

Standard for Air and Water Resistive Barriers – Self-Adhered Sheet Membrane, Bitumen Based - Material Specification

1. Scope

1.1 This document provides the material properties, performance requirements for the material properties, and test methods for self-adhered sheet membrane – bitumen based air and water resistive 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 values for the material properties.

1.3 These values are intended for use in specifications, product evaluations, and quality control. They are not intended to predict in situ end-use material performance.

1.4 This document is limited to the characterization of the material and does not address installed performance. The installation procedures required by the manufacturer may affect the material properties' performance.

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

1.6 The testing and evaluation of a material 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

2.1 The following documents are referred to in the text in such a way that some or all their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Documents Published by the Air Barrier Association of America (ABAA)
1600 Boston-Providence Hwy Walpole, MA 02081 U.S.A.
Telephone: (866) 956-5888 Fax: (866) 956-5819
www.airbarrier.org

ABAA T0002, Standard Test Method for Pull-Off Strength of Adhered Air and Water resistive Barriers Using an Adhesion Tester

ABAA T0004, Standard Test Method for Determining Gap Bridging Ability of Air and Water Resistive Barrier Materials

American Association of Textile Chemists and Colorists, AATCC
PO BOX 12215, RESEARCH TRIANGLE PARK NC 27709-2215
Telephone: (919) 549-8141
www.aatcc.org

AATCC TM127, Test Method for Water Resistance: Hydrostatic Pressure

Documents Published by the American Society for Testing and Materials (ASTM)
100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959 U.S.A.
Telephone: (610) 832-9585 Fax: (610) 832-9555
www.astm.org

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

ASTM C1498, Standard Test Method for Hygroscopic Sorption Isotherms of Building Material

ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

ASTM D522/D522M, Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings

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

ASTM D2247, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity

ASTM D3330, Standard Test Method for Peel Adhesion of Pressure Sensitive Tape

ASTM D4073/D4073M, Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes

ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials

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

ASTM E154/E154M Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

ASTM E631 Terminology of Building Constructions

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

ASTM E2485/E2485M, Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings

Documents published by the Environmental Protection Agency
<http://www.ecfr.gov/cgi-bin/textidx?sid=c7836e6ff67e5ad001bcb19ccfd99c1a&node=40:8.0.11.1&rgn=div5#40:8.0.1.1.0.1.1.7>

EPA Method 24—Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

3. Terminology

3.1 For the purposes of this document, the terms and definitions given in ASTM E631 and the following apply.

3.1.1 accredited testing laboratory, n
organization accredited to ISO 17025 by a member of the IAF/ILAC Multilateral Agreement, possessing the necessary competence to test material to the specific test method

3.1.2 air barrier material, n,
primary element that provides a continuous barrier to the movement of air

3.1.3 material, n
self-adhered sheet membrane bitumen based

3.1.4 self-adhered sheet membrane – bitumen based, n
sheet/roll of material with a bitumen adhesive as part of the material that provides the primary resistance to air leakage and water penetration

4. Requirements

4.1 General

4.1.1 The material, independent of a substrate, is intended to create a plane of airtightness and water resistance providing the function of an air barrier material and a water resistive barrier material in a building assembly.

4.2 Detailed

4.2.1 The material shall meet the material property values specified in Table 1.

4.3 Health and Safety requirements

4.3.1 The supplier shall ensure that a Safety Data Sheet (SDS) is available for the material covered by this document. The SDS will include all information required by OSHA and describe any known health hazards to installers or occupants of buildings. The supplier's installation instructions and SDS shall include any personal protection required during the installation process.

5. Sampling

5.1 Sampling shall be conducted by an independent, third party and shall ensure that the sampled product is truly representative of the material for which recognition is being sought. Sampling may be conducted at the location of manufacture, a warehouse or distribution center. The required amount of material required to conduct all of the testing shall be chosen from a single lot.

5.2 Unless otherwise specified, the number of rolls of material shall be left to the discretion of the laboratory determining compliance with this document.

6. Sample Sheets

6.1 For the air leakage rate testing, both material and fasteners, sample sheets of material measuring 1200 mm by 1200 mm (48 inch x 48 inch) shall be cut from the rolls if wide enough, or made by seaming two pieces together with an overlap specified by the manufacturer. For all other testing, sample sheets shall be the width of the material by 1200 mm (48 inch) long.

