

**Item P-629 Thermoplastic Coal Tar Emulsion Surface Treatments**

**DESCRIPTION**

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**This specification for thermoplastic coal tar emulsion includes three options. Any of the options may be used on apron areas that require a fuel resistant coating serving aircraft less than 60,000 lbs (27216 kg).**

- 1. Micro-surface: For use on all pavements on airports serving airplanes less than 60,000 lbs (27216 kg); any pavements on which aircraft do not operate including shoulders, overruns, roads, and parking areas. Micro-surface can be used at airports that server aircraft 60,000 lbs (27216 kg) or greater with FAA approval.**
- 2. Sand slurry seal: For use on all pavements on general aviation airports serving airplanes 12,500 lbs (5670 kg) or less; all pavements, except runways, on airports serving airplanes less than 60,000 lbs (27216 kg); any pavements on which aircraft do not operate including shoulders, overruns, roads, and parking areas.**
- 3. Spray seal coat: For use on all pavements, except runways, on general aviation airports 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.**

**With growing environmental/safety regulations, more states and local authorities are prohibiting the use of coal tar products. The Engineer must verify the selected materials comply with federal, state, and local authority requirements.**

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**629-1.1** This item shall consist of an application of a thermoplastic coal tar emulsion [ Micro-Surface, ][ Sand Slurry Seal, ][ Spray Seal Coat, ] applied to an existing, previously prepared asphalt surface, including airport pavements serving small airplanes [ 12,500 lbs (5670 kg) or less ], roads, and other general applications. Thermoplastic resin coal tar emulsion products provide a fuel-resistant surface where pavements are subjected to fuel spills. Thermoplastic resin coal tar emulsion products assist in pavement preservation through reducing the rate of pavement oxidation. The application of the surface treatment shall be in accordance with these specifications and shall conform to the dimensions shown on the plans or as directed by the Resident Project Representative (RPR).

## MATERIALS

**629-2.1 Thermoplastic coal tar emulsion.** The emulsion material shall be a thermoplastic coal tar emulsion made up of plastic resin and emulsified coal tar pitch. The thermoplastic coal tar emulsion shall be manufactured as a complete product and tested at the manufacturing plant for material certification. The cured thermoplastic coal tar emulsion sample must pass the fuel-resistance test in accordance with ASTM D5727.

**629-2.2 Manufacturer's certifications.** The Contractor shall furnish the manufacturer's certification of Analysis (COA) that all thermoplastic coal tar emulsion shipped to the project meets the following testing requirements:

### Thermoplastic Coal Tar Emulsion Properties

Property	Standard	Requirement
Water content	ASTM D5727, Section 6.1.6	≤58%
Ash of Residue	ASTM D5727, Section 6.1.9	≤ 15%
Flexibility	ASTM D5727, Section 6.1.14	1 rating
Resistance to Kerosene	ASTM D5727, Section 6.1.12	Pass with no loss of adhesion and no softening of film
Softening Point	ASTM D36	>212°F (100°C)

**629-2.3 Manufacturer sampling.** A sample of undiluted thermoplastic coal tar emulsion shall be obtained at the production facility from each consignment shipped to the job. Manufacturer shall store the samples in containers that are sealed against contamination and retained for a period of six months. Samples shall be stored at room temperature and not be subjected to freezing temperatures.

**629-2.4 Water.** Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use. The temperature of the water added during mixing shall be at least 50°F (10°C).

**629-2.5 Handling and storage.** All emulsion stored on-site shall be agitated at least once per day for a minimum of 15 minutes. The distributor or applicator, pumps and all tools shall be maintained in satisfactory working condition. Spray bar nozzles, pumps, or other equipment can be cleaned mechanically or with clean water.

**629-2.6 Health, safety, and environment.** The Contractor must provide a complete Safety Data Sheet (SDS) 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 SDS for hazardous materials. The SDS, Section II, shall include the Chemical Abstracts Service (CAS) registry numbers for all applicable hazardous ingredients in the coal tar emulsion product. The Contractor must provide the manufacturer's certification that the 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.

