Florida Department of Transportation

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May 31, 2007

Dr. Leslie McCarthy, PhD, P.E.
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section 932
Proposed Specification:**9320000**

Dear Dr. McCarthy:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Nonmetallic Accessory Materials for Concrete Pavement and Concrete Structures.

This change was proposed by Larry Sessions of the State Structures Office to remove a conflict between the Specifications and Design Standards on Structure Bearing Pads. This specification also has incorporated language from a previously approved Supplemental Specification that modified 932-1.2 through 932-1.5.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/dr
Attachment
cc: General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

NONMETALLIC ACCESSORY MATERIALS FOR CONCRETE PAVEMENT AND CONCRETE STRUCTURES.
(REV 4- 19-07)

SECTION 932 (Pages 816 – 825) is deleted and the following substituted:

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 AASHTOM 213 except the asphalt content is acceptable provided they contain minimums of 0.2% copper pentachlorophenate as a preservative and 1.0% 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.

932-1.1.2 Qualified Products List: The preformed joint filler 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 Joint Sealer for Pavement and Structures:**~~

~~**932-1.2.1 General:** This Specification covers joint sealer intended for use in sealing joints in asphalt and concrete pavements. These materials may also be used to seal joints in concrete bridges and other structures.~~

~~**932-1.2.2 Material:** The material shall meet the requirements of either ASTM D 1190 (Concrete Joint Sealer, Hot-Poured Elastic Type) or ASTM D 3405 (Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements). 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 or FM 5-533.~~

~~**932-1.2.3 Certification:** The Contractor shall provide the Engineer a certification conforming to the requirements of Section 6 from the manufacturer, 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.~~ ***932-1.2 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 conforming to the requirements of Section 6 from the manufacturer, 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:**~~

~~**932-1.3.1 General:** Low Modules Silicone sealant shall be furnished in a one part silicone formulation meeting the requirements specified herein. Manufacturers or distributors seeking approval of Low Modulus Silicone Sealants 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.~~

~~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.~~

~~932-1.3.2 Physical Requirements:~~

~~SILICONE SEALANT TYPE~~	~~Type A~~	~~Type B~~	~~Type C~~
~~Flow (maximum)~~	~~0.3 inches~~		
~~Extrusion rate~~	~~0.165 – 0.554 lb/hr~~	~~0.224 – 1.45 lb/hr~~	~~0.605 -1.21 lb/hr~~
~~Tack-free time at 77 ± 3ºF and 45 to 55% Relative Humidity~~	~~20-75 minutes~~	~~120 minutes, maximum~~	~~60 minutes, maximum~~
~~Specific gravity~~	~~1.1 to 1.515~~	~~1.10 to 1.40~~	~~1.26 to 1.34~~
~~Durometer hardness, Shore A (Cured seven days at 77 ± 3ºF and 50 ± 5% Relative Humidity)~~	~~10-25~~		
~~Durometer hardness, Shore 00 (Cured 21 days at 77 ± 3ºF and 50 ± 5% Relative Humidity)~~		~~40-80~~	~~20-80~~
~~Tensile stress (maximum) at 150% elongation~~	~~45 psi~~	~~40 psi~~	~~15 psi~~
~~Elongation (Cured seven days at 77 ± 3ºF and 50 ± 5% Relative Humidity)~~	~~800% minimum~~		
~~Elongation (Cured 21 days at 77 ± 3ºF and 50 ± 5% Relative Humidity)~~		~~800% minimum~~	~~1400% minimum~~
~~Ozone and Ultraviolet Resistance~~	~~No chalking, cracking or bond loss after 5,000 hours, minimum.~~		

SILICONE SEALANT TYPE	Type A	Type B	Type C
Bond to concrete mortar briquets (primed if required) (Cured seven days at 77 ± 3ºF and 50 ± 5% Relative Humidity)	50 psi minimum		
Bond to concrete briquets (Cured 21 days at 77 ± 3ºF and 50 ± 5% Relative Humidity)		40 psi minimum	35 psi minimum (includes bond to asphalt)
Movement Capability	No adhesive or cohesive failure and adhesion, 10 cycles at -50 to +100%		

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 ± 5ºF, 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.

932-1.3.4 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.

