

Standard for Air Barrier Material - Mechanically Fastened Engineered Polymer Film - Material Specification

1. Scope

1.1 This document provides the material property requirements and test methods to determine these properties for mechanically fastened engineered polymer film air barrier material that is used in building assemblies, whether installed on a building site or in a prefabrication facility.

1.2 The test methods listed in this document are used to determine the material property values. These values are intended for use in specifications, product evaluations and quality control. They are not intended to predict in situ end-use product performance.

1.3 This document is limited to flexible sheet film materials which are intended to be mechanically attached and are generally installed in the interior of a building in cold climates but not limited to that application. This document does not include material requirements for using this material in a water resistive barrier application.

1.4 This material does not withstand the loads applied to an air barrier system and therefore is intended to be supported on both sides.

1.5 This document is limited to determining the properties of a material only and does not address installed performance. Although the fastening practices (type of fastener, fastening schedule, etc.) may affect the installed function of these materials, the installed performance is not covered by this document.

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

1.7 The testing and evaluation of a product against this document may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this document has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any existing applicable regulatory requirements prior to its use.

2. Referenced Documents

The documents shown below are referenced in the text of this document. Unless otherwise stated elsewhere in this document such reference shall be considered to indicate the edition and/or revisions of the document available at the date on which the Committee approved this document.

Documents Published by the American Society for Testing and Materials (ASTM)
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ASTM C390, Standard Practice for Sampling and Acceptance of Thermal Insulation Lots

ASTM C1338, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facing

ASTM D543, Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents

ASTM D1005, Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers

ASTM D1790, Standard Test Method for Brittleness Temperature of Plastic Sheeting by Impact

ASTM D4073, Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes

ASTM D4272, Standard Test Method for Total Energy Impact of Plastic Films by Dart Drop

ASTM D4932, Standard Test Method for Fastener Rupture and Tear resistance of Roofing and Waterproofing Sheets, Roll Roofing and Shingles

ASTM D5034, Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials

ASTM E631, Terminology of Building Constructions

ASTM E2178, Standard Test Method for Air Permeance of Building Materials

ASTM E2556, Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

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

3. Terminology

3.1 For definitions of general terms related to building construction used in this document, refer to ASTM E631 Terminology of Building Constructions. No specific definitions or symbols outside of ASTM E631 are used in this document.

4. Requirements

4.1 General

4.1.1 This engineered polymer film air barrier material is intended to be used as the primary air barrier material to create a plane of airtightness in the building envelope. The film shall be free of holes, cuts or other defects that may compromise the maximum desired air leakage rate.

4.1.2 The supplier shall provide specific installation instructions for this material to be used in an air barrier application which will withstand the anticipated loads imposed both positive and negative.

4.2 Detailed requirements

4.2.1 Engineered polymer film air barrier material shall meet the physical properties values specified in Table 1.

4.3 Health and Safety requirements

4.3.1 The supplier shall ensure that the material covered by this document shall not present any known health hazards to installers or the occupants of buildings.

4.3.2 The supplier's installation instructions shall ensure that the material does not present any health and safety hazards either during the installation process or to the occupants after installation.

5. Sampling

5.1 The accredited testing laboratory determining compliance to this document shall be responsible for the random sampling of the material. Sampling shall be performed in accordance with the principles of ASTM C390. The organization shall select enough rolls on a single occasion from a single lot to complete all testing required by this document.

6. Sample Panels

6.1 Sample panels of the material shall be either the full rolls or panels cut from the rolls that were selected.

7. Conditioning of Sample Panels

7.1 Unless otherwise specified, sample panels / rolls shall be conditioned for 48 hours at a temperature of 23 ± 2 °C (73 ± 4 °F) and relative humidity of 50 ± 5 %.

8. Preparation of Specimens

8.1 Unless otherwise specified in the test method, the specimens shall be cut from the sample panels/rolls to the size required for the testing equipment. Unless specified otherwise, specimens shall be the standard thickness produced.

8.2 The specimens shall be cut from the interior of the sample roll so that no specimen edge is nearer than 75 mm (3 in.) to the original sample edge.

