



Designation: ~~E1745–11~~ E1745–17

Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs¹

This standard is issued under the fixed designation E1745; 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.

1. Scope

1.1 This specification covers flexible, preformed sheet membrane materials to be used as vapor retarders in contact with soil or granular fill under concrete slabs.

1.1.1 This specification does not cover bituminous vapor retarders. See Specification ~~E1993~~E1993/~~E1993M~~ for information on bituminous vapor retarders.

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 inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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

~~C168~~ Terminology Relating to Thermal Insulation

~~D828~~ Test Method for Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus

~~D882~~ Test Method for Tensile Properties of Thin Plastic Sheeting

~~D1709~~ Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method

~~E96~~/~~E96M~~ Test Methods for Water Vapor Transmission of Materials

~~E154~~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

~~E1643~~ Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

~~E1993~~E1993/E1993M Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs

~~F1249~~ Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor

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.

¹ This specification is under the jurisdiction of ASTM Committee ~~E06~~ on Performance of Buildings and is the direct responsibility of Subcommittee ~~E06.21~~ on Serviceability.

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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~~ standard's Document Summary page on the ASTM website.

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:

1 perm	=	1 grain/h · ft ² in. · Hg (inch-pound)
	=	57.2 10 ⁻¹² kg/(Pa · s · m ²) (SI fundamental units)
	=	57.2 ng/(Pa · s · m ²) (SI frequently used)
	=	0.66 g/24 h · m ² · mm Hg (SI has been used but is now obsolete)

3.2.2 *vapor retarder, n*—(formerly 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 preferred evaluation of both materials and constructions is the permeance.

3.2.4 *water-vapor permeance, n*—the time rate of water vapor flow through unit area of the known thickness of a flat material or a construction normal to two specific parallel surfaces induced by unit vapor pressure difference between the two surfaces under specific temperature and humidity conditions. See *perm*.

4. Classification

4.1 Materials shall be specified to conform to one of these three classes: A, B, or C, or specific requirements shall be specified in one or more of the properties listed in **Table 1**.

5. Specifying Information

5.1 Specifications for materials shall include the following:

5.1.1 This specification number.

5.1.2 Class A, B, or C, or alternatively, specific performance requirements for each of the properties listed in **Table 1**.

5.1.3 Performance requirements, if any, for special conditions (see **7.37.4**).

5.1.4 Execution or installation requirements with reference to Practice **E1643**.

6. Lap Sealing

6.1 The producer shall provide instructions for lap sealing, including minimum width of lap, method of sealing, and either supply or specify suitable products for lap sealing.

TABLE 1 Properties for Specified Performance Classes^A

	Class A		Class B		Class C	
	IP Units	SI Units	IP Units	SI Units	IP Units	SI Units
Water vapor permeance	0.1 perms		0.1 perms		0.1 perms	
(Test Methods E154 , Section 7, or Test Method F1249), max	(0.1 gr/[h·ft ² ·in.·Hg])	(6 ng/[s·m ² ·Pa])	(0.1 gr/[h·ft ² ·in.·Hg])	(6 ng/[s·m ² ·Pa])	(0.1 gr/[h·ft ² ·in.·Hg])	(6 ng/[s·m ² ·Pa])
(Test Methods E154/E154M , Section 7, or Test Method F1249), max	(0.1 gr/[h·ft ² ·in.·Hg])	(6 ng/[s·m ² ·Pa])	(0.1 gr/[h·ft ² ·in.·Hg])	(6 ng/[s·m ² ·Pa])	(0.1 gr/[h·ft ² ·in.·Hg])	(6 ng/[s·m ² ·Pa])
Tensile strength (Test Methods E154 , Section 9), ^B min	45.0 lbf/in.	7.9 kN/m	30.0 lbf/in.	5.3 kN/m	13.6 lbf/in.	2.4 kN/m
Tensile strength (Test Methods E154/E154M , Section 9), ^B min	45.0 lbf/in.	7.9 kN/m	30.0 lbf/in.	5.3 kN/m	13.6 lbf/in.	2.4 kN/m
Puncture resistance (Test Methods D1709 , Test Method B), min	no inch-pound equivalent used	2200 g	no inch-pound equivalent used	1700 g	no inch-pound equivalent used	475 g

^A Refer to Practice **E1643** for assessing suitability of use based on reported perm rating of material.

^B Tensile strength per unit width for the total sample thickness is used instead of tensile strength per unit area because vapor retarder materials are never used in unit thickness.