Designation: D6948/D6948M – 03 (Reapproved 2023)

Standard Practice for Application of Refined Coal Tar (Ready to Use, Commercial Grade)[1]

This standard is issued under the fixed designation D6948/D6948M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the application of emulsified refined coal tar slurry meeting the requirements of Specification D6945/D6945M Types I and II, by mechanized equipment as a weather protection and petroleum (aliphatic) solvent resistant sealer for use on bituminous concrete pavements. In order to clarify the differences between Types I and II, see 3.3 for standard definition of terms.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D490 Specification for Road Tar

D5727/D5727M Specification for Emulsified Refined Coal Tar (Mineral Colloid Type)

D6945/D6945M Specification for Emulsified Refined Coal-Tar (Ready to Use, Commercial Grade)

3. Terminology

3.1 Two types of mixtures are defined in Specification D6945/D6945M. The ingredients for both types of mixtures are normally combined at the contractor's yard or at the job site. Refined coal tar emulsion meeting Specification D5727/D5727M is concentrated when shipped from the manufacturer to the applicator.

3.1.1 *Specification D6945/D6945M Type I material*—is Specification D5727/D5727M material diluted with water typically by the applicator after which aggregate is added.

3.1.2 *Specification D6945/D6945M Type II material*—is Specification D5727/D5727M material diluted with water typically by the applicator after which additive and aggregate is added.

3.2 The mixtures described in 3.1.1 and 3.1.2 can be submitted to a laboratory approved by the owner for testing of their conformance to Specification D6945/D6945M Type I or Type II prior to their actual use on the job.

3.3 *Definitions:*

3.3.1 *additive*—one or more ingredients that can be added to a specific refined coal tar emulsion, water, or sand (or combination thereof) mixture to improve the coatings' durability, fuel resistance, drying time, color uniformity, or length of time required before opening the surface to traffic, or combination thereof. This material can also be used to modify the wet mixture's viscosity to improve aggregate suspension. Because there is such a wide variance of additives on the market, the aforementioned results may not take place. If an additive is used, it is recommended that it be supplied by the same manufacturer as the refined coal tar emulsion.

3.3.2 *application rate*—the volume of mixed materials applied per area of pavement surface, usually expressed in liters per square meter (L/m^2) [gallons per square yard (gal/yd^2)].

3.3.3 *applied mixture*—the combination of all ingredients mixed together and ready for application to the pavement. Also referred to as *seal coat* or *sealer*.

3.3.4 *bituminous concrete pavements, new*—pavements that have been placed less than 90 days.

[1] This practice is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.09 on Liquid Applied Coatings for Roofing and Asphaltic Concrete Pavement.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.3.5 *bituminous concrete pavements, aged*—pavements that weathered over at least one summer season and have shown signs of one or more of the following: cracking, raveling, aggregate polishing or graying due to oxidation, or combination thereof.

3.3.6 *brush applicator*—a hand-type or mechanized brush used to apply pavement sealer.

3.3.7 *crack filler*—a material that is placed in a pavement crack or joint to fill but not necessarily seal the void created by the crack or joint.

3.3.8 *crack sealant*—a material that has adhesive and cohesive properties to seal cracks, joints, or other narrow openings (less than 38.5 mm [1½ in.] wide) in pavements against the entrance or passage of water or other debris.

3.3.9 *crude coal tar*—condensed material taken from the coking process (high-temperature heating of coal under a vacuum) and containing all of the volatile constituents.

3.3.10 *cure, final (of the seal coat)*—the process of evaporation of water and volatiles of the applied seal coating mixture over the period of days resulting in the coating reaching its ultimate strength. The duration of this process is dependent upon ambient conditions.

3.3.11 *cure, initial (of the seal coat)*—the condition of an applied seal coating material that enables it to withstand vehicle traffic without damage to the seal coat.

3.3.12 *drying (of the seal coat)*—the process of evaporation of water of the applied seal coating mixture resulting in the coating being able to sustain light foot traffic.

3.3.13 *mechanized application equipment*—equipment used to mix and apply the refined coal tar emulsion mixture either with a spray or squeegee unit.

3.3.14 *priming*—application of an initial coat of a material designed to assist the adhesion of the additional coats of seal coating materials. Primers are always used as under coatings and are not designed to be used by themselves.

