

# Spray-Applied Penetrating Asphalt Rejuvenator Specification

## 1. DESCRIPTION

This work shall consist of furnishing all materials, equipment, labor, and preparation necessary for the application of a topically applied plant-based or petroleum-based penetrating asphalt rejuvenating agent to existing or newly constructed asphalt pavements while maintaining safe surroundings for workers, the motoring public, and the environment for the primary purpose of slowing the oxidation, raveling and other damage caused to unprotected asphalt pavements.

## 2. MATERIALS

Both plant-based and petroleum-based asphalt rejuvenating products will be accepted for this bid if they meet the material requirements listed below:

- Plant-based products shall be environmentally “GREEN” plant-based factory-emulsified rejuvenator agent. Penetrating plant-based rejuvenators may be emulsified, factory-blended or placed in its original formulation as per manufacturer’s recommendations. Petroleum-based asphalt rejuvenating products shall be an emulsion composed of a petroleum resin oil base uniformly emulsified with water. Each bidder must submit a bid with a certified statement from the asphalt rejuvenator manufacturer evidencing that the asphalt rejuvenating agent conforms to the required physical and chemical properties required to achieve the Material Performance and Testing outlined in 2a 1), 2) and 3) set forth herein.

At no time is any dilution or altering of the rejuvenating agent permitted once it leaves the blending facility or manufacturer. Rejuvenating materials shall follow all manufacturer’s recommended storage controls with regards to temperature (never frozen or overheated), agitation, and exposure to UV light. The manufacturer/contractor shall ensure that the products are free of defect and within the product’s useable shelf-life.

### a) Material Performance and Testing:

1) The asphalt rejuvenating agent shall have the capability to penetrate the asphalt pavement surface. The asphalt rejuvenating agent shall be absorbed and incorporated into the asphalt binder. Verification that said incorporation of the asphalt rejuvenating agent into the asphalt binder has been affective shall be by analysis of the chemical properties of the asphalt binder.

2) The viscosity shall be reduced by a minimum of 25% for a pavement two years or less in age and reduced by a minimum of 40% for a pavement greater than two years in age as determined by dynamic shear rheometer (DSR) method for asphalt testing in accordance with FAA P-632 procedure. The FAA P-632 specification is the current governing standard for performance requirements of surface applied asphalt rejuvenators. This analysis shall apply to extracted asphalt binder, taken from cores extracted thirty to forty-five days following application, in the upper 3/8 inch of pavement.

Reference Tables 1 and 2 below.

**Table 1. Pavement Three (3) Years or Less in Age**

Item	Property of Recovered Binder <sup>2</sup>	Requirement	Test Method
1	Absolute Viscosity <sub>60°C</sub> , P	≥ 25% Decrease <sup>2</sup>	ASTM D2171
2a	Complex Modulus <sub>60°C</sub> , G*		AASHTO T315
2b	Viscosity <sub>60°C</sub> , $\eta = G^* / \omega$ Pa·s		
2c	Phase Angle <sub>60°C</sub> , $\delta$ , °	Report	

**Table 2. Pavement More than Three (3) Years in Age**

Item	Property of Recovered Binder <sup>2</sup>	Requirement	Test Method
1	Absolute Viscosity <sub>60°C</sub> , P	≥ 40% Decrease <sup>2</sup>	ASTM D2171
2a	Complex Modulus <sub>60°C</sub> , G*, kPa		AASHTO T315
2b	Viscosity <sub>60°C</sub> , $\eta^* = G^* / \omega$ Pa·s		
2c	Phase Angle <sub>60°C</sub> , $\delta$ , °	Report	

<sup>2</sup> Procedures: Sample collection for application and acceptance as noted in this specification. Sample weights and measure by ASTM D3549; Extraction by: ASTM D2172, Method A using toluene (conditioning to remove moisture will not be accomplished); Recovery by: ASTM D1856 (Abson) or ASTM D5404 (Roto-Vap); and binder extraction, recovery and testing within 48-96 hours of obtaining pavement cores or equivalent surface area samples.

