

Item P-623 Emulsified Asphalt Spray Seal Coat

DESCRIPTION

This seal coat is approved for use on all pavements, except runways, serving airplanes 12,500 lbs (5670 kg) or less; and any pavements on which aircraft do not operate including shoulders, overruns, roads, and parking areas.

The Engineer, with FAA concurrence, may specify this item for airports serving airplanes less than 60,000 lbs (27216 kg) except for runways and acute-angled exit taxiways.

P-623 may be applied to:

- 1) Pavements in fair or better condition as defined in ASTM D5340 or advisory circular (AC) 150/5320-17, Airfield Pavement Surface Evaluation and Rating (PASER) Manuals.**
- 2) Low to moderate weathered surfaces as defined by ASTM D5340.**

The Engineer must verify the selected materials comply with federal, state, and local authority requirements.

623-1.1 This item shall consist of the application of a polymer modified, asphalt emulsion spray seal coat (seal coat) composed of an emulsion of binders prepared from crude petroleum, mineral fillers, water and polymer, applied to an existing, previously prepared asphalt surface. The seal coat shall be applied in accordance with these specifications, and as shown on the plans or as directed by the Resident Project Representative (RPR).

The performance of a seal coat 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 AC 150/5380-7, Airport Pavement Management Program (PMP), and ASTM D5340. A typical asphalt pavement candidate is one with a structural condition index (SCI) deduct value of less than 10 and a PCI equal to or greater than 60.

623-1.2 Application rate per square yard (square meter). The approximate amounts of seal coat per square yard (square meter) for the spray seal will be applied as provided in the Application Rate Table. The actual application rates will vary within the range specified to suit field conditions and will be recommended by the manufacturer’s representative and approved by the RPR from the test area/sections evaluation.

Application Rate

	2-coat application	3-coat application
1 st Coat	0.14 - 0.20	0.14 - 0.20
2 nd Coat	0.10 - 0.20	0.10 - 0.20
3 rd Coat	-	0.08 - 0.15
Total Application	0.30 minimum	0.30 – 0.55

The quantities of material shown in the table above cover an average range of conditions. The Engineer should select the application rate reflecting the local condition of the pavement such as surface texture, porosity, and age of the asphalt pavement to be sealed.

If additional coats are required, application rates are not to exceed 0.20 gal/yd²/coat (0.91 liters/m²/coat).

MATERIALS

623-2.1 Polymer modified asphalt emulsion spray seal (seal coat). A seal coat fortified with fillers created from binders prepared from crude petroleum shall meet the properties in the following table:

Polymer Modified Asphalt Emulsion Spray Seal Properties¹

Property	Characteristics	
	Minimum	Maximum
Density at 77°F (25°C), lb./gal (g/mL)	9 (1.0)	12 (1.5)
Residue by evaporation, %	44	...
Water content, %	...	56
Ash content of residue, %	30	40
Uniformity	Uniform homogeneous consistency.	
Wet film continuity	No separation, coagulation, or settlement that cannot be overcome by moderate agitation.	
Resistance to heat	No blistering, sagging, or slipping.	
Resistance to water	No loss of adhesion and no blistering or tendency to re-emulsify.	
Flash point	No tendency to flash.	
Flexibility	No flaking, cracking, or loss of adhesion to the substrate.	
Polymer modification	Minimum 3% by weight of asphalt binder.	

¹ For water content testing, use ASTM Test Method D95. For flash point testing, use ASTM Test Method D93. For other properties, use ASTM Test Methods D2939.

The Contractor shall provide a copy of the manufacturer’s Certificate of Analysis (COA) for material delivered to the project. If the asphalt emulsion is diluted at other than the manufacturer’s facility, the Contractor shall provide a supplemental COA from an independent laboratory verifying the asphalt emulsion properties. The COA shall be provided to and approved by the RPR before material is applied. The furnishing of the vendor’s certified test report for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer’s COA may be subject to verification by testing the material delivered for use on the project.

