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Standard Specification for Emulsified Coal-Tar Pitch (Mineral Colloid Type)¹

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This standard has been approved for use by agencies of the Department of Defense.

¹ This specification is under the jurisdiction of ASTM Committee ~~D-8~~ D08 on Roofing, Waterproofing, and Bituminous Materials and is the direct responsibility of Subcommittee D08.09 on Bituminous Emulsions.

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1. Scope

1.1 This specification covers mineral-colloid-stabilized, emulsified coal-tar pitch suitable for use as a weather-protective and aliphatic-solvent resistant coating over bituminous pavements of airports, parking areas, and driveways.

1.2 The values stated in SI (metric) units are to be regarded as the standard.

1.3 The following precautionary caveat pertains only to the test method portion, Section 6, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 140 Practice for Sampling Bituminous Materials²

D 466 Test Methods for Films Deposited from Bituminous Emulsions²

D 490 Specification for Road Tar³

D 529 Test Method for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Carbon-Arc Method)²

D 2939 Test Methods for Emulsified Bitumens Used as Protective Coatings²

2.2 Federal Specification:

VV-K-211 Kerosene⁴

3. Materials and Manufacture

3.1 The emulsion shall be made using binders prepared from high-temperature coke-oven tars conforming having viscosities of RT-11 or higher. The tars shall conform to the requirements of Specification D 490. Petroleum tars, oil, and water-gas tars shall not be used. ~~D 490.~~

3.2 Mineral filler (mineral colloids) shall consist of finely ground clay, silica, or other inert inorganic materials.

NOTE 1—**Caution:** Bentonitic or highly expansive clays may cause drying and shrinkage problems which may affect the durability of the pavement sealer.

3.3 When specified, the emulsion shall be fortified with antifreeze.

4. Physical Requirements

4.1 The emulsion shall be of suitable consistency for application by brush, squeegee, roller, or suitable spray equipment. The material shall be used as received. It shall not be diluted with water or thinned by heating. It shall bond firmly to properly prepared damp or primed surfaces.

NOTE 2—Pavement and ambient temperature should be not less than 7°C (45°F) at the time of application and for at least 12 h thereafter, with no precipitation of rain, snow, etc., until the emulsion has dried.

4.2 The product shall be of smooth, uniform consistency without settlement or segregation in storage to the extent that it cannot be readily dispersed by ordinary stirring.

² Annual Book of ASTM Standards, Vol 04.04.

³ Annual Book of ASTM Standards, Vol 04.03.

⁴ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave. Philadelphia, PA 19111-5094, Attn: NPODS.

4.3 The material, after stirring to homogeneity, shall be suitable for application by the selected method in single coats of approximately 0.3 to 0.4 L/m² (¾ to 1 gal/100 ft²) without appreciable drainage on inclines up to 0.8 % (0.1 in./ft).

4.4 The material shall conform to the physical properties prescribed in Table 1 prior to fortification with antifreeze.

5. Sampling

5.1 Sample in accordance with Practice D 140 and Test Methods D 2939.

6. Test Methods

6.1 *Wet Film Continuity*—Using a spatula, spread the wet emulsion to a thin film on a sheet of standard 67.7-g/m²(18-lb) mimeograph paper. As the emulsion is drawn out to a smear, it shall show a uniformly smooth nongranular consistency, free of coarse particles.

6.2 *Resistance to Freezing (when specified)*—Expose a representative specimen of the emulsion to a temperature of –18°C (0°F) for 24 h; then warm the specimen to 25°C (77°F) in an environment not exceeding 38°C (100°F) and stir thoroughly.

NOTE 3—In any test utilizing an oven, the oven to be used shall be a gravity convection type. The internal dimensions of the oven shall be not less than 305 by 305 by 305 mm (12 by 12 by 12 in.).

6.3 *Density at 25°C (77°F)*—See Section 5 of Test Methods D 2939, except express the density in kg/m³.

6.4 *Volatiles*—Determine by the difference between residue (6.5) and 100 %.

6.5 *Residue*—Test Methods D 2939, Section 7.

6.6 *Resistance to Volatilization*—Weigh a representative specimen from the residue determination (6.5) and then expose it for 30 min in a 270°C (518°F) oven. Weigh the specimen again after cooling and calculate the percent weight loss.

6.7 *Solubility of Residue in CS₂*—Test Methods D 2939, Section 9.

6.8 *Ash of Residue*— Test Methods D 2939, Section 10.

6.9 *Flammability*— Test Methods D 2939, Section 12.

6.10 *Drying Time*— Test Methods D 2939, Section 14, except test after drying for 8 h.

6.11 *Resistance to Heat*—Test Methods D 2939, Section 15, 80 ± 3°C (176 ± 5°F) for 2 h.

