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DIVISION 1500
JOINT SEALING AND JOINT FILLER MATERIAL

SECTION 1501

HOT JOINT SEALING COMPOUND

1501.1 DESCRIPTION

This specification covers hot pour joint sealants for use in sealing joints and cracks in asphalt and portland cement concrete pavements.

1501.2 REQUIREMENTS

a. General. Provide a joint sealant that is a homogeneous blend of elastomers and other plasticizers and agents blended to result in a product that seals cracks in pavements from water intrusion. The sealant must retain adhesion and flexibility during extremes of expansion and contraction of the crack through a temperature range of 0ºF to 140ºF. Heat and apply the material according to manufacturer's recommendations.

b. Bond. When tested at -20°F to 200% extension of 1/2 inch to 1-1/2 inch for 3 cycles, the material exhibits no cracking, separation, or other opening that at any point is greater than ¼ inch deep in the sealer or between the sealer and the mortar block. A minimum of 2 test specimens in a set of 3 representing a given sample must comply with this requirement.

c. Flow. 5 mm maximum.

d. Resilience. 50 – 80% recovery**.**

e. Penetration. 0°F, 150 grams, 5 seconds: 18 - 80

f. Provide material capable of a minimum 12-hour pot life at application temperature and of being re-heatable at least once (in a normal field application) without experiencing changes in application characteristics, polymer and oil separation, balling or other signs of gelling.

g. Package the material in pails or boxes clearly marked with recommended pouring temperature, maximum heating temperature, shelf life if appropriate, and batch number. The size of a batch, which is any well-defined quantity produced by essentially the same process during a designated amount or time (such as an 8-hour shift), must be a minimum of 10,000 lbs.

h. Lots from the same manufacturer may be commingled during application. Do not commingle materials from different manufacturers.

1501.3 TEST METHODS

a. Sample Preparation. ASTM D5167, sample size of 5 lbs. Maintain the material at the manufacturer's recommended pouring temperature for 6 hours for both initial and reheat, before preparing the specimens.

b. Bond. ASTM D5329, Section 9. In forming the bond test specimens, space the blocks 0.50 ± 0.01 inch apart by means of suitable spacer strips to enclose a space of 2.0 ± 0.05 inch by 2.0 ± 0.05 inch.

c. Flow. ASTM D5329, Section 8.

d. Resilience. ASTM D5329, Section 12.

e. Penetration. ASTM D5329, Section 6 with the following variations:

(1) Pour the sample into a 6 oz. tin flush with the top and allow to cool overnight.

(2) Place the specimen in a freezer at 0°F for 4 hours. Place the cone in the freezer for the last hour before the test.

(3) At the end of the 4-hour period, remove the cone from the freezer, place the specimen on the stand, and penetrate immediately.

(4) Return the specimen to the freezer, clean the cone, and return the cone to the freezer for 30 minutes before making each successive penetration.

f. Reheat. Allow the remainder of the sample to cool to room temperature until the next working day. Repeat **subsections 1501.3a.** through **1501.3e.** Results of tests must meet requirements, and be consistent with those from the first set of specimens.

1501.4 PREQUALIFICATION

a. Manufacturers interested in prequalifying material under this specification must provide a twenty-five pound sample to the Engineer of Tests for laboratory testing. Include a copy of the quality control test report for the batch of material the sample represents, material safety data sheets, and a complete set of heating and installation recommendations and instructions. Include any conditions and limits to the number of re-heating cycles for the material.

b. The material will be evaluated for compliance with this specification, and the manufacturer will be notified of the results. The Bureau of Materials and Research will maintain a list of qualified materials. Products will remain on the prequalified list as long as the results of batch testing and field performance are satisfactory. Report any changes in formulation to the Engineer of Tests for review and evaluation to determine if requalification is necessary.

1501.5 BASIS OF ACCEPTANCE

a. Prequalification as required in **subsection 1501.4**.

b. Receipt and approval of manufacturer's certification for minimum pot life and reheatability requirements. The manufacturer must certify that the material is capable of a minimum 12-hour pot life at application temperature and is re-heatable at least once (in a normal field application) without experiencing changes in application characteristics, polymer and oil separation, balling or any other signs of jelling. The manufacturer must designate any conditions and limits to the number of re-heating cycles for the material.

c. Satisfactory results of tests conducted at the Materials and Research Center on each batch of material. Samples will be obtained by a representative of KDOT and must be available for testing in the M & R Center a minimum of 10 working days before the date the material is required for installation.

d. Visual observation of performance in the field.

SECTION 1502

COLD APPLIED CHEMICALLY CURED JOINT SEALANT

1502.1 DESCRIPTION

This specification covers joint sealant and backer rod to be used for filling joints in portland cement concrete pavement.

