

## **3M™ VentureClad™ Insulation Jacketing Products**

# **Recommended Installation and Repair Guide**

## **Pipe and Equipment Insulation Jacketed with Factory and Field Installed 3M™ VentureClad™ Products**



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### Product Key

<b>1577CW</b>	Smooth silver aluminum with adhesive
<b>1577CW-E</b>	Embossed silver aluminum with adhesive
<b>1577NA</b>	Smooth silver aluminum without adhesive
<b>1577CW-CM/WM/BM</b>	Smooth silver aluminum, white, or black with adhesive and a membrane
<b>1579GCW</b>	Heavy duty, smooth silver aluminum with adhesive
<b>1579GCW-E</b>	Heavy duty, embossed silver aluminum with adhesive
<b>1579GNA</b>	Heavy duty, smooth silver aluminum without adhesive
<b>1579GCW-CM/WM</b>	Smooth silver aluminum and white with adhesive and a membrane

# 3M™ VentureClad™ Insulation Jacketing Products

## Recommended Installation and Repair Guidelines, Revision 1

### 1. Scope

- a. Using 3M™ VentureClad™ products 1577CW, 1579GCW, and 1579GNA, the following recommended installation guidelines apply when installing these materials to rigid or semi-rigid pipe insulation materials. It will apply to either factory or field jacketing. “CW” products have a pressure sensitive adhesive, covered with a release liner, over their entire inside surface. “NA” products have no adhesive.
- b. 1577CW, 1579GCW, and 1579GNA are suitable for both indoor and outdoor applications but not for below ground, buried applications. It is recommended that either 1577CW pressure sensitive tape be used for sealing all 1579GCW and 1579GNA seams, whether they are lap or butt joints, or the more flexible 1578CW tape. The 1577CW tape may be used for both securement and sealing the insulation sections/segments against both water and water vapor intrusion. The 1578CW tape is only to be used for sealing the insulation sections/segments against water and water vapor intrusion in recommended locations. 4-inch (100mm) wide seaming tape should be considered the standard if not recommended otherwise.
- c. Although the figures within this manual show the 3M™ VentureClad™ and 3M™ Venture Tape™ products with an embossed and smooth aluminum finish, they are also available in other colors.
- d. Insulation materials for which these procedures are applicable include, but are not necessarily limited to, the following: polystyrene, polyisocyanurate, phenolic foam, cellular glass, flexible elastomeric, polyolefin, faced or unfaced fiberglass, mineral wool, molded expanded perlite, flexible aerogel, and calcium silicate.
- e. These procedures assume the piping will operate at below ambient temperatures and therefore include sealing against water vapor intrusion. For below ambient applications, where condensation control is required, it may be beneficial to select a 3M™ VentureClad™ product with a high emittance (i.e., > 0.5) to reduce the insulation thickness required to prevent surface condensation. Since all the 3M™ VentureClad™ products covered by this manual will have a low water vapor permeance, no additional vapor retarder needs to be used so long as the 3M™ VentureClad™ is sealed tightly at all locations.
- f. The maximum use temperature of the Natural Aluminum 3M™ VentureClad™ products is 300°F (149°C). The maximum use of the Membrane 3M™ VentureClad™ products is 248°F (120°C). The pipe service temperature itself may be much higher on above ambient service. In those cases, the exposure temperature of the 3M™ VentureClad™ should be controlled to below 300°F by the design and installation of the insulation system.
- g. Proper adhesion of the materials is paramount in the long term success of the jacketing and the tape products. It is recommended that for both the 3M™ VentureClad™ and the 3M™ Venture Tape™, the installer keep the adherent surfaces free of dust, dirt, and water. It is recommended that the applicator is to seal immediately once this adhesive is exposed by removing the release liner.

## **2. Notes that apply to the installation of 3M™ VentureClad™ jacketing on insulated pipes:**

**Note 1:** *The guidelines in this manual do not purport to address all engineering issues associated with the use of 3M™ VentureClad™ jacketing products and pipe insulation system design. It is the responsibility of the facility owner to have (1) qualified structural engineers perform calculations, as required, to make certain that the securement is sufficient, accounting for the weight of the insulation system; (2) qualified mechanical engineers determine the insulation meets the required thermal requirements and (3) qualified corrosion engineers to specify type and thicknesses of insulation materials and coatings to protect the metal surfaces from corrosion under insulation.*

**Note 2:** *Users of this manual should use only trained, skilled, and experienced insulation workers. The guidelines included in this manual are not of sufficient detail to advise the installer of all techniques required to install insulation systems correctly.*

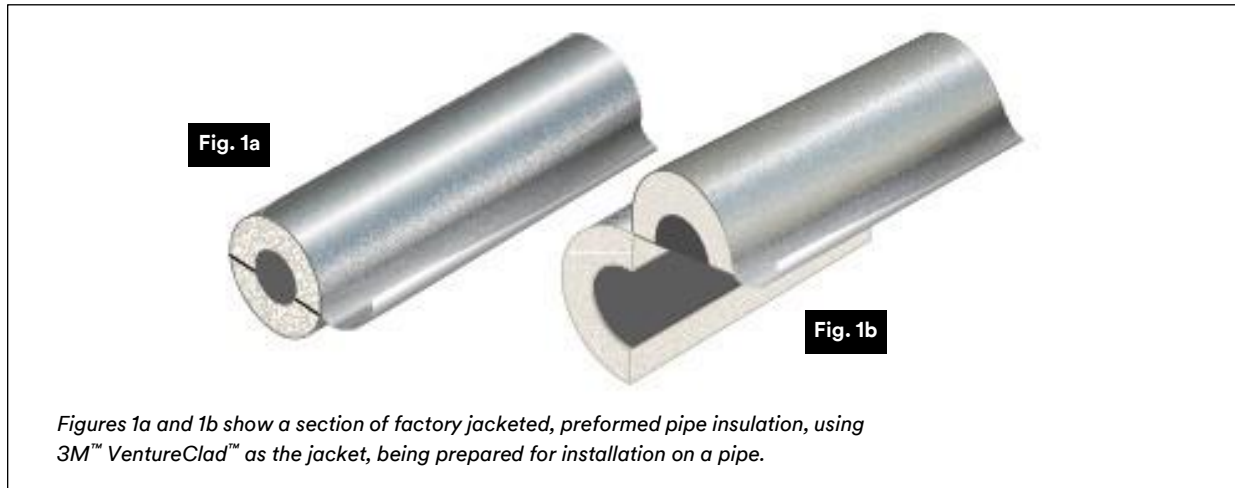
**Note 3:** *The guidelines in this manual do not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this manual to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

**Note 4:** *3M strongly recommends the facility owner/operator to conduct regular pipe and equipment insulation system maintenance. Damaged insulation systems can perform poorly and allow ingress of water from rain or melting snow or, on below ambient systems, water vapor intrusion with subsequent condensation. Wet insulation will not perform thermally on a par with that provided by the insulation material's manufacturer; further, it can lead to corrosion under insulation. The best prevention of these problems is a proactive insulation system maintenance program that includes sealing of the 3M™ VentureClad™ jacketing.*

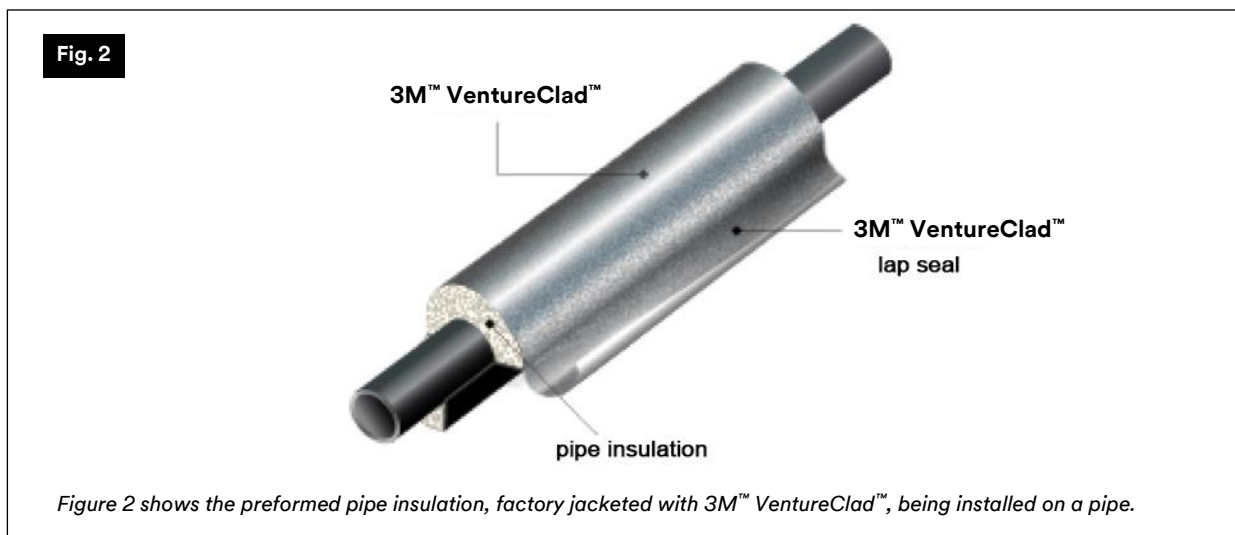
**Note 5:** *3M generally recommends the use of 3M™ Venture Tape™ 1577CW as a seaming tape with both 3M™ VentureClad™ 1577CW and 1579GCW products. In situations where extremely tight corners are required, the more flexible, 3M™ Venture Tape™ 1578CW product is acceptable.*

### 3. Installing straight sections of pre-formed pipe insulation that has been factory-jacketed:

On pipe sizes up through about 16-inch (400mm) NPS, the pipe insulation is slit into two pieces that hinge on the attached 3M™ VentureClad™ Insulation Jacketing. The sections are normally 36 inches (900mm) long, but may be cut shorter to accommodate field installation when required. See Figures 1a and 1b.



- a. Place the pipe insulation over top of the straight section of pipe to be insulated, as shown in Figure 2. For best securement of the insulation around the pipe, it is recommended that the longitudinal lap seal be at least 3 inches (75mm) wide.



- b. Adjust the pipe insulation, as shown in Figure 3, so the lap joint is either at 2 o'clock or at 10 o'clock. If recommended by the manufacturer of the insulation material, the two half-sections can be adhered to one another, during this step, using their recommended adhesive and application technique.

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**Fig. 3**

Adjust bottom half section up  
around pipe till they meet.



*Figure 3 shows the preformed section of pipe insulation, with factory applied 3M™ VentureClad™ as the jacket, being closed around the pipe.*

- c. Peel the release liner from the 3M™ VentureClad™ lap, as shown in Figures 4, 5, and 6. Next, press and seal the lap against the insulation and jacket, using the “squeegee” provided by 3M or equal. To accomplish a tight seal all along the entire length of that section of pipe insulation, rub the lap with the squeegee to remove all air and fish-mouth areas. When using the thicker 1579GCW as the jacket, it is recommended that an additional 4-inch (100mm) wide strip of 1577CW, cut to a length equal to the pipe insulation section (36 inches (900mm) or less) be applied over the lap joint, as shown in Figure 7.

**Fig. 4**



*Figure 4 shows the section of preformed pipe insulation, factory jacketed with 3M™ VentureClad™, having the release liner peeled to enable the sealing of the lap joint.*



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**Fig. 5**



Figure 5 shows the section of preformed pipe insulation, factory jacketed with 3M™ VentureClad™, fully installed on the pipe.

**Fig. 6**



Figure 6 is the same as Figure 5 except that the pipe insulation has been rotated, in the view, to show the sealed lap joint. Note that the lap joint should be at either 2 o'clock or 10 o'clock so it sheds water.

**Fig. 7**

Removing release liner  
from 3M™ Venture Tape™

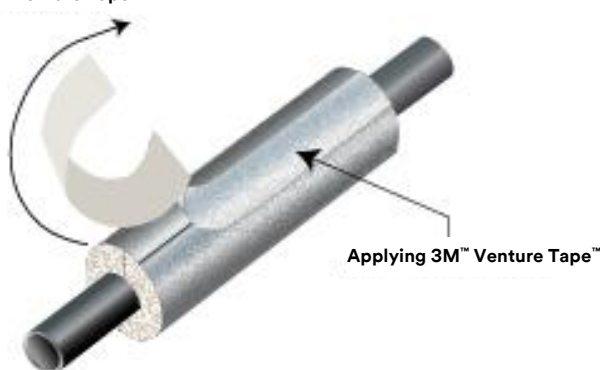


Figure 7 shows the application of 1577CW seaming tape over the same lap joint shown in Figure 6. This application is recommended when using the thicker 3M™ VentureClad™ 1579GCW as the insulation jacket, but is unnecessary when using the thinner 3M™ VentureClad™ 1577CW.

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- d. Butt the adjacent section of insulation tightly against the first section. After installation of the adjacent section of pipe insulation, take a piece of matching 4-inch (400mm) wide 1577CW seaming tape, cut to the length of the insulation circumference + 3 inches (75mm). Be certain that the tape is centered on the butt joint. Pull the release liner from it, and adhere the tape over the butt joint, making certain that the tape is centered on the butt joint. Use a “squeegee” to assure that the tape is well sealed to both the 3M™ VentureClad™ and to itself. See Figure 8a.
- e. If required by the insulation specification, stainless steel insulation bands can be installed at this point to secure the insulation section. As an alternative and if permitted by the insulation specification, 4-inch (100mm) wide 1577CW seaming tape, cut to the length of the pipe insulation circumference + 3 inches (75mm), can also be used, in place of metal bands.

**Fig. 8a**



#### **Insulated Pipe with 3M™ VentureClad™ and Exposed Butt Joint**

*Figure 8a shows an insulated pipe with 3M™ VentureClad™ and an exposed butt joint. This can accommodate either a taped, conventional butt joint (shown in Figures 8b and 8c), or it can be sealed with another sheet of 3M™ VentureClad™ as an expansion joint (shown in Figures 8d–8g).*

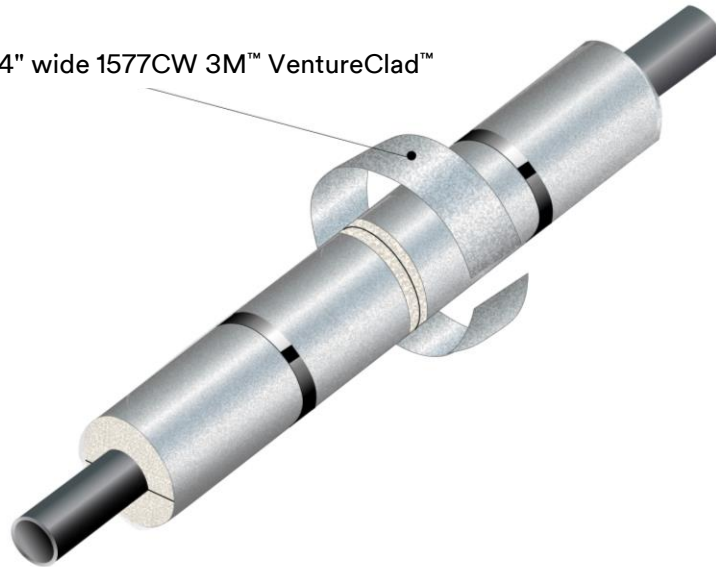


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**Fig. 8b**

4" wide 1577CW 3M™ VentureClad™



### Step 1: Wrap band around so the top overlaps the bottom underside

*Figure 8b shows the use of a strip of 4-inch (100mm) wide 1577CW seaming tape in forming a standard sealed butt joint between two adjacent pipe insulation sections covered with 3M™ VentureClad™ (either 1577CW or 1579GCW). The metal bands are optional. Note that this assembly does not include an expansion joint capability. See the following Figures 8d–8f for installation of an expansion joint.*

**Fig. 8c**

4" wide 1577CW



### Sealed joint complete

*Figure 8c shows a standard taped, sealed 3M™ VentureClad™ butt joint with no expansion capability. This makes use of a 4-inch (100mm) wide strip of 1577CW seaming tape.*

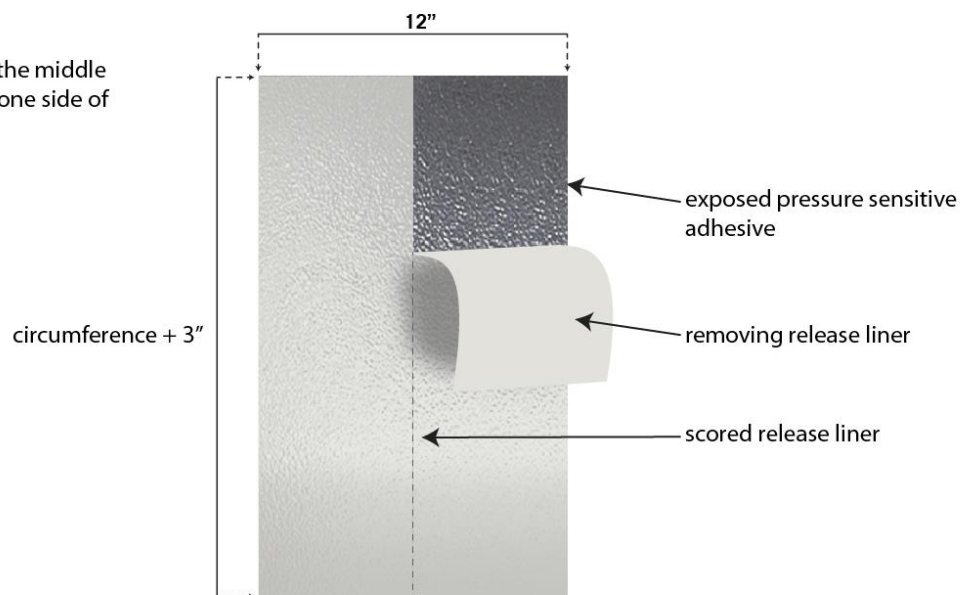
# 3M™ VentureClad™ Insulation Jacketing Products

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Installing an expansion joint on insulated pipe jacketed with 3M™ VentureClad™

**Fig. 8d**

Score down the middle and peel off one side of release liner



### Step 1: Prepare sheet of 3M™ VentureClad™

Figure 8d shows Step 1 in preparing a sheet of 3M™ VentureClad™ especially for an expansion joint.