932-1.3.5 Tolerance: 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 his expense. Installation tolerance shall be verified at 1,000 feet 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:** 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 No. 305. 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.~~

~~All installed bond breakers shall be covered by sealant at the end of each work day.~~ ***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 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, Method A*	*1.1 to 1.515*	*1.10 to 1.40*	*1.26 to 1.34*	*1.26 to 1.34*
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*	

SILICONE SEALANT TYPE	*Test Method*	*Type A*	*Type B*	*Type C*	*Type D*
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 failure and adhesion, 10 cycles at -50 to +100%*			*No adhesive or cohesive 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.*

932-1.4 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 Pads for Structures.**~~

~~**932-2.1 Resilient Pads:** Resilient pads shall be of laminated, preformed, fabric and rubber construction, composed of multiple layers of 8 ounce cotton duck impregnated and bound with high-quality natural rubber, or of equivalent and equally suitable materials compressed into resilient pads of uniform thickness. The number of plies shall be such as to produce the specified thickness, after compression and vulcanizing. The finished pads shall withstand compression loads, perpendicular to the plane of the laminations, of not less than 10,000 lb/in^2 without detrimental reduction in thickness or extrusion.~~

932-2.2 Neoprene Pads:

932-2.2.1 General: Neoprene pads, (elastomeric bearings) may be either of two types: (1) plain pads, composed of neoprene compound, or (2) composite pads, composed of layers of neoprene compound between which steel plates are bonded. In addition to the internal steel plates, the composite pads may have external steel load plates bonded to the upper or lower elastomeric layer or both.

Unless otherwise shown in the plans, plain pads shall be used only in thicknesses up to 3/4 inch; and pads thicker than 3/4 inch shall be composite.

The pads shall be furnished with the dimensions indicated in the plans and shall be composed of the specified elastomer type, grade, and shear modulus (or hardness) and adequate for the specified design load. The pads shall be tested at the appropriate level and shall satisfy any special requirements in the plans.

The elastomer portion of the elastomeric compound shall be 100% polychloroprene (neoprene). The elastomeric compound shall meet the requirements of ASTM D 2000 for the specific requirements shown in the following table:

Serial Designations for Basic Requirements			Suffix Designations
Durometer 50	Durometer 60	Durometer 70	All Durometer
2BC525	3BC625	3BC725	A14, B14, C12, E034, F17, K21, Z (OZONE)
Note: The complete designation of test requirements consists of the basic designation plus the suffix designation.			

ASTM D1149:			
	Durometer 50	Durometer 60	Durometer 70
100 pphm OZONE in air by volume, 20% strain, 100º ±2ºF, 100 hours, Mounting Procedure D518, Procedure A	No Cracks	No Cracks	No Cracks

Adhesion (composite pads only), ASTM D429:			
	Durometer 50	Durometer 60	Durometer 70
Bond made during vulcanization	40 lb/in	40 lb/in	40 lb/in

Unless otherwise specified in the plans, the elastomer shall be 50 Durometer and adequate for 1,000 lb/in^2 Design Compression Stress.

The pads shall be cast under pressure and heat and shall be individually molded to the size and shape called for in the plans. Pads shall be furnished in one piece, and the elastomer portions shall not be laminated in any manner.

Flash tolerance, finish, rubber-to-metal bonding, and appearance shall meet the requirements of the latest edition of the Rubber Handbook as published by the Rubber Manufacturers Association, Inc., RMA F3 and T.063 for molded bearings and RMA F2 for extruded bearings.

Plain pads may be molded or extruded and vulcanized in large sheets and cut to size. Cutting shall not heat the materials and shall produce a smooth finish to ANSI 250.

The pads shall be prepared and packaged by the manufacturer and shall be shipped in unbroken identifiable packages. Each package shall list the number of pads, the type of pads, and the purchase order number. The required mill test reports shall accompany the packaged pads. No package of pads shall weigh more than 1,800 lbs.

932-2.2.2 Dimensional Tolerances: Plain pads and composite pads shall be built to the design dimensions and these Specifications with the following tolerances:

1. Overall Vertical Dimensions:	
Design Thickness 1 1/4 inch or less: Design Thickness over 1 1/4 inch:	-0, +1/8 inch -0, +1/4 inch
2. Overall Horizontal Dimensions	
36 inches and less:	-0, +1/4 inch
Over 36 inches:	-0, +1/2 inch
3. Thickness of Individual Layers of Elastomer (Composite Pads Only) at any point within the bearing:	±20% of design value but no more than ±1/8 inch
4. Variations from a Plane Parallel to the Theoretical Surface (as determined by measurements at the edge of the bearings)	
Top:	slope relative to the bottom of no more than 0.005 radians
Sides:	1/4 inch
5. Position of Exposed Connection Members:	1/8 inch
6. Edge Cover of Embedded Laminates or Connection Members:	-0, +1/8 inch
7. Size of Holes, Slots or Inserts:	+1/8 inch
8. Position of Holes, Slots or Inserts:	+1/8 inch