3.3.15 *refined coal tar*—a selectively distilled coal tar meeting the requirements of Specification D490, grade RT-12.

3.3.16 *refined coal tar emulsion*—a stable and homogeneous dispersion of refined coal tar, clay, mineral fillers, and specialty chemicals in water.

3.3.17 *seal coating*—process of applying a protective coating to a bituminous concrete pavement.

3.3.18 *spray unit*—a piece of equipment equipped with a mixing tank and positive displacement pump that can homogeneously mix and apply protective coatings uniformly over the entire width of a spray bar or wand type application device.

3.3.19 *squeegee unit*—a piece of equipment equipped with a mixing tank and squeegeeing mechanism that can homogeneously mix and apply protective coatings uniformly over the entire width of a rubber squeegee or brush type application device.

3.3.20 *trafficability*—the ability of an applied seal coating material to withstand vehicle traffic without damage to the seal coat, except for wear from traffic.

3.3.21 *uniform coated surface*—a surface that has an even distribution of seal coating material free of pinholes, streaks, or other uneven characteristics, or combination thereof.

4. Significance and Use

4.1 This practice is designed as a guide for architects, engineers, property owners or their representatives, or combination thereof. Its use helps ensure the satisfactory performance of the protective coating system when applied over bituminous concrete pavements.

5. Materials

5.1 *Refined Coal Tar Emulsion (Seal Coating) Mixture*—A mixture of concentrated refined coal tar emulsion water and sand, with or without an additive, as specified in Specification D6945/D6945M.

5.2 *Crack Sealant*—As specified by the refined coal tar emulsion manufacturer.

5.3 *Oil Spot Primer*—As specified by the refined coal tar emulsion manufacturer.

5.4 *Pavement Primer*—As specified by the refined coal tar emulsion manufacturer.

6. Equipment

6.1 Use application equipment that is capable of applying the required coating rates evenly over the entire width of the application mechanism to provide a continuously coated surface. For spray units, this can be accomplished with either a spray bar or a wand-type application device. To ensure this, equip all spray units with a pumping distribution system using positive displacement pumps. All squeegee/brush units shall be properly adjusted and in condition for application of seal coat materials so that there are no streaks in the coating.

6.2 Bulk storage tanks shall be capable of mixing or circulating, or both, the coat tar emulsion to a uniform consistency.

6.3 The mixing part of the application equipment must be tank type with a mechanically powered, full sweep mixer capable of homogeneously mixing the entire contents of the tank.

6.4 Use of hand squeegee or brush application will be restricted to places not accessible to mechanized equipment, or to accommodate neat trim work at curbs and so forth. Material that is applied by hand application shall meet the same standards as that applied by machine.

7. Surface Preparation

7.1 *Preparation of Aged Asphalt Pavement Surfaces* (see 3.3.5).

7.1.1 *Patching*—Patch all bituminous concrete pavement surfaces which have been softened by petroleum derivates or have failed due to any other cause. Remove the damaged pavement to the full depth of the damage and replace with new asphalt concrete similar to that of the existing pavement. If a solvent containing cold-applied material is used, complete patching a minimum of 90 days prior to the planned application of the sealer to permit solvent escape before sealing.

7.1.2 *Crack Sealing*—Remove all vegetation and debris from cracks to a minimum depth of 13.0 mm [½ in.]. If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the manufacturer. Fill all cracks, ignoring hairline cracks (<3 mm [⅛ in.] wide), with a crack sealant. Wider cracks (over 38 mm [1½ in.] wide), along with soft or sunken spots may indicate that the pavement or the pavement base requires extensive repairs.

7.1.3 *Clean Existing Surface*—Clean pavement surface immediately prior to placing the prime coat or seal coat by air blowing, sweeping, or flushing well with water (leaving no standing water) or a combination of these. The cleaning activity must leave the surface free of dust, dirt, grease, vegetation, oil, or any type of objectionable surface film.

7.1.4 *Oil Spot Priming*—Remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then rinse thoroughly with clean, potable water. After cleaning treat these areas with an oil spot primer.

7.1.5 *Surface Priming*—Older, highly oxidized pavements sometimes have trouble allowing pavement sealers to adhere. To ensure adhesion to sound but oxidized pavements, mix and apply a prime coat of a type and at a rate recommended by the coal tar emulsion manufacturer, after all loose aggregate is removed.

