



Designation: C1916 – 21

# Standard Specification for Flexible Protective Jackets Made of Modified Asphalt/Butyl Rubber for Use over Thermal Insulation<sup>1</sup>

This standard is issued under the fixed designation C1916; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification addresses flexible protective jackets, made of a modified asphalt or butyl rubber sealing compound, for use over thermal insulation. The sealing compound is covered with an outer surface material. Typical applications are insulated ducts, pipe, and equipment. These materials shall be used only for outdoor or direct burial applications.

1.2 The jacket materials covered by this specification have an allowed exposure temperature range, after installation, from  $-25^{\circ}\text{F}$  to  $284^{\circ}\text{F}$  ( $-32^{\circ}\text{C}$  to  $140^{\circ}\text{C}$ ).

1.3 This specification does not address installation methods of this jacketing material.

1.4 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.

1.5 *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.*

1.6 *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:*<sup>2</sup>

[C168 Terminology Relating to Thermal Insulation](#)

[C1263 Test Method for Thermal Integrity of Flexible Water Vapor Retarders](#)

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.40 on Insulation Systems.

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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.

[C1371 Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emis-someters](#)

[D882 Test Method for Tensile Properties of Thin Plastic Sheeting](#)

[D883 Terminology Relating to Plastics](#)

[D1000 Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications](#)

[E96 Test Methods for Water Vapor Transmission of Materials](#)

[E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover](#)

[G154 Practice for Operating Fluorescent Ultraviolet \(UV\) Lamp Apparatus for Exposure of Nonmetallic Materials](#)

[G155 Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials](#)

## 3. Terminology

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

3.2 *Definitions:*

3.2.1 *flexible protective jacket, n*—a thin, flexible sealing compound, covered with an outer surface material, intended for use as a jacket over thermal insulation on pipe, duct, or equipment.

## 4. Materials and Manufacture

4.1 This flexible protective jacket consists of a sealing compound composed of one of the following: (1) rubber modified asphalt, (2) amorphous polyolefin (APO) modified asphalt, or (3) butyl or polyisobutylene rubber, each covered with some outer surface material.

4.2 The sealing compound is covered with an outer surface material consisting of one of the following: (1) polymer film, (2) bare aluminum foil, (3) polymer coated aluminum foil, or (4) polymer / aluminum foil / polymer (poly / aluminum / poly) laminate.

4.3 There is no additional adhesive material applied to the inside surface of this jacket. However, there is a release paper or plastic (liner) which adheres to the compound by virtue of

the tackiness of that material. The release paper or plastic film (liner) is a disposable material, normally removed during installation. It must first be removed for all performance tests.

## 5. Classification

5.1 Classification of this jacketing is based on three factors that determine its Type, Grade, Class, and Material Thickness. Type differentiates the sealing method (Type I and II), Grade differentiates the outer surface material (Grade 1 through 4), and Class differentiates the sealing compound material (Class A, B, or C).

### 5.1.1 Sealing Method:

#### 5.1.1.1 Type I: Self-Sealing

5.1.1.2 Type II: Heat Activated (sometimes referred to as “torch applied”)

### 5.1.2 Outer Surface Material:

#### 5.1.2.1 Grade 1: Polymer film only

#### 5.1.2.2 Grade 2: Aluminum foil / Polymer film laminate

5.1.2.3 Grade 3: Polymer film / coated aluminum foil laminate

5.1.2.4 Grade 4: Polymer film / Aluminum foil / Polymer film laminate

### 5.1.3 Sealing Compound Material:

5.1.3.1 Class A: Rubber modified asphalt compound

5.1.3.2 Class B: Amorphous polyolefin (APO) modified asphalt compound

5.1.3.3 Class C: Butyl or polyisobutylene (PIB) compound

### 5.1.4 Composite Material Thickness, minimum:

5.1.4.1 Thickness 1: 0.026 in. (0.66 mm)

5.1.4.2 Thickness 2: 0.043 in. (1.1 mm)

5.1.4.3 Thickness 3: 0.066 in. (1.687 mm)

5.1.4.4 Thickness 4: 0.120 in. (3 mm)

## 6. Physical and Performance Characteristics

6.1 For Type I materials, Grade 2 and 3 materials only, measure and report the total hemispherical emittance of the outer surface. For other materials, there is no requirement to measure and report outer surface emittance.