7. Conditioning of Sample Sheets

7.1 Sample sheets shall be conditioned in accordance with ASTM D618, Procedure A [i.e., 88 h at $(23 \pm 2) ^\circ\text{C}$ [$(73 \pm 5) ^\circ\text{F}$], $(50 \pm 5) \% \text{RH}$] prior to cutting of specimens or before testing for the material properties.

8. Preparation of Specimens

8.1 Unless otherwise specified in the test method, the specimens shall be cut from the sample sheets. When cutting the specimens from sample sheets, the edge of any specimen shall not be less than 50 mm (2 inches) from the edge of the sample sheet except where noted in this document.

9. Test Methods

9.1 Each test shall be conducted with virgin specimens and shall be independent from each other. All tests specimen preparation and all tests shall be conducted in an atmosphere of $(23 \pm 5) ^\circ\text{C}$ [$(73 \pm 9) ^\circ\text{F}$], $(50 \pm 10) \% \text{RH}$

9.2 Air Leakage Rate – Material

9.2.1 The air leakage rate of the material shall be determined in accordance with ASTM E2178.

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

9.3 Air Leakage Rate – Fastener

9.3.1 The fastener air leakage rate shall be determined per ASTM E2178 as follows.

9.3.2 Specimen substrate

9.3.2.1 The substrate shall be prepared by constructing a 16-gauge steel frame having outermost dimensions of 1200 mm by 1200 mm (48 inch by 48 inch), made of steel channels with four steel studs: one on each end and two spaced equidistant between. A 6 mm ($\frac{1}{4}$ inch) paper-faced gypsum material shall be installed on the steel frame. The gypsum shall be fastened with #8 – 40 mm ($1 \frac{1}{2}$ inch) minimum length bugle-head fine-thread self-drilling drywall screws providing at least 4 threads beyond steel substrate and installed $150 \text{ mm} \pm 6 \text{ mm}$ ($6 \text{ inch} \pm \frac{1}{4} \text{ inch}$) on center around 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. Two 12 mm ($\frac{1}{2}$ inch) holes are to be drilled through the gypsum board centered in each of the two stud cavities and spaced equidistance from the top and bottom frames.

9.3.3 Initial Specimen

9.3.3.1 Repair holes per material supplier's recommendations. Install the material over the gypsum board per the supplier's published installation instructions and requirements. Allow the material to cure or dwell if required by the supplier.

9.3.3.2 Per ASTM E2178, conduct, calculate and report the air leakage rate of the Initial Specimen no more than 48 hours after the required cure or dwell time of the material.

9.3.3.3 The results shall be reported as the average of the five specimens

9.3.4 Penetrated Specimen

9.3.4.1 Once the Initial Specimen air leakage rate has been completed, without disrupting the Initial Specimen or its mounting in the apparatus, install 48 screws into the interior framing members per panel equally spaced on the interior framing members in the panel. The screws are to be #12 40 mm ($1 \frac{1}{2}$ inch) minimum length bugle self-drilling screws with 18 to 36 threads per inch providing at least 4 threads beyond steel substrate and

installed $6 \text{ mm} \pm 2 \text{ mm}$ ($\frac{1}{4} \text{ inch} \pm \frac{1}{8} \text{ inch}$) proud of the bottom side of the lowest point of the bugle to the surface of the applied material (see Figure 1 #12 Bugle Self-Drilling Screw).

9.3.4.2 Per ASTM E2178, conduct and calculate the air leakage rate of the Penetrated Specimen within 48 hours of the installation of fasteners.

9.3.4.3 The results shall be reported as the average of the five specimens

9.4 Elongation

9.4.1 The elongation of the material shall be determined in accordance with ASTM D412 Method A Die C using five specimens. The rate of grip separation shall be $500 \pm 5 \text{ mm/min}$ ($20.0 \pm 0.2 \text{ in./min}$).

9.4.2 The results shall be reported as the average of 5 specimens.

9.5 Freeze Thaw Resistance

9.5.1 The freeze-thaw resistance of the material shall be determined in accordance with ASTM E2485 Method A, using five specimens of the material measuring 150 mm by 150 mm (6 inch x 6 inch).

9.5.2 The results of the five specimens shall be reported separately.

9.6 Fungi Resistance

9.6.1 The fungi resistance of the material shall be determined in accordance with ASTM C1338 using three specimens measuring 150 mm x 150 mm (6 inch x 6 inch).

