



Designation: D6945/D6945M – 03 (Reapproved 2023)

Standard Specification for Emulsified Refined Coal-Tar (Ready to Use, Commercial Grade)¹

This standard is issued under the fixed designation D6945/D6945M; 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 specification covers mineral-colloid-stabilized, emulsified refined coal tar suitable for use as a weather-protective and petroleum (aliphatic) solvent resistant coating. This product is typically applied to commercial lots and other low-speed bituminous concrete pavements suitable for protection.

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

[C136/C136M Test Method for Sieve Analysis of Fine and Coarse Aggregates](#)

[C142/C142M Test Method for Clay Lumps and Friable Particles in Aggregates](#)

[D140/D140M Practice for Sampling Asphalt Materials](#)

¹ This specification 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.

[D490 Specification for Road Tar](#)

[D2939 Test Methods for Emulsified Bitumens Used as Protective Coatings](#) (Withdrawn 2012)³

[D3423/D3423M Practice for Application of Emulsified Coal-Tar Pitch \(Mineral Colloid Type\)](#)

[D5727/D5727M Specification for Emulsified Refined Coal Tar \(Mineral Colloid Type\)](#)

3. Terminology

3.1 The refined coal tar emulsion mixed at the contractor's yard or at the job site shall meet the requirements of Specification [D5727/D5727M](#). Mixture Types I and II (see Appendix A of Practice [D3423/D3423M](#) for standard definition of terms) are described below:

3.1.1 *Type I material*—a mixture of refined coal tar emulsion meeting Specification [D5727/D5727M](#), water, and aggregate.

3.1.2 *Type II material*—a mixture of refined coal tar emulsion meeting Specification [D5727/D5727M](#), water, aggregate, and additive.

4. Classification

4.1 This specification is designed to give specifying authorities the information necessary to ensure that the appropriate base refined coal tar emulsion mixtures are specified for protecting bituminous concrete pavements where fuel resistance is required.

4.2 Normal aggregate loadings for Type I materials should range from 0.360 to 0.600 kg/L [3 to 5 lb/gal]. Type II materials can have slightly higher loadings of aggregate; however, aggregate loadings in excess of 0.720 kg/L [6 lb/gal] are strongly discouraged.

NOTE 1—Several researchers have shown that high aggregate loadings result in a lack of fuel resistance as determined by the Resistance to Kerosene test according to Test Methods [D2939](#). Poor adhesion may also occur with high sand loadings.

5. Materials and Manufacture

5.1 *Base Refined Coal Tar Emulsion*—This emulsion shall be made using binders prepared from a high-temperature

³ The last approved version of this historical standard is referenced on www.astm.org.

refined coal tar conforming to the requirements of Specification **D490** for RT11 or higher. The use of oil and water gas tar is not allowed. The base refined coal tar emulsion shall be in accordance with all requirements of Specification **D5727/D5727M**.

5.2 Aggregate—The aggregate shall be either a natural or manufactured (boiler slag has been used successfully) angular aggregate composed of clean, hard, durable particles free of clay and other objectionable material when tested in accordance with Test Method **C142/C142M**. (Boiler slag has been used successfully.)

NOTE 2—It is recommended that this aggregate meet the gradation given in **Table 1**, when tested in accordance with Test Method **C136/C136M**.

5.3 Additive—In the case of Type II material, the additive shall be approved by the base refined coal tar emulsion manufacturer.

6. Performance Requirements

6.1 Type I Composition—The refined coal tar emulsion seal coat shall consist of a mixture of refined coal tar emulsion, water, and aggregate and be proportioned within the ranges as shown in **Table 2**. The composition shall have written approval of the refined coal tar emulsion manufacturer.

6.2 Type II Composition—The refined coal tar emulsion slurry seal coat shall consist of a mixture of refined coal tar emulsion, water, aggregate, and additive and be proportioned within the ranges as shown in **Table 3**. The composition shall have written approval of the local coal tar emulsion manufacturer.

6.3 Mixture Testing—Prior to application, the contractor shall submit samples of component materials for the proposed mix in accordance with the terms of the agreement between the contractor and owner/related parties. The samples shall be blended according to selected proportions as given in the appropriate table, either **Table 2** or **Table 3**, and tested for conformance with **Table 4** requirements, for the appropriate type of mixture. The samples shall be tested by a laboratory designated by the owner/related parties.

6.3.1 Aggregate Verification Test—Periodic samples of mixture being applied at the job site shall be taken for mix design verification in accordance with Test Methods **D2939**. In order to verify that the proper amount of aggregate specified in **Tables 2 and 3** is contained in the mixture, samples of mixture

TABLE 2 Type I—Composition of Mixture per 100 gal of Refined Coal Tar Emulsion

Application	Refined Coal Tar Emulsion, L [gal]	Water, L [gal]	Aggregate, mg [lb]
First and Second Seal Coat	100 [100]	25–30 [25–30]	36–60 [300–500]

TABLE 3 Type II—Composition of Mixture per 100 gal of Refined Coal Tar Emulsion

Application	Refined Coal Tar Emulsion, L [gal]	Water, L [gal]	Additive, L [gal]	Aggregate, mg [lb]
First and Second Seal Coat	100 [100]	25–70 [25–70]	2–6 [2–6]	36–72 [300–600]

TABLE 4 Physical Requirements for Emulsified Refined Coal Tar Mixture Tested According to Test Methods **D2939**

Property ^A	Type I Characteristics		Type II Characteristics	
	min	max	min	max
Uniformity	Pass		Pass	
Residue by evaporation, %	50		40	
Water Content, %		50		60
Aggregate Content, %	17	32	16	34
Ash Content, percent	60	70	60	73
Drying Time, firm set, h	8		8	
Resistance to kerosene	Pass		Pass	
Resistance to water	Pass		Pass	
Flexibility	No flaking, cracking through to the substrate, or loss of adhesion to the substrate			

^A See Test Methods **D2939**.

being applied at the job site shall be taken for aggregate content verification in accordance with Test Methods **D2939**.

6.4 The manufacturer shall approve the refined coal tar emulsion as to the specific composition numbers to be used in the mix design.

7. Other Requirements

7.1 Both mixture types shall be of suitable consistency for application by brush, squeegee, roller, or suitable spray equipment without heating and shall bond to properly prepared damp or primed surfaces.

7.2 The mixture, after stirring to homogeneity, shall be suitable for application by the selected method in single coats without appreciable drainage on inclines up to 0.8 %.

7.3 The mixture shall conform to the physical properties prescribed in **Table 4**. When the mixture fails any of the given requirements, it shall be reformulated and retested for compliance.

8. Sampling

8.1 Sample in accordance with Practice **D140/D140M** and Test Methods **D2939**.

9. Inspection

9.1 Inspection of material shall be made as agreed upon between the purchaser and the manufacturer.

TABLE 1 Gradation of Aggregates^A

Siege Size	Percent Passing		
	Coarse	Medium	Fine
1.18 mm (No. 16)	100	100	100
0.850 mm (No. 20)	85–100	98–100	100
0.600 mm (No. 30)	25–85	85–100	98–100
0.425 mm (No. 40)	5–25	25–85	85–100
0.300 mm (No. 50)	2–10	5–25	25–85
0.212 mm (No. 70)	--	2–10	5–25
0.150 mm (No. 100)	0–2	0–4	2–10
0.106 mm (No. 140)	--	0–2	0–2

^A **Table 1** allows three choices of aggregate gradation. In either case, the refined coal tar emulsion manufacturer shall give written approval for the aggregate used in the mix design.