

**DELAWARE COUNTY
DELAWARE COUNTY ENGINEER'S OFFICE**

SUPPLEMENTAL SPECIFICATION 1211

FRictional Mastic Surface Treatment

APRIL 11, 2014

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1211.01 Description. This work consists of applying emulsified asphalt pavement course to provide a surface course for existing pavements. The paving mixture is composed of a cationic asphalt emulsion, crushed aggregate, mineral filler, water, and other additives.

1211.02 Materials. Use a mastic surface treatment (Mastic) consisting of the following materials milled together:

A. CSS-1h emulsified asphalt conforming to the following table:

CSS-1H	Minimum	Maximum
Viscosity, Saybolt Furol at 25°C, seconds	10	90
Particle Charge Test	Positive ^B	
Sieve Test, %	N/A	0.50 ^C
Residue, %	57	N/A
Test on Residue from Distillation	Minimum	Maximum
Penetration, 25°C, 100 g, 5 seconds	30	150

^A The storage stability test may be waived provided the asphalt emulsion storage tank at the mixing site has adequate provisions for circulating the entire contents of the tank, and provided satisfactory field results are obtained.

^B If the particle charge test is inconclusive, material having a maximum pH value of 6.7 will be considered acceptable.

^C The sieve test may be waived if material applies without clogging nozzles of the Mobile Distribution Unit (MDU) and satisfactory results are obtained.

The emulsified asphalt shall show no separation after mixing and shall be sampled in accordance with AASHTO T40.

B. Other emulsifiers.

Any other material added to the mixture or to any component materials to provide the required properties shall be supplied by the manufacturer.

C. Aggregate

Conform to 703.01 and 703.05 for aggregate. In addition, aggregate shall also be in conformance with the following additional requirements:

Property	Percent Maximum Limit
Absorbion, AASHTO T 85	N/A
Micro-Deval, AASHTO TP 58	20

Aggregate gradation, including mineral fillers, shall be according to Table 1211.02-1:

**TABLE 1211.02-1
AGGREGATE GRADATION**

Sieve Size	Total Percent Passing
No. 8 (2.36 mm)	100
No. 16 (1.18 mm)	95-100
No. 30 (600 µm)	85-100
No. 50 (300 µm)	40-70
No. 100 (150 µm)	30-60
No. 200 (75 µm)	25-65

The aggregate shall be free of cemented or conglomerated material and shall not contain any deleterious material. High mineral filler mixtures may require separate tests as directed by the engineer to verify the stated gradation percentages.

D. Water

Water shall be potable and free of harmful soluble salts.

1211.03 Proportioning. The manufacturer shall develop the job mix formula and shall provide certified test results for the Engineer's approval prior to use. Mix acceptance will be subject to satisfactory field performance.

Ensure that the mix design:

- A. Has aggregate meeting the gradation specified.
- B. Has a minimum of 30% aggregate by weight following ignition oven.
- C. Meets the specified properties listed in Table 1211.03-1

**TABLE 1211.03-1
MIX DESIGN PROPERTIES**

Test	Description	Specification
TB-100 (Modified)	Wet Track Abrasion Loss 3 day soak	80 g/m ² max.
AASHTO T-308-08 ^D	Asphalt Content by Ignition Method	30% min.

^D This method is modified to account for a high asphalt fine aggregate mixture.

Ensure that the final mix design states the following (all percentages are based on the dry weight of the aggregate):

- A. Source of each individual material.
- B. Aggregate gradation.
- C. Percentage of aggregate.
- D. Sand equivalence of the aggregate.
- E. Percentage of mineral filler (minimum and maximum).
- F. Percentage of water (minimum and maximum).
- G. Percentage of mix set additives (if required).
- H. Percentage of Binder and type.
- I. Quantitative effects of moisture content on the unit weight of the aggregate.

1211.04 Weather Limitations. Apply the mixture only when it is not raining and both the air temperature and the existing pavement surface temperature is a minimum of 60 °F (16 °C) and there is no forecast of an atmospheric temperature below 32 °F (0 °C) within 24 hours from the time the mixture is applied.

1211.05 Mixing Equipment. The mixture shall be mixed thru a central mixing plant. Aggregate, asphalt emulsion, water and other additives shall be proportioned by volume or weight (mass) utilizing the mix design approved by the Engineer.

1211.06 Equipment Calibration. Before mix production, calibrate the mixing equipment in the presence of the Engineer. Generate documentation for the Engineer, including individual calibrations of each material at various settings. Perform a new calibration if there is any change in the mix design. Supply all of the equipment, materials, and scales necessary to perform the calibration. Following calibration and adjustments for changes in the mix design, do not make any further calibration adjustments to the mixing equipment without the Engineer's approval.

1211.07 Spreading Equipment. A Mobile Distribution Unit (MDU) shall be utilized to transport and apply the mastic surface treatment. The MDU shall be fully self-contained and

shall have a storage tank with full sweep agitation, hydraulic system, operator controls, pumping system, material filters and spray bar capable of applying a full lane width. The MDU shall have sufficient power to operate the full spray system and the agitation system at the same time. The MDU shall conform to the following requirements:

- A. The storage tank shall have an internal full sweep mixing system. The storage tank shall have sufficient mixing capability to assure proper suspension of the fine aggregates in the mastic surface treatment.
- B. The MDU shall be equipped with a system allowing measurement and calculation of application rates.
- C. The pumping system shall provide operation resulting in high volume and low potential for cavitation. The pumps shall be engineered to handle materials containing fine aggregates.
- D. The applicator spray bar shall be sized with volumetric capacity to dampen and possible pressure ripples by providing even pressure to all spray tips. Attachments such as a spray shield and wind deflector shall be available when required.

1211.08 Maintenance of Traffic. Maintain one-lane, two way traffic on two lane streets and highways in accordance with the Contract Documents. Provide drums, traffic cones, flaggers, signs and other equipment as directed by the Engineer.

1211.09 Surface Preparation. Before applying the mixture, thoroughly clean the surface of all vegetation, loose material, and any other deleterious material immediately prior to application.

1211.10 Application. Apply the mastic surface treatment at the rate specified in the plans, or as directed by the Engineer. The minimum application rate shall be 0.10 Gal/Sq. Yd. for any application pass. Complete application shall consist of two applications with a minimum total application rate of 0.20 Gal/Sq. Yd.

1211.11 Acceptance. Maintain continuous control of mixture proportioning per the approved Job Mix Formula. The Contractor shall not dilute the mixture in the field with water or any other additive unless approved by the manufacturer.

The Engineer will base acceptance of the mastic surface treatment on the Engineer's summary of quantities used each day. The Engineer will approve and accept a day's application of mastic surface treatment provided:

- A. The Engineer's summary indicates conformance with the above control requirements for proportioning and application rate and
- B. The mastic surface treatment shall be uniform and homogeneous after applying on the existing surface and shall not show separation of the emulsion and aggregate after setting.

1211.12 Method of Measurement. The Department will measure Frictional Mastic Surface Treatment by the number of square yards complete and accepted in place. The Department will base the width of application on the width shown on the plans, specified in this

specification, or directed by the Engineer. The Department will measure the length along the centerline of each roadway or ramp.

1211.13 Basis of Payment. The Department will not pay for materials, equipment, or labor to make corrections.

The Department will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
1211	Square Yard	Frictional Mastic Surface Treatment