6.12 *Resistance to Kerosine*—Test Methods D 466, except apply the emulsion in two coats and use kerosine in testing applied film.

6.12.1 Apply the material in two coats using a brass mask 1.6 mm (¼ in.) in thickness for the first coat and a 3.2-mm (⅛-in.) brass mask with the same rectangular opening as the first mask for the second coat, so that the cured film has a minimum thickness of 1.6 mm (0.06 in.). Leave the mask for the first coat in place during the drying period and remove it before the second mask is positioned for the final coating application.

6.12.2 Cure each coat for 96 h in agitated air at 25 ± 1°C (77 ± 2°F) and 50 ± 10 % relative humidity.

6.12.3 After completion of curing, fill the metal ring, pressed into, but not through, the coating, with kerosine (see Sections 4 and 5 of Test Methods D 466). The kerosine shall comply with Federal Specification VV-K-211. Expose the coating to kerosine for 24 h before evaluation. Remove the kerosine from the metal ring before examining the film for adhesion.

TABLE 1 Physical Properties of Emulsified Coal-Tar Pitch (Mineral Colloid Type)

Property	Characteristics	
	Min	Max
Wet film continuity	smooth, nongranular film	
Resistance to freezing (when specified)	shall return to a homogeneous consistency when stirred	
Wet film continuity	Smooth, nongranular film.	
Resistance to freezing (when specified)	Shall return to a homogeneous consistency when stirred.	
Density at 25°C (77°F), kg/m ³	1150	...
Volatiles, %	...	63
Residue by evaporation, %	37	...
Resistance to volatilization, residue weight loss, %	...	15
Solubility of residue in CS ₂ , %	25	...
Ash content of residue, %	30	40
Flammability	shall show no tendency to flash or ignite	
Flammability	Shall show no tendency to flash or ignite.	
Drying time, firm set, h	...	8
Resistance to heat	no blistering, sagging, or slipping	
Resistance to heat	No blistering, sagging, or slipping.	
Resistance to kerosine	no loss of adhesion	
Resistance to kerosine	No loss of adhesion. No softening of the film.	
Resistance to water	no loss of adhesion	
Resistance to water	No loss of adhesion.	
Resistance to impact before and after accelerated weathering	no chipping, flaking, cracking, or loss of adhesion extending more than 6.4 mm (¼ in.) beyond periphery of impact	
Resistance to impact before and after accelerated weathering	No chipping, flaking, cracking, or loss of adhesion extending more than 6.4 mm (¼ in.) beyond periphery of impact.	

6.13 *Resistance to Water*—Test the cured coating film, prepared as in 6.12, in accordance with 5.2 of Test Methods D 466, but using distilled water.

6.14 *Resistance to Impact*:

6.14.1 Prepare the specimens used in this test by coating metal plates 75 by 225 by 3 mm (3 by 9 by $\frac{1}{8}$ in.) in size. Degrease the metal with a suitable solvent such as trichloroethylene; then polish with steel wool. Protect the reverse side of the panel against corrosion.

6.14.2 Apply the emulsion with a doctor blade set at a thickness of 1.6 mm ($\frac{5}{64}$ in.) to the prepared surface and allow to dry as described in 6.12.2.

6.14.3 Then place each specimen, coating uppermost, on a solid horizontal base, and subject it to the impact of a 0.9-kg (2-lb) steel ball dropped from a height of 2.4 m (8 ft). Conduct the test at $25 \pm 1^\circ\text{C}$ ($77 \pm 2^\circ\text{F}$). Examine the coating immediately for evidence of chipping, cracking, or loss of adhesion to the metal.

6.15 *Resistance to Impact after Accelerated Weathering*:

6.15.1 Prepare the specimens used in this test in accordance with 6.14; then subject them to 25 cycles of cycle B as described in Test Method D 529.

6.15.2 At the completion of the accelerated weathering period, subject each specimen to the impact test as described in 6.14.3.

NOTE 4—Instead of testing after accelerated weathering, the supplier may furnish a certification showing 3 years satisfactory field performance.

7. Retest and Rejection

7.1 If the results of any test do not conform to the requirements of this specification, retesting to determine conformity may be performed as agreed upon between the purchaser and the seller.

8. Inspection

8.1 Inspection of material shall be made as agreed upon between the purchaser and the seller as part of the purchase contract.

9. Certification

9.1 Upon request of the purchaser in the contract or order, a manufacturer's certification that the material was manufactured and tested in accordance with this specification together with a report of the test results shall be furnished at the time of shipment.

10. Packaging and Marking

10.1 Emulsion shall be packaged to permit acceptance by carrier for transportation and to afford adequate protection from normal hazards of handling and shipping.

10.2 Each package shall be plainly marked with the name and brand of the manufacturer or distributor as well as the type or grade of the product. Each package should also contain the manufacturer's production code or lot number.

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