623-2.2 Polymer modification. The type of polymer used for modification shall be chosen by the manufacturer. The polymer modifier shall be incorporated in the manufacturing process. The Contractor shall submit manufacturer’s technical data, the manufacturer’s certification indicating that the polymer meets the requirements of the specification, and the manufacturer’s approval of its use to the RPR. The amount of polymer will be a minimum 3% of the weight of the asphalt binder in the seal coat surface treatment.

Polymers are added to improve the coating’s final properties. These properties can include durability, drying time, color uniformity, and/or length of cure time. Polymers may also be used to modify the wet mixture’s viscosity to improve aggregate suspension.

The type of polymer to be used should be specified by the asphalt emulsion seal coat manufacturer and will depend on which final properties are desired.

The Engineer should specify the desired properties.

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23-2.3 Water. Water used in mixing or curing shall be from potable water sources, free of harmful soluble salts, and at least 50°F (10°C). Other sources shall be tested in accordance with ASTM C1602 prior to use.

623-2.4 Friction characteristics. [Not required.] [The Contractor shall submit to the RPR friction tests, from previous airport projects which used the emulsified asphalt spray seal coat 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 RPR 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.

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

CONSTRUCTION METHODS

623-4.1 Worker safety. The Contractor shall obtain a Safety Data Sheet (SDS) for both the asphalt sealer product and aggregate and require workmen to follow the manufacturer's recommended safety precautions. All additional industry standard safety precautions regarding the storage and applications of asphalts should be understood and followed by the Contractor.

623-4.2 Control strip. Prior to full production the Contractor shall construct a control strip, a minimum of 250 square yards. The test area will be designated by the RPR in an area representative of the project. The control strip will determine the application rate to be used as well as to demonstrate the equipment and placement methods to be used. If the control strip should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations and equipment shall be made. Additional control strips shall be placed and evaluated if required. Full production shall not begin without the RPR's approval of an appropriate application rate. Acceptable control strips shall be paid for in accordance with paragraph 623-8.1.

The application rate depends on the surface texture and the particular seal coat surface treatment selected.

If operational conditions preclude placement of a control strip on the pavement to be treated, it may be applied on a pavement with similar surface texture.

The only test required on the seal coat placed in the field is the viscosity test.

623-4.3 Weather limitations. The spray seal shall be applied only when the existing pavement surface is dry and when the weather is not foggy, rainy, or the humidity will not allow proper curing, or when the wind velocity will prevent the uniform application of the material. No material shall be applied when dust or sand is blowing or when rain is anticipated within eight (8) hours of application completion. The atmospheric temperature and the pavement surface temperature shall both be above 50°F (10°C) and rising and is expected to remain above 50°F (10°C) for 24 hours, unless otherwise directed by the RPR. 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 emulsion. Should emulsion get on any light or marker fixture, promptly clean the fixture. If cleaning is not satisfactory to the RPR, the Contractor shall replace any light, sign or marker with equivalent equipment at no cost to the Owner.

623-4.3 Equipment and tools. The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work. Equipment used to apply the seal coat shall have continuous agitation or mixing capabilities to maintain homogeneous consistency of the seal coat throughout the application process. Spray equipment shall be capable of mixing and spraying seal coat with aggregate added. Self-propelled squeegee equipment with mixing capability shall have at least two squeegee or brush devices (one behind the other) to ensure adequate distribution and penetration of seal coat surface treatment into pavement surface. Hand squeegees and brushes shall be acceptable in areas where practicality prohibits the use of mechanized equipment. A power broom or blower may be used for removing loose material from the surface to be treated.

623-4.4 Preparation of asphalt pavement surfaces. Clean pavement surface immediately prior to placing the seal coat so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film. Remove oil or grease by scrubbing with a detergent, then wash thoroughly with clean water. Any additional surface preparation, such as crack repair, shall be in accordance with Item P-101, paragraph 101-3.6.

[**a. New asphalt pavement surfaces.** Allow new asphalt pavement surfaces to cure so that there is no concentration of oils on the surface. A period of at least 30 days at 70°F (21°C) daytime temperatures shall elapse between the placement of a hot mixed asphalt concrete surface course and the application of the seal coat.

