

Rovanco® Piping Systems

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Insul-800 High Temp Conduit Installation Instructions

INS-HTC

Revised 02/17/25

This instruction manual will give you all the information needed in terms of techniques, tools, and accessories required to install ROVANCO Insul-800 High Temp Conduit. If you follow the instructions carefully, the end result will be a high quality, pressure testable conduit piping system. Thank you for showing your confidence in ROVANCO by purchasing its products. We sincerely appreciate your business and we will provide you with quality products with a fair price and “great” service to deserve your future business. Please consult your local ROVANCO Manufacturer’s Representative for information about all of the products provided by ROVANCO.

INSPECTION

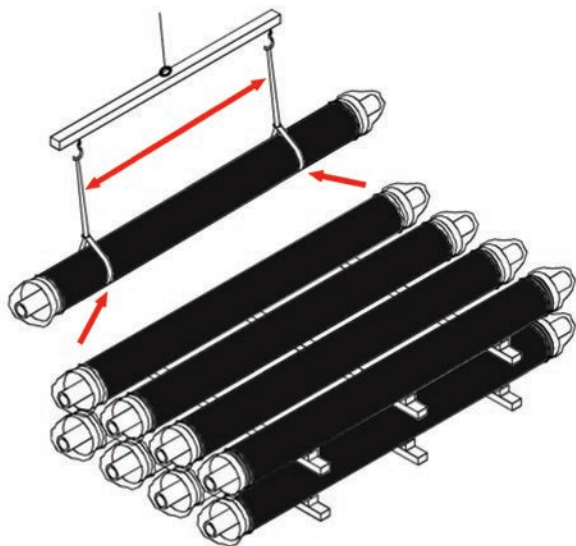
Inspect all shipments on receipt. Examine all pipe and accessories as they are unloaded. Check to insure that every item on the packing list is received. Check the contents of the cartons to insure that the materials have arrived safely. Do not throw the cartons from the vehicle. Handle all materials carefully. Have the freight carrier make out a damage or short receipt if any discrepancies are found. Keep a signed copy of this receipt and notify ROVANCO immediately. All spool pieces shipped have individual part numbers labeled on each end. Refer to your packing list to be sure you have all spool pieces shown. With your paperwork, you will receive two copies of the installation drawings. These drawings will show the location of each piece of ROVANCO Insul-800 High Temp Conduit.

UNLOADING

ROVANCO piping systems are manufactured to withstand normal field handling but, like any piping material, damage can occur from careless handling. The spool pieces should be unloaded from the truck using a cherry picker or other suitable equipment. **Lift the pieces with nylon slings and spreader bars as shown in illustration below** so as not to damage the polyethylene jacket. Do not use chains or chokers in direct contact with the polyethylene jacket. **Do not drop spool pieces because this can damage to the piping, insulation, conduit or coating.**

STORAGE

Use dunnage material under the pipe and between successive layers to protect the casing from foreign objects. Do not stack more than four layers high to avoid excessive weight on the bottom layer. Prior to installation cover the pipe ends with a white tarp or white visqueen to keep out water, excessive dust and debris. If the pipe will be stockpiled in direct sunlight or at temperatures exceeding 90°F, cover the entire system with a white tarp or white visqueen. Do not use opaque, clear or any other color other than white. If these steps are not taken, warranty will be void. There should be a layer of wood dunnage between the pipe and visqueen. Cartons of material (i.e. glue, foam kits, fiberglass adhesives, etc.) should be stored in a dry area at 60° to 80°F. Liquid foam has a shelf life of 6-12 months after delivery. Freezing or high temperatures may affect the product’s ability to perform their functions. If you are expecting or experiencing cold or freezing temperatures, move foam kits to a more suitable environment between 60°-80°F. IF these steps are not taken, warranty will be void.



TESTING

All carrier pipe must be hydro tested prior to insulating, pouring thrust blocks or backfilling the system. Failure to comply with testing procedures will void warranty.

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Testing

All carrier pipe must either be air or hydro tested per specifications prior to insulating, pouring thrust blocks around anchors or backfilling the system. Failure to comply with testing procedures will void warranty. Plastic carrier pipe must be hydro tested only, do not air test.

ROVANCO's products and processes are covered under various US patents, including, but not limited to 4,084,842 - 4,484,386 - 4,221,405 - 3,793,411.

