INSULATING HOT PIPING SYSTEMS

WITH FIBERGLASS PIPE INSULATION
INSTALLATION INSTRUCTIONS

61°F TO 1,000°F (16.1°C TO 538°C)

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SECTION 1: PERFORMANCE CRITERIA

1.0 ROLE OF PIPE INSULATION
Pipe insulation is designed to do one or more of the following on Hot Pipe Systems:

- Conserve energy and help reduce the building operating costs
- Stabilize process performance (process control)
- Protect personnel by reducing surface temperatures
- Reduce emissions
- Reduce noise

2.0 ROLE OF PIPE INSULATION FOR HOT SYSTEMS 61°F TO 1,000°F (16.1°C TO 538°C)
Pipe insulation for hot systems is specified and installed primarily for process control and energy conservation.

3.0 PIPE INSULATION DESCRIPTION
Fiberglass pipe insulation is a molded one- or multiple-piece insulation made from fiberglass fibers bonded with thermosetting resins. It is produced in 36-inch (0.92 m) lengths with or without a factory-applied jacket.

3.1 STANDARD PIPE AND TUBE SIZES
Fiberglass pipe insulation is manufactured to fit a wide range of standard pipe and tube sizes.

- Standard iron pipe sizes: ½ inch to 36 inches (15 mm to 914 mm) nominal pipe size
- Standard copper tube sizes: from ½ inch to 6 inches (15 mm to 150 mm)

3.2 INSULATION WALL THICKNESS
Fiberglass pipe insulation comes in standard, single-layer thicknesses from ½ inch to 5 inches (15 mm to 127 mm) in ½-inch (15 mm) increments. Requirements for thicker wall materials can be achieved using multiple layers of insulation, commonly known as nesting.

3.3 VAPOR RETARDER CLOSURE SYSTEM
An All Service Jacket (ASJ Max) is the factory-applied vapor retarder covering. The jackets include Owens Corning SSL II adhesive closure system that provides a positive, mechanical vapor sealing of the longitudinal jacket seam. Pressure-sensitive butt strips are used to seal the circumferential joints between sections of pipe.

3.4 FIBERGLASS INSULATION WITHOUT FACTORY-APPLIED JACKETING
Some fiberglass pipe insulations are available without a factory-applied jacket. These pipe insulations will have a shop- or field-applied jacketing system. For the purpose of this guide, the shop- or field-applied jacket must meet the same general requirements as the factory-applied ASJ Max jacket.

4.0 INSULATION THICKNESS

4.1 DETERMINING INSULATION THICKNESS
The ASHRAE Standard 90.1 and the International Energy Conservation Code (IECC) requirements for pipe insulation thickness are intended to serve as the minimum standard for energy efficiency in commercial buildings. In some cases, increased thickness for greater energy efficiency can be justified.

For an additional tool to determine the insulation thickness for energy conservation or personal protection at or below 140°F, use the NAIMA 3E Plus® insulation thickness software program. When using the program to determine the right insulation thickness for energy conservation, use the design criteria (temperature and humidity) that represents the worst-case scenario for the conditions.

The program can be downloaded free of charge from NAIMA at www.3eplus.org or obtained from Owens Corning at www.owenscorning.com.

4.2 DESIGN CONDITIONS
When specifying pipe insulation thickness for energy conservation as determined by NAIMA 3E Plus®, this thickness is calculated and recommended per set building temperature and humidity conditions given and used by the 3E Plus program.

4.3 PERSONAL PROTECTION
Personal protection is sufficient when the outside jacketing is at or below 140°F.

5.0 FITTINGS, VALVES, AND HANGERS

5.1 FITTINGS
For the insulation system to perform, fittings must be insulated to at least the same thermal performance as the pipe insulation applied to the straight pipe section. See Figures 2.6 through 2.11.

5.2 VALVES
For the insulation system to perform, valves must be insulated to at least the same thermal performance as the pipe insulation applied to the straight pipe section. See Figures 2.12 and 2.13.

5.3 HANGERS
The pipe insulation should be continuous through hanging supports. In order to prevent damage to the insulation, a rigid insert and/or metal saddle should be installed at hanger's support. See Figures 2.14 through 2.16.

6.0 ADDITIONAL INFORMATION

6.1 METRIC PIPE SIZES
Applications using metric pipe sizes shall use insulation sized in accordance with ASTM C585 for use with metric pipe sizes. Consult Owens Corning Fiberglas™ Pipe Sizing Manual; Pub No. 10018079, Metric Section for proper pipe insulation sizing.

