SECTION 932
NONMETALLIC ACCESSORY MATERIALS
FOR CONCRETE PAVEMENT AND CONCRETE STRUCTURES

932-1 Joint Materials.

932-1.1 Preformed Joint Filler for Pavement and Structures: Preformed joint filler shall meet the requirements of AASHTO M-153 or AASHTO M-213, or cellulose fiber types meeting all the requirements of AASHTO M-213 (except for the asphalt content) is acceptable provided they contain minimums of 0.2% zinc borate as a preservative and 1.5% waterproofing wax. For AASHTO M-153, unless a particular type is specified, either Type I, Type II or Type III may be used.

Preformed joint fillers shall have a thickness equal to the width of the joint required, and shall be furnished in lengths equal to the widths of the slabs in which they are to be installed, except that strips which are of a length not less than the distance between longitudinal joints, or between longitudinal joint and edge, may be used if laced or clipped together in a manner approved by the Engineer. The depth and shape of the joint filler shall conform to the dimensions shown in the plans. For doweled joints, proper provision shall be made for the installation of the dowels.

932-1.1.1 Certification: The Contractor shall provide the Engineer a certification conforming to the requirements of Section 6 from the manufacturer, confirming that the preformed joint filler meets the requirements of this Section.

932-1.2 Joint Sealer for Pavement and Structures:

932-1.2.1 General: This Specification covers joint sealer intended for use in sealing joints in asphaltic concrete pavement and portland cement concrete pavement. These materials may also be used to seal joints in portland cement concrete bridges and other structures.

932-1.2.2 Material: The joint sealant shall be composed of a mixture of materials, typically but not limited to bituminous based, that will melt when heated for application and then solidify to form a resilient and adhesive compound capable of sealing joints in portland cement concrete and/or asphaltic concrete against the infiltration of moisture and foreign materials throughout normal pavement conditions and at ambient temperatures. The manufacturer shall have the option of formulating the material according to their Specifications. However, the requirements delineated in this Specification shall apply regardless of the type of formulation used. The material shall cure sufficiently to not flow from the joint or be picked up by vehicle tires after 3 hours at 77°F. The material shall be capable of a uniform application consistency suitable for filling joints without the inclusion of large air holes or discontinuities and without damage to the material.

Materials for pavement joints shall be tested according to ASTM D-5329. Manufacturers or distributors seeking approval of their material in accordance with this Specification shall demonstrate the performance of their products in accordance with Florida Test Methods FM 5-532.

932-1.2.2.1 Physical Requirements of Joint Sealants for Portland Cement Concrete Only:

Parameter	Limits

Pour Point	Greater than or equal to 20°F lower than the safe heating temperature as stated by the manufacturer.
Cone-Penetration, Non-immersed at 77°F, 150g, 5s	Greater than or equal to 20°F lower than the safe heating temperature as stated by the manufacturer.
Flow at 40°F, 5 h	Less than or equal to 5.0 mm
Bond, Non-immersed, 0°F for 5 cycles*	No cracking, separation, or opening that at any point is over 1/4 inch deep, in the sealant or between the sealant and the substrate.
*The depth of a crack, separation or opening shall be measured perpendicular to the side of the sealant showing the defect. At least two test samples in a group of three representing a given sample of sealant shall meet this requirement.	

932-1.2.2.2 Physical Requirements of Joint Sealants for Portland Cement Concrete and/or Asphaltic Concrete:

Parameters	Limits
Safe Heating Temperature	Equal to the pouring temperature as identified by the manufacturer
Cone-Penetration, Non-immersed at 77°F, 150g, 5s	Less than or equal to 90 mm
Flow at 40°F, 5 h	Less than or equal to 3.0 mm
Bond, Non-immersed, -20°F for 3 cycles*	No cracking, separation, or opening that at any point is over 1/4 inch deep, in the sealant or between the sealant and the substrate.
Resilience at 77°F	Recovery greater than or equal to 60%
Asphaltic Concrete Compatibility at 140°F	No failure in adhesion, formation of an oily exudates at the interface between the sealant and the asphaltic concrete, or softening or other deleterious effects on the asphaltic concrete or sealant.
*The depth of a crack, separation or opening shall be measured perpendicular to the side of the sealant showing the defect. At least two test samples in a group of three representing a given sample of sealant shall meet this requirement.	

