Designation: ~~C1258 – 21~~ C1258 – 21a

Standard Test Method for Elevated Temperature and Humidity Resistance of Vapor Retarders for Insulation[1]

This standard is issued under the fixed designation C1258; 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 test method covers the determination of the resistance of flexible low permeance vapor retarders for thermal insulation as classified in Specification C1136 to elevated temperature and humidity. Water vapor permeance measurement and visual inspection after exposure at elevated temperature and humidity are used to assess vapor retarder response.

1.2 Typical vapor retarders evaluated in this test method are intended for indoor use and include foil-scrim-kraft laminates, metallized polyester-scrim-kraft laminates, treated fabrics, treated papers, films, foils, or combinations of these materials that comprise a vapor retarder material. This test method is not intended for assessment of the liquid-applied coatings, sealants, or mastics commonly used with insulation products.

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 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, health, and environmental 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]

C168 Terminology Relating to Thermal Insulation
C1136 Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
E96/E96M Test Methods for Water Vapor Transmission of Materials

3. Terminology

3.1 Terminology C168 shall be considered as applying to the terms used in this specification.

[1] This test method is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.33 on Insulation Finishes and Moisture.

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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.

4. Summary of Test Method

4.1 The vapor retarders are exposed to elevated temperature and humidity at 120°F (49°C) and 95 % relative humidity for a period of 28 days, then visually inspected for corrosion (if applicable), delamination, and other degradation. Water vapor permeance in accordance with Test Methods E96/E96M is measured after elevated temperature and humidity exposure.

5. Significance and Use

5.1 On systems operating at sub-ambient temperature, humid ambient conditions cause a vapor driving force toward the insulation. If not retarded, the driven moisture vapor is detrimental to the insulation's thermal resistance. A vapor retarder must resist degradation in order maintain its resistance to vapor passage. Degradation in this test method is induced by elevated temperature and humidity conditions.

6. Apparatus

6.1 *Environmental Chamber,* capable of maintaining an average of 120 ± 2°F (49 ± 1°C) and 95 ± 2 % relative humidity, using distilled or deionized water as the humidity source. The chamber shall be of the air-circulating variety.

6.2 *Lighted Box,* with five opaque sides and one transparent glass or plastic viewing side, illuminated with an incandescent lightbulb. The viewing area shall be slightly smaller than the vapor retarder specimen so that holes or degradation caused by the testing conditions are readily visible.

6.3 *Darkroom.*

6.4 *Cotton Gloves.*

6.5 Frame/holder of non-reacting material.

6.6 Support of non-reacting material from which to suspend specimens.

6.7 Other mounting accessories of non-reacting material as needed.

7. Test Specimens

7.1 From each sample cut four specimens that are large enough to acquire water vapor permeance test specimens after exposure. In any case, the specimen size shall be at least 6 by 6 in. (152 by 152 mm). The specimens shall be taken from areas spaced evenly across the roll or sheet width. Material exhibiting extraneous damage from mishandling in shipment or during sample preparation shall be avoided. A fifth specimen shall be cut and retained as an unexposed control.

8. Procedure

8.1 Use clean cotton gloves during handling of specimens to avoid surface contamination that may be confused with corrosion on foil or metallized laminates.

8.2 Observe the specimens prior to testing for pre-existing corrosion or degradation, or damage that could impact water vapor permeance, using the procedure in 9.1.2.

8.3 Using mounting and support materials that will not react corrosively with the specimens, and allow for clear exposure of the full observed area to the chamber atmosphere, suspend specimens vertically in the environmental chamber.

8.4 Suspend specimens so that the sides subject to corrosion are not touching each other and have a minimum of 0.5 in. (12.7 mm) airspace between them.

8.5 To avoid possible formation of condensation on specimens, allow the chamber to cool when loading or pre-warm specimens, or both, so that they are not below dew point when placed in the chamber.

8.6 Expose the specimens for 28 days at 120 ± 2°F (49 ± 1°C) and 95 % ± 2 relative humidity.

9. Evaluation

9.1 At the end of 28 days, again using cotton gloves to handle specimens, evaluate the specimens for the following:

9.1.1 For all products, place the specimens on the lighted box and inspect for corrosion in the form of pinholes, large holes, or metallization loss as evidenced by increased translucency as compared to the retained control specimen. Lightly mark areas of most apparent degradation with a felt-tip pen.

9.1.2 For foil laminates also inspect the foil surface for evidence of corrosion in the form of crystalline deposits. This inspection is accomplished in a darkroom by holding the specimen at an angle to the light source such that surface irregularities and color variation are apparent. Corrosion deposits have an iridescent appearance when viewed in this manner. Compare tested specimens to the unexposed control if necessary to determine if a change has occurred.

9.1.3 For all products, cut one water vapor permeance specimen from each aged piece. Specimens shall be cut from the most affected areas as identified during the light box inspection. Allow the specimens to stabilize for a minimum of 48 h at nominal 73°F (23°C)/50 % RH before starting the permeance test.

9.1.4 Determine the water vapor permeance in accordance with the desiccant method of Test Methods E96/E96M. The water vapor permeance test temperature shall be 73 ± 2°F (23 ± 1°C); relative humidity shall be 50 ± 2 %. Use the unexposed control specimen as the blank in the test.

10. Report

10.1 The report shall include a complete identification of the material tested including manufacturer, type, lot number, and production date.

10.2 As appropriate for the type of product being tested report:

10.2.1 Delamination, if any;

10.2.2 Corrosion, if any;

10.2.3 Metallization loss, if any; and

10.2.4 Water vapor permeance after test exposure.

11. Precision and Bias

11.1 No statement is made concerning the precision and bias of the visual inspection portion of this procedure, since results merely compare performance to an unexposed control.

11.2 Refer to Test Methods E96/E96M for precision and bias of the water vapor permeance determination.