

MASTIC SEAL GUIDELINE

PART 1 GENERAL

1.1. INCLUDES

- A. Application of a surface preservation treatment consisting of an engineered mixture of fine aggregates, clay, polymers, additives, and an asphalt emulsion that cures by evaporation

1.2 REFERENCES

A. AASHTO Standards:

- R 9 Acceptance Sampling Plans for Highway Construction
- T11 Materials Finer than # 200 Sieve
- T 27 Sieve Analysis of Fine & Coarse Aggregates
- T 59 Standard Method of Test for Emulsified Asphalt
- T 84 Specific Gravity and Absorption of Fine Aggregate
- T 308 Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method
- T 327 Standard Method of Test for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

B. ASTM Standards:

- C 117 Materials Finer Than 0.075mm (No. 22) Sieve in Mineral Aggregates by Washing
- C 136 Sieve Analysis of Fine and Coarse Aggregates
- D 5 Standard Test Method for Penetration of Bituminous Materials
- D 244 Standard Test Methods and Practices for Emulsified Asphalts
- D 6937 Standard Test Method for Determining Density of Emulsified Asphalt
- D 2196 Rheological Properties of Non-Newtonian Materials By Rotational (Brookfield Type) Viscometer
- D 3910 Standard Practices for Design, Testing and Construction of Slurry Seal
- D 7428 Standard Test Method for Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
- E 1911 Standard Test Method for Measuring Paved Surface Frictional Properties Using the Dynamic Friction Tester

C. International Slurry Seal Association (ISSA) Standards:

- TB 100 Wet Track Abrasion of Slurry Surfaces
** Modified test procedure available upon request*

1.3 SUBMITTALS

- A. **Mix Design:** Provide the following as per agency requirements
 - 1. Date of mix design
 - 2. Type and grade of emulsified asphalt source; Table 1 – Emulsified Asphalt
 - 3. Asphalt mastic properties; Table 3 – Mix Design
 - 4. Field Performance Asphalt mastic properties; Table 4 – Asphalt Mastic – Manufacture & Field Samples
 - 5. Fine aggregate physical properties; Table 2 – Aggregate
 - 6. Target Grading Curve for blend as per mix design aggregate
 - 7. Application rates
- B. **Testing Report:** If requested by ENGINEER, submit a report of source and field acceptance testing performed by CONTRACTOR and Suppliers as per Table 4

1.4 WEATHER LIMITATIONS

- A. **Temperature:**
 - 1. Apply surface treatment material when pavement and air temperature in the shade is above 60°F and rising
 - 2. Do not apply surface treatment material when the temperature is projected below 32°F within 72 hours prior or after planned application
- B. **Moisture and Other Conditions:**
 - 1. Do not apply surface treatment material during rain, when road surface moisture is present, or during other adverse weather conditions
 - 2. Cease operations when weather or other conditions prolong opening pavement surface to traffic beyond four (4) hours after completion of final application

1.5 ACCEPTANCE

- A. Based on agency preferred method quality control, quality assurance
 - 1. Field inspection verification coverage and application rate
 - 2. Engineer required certification off field performance as per table 4
- B. Mat Appearance:
 - 1. No runoff onto concrete curbs, curb pans, and shoulders
 - 2. No streaking
 - 3. No light spots
 - 4. No de-bonding due to road contaminants
 - 5. Total coverage of the pavement surface has a homogenous appearance

PART 2 MATERIALS

2.1 EMULSIFIED ASPHALT

- A. Use emulsified asphalt, grades CSS-1, or CSS-1h, in accordance with Table 1

| Table 1 – Emulsified Asphalt | | | |
|---|-------------|----------|-----|
| Criterion | 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 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 | 15 | 150 |

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 2

| Table 2 - Aggregate | | | |
|--|----------|--|------------------|
| Physical Properties (a) | | | |
| Criterion | Standard | Min | Max |
| Water Absorption, percent | T 84 | -- | 4 |
| Micro-Deval, percent (b) | D 7428 | -- | 20 |
| Gradation (c) | | | |
| 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) Micro Deval on aggregate larger than #60 sieve U.S c) Includes all mineral components | | | |

2.3 CENTRAL PLANT ADDITIVES

- 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 4%
- C. The central plant shall use water that is clean, non detrimental, and free from salts and contaminant
- D. Contractor shall not dilute mixture in the field with water or any other additive