932-1.2.3 Certification: The Contractor shall provide the Engineer a certification from the manufacturer conforming to the requirements of Section 6, confirming that the joint sealer materials meets the requirements of this Section.

932-1.2.4 Qualified Products List: The joint sealant materials 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.

932-1.2.5 Shipment: The material shall be delivered in containers plainly marked with the manufacturer's name or trademark product name, LOT number and date of expiration.

932-1.2.6 Bond Breaker Rod: The bond breaker rod shall be a closed cell, expanded polyethylene foam rod of the size and dimensions shown on the plans. It shall be compatible with the joint sealant and no bond or reaction shall occur between the rod and the sealant.

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

Bond breaker tape approved by the sealant manufacturer may be used in lieu of bond breaker rod when sealing random cracks.

932-1.3 Low Modulus Silicone Sealant Materials:

932-1.3.1 Low Modulus Silicone Sealants: Silicone sealant shall be furnished in a one part 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.

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 by evaporation of solvent or fluxing of harder particles. Tooling shall not be required. Use according to Design Standards, Index number 21110.

932-1.3.2 Physical Requirements:

SILICONE SEALANT TYPE	Test Method	Type A	Type B	Type C	Type D
Flow (maximum)	MIL S 8802	0.3 inches			
Extrusion rate	MIL S 8802	1.25-4.2 g/s	1.7-11.0 g/s	4.58-9.2 g/s	3.3 – 9.2 g/s
Tack-free time at 77 ± 3ºF and 45 to 55% Relative Humidity	MIL S 8802	20-75 minutes	120 minutes, maximum	60 minutes, maximum	30 - 60 minutes
Specific gravity	ASTM D-792,	1.1 to 1.515	1.10 to 1.40	1.26 to 1.34	1.26 to 1.34

SILICONE SEALANT TYPE	Test Method	Type A	Type B	Type C	Type D
	Method A				
Durometer hardness, Shore A (Cured seven days at 77 ± 3ºF and 50 ± 5% Relative Humidity)	ASTM D-2240	10-25			
Durometer hardness, Shore 00 (Cured 21 days at 77 ± 3ºF and 50 ± 5% Relative Humidity)	ASTM D-2240		40-80	20-80	
Tensile stress (maximum) at 150% elongation	ASTM D-412 (Die C)	45 psi	40 psi	15 psi	
Elongation (Cured seven days at 77 ± 3ºF and 50 ± 5% Relative Humidity)	ASTM D-412 (Die C)	800% minimum			600% minimum
Elongation (Cured 21 days at 77 ± 3ºF and 50 ± 5% Relative Humidity)	ASTM D-412 (Die C)		800% minimum	1400% minimum	
Ozone and Ultraviolet Resistance	ASTM C-793	No chalking, cracking or bond loss after 5,000 hours, minimum.			
Bond to concrete mortar briquets (primed if required) (Cured seven days at 77 ± 3ºF and 50 ± 5% Relative Humidity)	AASHTO T-132	50 psi minimum			
Bond to concrete briquets (Cured 21 days at 77 ± 3ºF and 50 ± 5% Relative Humidity)	AASHTO T-132		40 psi minimum	35 psi minimum (includes bond to asphalt)	
Movement Capability	ASTM C-719	No adhesive or cohesive			No adhesive or cohesive

SILICONE SEALANT TYPE	Test Method	Type A	Type B	Type C	Type D
		failure and adhesion, 10 cycles at -50 to +100%			failure and adhesion, 10 cycles at +100/-50 % (joints 2" wide)

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 ± 5ºF, sawed in half and bonded together with a thin section of sealant. After cure of sealant, briquets shall be tested in accordance with AASHTO T-132.

932-1.3.3 Field Cure: 6 inch 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 sample width shall not apply. A minimum hardness of 7.0 is required as evidence of adequate cure.

932-1.3.4 Qualified Products List: The low modulus silicone sealant used shall be one of the products listed on the Department's Qualified Products List. Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6.

932-1.4 Primer: When required by the manufacturer's product, a primer shall be used.

The manufacturer shall perform 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) 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 and 85°F 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 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 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 of pavement not to exceed 500 feet.

If the average of the specimens is out of tolerance, the Contractor shall remove and replace the entire 500 feet section at no additional expense to the Department.

Installation tolerance shall be verified at 1,000 feet intervals.