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For Leak Detection Installation Instructions, contact Rovanco for INS-RAT

Section 1: Installation of Spool Pieces

Fig. 1.1

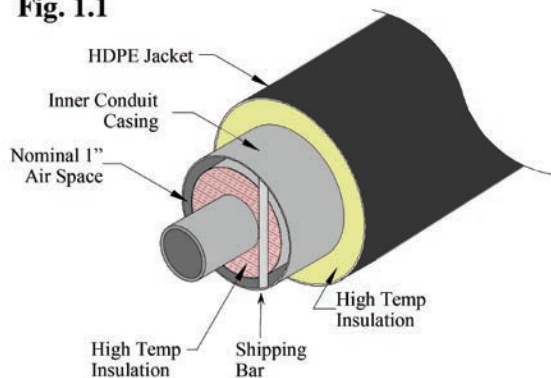


Fig. 1.2



Fig. 1.3

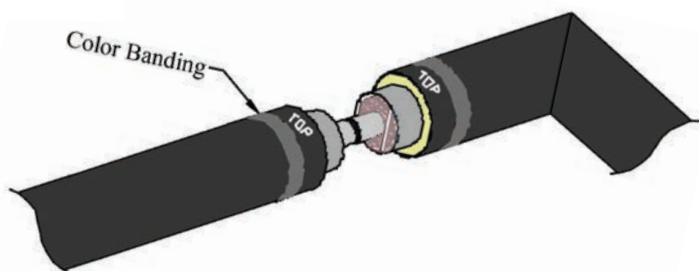


Fig. 1.4



Fig. 1.5

ROVANCO
Piping systems, inc.

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-- THE LEADER IN PRE-INSULATED PIPING SYSTEMS --

SHOP ORDER NUMBER:		INSPECTED BY:
PART NUMBER:		
MATCH THIS END TO PART NUMBER:		

This is an Insul-800 system. It is for high-temp steam and condensate. Understanding how this system is configured will help during installation. **See Figure 1.1**

After the ditch has been opened, the spool pieces should be installed in accordance with the installation drawings bearing the latest revision number. Each spool piece has its own part number which will match the drawing showing its approximate length.

If the conduit is not going to be installed immediately, leave the plastic bag over the end of the pipe. Plastic bags with the bottoms cut out or plastic sheeting can be taped over the polyethylene sleeve to help prevent water from entering the system should the trench flood. **This is the contractor's responsibility. See Figure 1.2**

Test cans can be used at the open ends of the systems to prevent water from entering the system. It is very important that the insulation is kept dry during installation!

IF water enters the conduit, contact Rovanco immediately so you can be instructed as to how to dry out the system. **IF piping system utilizes aerogel or mineral wool insulation** & gets wet, there is the possibility the insulation could emit an ammonia odor that should dissipate as the system dries out but could persist until the system is totally dried out.

ROVANCO suggests that you dig bell holes for field welding before lowering the pieces in the ditch. Lower the conduit into the trench, using a spreader bar and nylon slings. As pieces are lowered into the ditch, make sure that the trench bottom is free of sharp objects or rocks. ROVANCO recommends the use of clean backfill material without sharp stones. If the project specifications require a specific backfill material, we recommend the installer follow the specifications.

Check the drawings for possible cold spring locations. Notice that there are colored bands located on the end of some spool pieces. This band is to match an identical colored band of the adjacent piece at the field joint location. **See Figure 1.3**

This is to insure that expansion pipe supports are located in the proper areas. Also note that straight lengths coming off an expansion loop or elbow have a ROVANCO label marked TOP on the conduit end.

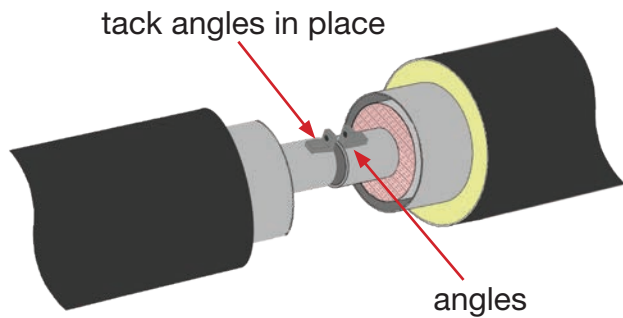
See Figure 1.4

This designates that these spool pieces have a top. This must be at the 12 o'clock position before the pipe is welded. This insures that the service pipe can move laterally within this special support.

See Figure 1.5 for a label example.

Section 2A: Pipe Cold Springing Requirements

Fig. 2.1



Shipping bar must be removed before cold springing procedures can be performed.

If cold springing is not required, move on to Section 3.

All systems do not require cold springing, refer to your ROVANCO site drawing to determine if the system you are installing requires cold springing. If so follow the instructions below, if not, go onto Section 3.

Refer to the ROVANCO installation drawings since an expansion elbow or a loop may require cold springing. The drawings will show you the amounts to cold spring at each leg. If the concrete anchor blocks can be poured before cold springing, use this method. When project scheduling requires that the cold-springing be completed prior to pouring concrete anchor blocks, the "Bridge Method" can be used. See Section 2B.

