U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Change 20 to STANDARDS FOR SPECIFYING CONSTRUCTION OF AIRPORTS--Updates Coal Tar Pitch Emulsion Specification

Date: 7/14/83
Initiated by: AAS-200

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Change: 20

1. PURPOSE. Item P-625, Coal Tar Pitch Emulsion Sealcoat, has been updated and rewritten in guide specification format. An option to use a rubberized sealcoat has been included.

The Change number and date of change are carried at the top of each page.

PAGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
419-426	10/29/74	419-426	7/14/83

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ITEM P-625 COAL-TAR PITCH EMULSION SEALCOAT

1. DESCRIPTION

1.1 This item shall consist of an application of a [rubberized] coal-tar emulsion sealcoat, with or without mineral aggregate, [and with the use of a latex rubber, which may or may not contain a silicone additive] applied on an existing, previously prepared bituminous surface, in accordance with these specifications for the area shown on the plans or as designated by the Engineer.

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a. Use of a rubberized sealcoat may be specified by the Engineer by incorporating the words enclosed in brackets.

b. Silicones increase the viscosity of the mixture and provide for a more even distribution of the materials.

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2. MATERIALS

2.1 AGGREGATE. The aggregate shall either be a natural or manufactured product and shall be composed of clean, hard, durable, uncoated particles, free from lumps of clay and all organic matter. The aggregate shall meet the gradation in Table 1, when tested in accordance with ASTM C136.

TABLE 1. GRADATION OF AGGREGATES

Sieve Size	Percentage By Weight Passing Sieves
No. 16 (1.18 mm)	100
No. 20 (0.85 mm)	85-100
No. 30 (0.60 mm)	15-85
No. 40 (0.40 mm)	2-15
No. 100 (0.15 mm)	0-2

2.2 BITUMINOUS MATERIALS. The bituminous material shall be a coal-tar pitch emulsion prepared from a high-temperature, coal-tar pitch conforming to the requirements of Federal Specification R-T-143. Oil and water gas tar shall not be used even though they comply with R-T-143. The coal-tar pitch emulsion shall conform to all requirements of Federal Specification R-P-355 except the water content shall not exceed 50 percent.

2.3 WATER. The water used in mixing shall be potable and free from harmful soluble salts. The temperature of the water shall be at least 50 degrees F (10 degrees C).

ITEM P-625 COAL-TAR PITCH EMULSION SEALCOAT

2.4 LATEX RUBBER. The rubber shall be a copolymer latex containing 51-70 parts butadiene and 30-49 parts acrylonitrile or styrene[.] [with silicones at 3 percent of the rubber content.] The average particle size shall be between 300 and 1500 angstroms and the rubber shall be compatible with the coal-tar pitch emulsion used by the Contractor. The rubber must mix homogeneously with the coal-tar emulsion, water, and sand in the proportions specified to produce a mixture that will adequately suspend the sand.

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The Engineer shall delete paragraph 2.4 if a rubberized coal-tar pitch emulsion is not specified.

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3. COMPOSITION AND APPLICATION

3.1 COMPOSITION. The [rubberized] coal-tar pitch emulsion sealcoat shall consist of a mixture of coal-tar pitch emulsion, water, [latex rubber] and aggregate in the proportions shown in Table 2. [The amount of water added to the rubberized coal-tar pitch emulsion or to the rubberized coal-tar pitch emulsion sand slurry, to achieve application consistency, shall not exceed 100 percent of the coal-tar pitch emulsion.] [The amount of water added to the coal-tar pitch emulsion sand slurry or to the emulsion shall not exceed 10 percent of the coal-tar pitch emulsion.] The final composition shall be determined by the Engineer within the limitations of Table 2.

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The Engineer shall incorporate the appropriate sentence in *the project specifications, depending on whether the* sealcoat is to be rubberized or non-rubberized.

The composition of the sealcoat applicable to a project (rubberized or non-rubberized) shall be specified by the Engineer from the information contained in this note. The composition and application rates shall be inserted into Table 2. Insert points are denoted by asterisks.

The proportions of water, sand and rubber and the application rate are a function of the condition of the pavement surface texture desired. A highly oxidized pavement or a pavement with substantial cracks will require more sand and rubber as well as a heavier application rate than a newly placed pavement.