COMPOSITION AND APPLICATION

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The Engineer shall select one of the following options based on whether the project is for (1) Thermoplastic Coal Tar Emulsion [ Micro-Surface Type A ] [ Micro-Surface Type B ], (2) Thermoplastic Coal Tar Emulsion Slurry Seal, or (3) Spray Seal Coat [ with ] [ without ] Sand Aggregate.

FOR THERMOPLASTIC COAL TAR EMULSION MICRO-SURFACE, INSERT THE FOLLOWING PARAGRAPHS FOR PARAGRAPH 629-3.0 TO 629-3.6:

629-3.0 Thermoplastic coal tar emulsion [ Micro-Surface Type A ] [ Micro-Surface Type B ].

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Type A Aggregate Thermoplastic Coal Tar Emulsion Micro-Surface generally can be used for:

- Existing pavements that are moderately rough and raveled and require a substantially improved surface profile or wearing surface.
Pavements that may require improvement of skid-resistance.
Areas that require wear protection, oxidation protection and chemical/fuel resistance.

Type B Aggregate Thermoplastic Coal Tar Emulsion Micro-Surface generally can be used for:

- Existing pavements that are raveled or smooth and require an improved surface profile or wearing surface.
Pavements that may require improvement of skid-resistance.
Areas that require wear protection, oxidation protection and chemical/fuel resistance.

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629-3.1 Quantities of materials per square yard. Based on the data in this specification, the Contractor shall submit the proportions of thermoplastic coal tar emulsion and aggregate proposed for use to the RPR for approval prior to the start of operations. A copy of the mix design and test data required by this specification shall be submitted to the RPR for approval along with the above information. No thermoplastic coal tar emulsion micro-surface shall be produced for payment until a job mix formula has been approved in writing by the RPR.

The approximate amounts of materials per square yard (square meter) for the micro-surface treatment shall be as provided in the Application Rate table.

### Application Rate

Aggregate Type	Composition <sup>i</sup> lbs/gal (kg/l)	Application Rate <sup>ii</sup> lb/yd <sup>2</sup> (kg/m <sup>2</sup> )
<b>A</b>	22-24 (2.63-2.87)	8 (4.34)
<b>B</b>	20-22 (2.39-2.63)	6.5 (3.53)

- i. Aggregate (lbs) shall be mixed homogeneously with the thermoplastic coal tar emulsion (gals).
- ii. Minimum application rate of uncured thermoplastic coal tar emulsion micro-surface.

**629-3.2 Aggregate.** The aggregate shall consist of sound, durable crushed igneous type stone (crushed basalt, granite, trap rock, etc.), be free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from coatings of clay, organic matter, and other deleterious materials. The percentage of wear shall not be greater than 35% when tested in accordance with ASTM C131. The aggregate shall meet the gradation in the table below for Type A and for Type B when tested in accordance with ASTM C136.

The Contractor shall provide a certification showing particle size analysis and properties of the material delivered for use on the project.

### Aggregate Material Gradation Requirements

Sieve Designation (square openings)	Percentage by Weight Passing Sieves	
	Type A	Type B
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	75-95	95-100
No. 16 (1.18 mm)	50-75	65-95
No. 30 (600 μm)	30-65	35-65
No. 50 (300 μm)	20-50	20-45
No. 100 (150 μm)	15-25	5-20
No. 200 (75 μm)	5-20	0-20

### 629-3.3 Application

**a. Application of primer coat.** After preparation of the pavement and acceptance by the RPR, the primer coat shall be applied to the pavement surface only where micro-surface will be applied. Apply a tack primer coat of thermoplastic coal tar emulsion diluted with 50% water at the rate of 0.10 gallons of mix per square yard (0.45 l/m<sup>2</sup>).

**b. Application of micro-surface.** The surface shall be pre-wet by fogging ahead of the spreader box. Water used in pre-wetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the spreader box. If temperatures are in the colder acceptable range the rate of fogging may be decreased. The mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. A sufficient amount of mixture shall be carried in the spreader box at all times so that even distribution is obtained. No clumped or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines from the coarse aggregate will be permitted.

