

3702 PREFORMED JOINT FILLERS

3702.1 SCOPE

Provide preformed filler material for joints in concrete construction.

3702.2 REQUIREMENTS

Use preformed joint filler material meeting the requirements of AASHTO M 153 or AASHTO M 213.

Provide the filler for each joint in a single piece for the full depth and width required for the joint unless otherwise approved by the Engineer. For pavement construction, provide filler in lengths equal to the width of the pavement lanes. Where dowel bars are necessary, provide joint filler with properly sized clean-cut punched holes correctly spaced to fit flush with the dowel bars.

Provide fiber or granulated cork bituminous bound-type filler meeting the requirements of AASHTO M 213, unless otherwise required by the contract or approved by the Engineer.

3702.3 SAMPLING AND TESTING — (BLANK)

3719 HOT-POURED, CRUMB-RUBBER TYPE CRACK SEALER

3719.1 SCOPE

Provide hot-poured, crumb-rubber type crack sealer for sealing cracks in concrete and bituminous pavements and miscellaneous structures.

3719.2 REQUIREMENTS

Provide crack sealer material meeting the following requirements:

- (1) On the Approved/Qualified Products List,
- (2) Consists of asphalt and crumb rubber blended together by the manufacturer to produce a homogeneous mixture,
- (3) When melted, the sealer does not separate or settle, and
- (4) Uniform consistency suitable for filling joints and cracks without inclusion of large air holes or discontinuities.

A Physical Requirements

Provide crack sealer meeting the requirements of ASTM D 6690, Type I with the following modifications in Table 3719-1 after one cycle of heating to the manufacturer's maximum heating temperature, cooling, and reheating to the manufacturer's maximum heating temperature.

Test	Specification
Recycled rubber, mass	≥ 18% of asphaltic components
Bond Test, 50% extension at 0 °F [-18 °C]*	No adhesion or cohesion bond failure after 5 cycles
Resilience at 77 °F [25 °C]	≥ 40%
Softening point	≥ 180 °F [82 °C]
* Use sawed cement mortar blocks or asphalt HMA blocks prepared using the method found in the Laboratory Manual.	

B Packaging and Marking

Package and ship the sealer material in boxes weighing no greater than 50 lb [23 kg]. Mark the boxes with the following information:

- (1) Material name,
- (2) Manufacturer name,
- (3) Brand name,
- (4) Weight,
- (5) Batch number, and
- (6) Maximum heating temperature recommended by the manufacturer.

3719.3 SAMPLING AND TESTING

A Sampling

Provide samples at rates and sizes meeting the requirements of the Schedule of Materials Control or as required by the contract.

The Engineer, in conjunction with the Materials Engineer, will perform tests on samples taken from the product proposed for use. Submit to the Engineer a manufacturer's Certificate of Compliance for each sealer batch.

B Methods of Test

Perform tests meeting the requirements of ASTM D 5329, except, perform the bond test using sawed cement mortar blocks or asphalt HMA blocks (consistent with

the pavement type) prepared in accordance with the methods in the Laboratory Manual.

3721 PREFORMED ELASTOMERIC COMPRESSION JOINT SEALS FOR CONCRETE

3721.1 SCOPE

Provide preformed polychloroprene elastomeric joint seals for use in sealing joints in concrete pavements, bridges, and other structures.

3721.2 REQUIREMENTS

A Composition and Manufacture

Provide joint seals meeting the requirements of ASTM D 2628 and as specified in this section.

Provide seals that are preformed and manufactured from a vulcanized elastomeric compound using polymerized chloroprene as the only polymer.

B Size and Shape

Provide preformed elastomeric compression joint seals in the size, shape, and dimensional tolerances of the seals as shown on the plans or required by the contract. The Contractor may use alternate shapes, if approved by the Engineer.

C Physical Properties

Unless the contract requires otherwise, provide a $\frac{13}{16}$ in [20 mm] joint seal meeting the physical properties in accordance with ASTM D 2628 and the following table:

Table 3721-1	
$\frac{13}{16}$ in [20 mm] Joint Seal Compression-Deflection Requirements	
Property	Requirement
Force at 0.65 in [16.5 mm]*	≥ 4 lb/linear in [0.70 N/mm]
Force at 0.41 in [10.5 mm]*	≤ 20 lb/linear in [3.50 N/mm]
* Meeting the requirements of ASTM D 2628 and the Compression-Deflection Test Method located in the Laboratory Manual.	

