

Special Specification 3002

Spray Applied Underseal Membrane



1. DESCRIPTION

Construct an underseal membrane composed of a warm spray-applied polymer-modified emulsion meeting the requirements of Table 1. The membrane is applied through a spray-paver and is covered immediately with a mixture of aggregate, asphalt binder, and additives mixed hot in a mixing plant.

Table 1
Polymer-Modified Emulsions Requirements

Test on Emulsion	Test Method	Min	Max
Viscosity @ 77°F, SSF	Tex-513-C	20	100
Storage Stability ¹ , %	Tex-521-C		1
Demulsibility ² Anionic emulsions — 35 ml of 0.02 N CaCl ₂ , % Cationic emulsions — 35 ml 0.8% sodium dioctyl sulfosuccinate, %	Tex-521-C	55	
Sieve Test ³ , %	Tex-521-C		0.05
Distillation Test ⁴ Residue by distillation, % by wt. Oil portion of distillate, % by vol.	Tex-521-C	63	0.5
Test on Residue from Distillation	Test Method	Min	Max
Elastic Recovery @ 50°F, 50 mm/min., %	Tex-539-C	60	
Penetration @ 77°F, 100 g, 5 sec, 0.1 mm	Tex-502-C	100	150

- After standing undisturbed for 24 hr., the surface must be smooth, must not exhibit a white or milky colored substance, and must be a homogeneous color throughout.
- Material must meet demulsibility test for emulsions.
- May be required by the Engineer only when the emulsion cannot be easily applied in the field.
- The temperature on the lower thermometer should be brought slowly to 350°F ±10°F and maintained at this temperature for 20 min. The total distillation should be complete in 60 ±5 min. from the first application of heat.

2. EQUIPMENT

- Spray Paver.** In addition to the requirements of Item 320, "Equipment for Asphalt Concrete Pavement," furnish a spray paver that will spray the membrane and apply the type and grade of mix shown on the plans and level the surface of the pavement layer in a single pass. Configure the spray paver so that the mixture is placed no more than 5 sec. after the membrane is applied.
- Membrane Storage Tank and Distribution System.** Equip the spray paver with an insulated storage tank having a minimum capacity of 900 gal., unless otherwise approved. Provide a metered mechanical pressure sprayer on the spray paver to apply the membrane at the specified rate. Locate the spray bar on the spray paver so that the membrane is applied immediately in front of the screed unit. Provide a read out device on the spray paver to monitor the membrane application rate.

Unless otherwise directed, furnish a volumetric calibration and strap stick for the tank in accordance with Tex-922-K, Part I. Calibrate the tank within the previous 5 yr. of the date first used on the project. The Engineer may verify calibration accuracy in accordance with Tex-922-K, Part II.

3. CONSTRUCTION METHODS

- Surface Preparation.** Remove existing raised pavement markers. Repair any damage incurred by removal as directed. Remove dirt, dust, or other harmful material before sealing. When shown on the plans, remove vegetation and blade pavement edges.

- 3.2. **Membrane Placement.** Unless otherwise directed, uniformly apply the membrane at a rate between 0.15 and 0.25 gal. per square yard. The Engineer may adjust the application rate, taking into consideration the existing pavement surface conditions. Spray the membrane using a metered mechanical pressure spray bar at a temperature between 140°F to 180°F. Monitor the membrane application rate and adjust the rate when needed or when directed. If required, verify that the spray bar is capable of applying the membrane at a uniform rate across the entire paving width as directed. Do not let the wheels or other parts of the paving machine contact the freshly applied membrane. Apply a uniform membrane coat to all contact surfaces and all joints as shown on the plans. Prevent splattering of the membrane when placed adjacent to curb, gutter, and other structures.
- 3.3. **Quality Control.** Perform the quality control tests listed in Table 2. If operational tolerances in Table 2 are exceeded, adjust processes or cease production when directed. The Engineer may perform independent tests to confirm contractor compliance and may require testing differences or failing results to be resolved before resuming production.
- 3.4. **Membrane Sampling.** Obtain a 1-qt. sample of the polymer-modified emulsion for each lot of mixture produced. The Engineer will witness the sampling of polymer-modified emulsion. Take the sample from the emulsion tank located on the paving machine, but not from the emulsion spraybar. Obtain the sample at approximately the same time the mixture random sample is obtained. Take all samples in accordance with Tex-500-C, Part III. Label the can with the corresponding lot and subplot numbers, and immediately deliver the sample to the Engineer. The Engineer will randomly choose at least 1 sample per project and test it to verify compliance with Table 1.

Table 2
Operational Tolerance and Minimum Testing Frequency

Test Description	Test Method	Minimum Testing Frequency	Operational Tolerance
Membrane Application Rate	Tex-247-F	1 per day	±0.02
Emulsion Membrane Sampling ¹	Tex-500-C	1 per day (sample only)	Table 1

1. The Engineer may reduce or waive the sampling and testing requirements based on a satisfactory history.

4. MEASUREMENT

Unless otherwise noted on the plans, underseal membrane material will be measured by one of the following methods:

- 4.1. **Volume.** Underseal membrane material will be measured at the applied temperature by strapping the tank before and after road application and determining the net volume in gallons from the distributor's calibrated strap stick. The Engineer will witness all strapping operations for volume determination.

If the meter and readout device is accurate within 1.5% of the strapped asphalt volume, the Engineer may allow use of the meter and readout to determine asphalt volume used and application rate.

The Engineer may require redetermination of meter readout at any time and will require volume determinations by strapping if the meter is not accurate to within 1.5% of strapped volume.

- 4.2. **Weight.** Underseal membrane material will be measured in tons using certified scales meeting the requirements of Item 320, "Equipment for Asphalt Concrete Pavement," unless otherwise approved. The transporting truck must have a seal attached to the driving device and other openings. The Engineer may require random checking on public scales, at the Contractor's expense, to verify weight accuracy.

Upon completion or temporary suspension, any remaining membrane material will be weighed by a certified public weigher or measured by volume in a calibrated tank, and the quantity converted to tons at the measured temperature. The quantity to be measured will be the number of tons received, minus the number of tons remaining after all directed work is complete, and minus the amount used for other Items.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided above will be paid for at the unit bid price for "Membrane Underseal." These prices are full compensation for all materials, equipment, labor, tools, and incidentals necessary to complete the work.