



# Standard Specification for Laminate Protective Jacket and Tape for Use over Thermal Insulation for Outdoor Applications<sup>1</sup>

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## 1. Scope

1.1 This specification addresses the minimum performance for flexible laminate protective jacket and a pressure sensitive adhesive tape for use over thermal insulation on pipes, duct, and equipment operating at both above and below ambient temperatures and installed outdoors, above ground. It does not include the following: protective metal jacket, homogenous plastic film jacket materials, modified asphalt jacket materials, and butyl rubber membranes.

1.2 This type of material shall consist of multiple layers of polymer film and aluminum foil laminated to one another with layer(s) of reinforcement as an option.

1.3 Jacket and tape materials covered by this specification shall have low water vapor permeance values; however, they are not necessarily always used as vapor retarders. The water vapor transmission tests address the jacket and tape materials only and do not address overlaps or taped joints. All materials shall be weather resistant and intended to have sufficient strength to provide protection for mechanical insulation.

1.4 Materials covered under this specification shall have a high, medium, or low surface emittance.

1.5 The top layer shall be one of the following: aluminum foil, a polymer film, or a polymer coating.

1.6 This specification includes jacket materials both with and without factory applied, pressure sensitive adhesives. The tape materials covered by this specification always have a factory applied, pressure sensitive adhesive.

1.7 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.

1.8 *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:<sup>2</sup>

- C168 Terminology Relating to Thermal Insulation
- C1136 Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
- C1263 Test Method for Thermal Integrity of Flexible Water Vapor Retarders
- C1338 Test Method for Determining Fungi Resistance of Insulation Materials and Facings
- C1371 Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emis-someters
- D774 Test Method for Bursting Strength of Paper
- D882 Test Method for Tensile Properties of Thin Plastic Sheeting
- D1000 Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
- D1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
- D3330 Test Method for Peel Adhesion of Pressure-Sensitive Tape
- D3759 Test Method for Breaking Strength and Elongation of Pressure-Sensitive Tape
- E96 Test Methods for Water Vapor Transmission of Materials
- F1249 Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
- G154 Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

### 3. Terminology

#### 3.1 Definitions:

3.1.1 Definitions in Terminology C168 apply to terms used in this specification.

3.1.2 *laminate jacket, n*—a thin, flexible sheet material intended for use as a jacket over thermal insulation on pipe, duct, or equipment, and consisting of multiple layers of plastic film and foil bonded together.

3.1.2.1 *Discussion*—A laminate jacket is available with or without a factory applied pressure sensitive adhesive.

3.1.2.2 *Discussion*—While laminate jacket is commercially available in different widths, it typically is provided commercially in approximately the same width as pipe insulation sections.

3.1.3 *laminate tape, n*—a thin, flexible sheet material intended for use as a tape to seal and secure a compatible laminate jacket over thermal insulation on pipe, duct, or equipment.

3.1.3.1 *Discussion*—Laminate tape always has a factory applied, pressure sensitive adhesive which first requires removal of a release liner.

3.1.3.2 *Discussion*—Laminate tape is commercially available in several different widths.

### 4. Classification

4.1 Classification of laminate jackets is based on strength and total emittance properties as listed in Table 1.

4.2 Further classification is based on exterior surface material as follows: Class 1—exposed aluminum foil, Class 2 a polymer film, Class 3 a polymer coating.

### 5. Materials and Manufacture

5.1 At least two layers shall be aluminum foil with a combined thickness greater than or equal to 0.0012 in. (0.030 mm).

5.2 At least one layer shall be a polymer film.

5.3 The polymer film(s) and foil layers shall be factory bonded to one another.

### 6. Performance Characteristics

6.1 The required performance characteristics are shown in Table 1.

### 7. Typical Sizes and Forms

7.1 Laminate jacket is normally provided in rolls that are 75 ft (22.9 m) long for Type 1 and 150 ft (45.7 m) long for Types 2 and 3 in either 23 in. (484 mm) or 35 ½ in. (902 mm) width. Other lengths and widths are available upon request as agreed upon by manufacturer and purchaser.