**Fig. 8e**

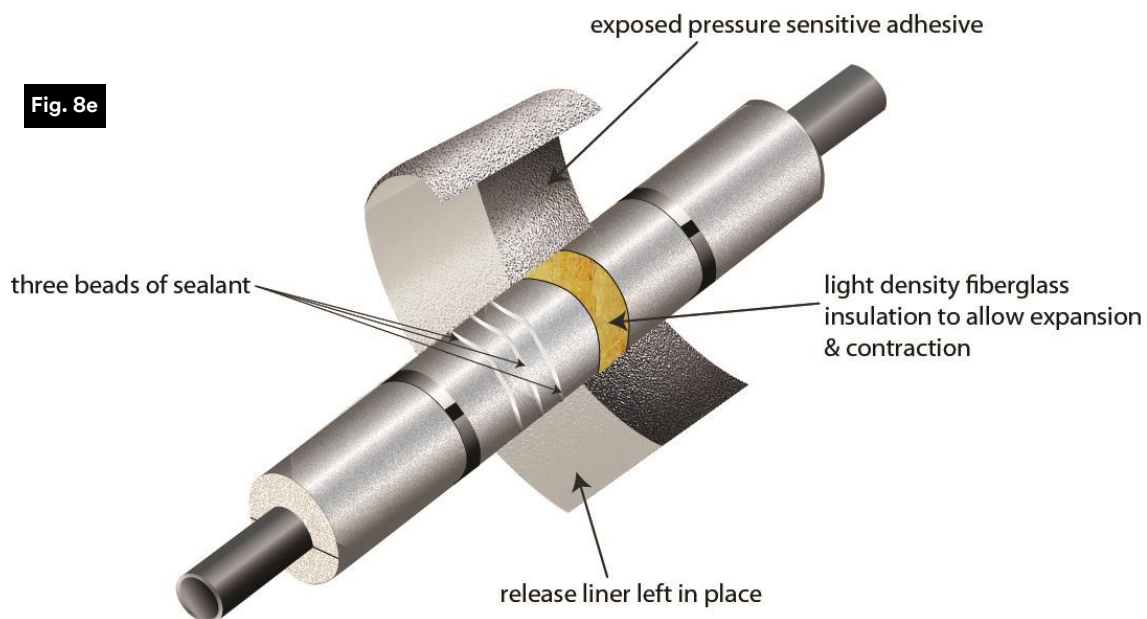
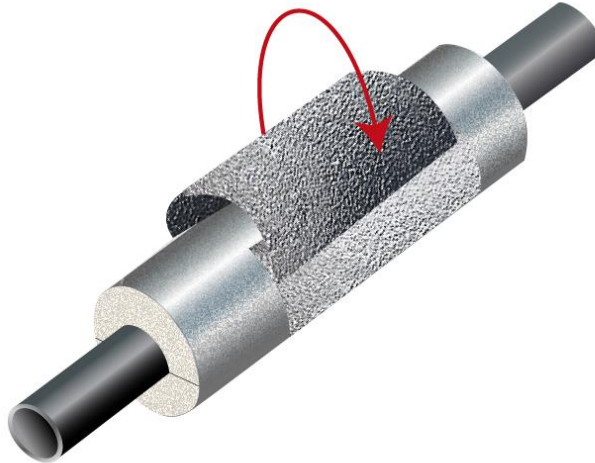


Figure 8e shows Step 2 in installing a 3M™ VentureClad™ expansion joint. Note that the sealant should be a non-curing, non-hardening type so as to allow for movement between the outer and the inner sheets of 3M™ VentureClad™ at the butt joint.

Installing an expansion joint on insulated pipe jacketed with 3M™ VentureClad™

**Fig. 8f**

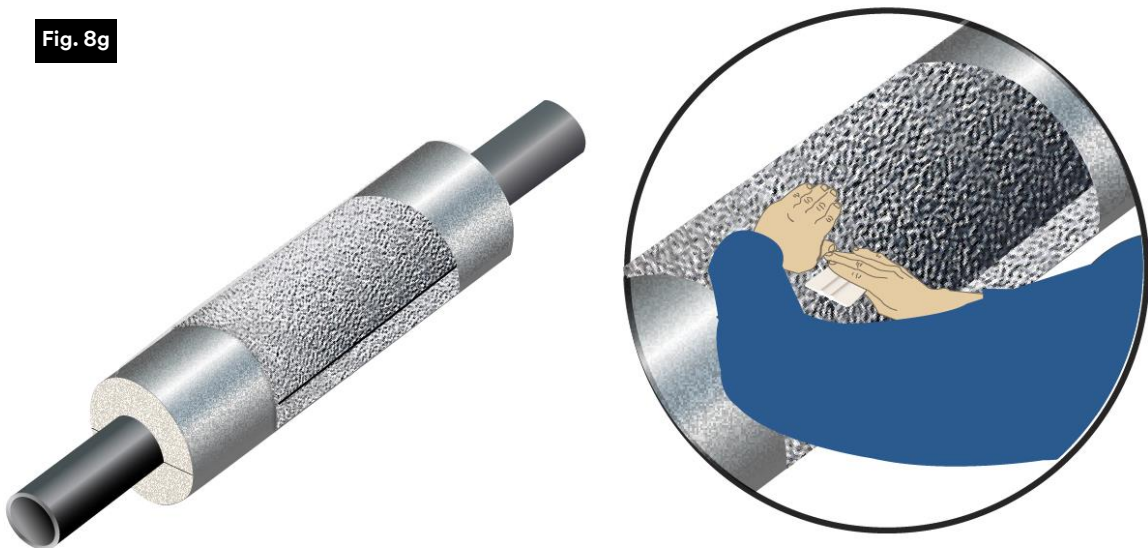


**Step 3: Wrap 3M™ VentureClad™ around so the top overlaps the bottom underside**

*Figure 8f shows Step 3 in installing a 3M™ VentureClad™ expansion joint.*

Installing an expansion joint on insulated pipe jacketed with 3M™ VentureClad™

**Fig. 8g**



**Step 4: Use squeegee to press and seal 3M™ VentureClad™ onto surface**

*Figure 8g shows the final Step 4 in completing a 3M™ VentureClad™ expansion joint, namely, using a squeegee to smooth out the 3M™ VentureClad™ and making certain that it is well sealed.*

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- f. For larger pipe sizes, normally > 16 inch (400mm) NPS, the pipe insulation is handled, and installed, as separate half-sections. See Figure 9. If recommended by the manufacturer of the insulation material, the two half-sections can be adhered to one another, during this step, using their recommended adhesive and application technique. This type of adhering is often referred to as “buttering the joints”.



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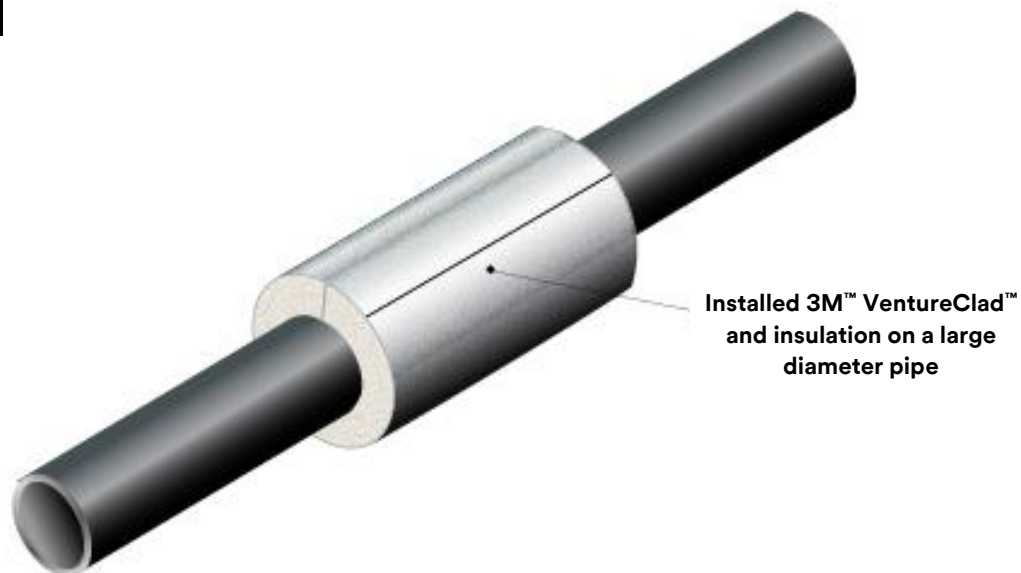
- g. Bring the half-sections together around the pipe. Remove the release liner, from the lap joint facing on one of the lap joints, to enable the 3M™ VentureClad™ lap to adhere to the 3M™ VentureClad™ on the other half section, as shown on Figure 10. Do the same with the second lap joint. Orient the two lap joints at 6 o'clock and 12 o'clock. As with smaller pipe insulation sections, it is recommended that these laps be a minimum of 3 inches (75mm) wide and be pressed firmly with a "squeegee" to assure good adhesion and tightly sealed joints over the entire length of the lap.



- h. Complete the installation of the two half sections, as shown on Figure 11. When using the thicker 1579GCW, it is recommended to also apply a strip of 1577CW tape over each lap joint, as previously shown in Figure 7.



**Fig. 11**

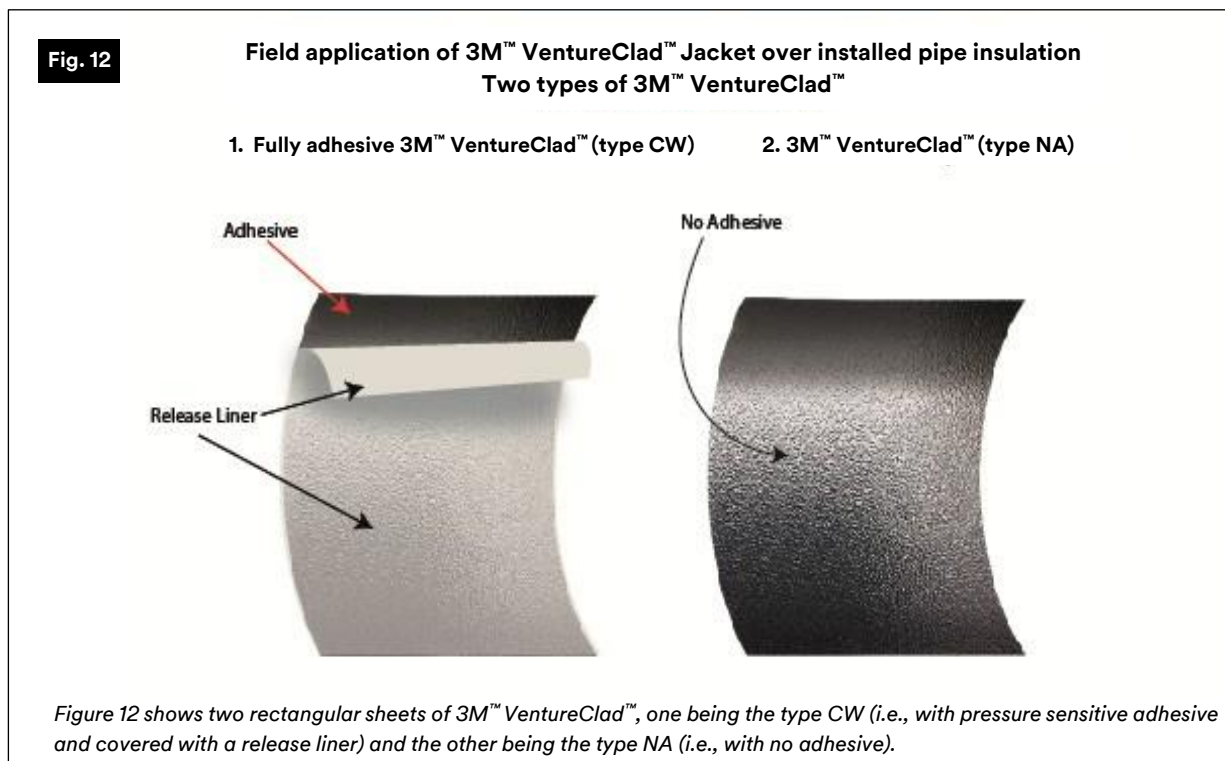


*Figure 11 shows the completed installation of preformed pipe insulation, factory jacketed with 3M™ VentureClad™.*

- i. Continue installing insulation sections until you reach a fitting, such as an elbow, tee, or valve.
- j. To secure the insulation to the pipe and if required by either the insulation manufacturer or the specification, install either stainless steel bands or 4-inch (100mm) wide 1577CW, at periodic axial distances from one another. Many lower density pipe insulation materials used for below ambient service, such as fiberglass, mineral wool, phenolic foam, polystyrene, and polyisocyanurate, do not normally require additional support from metal bands (Note: 3M is not making a recommendation about whether metal bands are necessary since this is an engineering issue that is project specific). When additional securement is required and if allowed by the specification, 4-inch (100mm) wide 1577CW, cut to a length of the insulation circumference + 3 inches (75mm) or more, can be used in place of metal bands.
- k. Vapor Dams / Stops: For below ambient applications, apply a vapor barrier mastic, per either the insulation manufacturer's recommendation or the project specification, to form "vapor dams" at every elbow. Note that the mastic must first be applied to the pipe surface, for a distance of 2 inches (50mm) along the pipe, then to the inside surfaces of both of the elbow insulation half sections, then to the butt end of the elbow insulation section to assure it seals properly and continuously. It is recommended that vapor dams be installed at a distance not to exceed 15 to 20 lineal feet (4.6m–6m) and also be installed at fittings.

#### 4. Field installation of 3M™ VentureClad™ jacket over insulated straight pipe:

- a. **Step 1:** Prepare sheets of 3M™ VentureClad™ CW cut to appropriate length. Be certain that the straight pipe insulation material has been installed so as not to exceed its maximum use temperature. The circumferential length of each 3M™ VentureClad™ sheet should be equal to the pipe insulation circumference + 3 inches (75mm) or more to account for the overlap needed at the lap joint. When multiple sheets are used to cover long linear runs of pipe, these also should have a minimum 3-inch (75mm) overlap.



- b. **Step 2:** Peel the release liner from the first sheet of 3M™ VentureClad™ CW (by about 3 inches at a time) and use a squeegee to press the material onto the insulation. See Figure 12. Repeat this step until the entire piece is overlapped and bonded directly to the insulation, as shown in Figure 13. Carefully bring the sheet around the pipe to prevent wrinkling and to make certain the sheet wraps around and laps over itself. See Figure 13.
- c. **Step 3:** For the thicker 1579GCW tape or 1579GNA products, apply a strip of 4-inch (100mm) wide strip of 1577CW tape over each circumferential butt joint, and then over each longitudinal lap joint. For product 1577CW, additional tape is unnecessary on the lap joints unless required by the specification.



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**Fig. 13**

### Field application of 3M™ VentureClad™ Jacket over installed pipe insulation

#### 1. Fully adhesive 3M™ VentureClad™ (type CW)

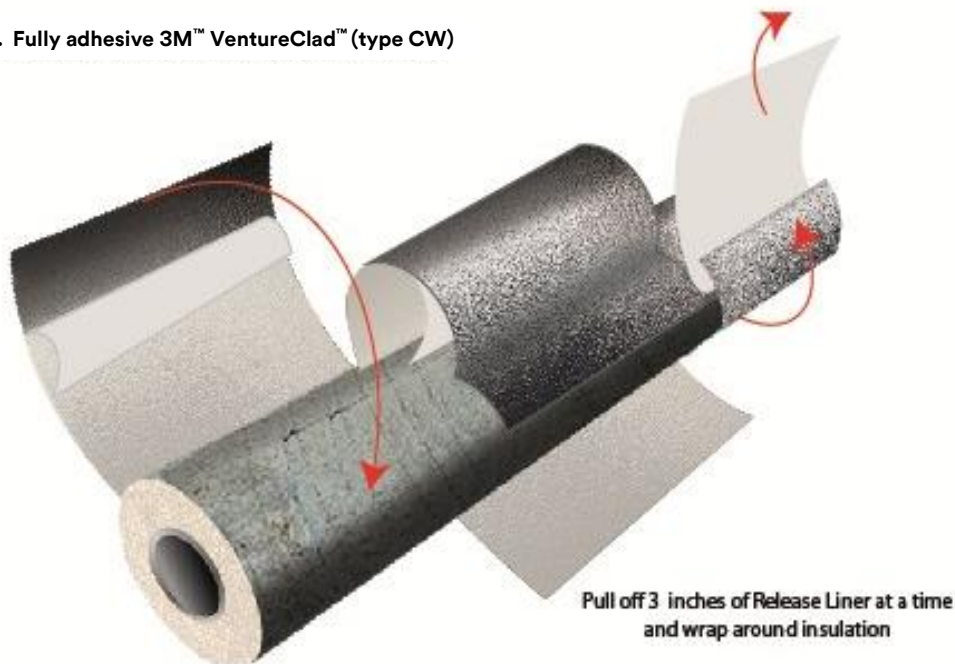


Figure 13 shows the installation of 3M™ VentureClad™ CW onto an insulated straight pipe. Note that the recommendation is for the installer to peel back about 3 inches (75mm) of the release liner at a time, adhere that 3 inches (75mm) of 3M™ VentureClad™ CW, then do another 3 inches (75mm). This will help assure the installer achieves a smooth surface.