6.2 STAPLING — NOT RECOMMENDED
Owens Corning does not recommend stapling of the SSL II closure or the ASJ Max tapes at any time.

The ASJ Max jacket polymer surface and the SSL II closure are designed and formulated to fuse together, forming a tight seal.

6.3 FILLETING/DIGGING/CHANNELING INSULATION — NOT RECOMMENDED
Owens Corning does not recommend Filleting/Digging/Channeling insulation on hot systems. Removing insulation and not maintaining desired thickness can affect energy performance and potentially increase surface temperatures.

Filleting/Digging/Channeling is a procedure when insulation is removed to accommodate pipe components, such as valves, cuppings, and hangers. This procedure reduces the thermal performance.

6.4 MASTIC RECOMMENDATIONS
When mastics are used in this Guide, the following mastics are recommended for use:
1. Fosters/Childers CP 33 water-based, https://fosterproducts.com/childers-products/
2. Vimasco Ultrafinish 739 brushseal water-based, https://vimasco.com/wp-content/uploads/2019/06/739-Ultra-Finsih-Data-Sheet-2016.pdf
3. Design Poly (DP) 3040 water-based, https://designpoly.com/wp-content/uploads/MASTIC/DP3040/DP3040tsb.pdf

6.5 TAPE RECOMMENDATIONS
Tapes typically used for piping insulation applications include the following products:
1. Avery Dennison FASSON – 0839, https://tapes.averydennison.com/content/dam/averydennison/pt/na/en/Literature/Product%20Information/Fasson%200839/FASSON-0839-WMP-ASJ-TDS-ADPT.pdf
2. 3M/Venture Film Faced ASJ Tape 106FXP, https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-Venture-Tape-Film-Faced-ASJ-Buttstrip-Tape-106FXP/?N=5002385+3293086976&rt=rud
3. ABI/Ideal Cold Seal 729+, https://www.abitape.com/product/cold-seal-729-asj/

6.6 MICA MANUAL PLATES
When possible, figures contained within this manual have been linked to a corresponding Plate listed in the Midwest Insulation Contractors Association (MICA) National Commercial & Industrial Insulation Standards (also referred to as MICA Plate).

SECTION 2: INSULATION SYSTEM INSTALLATION

PIPE INSULATION WITH FACTORY-APPLIED ASJ JACKET —STRAIGHT PIPE, SINGLE LAYER AND MULTI LAYER

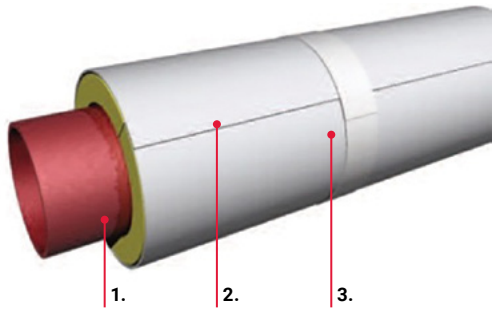
Verify all inspection and acceptance testing of the piping, as required by the specification, has been completed and that the piping is ready for installation of insulation (e.g., leak/pressure tests).

- Store in a dry indoor location. Protect insulation materials from moisture and soiling.
- Do not install insulation that has been damaged or wet due to ground water. Remove it from jobsite. An exception may be allowed in cases where the contractor is able to demonstrate that wet insulation, when fully dried out from clean water contamination (either before installation or afterward following exposure to system operating temperatures), will provide installed performance that is equivalent in respects to new, completely dry insulation. In such cases, consult the insulation manufacturer for technical assistance. Verify all surfaces are clean, dry, and free from dirt, scale, moisture, oil, and grease, and any required coatings are applied.
- Verify there is adequate clearance to install the fiberglass pipe insulation in accordance with project drawings, operation performance parameters of the specification, such as access to controls, valves, and for maintenance and repair. Reduced insulation from what is specified can lead to condensation issues.
- Install pipe insulation per Figure 2.1.
- Verify all pipe hangers, supports, and anchors are installed in accordance with the project specification per Figures 2.14 through 2.16.
- All pipe insulation longitudinal and circumferential joints must be sealed using the self-seal lap and butt strips. All SSL II closure self-seal laps and butt strips must be firmly rubbed with a sealing tool, such as a squeegee, to ensure proper adhesion. The butt strip must be centered on the circumferential joint, and the end of the strip should overlap itself by a minimum of 1 inch (25.4 mm). See Figures 2.1 and 2.2.
- Stapling of the ASJ Max jacket or self-sealing joints is not recommended. If staples are used, they must be outward-clinching staples that must then be sealed with a mastic or covered with an approved ASJ Max tape.
- The outermost ASJ Max jacketing must have a continuous, unbroken seal. Hangers, supports, anchors, etc., that are secured directly to hot surfaces must be adequately insulated and sealed. If the insulation or jacketing is damaged during or after installation, the system must be restored to its original condition. The insulation must retain its original thickness, and the jacketing must be repaired to restore jacket integrity.