D Identification and Marking

Provide joint seals marked with the following at intervals no greater than 4 ft [1.2 m]:

- (1) Manufacturer's name or the manufacturer's trademark,
- (2) Lot number, and
- (3) Date of production.

For multiple die extrusion machines, identify the seal produced from each extrusion die as an individual subplot, in addition to the list above. Limit individual lot numbers or subplot numbers to one every 8 h shift or every 6,000 ft [1,800 m], whichever results in the smallest lot size. Place a mark on the top surface of the seal at 1 ft [300 mm] intervals, to allow length measurements on each seal after installation.

Provide containers to package joint seals for shipment marked with the following information:

- (1) Name of the manufacturer,
- (2) Lot number or subplot number, and
- (3) Date of manufacture.

E Lubricant-Adhesive

Provide lubricant-adhesive meeting the requirements of ASTM D 2835 to install the seals.

3721.3 SAMPLING AND TESTING

The Engineer in conjunction with the Materials Engineer, may sample and test joint seals and lubricant-adhesive materials before or after delivery.

The Engineer in conjunction with the Materials Engineer, may reject an entire lot or subplot if a test result for that lot or subplot fails.

A Sampling

Provide samples at rates and sizes meeting the requirements of the Schedule for Materials Control or as required by the contract.

B Sample Preparation

The Engineer will prepare test specimens meeting the requirements of ASTM D 2628 and in accordance with the Laboratory Manual.

C Compression-Deflection Test

Perform compression-deflection testing on two specimens in accordance with the Laboratory Manual.

3722 SILICONE JOINT SEALANT

3722.1 SCOPE

Provide a silicone joint sealant for use in concrete pavement joints and cracks to protect the pavement from intrusion of water and incompressible material.

3722.2 REQUIREMENTS

Provide silicone joint sealant meeting the requirements of ASTM D 5893 and the following:

- (1) Primer-less,
- (2) Low modulus,
- (3) Does not contain solvents or diluents that can cause shrinkage or expansion during curing,
- (4) Smooth and uniform in appearance with a consistency that allows application with air pressure guns or hand caulking applicators,
- (5) Capable of withstanding repeated joint movement from -50 percent to 100 percent without losing adhesion to the concrete and without cohesion failure, and
- (6) Listed on the Approved/Qualified Products List.

3722.3 SAMPLING AND TESTING

Provide samples at rates and sizes meeting the requirements of the Schedule of Materials Control or as required by the contract.

3723 JOINT AND CRACK SEALER (HOT-POURED ELASTIC TYPE)

3723.1 SCOPE

Provide hot-poured elastic type joint and crack sealer to seal joints and cracks in concrete and bituminous pavements, bridges, and other structures.

3723.2 REQUIREMENTS

Provide a sealant material meeting the following requirements:

- (1) Listed on the Approved/Qualified Products List;
- (2) Composed of a combination of polymeric materials, fully reacted chemically to form a homogeneous compound;
- (3) When melted, ensure the sealant does not separate or settle and ensure the sealant does not contain a dispersed or settling component, and
- (4) Maintains a uniform consistency to seal joints and cracks without large air holes or discontinuities.

A Physical Requirements

Provide sealant meeting the requirements of ASTM D 6690, Type II and the following modifications:

Test	Requirement
Cone penetration at 77 °F [25 °C], 150 g, 5 s	60 – 90 dmm
Bond at –20 °F [–29 °C], 3 cycles, 100% extension	No adhesion or cohesion bond failure after 3 cycles
Mandrel bend test at –29 °F [–34 °C], 1 in [25 mm] mandrel	No cracking
Resilience at 77 °F [25 °C]	≥ 40%

B Packaging and Marking

Package and ship the sealant material in boxes no greater than 50 lb [23 kg]. Mark the containers with the following information:

- (1) Material name,
- (2) Manufacturer name,
- (3) Brand name,
- (4) Weight,
- (5) Batch number, and
- (6) Maximum heating temperature, as recommended by the manufacturer.

3723.3 SAMPLING AND TESTING

A Sampling

Provide samples in rates and sizes meeting the requirements of the Schedule of Materials Control, or as required by the contract.

The Engineer, in conjunction with the Materials Engineer, will perform tests on samples taken from the product proposed for use. Submit to the Engineer a manufacturer's Certificate of Compliance with each sealant batch.