3) The Engineer may require that untreated and treated core samples (a minimum of six inches in diameter) be removed by the Engineer at the owners expense. The treated core samples shall be taken in the same lane and in close proximity to each untreated core sample. A minimum of three untreated and three treated core samples shall be taken for each pavement group, or one set of six cores per every 50,000 square yards of treated pavement in each pavement group. If the Engineer requires sample cores, control cores shall be taken on the untreated portion of pavement 24-96 hours prior to applying the penetrating asphalt spray rejuvenator.

Cores taken from treated pavement shall be taken within 30-45 days following application in accordance with FAA -632 procedure.

### 3. EQUIPMENT

a) Pressure distributor: The asphalt rejuvenator shall be applied with a computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spreader bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under eight (8) miles per hour or seven hundred (700') feet per minute. Before beginning application, the equipment must be tested under pressure for leaks to ensure it is in good working order.

The distributor truck shall be equipped with a 20-foot (minimum) spreader bar with individual nozzle control. The distributor truck shall be capable of specific application rates in the range of 0.05 to 0.25 gallons per square yard. These rates shall be computer-controlled rather than mechanical. The distributor truck shall have an easily accessible thermometer that constantly monitors the temperature of the emulsion and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy.

The distributor should be equipped to hand-spray the rejuvenator agent in areas identified either on the plans or by the Engineer, or not accessible to the distributor truck itself.

b) Calibration: Furnish all equipment, materials, and labor as necessary to calibrate the computer-controlled distributor. Perform the calibration with the specified material prior to applying the penetrating asphalt spray rejuvenator on the prepared surface, in accordance with applicable standards and the project specifications.

## **5. WEATHER LIMITATIONS**

Place the rejuvenation product on an existing pavement surface that is slightly damp (not wet) or dry, and when both the pavement and atmospheric temperature is 50°F and rising. Do not place penetrating asphalt spray rejuvenator if any of the following conditions exist:

- a) Impending weather conditions do not allow for proper curing, or if temperatures are forecasted below 32°F within 24 hours from the time of work.
- b) The existing pavement temperature is 140°F or above.
- c) The pavement surface is wet, or if rain/freezing temperatures are forecasted within 24 hours of placement.
- d) If weather conditions interfere with application and/or curing, the Engineer may, at their discretion, suspend the job or require remedial action as deemed necessary.

## **6. SURFACE PREPARATION**

It is recommended the manufacturer closely review the pre-existing conditions of the pavement surface with the approved applicator to determine the effective application rate(s) for the penetrating asphalt spray rejuvenator treatment prior to application. Prior to application, the approved applicator shall determine whether the existing surface to be treated requires sweeping and/or cleaning. This surface preparation, if required, shall be accomplished by hand or power broom, power blowing, mechanical vacuum sweeper or other approved cleaning methods.

a) Asphalt Pavement Surfaces: The contractor shall ensure that all surfaces are clean and void of any deleterious materials prior to placing rejuvenating agent. Clean pavement surface immediately prior to placing the rejuvenating agent by sweeping, flushing well with water (leaving no standing water), or a combination of both, so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film. Remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then wash thoroughly with clean water. After cleaning, treat these areas with the oil spot primer. Any additional surface preparation, such as crack repair, may be made prior to the

application of the rejuvenating agents with a minimum of 4 weeks curing time before applying rejuvenating agent. Follow manufacturer's recommendations if in question.

b) Friction: Surface friction may be affected by the application of a rejuvenating agent. Testing on a localized area prior to the production should be conducted. Each Bidder shall provide friction test results evidencing between 24 and 96 hours after application of the rejuvenating agent shall indicate friction is increasing at a rate to obtain similar friction value of the pavement surface prior to application per FAA P-632 procedure. If conditions should fall below the agency's minimum threshold, the addition of a granular grit and/or additional signage may be required to notify of conditions until a time at which the friction numbers rebound. Round-a-bouts and locations that will have more aggressive turning maneuvers may need to be avoided or constructed in a manner that would prevent vehicular traffic from loss of friction.

c) Retro-reflectivity: Materials used for traffic markings including reflective beads, epoxy paints, latex paints, thermoplastic, etc. vary widely and the effect of the topically-applied asphalt rejuvenator on the markings will vary depending on their age, exposure to the elements, and geographical location.

