



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

This standard is issued under the fixed designation E1993/E1993M; 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.

<sup>ε1</sup> NOTE—Units information was editorially corrected in May 2013.

## 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.

1.3 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.

1.4 *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:<sup>2</sup>

- [C168 Terminology Relating to Thermal Insulation](#)
- [D828 Test Method for Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus \(Withdrawn 2009\)<sup>3</sup>](#)
- [D1790 Test Method for Brittleness Temperature of Plastic Sheeting by Impact](#)
- [D5147/D5147M Test Methods for Sampling and Testing Modified Bituminous Sheet Material](#)

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and are the direct responsibility of Subcommittee E06.21 on Serviceability.

Current edition approved April 1, 2013. Published May 2013. Originally approved in 1998. Last previous edition approved in 2008 as E1993 – 98 (2008). DOI: 10.1520/E1993\_E1993M-98R13E01.

<sup>2</sup> 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.

<sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.

- [E96/E96M Test Methods for Water Vapor Transmission of Materials](#)
- [E154/E154M Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover](#)
- [E631 Terminology of Building Constructions](#)

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, see Terminologies [C168](#) and [E631](#).

### 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>4</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 retarder, 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

<sup>4</sup> See 3.2.3 of Test Methods [E154/E154M](#). This conversion is based on a temperature of 0°C [32°F] and not on an environmental temperature of 23°C [73.4°F].

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 E154/E154M, Section 7 (based on Test Methods E96/E96M). 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 Methods E154/E154M.

7.2.3 *Permeance after Testing for Resistance to Deterioration from Organisms and Substances in Contacting Soil*—See Section 13 of Test Methods E154/E154M.

7.3 *Tensile Strength of New Material*—Refer to Section 9 of Test Methods E154/E154M. The apparatus is described in Test Method D828. Results shall comply with Table 1.

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 Methods E154/E154M.

7.4.2 See Method B of Test Method D1790.

7.5 Determine the thickness of the specimen using vernier calipers in accordance with Section 5 of Test Methods D5147/D5147M.

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 Methods E154/E154M.

7.6.2 *Effect of Low Temperature on Bending*—See Section 12 of Test Methods E154/E154M.

7.6.3 *Resistance to Deterioration from Petroleum Vehicles for Soil Poisons*—See Section 14 of Test Methods E154/E154M.

7.6.4 *Resistance to Deterioration from Exposure to Ultraviolet Light*—See Section 15 of Test Methods E154/E154M.

**TABLE 1 Property Requirements**

Property	Test Methods and Sections	SI Units	Inch-Pound Units
Water vapor permeance, as is material or new material, max	E154/E154M, Section 7	0.1 ng/Pa·s·m <sup>2</sup>	[0.002 perms]
Water vapor permeance, after wetting, drying, and soaking, max	E154/E154M, Section 8	0.1 ng/Pa·s·m <sup>2</sup>	[0.002 perms]
Water vapor permeance after testing for resistance to deterioration from organisms and substances in contacting soil, max	E154/E154M, Section 13	11 ng/Pa·s·m <sup>2</sup>	[0.20 perms]
Tensile strength, min	E154/E154M, Section 9	24.5 kN/m	[140 lbs, force/in.]
Puncture resistance: Test Methods E154/E154M; min	E154/E154M, Section 10	400 N	[90 lbs Force]
Puncture resistance; Test Method D1790, min	D1790	600 g	no inch-pound equivalent used

## 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 contact, 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

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