



Designation: C1879 – 21

# Standard Practice for Installation of Aluminum and Stainless Steel Jacketing over Thermal Insulation on Pipe and Rigid Tubing<sup>1</sup>

This standard is issued under the fixed designation C1879; 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 practice covers recommended installation techniques for aluminum and stainless steel jacketing for thermal and acoustic pipe insulation operating at either above or below ambient temperatures and in both indoor and outdoor locations. This practice applies to materials manufactured in accordance with Specification C1729 (aluminum jacketing) or Specification C1767 (stainless steel jacketing). It does not address insulation jacketing made from other materials such as mastics, fiber-reinforced plastic, laminate jacketing, PVC, or rubberized or modified asphalt jacketing, nor does it cover the details of thermal or acoustical insulation systems.

1.2 The purpose of this practice is to optimize the performance and longevity of installed metal jacketing and to minimize water intrusion through the metal jacketing system. This document is limited to installation procedures for metal jacketing over pipe insulation up to a pipe size of 48 in. NPS and does not encompass system design. This practice does not cover the installation of metal jacketing on rectangular ducts or around valves and gauges. It excludes the installation of spiral jacketing on cylindrical insulated ducts but is applicable to metal jacketing on cylindrical insulated ducts installed similarly to pipe insulation jacketing. Guide C1423 provides guidance in selecting jacketing materials and their safe use.

1.3 The intrusion of water or water vapor into an insulation system will, in some cases, cause undesirable results such as corrosion under insulation, loss of insulating ability, and physical damage to the insulation system. Minimizing the movement of water through the metal jacketing system is only one of the important factors in helping maintain good long-term performance of the total insulation system. There are many other important factors including proper performance and installation of the insulation, vapor retarder, and insulation joint sealant. Optimum long-term insulation system performance is only achieved by carefully considering all aspects of insulation system design and how these relate to the intended

application (hot, cold, cryogenic, severe environment, etc.). This practice only addresses installation of metal jacketing so total insulation system design is outside of its scope.

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
  - C450 Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging
  - C585 Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing
  - C1423 Guide for Selecting Jacketing Materials for Thermal Insulation
  - C1696 Guide for Industrial Thermal Insulation Systems
  - C1729 Specification for Aluminum Jacketing for Insulation
  - C1767 Specification for Stainless Steel Jacketing for Insulation

- 2.2 *Other Standards:*
- National Commercial & Industrial Insulation Standards (MICA), current edition

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

Current edition approved May 1, 2021. Published May 2021. DOI: 10.1520/C1879-21.

<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*—Terminology **C168** applies to the terms used in this specification.

#### 3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *flashing sealant, n*—a water resistant adhesive or mastic that retains flexibility and is used to seal the longitudinal joint, circumferential joint, or any other overlapping seam between sections of metal jacketing.

3.2.2 *metal gore, n*—one of a multitude of similar metal pieces used to form the jacketing for insulated pipe and rigid tubing elbows, fittings, or other non-straight portions of the insulation system.

3.2.2.1 *Discussion*—The individual metal gores begin as flat irregularly shaped pieces that are wrapped around an insulated elbow with the widest portion going over the heel of the insulated elbow and the two narrow ends meeting and attached to each other in the throat of the insulated elbow. These individual gore pieces meet one another at angles and have a triangular or truncated triangular shape when viewed from the side. Beading/crimping of metal gore edges is an optional but often used practice that achieves a tighter fit between neighboring metal gores.

3.2.3 *metal gore fitting cover, n*—jacketing for insulated elbows, fittings, or other non-straight portions of an insulation system made from a multitude of similar overlapping metal pieces (see *metal gore*).

3.2.4 *pre-formed metal fitting covers, n*—factory-produced metal jacketing for fittings or elbows comprised of a multitude of identical pieces that are hydraulic machine-pressed from flat sheet metal wherein two dimensionally identical parts, each covering about half the circumference of the insulation, are present on any given portion of the insulated fitting or elbow.

3.2.4.1 *Discussion*—At any given longitudinal location on the fitting or elbow insulation, there will always be two identical pre-formed metal jacketing pieces (often called a “left” and “right” or an “inner” and “outer”) that encapsulate that insulation location. Each piece of pre-formed metal jacketing fitting will only encase about half the circumference of the insulation. Pre-formed metal jacketing used on insulated elbows will always be curved similarly to the underlying pipe.