2.4 MIX DESIGN

| Table 3 | | | |
|--|----------------------|------|-----|
| Asphalt Mastic – Mix Design | | | |
| Test | Standard | Min | Max |
| Wet-Track Abrasion Loss (3 day soak), g/m ² (a) | ISSA TB 100 D3910 | -- | 80 |
| Asphalt content by Ignition Method, percent | AASHTO T 308 | 30 | -- |
| Dynamic Friction Test Number @ 20 kph (ratio) (b) | E 1911 | 0.90 | -- |
| NOTES (a) Use the modified method to account for realistic application depth and fine emulsion mixture. (b) Establish base friction value using prepared laboratory compacted slab of approved mix as surface to be tested. The Dynamic Friction Test (DFT) number ratio should indicate that after application of the mastic seal, the surface retains required minimum percentage DFT number of the original pavement surface. | | | |

2.5 PRODUCTION & FIELD SAMPLE

| Table 4 | | | |
|---|-----------------|-----|------|
| 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 |
| <ul style="list-style-type: none"> T-59 sample shall be dried to a state where measurements taken 20 minutes apart do not change indicate Samples shall be tested within 7 days | | | |
| ** Sample size should be reduced to achieve asphalt quantity Important! This test should be performed on a completely dry sample | | | |

PART 3 CONSTRUCTION REQUIREMENTS

3.1 CONSTRUCTION EQUIPMENT

A. Distribution equipment

- 1. Mixing Equipment.** All materials shall be thoroughly mixed as to produce a homogenous surface treatment. Individual volume or weight controls for proportioning each material in the mix shall be provided. Materials shall be added by a calibrated controlled device capable of monitoring the amount of material used at the time.
- 2. Distribution Equipment.** The Distributor shall be equipped with a full sweep agitation system, a pumping system designed to handle fine aggregate mixes, and sufficient power to operate the full spray system and the agitation system at the same time. The Distribution equipment shall be equipped with a monitoring system that ensures the even distribution of material and measures the application rate of the mix.
- 3. Storage Tanks.** If the mix is being delivered from a central mixing plant, then a job site storage tank shall have the minimum capacity of the entire transport load. The storage tank shall have an internal full sweep mixing system having a mixing capability of providing a homogenous mix representing the mix design at any given location within the tank.
- 4. Environmental Protection.** The contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment.

B. Storage Tanks:

1. When delivering mix from the central mixing plant to a job site storage tank, use only storage tanks with a minimum capacity to contain the entire transport load
2. Ensure that all storage tanks being used on the project contain the mix, have an internal full sweep mixing system, have a mixing capability of providing a homogenous mix, that represents the mix design at any given location within the tank

3.2 PREPARATION

A. Surface Cleaning:

1. Remove loose material, mud spots, sand, dust, oil, vegetation and other contamination material
2. When using water to clean pavement, allow cracks and surface to dry thoroughly

- B. Protect trees, plants, and other ground cover from damage
- C. Prune trees to allow equipment passage underneath
- D. Mask off end of streets and intersections to provide straight lines
- E. Protect curb, gutter, and sidewalk from spatter, mar, or overcoat

3.3 APPLICATION

A. General:

- 1. Two separate application coats are required. The first application must be thoroughly set and free of any damp areas before the second application begins
- 2. Make straight lines along lip of gutters and shoulders. Keep same thickness in these areas. No runoff on these areas will be permitted

B. Application Rate: Based upon weigh tickets and yield tests

- 1. First coat is 0.10 to .0.15 gallons per square yard
- 2. Total quantity after second coat is 0.25 gallons minimum
- 3. Application Rate: adjust according to surface conditions, only after obtaining review by ENGINEER

C. Placement

- 1. Application should be even and free of obvious light and heavy area
- 2. Do not reduce application rate along edges or around manhole covers
- 3. Make straight lines
- 4. Hand sprayers & squeegees to apply mix in areas that cannot be reached with distribution spray bar
 - a. Provide complete and uniform coverage
 - b. Avoid unsightly appearance from handwork

3.6 AFTER APPLICATION

- A. Protect surface treatment material from traffic until it has cured to tack it is capable of supporting traffic without any tracking
- B. Do not apply permanent lane markings or paint until final application of material is dried to tack free condition or as required by ENGINEER

End of Guideline-