



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

This standard is issued under the fixed designation D 4869; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—Keywords were added in May 1993.

## 1. Scope

1.1 This specification covers asphalt-saturated organic felt shingle underlayment for use as an underlayment with asphalt shingles.

1.2 The values stated in inch-pound units are to be regarded as 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 problems, 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 146 Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing<sup>2</sup>

D 1079 Terminology Relating to Roofing, Waterproofing, and Bituminous Materials<sup>2</sup>

D 1922 Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method<sup>3</sup>

E 96 Test Methods for Water Vapor Transmission of Materials<sup>4</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology D 1079.

## 4. Classification

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

4.1.1 *Type I*—Shingle Underlayment, and

4.1.2 *Type II*—Heavy Duty Shingle Underlayment.

## 5. Materials and Manufacture

5.1 In the process of manufacture, a single thickness of organic dry felt shall be uniformly 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 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 50 and 140°F (10 and 60°C).

6.3 The finished product shall pass the water shower exposure test described in 8.3, indicating resistance to liquid water transmission.

## 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 2-in. (50-mm) wide strips at random across the entire sheet and splitting them open for their full length.

7.2 The saturated felt may be surfaced lightly on one side with talc or other finely comminuted mineral material to prevent sticking in the roll.

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.

## 8. Sampling and Test Method

8.1 Sample the material and determine the properties enumerated in this specification in accordance with Test Methods D 146, E 96 (Procedure A), and D1922.

8.2 Determine the saturation percent by dividing the mass of the saturant by the mass of the desaturated (dry) felt, and multiply by 100.

8.3 Determine the resistance to liquid water transmission by the following test method:

8.3.1 *Scope*—The purpose of this test method is to indicate the resistance of the material to transmission of liquid water

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.04.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 08.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.06.

TABLE 1 Physical Requirements

	Type I	Type II
Tear strength, min, 77 ± 2°F (25 ± 1°C) lbf (N) (in any direction)	0.44 lbf (2 N)	0.88 lbf (4 N)
Pliability at 77 ± 2°F (25 ± 1°C), the ten strips tested shall not crack when bent 90° at a uniform speed over a rounded corner of radius	0.50 in. (12.7 mm)	0.75 in. (19.1 mm)
Loss on heating at 221°F (105°C) for 5 h, max, %	4	4
Water vapor transmission, min, permance, perm, (ng·Pa <sup>-1</sup> ·s <sup>-1</sup> ·m <sup>-2</sup> )	5 (287)	3 (172)
Liquid water transmission test	Pass	Pass

TABLE 2 Dimensions and Masses

	Type I	Type II
Width of the roll, in. (mm)	36 (914) ± 0.7 % <sup>A</sup>	36 (914) ± 0.7 % <sup>A</sup>
Area of the roll, min, ft <sup>2</sup> (m <sup>2</sup> )	432 (40.13) <sup>A</sup>	432 (40.13) <sup>A</sup>
Net mass of saturated felt, min, lb/100 ft <sup>2</sup> (g/m <sup>2</sup> )	8.0 (390)	20.0 (976)
Mass of saturant, min, lb/100 ft <sup>2</sup> (g/m <sup>2</sup> )	4 (195)	10.8 (527)
Mass of desaturated felt, min, lb/100 ft <sup>2</sup> (g/m <sup>2</sup> )	4.0 (195)	9.0 (439)
Ash, max, desaturated felt mass, %	10.0	10.0
Saturation, min, %	100.0	120.0
Moisture, %, max, at time of manufacture	2.0	2.0

<sup>A</sup> Or as agreed upon between purchaser and seller.

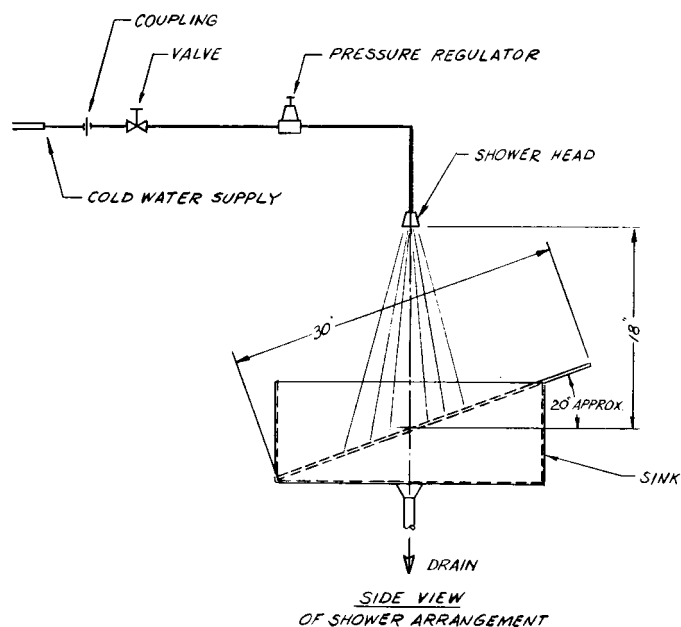


FIG. 1 Water Shower Exposure Test for Shingle Underlayment

and visible deterioration by observation of the material after a water shower is impinged for 4 h on an inclined plane typical of a low-slope shingle roof deck.