1502.2 REQUIREMENTS

a. Joint Sealant. Prequalify joint sealant before use on KDOT projects. Use either Type NS (Non Self-Leveling) or Type SL (Self-Leveling). Provide joint sealants that consist of a cold applied formulation that is self-priming and compatible with portland cement concrete. The sealants must comply with the applicable test requirements in ASTM D 5893. Acetic acid cure sealants will not be accepted.

b. Backer Rod. Furnish material that is resilient closed or open cell polyethylene foam rod as recommended by the manufacturer of the sealant. Provide a backer rod compatible with the sealant, with no bond or reaction occurring between the rod and the sealant.

1502.3 TEST METHODS

Test materials covered by this section in accordance with the applicable test methods in ASTM D 5893.

1502.4 PREQUALIFICATION

a. Laboratory Prequalification. Manufacturers interested in qualifying sealant under this specification must supply actual test data from an approved testing laboratory showing compliance with the specification. Submit test results to the Engineer of Tests.

b. Prequalified List. The Bureau of Materials and Research will include products complying with **subsection 1502.2** on a prequalified list. Failure of any field installation in less than the anticipated life will be cause for removal of the product from prequalified status. Products removed from prequalified status will be considered for re-qualification if the manufacturer can provide evidence that the cause of failure has been positively identified, and necessary formulation changes and quality control measures have been implemented to eliminate that cause. Complete prequalification under **subsection 1502.4**. is required for products removed from the prequalified list.

1502.5 BASIS OF ACCEPTANCE

a. Prequalified status as required in **subsection 1502.4**.

b. Receipt and approval of a Type A certification as specified in **DIVISION 2600**. Report all test requirements on the certification.

c. Use the material within 6 months of the date of the certification. If the material is not used within the 6 month period, re-testing and re-certification will be required. Use re-certified material within 45 days of the re-certification.

SECTION 1503

PREFORMED EXPANSION JOINT FILLER FOR CONCRETE

1503.1 DESCRIPTION

This specification covers redwood board expansion joint filler (Type A) for use in sidewalks, and preformed expansion joint filler (Type B) for concrete paving and structural construction.

1503.2 REQUIREMENTS

a. Type A. Provide redwood boards of sound heartwood. Occasional small sound knots and medium surface checks will be permitted provided the board is free of any defects that will impair its usefulness for the purpose intended.

The redwood board joint filler is composed of only one piece of board in the length of the joint, and with dimensions as shown in the Contract Documents. Positive tolerances of 1/16 inch thickness, 1/8 inch depth (or width) and ¼ inch length are permitted.

Immerse redwood board joint material in water for a minimum of 24 hours before being installed in the sidewalk. Do not allow the boards to dry out prior to installation.

b. Type B. Provide material that complies with AASHTO M 213.

1503.3 TEST METHODS

a. Type A. None specified.

b. Type B. As specified in AASHTO M 213.

1503.4 PREQUALIFICATION

None required.

1503.5 BASIS OF ACCEPTANCE

a. Type A. Visual inspection for the quality and dimensional requirements.

b. Type B.

(1) Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

(2) Visual inspection at destination for condition and compliance with dimensional and other requirements.

SECTION 1504

PREFORMED ELASTOMERIC COMPRESSION JOINT SEALS FOR CONCRETE

1504.1 DESCRIPTION

This specification governs the preformed elastomeric joint seals designed to operate under compression and intended for various applications. The specification also addresses certain components, such as lubricants and adhesives, required for installation of the seals.

1504.2 REQUIREMENTS

a. General.

(1) Unless specified otherwise in the Contract Documents, provide transverse pavement joint seals that comply with **TABLE 1504-1**.

TABLE 1504-1: DIMENSIONS FOR PREFORMED ELASTOMERIC COMPRESSION JOINT SEALS

Joint spacing on centers.	15 feet	30 feet
Allowable range of non-compressed seal width across flat contact surfaces.	0.687 ⇔ 0.750 inch 0.719 inch nominal width	0.812 ⇔ 0.875 inch 0.843 inch nominal width
Vertical dimension of non-compressed seal flat contact surface, per side, minimum.	0.630 inch	0.800 inch
Maximum allowable overall vertical dimension of seal when compressed to width of 3/8 inch.	1.50 inch	1.50 inch

(2) Provide elastomeric seals for bridge deck expansion joints that comply with the dimensional requirements specified in the Contract Documents.

b. Material Specifications.

(1) Comply with AASHTO M 220 when the intended application is pavement joints and AASHTO M 297 when the intended application is bridge deck joints.

