

ONYX MASTIC SURFACE TREATMENT

1.0 DESCRIPTION

Apply a mixture of asphalt emulsion, mineral aggregate, water, and other additives spray applied on a prepared surface as specified in the Contract Documents.

BID ITEM

Mastic Surface Treatment

UNITS

Gallons or Pounds per
Square Yard

1.1 REFERENCES

A. AASHTO Standards

- a. AASHTO R 5: Selection and Use of Emulsified Asphalts
- b. AASHTO T 11: Materials Finer Than 75 μm (No. 200) Sieve in Mineral Aggregate
- c. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates
- d. AASHTO T 308: Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method.
- e. AASHTO T 49: Penetration of Bituminous Materials
- f. AASHTO T 59: Standard Method of Test for Emulsified Asphalts

B. ASTM Standards

- a. ASTM D2397: Standard Specification for Cationic Emulsified Asphalt
- b. ASTM D 6934: Residue by Evaporation of Emulsified Asphalt
- c. ASTM D 6937: Determining Density of Emulsified Asphalt
- d. ASTM E 303-93: Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
- e. ASTM E 1911: Measuring Paved Surface Frictional Properties Using the Dynamic Friction Tester

C. ISSA Specifications and Guidelines

a. International Slurry Seal Association (ISSA) Specifications and Guidelines

2.0 MATERIALS

2.1 Cationic Emulsified Asphalt

Table 1: CSS-1HH - Emulsified Asphalt			
Test Method	Standard	Min	Max
Viscosity, Saybolt Furol at 77°F, seconds	T-59 / D244	15	100
Particle Charge Test In case of inconclusive particle charge, material having a maximum pH value of 6.0 will be acceptable as a CSS -1HH type	T-59 / D244	Positive	--
Sieve %	T-59	0	0.1
Residue by Distillation, percent	T-59	57	--
Penetration at 77° F, 100 g, 5 seconds (Test on Residue from Distillation)	T-49 / D-5	40	90

2.2 Aggregate

A. Use aggregate that is clean and free from organic matter or other detrimental substances

B. Ensure the aggregate meets requirements in table below

Table 2: Aggregate			
Physical Properties (a)			
Criterion	Standard	Min	Max
Water Absorption, percent	T 84	--	4
Gradation (b)			
Sieve	Standard	Master Grading Band Limits Percent Passing	Target Tolerance
No. 8	C136	100	
No. 16	C136	80 – 100	
No. 30	C136	75 – 100	+/- 5
No. 60	C136	50 – 85	+/- 5
No. 100	C136	40 – 65	+/- 5
No. 200	C117	25 – 65	+/- 5
a) Perform physical property tests on aggregates that are received before blending into sealer.			

b) Includes all mineral components

C. Mixture containing a minimum of 25 percent aggregate, by weight of wet mix.

2.3 Mix Design.

Develop and submit the job mix formula to the Agency for review and approval a minimum of 10 working days prior to applying the mastic surface treatment. Mix acceptance will be subject to satisfactory field performance and testing performed by the Agency, as needed, to verify compliance with the approved mix design.

- A.** Polymers, clays, and other additives may be used at the central plant, as necessary, to achieve mix design performance
- B.** Required minimum latex content by weight shall be 2% by weight of wet mix
- C.** The central plant shall use water that is clean, and free from salts and deleterious
- D.** Ensure the Mastic meets requirements in table below

Table 3: Asphalt Mastic			
Test	Standard	Min	Max
Wet-Track Abrasion Loss (3 day soak), g/m ² (a) & (b)	ISSA TB 100 D3910	--	80
Asphalt content by Ignition Method, percent	AASHTO T 308	30	--
<p>NOTES</p> <p>(a) Use the modified method to account for realistic application depth and fine emulsion mixture.</p> <p>(b) Use mastic formula as proposed before the addition of the coarse aggregate fraction</p>			

2.4 Production and Field Sample Testing

Table 4: Manufacturing and Field Sample Testing			
Asphalt Mastic – Manufacture & Field Samples			
Test	Standard Method	Min	Max
Solids content by evaporation	T-59*	48%	--
Asphalt content by Ignition Method, percent	T 308**	30%	--
Rotational Viscosity @ 20 RPM / RV spindle (cPs) @ 25 C	ASTM D2196 ***	800	4000
* T-59 sample shall be dried to a state where measurements taken 20 minutes apart do not change indicate ** Sample size should be reduced to achieve asphalt quantity Important! This test should be performed on a completely dry sample *** Perform within 7 days of sampling			

Provide certified test results for the combined aggregate and the mix in the design submittal. Also, include any adjusted requirements for the CSS-1HH.