B Methods of Test

B.1 Bond Test

Perform tests meeting the requirements of ASTM D 5329, except perform the bond test using sawed cement mortar blocks or asphalt HMA blocks (consistent with the pavement type) prepared using the methods found in the Laboratory Manual.

B.2 Mandrel Bend Test ASTM D 522, Method B

The Engineer, in conjunction with the Materials Engineer, will perform the Mandrel Bend Test at -29 °F [-34 °C] using a 1 in [25 mm] mandrel, bending the specimen 180° over 5 s. The Engineer will prepare test specimens meeting the requirements of ASTM D 6690, Type II, Flow Test, and condition the specimens at -29 °F [-34 °C] for at least 4 h.

3725 HOT-POURED, EXTRA-LOW MODULUS, ELASTIC-TYPE JOINT AND CRACK SEALER

3725.1 SCOPE

Provide hot-poured, extra-low modulus, elastic-type joint and crack sealer to seal joints in concrete pavement, bridges, other structures and rout and seal applications on bituminous pavements.

3725.2 REQUIREMENTS

Provide a sealant material meeting the following requirements:

- (1) Listed on the Approved/Qualified Products list;
- (2) Composed of a combination of polymeric materials, fully reacted chemically to form a homogeneous compound;
- (3) When melted, ensure the sealant does not separate or settle; and
- (4) Maintains a uniform consistency to seal joints and cracks without inclusion of large air holes or discontinuities.

A Physical Requirements

Provide sealant meeting the requirements of ASTM D 6690, Type IV with the following modifications:

Table 3725-1 ASTM D 6690 Type IV Modifications	
Test	Requirement
Cone penetration at 77 °F [25 °C], ASTM D 5329	100 – 150 dmm
Cone penetration at 0 °F [-18 °C], ASTM D 5329 modified	≥ 25 dmm
Resilience, ASTM D 5329	30% – 60%
NOTE: Ensure the material meets the requirements of Table 3725-1 after heating for 6 h with constant mixing in a laboratory melter at the manufacturer's maximum heating temperature.	

B Packaging and Marking

Package and ship the sealant material in boxes weighing no greater than 50 lb [23 kg]. Mark the boxes with the following information:

- (1) Material name,
- (2) Manufacturer name,
- (3) Brand name,
- (4) Weight,
- (5) Batch number, and
- (6) Maximum heating temperature recommended by the manufacturer.

3725.3 SAMPLING AND TESTING

Provide samples at rates and sizes meeting the requirements of the Schedule of Materials Control or as required by the contract.

The Engineer, in conjunction with the Materials Engineer, will perform tests on samples taken from the product proposed for use. Submit to the Engineer a manufacturer's Certificate of Compliance with each sealant batch.

Perform tests meeting the requirements of ASTM D 5329, except perform the bond test using sawed cement mortar blocks or asphalt HMA blocks (consistent with the pavement type) prepared using the methods found in the Laboratory Manual.

3726 PREFORMED GASKET SEALS FOR CONCRETE PIPE

3726.1 SCOPE

Provide preformed gasket seals to construct watertight joints for concrete pipe.

3726.2 REQUIREMENTS

Provide preformed gasket type seals to construct flexible, watertight joints in concrete pipe meeting the requirements of AASHTO M 315 and as shown in the plans for the specific joint design of the pipe.

3726.3 SAMPLING AND TESTING — (BLANK)

3728 BITUMINOUS MASTIC JOINT SEALER FOR PIPE

3728.1 SCOPE

Provide cold applied, mineral filled, joint sealing compound for joints of bell and spigot or tongue and groove, concrete or clay culvert, sewer, or drain pipe.

3728.2 REQUIREMENTS

Provide a bituminous mastic joint sealer consisting of refined petroleum asphalt meeting the requirements of ASTM D 4586, except for the following modifications:

Table 3728-1 ASTM D 4586 Modifications	
Test	Requirement
Grease cone penetration (unworked) 150 g, 77 °F [25 °C], 5 s, ASTM D 217	175 dmm – 300 dmm
Density	≥ 8.75 lb per gal [1.0 kg per L]
Non-volatile content	≥ 65%
Ash content, by ignition	25% – 45%
Cure Evaluation at 77 °F [25 °C]	Tough, plastic coating, free of blisters

Do not use coal tar products.

Provide material exhibiting 100 percent adhesion and cohesion when applied to metal, concrete, or vitrified clay surfaces.