932-2 Structure Bearing Pads.

932-2.1 Ancillary Structures - Plain or Fiber Reinforced Bearing Pads:

932-2.1.1 General: Furnish either plain or fiber reinforced (resilient) elastomer pads as shown in the Contract Documents. The elastomer shall be either natural rubber or polychloroprene (neoprene) and meet the material requirements of AASHTO M-251, Appendix X1. Finished pads shall meet the fabrication and tolerance requirements of AASHTO M-251.

932-2.1.2 Plain Pads: Plain pads shall be either molded, extruded, or vulcanized in large sheets and cut to size. Cutting shall not heat the material and shall produce a smooth finish. The finished pads shall withstand a uniform minimum ultimate compression load of 1750 lb/in^2.

932-2.1.3 Fiber Reinforced Pads: Fiber reinforced pads shall be preformed and constructed with either a homogeneous blend of elastomer and random-oriented high strength synthetic fiber cords or multiple layers of fabric and elastomer. Fabric shall be either fiberglass meeting the material requirements of AASHTO M-251, or 8 ounce cotton duck with pads manufactured in accordance with Military Specification MIL-C-882. Unless otherwise specified in the Contract Documents, holes will not be permitted in the fabric. Pads shall withstand a uniform minimum ultimate compression load of 4,000 lb/in^2 without detrimental reduction in thickness or extrusion.

932-2.2 Bridge Structures - Elastomeric Bearing Pads:

932-2.2.1 General: Furnish elastomeric bearing pads in accordance with the requirements of the “AASHTO LRFD Bridge Construction Specifications” Section 18.2, Elastomeric Bearings. Section 18.2 of the above mentioned specification establishes the requirements for plain, fabric reinforced and steel laminated elastomeric bearing pads for bridge structures. When steel reinforced bearings are specified, all edges of the embedded steel laminates, including at the laminate restraining devices and around holes and slots shall be covered with not less than 3/16 inch of elastomer or the minimum edge cover specified on the plans. All exposed laminations or imperfections that result in

less than the specified elastomer cover of any surface of the steel laminations shall be repaired by the manufacturer at the point of manufacture. The repair shall consist of sealing the imperfections flush on the finished pads with a bonded vulcanized patch material compatible with the elastomeric bearing pad. Repairs employing caulking type material or repairing the bearings in the field will not be permitted.

932-2.2.2 Materials: Use only grade 2 (or higher) 100 percent virgin polychloroprene (neoprene) material. No wax antiozonants or other foreign material may accumulate or be applied to the surfaces of the bearing. Use ASTM A-36 or ASTM A-1011 Grade 36 TypeI steel for the steel reinforcement in steel laminated elastomeric bearings. The minimum thickness for the steel reinforcement shall be +/- 0.1345 in. or ten gage material.

932-2.2.3 Testing: Comply with the testing requirements established in the "AASHTO LRFD Bridge Construction Specifications" Section 18.2. Unless otherwise shown in the Contract Documents, the rated service load for load testing shall be 1,600 pounds times the pad area in square inches. When the elastomer material is specified by Shore "A" hardness (durometer), comply with the testing and acceptance criteria in AASHTO M-251, Appendix X1 and X2.

932-2.2.4 Fabrication Tolerances: Fabricate elastomeric bearings to be within the tolerances stated in the "AASHTO LRFD Bridge Construction Specifications" Section 18.1.4, Manufacture or Fabrication.

932-2.2.5 Marking: Each elastomeric bearing pad shall be permanently marked. The marking shall consist of the order number, LOT number, pad identification number, elastomer type, and shear modulus or hardness (when shear modulus is not specified). Where possible, unless otherwise specified in the plans, the marking shall be on a face which is visible after erection of the structure.

932-2.2.6 Mill Analysis Reports: For plain, fiber reinforced and elastomeric bearing pads, provide six certified copies of the manufacturer's complete mill analysis, including actual results of all tests specified in this Subarticle, properly identified by project number, to the Engineer. The mill analysis reports shall be for material representative of that furnished.

The manufacturer shall certify that each pad satisfies the design specification.

932-2.3 Certification: The Contractor shall provide the Engineer a certification conforming to the requirements of Section 6 from the manufacturer, confirming that the bearing pads, (plain, fiber reinforced or elastomeric) meets the requirements of this Section.