



Standard Test Method for Thermal Integrity of Flexible Water Vapor Retarders¹

This standard is issued under the fixed designation C 1263; 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 visual determination of the thermal integrity of flexible water vapor retarders for those materials classified under Specification C 1136, including plastic, foil, or paper and composites of two or more of these materials to temperatures listed in the specification or purchase contract. The vapor retarders are intended for use at temperatures of -20 to 150°F (-29 to 66°C). This test method does not cover mastics or barrier coatings applied in liquid form or materials intended for use as weather barriers.

1.2 *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.*

2. Referenced Documents

2.1 ASTM Standards:

C 168 Terminology Relating to Thermal Insulating Materials²

C 1136 Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation²

3. Terminology

3.1 *Definitions*—Definitions of terms used in this test method will be found in Terminology C 168.

4. Significance and Use

4.1 In many applications, the vapor retarders used on a thermal insulation will be exposed to the temperatures listed in 7.2. Cracking or delamination of the retarder under these conditions would, in most cases, cause it to lose its effectiveness as a vapor retarder material.

5. Apparatus

5.1 *1 in. (25 mm) Outside Diameter Solid, Mild Steel Mandrel.*

5.2 *Laboratory Oven*, capable of maintaining $\pm 3^{\circ}\text{F}$ (2°C) up to a temperature of 150°F (66°C).

¹ This test method is under the jurisdiction of ASTM Committee of C-16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.33 on Thermal Insulation Finishes and Vapor Transmission.

Current edition approved June 15, 1995. Published August 1995. Originally published as C 1263 – 94. Last previous edition C 1263 – 94.

² *Annual Book of ASTM Standards*, Vol 04.06.

5.3 *Laboratory Freezer*, capable of maintaining $\pm 3^{\circ}\text{F}$ (2°C) down to a temperature of -20°F (-29°C).

5.4 *Room or Cabinet*, capable of maintaining $73.4 \pm 3^{\circ}\text{F}$ ($23 \pm 2^{\circ}\text{C}$) and $50 \pm 2\%$ relative humidity.

5.5 *Insulated Gloves.*

6. Test Specimen

6.1 From each sampled vapor retarder, test three 1 ft (305 mm) square specimens for each temperature extreme specified.

7. Procedure

7.1 Condition test specimen at a temperature of $73.4 \pm 3^{\circ}\text{F}$ ($23 \pm 2^{\circ}\text{C}$) and a relative humidity of $50 \pm 2\%$ for a period of 24 h.

7.2 Expose the specimen and the mandrel to the test temperatures of -20 and 150°F (-29 and 66°C) for a period of 4 h.

7.3 At the end of the exposure period, with specimen and mandrel at test temperatures, bend each specimen around the mandrel once through an angle of 180° in 3 ± 2 s so that the opposing sides are parallel. If the two surfaces of the test specimen are materially different, six specimens shall be tested with three specimens of each surface tested on the outside of the bend.

NOTE 1—When test conditions specify both low temperature and high temperature exposure conditions on the same vapor retarder, it is satisfactory to use the same specimen or to select separate specimens for each of the exposed temperatures, unless the specification or contract explicitly states that exposure tests must be conducted on the same specimen. If the latter is so, the test specimen must be reconditioned before submitting it to the next test temperature.

7.4 Immediately examine each specimen, while in the bent condition, for any cracks or delamination.

NOTE 2—Where multiple specimens are being examined, it is permissible to remove the tested specimen, while still in the bent condition, from the mandrel to allow for rapid reuse of the mandrel. The specimen must be restrained in the bent condition with paper clips or other suitable means until it returns to room temperature and is then examined.

7.5 To inspect for delamination, let each specimen return to room temperature, open to a flat condition and examine.

7.6 Any visible evidence of cracking or delamination on any of the three specimens shall constitute failure.

8. Report

8.1 Report the following information:

- 8.1.1 Identification of the material tested, including its composition and date of manufacture, if available.
- 8.1.2 Test temperature(s).
- 8.1.3 Date of testing.
- 8.1.4 Pass or fail and description of the failure, if any.

9. Precision and Bias

- 9.1 No precision measurement is necessary as this test

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method reports only a pass-fail condition of the test specimen.

10. Keywords

- 10.1 cracking; delamination; thermal integrity; vapor retarders