3728.3 SAMPLING AND TESTING

Submit to the Engineer a manufacturer's Certificate of Compliance.

Apply the bituminous mastic joint sealer in a layer $\frac{1}{16}$ in to $\frac{1}{8}$ in [2 mm to 3 mm] thick on a tinned metal panel. Cure the joint sealer at 77 °F [25 °C] for 24 h. An

acceptable bituminous mastic joint sealer will set to a tough, plastic coating, free of blisters.

3731 CAULKING COMPOUND

3731.1 SCOPE

Provide caulking compound meeting the requirements of Federal Specification A-A-272, in the type required by the contract.

3731.2 REQUIREMENTS

Apply the caulking compound in accordance with the manufacturer's recommendations.

Unless the contract requires otherwise, use near white, light gray, or buff colored caulking compound.

3731.3 SAMPLING AND TESTING — (BLANK)

3733 GEOTEXTILES

3733.1 SCOPE

Provide geotextiles (permeable fabrics) for the typical uses classified as follows:

- (1) Type 1 for wrapping subsurface drain pipe, joints of concrete pipe culvert, or other drainage applications;
- (2) Type 2. The Department no longer uses this classification. If the contract specifies Type 2, use Type 3 property requirements;
- (3) Type 3 for use under Class I and Class II random riprap, gabions, andrevet mattresses;
- (4) Type 4 for use under Class III and Class IV random riprap and hand-placed riprap on slopes no steeper than 3:1, horizontal to vertical;
- (5) Type 5 for separating materials for stabilization;
- (6) Type 6 for earth reinforcement;
- (7) Type 7 for use under Class III and Class IV random riprap on slopes steeper than 3:1, horizontal to vertical, and under Class V random riprap.

3733.2 REQUIREMENTS

A General

Provide geotextiles consisting of woven, nonwoven, or knit fabric of polymeric filaments or yarns, such as polypropylene, polyethylene, polyester, or polyamide, that form a stable network. Only use knit fabric as perforated pipe wrap. Provide geotextile resistant to biological and chemical environments normally found in soils, and that is free of chemical treatment or coating that may significantly reduce porosity or permeability.

Provide geotextile that is uniform in texture, thickness, and appearance, and is free of defects, flaws, or tears that may alter the strength or filtering properties. Repair geotextile as approved by the Engineer.

Deliver rolls of geotextile or geotextile-wrapped perforated pipe with an opaque plastic covering to protect the material from ultraviolet rays or contamination with mud, dirt, dust, or debris. Provide rolled geotextile labeled on the outside wrap and inside the core in accordance with ASTM D 4873 and as follows:

- (1) Manufacturer,
- (2) Product name, and
- (3) Roll number.

Ensure unprotected geotextile is not exposed to sun for more than seven days. Replace contaminated geotextile or geotextile exposed to the sun for more than seven days, if directed by the Engineer.

Provide geotextile meeting the requirements of Table 3733-1 for the type required by the contract.

If using Type 5 or Type 6 geotextile, produce seams meeting the requirements of Table 3733-1, row B3, "Seam Breaking Strength Minimum."

**Table 3733-1
Geotextile Properties**

<p>* Minimum Average Roll Values (MARV) based on average of at least three tests per swatch.</p> <p>† Provide socks made of knit polymeric materials and meeting the requirements of ASTM D6707-06, for Type H: fabric. Ensure the sock exhibits minimum snag or run potential, is factory-applied to maintain uniform installed mass, and conforms to the outside diameter of the tubing with a snug fit.</p> <p>‡ Needle-punched nonwoven. Do not use thermally bonded (heat-set) fabric.</p> <p>§ Requirements are site-specific and will be as specified in the contract. The property values may not be less than shown for Type 5. If the contract does not specify either B1 or B7, use a default value of 300 lb [1.3 kN] for B1. If the contract does not specify a seam strength, use a default value of 270 lb [1.2 kN] for B3.</p> <p> Adhere to this requirement if the contract requires or allows seams. Strength specifications apply to factory and field seams. Use thread for sewing that has a strength of at least 25 lb [110 N]. Sew seams with a Federal Type 401 stitch using a two-spool sewing machine, and install seams facing upward. For seaming with adhesives, see the Approved/Qualified Products List available at the Department's website.</p> <p># For U.S. sieve sizes, the AOS Number must be equal to or greater than the number specified.</p> <p>** Permittivity: P = K/L, where K = fabric permeability and L = fabric thickness.</p>
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3733.3 SAMPLING AND TESTING

A Certificate of Compliance

Ensure the supplier submits to the Engineer a Certificate of Compliance and a document stating the manufacturer's MARV with each shipment of geotextile. MARV are two standard deviations below the mean value of all rolls tested. Provide a copy of the Certificate of Compliance and MARV with each geotextile sample sent to the Materials Laboratory for testing.

