# Rejuvenating Restorative Seal Treatment NJSP-15-23

1. **Description.** This work shall consist of furnishing and applying a surface rejuvenating seal treatment to the existing roadway as shown on the plans. The restorative rejuvenating sealing treatment shall be a naphthenic maltene-based rejuvenating agent that is in accordance with this specification.
2. **Material Requirements.**
   1. **Emulsified Material.** The emulsified asphalt restoring agent shall be a naphthenic maltene-based rejuvenating agent composed of four maltene components: Polar Compounds, first Acidaffins, Saturates, and second Acidaffins. The maltene compounds shall be uniformly emulsified with water and shall be in accordance with the following:

|  |  |  |  |
| --- | --- | --- | --- |
| **Naphthenic Emulsified Asphalt Restoring Agent Requirements** | | | |
|  | **Min.** | **Max.** | **Test Method** |
| Viscosity, Saybolt Furol at 25 C, s | 25 | 150 | ASTM D244 |
| Sieve Test, % | -- | 0.1 | ASTM D244 (Mod1) |
| Particle charge test | Positive | | ASTM D244 |
| 1-day Settlement, % | -- | 1.0 | ASTM D244 |
| Residue, % | 64 | -- | ASTM D244 (Mod2) |
| **Test on Residue from Distillation** | **Min.** | **Max.** | **Test Method** |
| Viscosity, 60o C, cSt | 1000 | 4000 | ASTM D2170 |
| Maltene Distribution Ratio:  (Polar Compounds) + (First Acidaffins)  (Saturates) + (Second Acidaffins) | 0.7 | 1.1 | ASTM D2006-70 |
| (Polar Compounds)  (Saturates) ; Ratio | 0.5 | -- | ASTM D2006-70 |
| Asphaltenes, % | -- | 14.0 | ASTM D2006-70 |

1 Test procedure identical with ASTM D244 except that distilled water shall be used in place of two percent sodium oleate solution.

2 ASTM D244 Evaporation Test for percent residue is modified by heating a 50 gram sample to 149o C until foaming ceases, then cooling immediately and calculating results.

**2.2 Mineral Aggregate.** Fine aggregates materials shall be in accordance with Section 1002.3 of the Standard Specification with the following gradation requirements.

|  |  |
| --- | --- |
| **Sieve Size** | **% Passing** |
| **3/8”** | **100** |
| **#4** | **99** |
| **#8** | **61-69** |
| **#16** | **28-36** |
| **#30** | **11-19** |
| **#50** | **5-11** |
| **#100** | **5-9** |
| **#200** | **4-8** |

The gradation requirements may be waived by the engineer based upon an acceptable test strip placed on the project.

**2.3 Water.** Water shall be potable and free of harmful soluble salts.

**2.4 Mix Design.** At least 30 days before the work commences, the contractor shall submit to the engineer the manufacturer’s certification that the material is in compliance with the emulsified asphalt rejuvenating agent requirements. The contractor shall report the total dilution rate required as specified by the manufacturer.

**3.0 Construction Requirements.**

**3.1 Material Handling.** All material shall be handled and mixed in accordance with the manufacturer’s recommendations.

**3.2 Equipment.** The rejuvenating material shall be uniformly applied with a distributor capable of applying controlled rates from 0.05 to 0.5 gallons per square yard, with an allowable variation not to exceed 5 percent of the specified rate. Distributor equipment shall include full circulation spray bars, pump tachometer, and volume measuring device. The distributor shall be equipped to circulate and agitate the emulsion within the tank.

**3.3** The truck used for fine aggregate applications shall be equipped with a fine aggregate spreader that allows fine aggregate to be uniformly distributed onto the pavement. The spreader shall be capable of applying 2 to 6 pounds of fine aggregate per square yard in a single pass.

**3.4 Environmental Protection.** The contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment.

**3.5 Weather Limitations.** The rejuvenating material shall not be placed on any wet or damp surface. The rejuvenating material shall not be placed when the ambient temperature or pavement temperature is below 40⁰ F. Temperatures shall be obtained in accordance with MoDOT Test Method TM 20.

**3.6 Surface Preparation.** The surface shall be thoroughly cleaned immediately prior to placing the surface treatment.

**3.8 Dilution.** The rejuvenating material shall be blended with water at the rate specified by the manufacturer. The combined mixture of the emulsified asphalt rejuvenating agent and water shall be reported to the Engineer.

**3.9 Placement.** The target rate of application of the rejuvenating material shall be 0.12 gal/yd2. The engineer may make adjustments to the spray rate based on the existing pavement surface condition and the recommendations of the manufacturer.

**3.10 Opening to Traffic.** After the rejuvenating sealant application, the roadway shall remain closed until the surface is allowed to cure and the fine aggregate cover material is applied.

**3.11 Basis of Acceptance.**

**3.11.1 Field Testing.** The following field testing requirements shall be required on all mainline pavements using the restorative rejuvenating sealant treatment. The field testing requirements are not required for the treatment used on shoulders.

The contractor shall obtain twelve 6-inch diameter cores per project at random locations selected by the engineer. Six cores shall be taken prior to the rejuvenating sealant treatment (“untreated”) and six cores obtained at a minimum of 30-days after the rejuvenating treatment is applied (“treated”). The six cores shall be combined from each set (“untreated” vs. “treated”) for asphalt extraction and testing. The pavement cores shall be stored in clean covered containers that are clearly marked with following information: Project number, date sampled, sample location, “untreated” or “treated”, sampler name and phone number. The pavement cores shall be submitted to the engineer for testing at the MoDOT Central Laboratory in accordance with the following specifications:

The asphalt binder from the top 3/8-inch of the surface of the cores from each set extracted in accordance with AASHTO T164 - *Extraction of Asphalt*.

The asphalt binder shall be tested in accordance with the following specifications:

AASHTO T 49 - Penetration

AASHTO T 201 - Kinematic Viscosity

Satisfactory service from the restorative rejuvenating sealant treatment shall be based on the capability of the material to decrease the viscosity and increase the penetration value of the asphalt binder as follows:

The kinematic viscosity of the treated cores shall be reduced by a minimum of 20 percent of the untreated cores.

The penetration value of the treated cores shall be increased by a minimum of 15 percent of the untreated cores.

Restorative rejuvenating sealants not meeting the viscosity and penetration requirements shall be considered unacceptable material. The contractor shall reapply the rejuvenating sealant treatment and re-test for compliance.

**3.11.2 Field Performance.** The finished rejuvenating sealant treatment shall be evaluated by the engineer based on uniform coverage at the rate specified in the contract. A final surface with insufficient or inconsistent coverage shall be considered unacceptable material.

**4.0 Method of Measurement.** Final measurement of the surface treatment will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. Where required, measurement of the surface treatment, complete in place, will be made to the nearest square yard. The revision or correction will be computed and added to or deducted from the contract quantity.

**5.0 Basis of Payment.** The accepted quantity of surface treatment, in place, will be paid for at the contract unit (square yard) price. No separate payment will be made for any additional construction methods or processes. Manufacturer shall report the unit weight (lbs/gallon) of the rejuvenating sealing material on the bill of lading.