Upon completion of the work, the thermoplastic coal tar emulsion micro-surface shall have no bare spots or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform texture.

In areas where the spreader box cannot be used, the thermoplastic coal tar emulsion micro-surface shall be applied by a means of a hand squeegee.

#### **629-3.4 Equipment and tools.**

**a. Mobile mixing machine.** The mobile mixing machine shall be a truck-mounted mobile mixing plant with a towed-type spreader box. It shall have a water tank and water pump capable of delivering a constant volume of water.

The mobile mixing machine shall have an agitated storage tank for the thermoplastic coal tar emulsion and a non-shearing peristaltic pump with variable rate of flow for the delivery of this material. The mobile mixing machine shall have a hopper for holding aggregate, supplying this material to the mixing chamber by a conveyor belt. The rate of aggregate delivery shall be mechanically dependent upon the speed of the peristaltic pump.

The mobile mixing machine shall be a continuous-flow mixing unit capable of delivering predetermined quantities of thermoplastic coal tar emulsion, aggregate, and if necessary water, to the mixing chamber and discharging the thoroughly mixed material on a continuous basis. The mobile mixing machine shall deliver the materials to the mixing chamber in a constant proportion in a manner not dependent on power plant or vehicle speed. The machine shall be equipped with a water spray bar capable of fogging the pavement surface to aid in the application process.

Attached to the mixing machine shall be a mechanical-type squeegee distributor, equipped with flexible material in contact with the surface to prevent loss of material from the distributor. It shall be maintained to prevent loss of micro-surfacing on varying grades and adjusted to assure uniform spread. The spreader box may have an adjustable width.

**b. Prime coat distributor.** The prime coat distributor shall be either a truck-mounted 300 to 3,000-gallon (1136 to 11356 liter) tank or a trailer-mounted unit with a 300 to 1000-gallon tank (1136 to 3785 liters) containing suitably driven mixing blades to combine predetermined quantities of thermoplastic emulsion and water into a homogeneous mixture. It shall be equipped with a diaphragm style pump capable of delivering a constant volume of material to a spray wand or spray bar. The device shall have a bottom ball valve capable of delivering material to a squeegee spreader or a drag box.

**c. Auxiliary equipment.** Other tools or equipment such as power brooms, power blowers, air compressors, hand brooms, hand squeegees, etc., shall be provided as required.

**d. Calibration.** The Contractor shall furnish all equipment, materials and labor necessary to calibrate the equipment. It shall be calibrated to assure that it will produce and apply a mix that conforms to the job mix formula. Commercial equipment should be provided with a method of calibration by the manufacturer. All calibrations shall be made with the approved job materials prior to applying the Micro-Surface to the pavement. A copy of the calibration test results shall be furnished to the RPR.

**629-3.5 Control strip.** A qualified manufacturer's representative shall be present in the field to assist the Contractor in applying test areas and/or control strips. Prior to full production, the Contractor shall prepare a control strip of a minimum 16 feet wide by 100 feet long at the specified application rate. Separate control strips by a minimum of 200 feet between sections. The area to be tested will be designated by the RPR and will be located on the existing pavement.

The control strip shall determine the quality of the mixture in place as well as the performance of the equipment. The same equipment and method of operations shall be used on the control strip as will be used on the remainder of the work. 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.

**629-3.6 Friction characteristics.** Friction testing is not required for micro-surface installations.

**FOR THERMOPLASTIC COAL TAR EMULSION SAND SLURRY SEAL,  
INSERT THE FOLLOWING PARAGRAPHS FOR PARAGRAPH 629-3.0 TO  
629-3.6:**

**629-3.0 Thermoplastic coal tar emulsion sand slurry seal.**

**629-3.1 Quantities of materials per square yard.** Based on the data in this specification, the Contractor shall submit the proportions of thermoplastic coal tar emulsion and aggregate proposed for use to the RPR for approval prior to the start of operations. A copy of the mix design and test data required by this specification shall be submitted to the RPR for approval along with the above information. No thermoplastic coal tar emulsion sand slurry seal shall be produced for payment until a job mix formula has been approved in writing by the RPR.