Durably label and mark seals in compliance with the requirements of those AASHTO standards inclusive of a unique identifier such as a batch or lot number and date of manufacture. Package seals to prevent damage during transport and durably label the packaging containment with all information required to properly identify the contents.

(2) All adhesives, lubricants, cementing agents, etc., that are required for installation of the seals are to be specified and provided by the manufacturer of the seal. All installation is to be in strict accordance with the specified procedures and practices of the seal manufacturer. These procedures and practices are to be provided with the component.

Properly package all of these components and provide instructions for safe storage, transport, proper disposal of component and container, emergency procedures, etc. Durably label all with the name and address of the manufacturer, date of manufacture, shelf life or expiration date if applicable, a unique identifier such as a batch or lot number, and any other relevant information.

1504.3 TEST METHODS

Using the applicable AASHTO material specification shown in **subsection 1504.2b.,** conduct all tests required according to the specified procedures with the following exceptions:

- Pavement and bridge deck seals when compressed to a width of 80 and 85 percent of nominal are to provide a load resistance of not less than 50 pounds per linear foot.
- Bridge deck seals when compressed to a width of 50 percent of nominal are not to produce a load resistance that exceeds 500 pounds per linear foot.

These properties are evaluated while conducting the compression deflection tests according to the procedures of the applicable AASHTO standard.

1504.4 PREQUALIFICATION

a. General. All manufacturers of elastomeric seals that intend to provide seals for KDOT projects must have their products prequalified by size and design configuration. To initiate this process provide a request for the evaluation of the product to the Bureau Chief, Materials and Research along with the following documentation:

- The manufacturer's corporate name and address as well as the address of the facilities that are manufacturing the seals being prequalified,
- The method of traceability utilized for quality control such as lot or batch numbers, dates of manufacture, etc.,
- Typical material quantities represented by this method,
- A list of authorized distributors of the product(s) being prequalified if applicable**.**

b. Manufacturer Quality Control Requirements. The manufacturer must perform the quality control testing with an identified and adequately staffed section within its organization. The laboratory must have the proper calibrated equipment with which to adequately perform all testing required by **subsection 1504.3.** Provide a copy of the quality control plan to the Bureau Chief, Materials and Research.

c. Sampling and Testing Procedure. The manufacturer is to provide a 6-foot length sample of each seal size and design configuration they desire to have evaluated for prequalification. Submit samples to the Engineer of Tests. The samples are to be representative of seal production and are to be provided with certified laboratory reports documenting the results of the tests required by **subsection 1504.3**.

The samples will be evaluated and tested by the central laboratory according to **subsection 1504.3** with the results compared to those of the manufacturer.

d. Manufacturer Status. A manufacturer will be notified by written documentation of the results of their application for prequalification and in the event of any change in prequalified status once it has been attained.

The manufacturer is to immediately notify the Bureau of Materials and Research of any changes in the elastomeric compound, design configuration, dimensions, installation procedures and practices, etc., of the prequalified products. The Bureau of Materials and Research will review the changes and determined whether the product is to remain prequalified. If the changes disqualify the product, an application for prequalification as a new product according to the preceding requirements may be submitted. The failure of random verification samples removed from seals delivered to projects may also disqualify the product.

The Bureau will maintain a list of all prequalified manufacturers by facility and the specific seal size(s) and design(s) that have been approved. Authorized distributors of the approved products, as provided by the manufacturer, will also be maintained on the prequalified list. A distributor may be added to the prequalified list if they can provide verifiable documentation to The Bureau of Materials and Research that they are supplying a prequalified product.

1504.5 BASIS OF ACCEPTANCE

a. The manufacturer by facility and the specific seal size and design must be currently prequalified.

b. Receipt and approval of a Type C certification as specified in **DIVISION 2600**. for the seals, adhesives, lubricants, cementing agents, and any other products specified by the seal manufacturer for proper installation of the seals.

c. The **final disposition** of all products and components will be completed at the final destination as the result of inspection for the quality of workmanship, the delivery condition, and approval of the associated required documentation.

SECTION 1505

MATERIALS FOR FILLING AND SEALING JOINTS IN PIPE

1505.1 DESCRIPTION

This specification covers the following five types of products:

a. Joint compound for filling and sealing joints in concrete and vitrified clay pipe.

b. Flexible gasket type joint material for filling and sealing joints in concrete and vitrified pipe.

c. Factory molded joint rings for use on standard or extra strength clay pipe.

d. Materials for sealing joints in cast iron pipe.

e. Expanded closed-cellular rubber gaskets for filling and sealing joints in reinforced concrete pipe and boxes used for drainage and storm water lines.

