APPROVED:
Division Administrator

Digitally signed by AARON MICHAEL DAWSON
Date: 2026.02.24 08:12:18 -05'00'

By: _____

FEDERAL HIGHWAY ADMINISTRATION

Supplemental Technical Specification for

Liquid Membrane Waterproofing Systems for Bridge Decks

SCDOT Designation: SC-M-728 (07/26)

1. DESCRIPTION

Liquid Membrane Waterproofing Systems for Bridge Decks are defined as thin impermeable membranes that are placed by spraying or rolling/brushing fast curing liquid polymers to protect the bridge deck from penetration of moisture and deicing chemicals.

Furnish and install the waterproofing systems in accordance with the plans, special provisions, Qualified Products Policy 111 (Liquid Membrane Waterproofing Systems for Bridge Decks), and as specified herein.

2. MATERIALS

The following applies to liquid membrane waterproofing systems to be applied to the tops of adjacent cored slab units, adjacent box beam units or any other concrete bridge deck prior to placement of a hot mix asphalt overlay.

Provide a waterproofing system from Qualified Products List 111 (Liquid Membrane Waterproofing Systems for Bridge Decks) that consists of:

- Primer
- One or two coats of rapid curing cold liquid applied seamless methyl methacrylate or polyurethane methyl methacrylate combo membrane
- Aggregate keycoat
- Polymer modified tack coat

Provide a waterproofing system that can easily accommodate the need for day joints and patch repairs and is capable of bridging live cracks up to ⅛ in. in width.

Ensure that the chemical composition of the primer, membrane, aggregate keycoat, and tack coat that comprises the waterproofing system conforms to the manufacturer's specifications and that all components are approved by the manufacturer as being compatible. Confirm that any cleaning solvents are approved by the manufacturer prior to use.

Provide a primer that promotes adhesion of the membrane to the concrete surface. Ensure that the primer meets the requirements in Table 1.

Table 1: Primer Material Properties

Property	Test	Requirements
Gel Time		> 5 minutes
Tack Free Time		≤ 2.5 hours at 77 °F
Adhesion to Concrete	ASTM D7234	Failure in concrete

Provide a liquid waterproofing membrane that meets the requirements in Table 2.

Table 2: Liquid Waterproofing Membrane Material Properties

Property	Test	Requirements
Solids Content		100%
Stability	ASTM C836	≥ 6 months
Crack Bridging (Neat Material + Aggregated Keycoat)	ASTM C1305 (see Note 1)	Pass, no cracking
Extensibility after Heat Aging	ASTM C1522	For information only
Percent Elongation at Break	ASTM D638	≥ 300%
Tensile Strength	ASTM D638	≥ 1,100 psi
Shore Hardness	ASTM D2240 (see Note 2)	≥ 50 Type 00
Minimum Thickness (Membrane only)	ASTM D6132 or other approved method	≥ 80 mils minimum measured over peaks; or ≥ thickness used to pass ASTM C1305 (Whichever thickness is greater)
Membrane Waterproofing System Adhesion to Concrete	ASTM D7234	Failure in concrete
Permeance	ASTM E96	≤ 0.25 perms
Note 1: Modify ASTM C1305 to 80 cycles at -15°F no failure at ⅛ in per hour. Note 2: Modify ASTM D2240 per ASTM C836 section 6.5.		

Provide a broadcast aggregate keycoat that is durable and provides shear resistance to prevent the hot mix asphalt from shoving. Ensure aggregate has a minimum Mohs hardness rating of 7.

Provide a tack coat that consists of either a polymer modified asphalt emulsion, or a polymer modified asphalt binder meeting the manufacturer's recommendations.

Ensure that the liquid membrane waterproofing system bonds with the asphalt overlay meeting the requirements in Table 3. Use an asphalt type for the testing requirements in Table 3 that is representative of the asphalt to be used in the overlay.

