

SURFACE TREATMENT ITEMS

ITEM P-608-R RAPID CURE SEAL COAT

DESCRIPTION

608-R-1.1 This item shall consist of the application of an asphalt surface treatment composed of natural and refined asphalt materials, additives, and light oils, for taxiways and runways with the application of a suitable aggregate to maintain adequate surface friction; and airfield secondary and tertiary pavements including aprons, shoulders, overruns, roads, parking areas, and other general applications with or without aggregate applied as designated on the Plans.

The terms seal coat, asphalt sealer, and asphalt material are interchangeable throughout this specification. The term asphalt means natural and refined asphalt materials in this specification.

MATERIALS

608-R-2.1 AGGREGATE. The fine-aggregate material shall be a dry, clean, sound, durable, angular shaped, with highly textured surfaces, manufactured specialty abrasive aggregate. It shall have 100% fractured faces, SiO₂ content of 55% minimum, CaO of 3% max, with a sand equivalent greater than 85 and a Mohs hardness of 7 or greater. Additional characteristics as outlined in Table 608-R-1. The Contractor shall submit specialty aggregate manufacturer's technical data and the specialty aggregate manufacturer's certification indicating that the specialty aggregate meets the requirements of the specification to the Engineer prior to start of construction. The aggregate must be approved for use by the Engineer and shall meet the gradation limits in Table 608-R-2 when tested in accordance with ASTM C136:

**TABLE 608-R-1
AGGREGATE CHARACTERISTICS**

| Test | Standard | Range |
|-----------------------------|----------------------------|-----------|
| Micro-Deval | ASTM D7428 | 15% max |
| Magnesium Sulfate Soundness | ASTM C88 | 2% max |
| Aggregate Angularity | ASTM C1252 – Test Method A | 45% min |
| Moisture Content (%) | ASTM C566 | 2% max |
| Bulk Dry Specific Gravity | ASTM C128 | 2.6 – 3.0 |
| Absorption (%) | ASTM D2216 | 3% max |
| Mohs Hardness | Mohs Scale | 7 min |

**TABLE 608-R-2
AGGREGATE GRADATION REQUIREMENTS**

| Sieve | Percent Passing by Weight |
|--------|---------------------------|
| No. 8 | 100 |
| No. 14 | 98 - 100 |
| No. 16 | 85 - 100 |
| No. 30 | 15- 45 |
| No. 50 | 0 – 8 |
| No. 70 | 0 - 2 |

The Contractor shall provide a certification of analysis (COA) showing analysis and properties of the material delivered for use on the project. The Contractor's certification may be subject to verification by testing the material delivered for use on the project.

608-R-2.2 ASPHALT MATERIAL. The asphalt material base residue shall contain not less than 40% gilsonite, or uintaite, and shall not contain any tall oil pitch or coal tar material. The material shall be compatible with asphalt pavement, and have a 5-year minimum proven aviation performance record at airports with similar climatic conditions.

The solvent-based rapid cure material shall meet the following properties:

| | |
|--|--------|
| Kinematic Viscosity at 140°F, ASTM D4402, cSt. | 10-30 |
| Percent Residue by Distillation, ASTM D402, or Evaporation | 30-45% |

The residue from distillation shall have the following properties:

| | |
|---|----------|
| Penetration at 77°F, ASTM D5, dmm | 2-12 |
| Softening Point, ASTM D36 | 180-200 |
| Solubility in 1,1,1 Trichloroethylene, ASTM D2042 | 99% min. |

The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the asphalt sealer delivered to the project. If the asphalt sealer is diluted at other than the manufacturer's facility, the Contractor shall provide a supplemental COA from an independent laboratory verifying the asphalt sealer properties. The COA shall be provided to and approved by the Engineer before the asphalt 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.

The asphalt sealing material must be applied in an undiluted form. The material may be stored at ambient temperature for long periods of time if necessary. Storage will follow industry standard recommendations due to the flammability of the material; avoid sparks and open flames to come into contact with the material or any gasses that might be escaping the storage vessel.

Contractor shall provide a list of airport pavement projects, exposed to similar climate conditions, where this product has been successfully applied within at least 5 years of the project.

608-R-2.3 SEAL COAT WITH AGGREGATE. The Contractor shall submit friction test data from at least two (2) airport projects identified under subsection 608-R-2.2. The test data must be from the same project and include technical details on application rates, aggregate rates, and point of contact at the airport to confirm use and success of sealer with aggregate.

Friction test data in accordance with the Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5320-12, *Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces*, at 40 or 60 miles per hour (mph) wet, must include as a minimum; the friction value prior to sealant application; two values, between 24 and 96 hours after application, with a minimum of 24 hours between tests; and one value between 180 days and 360 days after the application. The results of the 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.

Seal coat material submittal without required friction performance will not be approved. Friction tests performed on this project cannot be used as a substitute of this requirement.

COMPOSITION AND APPLICATION RATE

608-R-3.1 APPLICATION RATE. The approximate amounts of materials per square yard (square meter) for the asphalt surface treatment shall be as provided in the table for the treatment area(s) at the specified rate(s) as noted on the plans. The actual application rates will vary within the range specified to suit field conditions and will be recommended by the manufacturer's representative for control strip evaluations, and approved by the Engineer from the test area/sections evaluation.

**TABLE 608-R-3
APPLICATION RATE**

| Dilution Rate | Quantity of Sealer gal/yd ² | Quantity of Aggregate lb/yd ² |
|---------------|---|---|
| N/A | 0.08-0.15 | 0.40-0.50 |

608-R-3.2 CONTROL AREAS AND CONTROL STRIPS. A qualified manufacturer’s representative shall be present in the field to assist the Contractor in applying control areas and/or control strips to determine the appropriate application rate of both sealer and aggregate to be evaluated and approved by the Engineer.

A test area and/or section shall be applied for each differing asphalt pavement surface identified in the project. The control area(s) and/or control strip(s) shall be used to determine the material application rate(s) of both sealer and aggregate prior to full production. The same equipment and method of operation shall be utilized on the control area(s) and/or control strip(s) as will be utilized on the remainder of the work.