1505.2 REQUIREMENTS

a. Compound Type Joint Filler.

(1) General. Provide a compound that is a ready-mixed homogeneous blend of asphalt or tar, inert filler and a suitable solvent or solvents. The inert filler may include polyethylene, polypropylene or cellulose fibers, mica, slate or silica flour or clay. Do not use any type of asbestos material. Mix all ingredients thoroughly at the factory to a uniform workable consistency.

(2) Physical. Provide a compound that complies with **TABLE 1505-1**:

TABLE 1505-1: COMPOUND TYPE JOINT FILLER

Property	Min.	Max
Percent Ash	----	30
Penetration (Standard Cone) 150g, 5 sec., 77°F	125	250

(3) Packaging. Limit container size to 5 gallons of material.

(4) Sampling. Sample in accordance with applicable provisions of KT-27.

b. Flexible Gasket Type Joint Filler. Provide a flexible plastic gasket material supplied in extruded rope form for use where infiltration or exfiltration is a factor in design. Produce flexible plastic gaskets from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and containing no solvents. Provide a gasket joint sealer that does not depend on oxidizing, evaporating or chemical action for adhesive or cohesive strength. Supply the sealer in extruded rope form of suitable cross section and size to fill the joint space when the pipes are joined.

Provide material that complies with AASHTO M 198 for Type B filler.

c. Factory Molded Joints. Provide factory-molded joints capable of being fused to both bell and spigot ends of pipe. Provide material that produces watertight joints when the pipe is joined in the trench. The material must comply with ASTM C 425.

d. Materials For Sealing Joints in Cast Iron Pipe.

(1) Packing. Provide material for packing that is twisted jute complying to the Federal Specification "Packing: Jute, Twisted" Serial No. HH-P-117-2, Type II.

(2) Caulking. Provide lead caulking complying to the Federal Specification "Lead, Caulking" Serial No. QQ-C-40.

(3) Rubber Seals. In lieu of lead and jute for sealing joints, the use of specially designed rubber seals will be permitted. Install rubber seals in accordance with the manufacturer's recommendation.

e. Expanded Closed-Cellular Rubber Gaskets for Reinforced Concrete Pipe and Precast Boxes.

(1) Provide gaskets of tubular cross-section, manufactured from extruded closed-cellular rubber and complying to the physical requirements of ASTM D1056, Class 2C1. Each gasket must be a single continuous part and will conform to the joint size and shape. The outer surface must be completely covered with a smooth, impermeable natural skin of the same material.

(2) Gasket cross-sectional diameters and installation practices, including maximum and minimum joint gaps must be in accordance with the manufacturer's recommendations. Provide a copy of the manufacturer's installation instructions to the Field Engineer.

Do not use this type of gasket when the pipe is installed by jacking or boring methods.

1505.3 TEST METHODS

a. Compound Type Joint Filler. Test in accordance with **TABLE 1505-2**.

TABLE 1505-2: COMPOUND TYPE JOINT FILLER

Property	Method
Penetration (Standard Cone, Unworked)	ASTM D 217
Use an 8-ounce gill can as the test container.	
Percent Ash	AASHTO T 111

1505.4 PREQUALIFICATION

None required.

1505.5 BASIS OF ACCEPTANCE

a. Compound Type Joint Filler. Satisfactory results of tests conducted at the Materials and Research Center. A representative of KDOT will sample each lot or batch of material. Each lot will be subjected to visual examination and testing in accordance with **subsection 1505.3** and for compliance with **subsection 1505.2 a**.

b. Flexible Gasket Type Joint Filler, Factory Molded Joint Rings and Materials For Sealing Joints In Cast Iron Pipe (except Rubber Seals). Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

c. Rubber Seals. Visual inspection by the Engineer.

d. Expanded Closed-Cellular Rubber Gaskets.

(1) Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

(2) Visual inspection by the Engineer for workmanship, fit and final installation practices.

SECTION 1506

POLYVINYL CHLORIDE (PVC) PLASTIC WATERSTOP

1506.1 DESCRIPTION

This specification covers extruded polyvinyl chloride (PVC) plastic waterstop.

1506.2 REQUIREMENTS

a. General. Provide PVC waterstop with a ribbed or serrated cross section profile with center bulb that complies with all current requirements of Corps of Engineers Specification CRD-C-572.

b. Dimensions. PVC waterstop is either nominal 6 inch width or 9 inch width as shown in the Contract Documents. Other dimensions are as follows:

(1) 6 inch PVC Waterstop. Center bulb 5/8 to ¾ inch outside diameter (OD) and ¼ to 3/8 inch inside diameter (ID). Minimum thickness adjacent to center bulb 0.360 inch. Waterstop may be uniform in cross-section or uniformly tapered to a minimum thickness of 3/16 inch between serrations at edges.

