



Designation: D226/D226M – 17

# Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing<sup>1</sup>

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 and health 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:*<sup>2</sup>

[D70 Test Method for Density of Semi-Solid Bituminous Materials \(Pycnometer Method\)](#)

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee [D08](#) on Roofing and Waterproofing and is the direct responsibility of Subcommittee [D08.04](#) on Felts, Fabrics and Bituminous Sheet Materials.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto: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 and 60°C [50 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 <sup>2</sup> [ft <sup>2</sup> ]	20.1 [216] or 40.1 [432] <sup>A</sup>	20.1 [216] <sup>A</sup>
Moisture, at point of manufacture, max % <sup>B</sup>	4.3	4.1
Net mass of saturated felt, min, g/m <sup>2</sup> [lb/100 ft <sup>2</sup> ]	560 [11.5]	1270 [26]
Mass of saturant, min, g/m <sup>2</sup> [lb/100 ft <sup>2</sup> ] <sup>C</sup>	303 [6.2]	732 [15.0]
Mass of desaturated felt, min, g/m <sup>2</sup> [lb/100 ft <sup>2</sup> ]	254 [5.2]	488 [10.0]
Ash, max, %	10.0	10.0
Perforated felt, avg, area of individual hole, max, mm <sup>2</sup> [in. <sup>2</sup> ]	32 [0.05]	...
Average venting area, min, %	0.1	...

<sup>A</sup> Other areas as agreed upon by purchaser and seller.

<sup>B</sup> 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.

<sup>C</sup> 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 to 20 cm<sup>3</sup> [1 to 1¼ in.<sup>3</sup>] of SAE No. 10 or 10W 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, mm<sup>2</sup> [in.<sup>2</sup>],  
 $H$  = average open holes, %, and  
 $S$  = average specimen area, mm<sup>2</sup> [in.<sup>2</sup>].

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

whether there is conformance to the criteria for success specified in the procedure.

8.3 Determine the saturation percent and saturation efficiency by the following method:

8.3.1 Calculate the percent saturation by dividing the mass of the saturant by the mass of the desaturated (dry) felt, and multiply the result by 100.

8.3.2 Determine the kerosine number of the desaturated (dry) felt in accordance with Test Method **D6136/D6136M**.

8.3.3 Calculate the saturation efficiency by dividing the percent saturation of the product by the kerosine number times the specific gravity of the saturant, and multiply the result by 100. A suitable method for determining the specific gravity of bitumen is Test Method **D70**.

8.3.4 The precision and bias of this method for measuring kerosine value are as specified in Test Method **D6136/D6136M**.

## **9. Inspection**

9.1 *Inspection*—Inspection shall be in accordance with the requirements of this specification.

9.2 *Inspection Alternatives*—Alternative inspection requirements shall be determined by and as agreed upon between the purchaser and the supplier.

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## **10. Rejection and Resubmittal**

10.1 *Failure to Conform*—Failure to conform to any of the requirements as stated in this specification constitutes grounds for rejection.

10.2 *Rejection Redress*—The supplier shall have the right to inspect the rejected materials. The supplier and the purchaser shall agree to the quantity of rolls deemed unacceptable. The supplier shall then have the right to submit the same number of new rolls as replacement.

## **11. Packaging and Package Marking**

11.1 Unless otherwise agreed upon between the supplier and purchaser, each product package shall be plainly marked with the supplier's name, the product brand, the ASTM designation, and type of bitumen if not evident in the label name of the product.

11.2 The rolls shall be securely wrapped or banded in a manner that completely encircles the roll and will prevent slipping or unrolling.

11.3 No roll shall contain more than two pieces, and no more than 3 % of the rolls in any lot shall contain two pieces. If a roll contains a manufacturing splice, the splice shall be clearly marked.

## **12. Keywords**

12.1 asphalt; built-up roofs; organic felt; waterproofing