and adhesion	ASTM C 719

~~Bond to mortar briquets:~~

~~—————Portland Cement Mortar: Briquets shall be molded and cured 28 days minimum in accordance with AASHTO T 132. Cured briquets shall be dried at 230 ± 5°F [110 ± 2.5°C], sawed in half and bonded together with a thin section of sealant. After cure of sealant, briquets will be tested in accordance with AASHTO T 132.~~

932-1.3.43 Field Cure: 6 inch [150 mm] samples of the sealant shall be taken by the Engineer from the joint at the end of a two week curing period and tested for durometer hardness (by Florida Method ANSI/ASTM D 2240), except that the requirements of a 1 inch [25 mm] sample width shall not apply. A minimum hardness of 7.0 is required as evidence of adequate cure.

~~**932-1.3.5 Tolerance:** A tolerance in cross-sectional height at midpoint of -1/16 to +3/16 inch [-1.6 to +4.8 mm] will be allowed to the nominal values shown for each joint width on the plan sheet. The Engineer shall check one joint for each 1,000 feet [300 m] of roadway by cutting out specimens. If the cross section of the cut specimen is~~

~~out of the allowable range, additional specimens shall be taken as follows. One joint every 100 feet [30 m] of pavement not to exceed 500 feet [150 m]. If the average of the specimens is out of tolerance, the Contractor shall remove and replace the entire 500 feet [150 m] section at his expense. Installation tolerance shall be verified at 1,000 feet [300 m] intervals.~~

~~**932-1.3.6 Certification:** The Contractor shall provide the Engineer certification conforming to the requirements of Section 6 from the manufacturer, confirming that the low modulus silicone sealant meets the requirements of this Section.~~

~~**932-1.3.7 Qualified Products List:** The low modulus silicone sealant used shall be one of the products listed on the Department's Qualified Products List (QPL). Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6.~~

~~**932-1.3.8 Shipment:** Sealant material shall be delivered in containers plainly marked with the manufacturer's name or trademark, product name, LOT number, and date of expiration.~~

~~**932-1.4 Primer:** When required by the manufacturer's product, a primer shall be used with the Low Modulus Silicone Sealant.~~

The manufacturer shall perform his quality control tests on each LOT of sealant primer material furnished to each project and furnish a certified report that each LOT of primer material furnished to a project meets his Company's Specifications for that product and the primer is suitable for its intended use.

Sealant primer material shall be delivered in containers plainly marked with the manufacturer's name or trademark and product name, LOT number and date of expiration.

932-1.5 Backer Rod and Tape Bond Breakers: *Backer rods and tape shall be compatible with the joint sealant and approved by the sealant manufacturer. No bond or reaction shall occur between the rod and the sealant.*

932-1.6 Installation: *Installation, material selection, joint dimensions, bond breaker suitability (by type and project) and other applicable bond breaker uses shall be in agreement with the requirements of Design Standards, Index Nos. 305 and 21110. Any modifications or exceptions to these requirements shall be shown in the plans.*

For new construction projects or general use where the joints to be sealed have uniform width, a closed cell, expanded polyethylene foam backer rod bond breaker shall be required. For rehabilitation projects and similar joint seals where the joints to be sealed have irregular width, an open cell, expanded polyethylene foam backer rod bond breaker with an impervious skin shall be required.

The backer rod shall be compatible with the joint sealant. No bond or reaction shall occur between the rod and the sealant.

Tape bond breaker approved by the sealant manufacturer may be used in lieu of backer rod bond breaker when sealing joints and/or random cracks, as required.

Type D Silicone sealant shall be placed when the ambient temperature is rising and is between 55°F [12.7°C] and 85°F [29.4°C] and the temperature is expected to rise for the next three hours minimum to provide to adequate joint opening and compression of the sealant during curing.

All installed bond breakers shall be covered by sealant at the end of each work day.

A tolerance in cross-sectional height at midpoint of $-1/16$ to $+3/16$ inch [-1.6 to $+4.8$ mm] will be allowed to the nominal values shown for each joint width on the plan sheet. The Engineer shall check one joint for each 1,000 feet [300 m] of roadway by cutting out specimens. If the cross section of the cut specimen is out of the allowable range, additional specimens shall be taken as follows:-:

One joint every 100 feet [30 m] of pavement not to exceed 500 feet [150 m]. If the average of the specimens is out of tolerance, the Contractor shall remove and replace the entire 500 feet [150 m] section at no additional expense to the Department. Installation tolerance shall be verified at 1,000 feet [300 m] intervals.