



Designation: **D1369 – 84 (Reapproved 2012) D1369 – 19**

Standard Practice for Quantities of Materials for Bituminous Asphalt-Aggregate Surface Treatments¹

This standard is issued under the fixed designation D1369; 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.

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

1. Scope

1.1 This practice covers the rates of application of bituminous asphalt materials and aggregates and types and grades of bituminous asphalt materials for single and multiple bituminous asphalt surface treatments as applied to suitably prepared pavements or bases.

1.2 The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.3 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.

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

1.5 *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

[C29/C29M Test Method for Bulk Density \(“Unit Weight”\) and Voids in Aggregate](#)

[D8 Terminology Relating to Materials for Roads and Pavements](#)

[D448 Classification for Sizes of Aggregate for Road and Bridge Construction](#)

[D490 Specification for Road Tar](#)

[D633 Volume Correction Table for Road Tar](#)

[D946/D946M Specification for Penetration-Graded Asphalt Binder for Use in Pavement Construction](#)

[D977 Specification for Emulsified Asphalt](#)

[D1139/D1139M Specification for Aggregate for Single or Multiple Bituminous Surface Treatments](#)

[D1250 Guide for the Use of the Joint API and ASTM Adjunct for Temperature and Pressure Volume Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils: API MPMS Chapter 11.1](#)

[D2027/D2027M Specification for Cutback Asphalt \(Medium-Curing Type\)](#)

[D2028/D2028M Specification for Cutback Asphalt \(Rapid-Curing Type\)](#)

[D2397/D2397M Specification for Cationic Emulsified Asphalt](#)

3. Terminology

3.1 For definitions of other terms used in this standard, refer to Terminology [D8](#).

3.2 *Definitions: Definitions of Terms Specific to This Standard:*

¹ This practice is under the jurisdiction of ASTM Committee [D04](#) on Road and Paving Materials and is the direct responsibility of Subcommittee [D04.24](#) on Bituminous Asphalt Surface Treatments.

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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.

3.2.1 The types of surface treatments covered by this practice are as follows:

3.2.2 *multiple-surface treatment—treatment, n*—a wearing surface composed of bituminous asphalt material and aggregate, in which coarser aggregate is placed uniformly over an initial application of bituminous asphalt material and followed by one or more subsequent applications of bituminous asphalt material and smaller aggregate.

3.2.2.1 *Discussion*—

Generally, the designated maximum size of the smaller aggregate is one half that of the aggregate used in the preceding application. Each application of aggregate is placed uniformly in a single layer, the thickness of which approximates the nominal maximum size of the aggregate.

3.2.3 *single-surface treatment—treatment, n*—a wearing surface of bituminous asphalt material and aggregate in which the aggregate is placed uniformly over the applied bituminous asphalt material in a single layer, the thickness of which approximates the nominal maximum size of the aggregate used.

4. Significance and Use

4.1 This practice is intended to be used as a guide by those involved in the design of bituminous asphalt surface treatments. It covers typical application rates for the various types of surface treatments and covers aggregate sizes and covers recommended grades of asphaltic material for both hot and cool weather conditions.

4.2 The typical bituminous asphalt material application rates given are for normal surfaces and non-porous aggregates. Provision is made for rate adjustment when other than normal surfaces or porous aggregates, or both, are involved.

5. Rates of Application

5.1 Typical quantities of materials for the several types of surface treatments are listed in ~~Table 1~~ Tables 1 and 2 and ~~Table 2~~.

TABLE 1 Quantities of Materials for Bituminous Asphalt-Aggregate Surface Treatments (U.S. Customary (Inch-Pound Units))

NOTE 1—The values are typical design or target values and are not necessarily obtainable to the precision indicated.

Surface Treatment		Aggregate		Bituminous Asphalt Material ^A	
Type	Application	Size No. ^B	Nominal Size (Square Openings)	Typical Rate of Application, ft ³ /yd ²	Typical Rate of Application, gal/yd ²
Single Single	initial	5	1 in. to ½ in.	0.50	0.42
	Initial	5	1 in. to ½ in.	0.50	0.42
		6	¾ in. to ¾ in.	0.36	0.37
		7	½ in. to No. 4	0.23	0.23
		8	¾ in. to No. 8	0.17	0.19
		9	No. 4 to No. 16	0.11	0.13
Double Double	initial	5	1 in. to ½ in.	0.50	0.42
	Initial	5	1 in. to ½ in.	0.50	0.42
	second	7	½ in. to No. 4	0.25	0.26
	Second	7	½ in. to No. 4	0.25	0.26
Double Double	initial	6	¾ in. to ¾ in.	0.36	0.37
	Initial	6	¾ in. to ¾ in.	0.36	0.37
	second	8	¾ in. to No. 8	0.18	0.20
	Second	8	¾ in. to No. 8	0.18	0.20
Triple Triple	initial	5	1 in. to ½ in.	0.50	0.42
	Initial	5	1 in. to ½ in.	0.50	0.42
	second	7	½ in. to No. 4	0.25	0.26
	Second	7	½ in. to No. 4	0.25	0.26
	third	9	No. 4 to No. 16	0.13	0.14
	Third	9	No. 4 to No. 16	0.13	0.14
Triple Triple	initial	6	¾ in. to ¾ in.	0.36	0.37
	Initial	6	¾ in. to ¾ in.	0.36	0.37
	second	8	¾ in. to No. 8	0.18	0.20
	Second	8	¾ in. to No. 8	0.18	0.20
	third	9	No. 4 to No. 16	0.13	0.14
	Third	9	No. 4 to No. 16	0.13	0.14

^A Experience has shown that these quantities should be increased slightly (5 to 10 %) when the bituminous asphalt material to be used was manufactured for application with little or no heating.