3.2.5 *tangent (as related to pre-formed metal fittings), n*—the straight portion on one or both ends of a pre-formed metal fitting jacket intended to overlap with straight pipe and rigid tubing metal jacketing.

3.2.6 *water staining, n*—a type of surface staining that occurs between two plates of aluminum in close proximity with water present from rain, condensation from high humidity environments, or other sources.

3.2.6.1 *Discussion*—Corrosion created by the presence of harsh chemicals in the insulation system or the surrounding environment is not considered water staining.

### 4. Summary of Practice

4.1 Metal jacketing serves primarily as a protective covering, providing physical and weather protection to the thermal insulation system underneath it. It is normally used

outdoors, although it is used indoors in some applications. Since it is generally not possible to seal all joints against water vapor intrusion, metal jacketing is not considered a vapor retarder and must not be used as such. The installation of a suitable vapor retarder applied to the insulation beneath the metal jacketing is outside the scope of this practice.

4.2 For field installed insulation systems, all testing of piping systems shall be completed, and the person responsible for the piping shall authorize the commencement of the insulation work prior to the installation of the insulation system.

4.3 For insulation systems that are partially factory-installed such as pre-insulated pipe, attachment of pipe or rigid tubing sections, and testing of the piping systems shall be completed prior to the installation of the insulation system at the pipe or rigid tubing joint locations.

### 5. Significance and Use

5.1 This practice applies to materials manufactured in accordance with Specification **C1729** (aluminum jacketing) or Specification **C1767** (stainless steel jacketing). This standard is intended to provide a basic practice for installing these types of materials. Refer to Specifications **C1729** and **C1767** for information on the differences between aluminum and stainless steel jacketing and where each is considered for use.

5.2 This practice is not intended to cover all aspects associated with installation for all applications, including factory and field fabricated pipe fitting covers.

NOTE 1—Consult the National Commercial & Industrial Insulation Standards (MICA), Guide **C1696**, the product manufacturer, and/or project specifications for additional recommendations.

5.3 Metal jacketing is typically used on insulated piping located outdoors, including, but not limited to, process areas and rooftops. Metal jacketing is used indoors where greater resistance to physical damage is required, for appearance, for improved fire performance, or as otherwise preferred. Metal jacketing used outdoors serves the same functions as indoors and also protects the insulation system from weather.

5.4 Metal jacketing is used over all types of pipe insulation materials.

### 6. Workmanship, Finish, and Appearance

6.1 The metal jacketing shall have no visible defects that will adversely affect its performance.

6.2 The outer surface of the unjacketed insulation system shall be dry and free of foreign substances prior to the application of metal jacketing.

6.3 Unless otherwise allowed, metal jacketing material shall be supplied in the manufacturer’s standard commercial package.

6.4 Metal jacketing shall be stored in a dry area before use. Water staining of aluminum occurs in some cases due to improper storage before installation.

6.5 All fasteners and bands shall be neatly aligned, and overall work must be of high quality in appearance and workmanship. See **7.4**.

6.6 The gap between metal jacketing and any objects penetrating the metal jacketing shall be between ¼ and ½ in. (between 6 and 13 mm), and this gap will be sealed with specifier approved flashing sealant.

## 7. Materials

### 7.1 Aluminum Jacketing:

7.1.1 Aluminum jacketing shall comply with the requirements of Specification **C1729**.

7.1.2 Aluminum jacketing roll or sheet edges and edges created by field cutting are, in some cases, sharp. Proper care must be taken when handling these edges. Consideration shall be given to applying a safety edge or safety hem per Specification **C1729**.

### 7.2 Stainless Steel Jacketing:

7.2.1 Stainless steel jacketing shall comply with the requirements of Specification **C1767**.

7.2.2 Stainless steel jacketing roll or sheet edges and edges created by field cutting are almost always sharp. Proper care must be taken when handling these edges. Consideration shall be given to applying a safety edge or safety hem per Specification **C1767**.