8.3.2 *Significance and Use*—This test method measures the ability of the shingle underlayment to resist the transmission of liquid water and visible deterioration by the action of water and, hence, function as intended. A function of shingle underlayment is to provide secondary protection to the deck and underlying structure by shielding these components from rain water which may be driven under the shingles by wind. A knowledge of the resistance of shingle underlayment to liquid water transmission is important to the assessment of its suitability for use as a secondary protective layer beneath roofing shingles.

8.3.3 *Apparatus*—The water exposure tester consists of the following components (see Fig. 1):

8.3.3.1 *One 1/2-in. IPS Connection Shower Head*,<sup>5</sup> mounted above sink. The head should be capable of providing a heavy shower as described below.

8.3.3.2 *Cold, 40 to 80°F (5 to 27°C), Tap Water* supply to the shower and appropriate sink and drain to collect water run off.

8.3.3.3 *Stopwatch, 5-gal (20-L) pail, and volumetric measuring vessel.*

8.3.3.4 *3/8-in. plywood, 15 by 30-in. (380 by 760-mm), for test specimen support.*

8.3.4 *Procedure:*

8.3.4.1 Mount each single thickness sheet specimen on a plywood board by overlapping and folding over all edges and stapling the specimen on the back of the board. Take care to ensure that the staples do not protrude at the front surface of the plywood board so as not to puncture the test specimen.

8.3.4.2 After sample preparation, condition the board at 70 to 80°F (21 to 27°C) and 30 to 55 % relative humidity for 24 h prior to testing.

8.3.4.3 Position the test board in the sink at a 20° incline with the shower head directly overhead and 18 in. (460 mm) above the center of the test board. The shower should impinge an area of approximately 10 to 12 in. (250 to 300 mm) in diameter.

8.3.4.4 Open the water supply to the shower head and adjust the flow regulator to provide a flow of 40 to 42 gal/h (42 to 44 cm<sup>3</sup>/s). Calibrate the volume of water by collecting the shower output in a 5-gal (20-L) pail for 1 min and then measure in a measuring vessel. Run the water shower for 4 h.

8.3.4.5 At the end of the test period, shut off the water supply and wipe the surface and edges of the test board free of excess dripping water.

8.3.4.6 Using a sharp knife, carefully cut the three edges of the specimen on the board to avoid accidental wetting of the back surface of the test specimen. Then turn over the specimen and inspect for any sign of wetness on the underside. Also inspect the top of the plywood board for wetness. Inspect the specimen for any visible signs of deterioration by the action of water.

8.3.4.7 Test two specimens from each roll of product as above to determine compliance with this test requirement.

8.3.5 *Results*—Liquid water transmission or nontransmission or evidence of visible deterioration in this test is expressed as follows:

Pass	No sign of any liquid water wetness on either specimen underside or top of plywood support or visible deterioration of the specimen.
Fail	Any sign of liquid water wetness on either specimen underside or top of plywood support or visible deterioration of the specimen.

8.3.6 *Precision and Bias*—No statement is made about either the precision or bias of this test method of measuring resistance to liquid water transmission since the result merely

<sup>5</sup> Part Number 1766, available from Keystone Franklin, Inc., Fort Washington, PA, or equivalent, has been found satisfactory for this purpose.

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

## **9. Inspection**

9.1 Inspection of the material shall be made as agreed upon between the purchaser and the supplier as a part of the purchase contract.

## **10. Rejection and Resubmittal**

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

## **11. Packaging and Marking**

11.1 The rolls shall be securely wrapped or banded with material which completely encircles the roll in a manner that will prevent slipping.

11.2 No roll shall contain more than two pieces, and no more than 3 % of the rolls in any lot shall contain two pieces.

11.3 Unless otherwise specified, each package shall be plainly marked with the manufacturer's name, brand name, ASTM designation, and type of bitumen if not evident in the label name of the product.

## **12. Keywords**

12.1 asphalt-saturated felt; roofing; shingle underlayment; waterproofing

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