Be sure that all spool pieces except the cold spring locations are welded up first. Concrete anchor plates must be poured prior to this method of cold springing. When you skip the joint to be cold sprung, leave the cold spring amount gaped between the two pipes.

Fig. 2.2

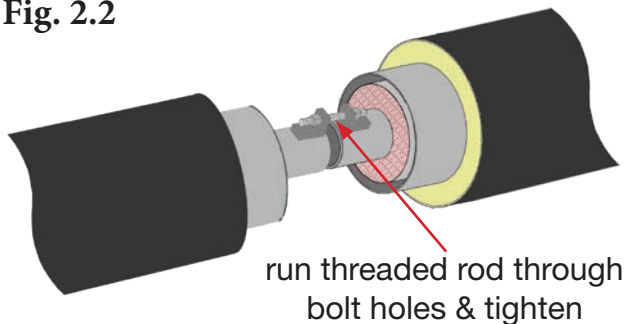
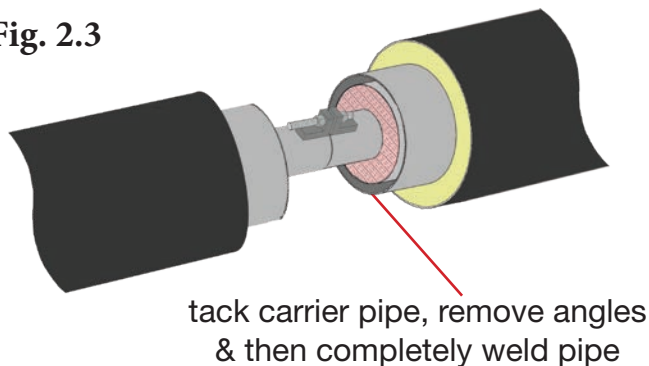


Fig. 2.3



1. Weld angles with a bolt hole in it on each end of the carrier pipes. **See Figure 2.1**

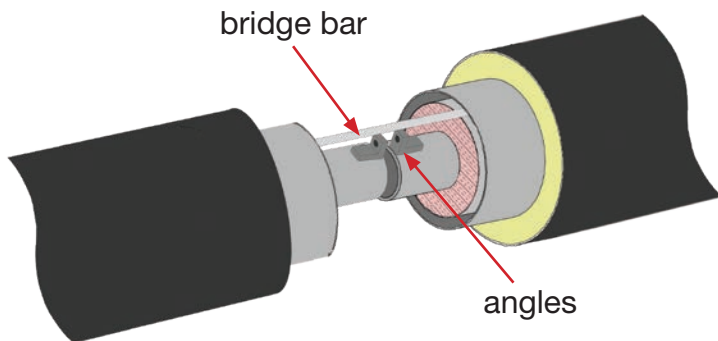
NOTE: Angles & rods NOT supplied by ROVANCO.

2. Run a piece of all-thread rod through the holes and tighten until the two pipes meet. **See Figure 2.2**

3. Tack weld the joint and remove the angles. Then completely weld the carrier pipe ends together. **See Figure 2.3**

Section 2B: Bridge Cold Springing

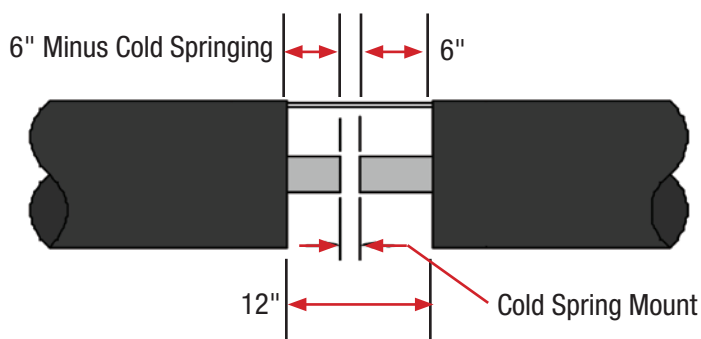
Fig. 2.4



This method of cold springing allows cold springing to be done before anchors are poured in concrete.

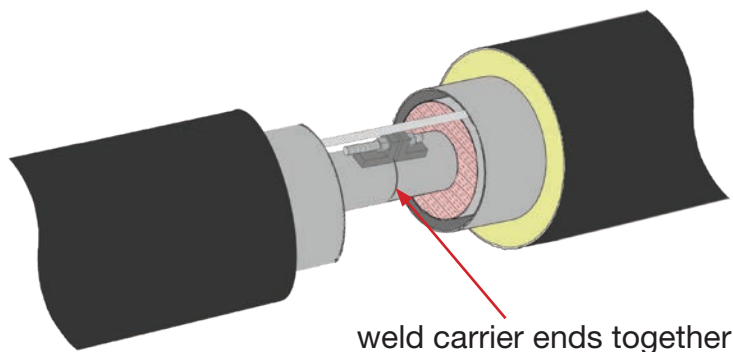
1. Make sure that exactly 12" is maintained between the ends of the conduit.
2. Weld an angle iron "Bridge" between the conduit ends. The bridge should be welded on the inside of the conduit at 12 o'clock. This is to prevent interference while installing the connector band and yet maintain drainage of the conduit system. Make sure that a 12" gap is maintained between all conduit ends. Also make sure that the distance to be cold sprung is left between the pipe ends. **See Figures 2.4 and 2.5**