3.0 CONSTRUCTION REQUIREMENTS

A. Mixing. Mix the aggregates, emulsified asphalt, water, and additives at a central mixing plant. Proportion all materials used in the mix by volume or weight utilizing the mix design approved by the Agency. Store the mastic surface treatment in a job site storage tank with a full sweep agitator capable of producing a homogeneous mixture and with the capacity to contain the entire transport load. Do not allow the temperature of the mix to fall to 32°F or less.

Provide individual volume or weight controls for proportioning each item to be added to the mix. Calibrate and mark each material control device. Locate the devices to be accessible for ready calibration, and place so the Agency can determine the amount of each material used at any time. Provide the Agency a certification showing the weight, gallons and temperature of mastic surface treatment in each transport load.

B. Surface Preparation. Immediately before applying the mastic surface treatment, thoroughly clean the surface of the roadway of all foreign material. Do not apply the mastic surface treatment if the roadway is wet.

C. Pre-Treatment - Apply a dilute adhesion promoter to the existing pavement surface at a rate of 0.023 to 0.030 gallons per square yard using a method approved by the Agency. Use a product that is supplied or approved by the mastic manufacturer and diluted per the manufacturer's recommendation.

D. Protection of Adjacent Structures. Protect the surfaces of all structures and other roadway appurtenances from damage or splatter of the mastic surface treatment. Restore any damaged or splattered appurtenances to their original condition at own expense.

F. Application of Mastic Surface Treatment. Uniformly apply the mastic surface treatment as shown in the Contract Documents. Maintain a homogenous mix conforming to the approved job mix formula as the mix is delivered to the job site and applied. Do not dilute the mix in the field with water or any other additives except as directed by the mastic manufacturer and approved by the Agency.

- a. Storage tank with full sweep agitation, hydraulic system, operator controls, pumping system with multiple pumps, material filters and a spray bar capable of applying a full lane width.
- b. Sufficient available power to operate the full spray system and the agitation system at the same time.
- c. System allowing the measurement and calculation of application rates.
- d. Pumps engineered to allow the system to handle fine aggregate materials.
- e. Pumps equipped with primary filter prior to the pumps and allow for a secondary filter system (if needed and capable) for fine post pump filtration of the material.
- f. Spray bar sized with volumetric capacity to dampen any possible pressure ripples by providing even pressure to all spray tips and capable of height adjustment during application process or as needed.
- g. Monitor the Mastic Treatment application and the condition and operation of the distributor equipment by using a qualified ground foreman with regular two-way radio communication to the distributor for maintaining application continuity and quality.
- h. Apply the mastic surface treatment utilizing one pass of the distributor supplying a total application rate of 0.25 to 0.42 gallons per square yard (2.5 – 5.25 pounds per square yard) at the spray temperature.
- i. Allow two pass applications of mastic surface treatment if needed for consistent surface texture needs and as required by Agency, mastic manufacturer or technology provider to maintain high quality in place final surface.
- j. At the beginning of each spread, start the application on a strip of building paper, approximately 3 feet in width and 1 foot longer than the spray bar. If the spray cut-off is not positive, use paper at the end of each spread. Remove and dispose of the paper in a satisfactory manner. The distributor shall be moving

- forward at proper speed when the spray bars are opened, unless the distributor is equipped to apply the specified rates from a standing start. Correct any skipped areas or deficiencies. Construct junctions (joints) of spreads to obtain a smooth riding surface. Alternative methods of constructing junctions may be approved by the Agency.
- k. Regulate the distribution of the mix to obtain a uniform application. Frequently check and adjust the angle of the spray nozzles and the height of the spray bars to obtain uniform distribution. If the spray bars rise as the load is removed, contributing to drilling and streaking, modify the distributor to maintain a constant spray bar height. Immediately stop distribution should any nozzle malfunction. Correct any deficiency before distribution is resumed.

G. Treatment of Adjacent Areas.

H. Curing. Provide adequate means to protect the mastic surface treatment from damage by traffic until the mix has cured sufficiently. Allow the mix to cure so as to not adhere to or be picked up by the tires of vehicles. Allow traffic on the surface once the mix has cured.

I. Weather Limitations. Do not place the mastic surface treatment when the ambient air temperature is less than 50°F, or the weather is foggy or raining, and the temperature is forecasted to go below 32°F within 24 hours following the placement.

K. Observation Period. The Agency (if needed with the Contractor) will inspect the mastic surface treatment 30 days after work is completed on the mastic surface treatment. Agency will inspect the mastic surface treatment between March 1 and April 1 the following year. Repair areas where there is no mastic surface treatment in place (bare areas) as directed by the Agency:

- a. In 5% the wheel paths; and
- b. Individual areas \geq 10 square yards;
- c. Where the total square yards of bare areas is greater than 5% of the total square yards of the mastic surface treatment.

4.0 MEASUREMENT AND PAYMENT

- A.** The Agency will measure mastic surface treatment by the square yard.
- B.** Payment for "Mastic Surface Treatment" at the contract unit price is full compensation for the specified work.