(2) 9 inch PVC Waterstop. Center bulb 5/16 inch to 7/8 inch OD and ¼ inch to ½ inch ID. Minimum thickness adjacent to center bulb 0.375 inch. Waterstop may be uniform in cross-section or uniformly tapered to a minimum thickness of ¼ inch between serrations at edges.

1506.3 TEST METHODS

Test in accordance with the current Corps of Engineers Specification CRD-C-572.

1506.4 PREQUALIFICATIONS

None required.

1506.5 BASIS OF ACCEPTANCE

PVC waterstop is accepted based on receipt and approval of a Type D certification as specified in **DIVISION 2600** and visual inspection for conditions and dimensional requirements.

SECTION 1507

PRESSURE RELIEF JOINT FILLER

1507.1 DESCRIPTION

This specification covers materials for pressure relief joint filler and lubricant adhesive for use when installing the joint filler material.

1507.2 REQUIREMENTS

a. Polyurethane Pressure Relief Joint Filler (4 inch Joint Opening).

(1) General: This material is a flexible, low density, cellular polyurethane plank for use in pressure relief joints for concrete pavements. It is multicellular, homogeneous foam, having a specially designed cross section, which locks the filler in place.

(2) Physical Properties. Provide joint filler material that complies with **TABLE 1507-1**:

TABLE 1507-1: POLYURETHANE PRESSURE RELIEF JOINT FILLER (4 inch Joint Opening)

Property	Requirements
Compression (PSI):	
At 25% Deflection	5 ± 2
At 65% Deflection	12 ± 4
Water Absorption (% by Volume):	Less than 30
Density (lbs/cu ft):	7 - 10
Recovery (Percent, Min.):	90
Dimensions:	
Width	4 inches Nominal
Depth	7 3/4 inches Nominal*

*Include a supply (equal to the length of the order) of 1 inch X 4 inches polystyrene or polyurethane foam as spacers to insert in the bottom of the trench.

b. Polyethylene Pressure Relief Joint Filler (2 inch or 4 inch Joint Opening).

(1) General: This material is a flexible, low density, multicellular, closed cell, polyethylene plank for use as a highway pressure relief joint. Provide 2 inch or 4 inch width as specified in the Contract Documents.

(2) Physical Properties. The joint filler material complies with **TABLE 1507-2**.

TABLE 1507-2: POLYURETHANE PRESSURE RELIEF JOINT FILLER (2 or 4 inch Joint Opening)

Property	Requirements
Compression (PSI):	
At 10% Deflection	Less than 10
At 80% Deflection	Less than 125
Water Absorption (% by Volume):	Less than 0.5
Density (lbs/cu ft):	2.6 ± 0.2
Dimensions:	
Width	2 inches or 4 inches Nominal
Depth	9 inches Nominal

c. Lubricant Adhesive. Provide a lubricant adhesive recommended by the manufacturer of the joint filler for use when installing the joint filler material. It must have workable consistency at the temperatures the filler material will be installed, be compatible with the joint filler material and the concrete, and be relatively unaffected by the moisture in concrete.

1507.3 TEST METHODS

a. Polyurethane Pressure Relief Joint Filler.

(1) Compression - Deflection - In accordance with ASTM D 3574 (Test C) using a rate of compression of 2 inches/minute and a sample preflexed 75%.

(2) Water Absorption - In accordance with AASHTO T-42.

(3) Recovery. 65% deflection recovery calculated after 1-minute relaxation from deflection return.

b. Polyethylene Pressure Relief Joint Filler.

(1) Compression: In accordance with ASTM D 1056 except determine the compressive strength at 10% deflection and 80% deflection.

(2) Water Absorption: In accordance with ASTM C 272 using conditioning procedure 10.1.1 at a temperature of 120 ± 5°F.

(3) Density: In accordance with ASTM D 3574 (Test A).

1507.4 PREQUALIFICATION

None required.

1507.5 BASIS OF ACCEPTANCE

a. Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

b. Visual inspection at destination for condition and dimensional requirements.

SECTION 1508

ELASTOMERIC CONCRETE

1508.1 DESCRIPTION

Elastomeric concrete is composed of a two-part rapid curing polymer binder material, aggregate and other ingredients as recommended by the binder manufacturer. Elastomeric concrete exhibits flexibility, suitable load carrying characteristics, ozone resistance, ultra-violet resistance and is not prone to cracking or spalling when exposed to ambient air temperatures of -30°F and warmer.