**Fig. 14**

### Field application of 3M™ VentureClad™ Jacket over installed pipe insulation

#### 2. Adhesive end strip on 3M™ VentureClad™ (type NA)

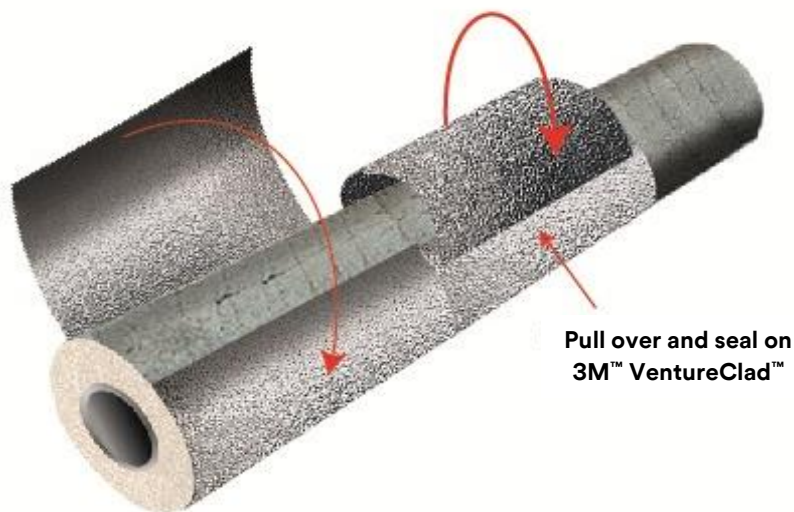
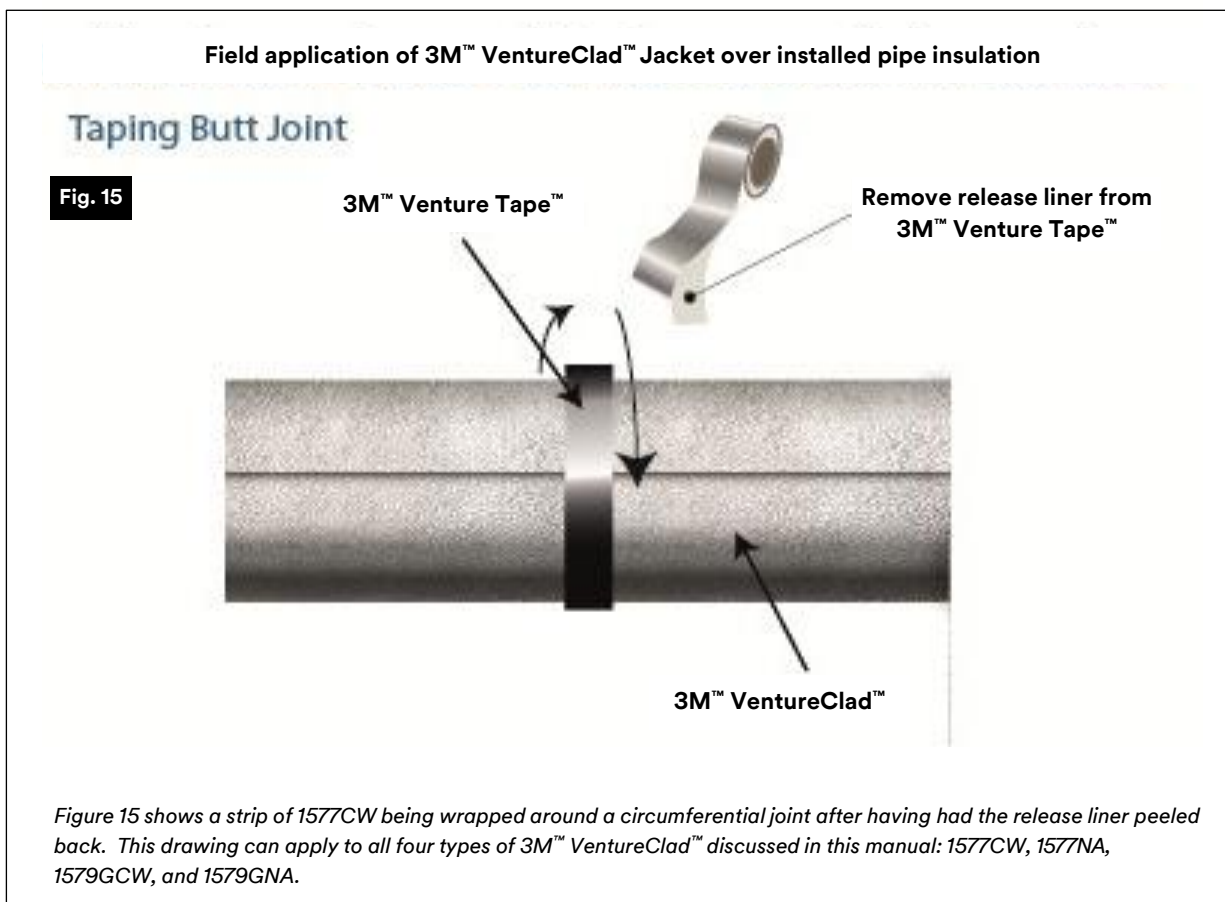


Figure 14 shows 3M™ VentureClad™ NA being installed onto a straight section of pipe that has already been insulated with unjacketed pipe insulation. This type of 3M™ VentureClad™ will have to be secured using a 4-inch (100mm) band of 1577CW.

## 3M™ VentureClad™ Insulation Jacketing Products

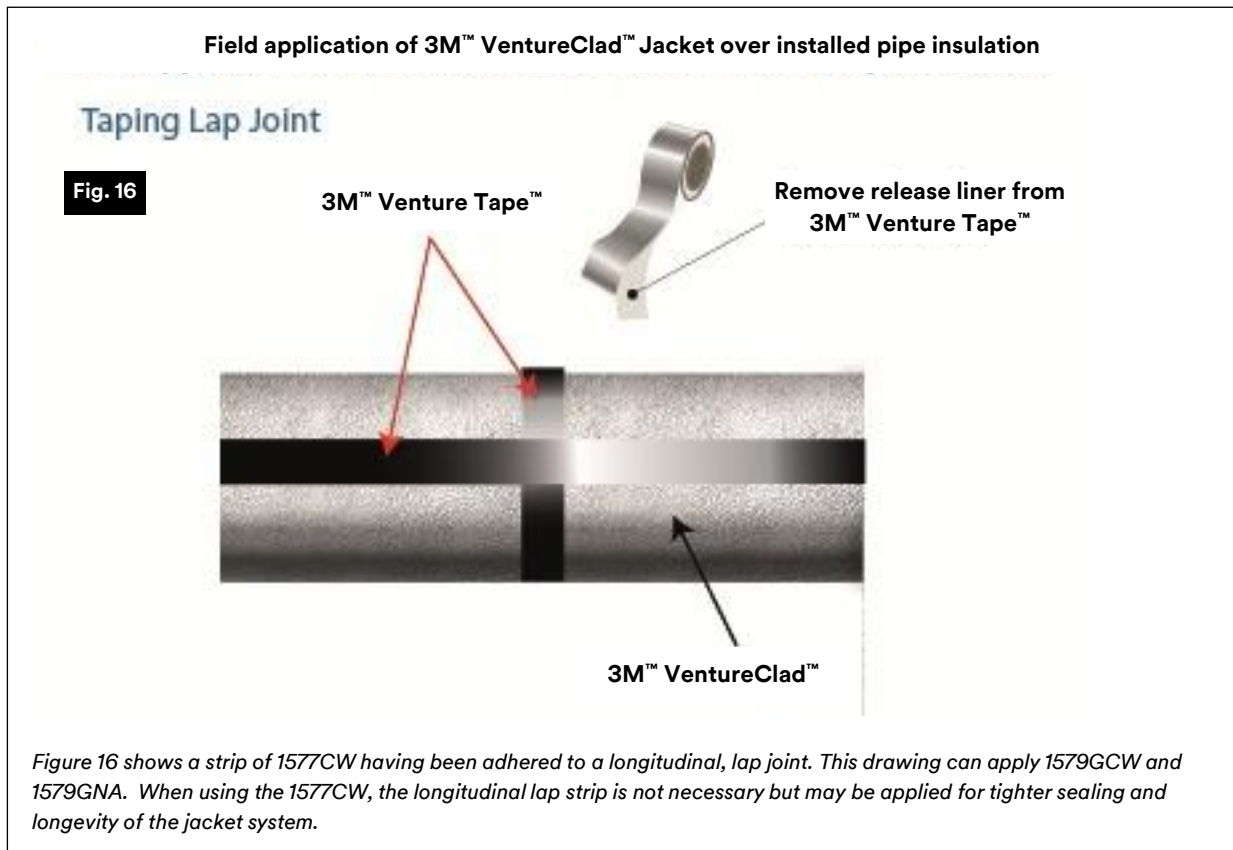
### Recommended Installation and Repair Guidelines, Revision 1

- d. Apply another sheet of 3M™ VentureClad™ in the same manner, adjacent to the first. The sheets do not have to overlap one another, but should be within ½ inch (12mm) of one another. Then, apply a strip of 4-inch (100mm) wide 1577CW to the circumferential joint. On small bore pipe (i.e., < 4 ½ inch (115mm) NPS), it is recommended that 1579GNA be used to cover the insulation and that a minimum 2-inch (50mm) wide 1577CW or 1578CW be used on all longitudinal seams and mitered joints and that 4 inch (100mm) wide 1577CW or 1578CW be used on all butt strip joints.
- e. Continue this sequence until you reach a fitting or other obstruction. See Figure 15.
- f. For above ambient applications on horizontal insulated pipe, the insulator may drill an approximately 1/4" (6mm) drain hole at the 6 o'clock position, to provide drainage, unless there is no clearance underneath the piping.



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### 5. Installing Factory-jacketed Fittings: Elbow Insulation fabricated from preformed pipe insulation sections that have been factory-jacketed with 3M™ VentureClad™.

#### a. Mitered elbows

- i. These elbows are to be fabricated, as two half sections, in a shop, following patterns in the National Commercial & Industrial Insulation Standards, 2011, Seventh Edition (referred to from here on as “the MICA Manual”), Table 12.20, for both short and long radius elbows. For example, an 8 x 2, LR, 90 degree elbow would be made from eight identical, mitered sections, each with a throat side dimension of 1-1/8 inches (28mm) and a heel side dimension of 3-5/8 inches (90mm).
- ii. The straight pipe insulation sections, from which the miters are to be cut, should first be jacketed with 1577CW or 1579GCW.
- iii. Fabrication: after all the miters have been cut from the straight pipe insulation sections jacketed with 3M™ VentureClad™, each half-“clam shell” is to be assembled. This is done by taping each ½ miter to the adjacent ½ miter using 1-inch (25mm) wide 1577CW or 1578CW, making certain that the tape is pressed firmly using a “squeegee”, against the jacketing on the miters to assure a tight seal. If recommended by the pipe insulation material manufacturer, the insulation ½ miter slices can be glued to one another in the process using their recommended adhesive and application technique. See Figure 17.

**Fig. 17**

**Individual mitters are taped together in fabrication shop**

(use of adhesive at insulation manufacture's recommendations)

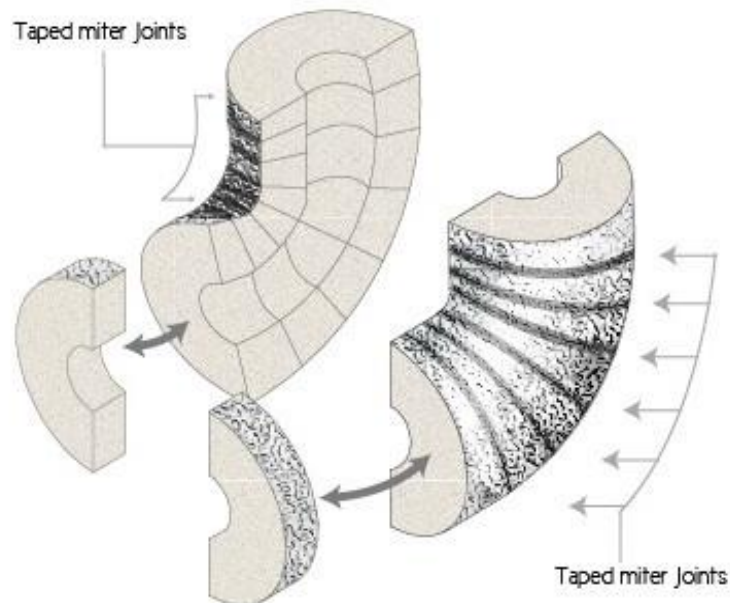


Figure 17 shows two half sections of a pipe elbow insulation fabricated from factory jacketed insulation.

Installation — In the field, bring the two “clam shell” sections together around the elbow, as shown in Figure 18.

**Fig. 18**

**First step in insulating 90 degree elbow**

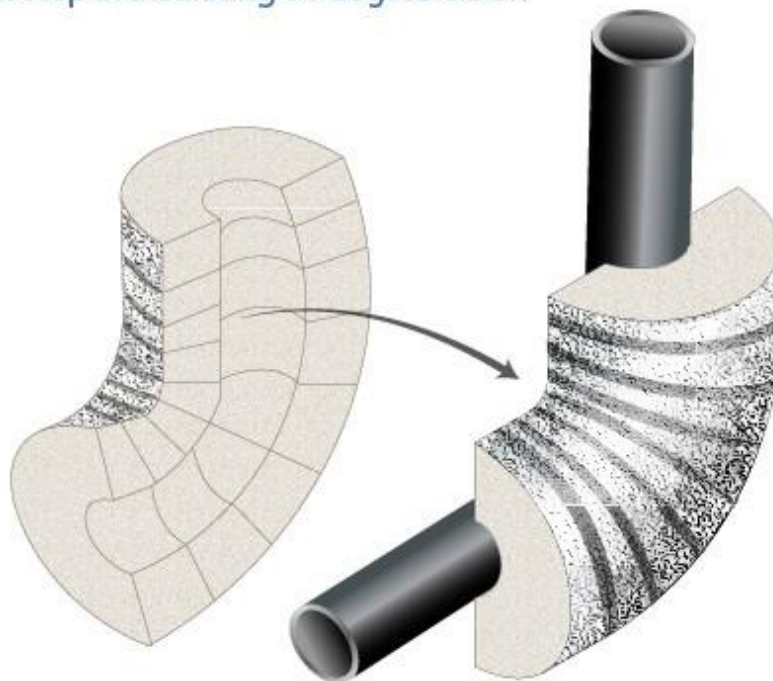


Figure 18 two half sections of 90 degree pipe insulation sections, being installed onto the elbow.

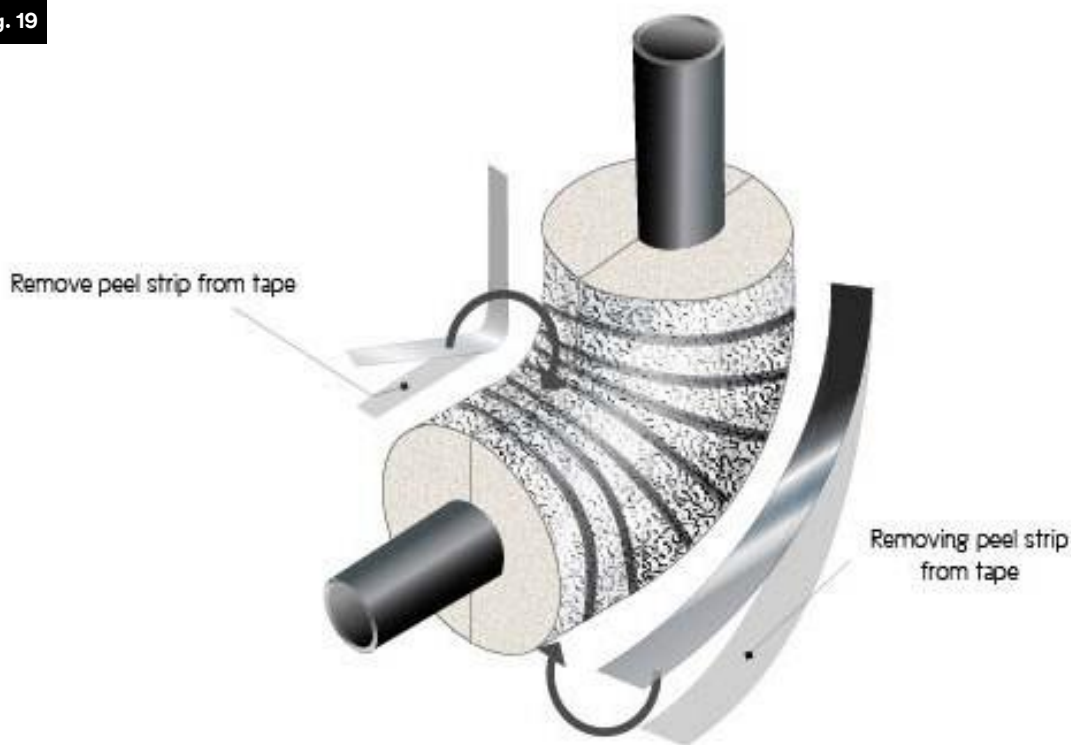
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- iv. Using two strips of 1577CW or 1578CW tape, of appropriate width for the size of the elbow being jacketed, with one cut to length of the “throat” and the other to the length of the “heel”, then attach the elbow insulation “clamshell” sections to one another by installing the strips of 3M™ Venture Tape™. See Figure 19. Be certain to press the tape strips firmly, using a squeegee to assure both a strong attachment and a tight vapor seal. If recommended by the insulation manufacturer, the insulation comprising the two “clamshells” can be adhered to one another, in the process, using their recommended adhesive and application technique.

#### Second step in insulating 90 degree elbow

**Fig. 19**



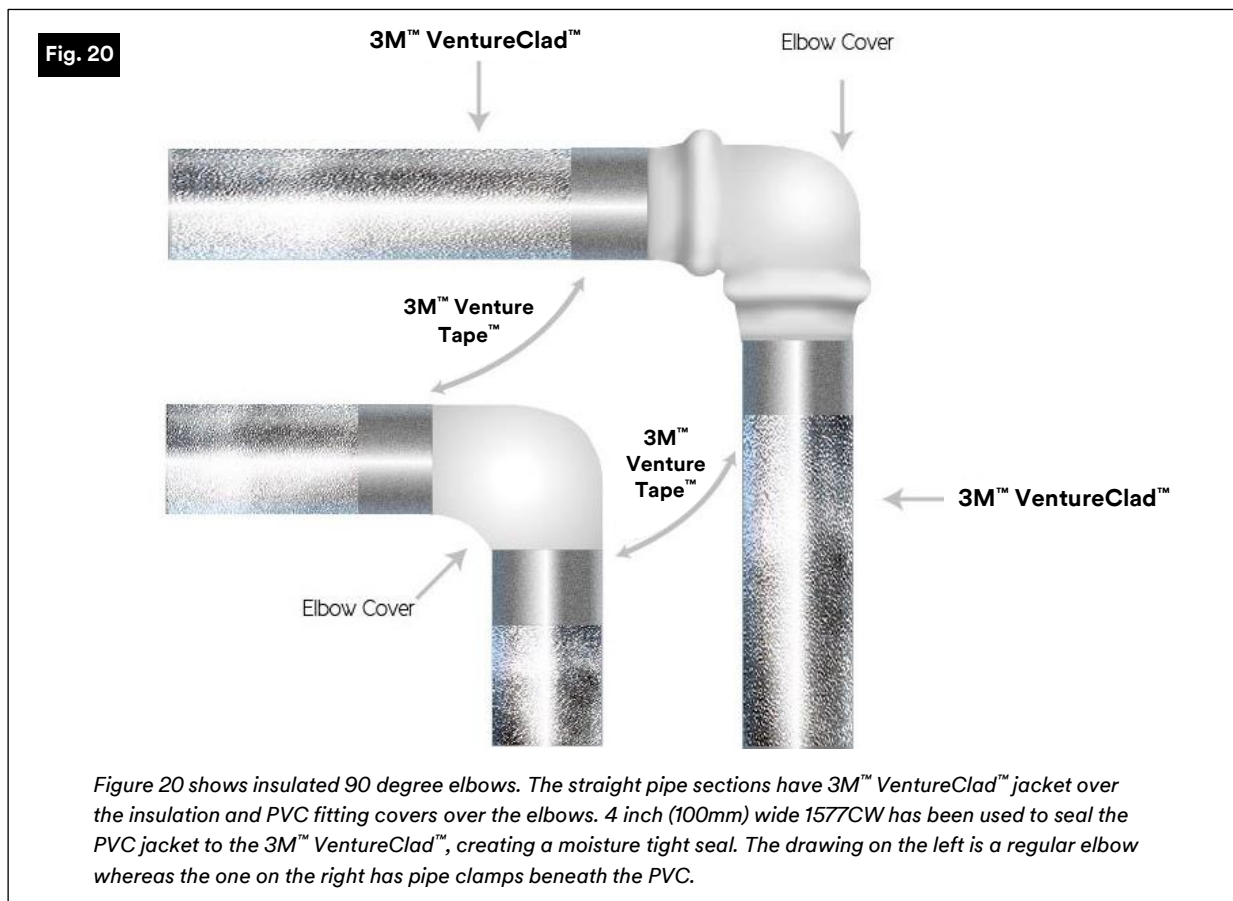
*Figure 19 shows a section of factory-jacketed elbow being installed onto a piping system.*



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- b. PVC jacketed elbow covers and other PVC fitting covers (generally for commercial applications only)
  - i. For insulation systems using straight pipe sections factory jacketed with 3M™ VentureClad™ and with PCV elbows, follow either the PVC manufacturer's installation instructions or follow those in the MICA Manual (7<sup>th</sup> Edition, 2011), Plate No. 12. This is particularly important if the PVC fitting cover forms the vapor retarder for the fitting. 3M is not making recommendations for how to seal the two PVC half sections to one another since that should be provided by the PVC fitting cover manufacturer or by the project specification.
  - ii. Some designers will not specify PVC jacketing for use outdoors and / or for high temperature applications. Note that 3M is not recommending the use of PVC fitting covers but merely acknowledging that they may be specified and used and if so, should be attached and tightly sealed to the adjacent 3M™ VentureClad™ jacketed pipe insulation.
  - iii. Use a strip of 4-inch (100mm) wide 1577CW, with a length equal to the insulation circumference + 3 inches (75mm), seal the PVC jacket to the 3M™ VentureClad™ on the adjacent pipe insulation section, using a squeegee, and thereby assure a tight vapor seal between the two jacketing materials. See Figure 20.