- a. **For Taxiway, Taxilane and Apron Surfaces.** Prior to full application, the Contractor shall place test areas at varying application rates as recommended by the Contractor’s manufacturer’s representative to determine appropriate application rate(s). The test areas will be located on representative section(s) of the pavement to receive the asphalt surface treatment designated by the Engineer.
- b. **For Runway and High-Speed Exit Taxiway Surfaces.** Prior to full application, the Contractor shall place a series of control strips a minimum of 300 feet long by 12 feet wide, or width of anticipated application, whichever is greater, at varying application rates as recommended by the manufacturer’s representative and acceptable to the Engineer to determine appropriate application rate(s). The control strips should be separated by a minimum of 200 feet between control strips. The area to be tested will be located on a representative section of the pavement to receive the asphalt surface treatment designated by the Engineer. The control strips should be placed under similar field conditions as anticipated for the actual application. Before beginning the control strip(s), the skid resistance of the existing pavement shall be determined for each control strip with a continuous friction measuring equipment (CFME). The skid resistance of existing pavement can be immediately adjacent to the control strip or at the same location as the control strip if testing prior to application.

The Contractor may begin testing the skid resistance of runway and high-speed exit taxiway control strips after application of the asphalt surface treatment has fully cured. If seal coat is to be applied when atmospheric and pavement surface temperatures are below 55°F and rising, consult with the manufacturer’s representative regarding time for seal coat to fully cure. Aircraft shall not be permitted on the runway or high-speed exit taxiway control strips until such time as the Contractor validates that its surface friction meets the maintenance planning friction levels in AC 150/5320-12, Table 3-2 when tested at speeds of 40 and 60 mph wet with approved CFME.

Prior to full application on runway and high speed exit taxiway surfaces, submit to the Engineer written documentation of skid resistance of the control area/control strip measured according to AC 150/5320-12.

- c. **Control Strip.** 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 Engineer’s approval of an appropriate application rate(s). Acceptable control strips shall be paid for in accordance with subsection 608-R-8.1.

CONSTRUCTION METHODS

608-R-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 solvent based asphalts should be understood and followed by the Contractor.

608-R-4.2 WEATHER LIMITATIONS. The asphalt sealer shall be applied only when the existing pavement surface is dry and when the weather is not foggy, rainy, or when the wind velocity will prevent the uniform application of the material. No material shall be applied when dust or aggregate is blowing or when rain is anticipated within 4 hours of application completion. The atmospheric temperature and the pavement surface temperature shall both be at, or above 40°F and rising. If seal coat is to be applied when atmospheric and pavement surface temperatures are below 55°F and rising, consult with the manufacturer's representative regarding time for seal coat to fully cure. The sealer shall not be applied when pavement temperatures are expected to exceed 160°F within the subsequent 72 hours, if traffic will be opened on pavement within those 72 hours. 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 sealer. Should sealer 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 Department.

Contractor shall submit an overspray shielding plan to the Engineer for approval prior to beginning surface treatment. Shielding shall be used when working near parked aircraft, in windy conditions, or as directed by the Engineer.

608-R-4.3 EQUIPMENT AND TOOLS. The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

- a. **Pressure Distributor.** The sealer shall be applied with a manufacturer-approved computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spray bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the sealer. 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 8 mph or 700 feet per minute (fpm).

The Contractor will provide verification of truck set-up (via a test-shot area), including but not limited to, nozzle tip size appropriate for application per nozzle manufacturer, spray-bar height and pressure and pump speed appropriate for the viscosity and temperature of sealer material, evidence of triple-overlap spray pattern, lack of leaks, and any other factors relevant to ensure the truck is in good working order before use. The distributor truck shall be equipped with a 12-foot, minimum, spray 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 sealer, and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy.

The distributor truck shall effectively mix the material prior to application.

The distributor shall be equipped with a hand sprayer to spray the sealer in areas not accessible to the distributor truck.

- b. **Aggregate Spreader.** The asphalt distributor truck will be equipped with an aggregate spreader mounted to the distributor truck that can apply aggregate to the sealer in a single pass operation without driving through wet sealer. The aggregate spreader shall be equipped with a variable control system capable of uniformly distributing the aggregate at the specified rate at varying application widths and speeds.

The aggregate spreader must be adjusted to produce an even and accurate application of specified aggregate. Prior to any seal coat application, the aggregate spreader will be calibrated onsite to ensure acceptable uniformity of spread. The Engineer will observe the calibration and verify the results. The aggregate spreader will be re-calibrated each time the aggregate rate is changed either during the application of test strips or production. The Contractor may consult the seal coat manufacturer representative for procedure and guidance. The aggregate spreader shall have a minimum hopper capacity of 3,000 pounds of aggregate. Push-type hand spreaders will be allowed for use around lights, signs and other obstructions, if necessary.

- c. **Power Broom/Blower.** A power broom and/or blower shall be provided for removing loose material from the surface to be treated.
- d. **Equipment Calibration.** Asphalt distributors must be calibrated within the same construction season in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the Engineer.

608-R-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 from the asphalt pavement by scrubbing with a detergent, washing thoroughly with clean water, and treating these areas with the oil spot primer. Patch or prepare asphalt pavement surfaces, and remove markings for seal coat as follows:

- a. **Patching and Repair.** Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement. Materials and methods of construction shall comply with the applicable sections of these Specifications.
- b. **Crack Sealing and Preparation.** Remove all vegetation and debris from cracks to a minimum depth of 1-inch. If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the Engineer. Fill all cracks wider than 1/4-inch with a crack sealant meeting ASTM D6690, Type IV. The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8-inch, not to exceed 1/4-inch. Any excess joint or crack sealant shall be removed from the pavement surface.
- c. **Painted Marking Removal.** All painted stripes or markings identified on the Plans for removal from the surface to be treated shall be removed according to subsection P-620-3.3.
- d. **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 daytime temperatures should elapse between the placement of a hot mixed asphalt concrete surface course and the application of the surface treatment.

Perform a water-break-free test to confirm that the surface oils have degraded and dissipated. Cast approximately one gallon 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.

Existing construction or transverse joints shall receive an initial application of seal coat 18 inches wide, centered on the joint.