1508.2 REQUIREMENTS

Elastomeric concrete, when combined in the proportions and manner specified by the binder manufacturer, complies with the **TABLE 1508-1**:

TABLE 1508-1: ELASTOMERIC CONCRETE

Property	Requirements
Elastomeric binder after 7-day cure.	
Impact Strength @ -20°F	7 ft-lb, min.
Tensile Strength	500 psi, min.
Ultimate Elongation	100 %, min.
Tear Resistance	80 lb/in., min.
Elastomeric binder after 30-day oven aging.	
Impact Strength @ -29°C	7 ft-lb, min.
Tensile Strength	500 psi, min.
Ultimate Elongation	50 %, min.
Elastomeric binder-aggregate mixture after 7-day cure.	
Bond Strength to Concrete	300 psi, min
Wet Bond Strength to Concrete	225 psi, min
Compressive Stress at 5 % deflection	300 psi min, 2000 psi max.
Resilience	70 %, min.

d. Use aggregates that are compatible with the elastomeric binder, as supplied with the system, or as specified by the binder manufacturer.

1508.3 TEST METHODS

a. Preparation of Specimens.

Prepare specimens by thoroughly mixing the components in the ratios specified by the manufacturer. Before mixing, heat the components to the temperatures recommended by the manufacturer during placement in order to provide a workable mixture and give an initial cure representative of field placement. Apply no heat after mixing. If heating is not specified, mix the components at ambient temperature.

Because of the high bond strength of these materials, mold surfaces such as Teflon or lubricant-coated metal are recommended. Pour binder mixtures into molds as soon as possible after thorough mixing so they will flow well. Minimize entrained air during mixing. It may be removed by the use of vacuum, physical means, or passing a soft flame over the surface. Allow specimens cure sufficiently before removal from molds so that they will not be damaged by removal.

Cure specimens at either 73 ± 3ºF for 7 days or at 140 ± 4ºF for 30 days, and test as specified. Stamp specimens for tensile strength, ultimate elongation and tear resistance from cast sheets of the proper thickness as soon as the binder is sufficiently cured. Sand these specimens to remove irregularities and provide true surfaces.

b. Tests on the Elastomeric Binder.

(1) Impact Resistance. The specimen is a cast disk 2.50 ± 0.05 inches in diameter and 0.375 ± 0.010 inches thick. Sand the faces flat and parallel. After 7 days cure, condition the specimens for 4 hours at -20°F. Remove the specimen from the freezer and placed on a dry machined steel plate. Immediately after placing the disk on the plate, drop a 1 pound steel ball onto the center of the specimen through a guiding tube from an initial drop height of 5 feet. The drop height is increased by ½ foot intervals until the specimen cracks, or until all specimens exceed the specification minimums. The result will be the average of 4 specimens. Any cracking of a specimen will constitute failure. Repeat the procedure with 4 specimens that have been oven cured for 30 days.

(2) Tensile Strength. This test is performed according to ASTM D 638 using the Type IV specimen with dimension WO of 1 inch, which corresponds to Die C of ASTM D 412. Perform Testing after 7 days of cure. Measure the thickness and width of the specimen neck using a dial gauge or caliper, and determine the cross sectional area. Use an initial test machine jaw separation of 2 inches and a crosshead speed of 2 inches per minute. Load the specimen to failure. Use the maximum load to determine the tensile strength. Test at least 8 specimens. Discard those with obvious flaws. Repeat the procedure with 8 specimens that have been oven cured for 30 days.

(3) Ultimate Elongation. Perform this test as a part of Tensile Strength using the same specimens. Determine ultimate elongation from the initial jaw separation and the amount of crosshead travel at failure. Report results as a percent of the original gauge length. Repeat the procedure with 8 specimens that have been oven cured for 30 days.

(4) Tear Resistance. Determine tear resistance according to ASTM D 624 using the Die C specimen. Perform testing after 7 days cure. Determine the thickness of the specimen at the point of tear with a dial gauge prior to testing. Use an initial testing machine jaw separation of 2 inches, and a crosshead speed of 2 inches per minute. Test a minimum of 5 specimens.

c. Tests on the Elastomeric Binder-Aggregate Mixture.

(1) Bond Strength to Concrete. Cast the elastomeric concrete against a mortar briquette half (briquette complies to AASHTO T 132). Saw the briquette in half so that the sawed surface area equals approximately 1 sq in. Sandblast the surface. Place the briquette in the mold and cast the elastomeric concrete against the sawed surface. Cure the specimens 7 days in air at 73 ± 3°F. Using the Riehle briquette tester, specimen failure is considered to occur at either the bond interface or in either of the two materials. Test a minimum of 4 specimens. Determine an average tensile breaking stress based on a 1 sq in cross-sectional area.