Perform a water-break-free test to confirm that the surface oils have degraded and dissipated. (Cast approximately one gallon (4 liters) of clean water out over the surface. The water should sheet out and wet the surface uniformly without crawling or showing oil rings.) If signs of crawling or oil rings are apparent on the pavement surface, additional time must be allowed for additional curing and retesting of the pavement surface prior to treatment.]

If the application is to be on new pavement surfaces, include paragraph 623-4.4a above.

623-4.5 Emulsion mixing.

Contractor must ensure the mixture is homogeneous with no balling or lumping. Continue to agitate the seal coat mixture in the mixing tank at all times prior to and during application so that a consistent mix is available for application. Small additional increments of water may be needed to provide a workable consistency, but in no case is the water content to exceed the specified amount.

623-4.6 Application of seal coat. Application of seal coat generally consists of two application coats of material. The first coat must be dry prior to the application of the second coat or subsequent coats if more than two coats are being applied. During all applications, the surfaces of adjacent structures shall be protected to prevent their being splattered or marred. Should the seal coat get on any light or marker fixture, promptly clean the fixture. If cleaning is not satisfactory to the RPR, the Contractor shall replace any light, sign or marker with equivalent equipment at no cost to the Owner.

Traffic shall not be allowed until the seal coat has thoroughly cured for approximately 24 hours.

If low spots and depressions greater than 1/2 inch (12 mm) in depth in the pavement surface cause ponding or puddling of the applied materials, the pavement surface shall be broomed with a broom drag. Brooming shall continue until the pavement surface is free of any pools of excess material. The RPR shall inspect and approve areas after brooming.

623-4.7 Freight and weigh bills. The Contractor shall submit waybills and delivery tickets during the progress of the work. Before the final estimate is allowed, file with the RPR certified waybills and certified delivery tickets for all seal coat used in the construction of the pavement covered by the contract. Do not remove seal coat from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

QUALITY CONTROL (QC)

623-5.1 Contractor qualifications. The Contractor shall furnish a certification demonstrating a minimum of three years of experience in the application of seal coats.

623-5.2 Sampling. A minimum of one sample per day shall be tested as specified in the table in paragraph 623-2.1. A random sample of approximately one-quart of the composite mix from the onsite

storage tank will be obtained daily by the Contractor in the presence of the owner's representative and stored in a proper container. The containers shall be sealed against contamination and retained in storage by the Owner for a period of six months. Samples shall be stored at room temperature and not be subjected to freezing temperatures.

A sample of undiluted asphalt emulsion shall be obtained from each consignment shipped to the job.

MATERIAL ACCEPTANCE

623-6.1 Application rate. The rate of application of the asphalt emulsion shall be verified at least twice per day. The Contractor must furnish the RPR the results daily.

METHOD OF MEASUREMENT

623-7.1 Asphalt seal coat. The quantity of seal coat shall be measured by the square yards [square meters] of material applied in accordance with the plans and specifications and accepted by the RPR.

BASIS OF PAYMENT

623-8.1 Payment shall be made at the contract unit price per square yard [square meter] for the seal coat applied and accepted by the RPR. This price shall be full compensation for all surface preparation, furnishing all materials, delivery and application of these materials, for all labor, equipment, tools, and incidentals necessary to complete the item control strip.

Payment will be made under:

Item P-623-8.1	Seal Coat – per square yard [square meter]
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REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D93	Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
ASTM D95	Standard Test Method for Water in Petroleum Products and Bituminous Materials by Distillation
ASTM D2939	
ASTM D5340	Standard Test Method for Airport Pavement Condition Index Surveys

Advisory Circulars (AC)

AC 150/5380-7	Airport Pavement Management Program (PMP)
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Code of Federal Regulations (CFR)

29 CFR 1910.1200	Occupational Safety and Health Standards, Toxic and Hazardous Substances, Hazard Communication
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40 CFR – Protection of Environment.

END OF ITEM P-623