608-R-4.5 APPLICATION OF ASPHALT SEALER. The asphalt sealer shall be applied using a pressure distributor upon the properly prepared, clean and dry surface at the application rate recommended by the manufacturer's representative and approved by the Engineer from the test area/sections evaluation for each designated treatment area. Recommended material temperature for application is 70°F to 90°F, but

depending on the application equipment used, good material dispersion and pavement coverage may be achieved at lower material temperatures. The material should not be heated above 100°F.

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, if feasible, to the specified application rate at no additional cost to the Owner. Each additional application shall be performed after the prior application of material has penetrated into the pavement.

If low spots and depressions greater than 1/2-inch in depth in the pavement surface cause ponding or puddling of the applied materials, the pavement surface shall be lightly broomed with a broom or brush type squeegee. Brooming shall continue until the pavement surface is free of any pools of excess material. Ponding and/or puddling shall not cause excessive pavement tackiness and/or additional distress.

During all applications, the surfaces of adjacent structures shall be protected to prevent their being spattered or marred. Asphalt materials shall not be discharged into borrow pits or gutters or on the airport area.

608-R-4.6 APPLICATION OF AGGREGATE MATERIAL. Immediately following the application of the asphalt sealer, aggregate at the rate recommended by the manufacturer's representative and approved by the Engineer from the test area/sections evaluation for each designated application area, shall be spread uniformly over the asphalt sealer in a single-pass operation simultaneous with the sealer application. The sealer material and aggregate shall be applied simultaneously in a single pass operation, so as to not drive through the applied fresh sealer. The aggregate shall be spread to the same width of application as the asphalt material and shall not be applied in such thickness as to cause blanketing.

Sprinkling of additional aggregate material, and spraying additional asphalt material over areas that show up having insufficient cover or bitumen, shall be done by hand whenever necessary. In areas where hand work is necessitated, the aggregate shall be applied before the sealant begins to break.

Minimize aggregate from being broadcast and accumulating on the untreated pavement adjacent to an application pass. Prior to the next application pass, the Contractor shall clean areas of excess or loose aggregate and remove from project site.

QUALITY CONTROL (QC)

608-R-5.1 MANUFACTURER'S REPRESENTATION. The manufacturer's representative knowledgeable of the material, procedures, and equipment described in the specification is responsible to assist the Contractor and Engineer in determining the appropriate application rates of the emulsion and aggregate, as well as recommendations for proper preparation and start-up of seal coat application. Documentation of the manufacturer representative's experience and knowledge for applying the seal coat product shall be furnished to the Engineer 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 Contractor's bid price.

608-R-5.2 CONTRACTOR'S QUALIFICATIONS. The Contractor shall provide the Engineer with the seal coat Contractor's qualifications for applicators, personnel and equipment. The Contractor shall also provide documentation that the seal coat Contractor is qualified to apply the seal coat and has made at least 3 applications similar to this project in the past 2 years.

MATERIAL ACCEPTANCE

608-R-6.1 APPLICATION RATE. The rate of application of the asphalt emulsion shall be verified at least twice per day.

608-R-6.2 FRICTION TESTS. Friction tests in accordance with AC 150/5320-12 shall be accomplished on all runway and high-speed taxiways that have received a seal coat. Friction testing shall not be performed until seal coat is fully cured. Each test includes performing friction tests at 40 mph and 60 mph both wet, 15 feet to each side of runway centerline. The Contractor shall coordinate testing with the Engineer and provide the Engineer a written report of friction test results. The Engineer shall be present for testing.

METHOD OF MEASUREMENT

608-R-7.1 The quantity of asphalt surface treatment shall be measured according to GCP Section 90, and by the square yards of material applied 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 asphalt material 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.

Initial application of seal coat to longitudinal and transverse joints shall be subsidiary to Pay Item P608.210.0000 Asphalt Surface Treatment, Rapid Cure.

BASIS OF PAYMENT

608-R-8.1 Payment shall be made at the contract unit price per square yard for the asphalt surface treatment applied and accepted by the Engineer. 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, including the friction testing and all work required to meet AC 150/5320-12, initial joint application, and any costs associated with furnishing a qualified manufacturer's representative to assist with control strips.

Payment will be made under:

Item P608.210.0000 Asphalt Surface Treatment, Rapid Cure – per square yard

TESTING REQUIREMENTS

| | |
|------------|--|
| ASTM C88 | Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate |
| ASTM C128 | Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate |
| ASTM C136 | Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates |
| ASTM C566 | Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying |
| ASTM C1252 | Standard Test Methods for Uncompacted Void Content of Fine Aggregate |
| ASTM D5 | Standard Test Method for Penetration of Asphalt Materials |
| ASTM D36 | Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus) |
| ASTM D402 | Standard Test Method for Distillation of Cutback Asphalt |
| ASTM D2042 | Standard Test Method for Solubility of Asphalt Materials in Trichloroethylene |
| ASTM D2216 | Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass |
| ASTM D2995 | Standard Practice for Estimating Application Rate of Bituminous Distributors |
| ASTM D4402 | Standard Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer |
| ASTM D6690 | Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements |

ASTM D7428

Standard Test Method for Resistance of Fine Aggregate to Degradation
by Abrasion in the Micro-Deval Apparatus

ITEM P-609 CHIP SEAL COAT

DESCRIPTION

609-1.1 This item shall consist of a chip seal coat as a wearing course composed of a single or multiple application of liquid asphalt material and aggregate cover placed on the prepared primed base or properly cured wearing surface, according to these Specifications, and shall conform to the dimensions and typical cross section shown on the Plans.

609-1.2 QUANTITIES OF MATERIALS. The approximate amounts of materials per square yard for the chip seal shall be as provided in Table 609-1 for the treatment specified on the Plans. The exact amounts shall be provided to the Engineer for review and approval.

TABLE 609-1. QUANTITIES OF MATERIALS

| Application No | Aggregate lbs/yd ² | Asphalt gal/yd ² | Type of Asphalt ^{1\1} |
|----------------|-------------------------------|-----------------------------|--------------------------------|
| 1 | 40-50 | 0.35-0.45 | Asphalt Cement |
| | | 0.40-0.50 | Emulsified Asphalt |
| 2 | 20-25 | 0.15-0.25 | Asphalt Cement |
| | | 0.20-0.35 | Emulsified Asphalt |
| 3 | 15-20 | 0.15-0.20 | Emulsified Asphalt |

^{1\1} See Table 609-4 for grades of asphalt and spraying temperatures.