Upon completion of insulation work, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to ensure compliance with requirements herein to cover and protect insulation materials during installation.

- All work shall conform to accepted industry standards and to manufacturers' recommendations. Owens Corning recommends the use of certified mechanical insulation inspectors who maintain current certification by the National Insulation Association (NIA) or the British Columbia Insulation Contractors Association (BCICA) Quality Assurance Certificate Program throughout the project. They will inspect and verify that the materials and the total insulation systems have been installed correctly in accordance with the specifications.

FIGURE 2.1 (MICA PLATE 1-100)

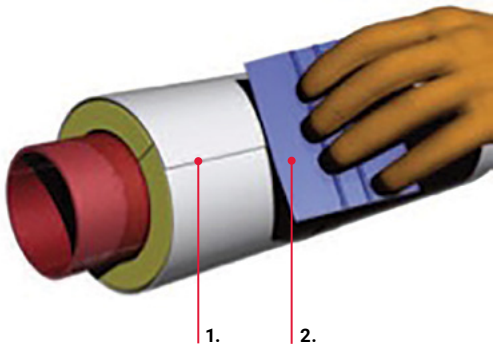


1. Preformed fiberglass pipe insulation with factory-applied ASJ Max jacket

2. Factory-applied SSL II closure self-seal tape joint

3. Butt strip tape; end of strip overlaps itself by a minimum of 1 inch (25.4 mm)

FIGURE 2.2

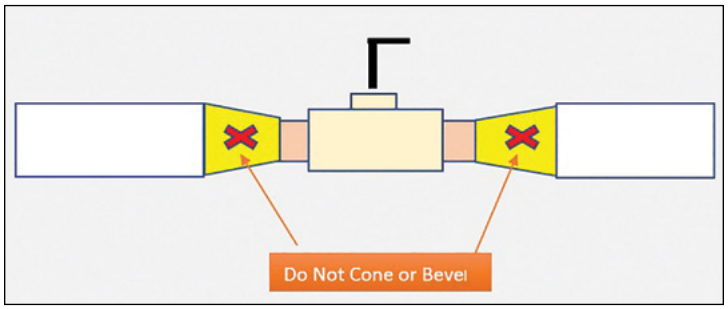


1. SSL II closure self-seal lap and factory-supplied butt strips must be firmly rubbed with sealing tool, such as a plastic squeegee

2. Squeegee

- At the termination, do not bevel or cone (as shown in Figure 2.3). Cut the pipe insulation square as shown in Figures 2.1 and 2.2.

FIGURE 2.3 CONE OR BEVEL NOT RECOMMENDED

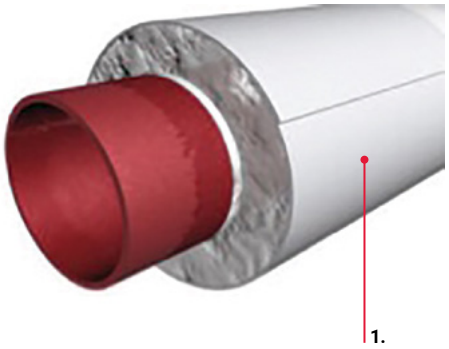


Note: Coning or beveling the ends of pipe insulation was done for appearance and takes away thermal performance. Coning or beveling was done at fittings, such as valves and couplings, where now these fittings need to be insulated, canceling the need for appearance.

PIPE TERMINATION

When the pipe insulation is being terminated, not adjoining to another pipe section or a surface such as the side of equipment or wall mastic, detail the exposed fiberglass end as shown in Figure 2.4.