(2) Wet Bond Strength to Concrete. Prepare mortar briquette halves the same as for Bond Strength to Concrete. After a 5-day cure in air at 73 ± 3°F, immerse the specimens in 73 ± 3°F water for 2 days in a horizontal position. After the immersion period, remove the specimens from the water and subject them to tensile testing with the Riehle briquette tester while still damp. Test a minimum of 4 specimens. Determine an average tensile breaking stress based on a 1 sq in cross-sectional area.

(3) Compressive Stress at 5 % Deflection. The test specimens are cast 1 inch cubes, prepared so as to have flat, parallel opposing faces free from irregularities. Cure the specimens seven days in air at 73 ± 3°F. Determine the original thickness of the specimen within 0.001 inch without a load. Place the specimen in the compression machine, apply a 100 pound load, and zero a dial gauge. Load the specimen at a rate of 0.15 inch per minute until a deflection of 0.10 inch is reached, at which point the compressive load is recorded and removed. Test a minimum of four cubes and calculate an average compressive stress based on the original 4 $in.^2$ area.

(4) Resilience. The Resilience test is a continuation of the Compressive Stress at 5 % Deflection test. After removal of the load, the specimen is allowed to recover for five minutes, after which the thickness is re-measured. Resilience is the percent recovery and is calculated as follows:

$$\text{Resilience} = \frac{(0.10 \text{ in.} + \text{final thickness} - \text{initial thickness}) \times (100)}{(0.10 \text{ in.})}$$

1508.4 PREQUALIFICATION

a. Manufacturers interested in prequalifying material under this specification must provide 3 sets of 2-component samples (2 for binder tests and 1 for binder-aggregate mixture tests) to the Engineer of Tests for laboratory testing. Provide 1 set of aggregate for binder-aggregate mixture testing. Include a copy of the quality control test report for the batch of material the sample represents, material safety data sheets, and a complete set of mixing and installation recommendations and instructions.

b. The material will be evaluated for compliance with this specification, and the manufacturer will be notified of the results. The Bureau of Materials and Research will maintain a list of qualified materials. Products will remain on the prequalified list as long as the results of verification testing and field performance are satisfactory. Report any changes in formulation to the Engineer of Tests for review and evaluation to determine if re-qualification is necessary.

1508.5 BASIS OF ACCEPTANCE

a. Prequalification as required by **subsection 1508.4.**

b. Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

c. Visual observation of performance in the field.

SECTION 1509

BRIDGE EXPANSION JOINT GAP REPAIR SYSTEM

1509.1 DESCRIPTION

This specification covers material and preparation procedures for bridge expansion joint gap repair as shown on the in the Contract Documents.

1509.2 REQUIREMENTS

a. Use nosing material that is a two-component rapid curing liquid polymer that cures to a dense semi-flexible weather, abrasion and impact resistant polymer and complies with **TABLE 1509-1**:

TABLE 1509-1: TWO-COMPONENT POLYMER NOSING MATERIAL (Without Aggregate Component)

Combined Components: Part A (Base) & Part B (Reactor)	
Property	**Requirement**
Mixing Ratio	1:1 by weight or volume
Viscosity	Average 100 centipoises
Color	Black
Weight/Gallon	Average 9.5 lbs.
Pot Life	@ 50°F - 60 minutes (In 8 oz. mass) @ 60°F - 50 minutes (In 8 oz. mass) @ 70°F - 40 minutes (In 8 oz. mass)

Cured Properties: (Polymer Nosing Material)		
Property	**Test Method**	**Requirement**
Tensile Strength	ASTM D 638	900 psi. (Min.)
Tensile Elongation	ASTM D 638	50% (Min.)
Shore "D" Hardness	ASTM D 2240	45 - 55

b. Use a tack coat that consists of just the two-component polymer nosing material without any aggregate component. Thoroughly combine the Part A (Base) and Part B (Reactor) components in the proper ratio of one volume base to one volume reactor prior to use. Complete mixing using a slow speed hand drill with a paint-type paddle stirrer or as recommended by the nosing manufacturer. Comply to the manufacturer's recommendations for mixing and application time.

c. The nosing mortar consists of a mixture of the two-component polymer nosing material and a clean, well graded dry silica sand such as flint shot or any clean dry sand in the No. 4 – No. 30 mesh sieve size. Mix the Mortar using an electric powered mortar mixer or as recommended by the manufacturer, in the proper proportions as recommended by the manufacturer. No variation in the mix will be permitted without the approval of the manufacturer and the Engineer.

d. Apply the tack coat to the prepared block-out area before any mortar is placed. The mortar must be placed and finished within 30 minutes of mixing, and before the tack coat has set. Mortar of sufficient thickness can be ready for traffic in 2-4 hours depending on the air temperature. Allow the nosing material to cure to a minimum temperature of 45°F before the backer rod is removed and the expansion gap is cleaned.