MATERIALS

609-2.1 AGGREGATE MATERIALS. The aggregate material shall be either crushed stone or crushed gravel. The cover material shall be screenings; sand may be used when specified.

If the material is to be crushed stone, it shall be manufactured from sound, hard, durable rock of accepted quality and crushed to specification size. All strata, streaks, and pockets of clay, dirt, sandstone, soft rock, or other unsuitable material accompanying the sound rock shall be discarded and not allowed to enter the crusher.

If the material is to be crushed gravel, it shall consist of hard, durable, fragments of stone or gravel of accepted quality and crushed to specification size. All strata, streaks, and pockets of sand, excessively fine gravel, clay, or other unsuitable material including all stones, rocks, and boulders of inferior quality shall be discarded and not allowed to enter the crusher. When tested according to ATM 305, the crushing of the gravel shall result in a product in which the material retained on the separate No. 4, 3/8-inch, and 1/2-inch sieves shall have at least 90% of particles with at least one fractured face.

TABLE 609-2. AGGREGATE MATERIAL REQUIREMENTS

| Material Test | Requirement | Standard |
|--|---|--------------|
| L.A. Wear | Loss: 40% maximum | AASHTO T 96 |
| Soundness of Aggregates by Use of Sodium Sulfate | Loss after 5 cycles: 12% maximum using Sodium sulfate | AASHTO T 104 |
| Degradation Value | 50 minimum | ATM 313 |
| Percentage of Fractured Particles | Minimum 90% by weight of particles with at least one fractured faces ¹ | ATM 305 |
| Flat, Elongated, or Flat and Elongated Particles | 8% maximum, by weight, of flat, elongated, or flat and elongated particles at 3:1 | ATM 306 |

¹ The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces. Fractured faces shall be achieved by crushing.

The crushed aggregate for the applications shall meet the requirements for gradation given in Table 609-3 when tested according to ATM 304.

TABLE 609-3. REQUIREMENTS FOR GRADATION OF AGGREGATE¹

| Sieve Designation (square openings) | Percentage by Weight Passing Sieves | | |
|--|--|--------------------|--------------------|
| | Aggregate No. 1 | Aggregate No. 2 | Aggregate No. 3 |
| 1 inch | 100 | | |
| 3/4 inch | 90-100 | | |
| 1/2 inch | 20-55 | 100 | |
| 3/8 inch | 0-15 | 85-100 | 100 |
| No. 4 | 0-5 | 10-30 | 60-85 |
| No. 8 | | 0-10 | 0-25 |
| No. 16 | | 0-5 | 0-5 |
| No. 200 | 0-1 | 0-1 | 0-2 |

¹ Locally available aggregate used for chip seals with similar gradations may be used provided the maximum aggregate size is the same; and the aggregate meets all other quality requirements in these specifications.

The gradations in the table represent the limits which shall determine suitability of aggregate for use for the specified applications from the sources of supply. The final gradations decided on, within the limits designated in the table, shall be uniformly graded from coarse to fine.

The aggregate to be used shall show no evidence of stripping or swell when tested according to according to ATM 414. The use of antistripping agents for the control of stripping shall be used if necessary.

609-2.2 ASPHALT MATERIAL. The types, grades, controlling specifications, and application temperatures for the asphalt materials are shown in Table 609-4. Provide the specific liquid asphalt material designated in the Plans.

TABLE 609-4. ASPHALT MATERIALS

| Type and Grade | Specification | Spraying Temperature \1\Deg. F |
|--------------------|---------------|--------------------------------|
| Asphalt Cement | | |
| PG 52-28 | AASHTO M 320 | 275+ |
| Emulsified Asphalt | | |
| RS-1 | AASHTO M 140 | 70-140 |
| RS-2 | AASHTO M 140 | 125-175 |
| MS-1, HFMS-1 | AASHTO M 140 | 70-160 |
| CRS-1 | AASHTO M 208 | 125-175 |
| CRS-2 | AASHTO M 208 | 125-175 |
| CRS-2P | AASHTO M 316 | 140-170 |

\1\ The maximum temperature for asphalt cements shall be below that at which fogging occurs.

The Contractor shall provide samples of the asphalt material and a copy of the manufacturer's Certificate of Analysis (COA) for each carload or equivalent of the asphalt material to the Engineer for review and

acceptance before the asphalt material is applied. 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 furnishing of COA 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.

609-2.3 SAMPLING AND TESTING Sampling and testing is the responsibility of the Contractor. Sampling and testing shall be performed by an approved commercial testing laboratory, or by the Contractor, subject to approval by the Engineer. Sampling shall be according to ATM 301 for aggregates and ATM 401 for asphalt material, unless otherwise directed. Perform aggregate gradation tests on each sample according to ATM 304. Perform all other aggregate tests on the initial source samples and repeat tests when there is a change of source. Perform sieve analyses daily from material samples. The tests shall include an analysis of each gradation of material. Submit copies of test results to the engineer, within 24 hours after completion of each test.

CONSTRUCTION METHODS

609-3.1 WEATHER LIMITATIONS. Asphalt material shall be applied only when the existing surface is dry and the atmospheric temperature is above 60°F. No material shall be applied when rain is imminent or when dust or sand is blowing.

609-3.2 EQUIPMENT AND TOOLS. The Contractor shall furnish all equipment, tools, and machines necessary for the performance of the work.

- a. **Asphalt Distributor.** The distributor shall be designed, equipped, maintained, calibrated according to ASTM D2995, and operated so that asphalt material at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 5%. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.
- b. **Aggregate Spreader.** The aggregate spreader shall be a self-propelled mechanical spreader or truck-attached mechanical spreader capable of uniformly distributing aggregate at the specified rates.
- c. **Power Rollers.** Power rollers shall be steel-wheeled or pneumatic-tired type, conforming to the following requirements:
 - (1) Steel-wheeled rollers shall have at least one steel drum and weigh a minimum of 5 tons. Steel wheels of the rollers shall be equipped with adjustable scrapers.
 - (2) Pneumatic-tired rollers shall be self-propelled and have wheels mounted on two axles in such manner that the rear tires will not follow in the tracks of the forward group. Tires shall be uniformly inflated to not less than 60 psi nor more than 80 psi pressure. The pneumatic-tired rollers shall be equipped with boxes or platforms for ballast loading and shall be loaded so that the tire print width of each wheel is not less than the clear distance between tire prints.
- d. **Power Broom.** A power broom and/or blower shall be provided for removing loose material from the surface to be treated.