**Application Rate**

<b>Composition<sup>i</sup> lbs/gal (kg/l)</b>	<b>Application Rate<sup>ii</sup> lb/yd<sup>2</sup> (kg/m<sup>2</sup>)</b>
17-19 (2.04-2.28)	4 (2.17)

1. Aggregate (lbs) shall be mixed homogeneously with the thermoplastic coal tar emulsion (gals).
2. Minimum application rate of uncured thermoplastic coal tar emulsion sand slurry seal.

**629-3.2 Aggregate.** The aggregate shall consist of sound, durable crushed igneous type stone (crushed basalt, granite, trap rock, etc.), clean washed masonry sand, or clean washed manufactured silica sand, be free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from coatings of clay, organic matter, and other deleterious materials. Aggregate shall have a minimum Mohs hardness of 6. The aggregate shall meet the gradation in the table below when tested in accordance with ASTM C136.

The Contractor shall provide a certification showing particle size analysis and properties of the material delivered for use on the project.

### Aggregate Material Gradation Requirements

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
No. 4 (4.75 mm)	100
No. 8 (2.36 mm)	99.5-100
No. 16 (1.18 mm)	85-100
No. 30 (600 μm)	50-90
No. 50 (300 μm)	15-55
No. 100 (150 μm)	0-20
No. 200 (75 μm)	0-20

#### 629-3.3 Application.

**a. Application of prime coat.** After preparation of the pavement and acceptance by the RPR, the prime coat shall be applied to the pavement surface only where thermoplastic coal tar emulsion sand slurry seal will be applied. Apply a prime coat of thermoplastic coal tar emulsion diluted with 50% water at the rate of 0.10 gallons of mix per square yard (0.45 l/m<sup>2</sup>).

**b. Application of sand slurry seal.** The surface shall be pre-wet by fogging ahead of the spreader box. Water used in pre-wetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the spreader box. The mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. A sufficient amount of mixture shall be carried in the spreader box at all times so that even distribution is obtained. No clumped or unmixed aggregate shall be permitted. No segregation of the thermoplastic coal tar emulsion and aggregate fines from the coarse aggregate will be permitted.

Upon completion of the work, the thermoplastic coal tar emulsion sand slurry seal shall have no bare spots or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform texture.

In areas where the spreader box cannot be used, the thermoplastic coal tar emulsion sand slurry seal shall be applied by a means of a hand squeegee.

#### 629-3.4 Equipment and tools.

**a. Mobile mixing machine.** The mobile mixing machine shall be a truck-mounted mobile mixing plant with a towed-type spreader box. It shall have a water tank and water pump capable of delivering a constant volume of water.

The mobile mixing machine shall have an agitated storage tank for the thermoplastic coal tar emulsion and a non-shearing peristaltic pump with variable rate of flow for the delivery of this material. The mobile mixing machine shall have a hopper for holding aggregate, supplying this material to the mixing chamber by a conveyor belt. The rate of aggregate delivery shall be mechanically dependent upon the speed of the peristaltic pump.

The mobile mixing machine shall be a continuous-flow mixing unit capable of delivering predetermined quantities of thermoplastic coal tar emulsion, aggregate, and if necessary water, to the mixing chamber and discharging the thoroughly mixed material on a continuous basis. The mobile mixing machine shall deliver the materials to the mixing chamber in a constant proportion in a manner not dependent on power plant or vehicle speed. The machine shall be equipped with a water spray bar capable of fogging the pavement surface to aid in the application process.

Attached to the mixing machine shall be a mechanical-type squeegee distributor, equipped with flexible material in contact with the surface to prevent loss of material from the distributor. It shall be maintained to prevent loss of micro-surfacing on varying grades and adjusted to assure uniform spread. The spreader box may have an adjustable width.

