



Designation: D226/D226M – 17 (Reapproved 2023)

Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing¹

This standard is issued under the fixed designation D226/D226M; 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 specification covers asphalt-saturated organic felts, with or without perforations, intended to be used with asphalts conforming to the requirements of Specification D312/D312M in the construction of built-up roofs, and with asphalts conforming to the requirements of Specification D449/D449M in the construction of water proofing systems.

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 non-conformance with the standard.

1.3 The following safety hazards caveat pertains only to the test method portion, Section 8, 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, 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

D70/D70M Test Method for Specific Gravity and Density of Semi-Solid Asphalt Binder (Pycnometer Method)

¹ This specification is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.02 on Steep Roofing Products and Assemblies.

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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.

D146/D146M Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing

D312/D312M Specification for Asphalt Used in Roofing

D449/D449M Specification for Asphalt Used in Dampproofing and Waterproofing

D1079 Terminology Relating to Roofing and Waterproofing

D6136/D6136M Test Method for Kerosine Number of Unsaturated (Dry) Felt by Vacuum Method

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology D1079.

4. Classification

4.1 Asphalt-saturated felts covered by this specification are of two types:

4.1.1 *Type I*—Commonly called No. 15 asphalt felt.

4.1.2 *Type II*—Commonly called No. 30 asphalt felt.

5. Materials and Manufacture

5.1 In the process of manufacture a single thickness of dry felt shall be saturated with an asphaltic saturant.

5.2 The felt shall be produced principally from organic fibers. The surface of the felt shall be uniform and relatively smooth. Upon splitting or tearing on the bias, the felt shall appear reasonably free of lumps or particles of foreign substances.

6. Physical Requirements

6.1 The material shall conform to the physical requirements prescribed in Table 1 and the dimensions and masses prescribed in Table 2.

6.2 The finished product shall not crack nor be so sticky as to cause tearing or other damage upon being unrolled at temperatures between 10 °C and 60 °C [50 °F and 140 °F].

6.3 Perforated felts shall conform to the same requirements as the plain type but shall also have uniformly spaced perforations.

TABLE 1 Physical Requirements of Asphalt-Saturated Roofing Felt

| | Type I | Type II |
|--|------------------------|------------------------|
| Average breaking strength, min, kN/m [lbf/in.] of width: | | |
| With fiber grain | 5.3 [30] | 7.0 [40] |
| Across fiber grain | 2.6 [15] | 3.5 [20] |
| Pliability at 25 °C [77 °F] | | |
| The ten strips tested shall not crack when bent 90° at a uniform speed over a rounded corner of: | 12.7 mm [½ in.] radius | 19.1 mm [¾ in.] radius |
| Loss on heating at 105 °C [221 °F] for 5 h, max, % | 4 | 4 |

TABLE 2 Dimensions and Masses of Asphalt-Saturated Roofing Felt

| | Type I | Type II |
|---|--|-------------------------|
| Width of roll, mm [in.] | 914 [36] ± 0.7 % or as agreed upon by purchaser and seller | |
| Area of roll, min, m ² [ft ²] | 20.1 [216] or 40.1 [432] ^A | 20.1 [216] ^A |
| Moisture, at point of manufacture, max % ^B | 4.3 | 4.1 |
| Net mass of saturated felt, min, g/m ² [lb./100 ft ²] | 560 [11.5] | 1270 [26] |
| Mass of saturant, min, g/m ² [lb./100 ft ²] ^C | 303 [6.2] | 732 [15.0] |
| Mass of desaturated felt, min, g/m ² [lb./100 ft ²] | 254 [5.2] | 488 [10.0] |
| Ash, max, % | 10.0 | 10.0 |
| Perforated felt, avg, area of individual hole, max, mm ² [in. ²] | 32 [0.05] | ... |
| Average venting area, min, % | 0.1 | ... |

^A Other areas as agreed upon by purchaser and seller.

^B At time of manufacture. Products with a higher moisture content at the time of installation may cause hot materials to foam, creating voids that may result in blisters.

^C The mass of saturant shall not be less than 1.2 times the mass of the dry felt for Type I with a saturation efficiency of not less than 70 %. The mass of the saturant shall not be less than 1.50 times the mass of dry felt for Type II.

7. Workmanship, Finish, and Appearance

7.1 The felt shall be thoroughly and uniformly saturated, and shall show no unsaturated spots at any point upon cutting 50 mm [2 in.] wide strips at random across the entire sheet and splitting them open for their full length.

7.2 The surface of the felt shall not be coated or covered with talc or other substance that would tend to interfere with adhesion between the felt and plying cement or bitumen.

7.3 The finished material shall be free of visible external defects, such as holes, ragged or untrue edges, breaks, cracks, tears, protuberances and indentations, except for intentionally provided perforations and the associated protuberances.

7.4 Laying lines are not prohibited in the manufacture of felts. Laying lines when applied to the felts shall be clearly visible during application of the roof, and spaced at appropriate distances apart to provide for application of built-up roofs with an appropriate number of plies.

7.4.1 When laying lines are used, the position of the laying lines measured from the edge of the sheet to the center of the line shall not deviate more than 6 mm [¼ in.] from the positions specified by the manufacturer to provide the appropriate number of plies on the roof.

8. Sampling and Test Methods

8.1 Sample the material and determine the properties enumerated in this specification in accordance with Test Methods **D146/D146M**.

8.2 Determine the openness of the perforations in saturated felts by the following method:

8.2.1 Cut three adjacent 305 mm [12 in.] ± 0.5 % square specimens across the width of the felt. Determine the number of perforations per specimen by multiplying the number of perforations per row by the number of rows. Correct for

differences when rows are off-set from each other. Calculate the average number of perforations per specimen, P .

8.2.2 Place the specimen on a sheet of white paper with the smoother side up (side from which the needling or perforating device enters the felt). Use a 50 mm [2 in.] wide natural or nylon bristle paint brush to apply uniformly 15 cm³ to 20 cm³ [1 in.³ to 1¼ in.³] of SAE No. 10 or 10 W grade motor oil to each specimen. Apply the oil with smooth strokes and without undue pressure on the brush. Complete the initial application in 1 min and continue to brush out the oil on the surface for an additional minute.

8.2.3 Lift the perforated felt from the paper upon completion of brushing and count the oil spots showing on the white paper beneath as open perforations. Calculate the percent of open holes, H , on the basis of the total number of holes determined in 8.2.1. Average the results of three determinations and report.

8.2.4 Measure the size of the perforations using an optical comparator. If round, record diameter of the holes. If square or rectangular, record appropriate dimensions. Calculate the average area, A , of the perforations.

8.2.5 Determine the average venting area as follows:

$$V = \frac{P \times A \times H}{S} \quad (1)$$

where:

- V = vented area, %,
- P = average number of perforations per specimen,
- A = average area at one hole, mm² [in.²],
- H = average open holes, %, and
- S = average specimen area, mm² [in.²].

8.2.6 No statement is made about either the precision or the bias of this method of determining the openness of the perforations in saturated felts since the result merely states