FIGURE 2.4 SINGLE LAYER (MICA PLATE 1-660)



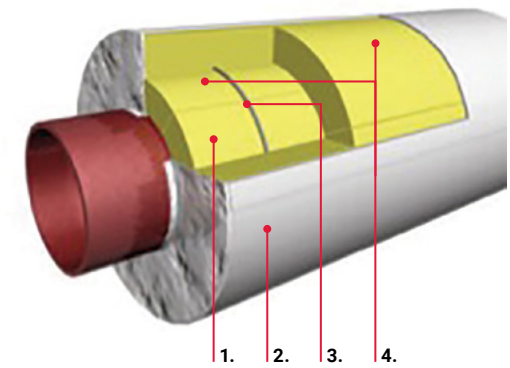
1. ASJ Max or vapor retarder jacket

Mastic is only required for cold systems

INSTALLING MULTI-LAYER (NESTED) INSTALLATION

Install multi-layer (nested) pipe insulation as shown in Figure 2.5.

FIGURE 2.5 MULTI-LAYER (MICA PLATE 1-101)



1. Preformed pipe insulation without jacket

2. Preformed pipe insulation with factory-applied ASJ Max jacket

3. Secure the inner pipe insulation layer

4. Staggered insulation joints

Mastic is only required for cold systems

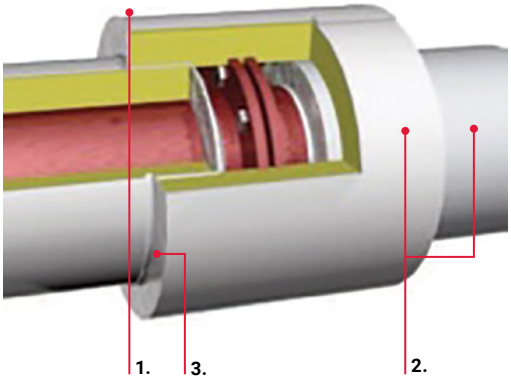
INSULATION OF PIPE SYSTEM FITTINGS: FLANGES/ UNIONS, COUPLINGS, ELBOWS, TEES, AND VALVES

Energy conservation requires that the insulation cover the entire length of the hot water pipe distribution system, including all fittings installed in the system.

The thermal performance of the insulation at the fittings should be consistent with the insulation applied to the straight pipe section as indicated by the project specification. This is accomplished by using a nested oversized pipe insulation section as shown in Figure 2.6. Seal the ends of the oversized section as shown in Figure 2.6; No. 3.

INSULATING FLANGES

FIGURE 2.6 FLANGES/UNIONS (MICA PLATE 2-135)



1. Nested insulation size

2. Factory-applied jacket

3. Mastic ends of insulation

Note: When nesting, ensure that there are no air spaces between the nested pipe insulation sections.

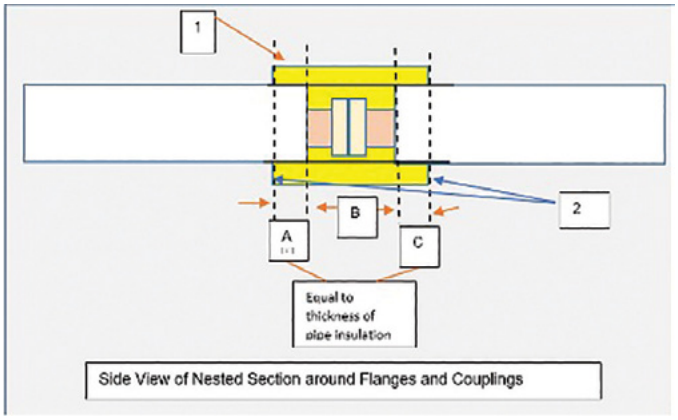
CALCULATING NESTED SIZE LENGTH

The nesting pipe section length to cover flange area is calculated as follows:

Insulation Thickness (A) + Uninsulated Space Around Flange (B) + Insulation Thickness (C) (see Figure 2.7)

FIGURE 2.7 NESTED OVERSIZED FLANGE INSULATION (MICA PLATE 2-135)

INSULATING COUPLINGS

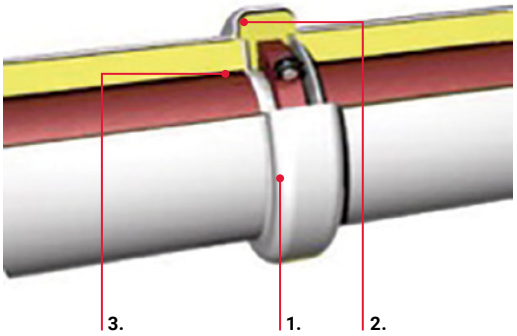


1. Preformed nested oversized fiberglass pipe insulation with ASJ Max jacket

2. Mastic ends of insulation

METHOD NO. 1: PER BELOW

FIGURE 2.8 PVC MOLDED FITTING COVER (MICA PLATE 2-535)



1. PVC molded fitting cover

2. Fiberglass insulation

3. Mastic or PVC tape on joints

METHOD NO. 2: NESTED

Use nested size insulation as described in Insulated Flanges and Figure 2.6.