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- iv. It is recommended that other types of PVC fitting covers, such as those for Tees, be sealed with 1577CW in the same manner as PVC elbows.
- v. The vapor permeance of PVC sheet depends on its thickness and permeability. One manufacturer of PVC fitting covers gives the vapor permeance values as 0.058 Perm for 0.015-inch (0.4mm) thick material, 0.047 Perm for 0.020-inch (0.5mm) thick material, and 0.027 Perm for 0.030-inch (0.75mm) thick material. Hence, PVC fitting covers do not nearly have as low a vapor permeance as 3M™ VentureClad™. To reduce the vapor permeance of these fitting covers, one option is cover the PVC with 3M™ VentureClad™. This can be done, as shown in Figure 21, using 1578CW or 1577CW as a wrap. 3M recommends 1-inch (25mm) wide tape for fittings with an OD < 4 inches (100mm), 2 inch (50mm) wide tape for fittings with an OD < 8 inches (200mm), 3 inch (75mm) wide tape for fittings with an OD < 13 inches (325mm), and 4 inch (100mm) wide tape for all larger fittings. Be certain to overlap all joints when applying the tape.

**Fig. 21**

#### PVC elbow wrapped and sealed with 3M™ Venture Tape™

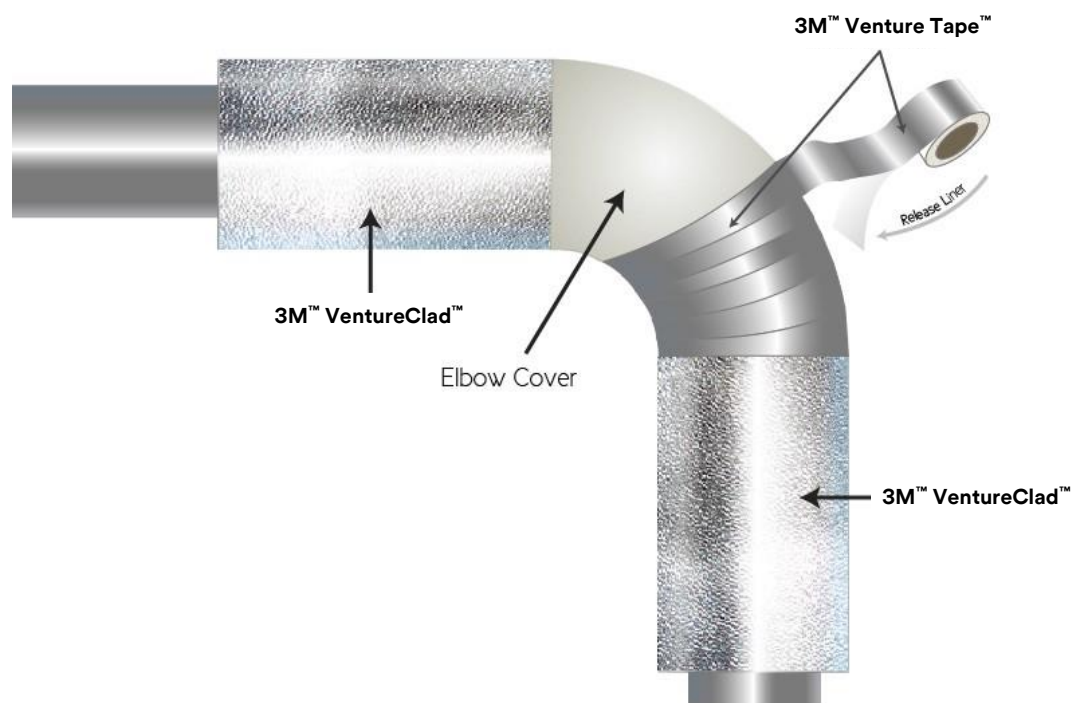


Figure 21 shows the vapor sealing of an installed PVC elbow cover with 3M™ VentureClad™ Tape 1577CW or 1578CW. Since 3M™ VentureClad™ has a much lower vapor permeance than commercially available PVC fitting covers, on a refrigeration system, the use of the tape will improve the vapor sealing of the fitting cover, thereby providing protection for the insulation itself. Note that the 3M™ VentureClad™ wrapping starts at the bottom of the elbow and works its way up so as to shed water.



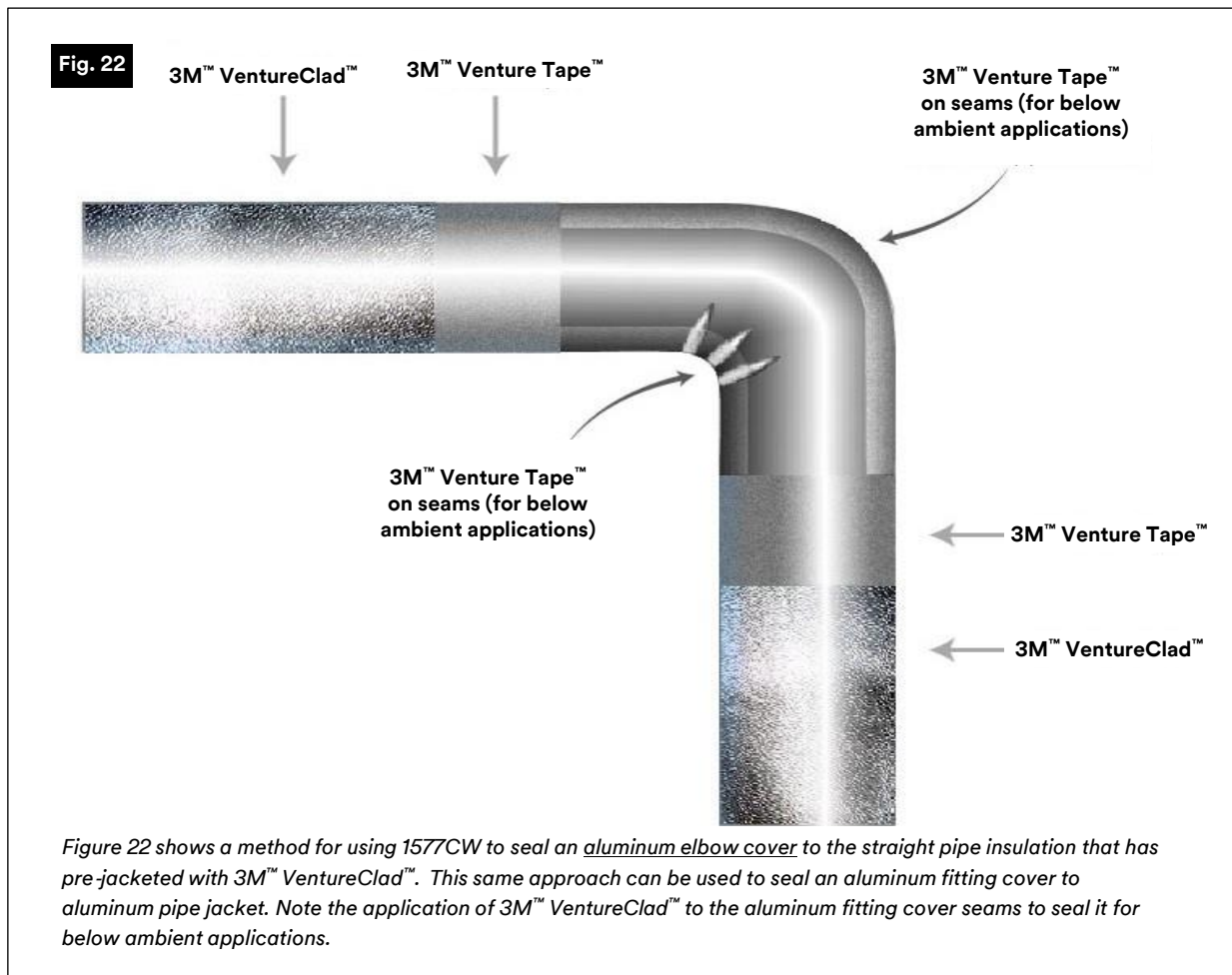
## 3M™ VentureClad™ Insulation Jacketing Products

### Recommended Installation and Repair Guidelines, Revision 1

- c. Pressed aluminum elbow covers and other aluminum fitting covers
  - i. For insulation systems using straight pipe sections factory jacketed with 3M™ VentureClad™ and with pressed aluminum elbows, follow the pressed aluminum fitting cover manufacturer's installation instructions.
  - ii. Note that 3M is not recommending the use of pressed elbow covers but merely acknowledging that they may be specified or selected and if so, should be attached and tightly sealed to the adjacent 3M™ VentureClad™ Jacketed Pipe Insulation.
  - iii. Use a strip of 4-inch (100mm) wide 1577CW, with a length equal to the insulation circumference + 3 inches (75mm), seal the pressed aluminum jacket to the 3M™ VentureClad™ on the adjacent pipe insulation section using a squeegee, and thereby assure a water and vapor tight seal between the two. See Figure 22.
  - iv. For below ambient applications, apply strips of 1578CW or 1577CW, with a minimum width of 2 inches (50mm), to both the "heel" and to the "throat" of the pressed aluminum elbow cover to seal the system from vapor intrusion. Use a squeegee to assure a tight vapor seal between the tape and the surface of the aluminum fitting cover. Note: The width of the tape needs to be appropriate to the insulated elbow's outer diameter. This may be 1-inch (25mm) width for insulated elbows with an OD < 4 inches (100mm), 2-inch (50mm) width for insulated elbows with an OD < 8 inches, 3-inch (75mm) width for insulated elbows with an OD < 12 inches (300mm), and 4-inch (100mm) width for all larger sizes.
  - v. For tight vapor seals, it is recommended that other types of PVC fitting covers, such as those for Tees, be sealed with 1577CW in the same manner as PVC elbows.

# 3M™ VentureClad™ Insulation Jacketing Products

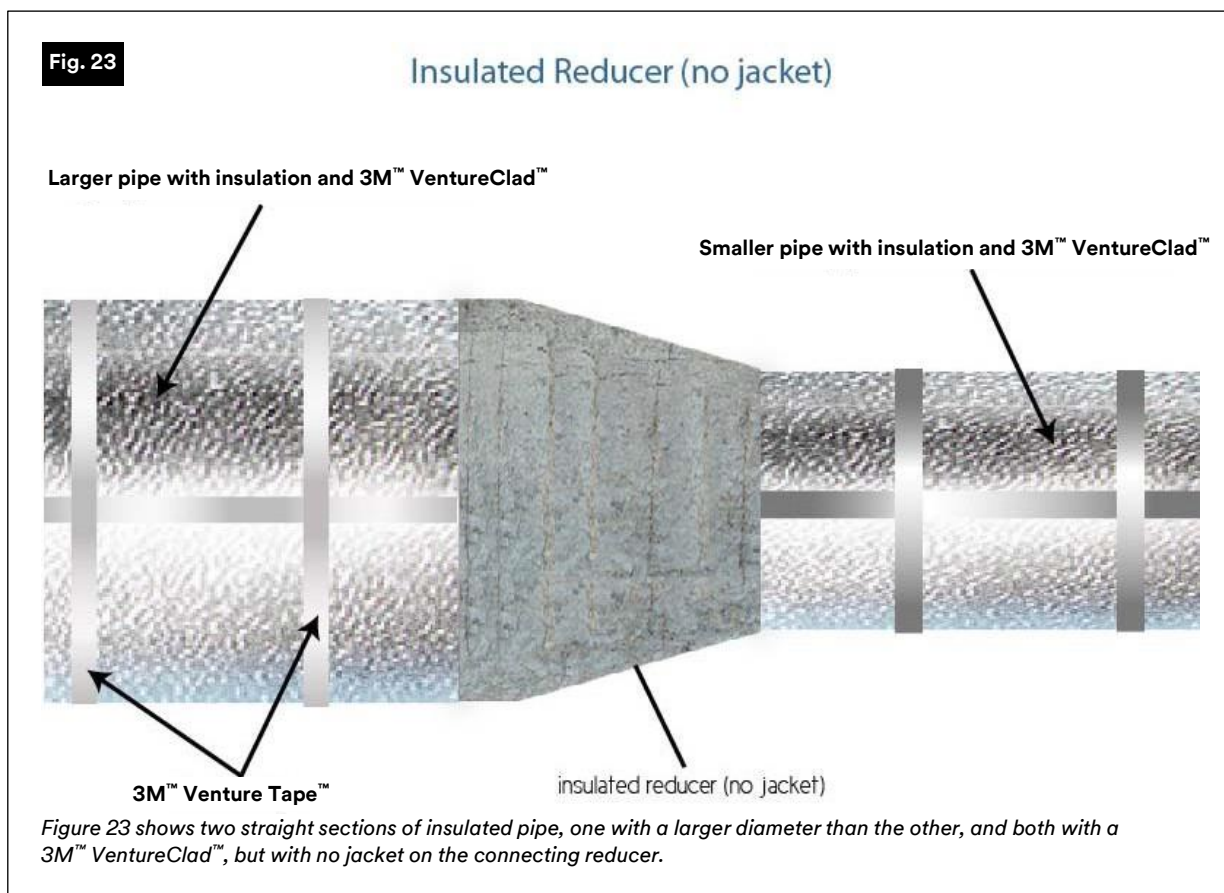
## Recommended Installation and Repair Guidelines, Revision 1



vi. Vapor Dams / Stops: See Section 2.L.

e. Insulated Reducer

- i. Insulated pipe reducers can be jacketed using one of two methods: either 4-inch (100mm) wide 1577CW, spiral wrapped around the reducer, or with a piece of 3M™ VentureClad™ pre-cut from a larger sheet of 1579GNA.
- ii. The adjacent two sections of straight pipe should already have been insulated and jacketed with 3M™ VentureClad™. See Figure 23.



iii. Spiral wrapping 1577CW:

- 1) Starting with a long strip of tape, start peeling the release liner and applying the tape, first to the smaller pipe jacket, adjacent to the reducer.
- 2) Spiral-wrap the tape, overlapping itself by at least ½ inch (12mm), until the entire insulated reducer is covered with 3M™ VentureClad™. See Figure 24.
- 3) Complete the job by bringing the tape over and onto the jacket on the larger of the two insulated pipes.
- 4) Using a squeegee, go over all the tape to make certain that it is well sealed and adhered. Remove any bubbles or places where the tape tends not to seal well.

# 3M™ VentureClad™ Insulation Jacketing Products

## Recommended Installation and Repair Guidelines, Revision 1

**Fig. 24**

**Wrapping insulated reducer with 3M™ Venture Tape™**

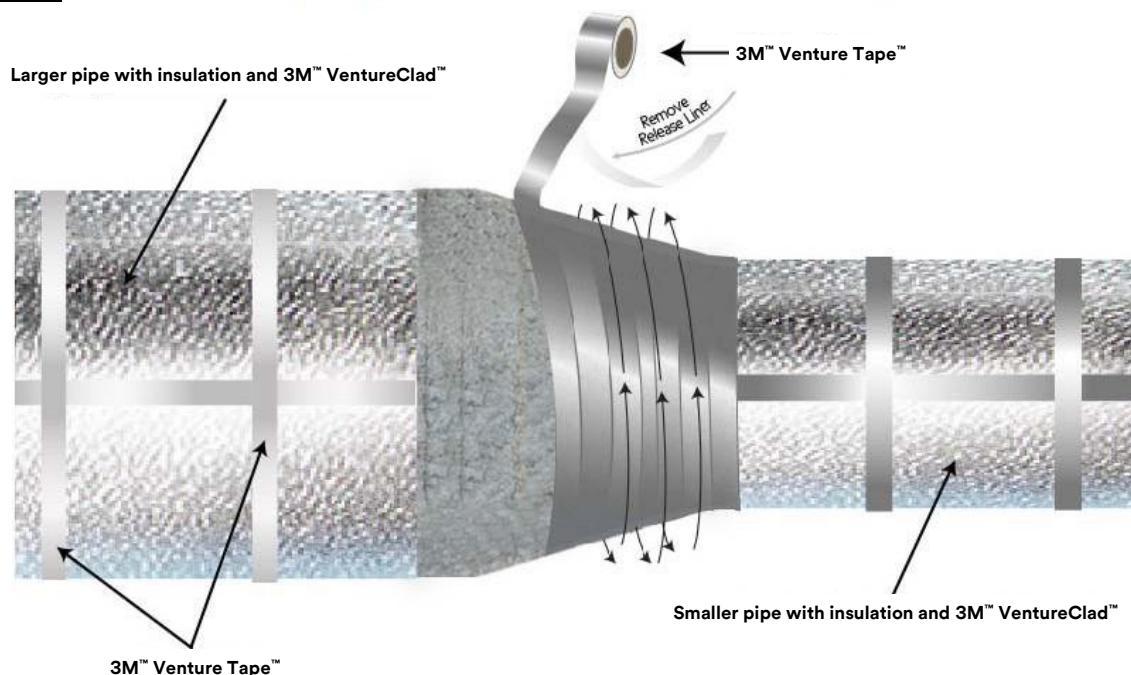


Figure 24 shows 3M™ Venture Tape™ being applied over the insulation on the reducer, forming a moisture tight jacket system. To seal effectively, the tape must first be applied to the surface of the 3M™ VentureClad™ on the smaller pipe, then at the end, to the 3M™ VentureClad™ on the larger pipe. Note that the tape, as it is spiral wrapped around the reducer, must make contact with the previous wrap by at least 1 inch (25mm) to assure that the tape is applied to itself.

iv. Jacketing the reducer with a sheet of pre-cut 3M™ VentureClad™ 1579GNA:

