

**Item P-632 Bituminous Pavement Rejuvenation**

**DESCRIPTION**

\*\*\*\*\*

**This type of surface treatment is approved for use on general aviation airports serving small airplanes 12,500 lbs (5670 kg) or less; however, it is only recommended for use on pavements other than airfield pavements.**

**Note in this specification, the term “rejuvenation product” will carry the same connotation as the term “rejuvenator” or “rejuvenator/sealer.” The term “rejuvenation product” will be used throughout this specification for the purpose of recognizing rejuvenation performance for each class of rejuvenation products.**

\*\*\*\*\*

**632-1.1** This item shall consist of a rejuvenator properly proportioned, mixed, and spread on an asphalt pavement surface, including airport pavements serving small airplanes 12,500 lbs (5670 kg) or less, roads, and other general applications. The application of the rejuvenator shall be in accordance with these specifications and shall conform to the dimensions shown on the plans or as directed by the Engineer.

**632-1.2 Bituminous pavement rejuvenation.** This item governs the application of an asphalt pavement rejuvenation product applied to a previously placed hot mix asphalt (HMA) surface in accordance with these specifications, as shown on the plans, or as directed by the Engineer. The purpose of this product is rejuvenation of the upper 3/8 inch (9 mm) of oxidized or otherwise aged asphalt binder without causing an unacceptable reduction in the friction characteristics (skid resistance) of the pavement section. Additionally, the rejuvenation product should not introduce unacceptable pavement distresses such as raveling, high temperature deformation (rutting), and loss of strength. The rejuvenation product should not contribute to accelerated deterioration of the pavement.

\*\*\*\*\*

**Project Selection. The performance of a rejuvenation product is contingent on the pavement condition at the time of application. The pavement condition survey provides a measure of the pavement condition by analyzing the type, amount, and severity of the distresses, and by determining the pavement condition index (PCI) in accordance with ASTM D5340. A typical asphalt pavement candidate for rejuvenation is one without structural, load associated distresses (or has provisions to correct these distresses) and with low to moderate environmental, temperature associated distresses. The recommended corrected PCI should be equal to or greater than 70 to qualify as a candidate for asphalt rejuvenation.**

\*\*\*\*\*

## MATERIAL

### 632-2.1 Rejuvenation product.

a. The rejuvenation product must be capable of achieving the minimum changes in the asphalt binder properties shown in Tables 1 or 2 after proper application and field exposure.

b. The binder extracted per ASTM D2172, Method A and recovered per ASTM D1856 or D5404 from samples of the upper 3/8 inch (9 mm) of the surface of the treated pavement must exhibit the percent decrease in absolute viscosity or complex viscosity and corresponding phase angle increase listed in Tables 1 or 2, when compared to the values from adjacent untreated samples from the same pavement in the prescribed timeframe.

c. The bid submittal must include, from previous projects, independent laboratory test results accredited by an American Association of State Highway Transportation Officials (AASHTO) Materials Reference Laboratory (AMRL). The test results should verify the ability of the proposed rejuvenation product to achieve the minimum changes in asphalt binder properties shown in Table 1 or 2.

**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> , $\delta, ^\circ$	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> , $\delta, ^\circ$	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 hours of obtaining pavement cores or equivalent surface area samples.

### 632-2.2 Rejuvenation documentation/certification.

a. **Performance.** The bid submittal must include documentation of previous use and test data conclusively demonstrating that the rejuvenation product has been used successfully for a period of two or more years by other user agencies; and that the asphalt rejuvenation product has been proven to perform in a manner equivalent to this specification, through field testing by/for using agencies as to the required change in the recovered asphalt binder properties. Testing data must be submitted indicating such product performance from at least two projects representative of two different HMA mix designs, each being tested for a minimum of two years to ensure reasonable longevity of the treatment, as well as product consistency. The performance documentation must be presented from a geographically similar

climatic region of the United States as that for this project, for example, wet-warm, wet-cool, dry-warm, and dry-cool, and contain data specified in paragraph 632-2.1.c.