Fig. 2.5



3. Install a "bridge" at every field joint in the run of pipe including the joint to be cold sprung, i.e. anchor to end seal or gland seal, and anchor to anchor.
4. Weld angles with holes and run a piece of threaded rod through the holes and tighten. Weld the carrier pipe as with the standard cold springing instructions in Section 2A. **See Figure 2.6**
5. Leave the bridges in place. Insulate joints and install connector bands per Section 6.
6. For conduit sizes 12¾" and larger, put two bridges, one at 3 o'clock, and one at 9 o'clock.
7. Tack weld the joint and remove the angles. Then completely weld the carrier pipe ends together.

Fig. 2.6

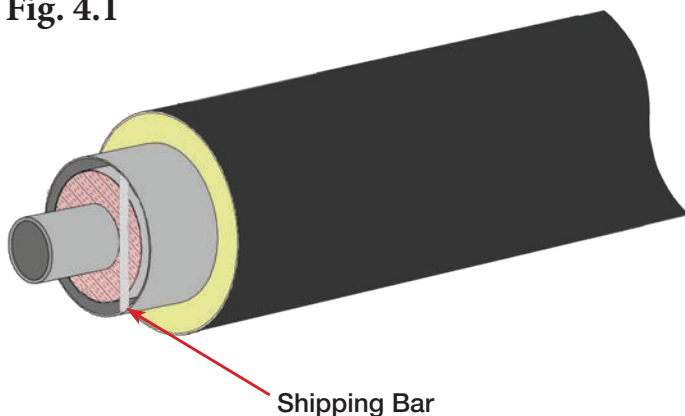


Section 3: Field Alteration of Spool Pieces

Although the ROVANCO spool pieces have been fabricated in accordance with contractor field measurements, sometimes obstructions or errors can require field alteration. Prior to making any field alterations, contact ROVANCO's Customer Service Department in Joliet, Illinois (815) 741-6700, so that we can instruct you in this process and insure that the resulting layout will function properly. This prior notification will also maintain the ROVANCO warranty.

Section 4: Welding of Carrier Pipe

Fig. 4.1



NOTE: Prior to any carrier field welds, pipe ends must be prepped in the field by contractor.

NOTE: During the welding process do NOT use anti-splatter or any type of lubricant IF your system has leak detection. These materials can cause the leak detection to fail.

If cold springing is required, perform steps in Section 2 before starting the welding of the carrier pipe process.

Prior to the welding of the carrier pipe, remove the shipping bar attached between the carrier pipe and outer conduit and clean up any remaining weld debris on the conduit. **The shipping bars have been put there to keep the pipe from sliding out of the conduit during transit, unloading, and lowering into the trench. These bars must be removed to allow the service pipe to expand during operation. See Figure 4.1**

Fig. 4.2



Wrap joints similar to this example

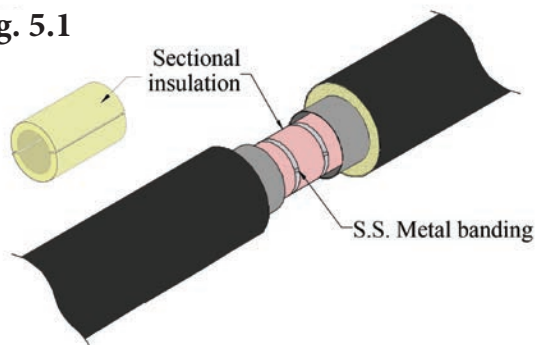
After removing the shipping bar, you will find it easier to align the inner pipe. If cold springing is required, see Section 3. Align and weld the carrier pipe. If the carrier pipe is not welded immediately, the field joint should be wrapped with plastic to prevent moisture & debris from getting into the system. **See Figure 4.2**

If your system has RhinoJoints or full round HDPE wraps (both optional), you can slide those over joint before covering with plastic to provide added protection.

If a hydrostatic test of the carrier pipe is not specified in the contract, ROVANCO recommends that a hydrostatic test be run on the internal pipe at 1½ times the job working pressure, not to exceed 250 psig without prior approval from ROVANCO. This test should be done prior to insulating the field joints and welding the connector bands closed, to allow inspection and repair of welds if necessary.