^B According to Classification D448.

TABLE 2 Quantities of Materials for Bituminous Asphalt-Aggregate Surface Treatments (Metric (SI Units))

NOTE 1—The values are typical design or target values and are not necessarily obtainable to the precision indicated.

Surface Treatment		Aggregate			Bituminous Asphalt Material ^A	
Type	Application	Size No. ^B	Nominal Size (Square Openings, mm)	Typical Rate of Application, m ³ /m ²	Typical Rate of Application, litre/m ²	
Single	initial	5	25.0 to 12.5	0.017	1.90	
		5	25.0 to 12.5	0.017	1.90	
	Initial	6	19.0 to 9.5	0.012	1.68	
		6	19.0 to 9.5	0.012	1.68	
	Second	7	12.5 to 4.75	0.008	1.04	
		7	12.5 to 4.75	0.008	1.04	
	Second	8	9.5 to 2.36	0.006	0.86	
		8	9.5 to 2.36	0.006	0.86	
	Third	9	4.8 to 1.2	0.004	0.59	
9		4.8 to 1.2	0.004	0.59		
Double	initial	5	25.0 to 12.5	0.017	1.90	
		5	25.0 to 12.5	0.017	1.90	
	Initial	7	2.5 to 4.75	0.008	1.18	
		7	2.5 to 4.75	0.008	1.18	
Double	initial	6	19.0 to 9.5	0.012	1.68	
		6	19.0 to 9.5	0.012	1.68	
	Initial	8	9.5 to 2.36	0.006	0.91	
		8	9.5 to 2.36	0.006	0.91	
Triple	initial	5	25.0 to 12.5	0.017	1.90	
		5	25.0 to 12.5	0.017	1.90	
	Initial	7	12.5 to 4.75	0.008	1.18	
		7	12.5 to 4.75	0.008	1.18	
	Second	9	4.75 to 1.18	0.004	0.63	
		9	4.75 to 1.18	0.004	0.63	
Triple	initial	6	19.0 to 9.5	0.012	1.68	
		6	19.0 to 9.5	0.012	1.68	
	Initial	8	9.5 to 2.36	0.006	0.91	
		8	9.5 to 2.36	0.006	0.91	
	Second	9	4.75 to 1.18	0.004	0.63	
		9	4.75 to 1.18	0.004	0.63	

^A Experience has shown that these quantities should be increased slightly (5 to 10 %) when the bituminous asphalt material to be used was manufactured for application with little or no heating.

^B According to Classification D448.

5.2 The quantities of the various gradations are normally sufficient to provide a uniform cover over the area specified. The quantities of aggregate are shown by volume measurement in order to minimize the effect of variations due to specific gravity, particle shape, surface texture, and porosity. For job control, the quantity of aggregate by volume may be converted to a weight figure by determining the loose unit weight of the aggregate and calculating or using [Table 3](#) [Tables 3 and 4](#) and [Table 4](#) to determine the pounds per square yard or kilograms per square metre.

TABLE 3 Approximate Conversion Table—Loose Unit Weight To Pounds per Square Yard

Loose Unit Weight		Approximate lb/yd ² at various application rates (ft ³ /yd ²)								
lb/yd ³	lb/ft ³ (approximately)	0.10 ft ³	0.15 ft ³	0.20 ft ³	0.25 ft ³	0.30 ft ³	0.35 ft ³	0.40 ft ³	0.45 ft ³	0.50 ft ³
1800	66.5	6.5	10	13.5	17	20	23.5	26.5	30	33.5
1900	70.5	7.0	10.5	14	17.5	21	24.5	28	31.5	35
2000	74	7.5	11	15	18.5	22	26	29.5	33.5	37
2100	78	8	11.5	15.5	19.5	23	27	31	35	39
2200	81.5	8	12	16.5	20.5	24.5	28.5	32.5	36.5	41
2300	85	8.5	13	17	21.5	25.5	30	34	38.5	42.5
2400	89	9	13.5	18	22	26.5	31	35.5	40	44.5
2500	92.5	9.5	14	18.5	23	28	32.5	37	41.5	46.5
2600	96.5	9.5	14.5	19.5	24	29	33.5	38.5	43.5	48
2700	100	10	15	20	25	30	35	40	45	50
2800	103.5	10.5	15.5	20.5	26	31	36.5	41.5	46.5	52
2900	107.5	10.5	16	21.5	27	32	37.5	43	48.5	53.5
3000	111	11	16.5	22	28	33	39	44.5	50	55