**b. Friction characteristics.** For projects where rejuvenation product(s) are applied on runway and taxiway surfaces, the Contractor shall submit to the Engineer friction tests, from previous airport projects which used the rejuvenation product in a similar environment, in accordance with AC 150/5320-12, at 40 mph (65 km/h) wet, showing, as a minimum; friction value of pavement surface prior to sealant application; two values, tested between 24 and 96 hours after application, with a minimum of 24 hours between tests; and one value tested at no less than 180 days or greater than 360 days after the application. The results of the two tests between 24 and 96 hours shall indicate friction is increasing at a rate to obtain similar friction value of the pavement surface prior to application, and the long term test shall indicate no apparent adverse effect with time relative to friction values and existing pavement surface. The Contractor shall submit to the Engineer a list of airports which meet the above requirements, as well as technical details on application rates, aggregate rates, and point of contact at these airports to confirm use and success of sealer. Friction tests shall be submitted from no less than one of the airports on the list and each set of tests described above, must be from one project.

Rejuvenation product submittal without the required friction performance will not be approved. Friction tests performed on this project cannot be used as a substitute of this requirement.

**c. Health, safety, and environment.** The Contractor must provide a complete Material Safety Data Sheet (MSDS) in accordance with U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Regulations (Standards – 29 CFR), 1910.1200 which establishes the requirement and minimum information for the MSDS for hazardous materials. The MSDS, Section II, shall include the Chemical Abstracts Service (CAS) registry numbers for all applicable hazardous ingredients in the rejuvenation product. The Contractor must provide the manufacturer's certification that the rejuvenation product complies with the Code of Federal Regulation (CFR) Title 40 – Protection of Environment. The manufacturer's certification shall address compliance for Air Programs, Part 59, National Volatile Organic Compound Emission Standards for Consumer and Commercial Products (for the airport location) and Water Programs, Part 116, Designation of Hazardous Substances.

## APPLICATION RATE

**632-3.1 Test sections.** Prior to full application, the Contractor must place a series of test sections (minimum one square yard (0.8 sq m)) at application rates as judged necessary by the manufacturer to establish the appropriate project rejuvenation product application rates for the specific product. As a minimum, a test section is required for each different HMA mix design identified in the project. Additional test sections may be required due to highly variable traffic areas, for example, taxiway pavement wheel paths versus taxiway edge areas or specific areas identified by the Engineer. The Contractor must select test sections to obtain pavement cores or saw cut "slabs" (equivalent surface area samples) in accordance with paragraph 632-6.3. The pavement cores or equivalent surface area samples must be taken 48 hours after application of the rejuvenation test sections and tested in accordance with Table 1 or 2, Item 1 and Item 2a, paragraph 632-2.1 for the purpose of determining a recommendation for the rejuvenation product application rates. The Contractor is responsible for all sampling and testing associated with the test sections.

A qualified manufacturer's representative shall be present in the field to assist the Contractor in applying test areas and/or test sections to determine the optimum application rate. [ A test section shall be required for friction testing for runway applications. ]

\*\*\*\*\*

**Add bracketed sentence if application is on a runway.**

\*\*\*\*\*

**632-3.2 Approval.** The Contractor and the Engineer shall examine the test sections 24 hours after treatment to determine if the entire rejuvenation product has penetrated into the surface. Application rates that have not allowed full penetration into the pavement surface after 24 hours must not be permitted to be used for full production. The application rates for full production must be determined by the Contractor and approved by the Engineer based on the Contractor's recommendation and observation of test sections and test section data from paragraph 632-3.1.

## CONSTRUCTION

**632-4.1 Worker safety.** The rejuvenation product must be handled with caution. The Contractor must obtain a MSDS for the rejuvenation product and require workmen to follow the manufacturer's recommended safety precautions.

**632-4.2 Weather limitations.** The rejuvenation product must be applied only when the existing surface is dry and the weather forecast is in accordance with the manufacturer's recommendations for application and curing. The rejuvenation product must not be applied during inclement weather or when rain or freezing temperatures are anticipated within 24 hours before or after application. If weather conditions interfere with application and/or curing, the Engineer may at his discretion suspend the job or require remedial action as deemed necessary.

During application, account for wind drift. Cover existing buildings, structures, runway edge lights, taxiway edge lights, informational signs, retro-reflective marking and in-pavement duct markers as necessary to protect against overspray before applying the rejuvenation product. Should the rejuvenation product get on any light or marker fixture, promptly clean the fixture. If cleaning is not satisfactory to the Engineer, the Contractor shall replace any light, sign or marker with equivalent equipment at no cost to the Owner.