6.2 See **Table 1** for physical and performance requirements.

## 7. Typical Sizes and Forms

7.1 Flexible protective jackets are supplied in varying thicknesses, lengths and widths to suit specification and application parameters based on user needs. Typical minimum

**TABLE 1 Physical and Performance Requirements**

Type	Grade	Outer Surface Material	Class	Sealing Compound	Thick.	Thickness, min. in. (mm)	Exposure temp range <sup>4</sup> °F (°C)	UV Stable?	Permeance, max. perms (ng/Pa·s·m <sup>2</sup> )	Tensile strength, min. lbf/in. width (N/cm width)	Elongation, percent min.	Puncture resistance, min. lbf (N)	Lap adhesion, min. lbf/in. width (N/cm width)		
Test Method						C1263	G154 or G155	E96, Procedure A	D1000 or D882	D1000 or D883	D1000 or E154	D1000			
I Self-sealing	1	Polymer Sheet	A	Rubber Modified Asphalt	T1	0.026 (0.67)	-4 to +160 (-20 to +71)	No	0.05 (2.9)	15 (26)	200	40 (178)	5 (8.8)		
					T2	0.043 (1.1)	-4 to +167 (-20 to +75)	No	0.03 (1.7)	15 (26)	30	40 (178)	5 (8.8)		
			B	APO Modified Asphalt	T2	0.043 (1.1)	-25 to +140 (-32 to +60)	No	0.03 (1.7)	100 (173)	5	165 (740)	1.7 (3.0)		
					T3	0.066 (1.7)	-25 to +170 (-32 to +77)	No	0.03 (1.7)	90 (156)	5	197 (882)	1.7 (3.0)		
			2	Aluminum Foil/ Polymer Sheet Laminate	A	Rubber Modified Asphalt	T2	0.043 (1.1)	-25 to +160 (-32 to +71)	Yes	0.01 (0.58)	18 (32)	30	15 (67)	18 (32)
	3	Polymer Sheet/ Coated Aluminum Foil Laminate	A	Rubber Modified Asphalt	T1	0.026 (0.67)	-4 to +167 (-20 to +75)	Yes	0.005 (0.05)	18 (32)	30	15 (67)	12 (21)		
			B	Modified Asphalt	T2	0.043 (1.1)	-4 to +167 (-20 to +75)	Yes	0.005 (0.05)	30 (53)	30	96.3 (432)	12 (21)		
					Butyl or PIB	T2	0.043 (1.1)	-4 to +167 (-20 to +75)	Yes	0.005 (0.05)	30 (53)	30	96.3 (432)	12 (21)	
4	Polymer Sheet/ Aluminum Foil/ Polymer Sheet Laminate	A	Rubber Modified Asphalt	T2	0.043 (1.1)	-4 to +167 (-20 to +75)	No	0.00 (0)	15 (26)	10	40 (178)	5 (8.8)			
C			Butyl or PIB	T2	0.043 (1.1)	-22 to +284 (-30 to +140)	No	0.00 (0)	30 (52)	30	15 (67)	5 (8.8)			
II Heat Activated	1	Polymer Sheet	B	APO Modified Asphalt	T4	0.120 (3.0)	-20 to +190 (-7 to +88)	No	0.02 (1.1)	90 (156)	5	90 (403)	12 (21)		

<sup>4</sup> Maximum and minimum exposure temperatures may be different than maximum and minimum installation temperatures. See manufacturer's installation or application guide.

widths include 23.5 in. (60 cm), 35.5 in. (90.5 cm), and 39.4 in. (100 cm) but are found in other widths as well. Specifications shall state minimum acceptable thickness while widths and lengths of rolls shall be agreed upon by the manufacturer and purchaser.

