Designation: D 2823 – 90 (Reapproved 1997)ε1

Standard Specification for Asphalt Roof Coatings[1]

This standard is issued under the fixed designation D 2823; 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 Department of Defense.

ε[1] NOTE—Added Section 13 and deleted Footnote 7 editorially in April 1997.

1. Scope

1.1 This specification covers asphalt roof coatings of brushing or spraying consistency.

1.2 *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 4 Test Method for Bitumen Content[2]

D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation[3]

D 140 Practice for Sampling Bituminous Materials[4]

D 224 Specification for Smooth-Surfaced Asphalt Roll Roofing (Organic Felt)[2]

D 312 Specification for Asphalt Used in Roofing[2]

D 449 Specification for Asphalt Used in Dampproofing and Waterproofing[2]

D 562 Test Method for Consistency of Paints Using the Stormer Viscometer[5]

D 946 Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction[5]

D 1079 Terminology Relating to Roofing, Waterproofing and Bituminous Materials[2]

E 1 Specification for ASTM Thermometers[6]

3. Terminology

3.1 For definitions of terms used in this specification, see Terminology D 1079.

4. Classification

4.1 *Type I* is made from asphalts characterized as self-healing, adhesive, and ductile, and conforming to the requirements of Specification D 312, Type I; Specification D 449, Types I or II; or Specification D 946.

4.2 *Type II* is made from asphalts characterized by high softening point and relatively low ductility, and conforming to the requirements of Specification D 312 Types II or III; or Specification D 449, Type III.

5. Materials and Manufacture

5.1 Asphalt roof coatings shall consist of an asphalt base, volatile petroleum solvents, and mineral stabilizers including asbestos fiber, mixed to a smooth, uniform consistency suitable for application by squeegee, three-knot brush, paint brush, roller, or by spraying.

6. Composition

6.1 Asphalt roof coatings complying with this specification shall conform to the following composition limits:

	min	max
Water, %	...	1.0
Nonvolatile matter, %	50	...
Asbestos and other mineral stabilizers, %	5	20
Asphalt, %	40	...
Mineral matter based on original mass of insoluble residue, %	80	...

7. Physical Requirements

7.1 *Uniformity*—After a thoroughly stirred sample has stood for 72 h at room temperature in a closed container, it shall show no separation of solvent or settling that cannot be overcome by moderate stirring.

7.2 *Consistency*— The roof coating shall be of a consistency that will spread readily and permit application by squeegee, brush, roller, or spray at the rate of 50 ft ^{2}/gal (1.25 m^2/L) on prepared roofing, saturated felt, and metal surfaces at ambient temperatures above 50°F (10°C). Consistency at 77°F (25°C) shall be between 50 and 400 Stormer s/100 revolutions.

7.3 *Behavior at 140°F (60°C)*—The roof coating shall show no evidence of blistering, and sag or slide shall be no greater than ¼ in. (6 mm). Staining or absorption of the coating on the reverse side of the prepared roofing test panel shall not exceed

[1] This specification is under the jurisdiction of ASTM Committee D-8 on Roofing, Waterproofing, and Bituminous Materials and is the direct reponsibility of Subcommittee D08.05 on Solvent-Bearing Bituminous Compounds for Roofing and Waterproofing.

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[2] *Annual Book of ASTM Standards*, Vol 04.04.

[3] *Annual Book of ASTM Standards*, Vol 05.01.

[4] *Annual Book of ASTM Standards*, Vol 04.03.

[5] *Annual Book of ASTM Standards*, Vol 06.01.

[6] *Annual Book of ASTM Standards*, Vol 14.03.

5 % of the coated area.

7.4 *Pliability at 32°F (0°C)*—There shall be no cracking or separation of the roof coating from the metal.

8. Sampling

8.1 Sample the material from the original containers immediately after stirring to a uniform consistency in accordance with Practice D 140. Restir samples to ensure uniformity immediately before withdrawing portions for individual tests.

9. Test Methods

9.1 *Water*—Test Method D 95.

9.2 *Nonvolatile Matter*—Weigh 10 ± 1 g of coating to the nearest 0.01 g into each of two tared, flat-bottom dishes having a diameter of approximately 2.5 in. (64 mm) and walls ⅝ in. (16 mm) high. Heat the dish and contents in an oven at 320 to 330°F (160 to 166°C) until the residue shows a loss of not more than 0.05 g on successively hourly weighings; make each weighing after cooling in a desiccator. Calculate the % nonvolatile matter from the mass of the residue and the mass of the original sample as follows:

$$\text{Nonvolatile matter, \%} = (R_e/S) \times 100 \quad (1)$$

where

R_e = mass of residue from evaporation, g, and
S = mass of original sample, g.

Record the average of the two separate determinations.