Section 5: Insulating Field Joints

Fig. 5.1



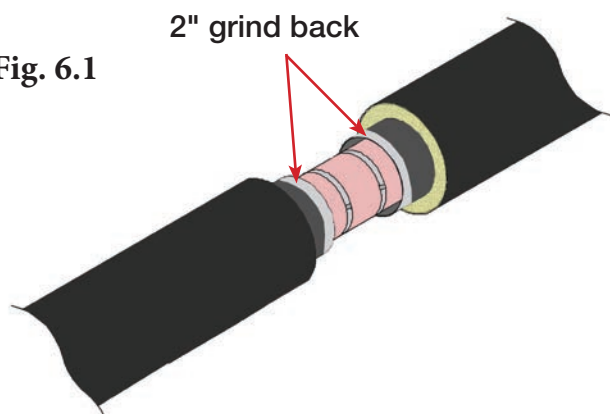
After the hydrostatic test has been completed, insulate the field joints. Sectional insulation has been provided in the cartons. Cut this insulation to length plus a 1/2" as required for each field joint and fasten with two stainless steel bands and clips, which have been provided by ROVANCO.

See Figure 5.1

NOTE: See pages 24-26 for Pull Rope option for high temp leak detection.

Section 6: Welding & Air Testing of Connector Bands

Fig. 6.1

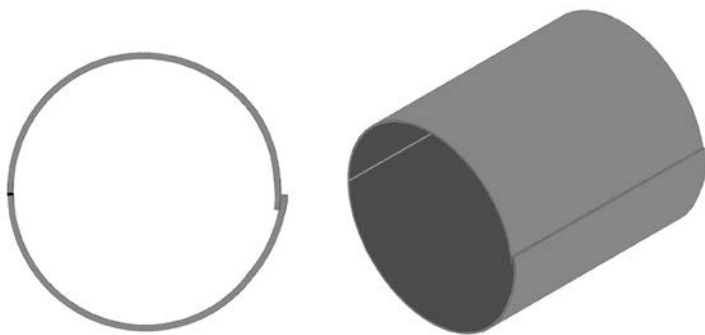


NOTE: It is the responsibility of the contractor to grind back both ends of the joint by 2" before installing the connector bands. This is only necessary if the conduit has a coating on it such as Rhinocoat.

Ends should be ground to clean, bare metal that is free of any coatings to allow the welding of the connector bands.

It is suggested the grinding of the ends be done BEFORE lowering pipe into trench. See Figure 6.1

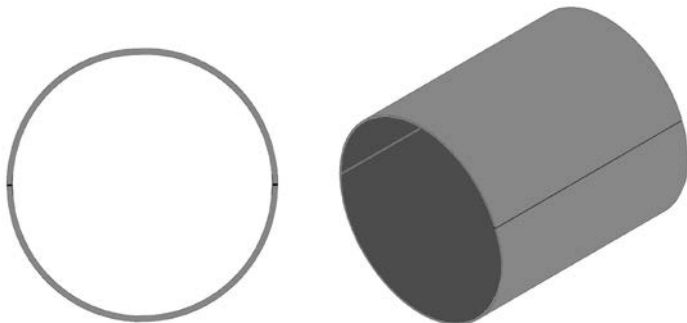
Fig. 6.2



NOTE: Connector bands **DO NOT** come coated. They are sent bare unless otherwise stated in specifications.

The length of each connector band is 15" to allow an overlap on your 12" joint area. The connector band is supplied in 2 equal length halves so there is no top or bottom half. Once the two bands are in place, centered over the joint, please note that one seam will be a butt fit and the other seam will be an overlap fit. This is the intended fit of the connector band. **See Figure 6.2**

Fig. 6.3



NOTE: If the system is 4" or 6" conduit, you will receive a 2-piece connector band. Both halves will be the same size. Connector band halves will have 2 butt weld seams that do NOT overlap. **See Figure 6.3**