**632-4.3 Equipment.** The Contractor must furnish all equipment and hardware necessary for the performance of the work. The rejuvenation product should be delivered in dedicated tankers and/or containers with agitating equipment and filters, per manufacturer's recommendations. The distributor must be designed and equipped in accordance with the manufacturer's recommendations, but include as a minimum, the following characteristics:

- a. Adequate heating capability for rapid heating of the rejuvenator to the proper application temperature.
- b. A positive displacement pump capable of pumping low viscosity material and providing a pre-selected constant pressure to deliver the specified rates of application.
- c. A full circulation spray bar and applicator that maintain proper nozzles, which provide the specified rate of application.
- d. A hooded spray bar and applicator that maintain proper nozzle height.
- e. A positive shut-off for the spray bar and a hand spray (with hose) equipped with a positive shut-off at the spray gun.
- f. A thermometer installed in the distributor tank to measure the temperature of the rejuvenation product at the time of the application.

g. A speedometer calibrated to a minimum of tenths of miles per hour.

h. A chart listing the capacity of the tank (in gallons (liters)) for each one inch (25 mm) of depth. A chart showing speed/pressure application rates must also be included.

**632-4.4 Preparation of asphalt pavement surfaces.** Clean pavement surface immediately prior to placing the seal coat 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, shall be in accordance with paragraph 101-3.6.

**632-4.5 Application of rejuvenation product.**

a. Following preparation and subsequent inspection of the surface and consideration for skid resistance, the rejuvenation product shall be uniformly applied over the surface to be treated at the approved rate with an allowable variation from the approved rate of application of ±5%, in accordance with ASTM D2995.

b. Materials shall be applied at the temperature recommended by the manufacturer.

\*\*\*\*\*

**To obtain uniform application of the material on the surface treated at the junction of previous and subsequent applications, heavy paper or cardboard, equivalent technique, must be spread on the surface at a sufficient distance back from the ends of each application so that the material may be started and stopped on the paper. Immediately after application, the building paper must be removed and properly disposed.**

**Areas missed by the distributor must be properly treated with the hand spray.**

**Following application of the rejuvenation product, the surface should not be disturbed for a period of at least 24 hours.**

\*\*\*\*\*

c. Other rejuvenation product application procedures include:

**(1) Calibration test.** Contractor must furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor or other application equipment. Calibration must be made with approved job material and prior to applying the rejuvenation product to the prepared surface. Calibration of the bituminous distributor and the specialized bituminous spray applicator must be in accordance with ASTM D2995.

**(2) Excess rejuvenation product removal.** Manufactured sand, as approved by the Engineer, must be provided by the Contractor at no additional costs and must be spread in sufficient quantity to effectively blot up any excess rejuvenation product remaining on the treated pavement surface after 24 hours at no additional costs.

**(3) Ponding and puddling of rejuvenation product.** If low spots and depressions in the pavement surface cause ponding or puddling of the rejuvenation product, the pavement surface must be broomed with a broom drag. Brooming should continue until the pavement surface is free of any pools of excess material. Ponding and/or puddling must not cause excess pavement softening and/or additional distress. The Engineer must inspect and approve areas after “brooming.”

**(4) Excess runoff of rejuvenation product.** The application rate should be reduced, and the Engineer notified, if the surface grade of the pavement surface causes excessive runoff of the rejuvenation product. Additional rejuvenation product, if necessary, may be subsequently applied after the first application of material has penetrated into the pavement to achieve the required properties of the treated binder

**(5) Insufficient rejuvenation product.** When it is determined by the Engineer that the actual application rate of the rejuvenation product is more than 5% below the approved application rate, subsequent applications of materials must be made to bring the actual application rate up to the approved rate; additional rejuvenation product must penetrate into the pavement surface within 24 hours after application. Multiple applications may be required at the discretion of the Engineer, requiring additional pavement sampling and rejuvenation testing to assure compliance with Table 1 or 2 of 632-2.1.

#### **632-4.6 Cure time remedial option – application of sand.**

**a.** The Contractor must apply sand to the surface of the treated asphalt pavement if the rejuvenation product does not meet the cure time requirement and/or the frictional characteristics (skid resistance) have been reduced to an unacceptable level. An unacceptable level of frictional characteristics (skid resistance) is defined in paragraph 632-6.6.