7.2 Tapes shall have a minimum width of 4 in. (10 cm) when used to seal seams and butted joints of jacket membranes to allow for a minimum 2 in. (5 cm) overlap on each side of the joint. Other widths for tapes are available as agreed upon by the manufacturer and purchaser.

## 8. Workmanship, Finish, and Appearance

8.1 This product shall be free of laminate separations, holes, tears, cuts, or creases.

## 9. Sampling, Inspection, and Rejection of Defective Material

9.1 A lot of material shall be considered to be the largest quantity, of a specific flexible protective jacket received by the purchaser under one order, or, if so, designated by the manufacturer, that quantity of products identified as the particular lot.

9.2 A unit of material shall be considered to be the smallest packaged quantity of flexible protective jacket within a lot, that is, one roll in a lot of rolls or one bundle of sealing compounds in a lot of material.

9.3 Lot inspection shall consist of thickness, width, and the appearance items in section 8.1 for specification conformance. Due to the impracticality of performing some tests on an inspection basis, all other properties shall be considered qualification properties. If deemed necessary, the purchaser shall request certification to specific test requirements at the time of the order.

9.4 Incoming lots shall be sampled at a minimum rate of 5 % of units received for inspection.

9.5 If any nonconformance to specification is detected within the 5 % sample, increase sampling to 10 % of the lot.

9.6 If 50 % or more of the 10 % sampled units are determined to be defective, the lot shall be considered unacceptable.

9.7 It shall be left to the discretion of the user whether to continue sampling for acceptable material. In any case, units found defective shall be considered unacceptable and rejected.

## 10. Tests and Evaluation Methods

10.1 *Permeance*—Use Test Methods E96, Procedure A to determine the water vapor permeance of this jacket material.

10.2 *Low and High Temperature Exposure*—Use Test Method C1263 to determine both low temperature and high temperature exposure.

10.3 *UV Exposure and Stability*—Use Practice G154 or Practice G155 to determine whether the composite material is stable when exposed to simulated exterior exposure, cycled for 1000 h. No deterioration such as surface cracking, surface delamination, extreme discoloration, or embrittlement is allowed.

10.4 *Tensile Strength*—Use Test Methods D1000, Sections 37-45, Breaking Strength and Elongation, or Test Method D882, to determine tensile (breaking) strength.

10.5 *Elongation*—Use Test Methods D1000, Sections 37-45, Breaking Strength and Elongation, or Test Method D882, to determine elongation at break.

10.6 *Puncture Resistance*—Use Test Methods D1000, Sections 123-128, for above ground applications or Test Methods E154 for below ground applications to determine puncture resistance.

10.7 *Lap Adhesion Strength*—Use Test Methods D1000, Sections 46-53, Adhesion Strength to Backing, to determine lap adhesion strength.

10.8 *Total Hemispherical Surface Emittance*—Use Test Method C1371 to measure the total hemispherical emittance of the composite material's outer surface.

## 11. Certification

11.1 When specified in the purchase order or contract, the purchaser shall be furnished certification that samples representing each lot have been either tested or inspected as directed in this specification and the requirements have been met. When specified in the purchase order or contract, a report of the results shall be furnished.

## 12. Product Marking

12.1 The packaged flexible protective jacket shall bear identification including the following information:

- 12.1.1 Manufacturer,
- 12.1.2 Product designation,
- 12.1.3 Roll or sealing compound dimensions and size,
- 12.1.4 Lot number or date code.

12.2 If required by the user, the packaged flexible protective jacket material shall bear a marking of conformance to this specification and classification.

## 13. Packaging

13.1 Unless otherwise specified, the flexible protective jacket material shall be supplied in the manufacturer's standard commercial package.

## 14. Keywords

14.1 APO; butyl rubber; composite membrane; flexible; modified asphalt; outer surface material; protective jacket; sealing compound; UV stable