1509.3 TEST METHODS

Test materials in accordance with the ASTM standards cited above. Test the sand using KT-2, Sieve Analysis of Aggregates.

1509.4 PREQUALIFICATION

None required.

1509.5 BASIS OF ACCEPTANCE

Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

SECTION 1510

BRIDGE JOINT SYSTEM – TWO PART SILICONE

1510.1 DESCRIPTION

This specification covers material for bridge expansion joint system using a 2-part silicone as shown in the Contract Documents.

1510.2 REQUIREMENTS

a. Provide joint sealer that is a two part, self-leveling, and rapid curing joint sealant that cures to a low-modulus rubber upon exposure to atmospheric moisture. Provide sealant that complies with **TABLE 1510-1 and 1510-2**.

TABLE 1510-1: TWO PART SELF-LEVELING SILICONE JOINT SEALANT (RAPID CURE)		
Combined Components:		
Property	**Test Method**	**Requirement**
Tack Free Time 25°C	MIL-2-8802	30-60 Min
Extrusion Rate	MIL-2-8802	0.4 to 1.2 lbs./Min
Specific Gravity	ASTM D 1475	1.3-1.4
Joint Elongation	ASTM D 3583	600% (Min.)
Joint Modulus	ASTM D 3583	0.3 to 0.8 psi (@100%)
Skin-Over Time	ASTM C 679	Max. 15 Minutes
Non-Volatile Content	ASTM D 1644, Method A	93% (Min.)

TABLE 1510-2: JOINT CURE RATE:	
% of Total Cure	**Hours**
50 %	4 to 6
75 %	24
100 %	48 to 100

b. Place the primer solution for the silicone joint sealant along both edges of the expansion gap prior to the installation of the sealant. Use a primer type and apply the coating thickness as specified by the sealant manufacturer.

c. Provide backer rod material that is compatible with both the nosing mortar and joint sealant and approved by the manufacturers. Use backer rod that is be approximately 25% larger than the joint opening so as to provide a tight fit into the joint. Install it to a depth shown in the Contract Documents.

d. Clean all tools and other application or mixing equipment frequently using a solvent type that is approved by the nosing mortar and joint sealant manufacturer.

1510.3 TEST METHODS

Test the material in accordance with the ASTM and MIL standards cited above.

1510.4 PREQUALIFICATION

None required.

1510.5 BASIS OF ACCEPTANCE

Receipt and approval of a Type D Certification as specified in **DIVISION 2600**.

SECTION 1511

BRIDGE JOINT SYSTEM - PREFORMED PRESSURIZED ELASTOMERIC NEOPRENE

1511.1 DESCRIPTION

This specification covers material for a bridge expansion joint system using a preformed, pressurized elastomeric neoprene seal as shown in the Contract Documents.

1511.2 REQUIREMENTS

a. Provide a polychloroprene (neoprene) elastomer profile that is preformed by extrusion and vulcanized into it's definitive shape, and is supplied in several configurations and dimensions, ranging from 1/4 to 4 inches. See the Contract Documents for profile size requirements. The profile must comply with AASHTO M 297, except it must be capable of being pressurized during installation.

b. Use a double-component, epoxy-based adhesive mixed at the job-site. Apply it to thoroughly cleaned expansion gap walls and outside rough walls of the profile. Provide an epoxy-based adhesive that complies with **TABLE 1511-1**.

TABLE 1511-1: DOUBLE COMPONENT THIXOTROPIC PASTE

Property	Requirement
Tensile Strength	4140 PSI
Axial Compression	8760 PSI
Solids Hardness	5 MOHS
Pot Life	40 Minutes at 68ºF
Flash Point	> 200ºF
Curing Time/Strong Bond Within	24 Hours
Complete Cure	7 Days at 68ºF
(At higher ambient temperatures, the cure will be accelerated.)	

c. Pressurization is done through a valve with a cap system. The profile is pressurized only during installation and curing time of the adhesive, to verify complete bonding throughout the gap/profile surfaces. Air pressure will bleed itself with time or the air valve can be broken loose any time after 24 hours of installation.

1511.3 TEST METHODS

Test the material in accordance with AASHTO M 297.

1511.4 PREQUALIFICATION

None required.

1511.5 BASIS OF ACCEPTANCE

Receipt and approval of a Type D Certification as specified in **DIVISION 2600**.