932-2.2.3 Specific Requirements for Composite Pads: The composite (neoprene and steel) pads shall be cast as a unit in a mold and bonded and vulcanized under heat and pressure. The molds shall have standard shop practice mold finish. The internal steel laminates shall be gritblasted and cleaned of all surface coating rust and mill scale before bonding, shall be free of sharp edges and burrs, and shall have a minimum edge cover of 1/4 inch. External load plates, if used, shall be protected from rusting by the manufacturer and preferably shall be hot-bonded to the bearing during vulcanization.

Composite pads shall consist of alternate laminations of neoprene and hot-rolled steel sheets molded together as a unit. Unless otherwise shown in the plans, the pads shall meet the following requirements: The outer metal laminations shall be 3/16 inch, and the inner laminations shall be 14-gauge. The outer laminations of neoprene shall be 1/4 inch; and the inner laminations shall be of equal thickness, the actual thickness depending upon the number of laminations. Unless otherwise shown in the plans, all components of the composite pad shall be molded together into an integral unit; and all edges of the steel laminations shall be covered by a minimum of 1/4 inch of elastomer. Exposed laminations, apparent as a result of manufacturing techniques, shall be sealed flush on the finished bearing pad with a bonded vulcanized patch consisting of material equivalent to that used in the manufacture of the pad. The pad surface shall be

free of cuts, blemishes, and molding defects in excess of 3/4 inch in length and 1/8 inch in depth and shall be free of foreign matter. The top and bottom bearing surfaces shall each have an integral sealing rib approximately 1/8 inch in depth (in addition to the specified total thickness) and 3/16 inch in width around their peripheries, which shall be free of cuts, tears, an separations. Variations from specified dimensions for individual laminations shall not exceed those specified in 932-2.2.2. Steel reinforcement in composite pads shall conform to AASHTO M 251.

932-2.2.4 Testing for Physical Properties: The pads shall meet the requirements for physical properties as specified in 932-2.2.5 when tested in accordance with ASTM Designations shown. Test specimens shall be prepared in accordance with ASTM D 3183. The pads will be acceptable on the basis of meeting the requirements for Durometer 50, 60 or 70, whichever is called for in the plans.

932-2.2.5 Original Physical Properties:

Durometer	50	60	70
Hardness (ASTM D 2240)	50 ±5 points	60 ±5 points	70 ±5 points
Tensile Strength* (ASTM D 412), minimum	2,250 psi	2,250 psi	2,250 psi
Elongation at Break*, minimum	400%	350%	300%
*Test results of these properties of test samples prepared from finished pads shall not be more than 10% below the specified value.			

932-2.2.6 Change in Original Physical Properties: The material, oven-aged 70 hours at 212ºF and tested in accordance with ASTM D 573, shall show the following:

Hardness..... 0 to +15 points, change
Tensile Strength ..... -15% change, maximum
Elongation at Break..... -40% change, maximum

932-2.2.7 Extreme Temperature Characteristics:

Compression Set (ASTM D 395 Method B, 22 hours at 212ºF)..... 35% maximum

932-2.2.8 Oil Swell:

Volume change (ASTM D 471, using ASTM Oil No. 3, 70 hours at 212ºF)..... 120% maximum

932-2.2.9 Ozone Cracking Resistance:

Time within which no cracks develop (ASTM D 1149) 100 pphm of ozone in air
by volume at 20% strain and a temperature
of 100 ± 2ºF..... 100 hours, minimum

932-2.2.10 Bond Between Neoprene and Steel (Composite Pads only):

ASTM D 429, Method B..... 40 lb/in

932-2.2.11 Bearing Tests and Acceptance Criteria: The acceptance criteria shall have two levels. Level I acceptance criteria shall be applied to all pads. Level II acceptance criteria shall be applied to more critical or unusual pads as required in the plans.

Level II test shall also be used to resolve differences over the acceptance of pads to which only Level I tests shall have been applied.