ITEM P-625 COAL-TAR PITCH EMULSION SEALCOAT

Type of Sealcoat	Composition and Quantities			
	Water gal./gal. of emul.	Sand lbs/gal. of emul.	Rubber gal./gal. of emul.	Application Rate gal./sq. yd. (Per Application)
Rubberized Sand Slurry	0.70-1.00	6-14	0.07-0.12	0.25-0.55
Rubberized Emulsion	0.70-1.00	-	0.03-0.05	0.10-0.25
Sand Slurry	0.10 (max)	5-7	-	0.15-0.25
Emulsion	0.10 (max)	-	-	0.10-0.15

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TABLE 2. COMPOSITION OF MIXTURE

Type of Sealcoat	Composition and Quantities			
	Water gal./gal. of emul.	Sand lbs/gal. of emul.	Rubber gal./gal. of emul.	Application Rate gal./sq. yd. (Per Application)
*	*	*	*	*

3.2 APPLICATION. [The rubberized coal-tar emulsion sealcoat shall be applied in three coats at the rate specified in Table 2. The first and second coats shall consist of a rubberized sand slurry; the third coat shall consist of a rubberized emulsion.] [The sand slurry coal-tar emulsion sealcoat shall consist of two coats applied at the rate specified in Table 2.] [The emulsion sealcoat shall consist of two coats of emulsion applied at the rate specified in Table 2.]

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The Engineer shall incorporate the appropriate sentence in the project specifications, depending on whether the sealcoat is rubberized, non-rubberized or emulsion only. When, in the opinion of the Engineer, an area will be subjected to heavy fuel spillage, a final application of straight emulsion, on a sand slurry sealcoat, may be made at the rate of 0.075 to 0.10 gallons per square yard (0.36 to 0.5 liters per square meter).

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ITEM P-625 COAL-TAR PITCH EMULSION SEALCOAT 1.5
1.6

3.3 TEST SECTION. Prior to full production, the Contractor shall prepare a quantity of mixture in the proportions shown in Table 2. The amount of mixture shall be sufficient to place a test section of approximately 50 square yards (45 square meters) at the application rate shown in Table 2. The area to be tested will be designated by the Engineer and will be located on the existing pavement.

The test section shall be used to verify the adequacy of the mixuture and to determine the exact application rate. The same equipment and method of operations shall be used on the test section as will be used on the remainder of the work.

If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations, and equipment shall be made. Additional test sections shall be placed and evaluated, if required.

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The test section 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.
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4. CONSTRUCTION METHODS

4.1 WEATHER LIMITATIONS. The sealcoat shall not be applied when the surface is wet or when the humidity or impending weather conditions will not allow proper curing nor when the atmospheric or pavement temperature is below 50 degrees F (10 degrees C), unless otherwise directed by the Engineer.

4.2 EQUIPMENT AND TOOLS. All methods employed in performing the work and all equipment, tools, and machinery used for handling materials and executing any part of the work shall be subject to the approval of the Engineer before the work is started.

(1) Distributors. Distributors used for the application of the tar emulsion shall be self-propelled, equipped with pneumatic tires, and capable of uniformly applying 0.15 to 0.50 gallon per square yard (0.69 to 2.3 liter per square meter) of tar emulsion over the required width of application. Distributors shall be equipped with removable manhole covers, tachometers, pressure gauges, and volume-measuring devices.

(2) Mixing Equipment. The mixing machine shall have a continuous flow mixing unit capable of accurately delivering a predetermined proportion of aggregate, water, emulsion [and rubber] and of discharging the thoroughly mixed product on a continuous basis. The mixing unit shall be capable of thoroughly blending all ingredients together.

ITEM P-625 COAL-TAR PITCH EMULSION SEALCOAT 1.5
1.6

(3) Spreading Equipment. 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 slurry from the distributor. It shall be maintained to prevent loss of slurry on varying grades and adjusted to assure uniform spread.

There shall be a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the specified rate of application. The spreader box shall have an adjustable width. The box shall be kept clean; asphalt and aggregate build-up on the box shall not be permitted.

4.3 PREPARATION OF PAVEMENT SURFACE. Bituminous pavement surfaces which have been softened by petroleum derivatives or have failed due to any other cause shall be removed to the full depth of the damage and replaced with new bituminous concrete similar to that of the existing pavement. Areas of the pavement surface to be treated shall be in a firm consolidated condition. They shall be sufficiently cured so that there is no concentration of oils on the surface. This can usually be determined by pouring water on the surface to be treated. If the water, after standing for a short period, picks up a film of oil, then that surface is not sufficiently cured for the application of the sealcoat.

A period of [**_____] days shall elapse between the placement of a bituminous surface course and the application of the sealcoat.

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The Engineer shall specify the time period. In order to allow adequate curing of the pavement surface prior to applying the sealcoat, a 30 day period is recommended.

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4.4 CLEANING EXISTING SURFACE. Prior to placing the sealcoat, the surface of the pavement shall be clean and free from dust, dirt, or other loose foreign matter, grease, oil, or any type of objectionable surface film. When directed by the Engineer, the existing surface shall be cleaned with a power blower and wire brushes.

Where vegetation exists in cracks, the vegetation shall be removed and the cracks cleaned to depth of two inches where practical. Those cracks shall be treated with a concentrated solution of a herbicide approved by the Engineer. Cracks wider than 3/4 inch (18 mm) shall be filled with compatible crack filler, prior to placing the sealcoat. Areas that have been subjected to fuel or oil spillage shall be wire brushed to remove any dirt accumulations. The area shall then be primed with shellac or a synthetic resin to prevent the sealcoat from debonding.