Fig. 6.4

Tack bottom half of connector band in several places to secure

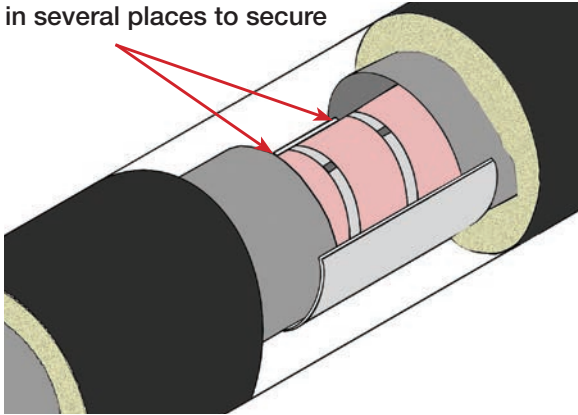


Fig. 6.5

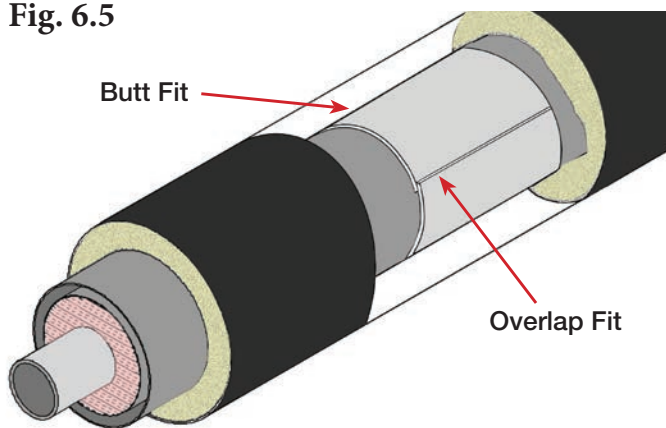


Fig. 6.6

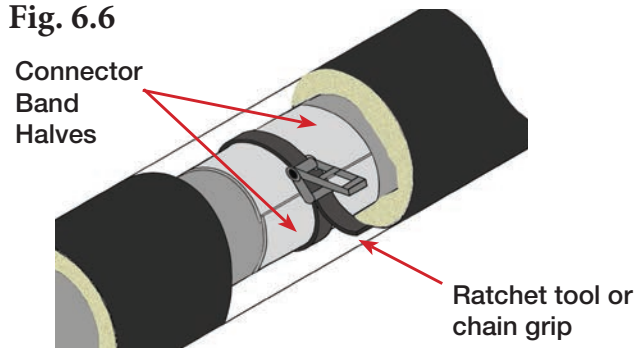
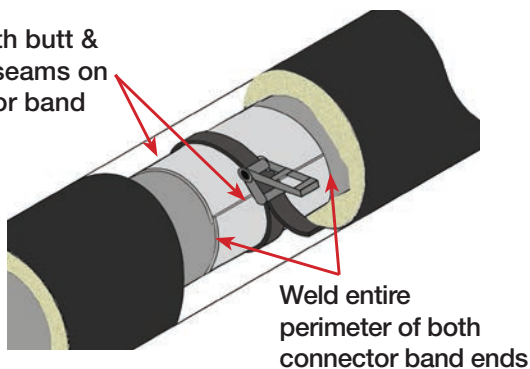


Fig. 6.7

Weld both butt & overlap seams on connector band



NOTE: During the welding process do NOT use anti-splatter or any type of lubricant IF your system has leak detection. These materials can cause the leak detection to fail.

To start, center one half over the bottom of the joint area. Tack that half in place with a couple quick tacks on each side of the connector band half along the same edge so it is semi-secured to the conduit. **See Figure 6.4**

Center and place the other half of the connector band on the top. **When the connector bands meet, one edge will butt fit and the other edge will overlap. See Figure 6.5**

Apply a ratchet tool or chain grips and tighten both halves of the connector band at once until they are pulled tight against the outer jacket. **See Figure 6.6**

Tack in place with welds until the whole connector band is secure and will not move. Now fully weld the butt fit and overlap seams on the connector band as well as the full perimeter on both ends of the connector band where it meets the conduit. When done welding, joint should be air tight. **See Figure 6.7**

If it is a 4" or 6" system with 2-piece split mechanical tubes, follow the steps above in regards to attaching one half, securing in place with tack welds, placing second half in place, ratcheting down and securing with tack welds. With this connector band system, you will have two seams that butt fit. Both these seams as well as the full perimeter on both ends of the connector band will need to be welded.

After all connector bands are fully welded, a 15 psi air test should be put on the inner casing prior to coating, shrink wrapping, pouring of thrust blocks or backfilling the system. Each connector band, gland seal, and testing apparatus should be checked for leaks with a soap and water test. If bubbles appear, a leak exists. **NOTE: Depressurize prior to repairing leak. If you try to repair with the pressure still on the system, you could blow a larger hole in the leak area.** After leak is repaired, retest as described above and re-soap the repaired joint to ensure the leak has been completely fixed.

If possible, air test system as you install. ROVANCO can provide test cans in case you need to do an air test on only part of the system or on a watershed.