**b.** The manufactured sand must be dry, hard, durable, free from clay, salt and foreign matter and well graded (100% passing #8 sieve and less than 10% passing #200 sieve). The sand must be uniformly applied at a rate of  $3.0 \text{ lb/yd}^2 \pm 0.5 \text{ lb/yd}^2$ , rolled (as recommended by the Contractor and accepted by the Engineer) into the treated surface and any surplus removed with a power broom, or as directed by the Engineer. The Contractor is responsible for all materials, equipment, and costs associated with the application of sand.

**c.** All manufactured sand or approved substitute used during the treatment must be removed from the airport as soon as practical after treatment of a pavement and prior to opening any airfield runway, taxiway, etc. This should be accomplished by a combination of hand and mechanical sweeping. All turnouts must be cleaned of any sand to the satisfaction of the Engineer. The Contractor is responsible for all materials, equipment, and costs associated with the application, removal and disposal of the sand.

**d.** If, after sand is swept and in the opinion of the Engineer, a hazardous condition exists on the pavement, the Contractor must apply additional sand and sweep same immediately following reapplication. No additional compensation will be allowed for reapplication and removal of sand.

### **QUALITY CONTROL**

**632-5.1 Manufacturer representation.** The Contractor must have a manufacturer's authorized representative on the job site at the beginning of the work and during all rejuvenation product application. The manufacturer's representative must have knowledge of the material, procedures, and equipment described in the specification and will be responsible for determining the application rates and must oversee the preparation and application of the rejuvenation product. Documentation of the manufacturer representative's experience and knowledge for applying the rejuvenation product must be furnished to the Engineer a minimum of 10 work days prior to placement of the test sections. The cost of the manufacturer's representative will be included in the bid price.

\*\*\*\*\*

**The requirement for the Contractor to require a manufacturer's authorized representative on the job site at the beginning of the work and during all rejuvenation product application may be deleted, at the discretion of the Engineer. Past experience has demonstrated that improper application rates have resulted through subcontract agreements, and this decision must be predicated on the Engineer's ability to control selection and placement of the application rate under the Contract provisions.**

\*\*\*\*\*

**632-5.2 Quality control plan.** The Contractor must submit a quality control plan to the Engineer a minimum of 10 days prior to applying test sections in accordance with paragraph 632-3.1. The quality control plan must address all items that affect the quality of the rejuvenation application including, but not limited to:

- a. Qualifications of personnel.
- b. Schedule for the project.
- c. Procedure to monitor the weather/temperature limitations.
- d. Inspection requirements including rejuvenation product, test sections, storage of rejuvenation product, preparation of the pavement surface, and equipment calibration.
- e. Provisions for obtaining, packaging and shipping acceptance samples and repair of the pavement.
- f. Provisions for sample testing, testing laboratory name, location, accreditation, contact person, all contact information, testing requested, and report on information.

**632-5.3 Warranty.** The Contractor must provide a manufacturer's/applicator warranty that the treated pavement will retain the lower binder properties of Table 1 or 2, for a period of two (2) years from the date of treatment. For compliance with the warranty, the Owner may obtain cores and perform tests in accordance with REJUVENATION ACCEPTANCE. The Contractor must further warrant that from the date the rejuvenation product was applied, the material will not flake, peel, chip, spall, nor otherwise contribute to or accelerate the aging of the pavement. The Contractor must reapply the rejuvenation product, as necessary, or provide remedial actions at no cost to the Owner, and/or refund all payments at the Owner's discretion. The Engineer must designate and record an area of no less than 10 square yard (8.36 m<sup>2</sup>) of untreated and 10 square yards (8.36 m<sup>2</sup>) of treated pavement as the control sections for warranty testing. In the event a pay reduction, or no payment, is enforced, the warranty is rescinded.

## REJUVENATION ACCEPTANCE

**632-6.1 Product sampling.** The Engineer will take samples of the rejuvenation product proposed for use upon delivery of each shipment in accordance with ASTM D140 and store in accordance with the MSDS, Section VII for a period of at least six months after payment in accordance with paragraph 632-8.1. Testing, as necessary, will be accomplished by the Engineer to verify information provided by the MSDS information.

**632-6.2 Freight and weigh bills.** The Contractor must furnish the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the rejuvenation product used in the construction covered by the contract. The Contractor shall not remove rejuvenation product from the tank car or storage tank until the initial outage and temperature

measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer.