Table 3: System Material Properties

Property	Test	Requirements
Shear Strength	AASHTO T 407	> 290 psi

3. CONSTRUCTION

Install the waterproofing system in accordance with the manufacturer's instructions. Perform the handling, mixing, and addition of membrane components in a safe manner to achieve the desired results in accordance with the manufacturer's recommendations. Take care to prevent adjacent areas from being over sprayed or other contamination.

Apply the waterproofing system along the entire length of bridge deck from curb to curb. Apply the waterproofing system on traffic face of bridge railing or along curb, when sidewalk is present, for a height of 2 in. from concrete deck surface. Do not apply between open joints in railing or over transverse bridge joints. Apply a neat finish line.

3.1. Submittals

Submit the following documentation to the Resident Construction Engineer (RCE) prior to installation of the waterproofing system:

- The waterproofing system to be installed.
- The manufacturer's installation instructions for the applicable waterproofing system including storage and protection instructions, as well as handling and mixing instructions.
- Safety data sheets for all components.
- Cleaning solvents approved by the waterproofing system manufacturer.
- Manufacturer's written approval of the Applicator's qualifications, including name of foreman and any key personnel needed for application.
- List of application equipment to be used.
- Manufacturer's written approval of the proposed polymer modified tack coat and the application rate.
- Certificate of compliance certifying that the aggregate for the keycoat meets the required hardness.

3.2. Installation Oversight

Either have the Manufacturer's installation crew install the entire liquid waterproofing system or have a Manufacturer's representative on site during the installation of all components of the waterproofing system.

3.3. Material Delivery and Storage

Deliver all components of the waterproofing system to the site in the manufacturer's original packaging, clearly identified with the products type and batch number. Store all components in an area that is cool, dry, out of direct sunlight, and comply with relevant health and safety regulations and

manufacturer's requirements. Provide copies of safety data sheets for all components to the RCE. Keep safety data sheets on site at an accessible location.

3.4. Application of Waterproofing Membrane

Installation procedure includes the preparation of the bridge deck surface and application of primer, liquid waterproofing membrane, aggregate keycoat, and polymer modified tack coat.

Apply the waterproofing system only after concrete application surface has aged for 28 days.

Apply the waterproofing system in the following conditions:

- The application surface is dry - the bridge deck surface has a moisture content of 5% or less, as confirmed by a portable electronic surface moisture meter supplied by the Contractor.
- Rain or fog is not occurring or expected during the application and curing period.
- Forecasted wind gusts are no greater than that recommended by manufacturer during application.
- The ambient temperature is 40°F or greater and is forecast to remain 40°F or greater during the application and curing period.
- The temperature of the bridge deck surface exceeds the dew point by at least 5°F.

A. Bridge Deck Surface Preparation

Repair all spalls and depressions in the bridge deck surface prior to the application of the primer. Fill depressions to a smooth flush surface with 1:2 mortar (one part cement to two parts sand) or an approved rapid setting patching mortar that is compatible with the waterproofing system. Remove rough spots, projections, or other defects which might cause puncture of the membrane so that the surface profile of the prepared deck surface shall not exceed a ¼ inch amplitude, peak to valley. Fill the shear keys of adjacent box beams or cored slabs with grout per the plans and specifications flush with the top of the beams not to exceed a ¼ inch elevation difference, free of rough spots, projections or other defects. If adjacent box beams and cored slabs have different elevations due to camber issues and with agreement of RCE, smooth the grout and transition the elevation difference with slope grade of not more than V:H=1:8 between the adjacent beams in any direction. Place expansion joint material in joints at bent locations as noted in the plans and specifications prior to applying the waterproofing system.

Immediately prior to the application of the primer, clean the bridge deck surface of all existing bond inhibiting materials in accordance with ASTM D4259 or as required by the manufacturer and RCE. Ensure that the surface preparation produces a clean dry surface and that the bridge deck surface is free of asphaltic product, surface laitance, oil staining, soiling, and dust.

B. Primer Application

Apply the primer in a continuous and unbroken full film and ensure full coverage. Apply in one coat as recommended in the manufacturer's written instructions. Measure and mix the primer components in accordance with the manufacturer's recommendations. Apply the primer using a single or multiple component spray system approved for use by the manufacturer. Alternately, brush or roller application may be allowed, if approved in writing by the manufacturer. Allow the primer to cure tack-free for the greater of 30 min or as required by the manufacturer's instructions,

prior to application of the first lift of liquid waterproofing membrane.