7.2 Laminate tape is normally provided in rolls that are 150 ft (45.7 m) long and 3 in. (76 mm) wide. Other lengths and widths are available upon request as agreed upon by manufacturer and purchaser.

### 8. Workmanship, Finish, and Appearance

8.1 This product shall be free of laminate separations, holes, tears, cuts, or creases, stains, or discoloration, or combinations thereof, and it will show no visual defects that will reduce serviceability.

8.2 Acceptance of visual defects shall be agreed upon by the manufacturer and purchaser.

### 9. Test and Evaluation Methods

9.1 The properties in this specification shall be determined in accordance with the following methods.

9.1.1 *Water Vapor Transmission*—Test Method E96 and Test Method F1249. These tests are for the jacket and tape materials only and not for overlaps or taped joints.

9.1.2 *Puncture Resistance*—Test Method D1000.

9.1.3 *Burst Strength*—Test Method D774.

9.1.4 *Tensile Strength*—Test Methods D3759 or D882.

9.1.5 *Peel Strength*—Test Method D3330, Method A.

**TABLE 1 Performance Characteristics of Laminate Jacket and Tape Materials**

Property	Test Method	Performance	Units
Water vapor permeance, maximum	E96, Procedure B	0.00	perm (metric perm)
Puncture resistance, minimum	D1000	Type 1: 65 (289); Type 2: 23 (102); Type 3: 21 (93)	lbs. (N)
Burst resistance, minimum	D774	Type 1: 400 (2756); Type 2: 150 (1034); Type : 140 (965)	Psi (kPa)
Tensile strength, minimum	D3759 or D882	Type 1: 150 (26.3); Type 2: 55 (9.6); Type 3: 40 (7.0)	lbs./in. (N/mm)
Peel adhesion of material with a pressure sensitive adhesive, minimum	D3330, Method A	Type 1: 64 (700); Type 2: 40 (438); Type 3: 40 (438)	oz./in. (N/m)
Low-temperature exposure	C1263	-40° (-40°)	°F (°C)
High-temperature exposure	C1263	+ 240° (116°)	°F (°C)
Dimensional stability	D1204	< 0.5%	
Weather resistance	G154, Cycle 1 for 1 000 h total exposure	No delamination or apparent deterioration such as cracking, extreme discoloration, or embrittlement allowed.	N/A
Water resistance	See Section 9.1.1	No bubbles, blisters, substrate separation.	N/A
Fungi resistance	C1338	Pass	N/A
Total hemispherical emittance (ε)	C1371	Grade 1: ε ≤ 0.1; Grade 2: 0.1 < ε < 0.8; Grade 3: ε ≥ 0.8	N/A

9.1.6 *Fungi Resistance*—Test Method **C1338** with growth no greater than that on a comparative item (in this case, a white birch wood tongue depressor).

9.1.7 *Dimensional Stability*—Tested in accordance with Test Method **C1136**, 10.4.

9.1.8 *Low-Temperature Resistance*—Test Method **C1263**.

9.1.9 *High-Temperature Resistance*—Test Method **C1263**.

9.1.10 *Total Hemispherical Emittance*—Test Method **C1371**.

9.1.11 *Water Resistance*—Immerse sample into water at a temperature between 70°F (21.1°C) and 76°F (24.4°C) for 24 h. Observe for unforced delamination, that is, bubbles, blisters, substrate separation.

9.1.12 *Weather Exposure*—Test Method **G154** with 1 cycle for 1000 h exposure followed by inspection for deterioration such as cracking, extreme discoloration, or embrittlement.

## 10. Keywords

10.1 above ambient; below ambient; jacket materials; jacketing materials; laminate jackets; nonmetallic jacketing; protective jackets; protective jacketing; self-supporting; thermal insulation; vapor retarder; weather resistant

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