609-3.3 PREPARING UNDERLYING COURSE. The surface of the underlying course shall be prepared, shaped, and conditioned to a uniform grade and section, as shown on the Plans and as specified. Loose dirt and other objectionable material shall be removed from the surface.

On those type of bases where a prime coat is required and specified, the prime shall be applied and satisfactorily cured before starting the asphalt surface treatment.

When specified, the Contractor shall be required to patch, with premixed material, any holes or other malformations deviating from the true cross section and grade. The premixed material shall be made of the asphalt material specified and prepared by the method directed by the Engineer. All small patches shall be thoroughly hand tamped while the large patches shall be rolled with a power or pneumatic roller.

609-3.4 CONTROL STRIP. Prior to providing a complete chip seal coat and in the presence of the Engineer, treat three lengths of at least 100-feet for the full width of the distributor bar. Use the appropriate typical application rates shown in Table 609-1 for one surface treatment trial. Make other chip seal coat trials using various amounts of materials, as required by the Engineer.

609-3.5 APPLICATION OF ASPHALT MATERIAL. Asphalt material shall be applied on the properly prepared surface at the rate and temperature specified using a pressure distributor to obtain uniform distribution at all points. To insure proper drainage, the strips shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope. During all applications, the surfaces of adjacent structures shall be protected in such manner as to prevent their being spattered or marred. Asphalt materials shall not be discharged into borrow pits or gutters or upon the airport area.

609-3.6 APPLICATION OF AGGREGATE MATERIAL. Immediately after the application of the asphalt material, or as directed by the Engineer, uniformly spread the aggregates over the asphalt material at the rate specified for each designated application. Trucks spreading aggregate shall be operated backward so that the asphalt material will be covered before the truck wheels pass over it. The aggregate shall be spread in the same width of application as the asphalt material and shall not be applied in such thickness as to cause blanketing. Back-spotting or sprinkling of additional aggregate material, and pouring additional asphalt material over areas that show up having insufficient cover or asphalt, shall be done by hand whenever necessary. Additional spreading of aggregate material shall be done with a motor-patrol grader equipped with broom moldboard, a broom drag, kick broom, or a power broom, as directed by the Engineer.

Immediately after spreading each application, the aggregate shall be rolled. The rolling shall be continued until no more aggregate can be worked into the surface. In the construction of the second and third application, blading with the wire-broom moldboard attachment, kick broom, or broom dragging shall begin as soon as possible after the rolling has started and after the surface has set sufficiently to prevent excessive marking. Further blading and rolling on the strip being placed and on adjacent strips previously placed, shall be done as often as necessary to keep the aggregate material uniformly distributed. These operations shall be continued until the surface is evenly covered and cured to the satisfaction of the Engineer.

Succeeding applications shall not be applied until the preceding application has set and in no case until at least 24 hours have elapsed. If dust, dirt, or other foreign matter accumulates on the surface between the applications, the Contractor shall sweep and clean the surface as specified herein. The asphalt material and the aggregate shall be spread upon the clean and properly cured surface and handled as required. Avoid brooming or tracking dirt or any foreign matter on any portion of the pavement surface under construction.

All surplus aggregate from the final application shall be swept off the surface and removed prior to final acceptance of the work.

609-3.7 CORRECTION OF DEFECTS. Any defects, such as raveling, low centers, lack of uniformity, or other imperfections, shall be corrected to the satisfaction of the Engineer.

All defective materials resulting from over-heating, improper handling, or improper application shall be removed by the contractor and replaced with approved materials according to these specifications.

609-3.8 FREIGHT AND WAYBILLS. Before the final estimate is allowed the Contractor shall file with the Engineer receipted bills where railroad shipments are made, and certified waybills when materials are received in any other manner, of the asphalt and covering materials actually used in the construction

covered by the contract. The Contractor shall not remove asphalt material 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. Copies of all freight bills and waybills shall be furnished to the Engineer during the progress of the work.

METHOD OF MEASUREMENT

609-4.1 The asphalt material will be measured by the ton. Water added to emulsified asphalt will not be measured for payment.

609-4.2 The quantity of aggregate material for the first, second, and third application to be paid for will be the number of tons of aggregate used for the accepted work.

609-4.3 Chip Seal Coat, [number of aggregate] Applications. Section 90, by square yard of chip seal coat. Chip seal coat will be measured by the square yard, all preparation, materials, and application, completed and accepted. Liquid asphalt material, aggregate, blotter material, water used for aggregate and preparation, sweeping and dust control are subsidiary to P-609 items. Any areas of asphalt surface treatment found unacceptable by the Engineer shall be removed and reconstructed at the Contractor's expense. The pay unit/payment is for all layers/full depth of the surface treatment.

BASIS OF PAYMENT

609-5.1 Payment will be made at the contract unit price per ton for asphalt material for surface treatment and per ton for the first, second, and third aggregate application, or by the square yard for the completed chip seal coat application, as shown in the Bid Schedule.

Payment will be made under:

| | |
|--------------------|---|
| Item P609.010.0000 | Asphalt Material – per ton |
| Item P609.020.0000 | First Application Aggregate – per ton |
| Item P609.030.0000 | Second Application Aggregate – per ton |
| Item P609.040.0000 | Third Application Aggregate – per ton |
| Item P609.050.0000 | Chip Seal Coat, ____Applications – square yard. |

TESTING REQUIREMENTS

| | |
|--------------|--|
| ATM 301 | Sampling of Aggregates |
| ATM 304 | Sieve Analysis of Aggregates & Soils |
| ATM 305 | Percentage of Fracture in Coarse Aggregate |
| ATM 306 | Percentage of Flat and Elongated Particles in Coarse Aggregate |
| ATM 313 | Degradation Value of Aggregate |
| ATM 401 | Sampling Asphalt Materials |
| ATM 414 | Anti-Strip Requirements of Hot Mix Asphalt |
| AASHTO T 96 | Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine |
| AASHTO T 104 | Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate |

MATERIAL REQUIREMENTS

AASHTO M 140

Emulsified Asphalt

AASHTO M 208

Cationic Emulsified Asphalt

AASHTO M 320

Performance Graded Asphalt Binder

ITEM P-626 EMULSIFIED ASPHALT SLURRY SEAL SURFACE TREATMENT

DESCRIPTION

626-1.1 This item shall consist of a mixture of emulsified asphalt, polymer, mineral aggregate, and water properly proportioned, mixed, and spread on an asphalt pavement surface, including airport pavements serving airplanes of 12,500 lbs or less, roads, and other general applications. The application of the surface treatment shall be according to these Specifications and shall conform to the dimensions shown on the Plans or as directed by the Engineer.