~~Level I criteria require that the pad be manufactured according to this Specification and any additional requirements specified in the plans. The manufacturer shall proof load each composite pad with a compressive load 1.5 times the maximum design load. If bulging patterns imply laminate placement which does not satisfy design criteria and manufacturing tolerances or if bulging suggests poor laminate bond, the pad shall be rejected. The pad shall be acceptable if the number of surface cracks do not exceed 5; however, if there are more than three separate surface cracks which are greater than 0.08 inch wide and 0.08 inch deep or any one surface crack which is greater than 1.0 inch long and 0.08 inch deep, the pad shall be rejected. Cracks shall be measured under test loading conditions.~~

~~Unless otherwise specified in the plans, the maximum design load in pounds shall be 1,000 times the pad area in square inches.~~

~~Level I criteria requires that the elastomer satisfies the minimum properties of 932-2.2.1 except as otherwise specified in the plans. Tensile strength, elongation at break, Durometer hardness, bond strength, and ozone resistance shall be tested for each production LOT of pads. A LOT shall consist of a single type of bearing, of the same design and material, submitted for inspection at the same time, as defined in ASTM D 4014. A new set of all tests shall be required whenever there is a change in the type or source of raw materials, elastomer formulation or production procedures.~~

~~Level II criteria require that all Level I conditions are satisfied, except that individual conditions may be waived by the Engineer if Level II certification is used as an arbitration of disputes. Any failure at Level II shall constitute rejection of the entire LOT. As a minimum, shear modulus and compressive stiffness shall be determined in accordance with ASTM D 4014. The shear modulus may be determined by testing a piece of the finished pad as specified in ASTM D 4014 (if possible), or a comparable non-destructive test may be performed on the complete pad. A compressive stiffness test shall be performed on the complete pad. The shear modulus shall fall within 15% of the value specified in the plans or within the following limits if no value for shear stiffness is specified:~~

~~Durometer Hardness~~	~~50~~	~~60~~	~~70~~
~~Shear Modulus at 73ºF~~	~~85-110 psi~~	~~120-155 psi~~	~~160-260 psi~~
~~creep deflection at 25 years instantaneous deflection~~	~~25%~~	~~35%~~	~~45%~~

~~The compressive stiffness shall vary by no more than 10% from the median value of all pads, nor more than 20% from the design value, if specified. However, a compressive stiffness and a shear stiffness shall not both be specified for the same pad.~~

~~For the properties of the rubber compound to be measured by test in Level I, one extra pad shall be produced per LOT, selected at random for the necessary destructive sampling. The rubber samples shall be cut from interior laminates of the pad. In the sampling, internal surfaces exposed by vertically sawing through the middle of the pads, shall be measured for Durometer hardness as a check on completeness of~~

~~vulcanization. All readings for hardness shall fall within the range for the Durometer value specified.~~

~~For Level II non-destructive testing, two pads per LOT shall be provided. For LOTs exceeding 50 pads, at least one additional pad shall be tested for every 50 pads or part thereof.~~

~~When plain or laminated neoprene pads are detailed in the plans and fabricated in accordance with the plans and Specification, submittal of shop drawings will not be required. The Contractor shall submit shop drawings to the Engineer for approval prior to fabrication of neoprene pads that are not fabricated as detailed in the plans or have external steel load plates or other materials bonded to the upper or lower elastomeric layers.~~

~~The Contractor shall also provide the Department with written notification 30 days prior to the start of pad production. This notification shall include the project number, quantity and size of pads being produced, manufacturer's name, location, and the name of the representative who will coordinate production, inspection, sampling and testing with the Department.~~

~~After completion of pad production, the Contractor shall allow the Department 14 days after notification for selecting the pads to be tested. The time required for testing shall be determined by the testing lab selected by the Contractor. All tests shall be conducted by an independent laboratory approved by the Department and under the direction of the Engineer. The Department reserves the right to perform additional Level I or check tests on no more than one pad per LOT, if deemed necessary. As a convenience and by agreement, the independent laboratory may use the manufacturer's test facilities providing that testing machines are shown to comply with AASHTO T 67.~~

~~The Contractor shall provide all pads, including pads that are needed for fulfilling testing requirements. All costs of testing and any extra pads needed for testing shall be borne by the Contractor and included in the bid price for the bearing pads.~~

~~If a pad fails the requirements of the compressive proof load, the pad shall be rejected (other tests failures affect LOT acceptance). If a pad for a given LOT fails to meet other test requirements specified herein, all pads in that LOT shall be rejected. In this event, the Contractor may provide two additional pads from the rejected LOT for a repeat test at Level II. All costs associated with additional (repeat) tests shall be borne by the Contractor. Both pads must pass Level II Test for acceptance of the LOT.~~

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 the "AASHTO LRFD Bridge Construction Specifications" Section 18.2.3.1.*