- 1) Start with a pre-cut sheet of 3M™ VentureClad™ with no adhesive, type NA, as shown in Figure 25:

**Field Application of 3M™ VentureClad™ Jacket over insulated reducer**

**Cut 3M™ VentureClad™ to fit insulated reducer (type NA)**

No Adhesive

**Fig. 25**

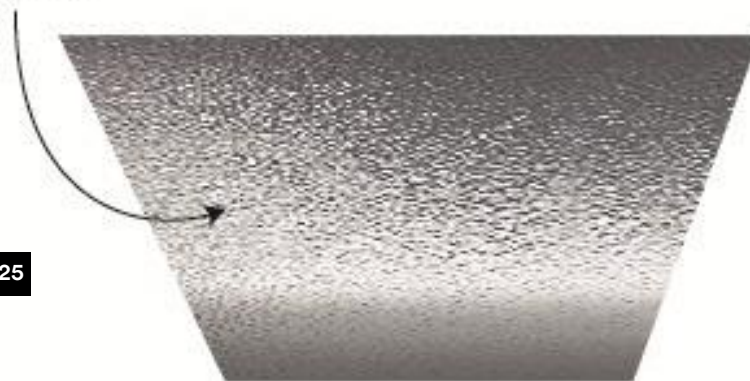


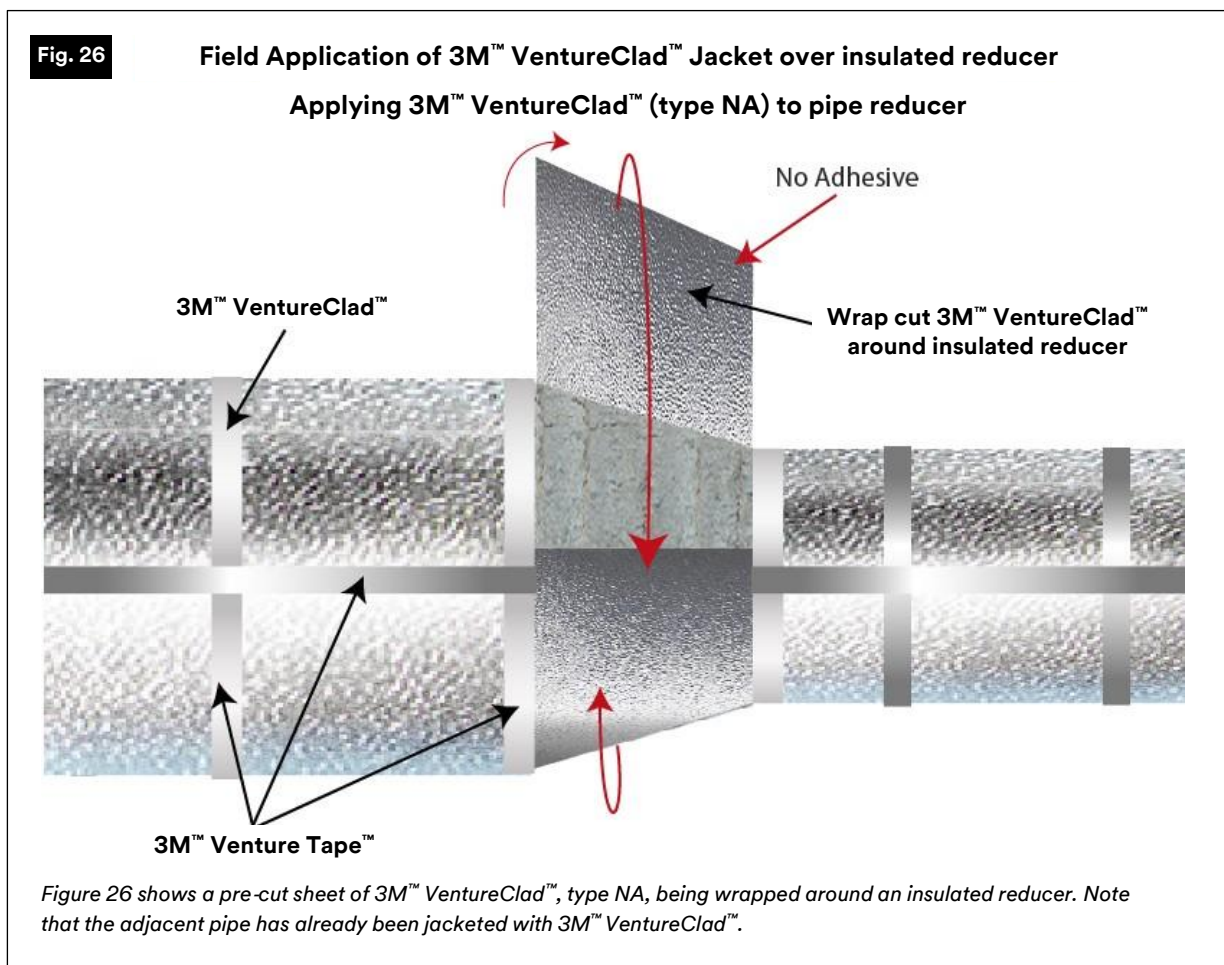
Figure 25 shows a sheet of 3M™ VentureClad™ 1577 NA or 1579GNA pre-cut to fit the insulated reducer.



## 3M™ VentureClad™ Insulation Jacketing Products

### Recommended Installation and Repair Guidelines, Revision 1

- 2) Next, apply the sheet of 3M™ VentureClad™ to the insulated reducer, wrapping it around as you proceed. See Figure 26.



- 3) After wrapping the pre-cut sheet of 3M™ VentureClad™, type NA, around the reducer, tape the longitudinal lap joint with a strip of 3M™ VentureClad™ tape 1577CW. See Figure 27.

**Fig. 27**

**Field Application of 3M™ VentureClad™ Jacket over insulated reducer**

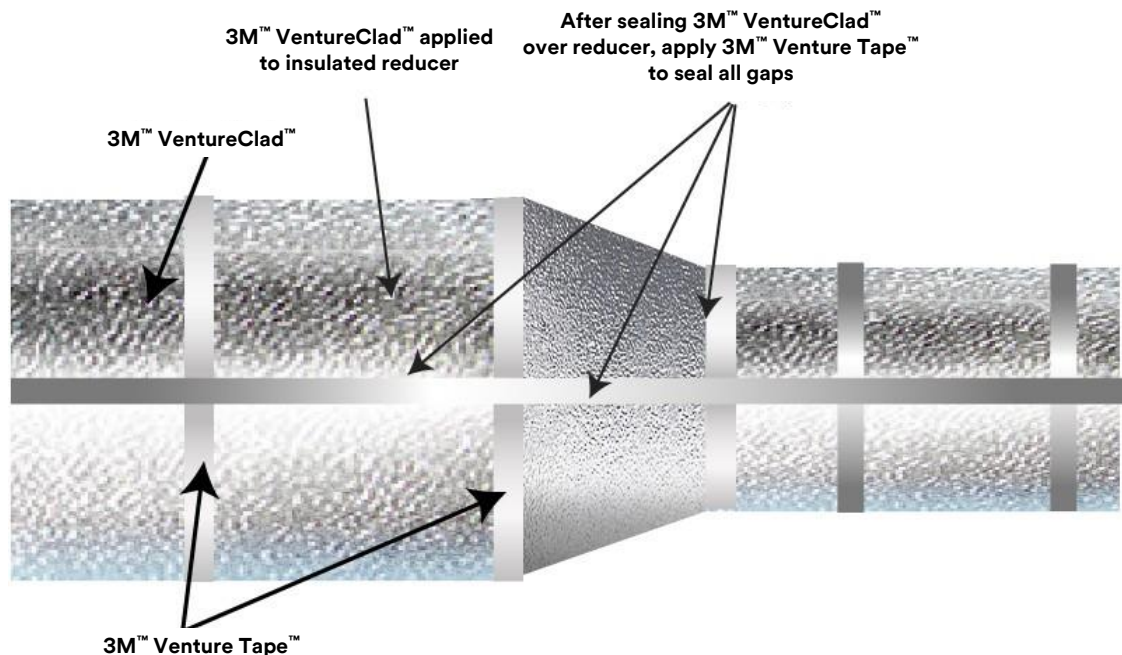


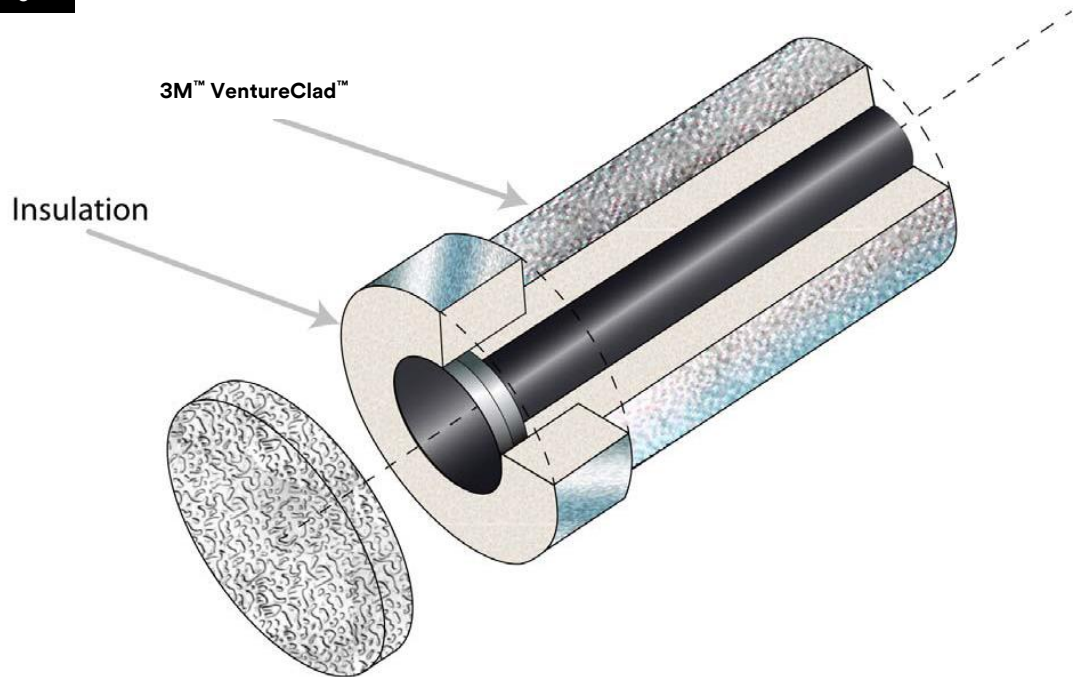
Figure 27 shows an insulated reducer with fully installed 3M™ VentureClad™, type NA. Extra strips of tape, to seal the circumferential butt joints, will be necessary to seal the 3M™ VentureClad™ on the reducer to the 3M™ VentureClad™ on the adjacent straight pipe. Tape is added over the horizontal lap joint last.

**f. Insulated Blind Flanges**

- i. Insulated blind flanges can be sealed from weather and, on below ambient systems, from water vapor intrusion using 1577CW.
- ii. Figure 28 shows an insulated pipe with an insulated blind flange. This fitting can be fabricated from factory or fabricator jacketed pipe insulation and insulation board, where the jacketing is 3M™ VentureClad™. Be certain to seal all seams and joints using either 1577CW or 1578CW.

**Insulated blind flange with 3M™ VentureClad™ Jacket on the insulation**

**Fig. 28**



*Figure 28 shows an insulated blind flange. This insulation system consists of pipe insulation pre-jacketed with 3M™ VentureClad™ plus a disk shaped end cap cut out of an insulation board first faced with 3M™ VentureClad™. 3M™ Venture Tape™ is used to bind this together as well as seal it from water and vapor ingress.*

**g. Sealed Cap over End of Vertical Pipe Insulation**

- i. When pipe insulation, on a vertical pipe, ends, and the pipe is located outdoors and jacketed with 3M™ VentureClad™, either type CW or NA, the end of the insulation should be sealed to prevent water from precipitation getting absorbed into the insulation.
- ii. A metal end cap, especially fabricated to account for both the pipe diameter and the insulation outer diameter, can be installed and sealed, using a weather resistant sealant.
- iii. See Figure 29.



**Fig. 29**

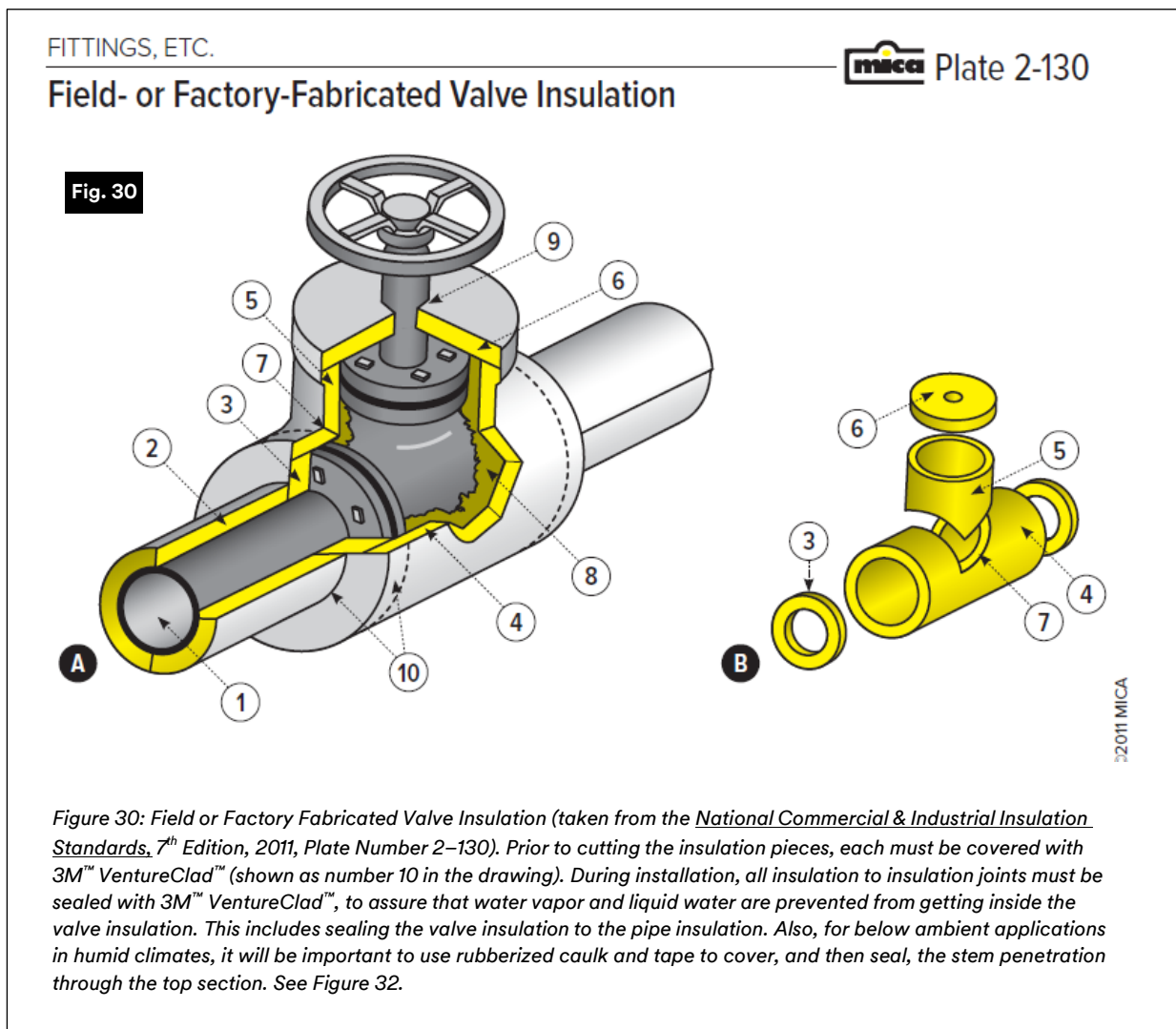
**Metal end cap over insulation jacketed with 3M™ VentureClad™ Jacket**



*Figure 29 shows a metal end cap installed over a straight section of pipe, jacketed with 3M™ VentureClad™, and a bare pipe above that. The correct installation of the metal end cap, with a sealant, will prevent water from precipitation getting into the insulation.*

## 6. Installing Factory-fabricated or Field-fabricated Valve Insulation

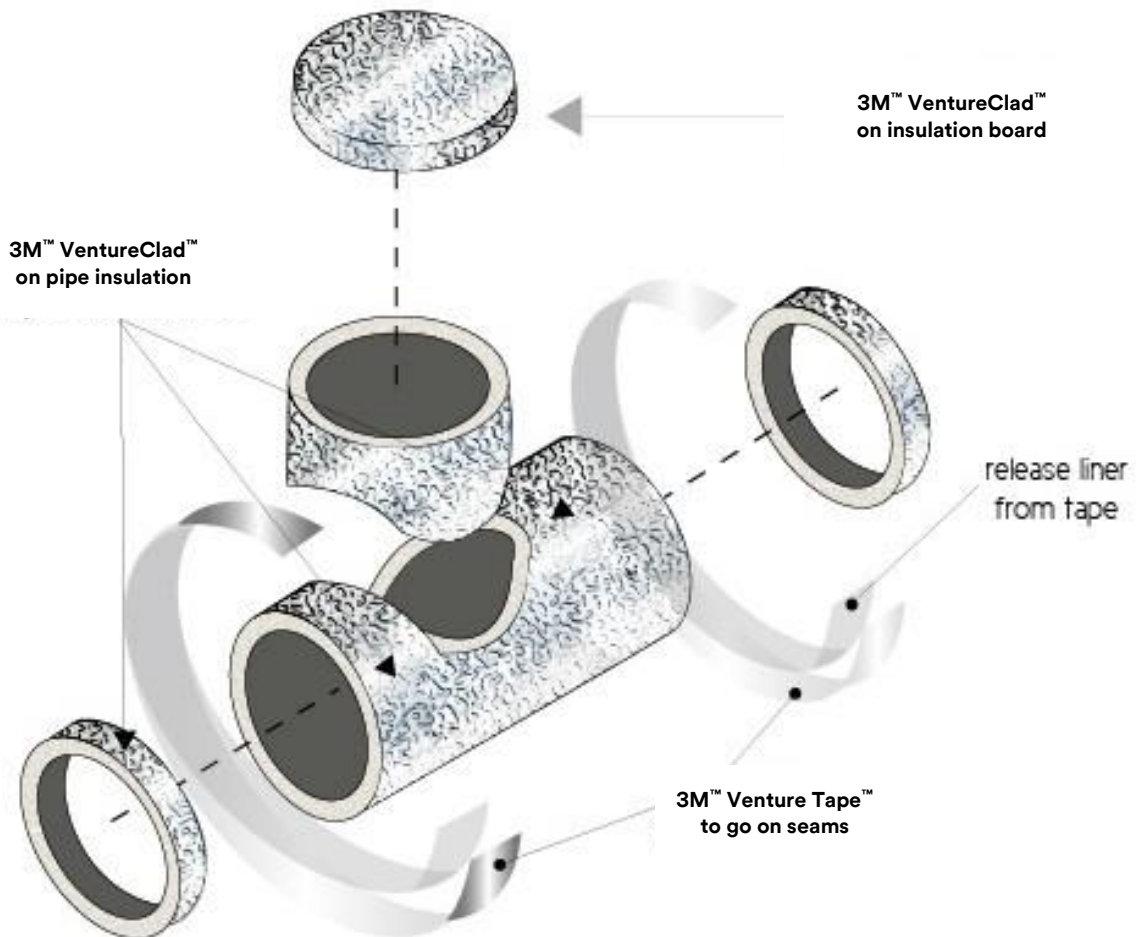
- a. See the MICA Manual (7<sup>th</sup> Edition, 2011), Plate No. 2–130 (reproduced in Figure 30).



