Designation: E2925 – 17

Standard Specification for Manufactured Polymeric Drainage and Ventilation Materials Used to Provide a Rainscreen Function[1]

This standard is issued under the fixed designation E2925; 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 is applicable to manufactured polymeric materials used to provide a rainscreen function, a means for the drainage of liquid moisture and the ventilation of vapor moisture that enters an above-grade exterior wall assembly. Rainscreen materials that comply with this specification are intended to be used behind exterior cladding products and intended to cover one hundred percent (100 %) of the wall area that is designed to provide a rainscreen function to resist water infiltration.

1.2 This specification addresses the following types of rainscreen materials:

1.2.1 *Type A*—entangled mesh materials.

1.2.2 *Type B*—formed/textured sheet material.

1.2.3 *Type C*—formed battens.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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.*

1.5 *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]

C578 Specification for Rigid, Cellular Polystyrene Thermal Insulation

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

D3045 Practice for Heat Aging of Plastics Without Load

D5199 Test Method for Measuring the Nominal Thickness of Geosynthetics

D5322 Practice for Laboratory Immersion Procedures for Evaluating the Chemical Resistance of Geosynthetics to Liquids

D6108 Test Method for Compressive Properties of Plastic Lumber and Shapes

D6364 Test Method for Determining Short-Term Compression Behavior of Geosynthetics

E84 Test Method for Surface Burning Characteristics of Building Materials

E283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

E631 Terminology of Building Constructions

E2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies

G154 Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

2.2 *Other Standard:*[3]

CAN/CGSB 51.33-M89 Vapor Barrier Sheet, Excluding Polyethylene, for Use in Building Construction

3. Terminology

3.1 *Definitions*—For definitions of general terms related to building construction used in this specification, refer to Terminology E631.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *capillary action, v*—liquid water movement against gravity induced by the force of molecular attraction (surface

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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 Document Summary page on the ASTM website.

[3] Available from Canadian General Standards Board (CGSB), 11 Laurier St., Phase III, Place du Portage, Gatineau, Quebec K1A 0S5, Canada, http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb.

tension) between the water and the material it contacts, facilitated by a small gap between materials.

3.2.2 *exterior cladding, n*—weather-exposed materials of a wall assembly including but not limited to siding, stucco, masonry veneer, but excluding fenestration (doors and windows).

3.2.3 *mortar screen, n*—layer of material designed to prevent mortar from entering the drainage space.

3.2.4 *polymeric, n*—materials composed primarily of polymers.

3.2.5 *polymeric rainscreen material, n*—material intended to be installed behind exterior cladding products which creates a drainage and ventilation space for liquid and vapor moisture that enters an above-grade exterior wall assembly reducing water transfer to the water resistive barrier (WRB).

3.2.6 *rainscreen space, n*—separation behind the cladding in the wall assembly intended to inhibit capillary action and moisture bridging as well as to promote ventilation and the drainage of moisture.

3.2.7 *water-resistive barrier (WRB), n*—material that is intended to resist liquid water that has penetrated the cladding system.

4. Classification

4.1 *Type A*—entangled mesh materials.

4.2 *Type B*—formed/textured sheet material.

4.3 *Type C*—formed battens.

5. Materials and Manufacture

5.1 Description of the material composition and structure shall be made available upon request.

5.1.1 Descriptions of the materials shall include roll or package weight and dimensions.

5.1.2 Descriptions of the material composition shall include linear density (basis weight).

5.1.3 All materials claiming compliance with this specification shall be described in such statements as described in all applicable test reports.

6. Material Properties

6.1 *Ventilation/Airflow Test:*

6.1.1 The airflow rate shall be measured in accordance with Annex A1.

6.2 *Drainage Test:*

6.2.1 The drainage test shall be conducted in accordance with Annex A2.

6.3 *Thickness Test:*

6.3.1 The thickness shall be measured in accordance with Test Method D5199 at 0.20 kPa.

6.4 *Compression Test:*

6.4.1 The compressive strength for Type A and B shall be determined in accordance with Test Method D6364 at 10 % compression and at full yield (if yield occurs).