7.2 *Preparation of New Bituminous Concrete Pavement Surfaces:*

7.2.1 Allow new bituminous concrete surfaces to cure so that there is no accumulation of oils on the surface. A period of at least 90 days at daytime temperatures of 21 °C [70 °F] or greater shall elapse between the placement of a bituminous concrete surface course and the application of the seal coat.

7.2.2 Perform a water-break-free test to confirm that the surface oils have degraded and dissipated. (Cast 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 bituminous surface does not pass this test, additional time must be allowed and retesting should be done prior to sealing.

7.2.3 *Cleaning*—Clean as detailed in 7.1.3.

7.2.4 *Oil Spot Priming*—When needed see 7.1.4.

8. Mixing and Application of Seal Coating Mixture

8.1 *Mixing:*

8.1.1 *Preparation of Mixture*—Blend the seal coating mixture in the equipment described in 6.2 using the ingredients described in the composition table of Specification D6945/D6945M Type I or Type II prior to application. The mixing shall produce a smooth, homogeneous mixture of uniform consistency. (Consult the refined coal tar emulsion manufacturer for their recommended order of addition of the ingredients.) During the entire mixing and application process, no breaking, segregating, or hardening of the emulsion, nor balling or lumping of the sand will be permitted. Continue to agitate the seal coating mixture in the mixing tank at all times prior to and during application so that a consistent mix is applied.

8.1.2 Small additional increments of water may be needed to provide a workable consistency, but in no case shall the water content exceed the specified amount.

8.2 *Application of Seal Coating Mixture:*

8.2.1 *Application Rate*—Apply the mixture at rates specified in Table 1. Application rates depend on surface characteristics and application method (spray or squeegee). Rates are not to exceed the values given in Table 1 and at no time will total coats exceed 2.7 L/m^2 [0.60 gal/yd^2].

8.2.2 *Application Rate Guide:*

8.2.2.1 For pavements with a fine texture, spray applications are generally recommended.

8.2.2.2 For pavements with a rough texture or old oxidized pavements one squeegee coat is generally recommended, then another squeegee coat or one spray coat.

8.2.3 *Precautions:*

8.2.3.1 Sealer should not be applied unless pavement temperature is at least 10 °C [50 °F] and the air temperature is 10 °C [50 °F] and rising.

8.2.3.2 Sealer should not be applied during rainy or wet weather, during heavy fog, dew, and during hours of operation of sprinkler systems or when rain is anticipated within 8 h after application is completed.

8.2.3.3 Sealer should not be applied to hot surfaces under the summer sun (over 32 °C [90 °F]) without first applying pavement primer or first cooling the surface with clean water. Water should dampen the surface without leaving puddles.

8.2.3.4 Since an emulsion may be damaged by freezing, it should be protected at all times when the temperature drops below 4 °C [40 °F].

8.2.4 *Water Fog*—To provide maximum adhesion, the manufacturer may require a water fog spray (dampening).

8.2.5 *Prime Coat*—When needed see 7.1.5.

8.2.6 *First Coat*—Apply the mixture uniformly to obtain the rates specified in Table 1.

8.2.7 *Dry and Initial Cure Between Coats*—Allow each coat to dry and initially cure before applying all subsequent coats.

8.2.8 *Second Coat*—Apply the second coat as outlined for the first coat above.

8.2.9 *Additional Coats*—Additional coats may be applied over the entire surface or in heavy traffic areas such as drive lanes.

TABLE 1 Application Rate Chart

Application^{A,B,C}	Formula Rate of Application Range of Mix, L/m^2 [gal/yd^2]		
	Aggregate Gradation		
	Coarse	Medium	Fine
First and Second Coat, Fine Textured Pavements	1.13–1.36 [0.25–0.30]	0.81–1.00 [0.18–0.22]	0.54–0.68 [0.12–0.15]
First and Second Coat, Rough Textured Pavements	1.13–1.36 [0.25–0.30]	0.81–1.13 [0.18–0.25]	0.54–0.91 [0.12–0.20]

^{A} The increase in required application rates corresponds with increases in the maximum aggregate particle size.
^{B} Additional coats may be specified for greater wearability.
^{C} Prime coat, if required, as specified by the coal tar emulsion manufacturer; see 7.1.5.