



# Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs<sup>1</sup>

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## 1. Scope

1.1 This specification covers bituminous water vapor retarders for use in contact or granular fill under concrete slabs.

1.2 The specified tests are conducted on new materials and materials that have been conditioned or exposed to simulate potential service conditions.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- C 168 Terminology Relating to Thermal Insulating Materials<sup>2</sup>
- D 828 Test Method for Tensile Breaking Strength of Paper and Paperboard<sup>3</sup>
- D 1790 Test Methods for Brittleness Temperature of Plastic Sheeting by Impact<sup>4</sup>
- D 1985 Practice for Preparing Concrete Blocks for Testing Sealants for Joints and Crack Fillers<sup>5</sup>
- D 5147 Test Methods for Sampling and Testing Modified Bituminous Sheet Material<sup>6</sup>
- E 96 Test Methods for Water Vapor Transmission of Materials<sup>2</sup>
- E 154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs or Walls or as Ground Cover<sup>7</sup>
- E 631 Terminology for Building Constructions<sup>7</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 For definitions of terms used in this specification, see Terminologies C 168 and E 631.

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

3.2.1 *perm, n*—the time rate of water vapor migration through a material or a construction of one grain per hour, square foot, inch of mercury pressure difference.

3.2.1.1 *Discussion*—If a specification states that a one perm limit is required, the same flow rate will be obtained from the following relationships<sup>8</sup>:

1 perm	= 1 grain/(h · ft <sup>2</sup> · in Hg)	inch pound
	= 57.2 10 <sup>-12</sup> kg/(Pa · s · m <sup>2</sup> )	SI Fundamental Units
	= 57.2 ng/(Pa · s · m <sup>2</sup> )	SI Frequently Used
	= 0.66 g/24h · m <sup>2</sup> · mm Hg	SI has been used but is now obsolete

3.2.2 *vapor retarded, n*—(formally vapor barrier) a material or construction that impedes the transmission of water vapor under specified conditions.

3.2.3 *water vapor permeability, n*—a property of material which is water vapor permeance through unit thickness. Since materials that provide resistance to vapor flow are never used in unit thickness, the evaluation of both materials and constructions used herein is permeance.

## 4. Sampling

4.1 Each sampling shall consist of sufficient material to provide at least five specimens for the tests listed in Section 7.

## 5. Specifying Information

5.1 Specification for materials shall include the following:

5.1.1 This specification number, and

5.1.2 Performance requirements, if any, for special conditions (see 7.6).

## 6. Lap Sealing

6.1 This producer shall provide supplier/seller/installer with instructions for lap sealing, including minimum width of lap, method of sealing, and shall either supply or recommend specified suitable products for lap sealing.

## 7. Properties

7.1 The bituminous membrane water vapor retarder shall consist of asphaltic materials reinforced with multiple plies of suitable fabric. The bituminous vapor retarder shall meet the requirements listed in Table 1 as well as those outlined below.

7.2 *Permeance*—Material, including lap seals, shall conform to the requirements listed in Table 1 under the following conditions when tested according to Test Methods E 154,

<sup>8</sup> See 3.2.3 of Test Method E 154. This conversion is based on a temperature of 0°C (32°F) and not on an environmental temperature of 23°C (73.4°F).

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<sup>2</sup> Annual Book of ASTM Standards, Vol 04.06.

<sup>3</sup> Annual Book of ASTM Standards, Vol 15.09.

<sup>4</sup> Annual Book of ASTM Standards, Vol 08.01.

<sup>5</sup> Annual Book of ASTM Standards, Vol 04.03.

<sup>6</sup> Annual Book of ASTM Standards, Vol 04.04.

<sup>7</sup> Annual Book of ASTM Standards, Vol 04.11.

**TABLE 1 Property Requirements**

Property	Test Method and Section	Inch-Pound Units	SI Units
Water vapor permeance, as is material or new material, max	E 154, Section 7	0.002 perms	0.1 ng/Pa-s-m <sup>2</sup>
Water vapor permeance, after wetting, drying, and soaking, max	E 154, Section 8	0.002 perms	0.1 ng/Pa-s-m <sup>2</sup>
Water vapor permeance after testing for resistance to deterioration from organisms and substances in contacting soil, max	E 154, Section 13	0.20 perms	11 ng/Pa-s-m <sup>2</sup>
Tensile strength, min	E 154, Section 9	140 lbs, force/in.	24.5 kN/m
Puncture resistance: ASTM E 154; min	E 154, Section 10	90 lbs Force	400 N
Puncture resistance; Test Method D 1709, min	D 1790	no inch-pound equivalent used	600 g

Section 7 (based on Test Methods E 96). Laboratory conditions for temperature shall be  $23 \pm 1^\circ\text{C}$  ( $73.4 \pm 1.8^\circ\text{F}$ ) and test humidity shall be  $50 \pm 2\%$ .

7.2.1 Permeance of new material.

7.2.2 *Permeance after Wetting, Drying and Soaking*—Refer to Section 8 of Test Method E 154.

7.2.3 *Permeance after Testing for Resistance to Deterioration from Organisms and Substance in Contacting Soil*—See Section 13 of Test Method E 154.

7.3 *Tensile Strength of New Material*—Refer to Section 9 of Test Method E 154. The apparatus is described in Test Method D 828. Results shall comply with Table 1.

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7.4 *Resistance to Puncture of New Material*—Results shall comply with Table 1.

7.4.1 The apparatus is described in 10.2.1 of Test Method E 154.

7.4.2 See Method B of Test Method D 1709.

7.5 Determine the thickness of the specimen using vernier calipers in accordance with Section 5 of Test Method D 5147.

7.6 When specifically required by the buyer for special conditions that require properties of high temperature, low temperature, or deterioration from petroleum, vehicle, or soil poisons, the material shall be tested to the following:

7.6.1 *Resistance to Plastic Flow and Elevated Temperature*—See Section 11 of Test Method E 154.

7.6.2 *Effect of Low Temperature on Bending*—See Section 12 of Test Method E 154.

7.6.3 *Resistance to Deterioration from Petroleum Vehicle for Soil Poisons*—See Section 14 of Test Method E 154.

7.6.4 *Resistance to Deterioration from Exposure to Ultra-violet Light*—See Section 15 of Test Method E 154.

## 8. Certification

8.1 When supplied in the purchase order or contract, the purchaser shall be furnished with certification that samples representing each lot have been tested or inspected as directed in this specification and that requirements have been met.

8.2 When supplied in the purchase order or contract, the producer or supplier shall furnish a summary of the test procedures listed in Table 1, supplier shall furnish a summary of the test procedures listed in Table 1, providing for each test the laboratory that performed or witnessed the test, the date of the most recent test, and the test results.

## 9. Keywords

9.1 bituminous; concrete; concrete slab; floor; vapor retarder; water vapor