626-1.2 ACRONYMS. Also see Subsection GCP-10-02.

ISSA International Slurry Surfacing Association, Washington, DC

MATERIALS

626-2.1 AGGREGATE. The aggregate shall consist of sound and durable manufactured sand, slag, crusher fines, crushed stone, or a combination thereof. The aggregate shall be clean and free from vegetable matter, dirt, and other deleterious substances. The aggregate shall have a sand equivalent of not less than 45 percent when tested according to ATM 307. The aggregate shall show a loss of not more than 35 percent when tested according to AASHTO T 96. The sodium sulfate soundness loss shall not exceed 12 percent, after 5 cycles when tested according to AASHTO T 104. Aggregates shall have a minimum degradation value of 50 when tested according to ATM 313. Aggregate shall be 100% crushed.

The combined aggregate shall conform to the gradation shown in Table 626-1 when tested according to ATM 304. The specific aggregate gradation type will be designated in the Plans.

TABLE 626-1. GRADATION OF AGGREGATES

| Sieve Size | Percent by Weight Passing Sieve | | |
|--|---------------------------------|--------------|------------|
| | Type I | Type II | Type III |
| 3/8 in. | 100 | 100 | 100 |
| No. 4 | 100 | 90 - 100 | 70 - 90 |
| No. 8 | 90 - 100 | 65 - 90 | 45 - 70 |
| No. 16 | 65 - 90 | 45 - 70 | 28 - 50 |
| No. 30 | 40 - 65 | 30 - 50 | 19 - 34 |
| No. 50 | 25 - 42 | 18 - 30 | 12 - 25 |
| No. 100 | 15 - 30 | 10 - 21 | 7 - 18 |
| No. 200 | 10 - 20 | 5 - 15 | 5 - 15 |
| Residual asphalt content, percent dry weight of aggregate | 10% - 16% | 7.5% - 13.5% | 6.5% - 12% |

The job mix design (JMD) shall be run using aggregate within the gradation band for the desired type shown in Table 626-1. Once the JMD has been submitted and approved by the Engineer, the aggregate used on the project shall not vary by more than the tolerances shown in Table 626-2. At no time shall the aggregate used go out of the gradation bands in Table 626-1.

The aggregate will be accepted at the job location or stockpile. The aggregate will be accepted based on five gradation test samples according to ATM 301. If the average of the five tests is within the gradation tolerances, the materials will be accepted by the Engineer. If the tests show the material to be out of tolerance, the Contractor has the choice either to remove the material or blend other aggregates with the stockpile material to bring it into specification. Materials used in blending shall meet the quality tests before blending and shall be blended in a manner to produce a consistent gradation. This blending may require a new JMD.

Screening shall be required at the project stockpile site if there are oversize materials in the mix. Precautions shall be taken to prevent segregation of the aggregate in storing and handling. The stockpile shall be kept in areas that drain readily.

- a. **Aggregate Tolerance.** Once the JMD has been accepted, the aggregate gradation used on the project may vary from the aggregate gradation used in the JMD on each sieve by the percentages shown in Table 626-2. If the project aggregate fails to remain within this tolerance, a new JMD will be required by the Engineer at the expense of the Contractor.

TABLE 626-2. AGGREGATE TOLERANCE

| Sieve Size | Tolerance, percent passing by weight |
|---|--------------------------------------|
| 3/8 in. | ± 5 |
| No. 4 | ± 5 |
| No. 8 | ± 5 |
| No. 16 | ± 5 |
| No. 30 | ± 5 |
| No. 50 | ± 4 |
| No. 100 | ± 3 |
| No. 200 | ± 2 |
| Residual Asphalt, percent dry weight of aggregate | ± 1 |

626-2.2 MINERAL FILLER. If mineral filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of AASHTO M 17 and shall be used in the amounts required by the JMD. The mineral filler shall be considered as part of the aggregate.

626-2.3 EMULSIFIED ASPHALT. The specific emulsified asphalt is designated in the Plans, and shall conform to the requirements of AASHTO R 5. The cement mixing test is waived for these slurry type emulsions. The type of emulsified asphalt shall be either anionic or cationic, whichever is best suited to the aggregate and job conditions to be encountered.

The Contractor shall provide samples of the emulsified material and a copy of the manufacturer's Certificate of Analysis (COA) for each carload or equivalent of the asphalt material to the Engineer for review and acceptance before the emulsified asphalt material is applied. The furnishing of COA for the emulsified 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.

626-2.4 POLYMER. The Contractor shall submit manufacturer's technical data, the manufacturer's certification indicating that the polymer meets the requirements of the specification, and the asphalt material manufacturer's approval of its use to the Engineer.

626-2.4 WATER. All water used in mixing or curing the slurry shall be from potable sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

COMPOSITION AND APPLICATION

626-3.1 COMPOSITION. The slurry seal shall consist of a mixture of emulsified asphalt, mineral aggregate, a minimum of 1% polymer (when specified), additives as necessary, and water.

626-3.2 JOB MIX DESIGN. No slurry seal for payment shall be placed until a JMD has been approved by the Engineer. The JMD shall be developed by a laboratory with experience in designing slurry seal mixes and a signed copy shall be submitted in writing by the Contractor to the Engineer at least 10 days prior to the start of operations.

The laboratory report JMD shall indicate the proportions of aggregates, mineral filler (min. and max.), water (min. and max.), polymer (%), and asphalt emulsion based on the dry aggregate weight. It shall also report the quantitative effects of moisture content on the unit weight of the aggregate (bulking effects). The JMD shall be in effect until modified in writing by the Engineer. Should a change in sources of materials be made, a new JMD shall be established before the new material is used.