B Sampling and Testing

The Department's inspection and test results will determine acceptance of the geotextile, in accordance with 1603.4, "Acceptance." In the presence of the Engineer, randomly select samples in the field at the rates and sample sizes shown in the Schedule of Materials Control. Cut samples across the full width of the roll. Do not sample the first full turn (outside layer) of the roll. Provide seam samples in addition to the regular sample. Use the same machine, or an equal machine to the one on the project, to join seam samples.

3741 ELASTOMERIC BEARING PADS

3741.1 SCOPE

Provide elastomeric bearing pads for use in bridges and other structures.

3741.2 REQUIREMENTS

A General

Provide bearing pads no greater than ½ in [13 mm] thick, fabricated of all elastomer. Provide bearings of laminated construction when pads are greater than ½ in [13 mm] thick. Refer to AASHTO *Standard Specifications for Transportation Materials and Methods of Sampling and Testing* - Part 1A, M251 for tolerances for dimensions and configurations, except provide elastomer to a thickness of ¼ in [6 mm] within a range from +⅛ in to -¹/₁₆ in [+3 mm to -2 mm] to cover the top and bottom steel plates.

Provide laminated pads meeting the following requirements or characteristics:

- (1) Consisting of alternate layers of elastomer and metal reinforcement integrally bonded together,

- (2) Containing reinforcement spaced as shown on the plans, and parallel to the top and bottom surfaces of the pad, and
- (3) Including the manufacturer's name or trademark molded into the edge of the pad.

Do not expose the finished laminated pad to instantaneous temperatures greater than 400 °F [205 °C].

The Contractor may cut elastomer pads from larger sheets cast to the thickness shown on the plans. Avoid heating or damaging the material when cutting. Ensure the cutting produces smooth edges at least meeting the requirements of ANSI 250 finish.

Cover the edges of metal reinforcement with ¼ in [6 mm] of elastomer.

B Physical Properties

B.1 Elastomer

Provide elastomer for bearing pads meeting the requirements of AASHTO M 251 with durometer hardness of 60 ± 5 on the Shore "A" scale. Provide elastomer compounds classified as low-temperature Grade 4 meeting the grade requirements of AASHTO *LRFD Bridge Design Specifications*, Table 14.7.5.2-1, "Low temperature Zones and Minimum Grade of Elastomer."

B.2 Metal Reinforcement

Provide mild steel plates at least ¼ in [3 mm] thick for use as metal reinforcement.

B.3 Complete Pad

When testing a full size pad in compression meeting the requirements of the Materials Laboratory, ensure the compressive strain is in accordance with the following:

Table 3741-1		
Maximum Allowable Compressive Strain		
Shape Factor	Maximum Applied Load, <i>percent</i>	
	800 psi [5.5 MPa]	1,200 psi [8.3 MPa]
6	6	8.5
7	5	7
8	4	5.5
9	3.5	5

For shape factors other than those specified in Table 3741-1, extrapolate the allowable compressive strain percentage from an appropriate curve that defines the data specified in Table 3741-1, as identified in AASHTO *LRFD Bridge Design Specifications*. If tested with an applied load of 1,500 psi [10 MPa], ensure the pad does not crack or bulge nonuniformly.

C Certification

Submit to the Engineer a manufacturer's Certificate of Compliance.

3741.3 SAMPLING AND TESTING

A Sampling

Use a bearing pad supplier listed on the Approved/Qualified Products List. Obtain one bearing pad, one laminated pad, or both and the manufacturer's test report from the pad supplier. Submit the pad samples and test report to the Office of Materials for testing. Ensure the pad samples are taken from the heat of the material being supplied to the project.

B Testing

Provide test specimens meeting the requirements of ASTM D 2240. The Engineer will perform tests meeting the requirements of ASTM D 412.

3751 BURLAP CURING BLANKETS

3751.1 SCOPE

Provide burlap cloth for use as a curing cover on portland cement concrete.