7.3 *Insulated Pipe and Rigid Tubing Elbow and Fitting Covers*—It is recommended that aluminum or stainless steel jacketing for insulated pipe or tubing elbows/fittings be two-, four-, or eight-piece pre-formed metal fitting covers where available although a metal gore fitting cover is acceptable. See **3.2.2** through **3.2.5** for information distinguishing pre-formed metal fitting covers from metal gore fitting covers.

### 7.4 Banding and Fasteners:

7.4.1 Acceptable fasteners for above-ambient temperature applications include banding, screws, and rivets.

7.4.2 In applications where the pipe temperature is below the ambient temperature where a vapor retarder is required, rivets, screws, or any other fastener capable of penetrating the underlying vapor retarder shall not be used to secure metal jacketing. Banding is used in these applications.

7.4.3 S-clips are recommended to support jacketing on vertical pipe, but their use is not mandatory.

### 7.5 Jacketing/Flashing Sealants:

7.5.1 Jacketing/flashing sealants shall be moisture and water resistant, non-hardening, and flexible.

7.5.2 Flashing sealants shall be used to seal around protrusions, insulation terminations, and jacketing slip joints. Flashing sealants are used at all metal jacketing joints if so indicated by the specifier in order to help keep water out of the insulation system.

## 8. Installation Practices

### 8.1 General:

8.1.1 Good communication and coordination between the installer of the metal jacketing, the installer of the insulation, and any procurement personnel is necessary to assure proper fit of the metal jacketing over the insulation, especially at fittings and elbows where the insulation outer diameter tolerance (see Practice **C585**) and/or possible use of miters in insulation elbows has a significant impact on the fit of the metal jacketing.

8.1.2 The installer shall use the specified nominal metal jacketing thickness. Refer to the appropriate metal jacketing material standard (Specification **C1729** or Specification **C1767**) for dimensional tolerances.

8.1.3 Metal jacketing shall be applied over dry insulation, vapor retarder, or acoustical barrier.

8.1.4 Before jacketing is installed on a portion of the insulated piping or rigid tubing, any vapor retarder system on that portion must be complete and continuous.

8.1.5 Unless otherwise specified, installation methods for aluminum and stainless steel jacketing shall be the same.

8.1.6 With the exception of stainless steel accessory items used for jacketing closure such as banding or screws, aluminum and stainless steel jacketing materials shall not be used on the same system in contact with each other to reduce the risk of corrosion arising from the use of dissimilar metals in contact.

8.1.7 Metal jacketing overlaps at joints shall be oriented to best avoid water infiltration. Whenever possible, metal jacketing overlaps shall be oriented to naturally shed water or face away from prevailing winds.

8.1.8 Expansion and contraction of the insulation system must be considered when selecting and sizing jacketing and securement materials and methods, especially for large diameter pipe, high-temperature systems, or applications that cycle between hot and cold temperatures.

8.1.9 The pipe and rigid tubing insulation used shall comply with the sizing requirements specified in Practice **C585** in order to help ensure proper fit of the metal jacketing over the insulation.

8.1.9.1 Two, four, and eight-piece pre-formed metal fitting covers installed on insulated pipe and rigid tubing elbows and fittings will, in some cases, yield an unacceptably small heel and throat (longitudinal) overlap if the insulation is mitered or if the pipe insulation outer diameter exceeds the tolerances specified in Practice **C585**. Options to successfully install metal jacketing covers in this situation are to use the next larger diameter pre-formed metal fitting cover available, rasp or otherwise trim down the high points of the insulation at the miter “peaks”/joints on the heel of the fitting/elbow, or to replace the insulation with properly sized insulation using the proper number of miters as specified in Practice **C450**. Consult the metal jacketing cover manufacturer for recommended sizes. In some situations, using the next larger diameter pre-formed metal fitting cover available will lead to fish-mouthing of this elbow cover where it meets the metal jacketing on the adjacent straight pipe.

### 8.2 Straight Pipe:

8.2.1 Metal jacketing overlaps at butt/circumferential joints between straight pipe jacketing sections shall be a minimum of 2 in.

8.2.2 Metal jacketing overlaps at longitudinal joints on straight pipe jacketing sections shall be a minimum of 2 in. for systems with nominal insulation outer diameters up to 16 in., and shall be a minimum of 3 in. for systems with nominal insulation outer diameters over 16 in.