6.4.2 The compressive strength for Type C shall be determined in accordance with Test Method D6108.

6.5 *UV Exposure Test:*

6.5.1 The test specimens shall be exposed in accordance with Practice G154 following Cycle 1 for 336 h.

6.5.2 After the UV exposure test has been completed, the compression test (6.4) shall be repeated.

6.6 *Heat Aging:*

6.6.1 The test specimens shall be heat aged in accordance with Practice D3045 at a temperature of (77 ± 3) °C for 90 days.

6.6.2 After the heat aging test has been completed, the thickness test (6.3) and the compression test (6.4) shall be repeated.

6.7 *Mold and Fungi Resistance:*

6.7.1 The specimens shall be tested in accordance with Test Method C1338 for 28 days exposure.

6.8 *Water Exposure:*

6.8.1 The specimens with dimensions (250 ± 2) mm by (250 ± 2) mm shall be immersed in water in accordance with Practice D5322 using tap water at (50 ± 2) °C for 168 h.

6.8.2 After the water exposure test has been completed and within one hour of removal from the water, the compression test (6.4) shall be repeated.

6.9 *Flame Spread Test (Optional):*

6.9.1 When desired, the material shall be tested in accordance with Test Method E84 for flame spread.

6.10 *Freeze-Thaw (Optional):*

6.10.1 The freeze-thaw exposure shall be conducted in accordance with the aging procedure of Section 8.3.2.1 of CAN/CGSB 51.33-M89.

6.10.2 After the freeze thaw exposure test has been completed and within one hour of the completion of the test, the compression test (6.4) shall be repeated.

7. Material Performance Requirements

7.1 All materials shall provide the minimum performance requirements listed in Table 1.

8. Sampling

8.1 The material to be tested for conformance to this specification shall be taken directly from a randomly selected roll or package which is representative of the commercial product.

9. Specimen Preparation

9.1 The specimens from roll materials shall be cut from the interior of the sample roll so that no specimen edge is nearer than 75 mm to the original roll edge.

9.2 Unless otherwise stated in the test method, all specimens shall be conditioned for a minimum period of 40 h at (23 ± 2) °C and (50 ± 10) % relative humidity (RH).

9.3 The specimen size shall be determined by the test method.

9.4 If not otherwise specified in the referenced test method, a minimum of five specimens shall be tested and each specimen shall meet the minimum performance requirements.

TABLE 1 Material Performance Requirements

Test	Method	Units	Performance Requirements Minimum
Ventilation/Airflow	3.1	L/s	Declare
Drainage	3.2	%	Declare
Thickness	3.3	mm	5
Compression Strength	3.4	kPa	Declare
UV Exposure	3.5	%	80 % of the compression strength before UV exposure
Heat Aging	3.6	%	80 % of the compression strength before heat aging
Mold/Fungal Growth	3.7	visual	no visible mold or fungi growth on the test specimens
Water Exposure	3.8	%	80 % of the compression strength before water exposure
Optional Tests			
Flame Spread	3.9	...	Declare
Freeze/Thaw	3.10	...	80 % of the compression strength before freeze thaw

10. Reporting Requirements

10.1 Report required and declared test data in the form of a table(s) with property, result and pass/fail status including results for all properties tested.

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

10.2.1 date test conducted;

10.2.2 manufacturer's name, address, production facility address and product designation;

10.2.3 type and name of the material and other material description;

10.2.4 description of the material composition and structure;

10.2.5 lot number and manufactured date;

10.2.6 expiration date; if applicable;

10.2.7 material sampling procedure used;

10.2.8 description of test apparatus, calibration standards used and their source;

10.2.9 name and location of laboratory performing the tests and the accreditation agency for the laboratory;

10.2.10 description of the specimen preparation;

10.2.11 size of specimens used for each test (length, width (or diameter) and thickness);

10.2.12 declaration of conformity with this specification;

10.2.13 if the standard requirements were modified, a statement in the test report and a complete description of the modifications;

10.2.14 results of drainage test shall be reported as the percentage and weight of water drained from the test wall assembly (with and without insect screen), and the percentage and weight of the water retained in the test wall assembly;

10.2.15 the compression test results shall provide the complete compression curve;

10.2.16 the compression test values shall be reported at 10 % compression and at yield for each sample, and the average values shall be calculated;

10.2.17 the flame spread test results shall include the flame spread rating and smoke developed index;

11. Marking and Labeling

11.1 The material shall be marked or labeled with manufacturer name and product name.

12. Packaging and Package Marking

12.1 The information on the material or packaging shall include the manufacturer's name, product name, and reference to this specification.