9.3 *Asbestos and Other Mineral Stabilizers, and Asphalt*—Test Method D 4, Procedure No. 2, but substitute trichloroethylene for carbon disulfide. Mineral matter shall be reported as asbestos and other mineral stabilizers, bitumen as asphalt. Calculate asphalt as percent of original, X_a, as follows:

$$X_a = N - (100\ B/A) \quad (2)$$

where:

N = percent nonvolatile matter from 8.2,
B = net mass of insoluble residue, including corrections, and
A = mass of sample taken.

9.4 *Mineral Matter Based on Original Mass of Insoluble Residue*—Using the data obtained in accordance with Test Method D 4, Procedure No. 2, calculate the percent mineral matter based on the original mass of the insoluble residue, M_i, as follows.

$$M_i = (C/B) \times 100 \quad (3)$$

where:

C = net mass of ignited, reconstituted mineral matter, including any corrections and
B = net mass of insoluble residue, including any corrections.

9.5 *Consistency*:

9.5.1 *Summary of Test Method*—Consistency is determined using the Stormer Viscometer and the rate of shear reported in terms of the time required for 100 revolutions of the rotor produced by a specified load (compare with Test Method D 562).

9.5.2 *Apparatus*:

9.5.2.1 *Standard Stormer Viscometer*.

9.5.2.2 *Water Bath—Test Cup Assembly*, without central baffle or thermometer holder.

9.5.2.3 *Rotor*, propeller-type (see Fig. 1).

9.5.2.4 *Slotted Weights and a Suitable Hanger*.

9.5.2.5 *Thermometer*— ASTM Stormer Viscosity Thermometer having a range from 20 to 70°C, and conforming to the requirements for Thermometer 49C as prescribed in Specification E 1.

9.5.2.6 *Stop Watch*.

9.5.3 *Preparation of Apparatus*:

9.5.3.1 Place the Stormer Viscometer on a table or shelf high enough to permit the weight to drop about 40 in. (1 m), or sufficient distance to produce about 125 revolutions of the rotor. Insert the shaft of the propellar-type rotor in the chuck as far as it will go and secure it with the set screw.

9.5.3.2 Raise the water bath–test cup assembly until the bottom of the test cup just touches the bottom of the rotor blade; then lower the assembly ¼ in. (6 mm). Tighten the set screw on the position collar, if available, while the collar is in contact with the bracket and the assembly, and use this setting to position the cup for all test runs. Using the set screws in the rim of the bath holder, adjust the water bath– test cup assembly so that the cup and rotor are visually concentric.

9.5.3.3 For convenience in weight adjustment, attach a slotted metal can cover approximately 2 in. (50 mm) in diameter to the hanger to support the slotted weights required.

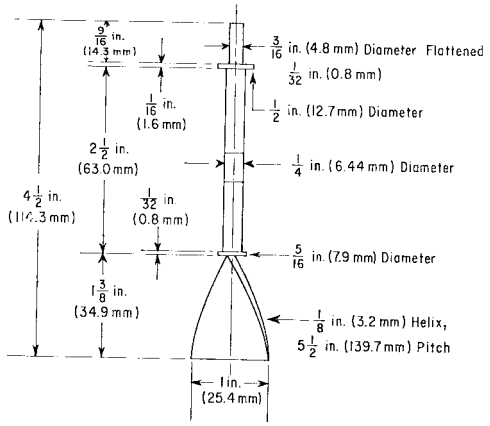
9.5.4 *Calibration*:

9.5.4.1 Use a 94.85 % by weight aqueous glycerin solution as a calibration standard. Determine the initial concentration of reagent grade glycerin by accurately measuring its specific gravity (refer to the Appendix), and then add additional water to make up the desired total of 5.15 % by weight water.

9.5.4.2 Determine the weight on the viscometer cord (approximately 100 g) required to produce 100 revolutions of the rotor in the glycerin calibration standard at 25 ± 0.2°C in 18.0 ± 0.2 s. Check the calibration periodically, particularly after prolonged use of the instrument, and recalibrate as necessary.

9.5.5 *Procedure*:

9.5.5.1 Remove the test cup and fill it with the sample to a level that will extend ¼in. (6 mm) above the top of the rotor blade. Agitate the sample in the cup thoroughly to remove any



NOTE 1—All dimensions are subject to a tolerance of ±0.004 in. (±0.1 mm). Material: nickel-plated brass or stainless steel.

FIG. 1 Propeller-Type Rotor for Use with Stormer Viscometer

trapped air bubbles. Place the test cup in the water bath, and then move the assembly up into test position against the preset collar.

9.5.5.2 Add 450 g to the calibration weight on the cord determined in 9.5.4.2. This will be the test load or driving weight.