The Contractor shall submit to the Engineer for approval a complete JMD on the materials proposed for use, prepared and certified by an approved laboratory. Compatibility of the aggregate, emulsion, mineral filler, and other additives shall be verified by the JMD. The JMD shall be made with the same aggregate and grade of emulsified asphalt that the Contractor will provide on the project. At a minimum the required tests and values needed are shown in Table 626-3:

TABLE 626-3. SLURRY MIX TESTS

| TEST | DESCRIPTION | SPECIFICATION |
|-------------|---|--------------------------|
| ISSA TB-100 | Wet Track Abrasion of Slurry Surfacing Systems, One Hour Soak | 50 g/ft ² Max |
| ISSA TB-115 | Determination of Slurry Seal Compatibility | Pass |

626-3.3 APPLICATION RATE. Unless otherwise specified, the slurry seal shall be applied to at the application rates shown in Table 626-4 for that gradation of material used. The rate of application shall not vary more than ± 2 lb/yd².

TABLE 626-4. SLURRY APPLICATION RATES
(Pounds of mixture per square yard)

| Type I | Type II | Type III |
|--------|---------|----------|
| 8 - 12 | 12 - 20 | 18 - 30 |

626-3.4 CONTROL STRIPS. Control Strips, of 60 yd² each, shall be placed prior to the start of the slurry seal work in the presence of the Engineer. The test area will be designated by the Engineer and will be located on the existing pavement. Control strips shall be made by each machine after calibration. Samples of the slurry seal may be taken and the mix consistency verified by using ISSA TB-106 Slurry Seal Consistency test. In addition, the proportions of the individual materials may be verified by the Engineer by using the calibration information provided after machine calibration. If any test does not meet specification requirements, additional tests shall be made at the expense of the Contractor, until an acceptable control strip is placed.

CONSTRUCTION METHODS

626-4.1 WEATHER LIMITATIONS. The slurry seal shall not be applied if the pavement or air temperature is below 50°F and falling but may be applied when both pavement and air temperature are above 45°F and rising. No slurry seal shall be applied when there is danger that the finished product will freeze before 24 hours. Do not apply slurry seal during rain or other adverse weather conditions. The mixture shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

626-4.2 EQUIPMENT AND TOOLS. The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of this work.

- a. **Slurry Mixing Equipment.** The machine shall be specifically designed and manufactured to lay slurry seal. The material shall be mixed by a self-propelled slurry seal mixing machine of either truck mounted or continuous run design. Either type machine shall be able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, and water to a revolving mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for materials to maintain an adequate supply to the proportioning controls.

If continuous run equipment is used, the machine shall be equipped to allow the operator to have full control of the forward and reverse speed of the machine during application of the slurry seal,

with a self-loading device, with opposite side driver stations, all part of original equipment manufacturer design.

The aggregate shall be pre-wetted immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients. No excessive mixing shall be permitted. The mixing machine shall be equipped with a fines feeder that provides an accurate metering device or method to introduce a predetermined proportion of mineral filler into the mixer at the same time and location that the aggregate is fed into the mixer.

The mixing machine shall be equipped with a water pressure system and fog-type spray bar adequate for complete fogging of the surface with an application of 0.05 to 0.10 gal/yd² preceding the spreading equipment.

Sufficient machine storage capacity to mix properly and apply a minimum of 5 tons of the slurry shall be provided. Proportioning devices shall be calibrated prior to placing the slurry seal.

- b. Slurry Spreading Equipment.** The mixture shall be spread uniformly by means of a conventional surfacing spreader box attached to the mixer and equipped to agitate and spread the material evenly throughout the box. A front seal shall be provided to ensure no loss of the mixture at the surface contact point. The rear seal shall act as the final strike-off and shall be adjustable. The spreader box and rear strike-off shall be so designed and operated to produce a free flow of material of uniform consistency to the rear strike-off. The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement geometry. A burlap drag or other approved screed may be attached to the rear of the spreader box to provide a uniform mat.

A continuous spreading operation shall be maintained by means of a continuous charging operation so that a minimum of construction joints occur. Continuous operating is defined as one in which the spreading operation progresses prior to initial setting or breaking of the slurry mix, which starts within approximately 15 minutes.

Provide suitable storage facilities for the asphalt emulsion, using containers equipped to prevent water from entering the emulsion. If necessary, suitable heat shall be provided to prevent freezing.

- c. Auxiliary Equipment.** Other tools or equipment such as brushes, hand squeegees, hose equipment, tank trucks, water distributors and flushers, power blowers, barricades, etc., shall be provided as required.
- d. Roller.** The roller shall be a self-propelled pneumatic-tired roller capable of exerting a contact pressure during rolling of 50 psi. It shall be equipped with a water spray system, to be used if the slurry is picking up on the tires during rolling.
- e. Tack Coat and Distributor.** Normally a tack coat is not required unless the surface to be covered is extremely dry and raveled or is concrete or brick. If required, the tack coat should consist of one part emulsified asphalt and three parts water. The emulsified asphalt may be the same as that used in the mix. Pressure distributors used for application of the diluted asphalt emulsion tack coat shall be self-propelled, equipped with pneumatic tires, and capable of uniformly applying 0.05 to 0.15 gal/yd² of the diluted emulsion over the required width of application. Distributors shall be equipped with tachometers, pressure gages, and volume-measuring devices. The tack coat shall be applied at least 2 hours before the slurry seal but within the same day.

626-4.3 EQUIPMENT CALIBRATION. Each slurry mixing unit to be used on the project shall be calibrated in the presence of the Engineer prior to construction. Previous calibration documentation covering the exact materials to be used may be accepted by the Engineer provided they were made during the calendar year. The documentation shall include an individual calibration of each material at various settings, which can be related to the machine's metering devices. No machine will be allowed to

work on the project until either the calibration has been completed or a previous calibration is accepted by the Engineer.

626-4.4 PREPARATION OF EXISTING SURFACE. Clean pavement surface immediately prior to placing the tack coat and slurry seal coat by sweeping, flushing well with water leaving no standing water, or a combination of both, so that the pavement surface 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. Water flushing will not be permitted in areas where considerable cracks are present in the pavement surface. After cleaning, treat these areas with an oil spot primer.