- b. For factory fabricated materials, all insulation surfaces should first be covered with 3M™ VentureClad™. See Figure 31.
- c. In the field, all factory-fabricated valve sections should be taped to one another, using 1578CW or 1577CW, as the pieces are assembled so as to create a vapor / water tight seal. Use a minimum width of 2-inch (50mm) tape to tightly seal the insulation section joints against water and water vapor intrusion, using a squeegee to assure a tight seal. For above ambient applications on horizontal insulated valves, such as shown in Figure 30, the insulator may drill an approximately 1/4" (6mm) drain hole at the 6 o'clock position, to provide drainage, unless there is no clearance underneath the valve.

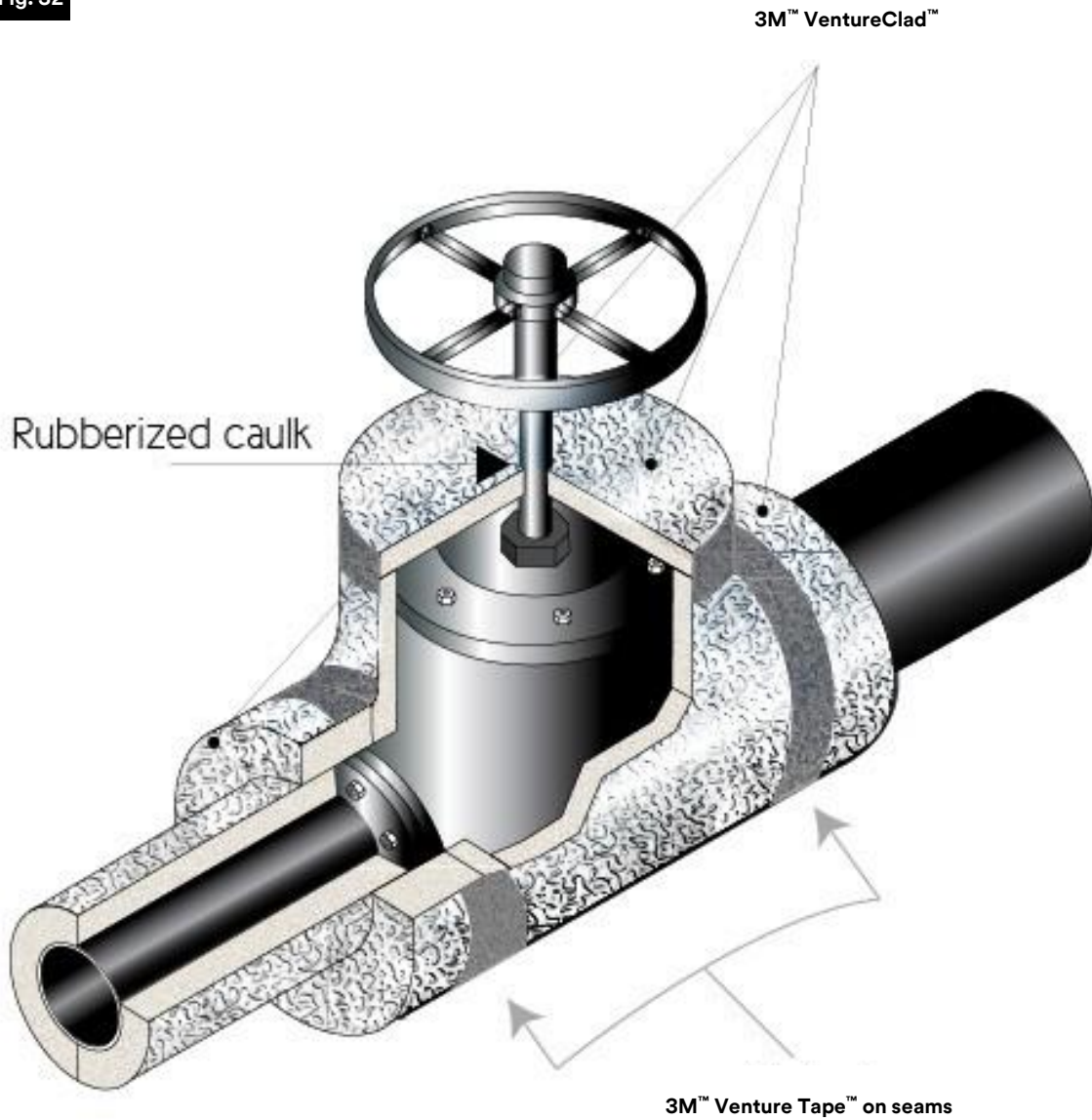
**Valve insulation with 3M™ VentureClad™ Jacketing**

**Fig. 31**



*Figure 31 shows a method of insulating a flanged gate valve using pipe insulation pre-jacketed with 3M™ VentureClad™. 1577CW or 1578CW 3M™ Venture Tape™ should be used to seal the butt joints and to seal the faced disk cap to the top.*

**Fig. 32**



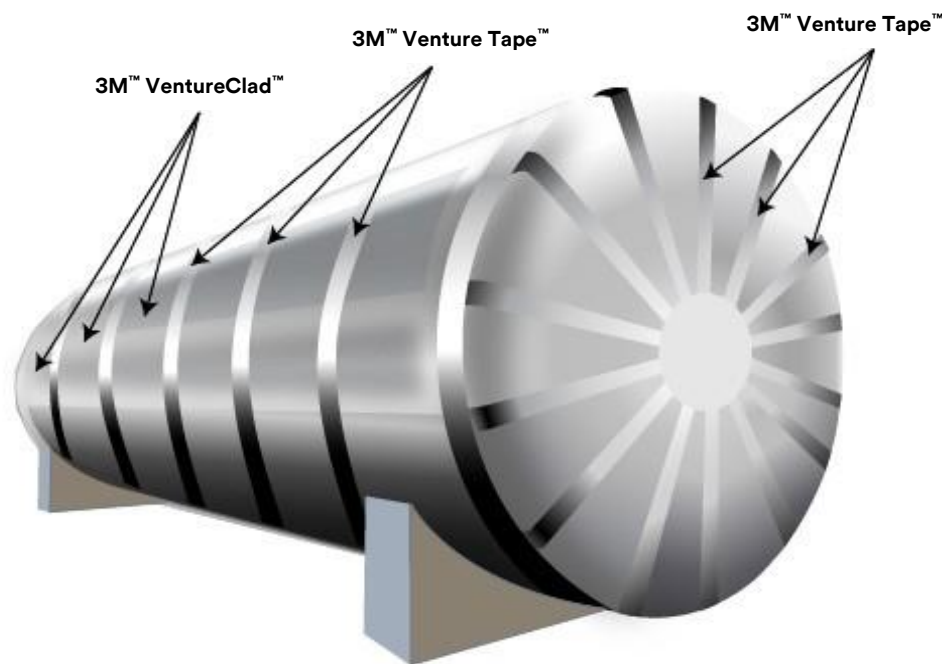
*Figure 32 shows the assembled and installed valve insulation. To complete the seal, some caulk should be applied around the valve stem penetration of the cap*

## **7. Using 3M™ VentureClad™ to Jacket an Insulated, Small Diameter Storage Tank**

- a. An insulated hot or cold, small diameter storage tank can be jacketed with 3M™ VentureClad™ and sealed with 3M™ Venture Tape™ as a final step, after the insulation has already been installed.
- b. The first step, once the tank is insulated with an insulation material within its maximum use temperature (such as mineral fiber blankets, mineral fiber pipe and tank wrap, mineral fiber V-cut boards, calcium silicate block, molded expanded perlite block, cellular glass block, glass fiber felt blankets, rigid plastic foam insulation, flexible elastomeric, or flexible aerogel insulation), is to prepare sheets of 3M™ VentureClad™ cut to appropriate length. Each sheet should be numbered with a pen or pencil to keep the installation sequence straight.
- c. All butt joints and lap joints should be covered and sealed using 4 inch (100mm) wide 1577CW.
- d. The tank head(s) should be covered with “pie” shaped sheets of 3M™ VentureClad™, type CW, adhered to the insulation, and then should have the butt joints covered and sealed using 4-inch (100mm) wide 1577CW. See Figure 33.
- e. For above ambient applications on horizontal insulated tanks, such as discussed in this section, the insulator may drill an approximately 1/4" (6mm) drain hole at the 6 o'clock position, to provide drainage, unless there is no clearance underneath the tank. For below ambient applications, these drainage holes should not be drilled.

**Fig. 33**

**Insulated horizontal storage tank with 3M™ VentureClad™**



*Figure 33 shows a horizontal storage tank with 3M™ VentureClad™.*



**8. Using Insulation boards, factory jacketed with 3M™ VentureClad™, to insulate a Large Diameter Horizontal Storage Tank operating at temperatures from ambient up to 350°F.**

As an alternative, the tank can first be insulated and covered with 3M™ VentureClad™, type CW, field installed. However, the steps below apply to factory jacketed insulation either on flexible insulation blankets or on rigid insulation boards.

- a. A hot tank operating at a temperature up to 350°F can be insulated with insulation boards that have been factory-jacketed, or faced, with 1577CW or 1579GCW. Seams can be sealed using 1577CW tape.
- b. The insulation should first be applied to the sidewalls, then to the roof.
- c. As shown on Figure 34, the first step is to install weld stud pins on the tank surfaces. The spacing and size (i.e., diameter) of these weld stud pins must first be determined by an engineering analysis that takes into account design wind loads and insulation weight. The length of the pins after cutting off extra length, would be only 1/16 inch (2mm) longer than the insulation type and thickness which also must be determined by engineering analysis that takes into account maximum allowable heat loss, or heat gain, for design conditions.
- d. The second step is to push each 2-foot x 4 foot insulation board, faced with 3M™ VentureClad™, over the weld stud pins. Each board must butt up against the adjacent board.
- e. The third step is to push speed washers over the weld stud pins. These are pressed down to the surface of the insulation board sufficiently to slightly depress the board.
- f. The forth step is to tape all the joints with the 1577CW, that has a minimum width of 4 inches (100mm), using a squeegee to make certain that the tape adheres completely to the boards.
- g. The fifth step is to bend the protruding end of each weld stud pin 90° so it is flush with the speed washer.
- h. The sixth step is to cover and seal each speed washer / weld pin stud with a piece of 3M™ VentureClad™ that is sufficiently long to cover the washer.
- i. The roof can be insulated in the same manner as the sidewalls. 3M™ VentureClad™ should be used to seal the roof insulation system to the sidewall insulation system.
- j. Blanket Insulation: Rolls of blanket insulation, such as fiberglass, mineral wool, glass fiber mat, and aerogel, can also be used to insulate tanks. Unfaced rolls of blanket insulation would first be applied over weld pin studs to the tank's surfaces. Then, 3M™ VentureClad™ would be applied over top of that, also working with rolls, and this would be sealed with 1577CW. As with the insulation boards, there are many engineering issues that must be suitably addressed by others.
- k. Repairs to rips and tears in the 3M™ VentureClad™ Jacket would be made in the same manner as shown for pipe insulation (shown at the end of this manual).

**Fig. 34A**

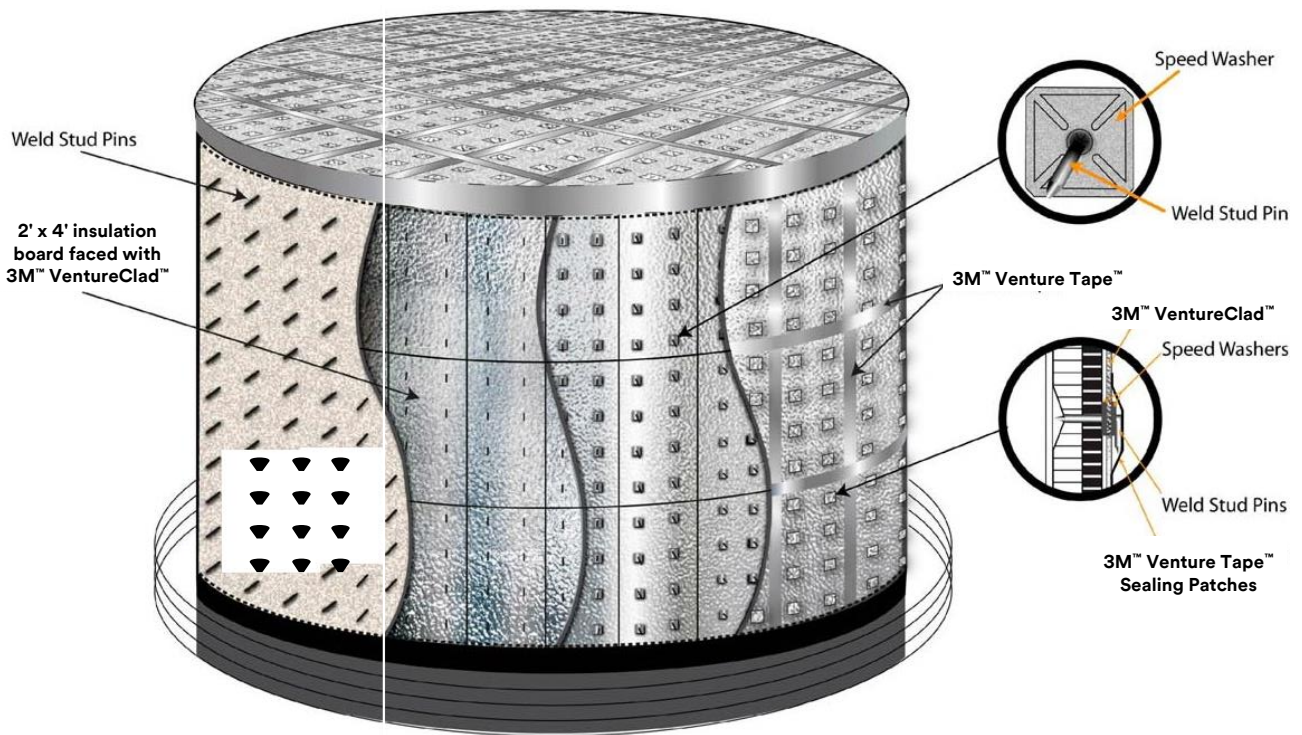
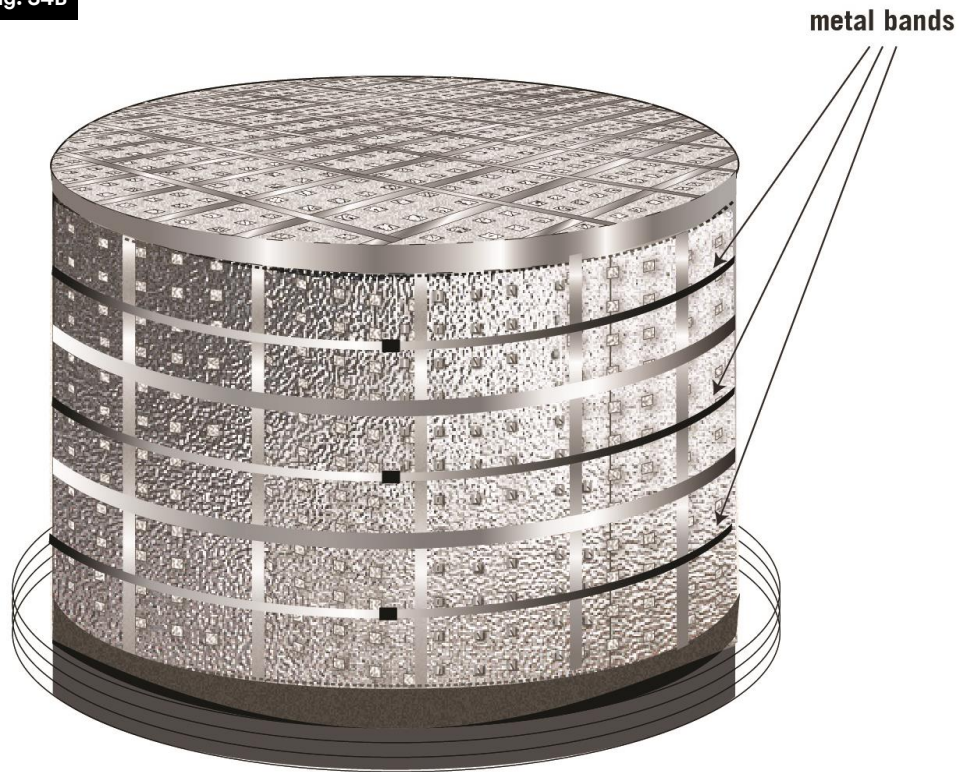