ITEM P-625 COAL-TAR PITCH EMULSION SEALCOAT

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If a rubberized sealcoat is included in the specifications, all cracks may be filled with the slurry at the time it is applied to the pavement. However, application must be made with a squeegee as specified in paragraph 4.2(c).

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4.5 APPLICATION OF EMULSION. The emulsion shall be applied at a uniform rate with a distributor at the rate specified in Table 2. When it is necessary to dilute the emulsion in order to aid application, the emulsion may be diluted with clean water but not more than 10 percent.

4.6 APPLICATION OF SLURRY. When the emulsion, aggregate, water [and rubber] are blended, the material shall be premixed to produce a homogeneous mixture of uniform consistency. The quantities of materials to be combined in each batch shall be in accordance with the proportions shown in Table 2.

Before application, the materials shall be proportioned accurately and mixed by suitable mixing equipment. The emulsion and the water shall first be charged into the mixer and blended to a desired consistency. Aggregate shall then be added at a slow and uniform rate while the mixing is continued. [The latex rubber shall then be added.] After all the constituents are in the mixer, the mixing shall continue for approximately five minutes or longer, if necessary. The mixing shall produce a smooth, free flowing homogeneous mixture of uniform consistency. Slow mixing shall be continuous from the time the bitumen is placed into the mixer until the slurry is applied by distributor truck or poured into the spreading equipment. During the entire mixing process, no breaking, segregating, or hardening of the emulsion nor balling, lumping, or swelling of the aggregate shall be permitted. The slurry shall be applied at a uniform rate to provide the desired amount. A sufficient amount of slurry shall be fed in the spreader box to keep a full supply against the full width of the squeegee, so that complete coverage of all surface voids and cracks is obtained.

In areas where a spreader box cannot be used, the slurry shall be applied by means of a hand squeegee.

Upon completion of the work, the sealcoat shall have no pin holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform texture.

Each application shall be allowed to dry thoroughly before the next coat is applied.

ITEM P-625 COAL-TAR PITCH EMULSION SEALCOAT 1.5 1.6

4.7 CURING. The mixture shall be permitted to dry for a minimum of [**_____] hours after the final application before opening to traffic and shall be sufficiently cured to drive over without damage to the sealcoat. Any damage to the uncured mixture will be the responsibility of the Contractor to repair.

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A minimum of 24 hours is recommended.

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4.8 HANDLING. The mixture shall be continuously agitated from the time it had been mixed until its application on the pavement surface. 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 with coal-tar toluene or xylene.

4.9 CONTRACTOR'S CERTIFICATION. The Contractor shall furnish the manufacturer's certification that each consignment of emulsion shipped to the project meets the requirements of Federal Specification R-P-355, except the water content shall not exceed 50 percent. [The Contractor shall furnish certification to the Engineer that the latex rubber shipped to the project meets the requirements of the material specified in paragraph 2.4.] The [certification] [certifications] shall be delivered to the Engineer prior to the beginning of work. The manufacturer's certification for the emulsion [and rubber] shall not be interpreted as a basis for final acceptance. Any certification received shall be subject to verification by testing samples received for project use.

5. METHOD OF MEASUREMENT

5.1 The coal-tar pitch emulsion shall be measured by the gallon (liter) of undiluted emulsion.

5.2 The mineral aggregate shall be measured by the ton (kilogram).

5.3 The latex rubber shall be measured by the gallon (liter).

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Paragraph 5.3 shall be deleted if a rubberized sealcoat is not specified.

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ITEM P-625 COAL-TAR PITCH EMULSION SEALCOAT 1.5 1.6

6. BASIS OF PAYMENT 384

6.1 Payment shall be made at the contract unit price per gallon (liter) for the coal-tar pitch emulsion, per ton (kilogram) for the mineral aggregate[,][.] [and per gallon (liter) for the latex rubber.] These prices shall fully compensate the Contractor for furnishing all materials; and for all labor, equipment, tools, and incidentals necessary to complete the items. 386 388 389 390 393 394

Payment will be made under: 396
Item P-625-5.1 Coal-Tar Pitch Emulsion - per gallon (liter) 397
Item P-625-5.2 Aggregate - per ton (kilogram) 398
Item P-625-5.3 Latex Rubber - per gallon (liter) 399

********** 400.4.1
Item P-625-5.3 shall be deleted of a rubberized sealcoat is not specified. 401 401
********** 402.1.2

7. TESTING REQUIREMENTS 404

ASTM 136	Sieve or Screen Analysis of Fine and Coarse Aggregates	406 407 408

8. MATERIAL REQUIREMENTS 411

Federal Specification R-P-355	Pitch, Coal-Tar Emulsion (Coating for Bituminous Pavements)	413 414 415
Federal Specification R-T-143	Tars, (for use in) Road Construction	417 418

+ + END OF ITEM P-625 + + 419.3

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