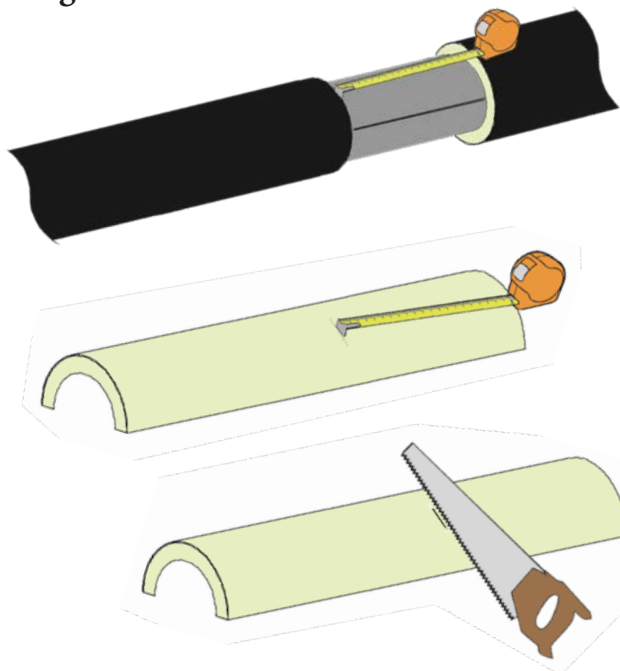
NOTE: After passing the pressure test, if specifications call for the field coating of connector bands, apply coating supplied by Rovanco in accordance to the instructions accompanying the coating.

NOTE: If Your System Has RhinoJoint See INS-RJAT Now For Installation Instructions.

Section 7: Sectional Insulating of the Inner Conduit Casing

The carrier pipe must be fully tested before insulating the joint. If you are insulating with poured in place foam, go to Section 8. **If your system has RhinoJoints, see INS-RJAT for those installation instructions.**

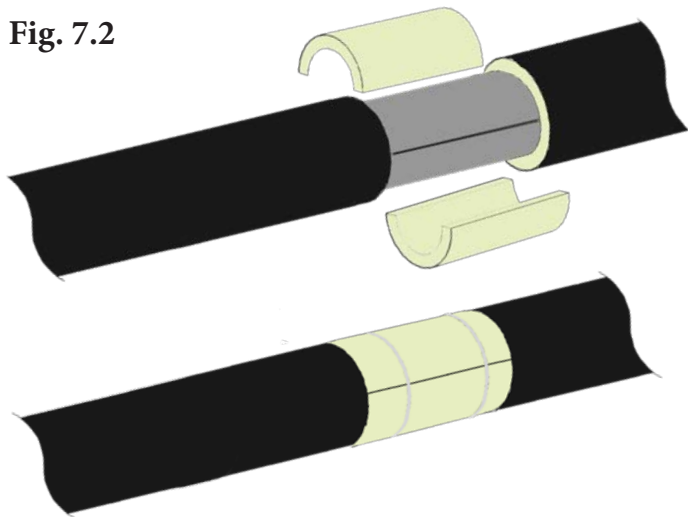
Fig. 7.1



For sectional insulation, measure each joint area width. Then measure the insulation and mark the width of the joint on the insulation. Cut the insulation to the same size as the joint with a hand saw. **See Figure 7.1**

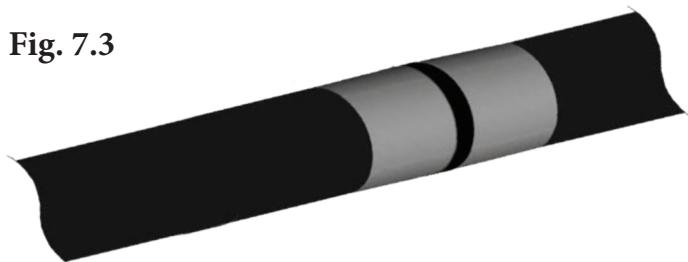
Prepare the joint to be insulated following the procedures outlined in the piping system installation instructions included with your shipment. Air test must be done and passed before placing & securing the sectional insulation.

Fig. 7.2



Put the two insulation halves in place and band or tape the them together to secure them in place. **See Figure 7.2**

Fig. 7.3



Cut the polyethylene sleeve to length. Refer to page 13 of these installation instructions for sleeve lengths for each jacket size.

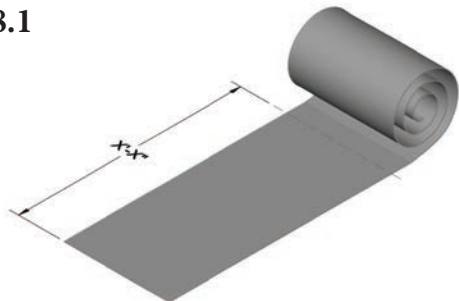
Depending on the outer jacket size, cut the polyethylene sleeve so edges of sleeve overlaps the edges of the joint by 2". Pull to snug up sleeve and tape down in the middle. Do not tape the edges of polyethylene sleeve. **See Fig. 7.3**

Next, the shrink wrap will be applied over the insulated field joint. Go to Section 9 on page 13 for those instructions.