9.5.5.3 Adjust the temperature of the sample and the entire test assembly to 25 ± 0.2°C. To expedite reaching equilibrium, raise the driving weight and release the brake to provide agitation. When the water bath, test cup, sample, and rotor have all reached 25 ± 0.2°C, remove the thermometer.

9.5.5.4 Raise the driving weight on the cord so that it nearly touches the pulley. With stop watch in hand, release the brake and observe the moving pointer. After 8 to 10 revolutions have been made, time the next 100 revolutions. Take the average of at least three determinations and record as the Stormer consistency in s/100 revolutions. Record the total driving weight.

9.5.5.5 Consistencies of up to approximately 100 s/100 revolutions shall be determined directly by timing 100 revolutions. For higher consistencies, when timing 100 revolutions might unduly prolong the test, calculate the time required for 100 revolutions from direct measurement of the time required for no less than 25 revolutions.

9.6 *Behavior at 140°F (60°C)*:

9.6.1 Prepare two test specimens with each base by brushing roof coating on two 6 by 6-in. (150 by 150-mm) steel panels and two pieces of smooth surface asphalt roll roofing, each covered by a 1/32-in. (0.8-mm) ± 10 % thick mask with a 3 by 5-in. (75 by 125-mm) opening in the center. The steel panels shall be 0.40 to 0.32-mm (28 to 30-gage) nominal thickness, with clean surfaces free of oil and scale, and capable of being bent smoothly 180 deg around a 1-in. (25-mm) mandrel. The smooth surface asphalt roll roofing shall conform to the requirements of Specification D 224.

9.6.2 Immediately after brushing the coating on the test panels, remove the mask and embed a thread in each coating across the 3-in. (75-mm) dimension, parallel to and no more than 2 in. (50 mm) from one edge of the coating. Measure the distance of the thread from the edge of each test panel to the nearest 1/32in. (1 mm).

9.6.3 Expose the test panels horizontally in a well-ventilated area for 60 min at 73.4 ± 3.6°F (23 ± 2°C), but not in direct sunlight.

9.6.4 Suspend the panels vertically with the thread closest to the top edge in an oven at 140 ± 3.6°F (60 ± 2°C). After 5 h, remove the test panels from the oven and examine for any sign of blistering. Then measure to the nearest 1/32 in. (1 mm) the distance of the thread from the edge of each panel again to determine the extent of any sagging or sliding. Average the two determinations from each type panel. Report results to the nearest 1/32 in. (1 mm).

9.6.5 Observe and estimate to the nearest 5 % the area stained on the reverse side of the prepared roofing panel due to the absorption of the roof coating.

9.7 *Pliability at 32°F (0°C)*:

9.7.1 Cool the coated metal panels from the preceding test to room temperature, and then immerse them in a water bath at 32°F (0°C) for 1 h.

9.7.2 Remove the panels from the water bath and immediately bend them over a 1-in. (25-mm) diameter mandrel through 180°. The bending shall be accomplished in approximately 2 s at a uniform rate, with the metal side of the test panel against the mandrel.

9.7.3 Immediately after bending, dry the panels thoroughly and examine the coating visually for cracking or bond failure. Ignore cracks less than 1/8 in. (3 mm) long unless they extend to the metal.

10. Precision

10.1 The precision of the test methods used in this specification has not yet been determined.

11. Inspection

11.1 Inspection of the material shall be agreed upon by the purchaser and the seller as part of the purchase contract.

12. Rejection and Rehearing

12.1 Failure to conform to any of the requirements prescribed in this specification shall constitute grounds for rejection. In cases of rejection, the seller shall have the right to reinspect and resubmit the lot after removal of those packages not conforming to the specified requirements.

13. Keywords

13.1 asbestos; asphalt; fibered; roof coating

APPENDIX

(Nonmandatory Information)

X1. SPECIFIC GRAVITY OF AQUEOUS GLYCERIN SOLUTIONS

X1.1 Aqueous solutions of glycerin are suitable liquids for use as standards in calibrating the Stormer Viscometer. By means of an accurate specific gravity determination, the percent glycerin concentration can be determined within ±0.02.

Sp Gr,[7] 25/25 C	Glycerin, weight %
1.23585	90.00
1.23850	91.00
1.24115	92.00
1.24380	93.00
1.24645	94.00
1.24910	95.00
Sp Gr,[7] 25/25 C	Glycerin, weight %
1.25165	96.00
1.25425	97.00
1.25685	98.00
1.25945	99.00
1.26201	100.00

[7] Taken from *Handbook of Chemistry and Physics,* 30th Ed., Chemical Rubber Publishing Co., 19801 Cranwood Parkway, Cleveland, OH 44128, 1948, p. 1742. See also Sheeley, M. L., *Industrial and Engineering Chemistry,* IECHA, Vol 24, 1932, p. 1060.