**632-6.3 Field sampling procedures.** Sampling of the pavement sections to be treated must be performed before and after the pavement has been treated with the rejuvenation product. The Contractor will be responsible for obtaining all pavement core samples or equivalent surface area samples as approved by the Engineer for testing. At the discretion and approval of the Engineer, the before samples collected and tested for application may suffice for before samples for acceptance.

**a.** At each sampling location, three (3) cores or equivalent surface area samples of the untreated pavement must be taken before the rejuvenation product is placed and three (3) cores or equivalent surface area samples of the treated pavement after application of the rejuvenation product must be taken. The before and after cores must be taken in the same general area, at a minimum within the same paving lane and within one foot (30 cm) of each other. All pavement cores taken by the Contractor must be six (6) in diameter. The Contractor must repair any sample holes resulting from the removal of asphalt concrete pavement cores or equivalent surface area samples (with suitable materials and methods as approved by the Engineer) at no cost to the Owner.

**b.** The treated pavement cores or equivalent surface area samples must be taken 30-45 days after application of the rejuvenation product.

**c.** Both untreated and treated pavement cores or equivalent surface area samples must be performed for each 20,000 square yards (16723 m<sup>2</sup>) or fractional part of pavement section per pavement plan or as required by the Engineer. Material acceptance in accordance with paragraph 632-2.1, Table 1 or Table 2, will be based on the test results for each 20,000 square yards (16723 m<sup>2</sup>) or fractional part of treated pavement section per pavement plan or as required by the Engineer. Locations for untreated samples should be determined by the Engineer on a random basis in accordance with the procedures contained in ASTM D3665 provided requirements of paragraph 632-6.3.a. can be satisfied for both untreated and treated samples.

\*\*\*\*\*

**It is recognized, the rate of recovered viscosity reduction in addition to product type and application rate is influenced by the climatic conditions and time of exposure prior to sampling and testing. All means to standardize these parameters should be taken. Time factor and weather conditions for all should be noted and recorded.**

\*\*\*\*\*

**d.** Pavement core samples or equivalent surface areas samples must be placed in labeled sealable plastic bags immediately after taking, cleaning and removing sampling water (blotting). The sealed samples must then be placed in labeled plastic core canisters. For equivalent surface area samples, an equivalent processing for the sample is required as approved by the Engineer. The specimens must be shipped to the designated laboratory within 24 hours of collection.

**632-6.4 Rejuvenation testing responsibility.** All acceptance testing necessary to determine conformance with this specification must be performed by the Engineer, or accredited independent test agency, to verify that the rejuvenation product achieves the minimum decrease in the asphalt binder properties as measured from binder in the top 3/8 ±1/32 inch (9mm ±1 mm) of the samples.

**632-6.5 Rejuvenation testing.** Tests must be conducted to extract the bituminous binder from the top 3/8 ±1/32 inch (9mm ±1 mm) of the cores/slabs precisely cut from the field specimens.

**a.** Binder extraction must be by ASTM D2172, Method A (centrifuge) with toluene, and recovered according to ASTM D1856 (Abson Method) or ASTM D5404 (Roto-Vap Method).



(1) Viscosity of the bituminous material must be measured in accordance with ASTM D2171. The percent decrease in the binder properties must be computed as follows:

$$\frac{100 (\text{absolute viscosity, } P, \text{ of untreated sample}) - (\text{absolute viscosity, } P, \text{ of treated sample})}{(\text{absolute viscosity, } P, \text{ of untreated samples})}$$

(2) The complex modulus,  $G^*$ , kPa, must be measured in accordance with AASHTO T315 C, at 140°F (60°C) 10 rad/sec or other recorded frequency. The percent decrease in the binder properties must be computed as follows:

$$\frac{100 (\text{complex modulus, } G^*, \text{ kPa of untreated sample}) - (\text{complex modulus, } G^*, \text{ kPa, of treated sample})}{(\text{complex modulus, } G^*, \text{ kPa, of untreated samples})}$$

(3) The complex viscosity,  $\eta^*$ , at 140°F (60°C) must be calculated and reported from the complex modulus,  $G^*$  and angular frequency,  $\dot{\omega}$  (radians/sec).

b. Test results for absolute viscosity, complex modulus (and viscosity), and phase angle must be reported. The maximum percent reduction calculated for absolute viscosity or complex modulus must be considered in BASIS OF PAYMENT.

c. In the event of binders recovered from aged pavements and/or pavements using polymer modified binders (before treatment) exhibiting absolute viscosities  $\geq 200,000$  P (data becomes suspect, viscosity exceeds test capabilities) the viscosity reduction compliance requirement should be determined based on the complex modulus,  $G^*$ , kPa.