12.2 Installation instructions shall be provided as part of the packaging and shall include as a minimum.

12.2.1 maximum weather exposure time allowed before cladding shall be installed;

12.2.2 type of mechanical fastener;

12.2.3 minimum fastener spacing to attach the material to the underlying structure; and

12.2.4 minimum over lapping requirements.

13. Keywords

13.1 drainage plane; rainscreen; water-resistive barrier; weather-resistive barrier

ANNEXES

(Mandatory Information)

A1. DRAINAGE AND VENTILATION/AIRFLOW TEST

A1.1 Objective

A1.1.1 The objective of this test is to measure the assembly's ability to allow for ventilation from the bottom of the specimen up and behind the cladding. Due to the design of the test apparatus, a separate specimen; other than that which is tested for drainage, shall be permitted to be tested. The air flow testing procedure is designed to determine the amount of airflow under a range of relatively low air pressure differences in a wall cavity created by the rainscreen material, over the height of a wall, which are understood to be in the range of 1 to 10 Pa under most natural exposure conditions.

A1.2 Test Apparatus

A1.2.1 Construct a test apparatus using 50 by 100 mm wood framing material. The perimeter framing shall be 1200 mm wide by 2400 mm high, outside dimensions. Two wood framing members, spaced 400 mm on center shall be inserted in the 1200 mm width. All framing members shall be secured at each joint using #10 by 75 mm wood screws. Install a 6 mm (nominal) clear polycarbonate sheet to the framing members to simulate both the sheathing and the water resistive barrier. Secure the polycarbonate sheet to the framing members by drilling holes in the polycarbonate material and installing #10 by 25 mm wood screws every 200 mm (nominal).

A1.2.2 Install the rainscreen material being tested over (on the exterior side of) the polycarbonate sheet in accordance with the polymeric rainscreen material manufacturer's instructions. The instructions shall include the perimeter conditions (that is, flashing/assembly details at the top and bottom of the wall assembly). The sides of the test apparatus with the rainscreen material installed shall be completely sealed to restrict air from being able to exit out the sides during the ventilation testing.

A1.2.3 If required by the rainscreen material manufacturer, a mortar screen shall be installed where the rainscreen material is used behind adhered masonry or cement plaster (stucco) cladding systems.

A1.2.4 Where the rainscreen material can be installed with an insect screen at the top and/or bottom, the test apparatus shall be tested with and without the insect screen(s).

A1.2.5 Install a 1200 by 2400 by 50 mm thick (nominal) extruded polystyrene (XPS) foam insulation board complying with Specification C578 to the exterior side of the rainscreen material to simulate a cladding system. Install the board in place using fasteners that go through the XPS and into the framing spaced (400 ± 25) mm on center both vertically and horizontally. Seal the fastener holes in the XPS with sealant that is compatible with the XPS to prevent water and air leakage. Seal the top and sides of the specimen to restrict air from being able to exit during the testing.

A1.2.6 Construct a manifold at the top of the specimen (see Fig. A1.1) from which to introduce the air pressure differential.