**b. Prime coat distributor.** The prime coat distributor shall be either a truck-mounted 300 to 3,000-gallon (1136 to 11356 liter) tank or a trailer-mounted unit with a 300 to 1000-gallon tank (1136 to 3785 liters) containing suitably driven mixing blades to combine predetermined quantities of thermoplastic emulsion and water into a homogeneous mixture. It shall be equipped with a diaphragm style pump capable of delivering a constant volume of material to a spray wand or spray bar. The device shall have a bottom ball valve capable of delivering material to a squeegee spreader or a drag box.

**c. Auxiliary equipment.** Other tools or equipment such as power brooms, power blowers, air compressors, hand brooms, hand squeegees, etc., shall be provided as required.

**d. Calibration.** The Contractor shall furnish all equipment, materials and labor necessary to calibrate the equipment. It shall be calibrated to assure that it will produce and apply a mix that conforms to the job mix formula. Commercial equipment should be provided with a method of calibration by the manufacturer. All calibrations shall be made with the approved job materials prior to applying the slurry seal to the pavement. A copy of the calibration test results shall be furnished to the RPR.

**629-3.5 Control strip.** A qualified manufacturer’s representative shall be present in the field to assist the Contractor in applying control areas and/or control strips. The area to be tested will be designated by the RPR and will be located on the existing pavement.

The control strip shall determine the quality of the mixture in place as well as the performance of the equipment. The same equipment and method of operations shall be used on the control strip as will be used on the remainder of the work. 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.

**629-3.6 Friction characteristics.** Friction testing is not required for sand slurry installations.

**FOR THERMOPLASTIC COAL TAR EMULSION SPRAY SEAL COAT [ WITH ]  
[ WITHOUT ] SAND AGGREGATE, INSERT THE FOLLOWING FOR  
PARAGRAPH 629-3.0 TO 629-3.6:**

**629–3.0 Thermoplastic coal tar emulsion spray seal coat [ with ] [ without ] sand aggregate.**

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**Thermoplastic coal tar emulsion spray seal coat treatments may be used for taxiways and runways with the application of a suitable aggregate to maintain adequate surface friction; airfield secondary and tertiary pavements including shoulders, overruns, roads, parking areas, and other general applications with or without aggregate applied. The thermoplastic coal tar emulsion spray seal coat may be applied to new asphalt pavement and 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. A thermoplastic coal tar emulsion spray seal coat without aggregate, more commonly called a “fog seal”, can**



be considered for use on pavements with low to moderate weathered surfaces as defined by ASTM D5340.

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**629-3.1 Quantities of materials per square yard.** Based on the data in this specification, the Contractor shall submit the proportions of thermoplastic coal tar emulsion and aggregate proposed for use to the RPR for approval prior to the start of operations. A copy of the test data required by this specification shall be submitted to the RPR for approval along with the above information. No thermoplastic coal tar emulsion spray seal coat shall be produced for payment until approved in writing by the RPR.

**Application Rate without Aggregate**

Composition	Application Rate gal/yd <sup>2</sup> (L/m <sup>2</sup> )
75% thermoplastic coal tar emulsion and 25% water (±5%)	0.15-0.25 (0.081-0.136)

**Application Rate with Aggregate**

Application Coat(s)	Composition <sup>i</sup> lbs/gal (kg/L)	Application Rate <sup>ii</sup> Per Coat gal/yd <sup>2</sup> (L/m <sup>2</sup> )	Total Application Rate <sup>ii</sup> gal/yd <sup>2</sup> (L/m <sup>2</sup> )
1	6 (0.72)	0.20-0.30 (0.76-1.14)	0.20-0.30 (0.76-1.14)
2	3 (0.36)	0.10-0.15 (0.38-0.57)	0.20-0.30 (0.76-1.14)

- i. Aggregate (lbs) shall be mixed with the undiluted thermoplastic coal tar emulsion (gals).
- ii. Minimum application rate of uncured thermoplastic coal tar emulsion spray seal coat.