**632-6.6 Skid resistance.** Special attention must be afforded to skid resistance based on the use of the pavement surfaces.

a. **For runway surfaces.** The pavement surface areas treated with rejuvenation product must be tested for skid resistance a minimum of forty-eight (48) hours after application of the rejuvenation product. The results of the friction evaluation must be equal or greater than the Maintenance Planning levels provided in Table 3-2, "Friction Level Classification for Runway Pavement Surfaces," in AC 150/5320-12, Measurement, Construction, and Maintenance of Skid-resistant Airport Pavement Surfaces, when tested at speeds of 40 and 60 mph (65 and 95 km/h) with approved continuous friction measuring equipment (CFME).

b. **For taxiway and apron surfaces.** The skid resistance for taxiway and apron surfaces must be inspected by the Contractor and Engineer a minimum of forty-eight (48) hours after application of the rejuvenation product. In the event either the Contractor or the Engineer has concern on the skid resistance of these surfaces, the Contractor must exercise 632-4.6, Cure Time Remedial Option – Application of Sand, to the satisfaction of the Engineer. Otherwise, the provisions of paragraph 632-6.6.a may be directed by the Engineer.

## METHOD OF MEASUREMENT

**632-7.1 Asphalt crack preparation and seal.** The quantity of asphalt crack preparation and seal to be paid for must be the number of linear feet (m) performed in accordance with the plans and specifications and accepted by the Engineer.

**632-7.2 Asphalt rejuvenation.** The quantity of rejuvenation product to be paid for will be the number of square yards (sq m) performed in accordance with the plans and specifications and accepted by the Engineer. The Contractor must furnish the Engineer with the certified weigh bills when materials are received for the rejuvenation product used under this contract. The Contractor must not remove material from the tank car or storage tank until initial amounts and temperature measurements have been verified.

### BASIS OF PAYMENT

**632-8.1 Payment.** Payment for accepted rejuvenation product will be made at the contract unit price per square yard (square meter) for bituminous rejuvenation adjusted according to paragraph 632-8.1.a. Payment for the crack preparation and seal will be made at the contract unit price per linear foot (linear meter).

**a. Basis of adjusted payment.** The payment for accepted rejuvenation product must be calculated in accordance with Table 3.

**Table 3. Rejuvenation Pay Reduction**

<b>Binder Rejuvenation at Acceptance % Reduction in Absolute Viscosity or Complex Modulus</b>		<b>% Payment</b>
<b>Pavement More Than 3 Years in Age</b>	<b>Pavement Less Than 3 Years in Age</b>	
≥ 40	≥ 25	100
30.0 - 39.9	20.0 - 24.9	75
Less than 30.0	Less than 20.0	No payment

**b. Final payment.** Final payment will not be made until rejuvenation success has been confirmed by acceptance testing, which does not occur until 30-45 days after application. Final payment will be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-632-1	Asphalt Crack Preparation and Seal – per linear foot (linear meter)
Item P-632-2	Asphalt Rejuvenation – per square yard (square meter)

### TESTING REQUIREMENTS

29 CFR Part 1910.1200 Hazard Communication

ASTM D140	Standard Practice for Sampling Bituminous Materials
ASTM D1856	Standard Test Method for Recovery of Asphalt from Solution by Abson Method
ASTM D2171	Standard Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer
ASTM D2172	Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D2995	Standard Practice for Estimating Application Rate of Bituminous Distributors
ASTM D3549	Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D5340	Standard Test Method for Airport Pavement Condition Index Surveys

---

ASTM D5404	Standard Practice for Recovery of Asphalt from Solution Using the Rotary Evaporator
AASHTO T315	Standard Method of Test for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)
AC 150/5320-12	Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces
AC 150/5380-6	Guidelines and Procedures for Maintenance of Airport Pavements

**END OF ITEM P-632**