3751.2 REQUIREMENTS

Provide burlap cloth meeting the requirements of AASHTO M 182, Class 3 for use as a curing cover on portland cement concrete.

3751.3 SAMPLING AND TESTING

Provide samples for testing meeting the requirements of the Schedule of Materials Control.

3753 TYPE 1-D MEMBRANE CURING COMPOUND

3753.1 SCOPE

Provide clear or translucent liquid membrane forming curing compounds with a Type 1-D fugitive dye for spray application on portland cement colored or stamped concrete surfaces, where a finished white surface would mask the decorative finished concrete surface when exposed to the air.

3753.2 REQUIREMENTS

A General

Provide membrane curing compound meeting the following requirements:

- (1) All membrane-curing compounds pre-approved by the Department before use. The most current approved lots and batches with product expiration dates are available on the Approved/Qualified Products List,
- (2) Meets the requirements of the Department's Curing Compound Manufacturer Approval Program, as listed in the Approved/Qualified Products List, including pre-testing of materials by the manufacturer,
- (3) Meets the requirements of ASTM C 309, Type 1-D Curing Compound, and
- (4) The Engineer will not allow the use of curing compound that is over 1 year from the manufacture date.

The Contractor may use Type 1-D curing compound in other concrete applications as approved by the Engineer or as shown on the special provisions. Use of any other Type 1 curing compound is at the discretion of the Engineer, in conjunction with the Concrete Engineer.

3753.3 SAMPLING AND TESTING

Provide samples for testing meeting the requirements of the Schedule of Materials Control.

Test the material at an application rate of 200 sq. ft per gal [5 sq. m per L].

3754 POLY-ALPHA METHYLSTYRENE (AMS) MEMBRANE CURING COMPOUND

3754.1 SCOPE

Provide poly-alpha methylstyrene liquid membrane curing compounds for spray application on portland cement concrete surfaces exposed to the air.

3754.2 REQUIREMENTS

Provide membrane-curing compound meeting the following requirements:

- (1) All membrane-curing compounds pre-approved by the Department before use. The most current approved lots and batches with product expiration dates are available from the Approved/Qualified Products List.
- (2) Meets the requirements of the Department's Curing Compound Manufacturer Approval Program, including pre-testing of all materials by the manufacturer.
- (3) Meets the requirements of ASTM C 309 for the type required by the contract.
- (4) The Engineer will not allow the use of curing compound that is over 1 year from the manufacture date.
- (5) White pigmented Type 2, Class B.
- (6) Resin is 100 percent poly-alpha methylstyrene and formulated to maintain the specified properties of Table 3754-1.

Table 3754-1 Requirements for 3754 AMS Curing Compound	
Properties	Range
Total solids, % by weight of compound	≥ 42
% reflectance in 72 h (ASTM E 1347)	≥ 65
Loss of Water, kg/sq. m in 24 h (ASTM C 156)	≤ 0.15
Loss of Water, kg/sq. m in 72 h (ASTM C 156)	≤ 0.40
Settling Test, ml/100 ml in 72 h*	≤ 2
V.O.C. Content, g/L	≤ 350
Infrared Spectrum, vehicle	100% α methylstyrene
<p>* Test in accordance with the method on file at the Materials Laboratory.</p> <p> Match the infrared scan for the dried vehicle from the curing compound to the infrared scan on file at the Materials Laboratory.</p>	

3754.3 SAMPLING AND TESTING

Provide samples for testing meeting the requirements of the Schedule of Materials Control.

Test the material at an application rate of 200 sq. ft per gal [5 sq. m per L].

3755 LINSEED OIL MEMBRANE CURING COMPOUND

3755.1 SCOPE

Provide extreme service white pigmented, heavy bodied linseed oil emulsion for application as a membrane cure and sealer.

3755.2 REQUIREMENTS

Provide membrane curing compounds meeting the following requirements:

- (1) All membrane-curing compound pre-approved by the Department before use. The most current approved lots and batches with product expiration dates are available on the Approved/Qualified Products List.
- (2) Meets the requirements of the Department's Curing Compound Manufacturer Approval Program, including pre-testing of materials by the manufacturer.
- (3) Composed of a blend of boiled linseed oil and high viscosity, heavy bodied linseed oil emulsified in a water solution meeting the requirements of ASTM C 309, Type 2, except the Department will waive the drying time.
- (4) The Engineer will not allow the use of curing compound that is over 1 year from the manufacture date.
- (5) Sprayable at temperatures of at least 40 °F [4 °C].
- (6) Formulated to maintain the specified properties of Table 3755-1.