9.6.2 The results for each of the three specimens shall be reported individually as a percentage of fungal growth on the surface area being tested.

9.7 Gap Bridging Ability

9.7.1 The gap bridging ability of the material installed on substrates outlined in the test method shall be determined in accordance with ABAA T0004 using five specimens. The material shall be installed on the substrate in accordance with the manufacturer's published installation instructions.

9.7.2 The test results for each of the five specimens shall be reported individually and shall include the gap size and test temperature.

9.8 Lap Adhesion

9.8.1 The lap adhesion of the material shall be determined in accordance with ASTM D3330 Method B using three specimens per dwell time. Samples shall be prepared according to ASTM D3330 Method B onto steel panels that meet ASTM D3330 Section 6.3. Dwell time shall be 1 hour and 24 hours

9.8.2 The test result of the lap adhesion of the material shall be reported as the average of the three specimens test results.

9.9 Low Temperature Flexibility

9.9.1 The low temperature flexibility of the material shall be determined in accordance with ASTM D522/D522M using three specimens.

9.9.2 Conduct the test using a 13 mm (1/2 inch) diameter mandrel and conduct the test at -26 °C (-15 °F)

9.9.3 The results of the three specimens (any cracking) shall be reported individually for each specimen.

9.10 Peel Adhesion (180 degrees)

9.10.1 The peel adhesion of the material shall be determined in accordance with ASTM D3330 Method A using three specimens per dwell time. Samples shall be prepared according to ASTM D3330 Method A onto steel panels that meet ASTM D3330 Section 6.3. Dwell time shall be 1 hour and 24 hours.

9.10.2 The test result of the peel adhesion of the material to the substrate shall be reported as the average of the three specimens.

9.11 Pull Adhesion

9.11.1 The pull adhesion of the material to a substrate shall be determined in accordance with ABAA T0002. The material shall be installed on three substrates - gypsum board and OSB panel measuring 1 meter by 1 meter (39 inch by 39 inch) and on three 200 mm x 400 mm (8 inch x 16 inch) medium density CMU blocks. A single test requires three pulls. The material shall be cut through, but care shall be taken to not cut into the substrate.

9.11.2 The results shall be reported for each of the three substrates as the average of the three pulls for that substrate.

9.12 Resistance to Puncture

9.12.1 The resistance to puncture of the material shall be determined in accordance with ASTM E154 Section 10 using three specimens.

9.12.2 The result shall be the average of the three specimens.

9.13 Surface Burning Characteristics – Flame Spread Index and Smoke Development Index

9.13.1 The surface burning characteristics of the material shall be determined in accordance with ASTM E84 by conducting two separate tests. The specimens (material and substrate) shall be prepared in accordance with the ASTM E84 test method.

9.13.2 The flame-spread index and smoke development index shall be reported for each test, not averaged together.

9.14 Tear Initiation

9.14.1 The tear initiation of the material shall be determined in accordance with ASTM D4073 using three specimens.

9.14.2 The test result reported shall be the average of the three specimens.

9.15 Volatile Organic Compounds

9.15.1 The volatile organic compounds of the material shall be determined in accordance with EPA Method 24 using three specimens measuring 150 mm by 150 mm (6 inch by 6 inch).

9.15.2 The results of the three specimens shall be reported individually.

9.16 Water Resistance – Hydrostatic Head Test

9.16.1 The water resistance of the material shall be determined in accordance with AATCC TM127 Method B, Option 2, using three specimens with at a constant hydrostatic head of 55 cm (22 inches) for a period of 5 hours.

9.16.2 The result of the material tested shall be reported for each specimen.

9.17 Water Resistance in 100% Relative Humidity

9.17.1 The water resistance of the material shall be determined in accordance with ASTM D2247 using three specimens measuring 100 mm by 150 mm (4 inch x 6 inch) applied to stainless steel matching the peel adhesion requirements.

9.17.2 Specimens shall be placed in the chamber at 15° from vertical and exposed to (38±2) °C and (98+2) %RH for 14 days.

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

9.18 Hygroscopic Sorption Isotherms – Equilibrium Moisture Content by Weight

9.18.1 The water vapor adsorption and equilibrium moisture content by weight of the material shall be determined in accordance with ASTM C1498 using three specimens measuring 150 mm by 150 mm (6 inch by 6 inch) at 50%, 70% and 90% R.H.