All painted stripes or markings on the surface to be treated, shall be removed according to Subsection P-620-3.3. Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement. Materials and methods of construction shall comply with the applicable sections of these specifications. Remove all vegetation and debris from cracks to a minimum depth of 1-inch. If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the Engineer. Fill all cracks greater than 1/4-inch (wide) with a crack sealant meeting ASTM D6690, Type IV. The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8-inch, not to exceed 1/4-inch. Any excess joint or crack sealant shall be removed from the pavement surface.

626-4.5 APPLICATION OF SLURRY SEAL COAT. Charge the mixture in the following order:

- a. Water
- b. Aggregate
- c. Asphalt Emulsion

No violent mixing will be permitted. Maintain temperature range at the mixer between 90 and 120 °F. Mix until a uniform coating of the aggregate is obtained. Continue mixing until the mixture is discharged into the spreader box. Discard the entire batch if there is evidence that the emulsion has broken.

The surface shall be pre-wet by fogging ahead of the slurry 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 slurry spreader box. The slurry mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. Total time of mixing shall not exceed 2 minutes. A sufficient amount of slurry shall be carried in all parts of the spreader box at all times so that complete coverage of all surface voids and cracks is obtained. Care shall be taken not to overload the spreader box which shall be towed at a slow and uniform rate not to exceed 5 mph. No lumping, balling, or unmixed aggregate shall be permitted. No segregation of the emulsion and fines from the coarse aggregate will be permitted. If the coarse aggregate settles to the bottom of the mix, the slurry shall be removed from the pavement surface. A sufficient amount of slurry shall be fed into the box to keep a full supply against the full width of the spreader box. The mixture shall not be permitted to overflow the sides of the spreader box. No breaking of the emulsion will be allowed in the spreader box.

Apply the slurry seal to form a film with a maximum thickness of 3/8 inch. Isolated depressions and cracks may have a thickness greater than 3/8 inch in order to obtain a smooth surface.

The finished surface shall have no more than 4 tear or drag marks greater than 1/2 inch wide and 4 inches long in any 12 foot by 22 foot section. It shall have no tear or drag marks greater than 1 inch wide and 3 inches long.

The finished surface shall have no transverse ripples of 1/4 inch or more in depth, as measured with a 12-foot straight edge laid upon the surface.

Adjacent lanes shall be lapped at the edges a minimum of 2 inches with a maximum of 4 inches to provide complete sealing at the overlap. Construction longitudinal and transverse joints shall be neat and uniform without buildup, uncovered areas, or unsightly appearance. All joints shall have no more than 1/4 inch difference in elevation when measured across with a 12-foot straight edge.

After application of the slurry seal, the surface shall be rolled with a pneumatic-tired roller a minimum of 2 complete passes. The roller shall be operated at a tire pressure of approximately 50 psi.

The fresh slurry seal application shall be protected by barricades and markers and permitted to dry for 4 to 24 hours, depending on weather conditions. Any damage to uncured slurry shall be repaired at the expense of the Contractor.

In areas where the spreader box cannot be used, the slurry shall be applied by means of a hand squeegee. Upon completion of the work, the seal coat shall have no holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform and skid resistant texture satisfactory to the Engineer. All wasted and unused material and all debris shall be removed from the site prior to final acceptance.

Upon completion of the project, the Contractor shall sweep the finished surface with a conventional power rotary broom, to remove any potential loose material from the surface. The material removed by sweeping shall be disposed of in a manner satisfactory to the Engineer.

626-4.6 CERTIFICATION. Samples of the emulsion that the Contractor proposes to use, together with a statement as to its source, shall be submitted, and approval shall be obtained before using such material. The Contractor shall submit to the Engineer a manufacturer's certified report for each consignment of the emulsion. The manufacturer's certified report shall not be interpreted as a basis for final acceptance. All such reports shall be subject to verification by testing samples of the emulsion as received for use on the project.

METHOD OF MEASUREMENT

626-5.1 The emulsified asphalt for slurry coat will be measured by the square yard.

626-5.2 Aggregate will be measured by the ton of dry aggregate.

626-5.3 Tack coat will be measured by the ton.

626-5.4 Emulsified Asphalt Slurry Seal Surface Treatment will be measured according to Section 90 by the square yard, all preparation, materials, and application, completed and accepted. Liquid asphalt material, aggregate, blotter material, water used for emulsion and preparation, sweeping and dust control are subsidiary to the work. Any areas of emulsified asphalt slurry seal surface treatment found unacceptable by the Engineer shall be removed and reconstructed at the Contractor's expense. The pay unit/payment is for all layers/full depth of slurry seal surface treatment.

BASIS OF PAYMENT

626-6.1 Payment will be made at the contract unit price per square yard for the slurry coat and at the contract price per ton for aggregate and tack coat.

Payment will be made under:

| | |
|--------------------|--|
| Item P626.010.0000 | Emulsified Asphalt for Slurry Coat - per square yard |
| Item P626.020.0000 | Aggregate - per ton |
| Item P626.030.0000 | Emulsified Asphalt for Tack Coat - per ton |
| Item P626.040.0000 | Emulsified Asphalt Slurry Seal Surface Treatment – per square yard |

TESTING REQUIREMENTS

| | |
|--------------|--|
| AASHTO T 96 | Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine |
| AASHTO T 104 | Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate |
| ATM 313 | Degradation Value of Aggregates |
| ISSA TB-100 | Wet Track Abrasion of Slurry Surfacing Systems |
| ISSA TB-106 | Measurement of Slurry Seal Consistency |
| ISSA TB-115 | Determination of Slurry System Compatibility |
| ASTM C1602 | Mixing Water Used in the Production of Hydraulic Cement Concrete |
| ASTM D6690 | Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements |
| ATM 301 | WAQTC FOP for AASHTO T 2 Sampling of Aggregates |
| ATM 304 | WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates |
| ATM 307 | WAQTC FOP for AASHTO T 176 Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test |
| ATM 313 | Degradation Value of Aggregates |

MATERIAL REQUIREMENTS

| | |
|-------------|---|
| AASHTO M 17 | Mineral Filler for Bituminous Paving Mixtures |
| AASHTO R 5 | Selection and Use of Emulsified Asphalts |