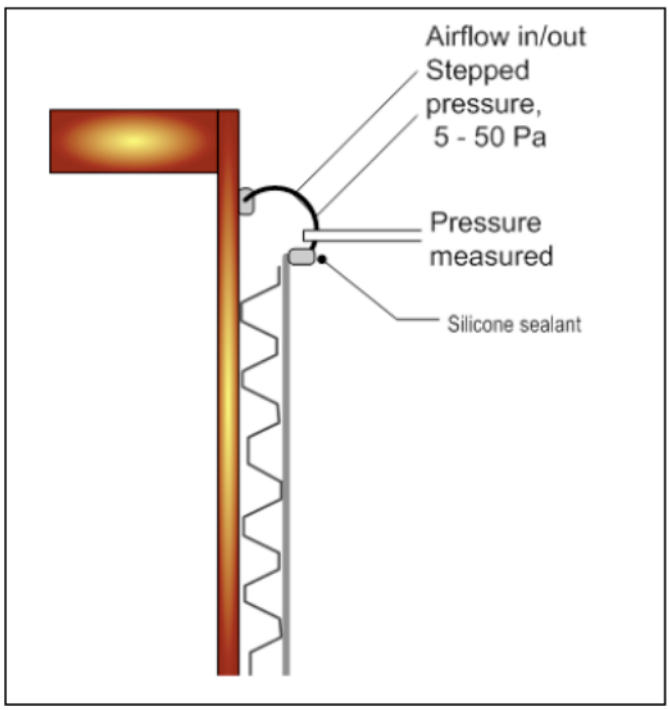

FIG. A1.1 Schematic of Air Testing Manifold

The manifold shall be constructed air tight such that air can be drawn through the width of the test specimen, while measurements are taken to determine the amount of air flow.

A1.2.7 Fabricate a four foot length of PVC pipe with a T-joint in the middle, cut in half lengthwise, and sealed against one end of the wall assembly.

A1.2.8 Install a calibrated air flow device complying with Test Method E283 that controls the amount of air being passed through the wall assembly.

NOTE A1.1—A schematic of the test apparatus can be seen in Fig. A1.2.

A1.2.9 Connect a pressure transducer (digital manometer) to the PVC pipe to measure the pressure difference across the wall section.

A1.3 Test Procedures

A1.3.1 Place the specimen vertically on a table with a means to hold the specimen in place.

A1.3.2 Apply negative pressure to the wall assembly. Negative pressure tends to pull seals tighter.

NOTE A1.2—This tends to result in slightly lower system leakages than with positive pressure, but these differences are expected to be insignificant for a full-scale wall in service.

A1.3.3 Conduct air test leaving the opposite end of the wall assembly open to atmosphere thereby allowing the maximum amount of air to flow through the drainage gap.

A1.3.4 Pressurize the wall assembly with the end opposite the PVC pipe sealed to take into account all airflow paths other then the intended one to evaluate unintended air leakage into the wall assembly.

NOTE A1.3—This approach accounts for other small leaks (in the wall or the apparatus) that may not be perfectly sealed. This quantity is termed extraneous leakage.

A1.3.5 Measure the airflow through the rainscreen material at 1, 5, and 10 Pa pressure differential measured at the PVC pipe and atmosphere utilizing the air flow measuring apparatus of Test Method E283.

A1.3.6 Deduct extraneous leakage from the airflow results to calculate the actual air flow through the rainscreen material.

A1.3.7 Record and report the air leakage in L/s and indicate whether a mortar screen or a insect screen was included in the testing.

A2. DRAINAGE TEST

A2.1 Test in accordance with Test Method E2273 with the following modifications.

NOTE A2.1—Due to the design of the test apparatus, a separate specimen other than that which is tested for ventilation / air flow shall be permitted to be tested.

A2.2 Apparatus

A2.2.1 Construct a test apparatus using 50 by 100 mm wood framing material. The perimeter framing shall be 1200 mm wide by 2400 mm high, outside dimensions. Two wood framing members, spaced 400 mm on center shall be inserted in the 1200 mm width. All framing members shall be secured at each joint using #10 by 75 mm wood screws. Install a 6 mm (nominal) clear polycarbonate sheet to the framing members to simulate both the sheathing and the water resistive barrier. Secure the polycarbonate sheet to the framing members by drilling holes in the polycarbonate material and installing #10 by 25 mm wood screws every 200 mm (nominal).

A2.2.2 Install the rainscreen material being tested over (on the exterior side of) the polycarbonate sheet in accordance with the polymeric rainscreen material manufacturer's instructions.

A2.2.3 If required by the rainscreen material manufacturer, a mortar screen shall be installed where the rainscreen material is used behind adhered masonry or cement plaster (stucco) cladding systems.

A2.2.4 Where the rainscreen material can be installed with an insect screen at the top and/or bottom, the test apparatus shall be tested with and without the insect screen(s).