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

9.19 Water Vapor Transmission Rate

9.19.1 The water vapor transmission rate of three specimens of the of the material on a supporting screen shall be determined in accordance with ASTM E96 test method for both the desiccant method Procedure A and the water method Procedure B. The size of the specimen shall be in accordance with the test standard.

9.19.2 The results and the thickness of the material tested shall be reported as the average of the three specimens for each procedure.

10. Reporting Requirements

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

In addition to the information specified in the individual test methods, all reports describing the testing of the material in accordance with this document shall include the following information:

10.2 In addition to the information specified in the individual test methods, all reports describing the testing of the material in accordance with this document, shall include the following information:

- a. Supplier's name, address, production facility address and product designation;
- b. Material description including name and type;

- 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 and applied thickness of each specimen used for each test;
- g. Report of all test results according to the test methods, with the same precision as the requirements listed in Table 1, comparison of the results to the requirements in Table 1 and indicate whether the property was passed or failed;
- h. Declaration of conformity with this document; and
- i. An appendix to the report shall contain the data used to generate the above items.

11. Marking and Labeling

11.1 Each roll shall be clearly marked or labelled with the following information:

- a. Supplier's name
- b. Material name
- c. Type of material (e.g. self-adhered air and water resistive barrier)
- d. Country of manufacturer
- e. Lot number
- f. Storage temperature range

12. Supplier's Documentation

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

12.2 The supplier shall provide, upon request, the following:

- a. Description of the material including their properties
- b. Safety data sheet (SDS)
- c. Instructions for safe handling, use and disposal of the material
- d. Physical properties for the material
- e. Limitations for use of the material
- f. Installation instructions

13. Keywords

13.1 air barrier, water resistive, membrane, self-adhered

TABLE 1
REQUIREMENTS FOR PHYSICAL PROPERTIES

Property	Unit	Requirements		Test Method
		Min.	Max.	
Air Leakage Rate - Material	L/(s·m ²) @ 75 Pa CFM/ft ² @ 1.57 psf	-	0.0200	ASTM E2178
		-	0.0040	
Air Leakage Rate - Fastener	L/(s·m ²) @ 75 Pa CFM/ft ² @ 1.57 psf	-	0.0200	ASTM E2178 with modified specimen Provide air leakage rate of initial specimen and penetrated specimen
		-	0.0040	
Elongation	%	200	-	ASTM D412 Method A Die C
Freeze-Thaw Resistance	visual	no surface changes	-	ASTM E2485 Method A
Fungi Resistance	%	no growth	-	ASTM C1338
Gap Bridging Ability	mm inch	Report temperature material were tested at and the Class and Type		ABAA T0004
Lap Adhesion	N/mm lbf/inch	0.875 5.0	- -	ASTM D3330 Method B
Low Temperature Flexibility	visual	no surface changes	-	ASTM D522/D522M
Peel Adhesion (180)	N/mm lbf/inch	0.875 5.0	- -	ASTM D3330 Method A
Pull Adhesion	kPa psi	110 16	- -	ABAA T0002 – Declare actual value for each substrate
Resistance to Puncture	N lbf	178 40	- -	ASTM E154 Section 10
Surface Burning Characteristics	-	declare	-	ASTM E84 – Declare for each specimen for each test
Flame Spread Index	-	declare	-	
Smoke development Index	-	declare	-	
Tear Initiation	N lbf	40 9	- -	ASTM D4073
Volatile Organic Compounds	ppm	Report		EPA24

Water Resistance – Hydrostatic Head Test at 55 cm (22 inches) for 5 hours	visual	No water drops visible underside of the specimen	-	AATCC TM127
Water Resistance in 100% Relative Humidity	visual	-	No change in color, blistering, etc.	ASTM D2247
Hygroscopic Sorption Isotherms – Equilibrium Moisture Content by Weight	%	Report		ASTM C1498 at 50%, 70% and 90% R.H.
Water Vapor Transmission Rate – water and desiccant method	ng/(Pa·s·m ²) Perms	Report for both water and desiccant method		ASTM E96

FIGURE 1 - BUGLE SELF TAPING SCREW

Bugle head self-tapping screws installed 6 mm (1/4 inch) proud of the bottom side of the lowest point of the bugle to the surface.