Table 3755-1 Chemical Requirements of Linseed Oil Membrane Curing Compound (volumes exclusive of added pigment)	
Material Requirements	Percent by Weight
Oil phase (50% ± 4% by volume):	
Boiled linseed oil	80
Z-8 viscosity linseed oil	20
Water phase (50% ± 4% by volume)	100

3755.3 SAMPLING AND TESTING

Provide samples for testing meeting the requirements of the Schedule of Materials Control.

Test membrane curing compound at an application rate of 200 sq. ft per gal [5 sq. m per L].

3756 PLASTIC CURING BLANKETS

3756.1 SCOPE

Provide white polyethylene sheeting for use as a curing cover on portland cement concrete.

3756.2 REQUIREMENTS

Provide white polyethylene sheeting meeting the requirements of AASHTO M 171, "White Opaque Polyethylene Film."

3756.3 SAMPLING AND TESTING

Provide samples for testing meeting the requirements of the Schedule of Materials Control.

3757 MEMBRANE WATERPROOFING SYSTEM

3757.1 SCOPE

Provide a membrane waterproofing system to be used for waterproofing below-grade joints in concrete structures, tunnels, and other below grade applications on concrete structures.

3757.2 REQUIREMENTS

Provide a membrane waterproofing system meeting the following requirements:

- (1) Listed on the Approved/Qualified Products List, and
- (2) Consists of a primer, a rubberized asphalt membrane on a cross-laminated polyethylene carrier film, a pointing mastic, and a protection course.

A Primer

Provide a solvent-based primer meeting the requirements of federal and Minnesota Pollution Control Agency VOC regulations and specially formulated for use with the waterproofing system being used.

B Membrane

Provide waterproofing system with a membrane meeting the requirements of Table 3757-1:

Table 3757-1 Waterproofing Membrane Requirements		
Property	Specification	Test Method
Thickness	≥ 56 mil [1.42 mm]	ASTM D 3767, Method A
Tensile strength	≥ 250 psi [1.7 MPa]	ASTM D 412, Die C
Elongation	≥ 300%	ASTM D 412, Die C
Composition	Rubber asphalt	Infrared scan

C Carrier Film

Provide membrane waterproofing system with carrier film meeting the requirements of Table 3757-2:

Table 3757-2 Waterproofing Carrier Film Requirements		
Property	Specification	Test Method
Thickness	≥ 4 mil [0.1 mm]	ASTM D 3767, Method A
Composition	Polyethylene	Infrared scan

D Composite Membrane

Provide membrane waterproofing system with a composite membrane meeting the requirements of Table 3757-3:

Table 3757-3 Waterproofing Composite Membrane Requirements		
Property	Specification	Test Method
Pliability, 180° bend, 1 in [25 mm] mandrel at -25 °F [-32 °C]	Unaffected	ASTM D 146
Permeance	0.05 – Perms	ASTM E 96, Method B
Peel adhesion	≥ 5 lb/in [kg/mm]	ASTM D 903 Modified*
Water absorption	-0.1%, 72 h	ASTM D 1970
* 90 percent peel after 7 days at 70 °F [21 °C], plus 7 days at 120 °F [49 °C], plus 7 days at 70 °F [21 °C] (dry) (wet). The 180° peel strength is run at a rate of 12 in [300 mm] per minute.		

3757.3 SAMPLING AND TESTING

Provide samples in rates and sizes meeting the requirements of the Schedule of Materials Control, or as required by the contract.

The Engineer, in conjunction with the Materials Engineer, may perform tests on samples taken from the product proposed for use or on samples submitted and certified by the manufacturer as representative of the membrane waterproofing system to be supplied.

3760 INSULATION BOARD (POLYSTYRENE)

3760.1 SCOPE

Provide extruded polystyrene insulation board for use on highway insulation applications.

3760.2 REQUIREMENTS

Provide extruded polystyrene insulation board used for highway insulation applications meeting the requirements of AASHTO M 230, except the Department will not apply the requirement for flammability. The contract will identify the selected type of insulation board and the insulation board strength as listed in AASHTO M 230.

3760.3 SAMPLING AND TESTING

Provide samples meeting the requirements of the Schedule of Materials Control.