Apply a second coat of primer if the first coat is absorbed by the concrete or as required by the RCE. If a second coat is required, allow drying time per manufacturer's instructions, prior to applying liquid waterproofing membrane.

Apply the first lift of liquid waterproofing membrane within 24 hours of applying the primer coat. If 24 hours is exceeded, re-prime per the manufacturer's instructions prior to applying the first lift of liquid waterproofing membrane.

C. Liquid Waterproofing Membrane Application

Mix and apply the liquid waterproofing membrane following the manufacturer's instructions. Use spray equipment that can be controlled so that the quantities applied may be monitored and allow for coverage rates to be checked.

Visually inspect the cured surface following the application of the liquid waterproofing membrane for defects or pinholes. If any defects or pinholes are found, mix an appropriate quantity of membrane material and repair in accordance with Section 3.4, Part D: Repairs.

For multi-stage construction of the bridge deck surface, overlap the subsequent stage membrane over the existing cured membrane by 6 in to form a continuous layer. Clean the existing membrane of all contamination, including tack coat material and dirt to an edge distance of a least 6 in. Wipe clean area with a solvent as approved by the manufacturer.

D. Repairs

If an area of liquid waterproofing membrane requires repair or if the membrane becomes damaged, perform a patch repair to restore the integrity of the membrane. Cut the damaged area back to sound material and wipe with a solvent, approved by the manufacturer up to a distance of at least 6 in beyond the periphery of the removed material to remove contaminants. Prime the concrete deck surface as necessary and reapply by the liquid waterproofing membrane. Apply new membrane with a 6 in overlap onto the existing membrane. Ensure all repairs comply with the manufacturer's guidelines. Ensure that repair patches meet the minimum thickness of the original applied membrane.

Repair any pin holes or holidays in the membrane in accordance with the manufacturer's instructions.

E. Applying Aggregate for Keycoat

Apply an additional layer of liquid waterproofing membrane, or resin approved by the manufacturer, to a thickness recommended by the manufacturer into which an aggregate keycoat is broadcast. Apply aggregate at a rate designated by the manufacturer. Remove loose aggregate prior to applying the tack coat.

For multi-stage construction, apply the aggregate keycoat of the previous stage to a limit of 6-in. from the stage construction joint to allow the subsequent stage membrane material to bond directly to the existing membrane. Apply the aggregate keycoat for the subsequent stage to the limit of the previous stage's aggregate keycoat.

F. Applying Tack Coat

Apply the polymer modified tack coat in accordance with the membrane manufacturer's recommendation.

G. HMA Pavement Over Membrane

Place the HMA overlay in accordance with the plans and specifications. During paving, apply a light soap liquid to the paving equipment wheels to prevent tack coat pick-up.

Apply hot mix asphalt (HMA) overlay within 24 hours of the liquid membrane waterproofing period, unless approved otherwise in writing by the RCE. Do not allow any equipment or material on the waterproofed area until the HMA overlay is placed.

3.5. Protection of Exposed Surfaces

Exercise care in the application of the waterproofing system to prevent surfaces not receiving treatment from being spattered or marred. Clean any spatters on these surfaces to the satisfaction of the RCE.

4. Measurement

Liquid Membrane Waterproofing (Bridge Deck) will be measured by the square yard of the membrane system complete in place, including 2" extending up the face of the barrier or curb.

5. Payment

Payment for the accepted quantity for Liquid Membrane Waterproofing (Bridge Deck) is full compensation for installation of the primer, liquid waterproofing membrane, aggregate keycoat, polymer modified tack coat, and for all materials, labor, equipment, safety devices, tools, and incidentals necessary to complete the work as specified.

Pay items under this Section include the following:

Item No.	Pay Item	Unit
7283000	Liquid Membrane Waterproofing (Bridge Deck)	SY