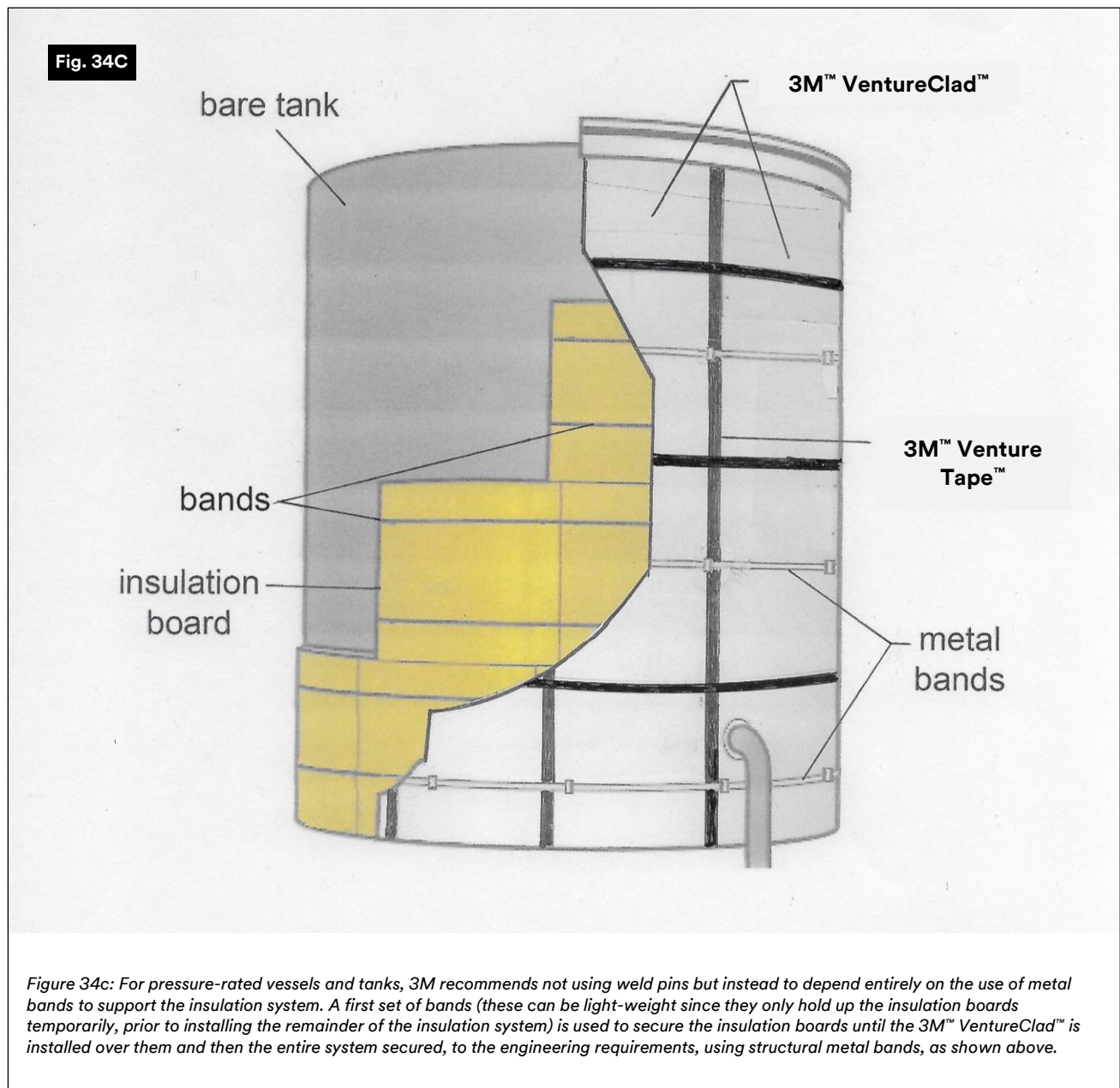
Figure 34a shows a suggested method for insulating a non-pressure rated hot or cold tank, in four stages, using insulation boards first faced with 3M™ VentureClad™. Weld-pin studs, first installed on the Joints and speed washers should be sealed with 1577CW. If hot service, the operating temperature should not exceed 350°F so as not to exceed the temperature limitation of the 3M™ VentureClad™. Note that there are project specific engineering design issues, such as pin spacing, pin size, and insulation type and thickness that are not addressed by this diagram. Also note that 3M does not recommend walking on the top surface shown in this figure. If a walking surface is required, 3M recommends the use of conventional ribbed metal jacketing with a separate structural support system (engineering design not addressed by this installation guide).



**Fig. 34B**



*Figure 34b shows the use of metal bands to secure the insulation system covered with 3M™ VentureClad™ Jacketing that was shown in Figure 34a. Note that this design is recommended only for a non-pressure rated storage tank or vessel since the insulation system depends on weld pins which are not recommended by 3M for a pressure-rated vessel. Note also that 3M™ Venture Tape™ to seal the joints between the pieces of 3M™ VentureClad™.*



### 9. Using 3M™ VentureClad™ to Jacket an Insulated Heat Exchanger

- a. See Figure 35.
- b. A horizontal or vertical exchanger, with an operating temperature up to 1200°F, can be insulated with mineral wool blanket insulation, calcium silicate block insulation, molded expanded perlite block insulation, or glass fiber felt insulation. These materials are typically installed by using stainless steel banding or stainless steel tie wire to secure the insulation in place, prior to installation of the jacket. Engineering instructions should be followed.
- c. Once the insulation has been installed and fully secured in place, 3M™ VentureClad™ Jacket 1577CW or 1579GCW can then be installed over it. Both lap seams and circumferential seams should be sealed using 4-inch (100mm) wide 1577CW tape. The 3M™ VentureClad™ jacket on the cylindrical portion of the heat exchanger should be taped to the jacketed hemi-spherical head insulation to seal that junction as well.
- d. Once the entire 3M™ VentureClad™ jacket system has been installed, stainless steel bands can be installed, as required, over top of both circumferential taped seams and half way in between these circumferential seams. 3M recommends that an engineering evaluation first be performed, by a qualified structural engineer, to determine the dimensions of these bands and to determine the necessary spacing.

**Fig. 35** Insulated heat exchanger with 3M™ VentureClad™ Jacket

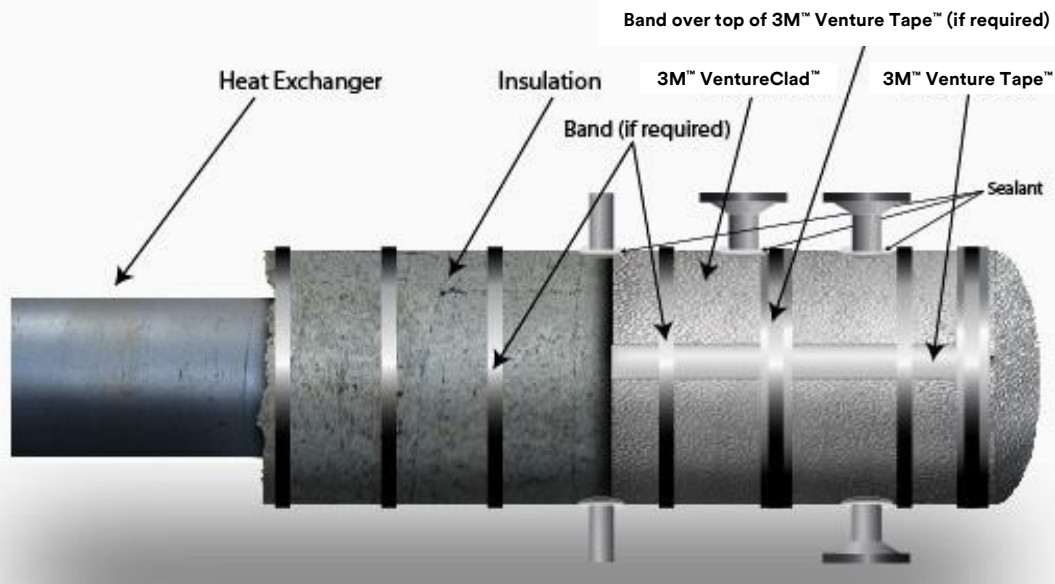


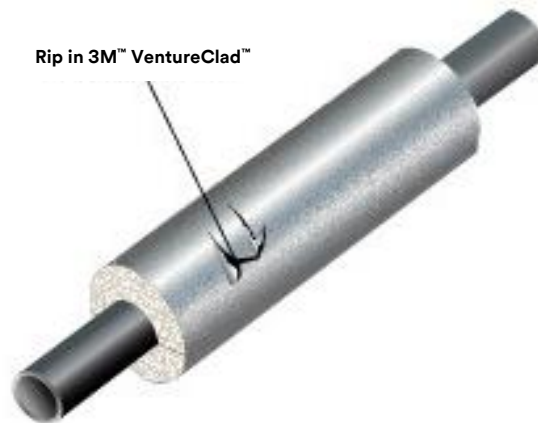
Figure 35 shows the two major steps in applying 3M™ VentureClad™ jacket to a heat exchanger insulated, in this case, with mineral wool blankets (the insulation type could also be glass fiber felt or calcium silicate or molded expanded perlite blocks). Note that 4 inch wide 1577CW is used to seal the joints. Finally, stainless steel bands may be installed over the taped circumferential joints to further secure the insulation system if required by the specification.

## 10. Repair of punctures and tears of the 3M™ VentureClad™

- a. While both 3M™ VentureClad™ 1577CW and 1579GCW are strong and resistant to rips, punctures and / or tears, any of these types of damage can occur with enough pressure. When this happens, the damage should be repaired as soon as possible, particularly on below ambient applications.
- b. To make a repair, clean the area around the rip, puncture, or tear with a cloth to remove dust and loose dirt. If an oily substance is on the 3M™ VentureClad™ surface, it should first be removed with an appropriate solvent, as recommended by either the specification or the facility owner.
- c. Figures 36, 37, and 38 show a recommended method for repairing a rip, puncture, or tear in the jacket using 1577CW tape. Note that the piece of 1577CW should first be cut to a length equal to the length of the rip, puncture, or tear plus 3 inches (75mm) on all sides.
- d. Press the piece of 1577CW with a squeegee to assure that it forms both a water tight and a vapor tight seal around the rip, puncture, or tear.

**Fig. 36**

**Installed 3M™ VentureClad™ and insulation on pipe**



*Figure 36 shows a rip in the 3M™ VentureClad™. This should be repaired as soon as it is discovered to prevent water from precipitation from entering the insulation. For below ambient service, it should be repaired to prevent water vapor ingress.*

**Fig. 37**

## Repairing a hole in 3M™ VentureClad™



Figure 37 shows taking a piece of 4-inch (100mm) wide 1577CW and removing the release liner to allow its application to the 3M™ VentureClad™ surface.

**Fig. 38**

## Repaired 3M™ VentureClad™

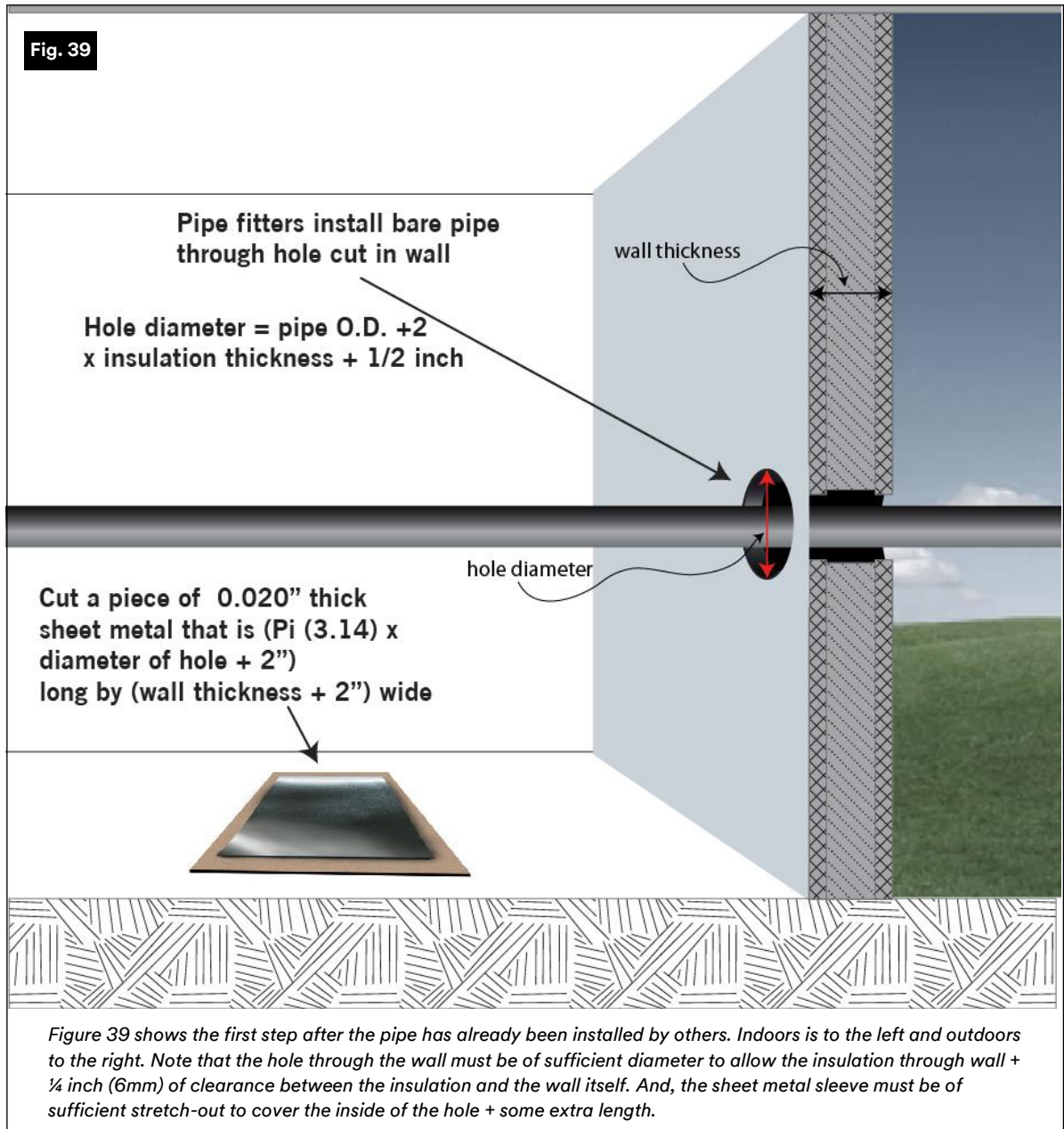


Figure 38 shows the installed 1577CW “patch” used to seal the rip in the 3M™ VentureClad™.



## 11. Using 3M™ VentureClad™ to jacket an insulated pipe that penetrates an exterior wall

Sometimes, it is necessary for an insulated pipe to penetrate an exterior wall (i.e., a wall that separates indoors from outdoors). In these cases, it is critical to prevent the intrusion of water, from precipitation or other sources, into the wall cavity and, from there, into the building. The following seven figures show one way to do this correctly, using 1577CW or 1579GCW, as the jacket, starting with Figure 39. 1577NA or 1579GNA could also be used but are not shown in these drawings.



The next step is to roll up the sheet metal sleeve and slip it into the hole through the wall, as show in Figure 40.

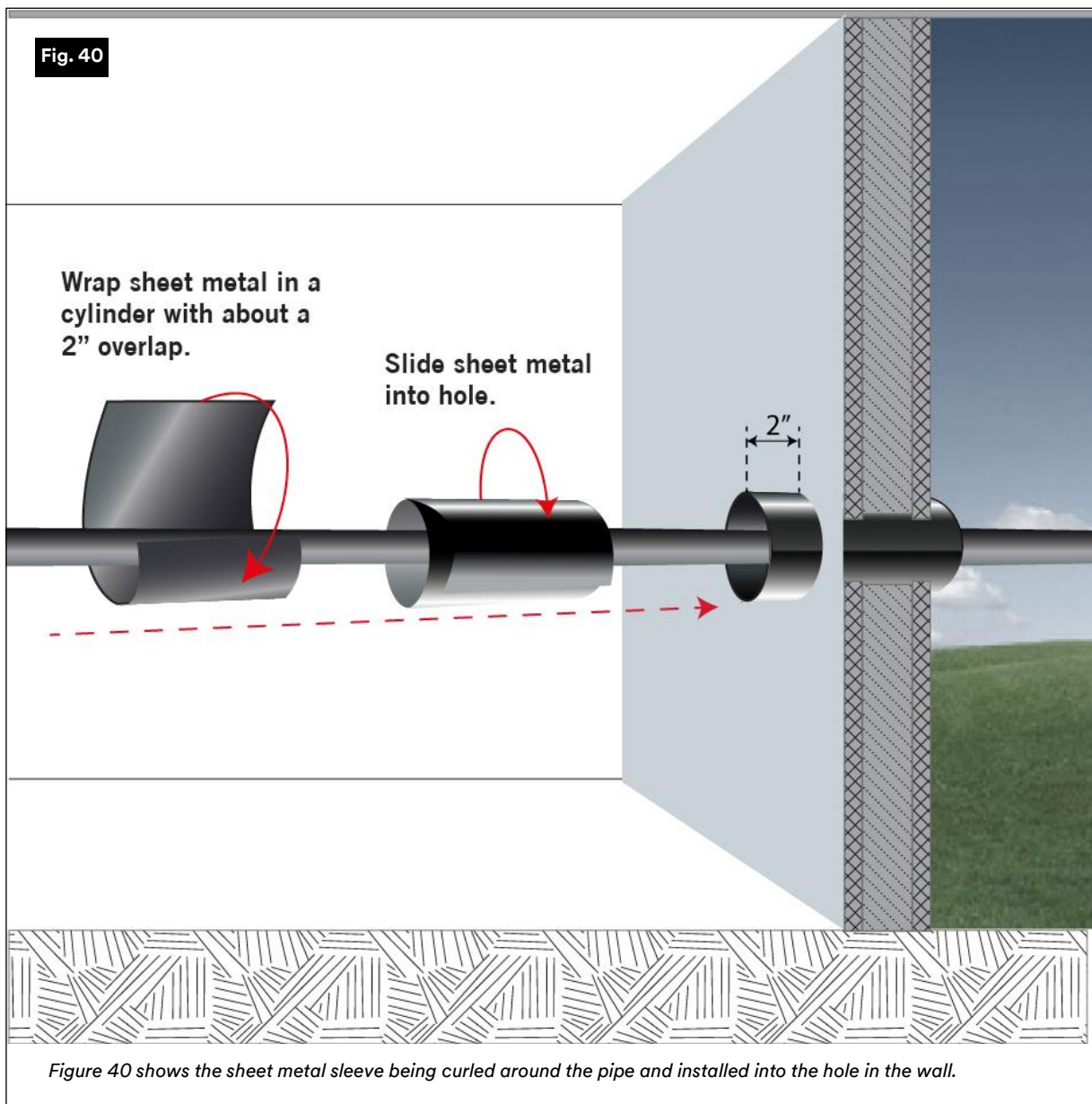


Figure 41 shows a first section of pipe insulation, jacketed with either 1577CW or 1579GCW, being installed on the pipe. Figures 40 through 45 show more details on doing this.