INSULATING 45- AND 90-DEGREE ELBOWS

Elbows can be insulated using preformed or molded insulation, field-fabricated from a straight section of pipe insulation, or insulated using fiberglass blanket inserts.

- Insulate fittings to the same thermal performance as the adjacent insulation with either pre-cut fiberglass inserts[1] or molded segmented pipe insulation that has been mitered to conform to the PVC fitting cover.
- Install a PVC cover as recommended by the manufacturer.
- After the cover is in place, seal the throat seam and circumferential edges with PVC tape, adhesive/solvent, or mastic to all joints.

NOTE: All surfaces to be taped should first be cleaned with a cloth to remove all dust, dirt, and grease in order to provide the pressure-sensitive adhesive with a good bonding surface.

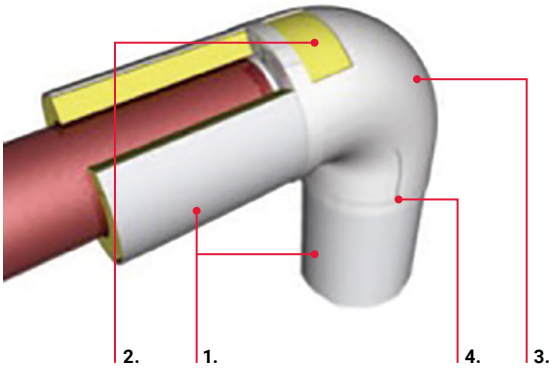
Do not pull too hard when applying PVC tape as it has a tendency to creep. Apply the tape to bridge, cover the gap or contour, and give it a smooth, flat finish.

Recommended Manufacturers[2] of PVC Covers:

- Proto Corp., Clearwater, FL 33762; www.protocorporation.com
- PIC Plastics Carthage, MO 64836; http://pic-plastics.com/

1 Pre-cut fiberglass inserts must be installed to PVC Cover manufacturer's recommendation.
2 Other manufacturers of PVC cover with equal performance are acceptable.

FIGURE 2.9 ELBOW COVERS (MICA PLATE 2-500)



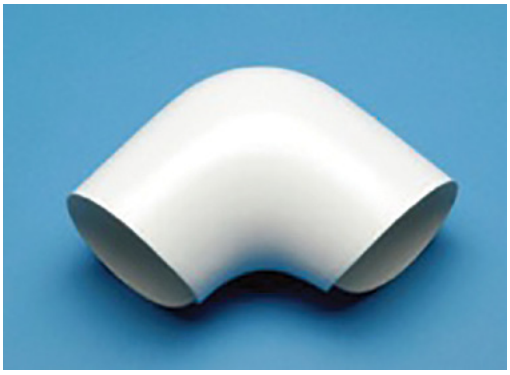
1. Preformed fiberglass pipe insulation with ASJ Max jacket

2. Fabricated, mitered, molded, or pre-cut fiberglass insert pipe insulation

3. PVC fitting cover (see Photo 2.1)

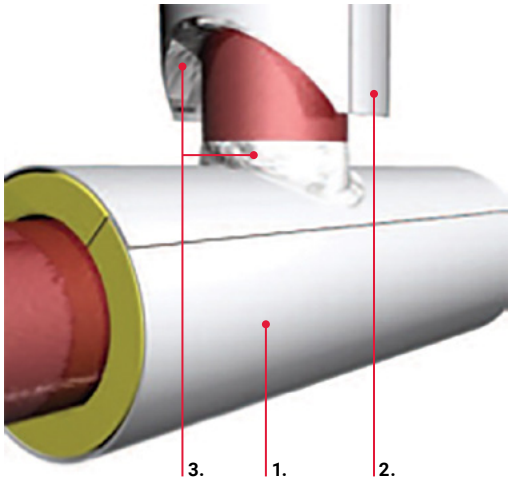
4. Apply PVC tape, adhesive/solvent, or mastic to all joints

PHOTO 2.1 PVC ELBOW COVER



INSULATING TEES

FIGURE 2.10 TEES (MICA PLATE 2-520)

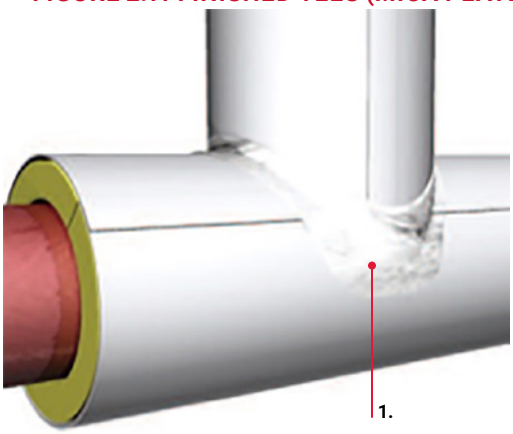


1. Preformed pipe insulation should be continued through the tee. The insulation and jacket in straight sections should be cut to fit around the vertical pipe.

