



Designation: ~~C921-03a~~ Designation: **C 921 – 09**

Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation¹

This standard is issued under the fixed designation C 921; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This practice covers jackets applied over thermal insulation on piping and equipment, including materials applied solely for physical protection, and materials applied as vapor retarders.

1.2 This practice provides material and physical requirements, or both, for jackets. Guidance in selecting the proper jacket for a given application can be found in Guide C 1423.

1.3 This practice does not cover field applied mastics or barrier coatings and their attendant reinforcements, nor does it cover jackets for buried insulation systems.

~~1.4 The values stated in inch-pound units are to be regarded as standard. SI units are given in parenthesis.~~

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

~~A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip~~²

~~A240 Specification for Heat-Resistant Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Steel~~² ~~240/A 240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications~~

~~A366/A366M Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality~~ ~~336/A 336M Specification for Alloy Steel Forgings for Pressure and High-Temperature Parts~~

~~A 653/A 653M Specification for Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy, Coated (Galvannealed) by the Hot-Dip Process~~ ~~Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process~~

~~A 792/A 792M Specification for Steel Sheet, 55% Aluminum-Zinc Alloy, Coated by the Hot-Dip Method~~⁴ ~~Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process~~

~~B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate~~

~~C 168 Terminology Relating to Thermal Insulating Materials~~ ~~Terminology Relating to Thermal Insulation~~

~~C 390 Practice for Sampling and Acceptance of Preformed Thermal Insulation Lots~~

~~C 921 Practice for Sampling and Acceptance of Preformed Thermal Insulation~~⁶ ~~Practice for Determining the Properties of Jacketing Materials for Thermal Insulation~~

~~C 1258 Practice for Sampling and Acceptance of Preformed Thermal Insulation~~⁶ ~~Test Method for Elevated Temperature and Humidity Resistance of Vapor Retarders for Insulation~~

~~C 1263 Test Method for Thermal Integrity of Flexible Water Vapor Retarders~~

~~C 1338 Test Method for Determining Fungi Resistance of Insulation Materials and Facings~~

~~C 1423 Guide for Selecting Jacketing Materials for Thermal Insulation~~⁶

¹ This practice 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*, Vol 01.03, volume information, refer to the standard's Document Summary page on the ASTM website.

~~C835 Test Method for Total Hemispherical Emittance of Surfaces from 20 to 1400°C~~⁶ Guide for Selecting Jacketing Materials for Thermal Insulation

D 774/D 774M Test Method for Bursting Strength of Paper

D 828 Test Method for Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus

D 882 Test Methods Method for Tensile Properties of Thin Plastic Sheeting

D 1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature

E 84 Test Method for Surface Burning Characteristics of Building Materials

E96 96/E 96M Test Methods for Water Vapor Transmission of Materials

2.2 TAPPI Standards:

T461 Flame Resistance of Treated Paper and Paperboard~~T803 Puncture Test of Containerboard~~^{11,3}

3. Terminology

3.1 *Definitions*—Definitions in Terminology C 168 apply to terms used in this practice, including the word jacket, which is defined as "a form of facing applied over insulation". In common use, the terms jacket and jacketing shall be considered interchangeable.

4. Classification

4.1 *Type I*—Semi-rigid, for physical abuse resistance, physical support, and finish.

4.1.1 Grade 1: Aluminum sheet metal,

4.1.2 Grade 2: Stainless steel sheet metal,

4.1.3 Grade 3: Coated steel sheet metal, and,

4.1.4 Grade 4: Plastic sheet.

4.2 *Type II*: Flexible for vapor retardance, or physical support or finish combination thereof.

4.2.1 Grade 1: Laminated multi-layer,

4.2.1.1 Class A: Below ambient application; extremely low permeance,

4.2.1.2 Class B: Below ambient application; very low permeance,

4.2.1.3 Class C: Below ambient application; low permeance, and

4.2.1.4 Class D: Above ambient application; no vapor retarder needed,

4.2.2 Grade 2: Plastic film.

4.2.2.1 Class A: Below ambient application; extremely low permeance,

4.2.2.2 Class B: Below ambient application; very low permeance,

4.2.2.3 Class C: Below ambient application; low permeance, and

4.2.2.4 Class D: Above ambient application; no vapor retarder needed.

4.3 Grade 3: Fabric

4.3.1 No grades; support only, vapor retarder properties not applicable.

5. Significance and Use

5.1 Jackets provide one or more of three basic functions when applied over thermal insulation:

5.1.1 Physical protection, in the form of abuse resistance and added structural integrity or support for the insulating medium.

5.1.2 Resistance to moisture vapor intrusion into the insulating medium in those applications where ambient and operating temperatures create a vapor driving force toward the cold (insulated) surface.

5.1.3 Exposed finish for the insulation

5.2 Type I semi-rigid jackets, in the form of metallic or heavy gauge plastic sheet, are used over insulation on piping or equipment to provide high abuse resistance. In this case, the material is also referred to as a protective jacket.

5.3 The vapor retarding Type II flexible jacket (Grades 1 and 2, Classes A, B and C) is used by itself in below ambient service applications not requiring high abuse resistance. In those cases where high abuse resistance is required, it is applied to the insulation prior to installation of a protective jacket.

5.4 The non vapor-retarding Type II flexible jacket (Grades 1 and 2, class D) is used by itself in above ambient service applications not requiring high abuse resistance. It may also be used for support of the insulation prior to installation of a protective jacket in above ambient applications requiring high abuse resistance.

5.5 Since semi-rigid protective jackets do not perform a vapor retarder function, and flexible jackets do not provide high abuse resistance, the various materials categorized herein are commonly used in combination, but not interchangeably.

5.6 Vapor-retarding properties are not necessary for systems operating above ambient.

5.7 In applications where there is a need to reduce surface emittance, non-metallic jacket, or painted, or film covered metal jacket may be specified.

⁶ Annual Book of ASTM Standards, Vol 01.05.

³ Available from Technical Association of the Pulp and Paper Industry (TAPPI), 15 Technology Parkway South, Norcross, GA 30092, <http://www.tappi.org>.