9. Test Methods

9.1 Air Leakage Rate

9.1.1 The air leakage of the material shall be determined in accordance with ASTM E2178 using five specimens with minimum dimensions of 1200 mm x 1200 mm x manufactured thickness (48 inch x 48 inch x manufactured thickness).

9.1.2 The results shall be reported as the average of the five specimens.

9.2 Chemical Resistance

9.2.1 The chemical resistance of the material shall be determined in accordance with ASTM D543 using three specimens.

9.2.2 The results shall be reported as the average of the three specimens.

9.3 Elongation

9.3.1 The elongation of the material shall be determined in accordance with ASTM D5034 using three specimens.

9.3.2 The results shall be reported as the average of the three specimens.

9.4 Fastener Air Leakage

9.4.1 The fastener air leakage shall be determined in accordance with ASTM E2178 as follows. The specimen shall be prepared by constructing a wood frame having outermost dimensions of 1200 mm by 1200 mm (48 inches by 48 inches), made of wood studs and plates with four studs: one on each end and two spaced equidistant between. A 6 mm ($\frac{1}{4}$ inch) gypsum material shall be installed on the

wood frame and fastened with drywall screws at the perimeter only and in such a manner that the locations of the perimeter fasteners will be covered within the perimeter seal of the test apparatus – not contributing to the measured air leakage of the test specimen. The edges of the frame and material shall be sealed so that the air can only go through the fastened material.

9.4.2 Install the engineered polymer film over the gypsum board fastening at the outer perimeter only. Determine the extraneous leakage in accordance with ASTM E2178 as well as the total leakage of the “unfastened” material.

9.4.3 Once the extraneous leakage and total leakage are determined and without disrupting the test specimen or its mounting in the apparatus, install seven rows (rows on the stud and rows between the studs) of 12 mm (1/2 inch) staples into the gypsum panel test, spaced 150 mm (6 inch) apart.

9.4.4 Conduct the test in accordance with ASTM E2178 to determine the assembly leakage with the fasteners installed.

9.4.5 The results shall be reported as the difference between the average of the five specimens tested before and tested after the installation of fasteners.

9.5 Fastener Pull Resistance

9.5.1 The fastener pull resistance (rupture) shall be determined in accordance with ASTM D4932. The fasteners used shall be according to the manufacturer’s installation instructions.

9.5.2 The results shall be reported as an average of the five specimens.

9.6 Fungi Resistance

9.6.1 The fungi resistance of the material shall be determined in accordance with ASTM C1338 using three specimens.

9.6.2 The results shall be reported as the average of the three specimens.

9.7 Impact Resistance

9.7.1 The impact resistance shall be determined in accordance with ASTM D4272 using three specimens.

9.7.2 The results shall be reported as an average of the three specimens.

9.8 Material Aging

9.8.1 The UV aging shall be determined in accordance with ASTM E2556 Section A1.2. Specimens shall be tested for tensile strength (ASTM D5034) and for air leakage rate (ASTM E2178) before and after aging.

9.8.2 The results shall be reported as an average of the five specimens tested before and after aging.

9.9 Pliability

9.9.1 The pliability shall be determined in accordance with ASTM E2556 Section A1.3 using three specimens.

9.9.2 The results shall be reported as the average of the five specimens.

9.10 Tear Resistance

9.10.1 The tear resistance shall be determined in accordance with D4073 using five specimens, tested in each direction (MD and XMD) except that the rate of jaw separation shall be 50 mm [2.0 inch]/min.

9.10.2 The results shall be reported as the average tear strength of the five specimens for each direction tested.

9.11 Tensile Strength

9.11.1 The tensile strength shall be determined in accordance with ASTM D5034 using five specimens. The material shall be tested in both the MD and XMD using the modified grab (MG) method.

9.11.2 The results shall be reported as the average of the five specimens.

9.12 Thickness

9.12.1 The thickness shall be determined in accordance with ASTM D1005 using three sets of five measurements across the roll.