2. Vertical section of pipe insulation should be cut to fit flush with the straight pipe insulation. The ASJ Max jacket should then be sealed with mastic.

3. All terminations must be finished with mastic.

FIGURE 2.11 FINISHED TEES (MICA PLATE 2-520)



1. All terminations must be finished with mastic.

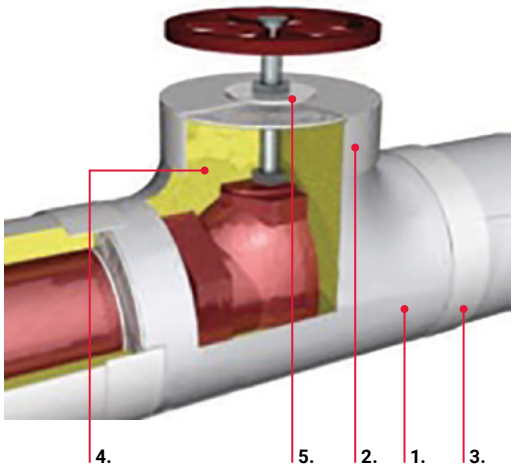
INSULATING VALVES

- Valves must be installed using the correct thickness in insulation as outlined by project specification and/or applicable codes to maintain thermal performance throughout the system.
- Coning or beveling compromises the thermal performance of the system and should be avoided. When terminating, cut pipe insulation ends square.
- Use valve handle extensions to maintain insulation thickness.
- Removable pads or covers are an acceptable means of insulation and should be used where appropriate.

Following are two ways to insulate valves.

(1) MOLDED VALVE COVERS

FIGURE 2.12 MOLDED VALVE COVERS (MICA PLATES 2-130 AND 2-530)



1. **Molded PVC valve fitting cover (see Photo 2.3)**
2. **Molded PVC end cap (see Photo 2.4). It is possible for the PVC valve cover to incorporate an end cap. If the end cap has a penetration to accommodate the valve stem, the hole must then be sealed with a vapor retarder mastic.**
3. **PVC tape**
4. **Fiberglass insulation wrapped around valve, filling void space**
5. **The void around the valve stem must be filled with insulation.**

PHOTO 2.3 MOLDED PVC VALVE FITTING COVER

PHOTO 2.4 PVC END CAP

INSULATING VALVES (2) NESTED OVERSIZED VALVE INSULATION

INSULATING VALVE:

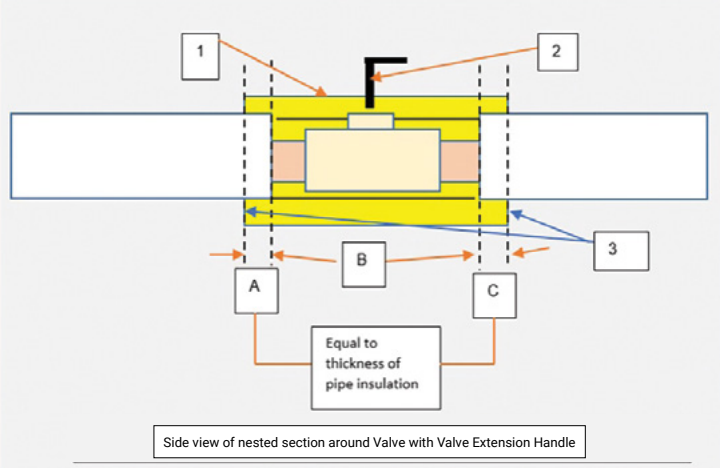
Use nesting pipe section around valves to minimize energy loss.