**629-3.2 Aggregate.** The aggregate material shall be a dry, clean, dust and dirt free, sound, durable, angular shaped manufactured specialty sand, such as that used as an abrasive, with a minimum Mohs hardness of 6. The Contractor shall submit manufacturer’s technical data and a manufacturer’s certification indicating that the specialty sand meets the requirements of the specification to the RPR prior to bid. The sand must be approved for use by the RPR and shall meet the following gradation limits:

**Aggregate Material Gradation Requirements**

<b>Sieve Designation (square openings)</b>	<b>Percentage by Weight Retained Sieves</b>
No. 20 (850 μm)	0-2
No. 30 (600 μm)	0-12
No. 40 (425 μm)	2-60
No. 50 (300 μm)	5-60
No. 70 (212 μm)	5-60
No. 100 (150 μm)	5-30
No. 140 (106 μm)	0-10
No. 200 (75 μm)	0-2
Finer than No. 200	0-0.3

The Contractor shall provide a certification showing particle size analysis and properties of the material delivered for use on the project.

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**The gradations in the table represent the limits in determining aggregate suitability for use in the thermoplastic coal tar emulsion spray seal. The sand gradation used, within the limits designated in the table, shall provide sufficient friction levels to meet or exceed the Maintenance Planning Friction Level in Table 3-2, “Friction Level Classification for Runway Pavement Surfaces” of AC 150/5320-12, Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces.**

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**629-3.3 Application.**

a. Pavement surfaces which have excessive runoff of seal coat due to excessive amount of material being applied or excessive surface grade shall be treated in two or more applications to the specified application rate at no additional cost to the Owner. If multiple coats are specified, each coat shall be allowed to dry and cure initially before applying any subsequent coats. The initial drying shall allow evaporation of water of the applied mixture, resulting in the coating being able to sustain light foot traffic.

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. Ponding and/or puddling shall not cause excessive pavement softening and/or additional distress. The RPR shall inspect and approve areas after brooming.

During all applications, the surfaces of adjacent structures shall be protected to prevent their being spattered or marred. Thermoplastic coal tar emulsion materials shall not be discharged into borrow pits or gutters.

**629-3.4 Equipment and tools.**

a. **Seal coat distributor.** The seal coat distributor shall be either a truck-mounted 300 to 3,000-gallon (1136 to 11356 liter) tank or a trailer-mounted unit with a 300 to 1000 gallons (1136 to 3785 liters) containing suitably driven mixing blades to combine predetermined quantities of thermoplastic emulsion, aggregate if specified and if necessary, water into a homogeneous mixture. It shall be equipped with a

diaphragm style pump capable of delivering a constant volume of material to a spray wand or spray bar. The device shall have a bottom ball valve capable of delivering material to a squeegee spreader or a drag box.

**b. Auxiliary equipment.** Other tools or equipment such as power brooms, power blowers, air compressors, hand brooms, hand squeegees, etc., shall be provided as required.

**c. Calibration.** The Contractor shall furnish all equipment, materials and labor necessary to calibrate the equipment. It shall be calibrated to assure that it will produce and apply a mix that conforms to the job mix formula. Commercial equipment should be provided with a method of calibration by the manufacturer. All calibrations shall be made with the approved job materials prior to applying the seal coat to the pavement. A copy of the calibration test results shall be furnished to the RPR.

**629-3.5 Control strip.** A qualified manufacturer's representative shall be present in the field to assist the Contractor in applying control areas and/or control strips. The Contractor shall prepare a control strip at the specified application rate. Separate control strips by a minimum of 200 feet between sections. The area to be tested will be designated by the RPR and will be located on the existing pavement.

The control strip shall determine the quality of the mixture in place as well as the performance of the equipment. The same equipment and method of operations shall be used on the control strip as will be used on the remainder of the work. 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.

**a. For taxiway, taxilane and apron surfaces.** Prior to full application, the Contractor shall place test area as specified by the manufacturer's representative and RPR. The test area will be located on representative section of the pavement to receive the Thermoplastic coal tar emulsion spray seal coat designated by the RPR.