Since traffic markings may be affected by the application of some topical rejuvenating agents, care and tests should be conducted prior to placement. Minimum thresholds established for reflectivity on longitudinal pavement markings shall meet the Supplemental Notice of Proposed Amendment (SNPA) to the 2009 Manual for Uniform Traffic Control Devices (MUTCD). If the values are diminished to a point that the agency deems are below the minimum threshold for that agency, reflective traffic tabs shall be installed to augment the in-place markings until a time that the retro-reflectivity numbers rebound back above the minimum threshold.

## **7. APPLICATION OF PENETRATING ASPHALT REJUVENATOR**

The Contractor shall follow the construction methods as described. Target application rates for the penetrating asphalt spray rejuvenator shall be in the range of 0.05 to 0.135 gallons per square yard as established by the Engineer after spraying a test strip or strips with varying application rates in order to determine the optimum rate to achieve coating without runoff or delayed curing times. Generally, the application rate for pavements 2 years old and less will be in the range 0.05 to 0.075 gallons per square yard, the application rate for pavements 3 to 5 years old will be in the range 0.08 to 0.10 gallons per square yard, and the application rate for pavements 6 years old and older will be 0.11 to 0.135 gallons per square yard.

The penetrating asphalt spray rejuvenator shall be applied at an initial rate determined by the manufacturer's recommendation and the Engineer on site. A 200' test strip will be required to ensure that the rate is at a sufficient amount for uniform coverage of the asphalt surface. Continuous monitoring of surface conditions or changes in asphalt mat characteristics requiring adjustment to the application rates to conform to conditions shall be determined by the manufacturer's representative. If the target application rates are not the optimum application rates to achieve proper coating of the existing or newly constructed pavement surface, or if the break time is too long or too short, immediately notify the Engineer. Adjust and document the new application rate by stationing.

Do not allow the asphalt rejuvenating agent to streak on the road surface. If the Engineer determines that streaking is occurring, cease operations until the Engineer is satisfied that streaking has been eliminated.

Apply the penetrating asphalt spray rejuvenator treatment to all exposed areas of asphalt surface as directed by the Engineer.

## **8. TRAFFIC CONTROL**

The Contractor shall furnish all necessary traffic control, barricades, signs and flagmen, to ensure the safety of the traveling public and to all working personnel. The Contractor shall have on site an (Maintenance of Traffic) M.O.T. person with no less than an Intermediate certification and submit an M.O.T plan indicating all facets of traffic control for the project area. The M.O.T. plan must be approved in writing prior to commencing any work. All traffic control shall be in accordance with the agency Roadway Design Standards, most current edition. M.O.T. and associated devices shall be checked daily and periodically throughout the project for compliance; and where adjustments or corrections are needed, prompt revisions shall be made.

## **9. METHOD OF AWARD**

To ensure contractor accountability, the Owner intends to award all items to a single contractor. Accordingly, contractors must bid on all items of work, and the low bidder will be the contractor whose total bid price is the lowest. The bid quantities are not guaranteed, and their primary purpose is for the determination of the low bidder.

## **10. MEASUREMENT AND PAYMENT**

- a) The quantity to be measured for payment will be the number of square yards of penetrating asphalt spray rejuvenator completed at various application rates.
- b) No additional compensation shall be made for additional work required to apply penetrating asphalt spray rejuvenator treatment to areas outside the normal operating width of the distributor.

END OF SECTION