The nesting pipe section length to cover valve area is calculated as follows:

Insulation Thickness (A) + Uninsulated Space Around Valve (B) + Insulation Thickness (C) (see Figure 2.13)

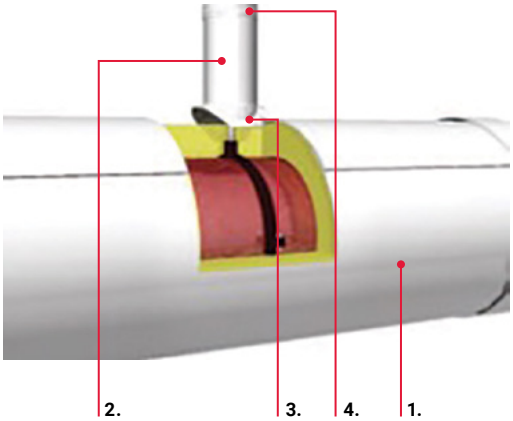
Note: The overlap of insulation (A and C) is, at a minimum, the installed insulation thickness.

FIGURE 2.13 NESTED OVERSIZED VALVE INSULATION (MICA PLATE 2-135)



1. **Preformed nested oversized fiberglass pipe insulation with ASJ Max jacket**
2. **Valve extension handle with fiberglass insulation wrapped around valve, filling void space**
3. **Mastic pipe insulation ends**

FIGURE 2.14 SPLIT RING (CONTACT) HANGER (MICA PLATE 1-600)

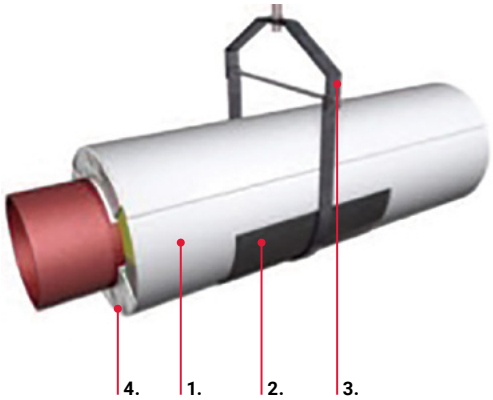


1. Preformed fiberglass pipe insulation with factory-applied ASJ Max jacket
2. Insulate support rod with preformed fiberglass pipe insulation as required to prevent condensation. See Insulation Support Rod following.
3. Mastic joint
4. Add mastic at butt joints of pipe section and termination of insulation on support rod.

Insulation Support Rod for Energy Control

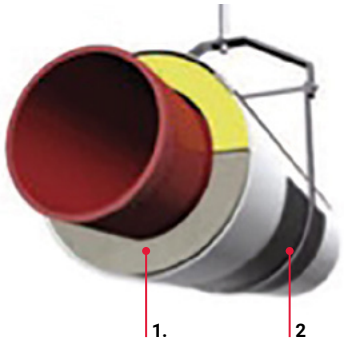
1. Insulate support rod with preformed ½ x 1 fiberglass pipe insulation.
2. From the top of the pipe insulation, insulate 6 inches up the support rod. If support rod is less than 6 inches from support hanger, insulate the entire rod.
3. The ½ x 1 pipe insulation should be cut to fit flush with the straight pipe insulation. The ASJ Max jacket is then sealed with and finished with mastic.
4. At the top of the ½ x 1 rod insulation, fill at least 1 inch down the space between the rod and pipe insulation with fiberglass, and seal with mastic.

FIGURE 2.15 CLEVIS HANGER (MICA PLATE 1-620)



1. Preformed fiberglass pipe insulation with factory-applied ASJ Max jacket
2. Metal pipe saddle
3. Clevis hanger
4. High-density insulation insert as required

FIGURE 2.16 CLEVIS HANGER HIGH-DENSITY INSULATION/INSERT DETAIL (WHEN REQUIRED) (MICA PLATES 1-610 AND 1-640)



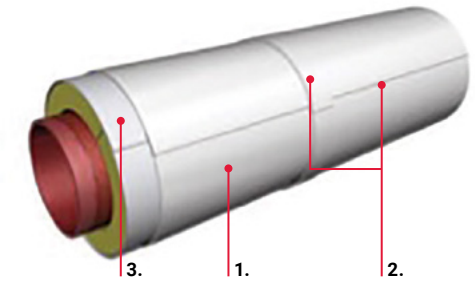
1. High-density insulation half section insert of either Foamglas®, or structural fiberglass. At a minimum, the high-density insert must be at least as long as the saddle.
2. Metal pipe saddle

FIELD-APPLIED JACKETS

Install PVC or metal jacket as indicated in the project specification. PVC or metal jackets are installed over factory-applied ASJ Max jacket in order to provide abuse protection, cleanable surface, or a specific appearance as required by the space or area of the installation.