A2.2.5 Install a 1200 by 2400 by 50 mm thick (nominal) extruded polystyrene (XPS) foam insulation board complying with Specification C578 to the exterior side of the rainscreen material to simulate a cladding system. Install the board in place using fasteners that go through the XPS and into the framing spaced (400 ± 25) mm on center both vertically and

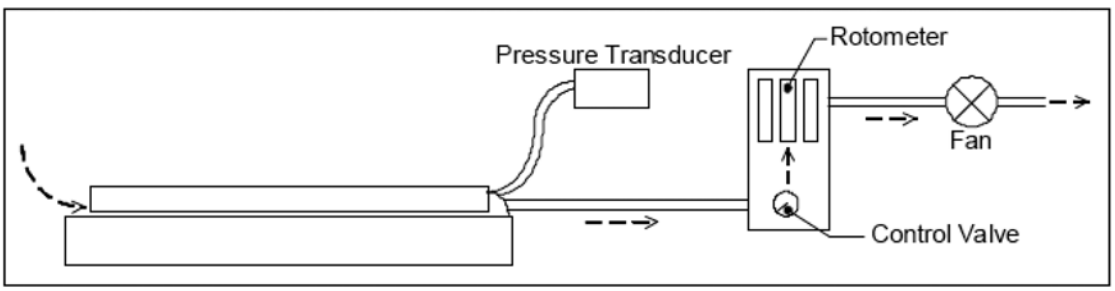

FIG. A1.2 Schematic of Test Apparatus

horizontally. Seal the fastener holes in the XPS with sealant that is compatible with the XPS to prevent water leakage. Seal the top and sides of the specimen to restrict water from being able to exit during the testing.

A2.2.6 Install a water collection tray (gutter system) at the bottom of the wall assembly. The collection tray shall permit the water introduced behind the cladding to drain into a water collection container. The water collection container shall be of sufficient size to collect and hold all water drainage throughout the test. The water collection tray and container shall be installed such that it is water tight and is able to collect all water that drains from behind the cladding.

A2.2.7 Cut/construct a 50 by 1050 mm (nominal) slot (slot fault) in the face of the cladding, 300 mm (nominal) from the top of the specimen in accordance with Test Method E2273, so that the exterior face of the rain screen material is exposed. If the rainscreen material has an integral mortar screen, the mortar screen shall be removed at the slot fault to allow water to be applied to the exterior face of the rainscreen material.

A2.2.8 Install and seal the water spray box over the slot fault such that the assembly is water tight and does not allow water to drain anywhere but into the opening (slot fault) cut in the cladding and to behind the cladding.

A2.2.9 Adjust the test apparatus such that the spray box measures 1070 mm long, 240 mm deep and 180 mm high (nominal).

A2.2.10 Install four (4) nozzles in the spray box, with the nozzles being located at 225 mm and 450 mm (nominal) from the right and left vertical center of the box.

A2.2.11 Set the spray system to deliver water at a rate of 226 g/min $\frac{+10}{-0}$ %.

A2.2.12 Calibrate the spray system in accordance with Test Method E2273 with the exception that the weight of the water over the 15-min period shall be adjusted to measure between 3.39 and 3.73 kg.

A2.3 Test Procedures

A2.3.1 Deliver the prescribed amount of water from the calibrated spray system for a test period of 15 min via the slot fault.

A2.3.2 Drain the specimen for a period of (60 ± 5) min.

A2.3.3 Record and report the percentage and weight of water drained from the test wall assembly (with and without insect screen), and the percentage and weight of the water retained in the test wall assembly.

APPENDIX

(Nonmandatory Information)

X1. EXPLANATORY INFORMATION

X1.1 Vapor Permeability of Polymeric Rainscreen Materials

X1.1.1 The specification does not mandate minimum or maximum moisture vapor permeability for polymeric rainscreen materials. A product's permeability does not have an impact on its ability "to create a drainage and ventilation space behind the exterior cladding." Certain types of engineered (polymeric) rainscreen products are fully vapor permeable. Other types of engineered (polymeric) rainscreen products may provide some resistance to water vapor or may be virtually impermeable to water vapor. While the vapor permeable polymeric rainscreen products allow moisture to diffuse from the inside to the outside, they also allow inward vapor movement (for example, solar-driven moisture) which should be considered in the design of the wall assembly.

X1.1.2 Ventilated vapor impermeable polymeric rainscreen products reduce inward vapor diffusion and allow interior moisture to diffuse through a ventilated drainage space so that the rainscreen material does not provide the function of a vapor barrier/retarder in the assembly.