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 woven from 100 percent continuous glass fibers of "E" type, cotton or polyester yarn. The minimum thread count in either direction shall be 25 threads per inch. Each ply of fabric shall have a minimum breaking strength of 800 lb/in of width in each thread direction. The number of plies shall be such as to produce the specified uniform thickness, after compression and vulcanizing. Unless otherwise specified in the Contract Documents, holes will not be permitted in the fabric. The finished 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. Section18 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" 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 A709 or ASTM A1011 Grade 36 Type I 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 "AASHTO LRFD Bridge Construction Specifications" Section 18.2 of the specification noted above. For the definition of LOT size, refer to Section 18.3.4.1 in the above noted specification.*

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. Perform shear modulus tests when the shear modulus is specified in the Contract Documents. For determination of other test performance criteria, use the following cross-over table to convert from shear modulus to Shore 'A' hardness (durometer) (conduct test at a temperature of 73^{o}F):

Shear Modulus	*0.095 - 0.13 ksi*	*0.13 - 0.2 ksi*	*0.2 - 0.3 ksi*
Hardness (durometer)	*50*	*60*	*70*

932-2.2.4 Fabrication Tolerances: *Fabricate elastomeric bearings to be within the tolerances stated in the "AASHTO LRFR 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.*

~~932-2.2.12~~***3*** **Mill Analysis Reports:** For *plain, fiber reinforced and elastomeric bearing*~~both plain~~ pads~~ and composite pads~~, *provide* six certified copies of the manufacturer's complete mill analysis, including actual results of all tests specified in this Subarticle,~~ and~~ properly identified by project number, ~~shall be furnished~~ to the Engineer~~ by the Contractor~~. The mill analysis reports shall be for material representative of that furnished.

The manufacturer shall certify that each pad satisfies the design specification.~~ Each composite pad shall be permanently marked. The marking shall consist of the order number, LOT number, pad identification number, and elastomer type and hardness number. Where possible, unless otherwise specified in the plans, the marking shall be on a face which is visible after erection of the structure.~~

~~932-2.2.13~~***4*** **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*~~neoprene, elastomeric and composite pads~~) meets the requirements of this Section.

NONMETALLIC ACCESSORY MATERIALS FOR CONCRETE PAVEMENT AND CONCRETE STRUCTURES.
(REV 4- 19-07)

SECTION 932 (Pages 816 – 825) is deleted and the following substituted:

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 AASHTOM 213 except the asphalt content is acceptable provided they contain minimums of 0.2% copper pentachlorophenate as a preservative and 1.0% 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.

932-1.1.2 Qualified Products List: The preformed joint filler 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 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 conforming to the requirements of Section 6 from the manufacturer, 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 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, Method A	1.1 to 1.515	1.10 to 1.40	1.26 to 1.34	1.26 to 1.34
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%	AASHTO T 132	50 psi minimum			

SILICONE SEALANT TYPE	Test Method	Type A	Type B	Type C	Type D
Relative Humidity)					
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 failure and adhesion, 10 cycles at -50 to +100%			No adhesive or cohesive 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.

932-1.4 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 the "AASHTO LRFD Bridge Construction Specifications" Section 18.2.3.1.

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 woven from 100 percent continuous glass fibers of "E" type, cotton or polyester yarn. The minimum thread count in either direction shall be 25 threads per inch. Each ply of fabric shall have a minimum breaking strength of 800 lb/in of width in each thread direction. The number of plies shall be such as to produce the specified uniform thickness, after compression and vulcanizing. Unless otherwise specified in the Contract Documents, holes will not be permitted in the fabric. The finished 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. Section18 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" 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 A709 or ASTM A1011 Grade 36 Type I 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 “AASHTO LRFD Bridge Construction Specifications” Section 18.2 of the specification noted above. For the definition of LOT size, refer to Section 18.3.4.1 in the above noted specification.

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. Perform shear modulus tests when the shear modulus is specified in the Contract Documents. For determination of other test performance criteria, use the following cross-over table to convert from shear modulus to Shore 'A' hardness (durometer) (conduct test at a temperature of 73^{o}F):

Shear Modulus	0.095 - 0.13 ksi	0.13 - 0.2 ksi	0.2 - 0.3 ksi
Hardness (durometer)	50	60	70

932-2.2.4 Fabrication Tolerances: Fabricate elastomeric bearings to be within the tolerances stated in the “AASHTO LRFR 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.

932-2.3 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.

932-2.4 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.