**b. For runway and high-speed taxiway surfaces.** Prior to full application, the Contractor shall place a control strip a minimum of 300 feet (90 m) long by 12 feet (3.6 m) wide, or width of anticipated application, whichever is greater, as stipulated by the manufacturer's representative and RPR. The area to be tested will be located on a representative section of the pavement to receive the Thermoplastic coal tar emulsion spray seal coat designated by the RPR. Before beginning the control strip, the skid resistance of the existing pavement shall be determined for each control strip with a continuous friction measuring equipment (CFME). The skid resistance test after application shall be at approximately the same location as the test done on the existing pavement. The Contractor may begin testing the skid resistance of runway and taxiway control strips after application of the Thermoplastic coal tar emulsion spray seal has fully cured. Aircraft shall not be permitted on the runway or taxiway control strips for a minimum of 24 hours and until such time as the Contractor validates that its surface friction meets AC 150/5320-12. The results of the friction evaluation meet or exceed 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) wet with approved CFME.

If the control strip should prove to be unsatisfactory, necessary adjustments to the application rate, placement operations, and equipment shall be made. Additional control strips shall be placed and additional skid resistance tests performed and evaluated. 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 629-8.1.

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**The control strip affords the Contractor and the Engineer an opportunity to determine the quality of the mixture in place as well as the performance of the equipment.**

**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.**

**For projects calling for application of the thermoplastic coal tar emulsion surface treatment on runway and high-speed taxiway, the Engineer shall document skid resistance in accordance with AC 150/5320-12, Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces, prior to full application.**

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**629-3.6 Friction characteristics** For projects where thermoplastic coal tar emulsion spray seal coat is applied on runway and taxiway surfaces, the Contractor shall submit to the RPR friction tests, from previous airport projects which used the thermoplastic coal tar emulsion spray seal coat in a similar environment, in accordance with AC 150/5320-12, at 40 or 60 mph (65 or 95 km/h) wet, showing, as a minimum; friction value of pavement surface prior to thermoplastic coal tar emulsion spray seal coat 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 thermoplastic coal tar emulsion spray seal coat 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 thermoplastic coal tar emulsion spray seal coat with aggregate. 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.

The thermoplastic coal tar emulsion spray seal coat 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.

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## CONSTRUCTION METHODS

**629-4.1 Worker safety.** The Contractor shall obtain a SDS for both the thermoplastic coal tar emulsion product and aggregate and require workmen to follow the manufacturer’s recommended safety precautions.

**629-4.2 Weather limitations.** The material shall not be applied when the humidity or impending weather conditions will not allow proper drying or when the atmospheric or pavement temperature is below 50°F (10°C), unless otherwise directed by the RPR.

During application of thermoplastic coal tar emulsion surface treatment, 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 emulsion. Should thermoplastic coal tar emulsion surface treatment 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.

**629-4.3 Preparation of asphalt pavement surfaces.** Clean pavement surface immediately prior to placing the surface treatment 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 P101-3.6.

**629-4.4 Application.** Application shall be in accordance with paragraph 629-3.3.

**629-4.5 Curing.** The mixture shall be permitted to dry for a minimum of 24 hours after the application, before opening to traffic or painting, and shall be sufficiently cured to drive over without damage to the installation. Any damage to the uncured mixture caused by the Contractor will be the responsibility of the Contractor to repair.

### QUALITY CONTROL (QC)

**629-5.1 Field emulsion sampling.** All emulsion sampling methods shall be in accordance with ASTM D140. Samples must be taken from the center of an agitated bulk storage tank after a minimum of 15 minutes of continual agitation.