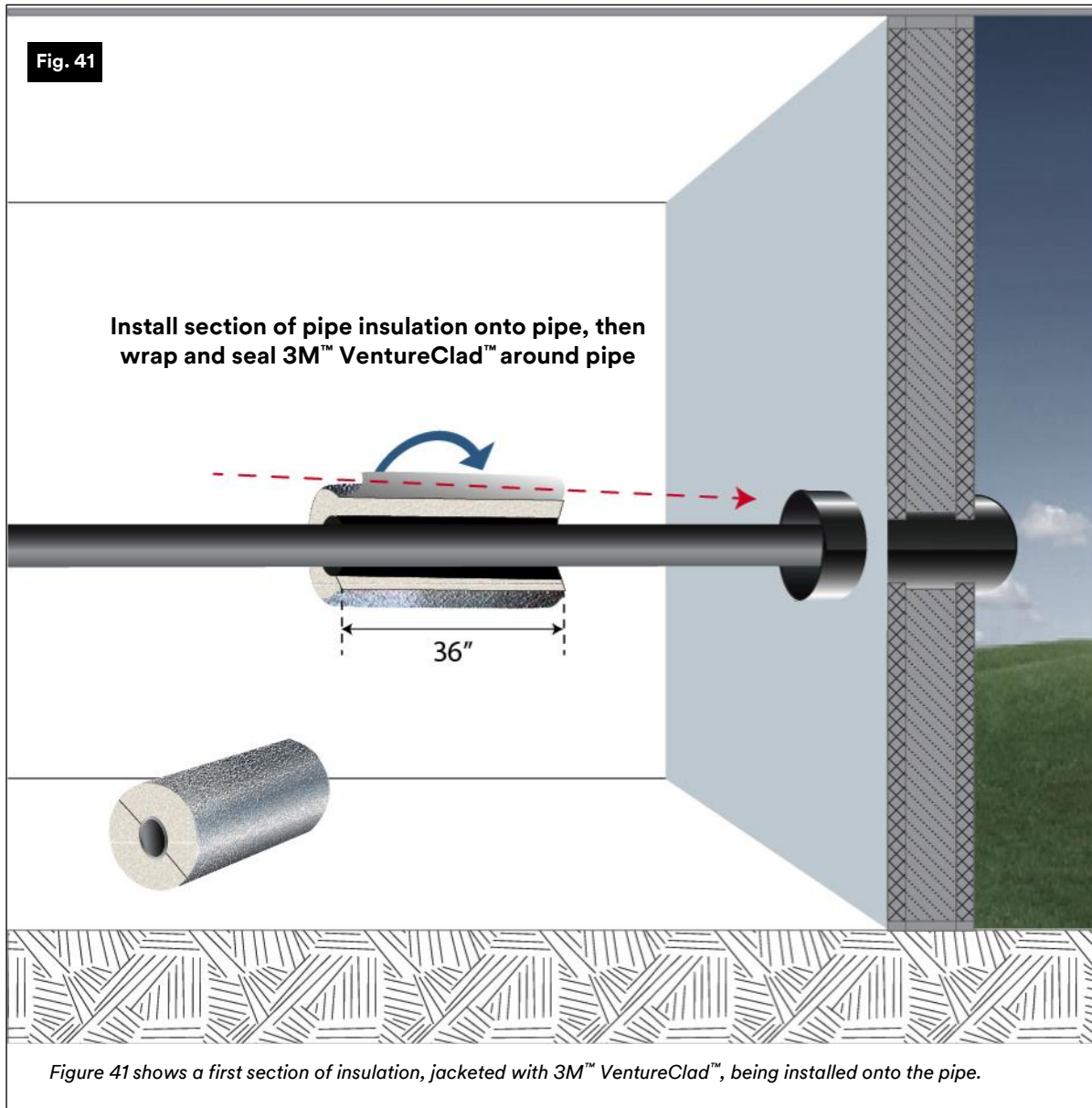


Figure 42 shows the section of jacketed pipe insulation being slid into the wall penetration, inside of the sheet metal sleeve. The installer should push the 36-inch long section of jacketed pipe insulation through the wall so it comes out the other side where it can be joined with already installed insulation there, as shown in Figures 8a–8c.

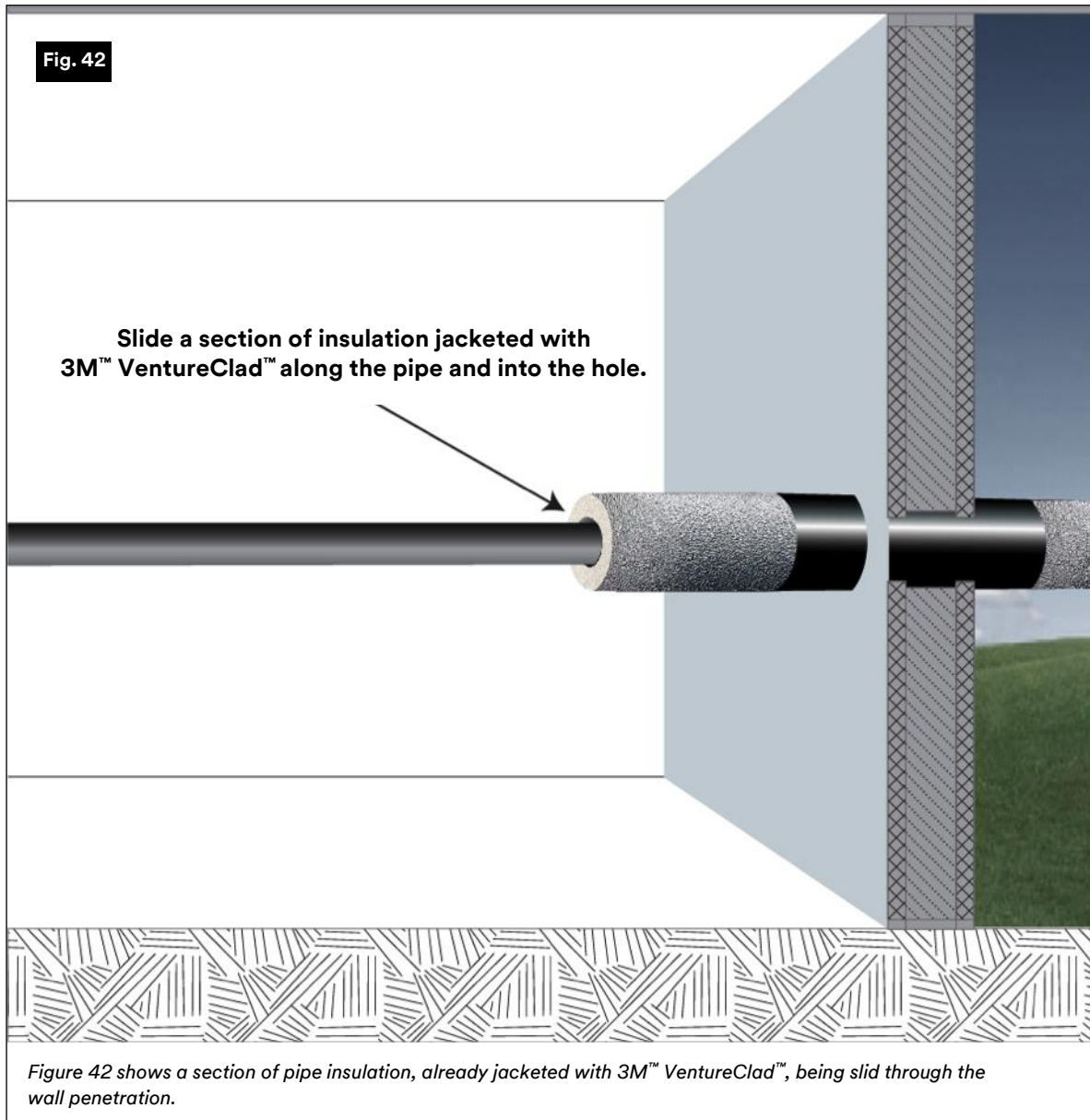




Figure 43 shows additional sections of pipe insulation, jacketed with 1577CW or 1579GCW, and taped together, being installed until they come to within 36 inches (915mm) of the pipe insulation section already installed in the wall penetration.

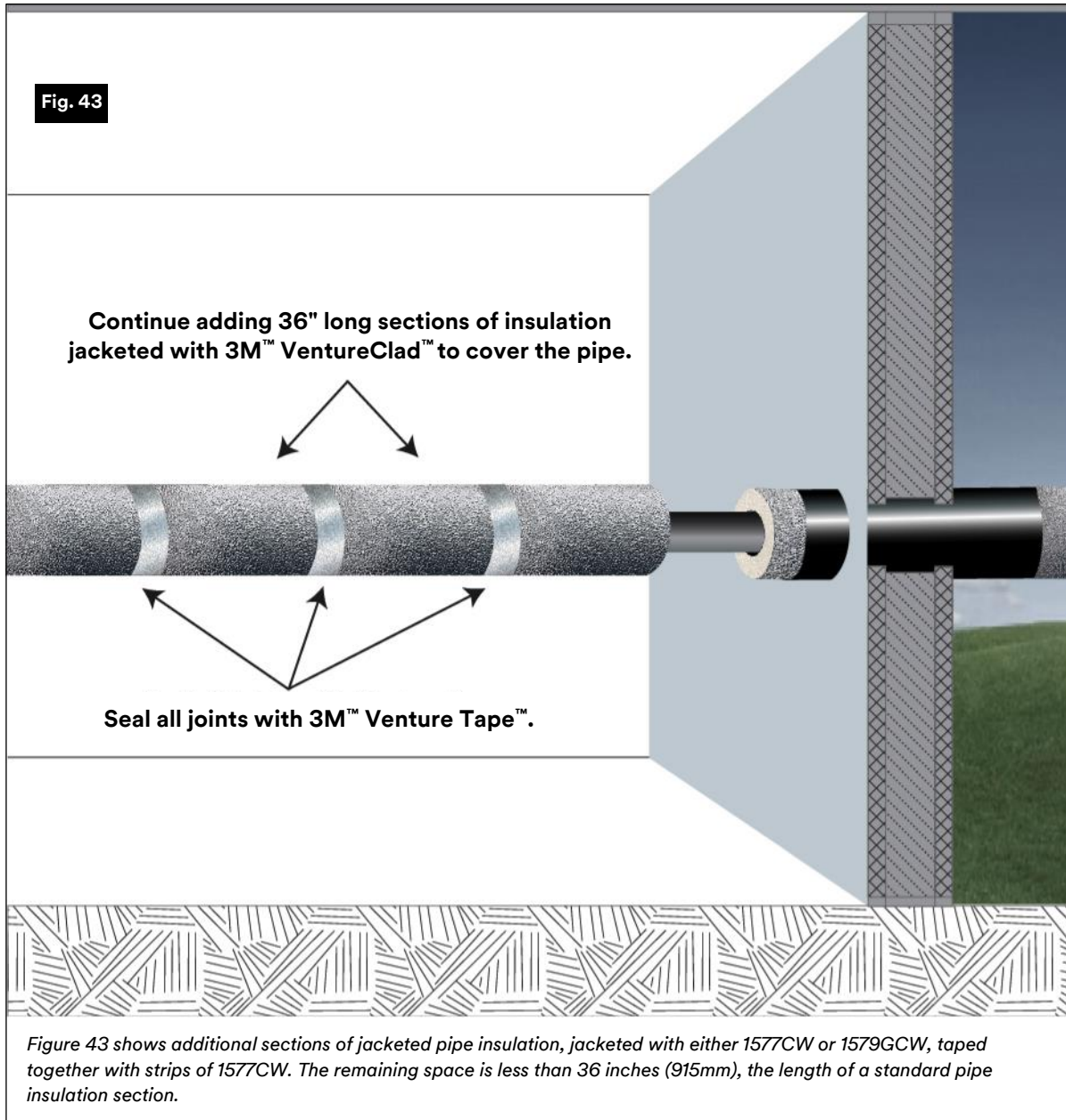




Figure 44 shows the insertion of a shorter section of jacketed pipe insulation, custom cut to a length less than 36 inches (915mm), being installed on the pipe.

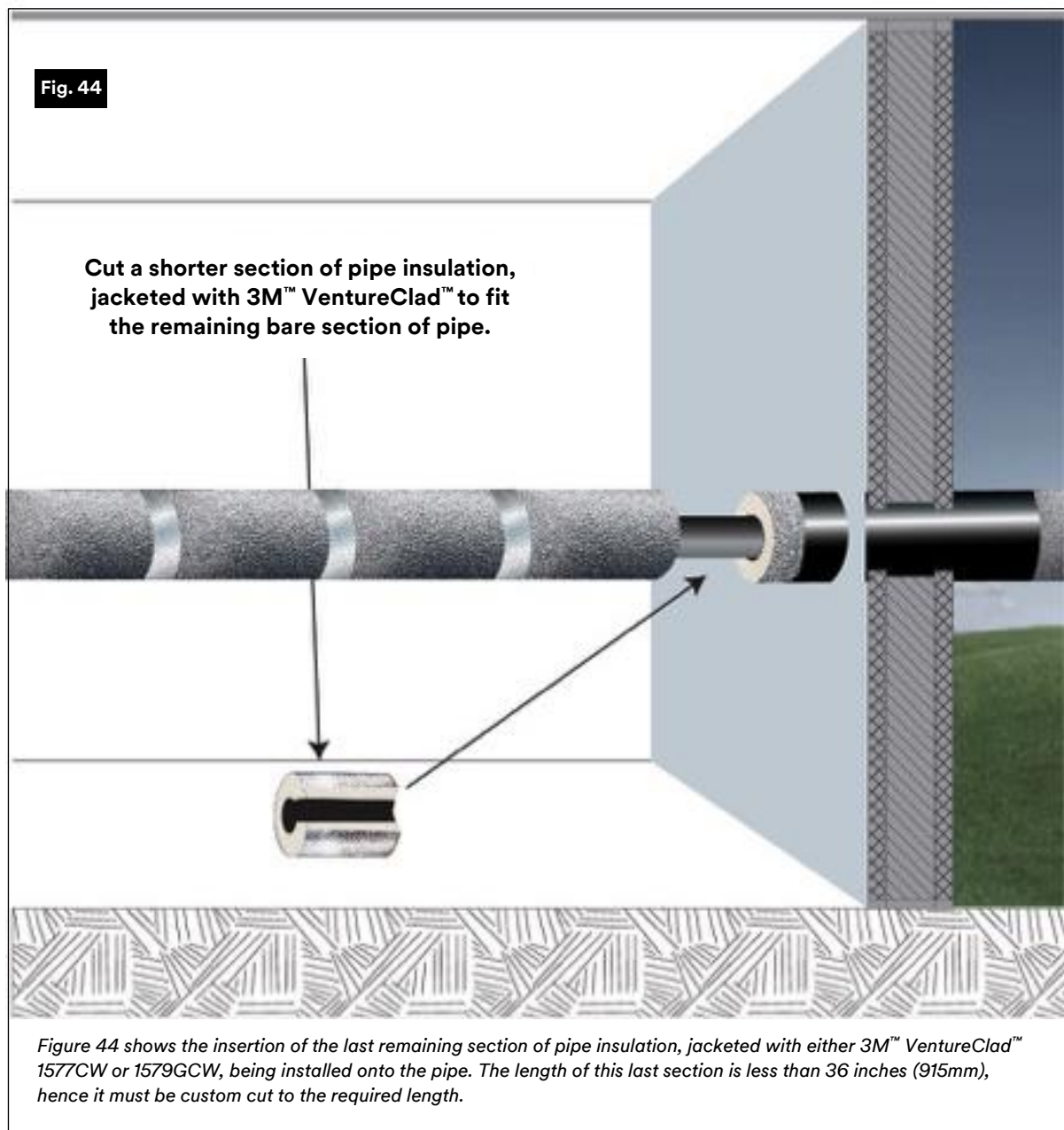
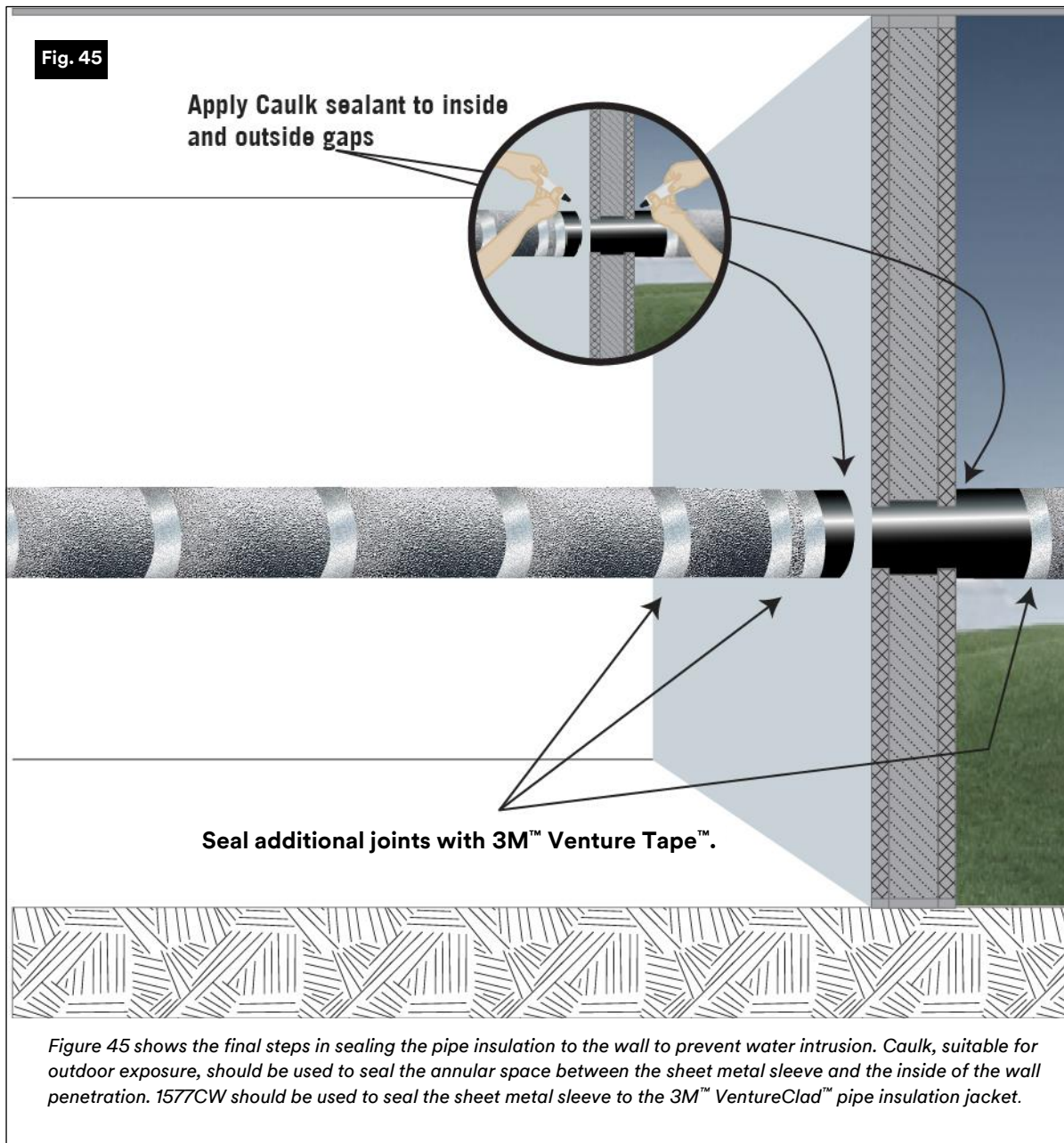


Figure 45 shows the last remaining jacketed pipe insulation section installed and taped into place using 1577CW. Note that the highlight shows the process of caulking the annular space between the sheet metal sleeve and wall using a caulk suitable for outdoor exposure. Note also that the sheet metal sleeve should be taped, using 1577CW, to the 3M™ VentureClad™ Jacket on the pipe insulation. These two final steps seal the penetration from water intrusion and must be done with.



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The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

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