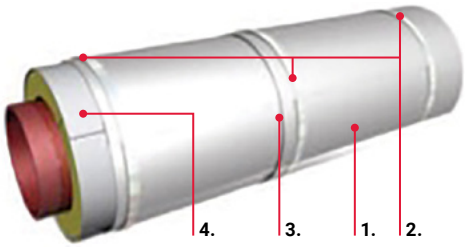
JACKETING

FIGURE 2.17 PVC JACKET (MICA PLATES 1-500 AND 1-510)



1. **Field-applied PVC jacket**
2. **PVC jacket with overlap at all joints. Secure and seal joints with PVC tape or solvent weld adhesive.**
3. **ASJ Max jacket**

FIGURE 2.18 METAL JACKET (MICA PLATE 1-400)



1. **Field-applied metal jacket**
2. **Metal jacket secured using bands per manufacturer's instructions (typically three per section)**
3. **Installed metal jacket with overlap at all joints**
4. **ASJ Max jacket**

DOUBLE-LAYER (NESTED/MULTI-LAYER) INSTALLATION

STRAIGHT SECTIONS

FIGURE 2.19

Overlap/offset the first-layer circumferential seam with the second layer of pipe insulation by a minimum 2 inches.

- It is noted that, around valves, fittings, and hangers, this overlap could be less.

FIGURE 2.19 OVERLAP OF CIRCUMFERENTIAL SEAM (MICA PLATE 1-660, DETAIL A)

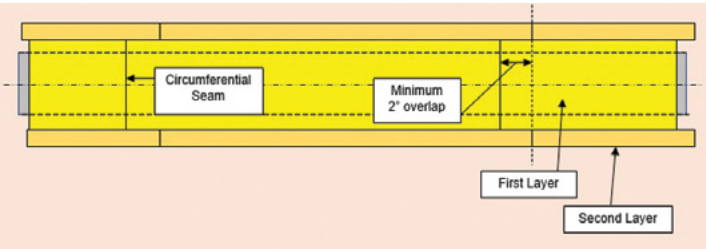


FIGURE 2.20

The first-layer pipe section longitudinal (hinge) seam shall be overlapped/offset by the second layer of pipe insulation by a minimum 2 inches.

- It is noted that, around valves, fittings, and hangers, this overlap could be less than 2 inches and due to the positioning of the valves, fittings, and hangers, the longitudinal (hinge) seams of the two sections may be across from each other.

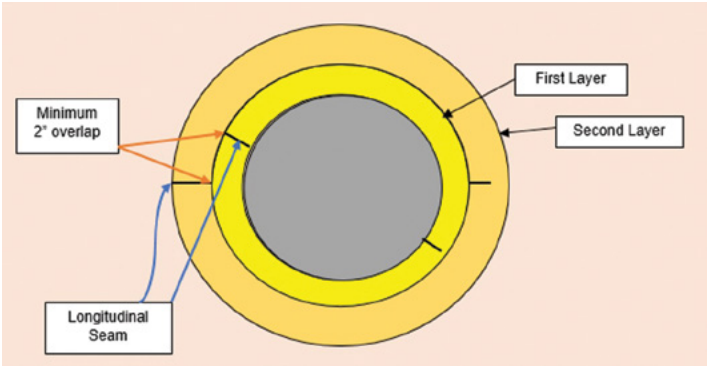


FIGURE 2.20 OVERLAP OF LONGITUDINAL SEAM

NOTE: Longitudinal Seams between the two layers that come close together due to install conditions, but are tightly butted together, will still thermally perform.

ELBOWS

When installing into Elbows, overlapping the insulation layer joints will usually not be possible.

USING PVC COVERS

Both layers are cut square at the pipe/elbow joint. Install PVC Covers per PVC Cover manufacturer's recommendation.

CUTTING 45° AT THE ELBOWS

Both layers are cut square at the center of the bend of the elbow.

TEES

USING PVC COVERS

Both layers are cut square at the pipe/tee joint.

PIPE SECTIONS AROUND THE TEES

If installing pipe sections around the Tees as described in the section on Insulating Tees, offsetting the seams can be difficult to accomplish. Install insulation such that joints are butted tightly together.

VALVES AND HANGERS

Installing pipe sections around valves and hangers as described in the section on Insulating Valves and Hangers offsetting the seams, can be difficult to accomplish.

APPENDIX

This Guide is not intended to preclude alternate methods of installation when such methods and materials can be documented as providing equivalent performance.

NOTES

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