**629-5.2 Field composite mix sampling.** Composite mix of thermoplastic coal emulsion and aggregate shall be taken directly from the pug mill of the mobile mixing machine for micro-surface and sand slurry installations into a sealed 1-gallon container to be weighed. The minimum weight of composite mix shall be the following:

- a. Type A Micro-Surface Composite Mix – Minimum 14 pounds per gallon
- b. Type B Micro-Surface Composite Mix – Minimum 13.5 pounds per gallon
- c. Sand Slurry Composite Mix – Minimum 13 pounds per gallon

**629-5.3 Manufacturer's representation.** The manufacturer's representative shall have knowledge of the material, procedures, and equipment described in the specification and shall be responsible for verifying the job mix formula submitted to the RPR and shall oversee the preparation and application of the thermoplastic coal tar emulsion surface treatment. Documentation of the manufacturer representative's experience and knowledge for applying the thermoplastic coal tar emulsion surface treatment shall be furnished to the RPR a minimum of 10 work days prior to placement of the control strips. The cost of the manufacturer's representative shall be included in the bid price.

**629-5.4 Contractor qualifications.** The Contractor shall provide the RPR Contractor qualifications for applicators, personnel and equipment. The Contractor shall also provide, from the thermoplastic coal tar emulsion Manufacturer, documentation that the Contractor is certified to apply the thermoplastic coal tar emulsion surface treatment. Contractor shall provide documentation for at least three (3) applications similar to this project completed in the past two (2) years.

### MATERIAL ACCEPTANCE

**629-6.1 Friction tests.** [ For spray seal versions only. Micro-surface and sand slurry versions do not require friction testing. ] Friction Test in accordance with AC 150/5320-12, Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces, shall be accomplished on all runway and taxiways that have received a seal coat. The Contractor shall coordinate testing with the RPR. Each test includes performing friction tests at 40 mph

and 60 mph (65 and 95 km/h) both wet, 15 feet (4.5 m) to each side of runway centerline. Friction test shall be run within 30 days prior to application of the seal coat to runway and/or high-speed taxiways and after application of the seal coat. The RPR shall be present for testing. The Contractor shall provide a written report of friction test results.

### METHOD OF MEASUREMENT

**629-7.1 Measurement.** The Thermoplastic Coal Tar Emulsion [ Micro-Surface Type A ] [ Micro-Surface Type B ][ Sand Slurry Seal ][ Spray Seal Coat with Sand Aggregate ][ Spray Seal Coat without Sand Aggregate ] shall be measured by the square yard (sq m) of the area indicated on the contract drawings or designated by the RPR.

### BASIS OF PAYMENT

**629-8.1 Payment.** Payment shall be made at the contract unit price per square yard (square meter) for the Thermoplastic Coal Tar Emulsion [ Micro-Surface Type A ][ Micro-Surface Type B ] [ Sand Slurry Seal ][ Spray Seal Coat with Sand Aggregate ][ Spray Seal Coat without Sand Aggregate ]. This price shall fully compensate the Contractor for furnishing all materials and for all labor, equipment tools and incidentals necessary to complete the thermoplastic coal tar emulsion product installation, including mix design and data sheets stipulated in these specifications.

Payments will be made under:

Item P-629-8.1 Thermoplastic coal tar emulsion [ Micro-Surface Type A ][ Micro-Surface Type B ][ Sand Slurry Seal ][ Spray Seal Coat with Sand Aggregate ][ Spray Seal Coat without Sand Aggregate ] – per square yard [ square meter ].

[ Item P-629-8.2 Runway and High Speed Exit Taxiway Friction Testing - per lump sum ][ Not required ].

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**For spray seal versions only. Micro-surface and sand slurry versions do not require friction testing**

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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 D36  | Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)   |
| ASTM C131 | Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine |
| ASTM C136 | Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates   |

ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D140	Standard Practice for Sampling Bituminous Materials
ASTM D5340	Standard Test Method for Airport Pavement Condition Index Surveys
ASTM D5727	Standard Specification for Emulsified Refined Coal Tar (Mineral Colloid Type)
Advisory Circulars (AC)	
AC 150/5320-12	Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces
AC 150/5320-17	Airfield Pavement Surface Evaluation and Rating (PASER) Manuals
Code of Federal Regulations (CFR)	
29 CFR Part 1910.1200	Hazard Communication
40 CFR	Protection of the Environment

**END OF ITEM P-629**