9.12.2 The results shall be reported as the average of the three sets of measurement.

9.13 Water Vapor Transmission Rate

9.13.1 The water vapor transmission rate of three specimens shall be determined in accordance with both the desiccant method and the water method of ASTM E96 at a temperature of $(23 \pm 2) ^\circ\text{C}$ [$(73 \pm 5) ^\circ\text{F}$].

9.13.2 The results shall be reported as the mean value of the three specimens.

9.13.3 The water vapor transmission rate of three specimens shall be determined in accordance with ASTM F1249 at a temperature of $(23 \pm 2) ^\circ\text{C}$ [$(73 \pm 5) ^\circ\text{F}$]. Four different atmospheres (difference of 35%RH, 50%RH, 60%RH, 80%RH) shall be used for the testing.

9.13.4 The results shall be reported as the mean value of the three specimens.

10. Reporting Requirements

10.1 Test data shall be reported in the form of a table with property, result and pass/fail columns including results for all properties listed in this document followed by a statement on whether the product met the requirements of this document.

10.2 The *supplier* shall allow publication of the results in material evaluation reports or listing of each physical property test required by this document when claiming to meet this document.

10.3 In addition to the report specified in the individual test method reporting section, all reports describing the testing of the material in accordance with this document shall also include the following information:

- a. The *supplier's* name, address, production facility address and product designation;
- b. The type and name of the *material* and other material description;
- c. Lot number and manufactured date;
- d. Sampling information;
- e. Name and location of laboratory performing the tests and the accreditation agency for the laboratory;
- f. Size of specimens used for each test;
- g. Report of all test results according to the test methods;

- h. Summary of measured results compared to the requirements of this document and when applicable, an indication that the property has passed/failed;
- i. Report of the average test result of all specimens tested for each test method, the values reported shall have the same precision as the requirements listed in Table 1;
- j. List in a table the reported results compared to the requirements of this document and state whether that material requirement has either passed or failed;
- k. Declaration of conformity with this document; and
- l. An appendix to the report shall contain the data used to generate the above items.

11. Labeling

11.1 Each package shall be clearly marked with the following information:

- a. Supplier's name;
- b. Product name;
- c. Type of material (e.g. air barrier);
- d. Country of manufacturer; and
- e. Lot number.

12. Supplier Documentation

12.1 The *supplier* shall provide the *contractor*, upon request, with the following:

- a. Description of the material;
- b. Safety data sheet;
- c. Instructions for safe handling, use and disposal of the material;
- d. Properties for the *material*;
- e. Limitations for use of the *material*;

13. Keywords

13.1 air barrier material, polymer film

**TABLE 1
 REQUIREMENTS FOR PHYSICAL PROPERTIES**

Property	Unit	Requirements		Test Method
		Min.	Max.	
Air Leakage Rate	L/(s·m ²) @ 75 Pa CFM/ft ² @ 1.57 psf	- -	0.0200 0.0040	ASTM E2178
Chemical Resistance	-	No pitting or cracking	-	ASTM D543
Elongation	%	600	-	ASTM D5034
Fastener Air Leakage	L/(s·m ²) @ 75 Pa CFM/ft ² @ 1.57 psf	- -	0.100 0.020	ASTM E2178
Fastener Pull Resistance	N lb	4.5 1	- -	ASTM D4932
Fungi Resistance	visual	no mold growth, based on surface area coverage	-	ASTM C1338
Impact Resistance	N lbf	5.6 1.25	- -	ASTM D4272
Material Aging – Air permeance (ASTM E2178 and Tensile Strength (ASTM D5034)	%	-	No greater than 10% difference between before and after	ASTM E2556 Section A1.2
Pliability	visual	No cracking		ASTM E2556 Section A1.3
Tear Resistance	N lb	185 42	- -	ASTM D4073
Tensile Strength	Kpa psi	2.0 0.3	- -	ASTM D5034
Thickness	%	-	±12	ASTM D1005
Water Vapor Transmission Rate – water and desiccant method	ng/(Pa·s·m ²) Perms	Values reported for both methods		ASTM E96
Water Vapor Transmission Rate	ng/(Pa·s·m ²) Perms	Values reported for each atmosphere		ASTM F1249