Section 8: Poured In Place Insulating of the Inner Conduit

The carrier pipe must be fully tested before insulating the joint. If you are insulating with sectional foam, go back to Section 7. **If your system has RhinoJoints, see INS-RJAT for those installation instructions.**

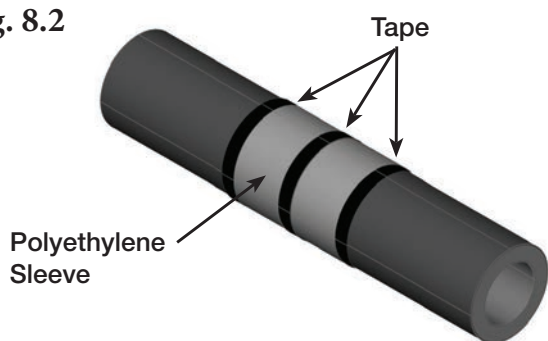
Fig. 8.1



Cut the polyethylene sleeve to length. Refer to page 13 of these installation instructions for sleeve lengths for each jacket size.

Depending on the outer jacket size, cut the polyethylene sleeve to length **See Fig 8.1** so edge overlaps the other edge of the sleeve by 2" and tape down. **See Fig. 8.2**

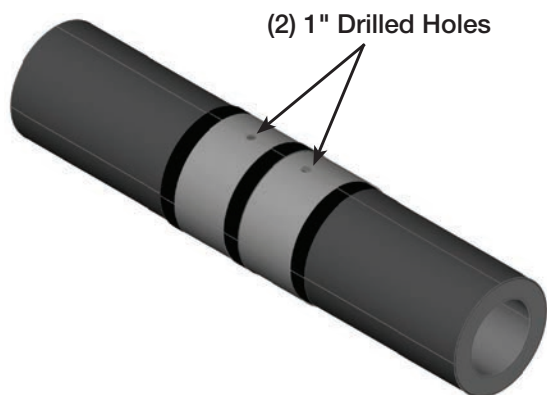
Fig. 8.2



Slide the provided polyethylene sleeve into place so it is centered over the joint. Cinch it up as tightly as possible around the HDPE jacket using tape to secure it in place. **See Fig 8.2**

Drill (2) 1" holes in the polyethylene sleeve at opposite ends as shown. **See Fig 8.3**

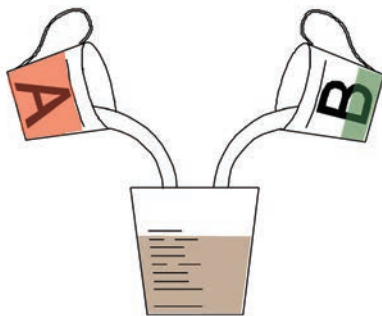
Fig. 8.3



Do not begin the foaming process until you have read and understand the associated steps. Prepare the joint to be insulated following the procedures outlined in the piping system installation instructions included with your shipment. Air test must be done and passed before beginning the foaming process.

Label your measuring cups with the letters A & B to prevent a mix-up later on. Examine the mixing charts on page 12, then pour the correct amount of A & B agents into the separate measuring cups. Make sure to have the right size joint from the table. Some larger sizes require two or three separate pours.

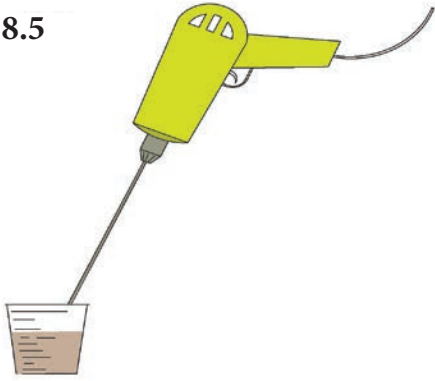
Fig. 8.4



Pour the measured amounts of A & B material into a 3rd mixing cup to combine. **See figure 8.4**

300° Liquid Foam is mixed (2) parts "A" to (1) part "B"

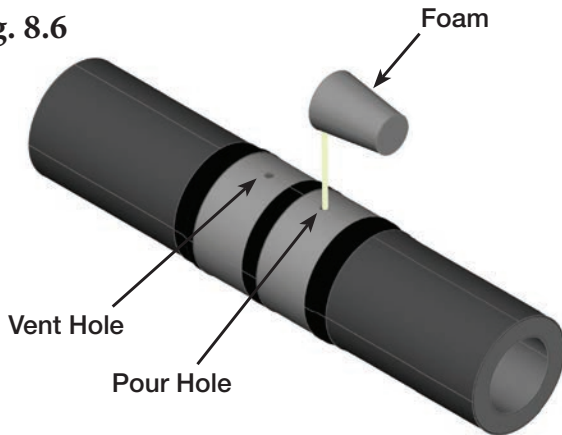
Fig. 8.5



Using an electric drill with the mixer head attachment provided, mix the components for twenty seconds. In temperatures above 70 degrees mix for 12-15 seconds. **See figure 8.5**

The cream time is shown on the graph on page 12.

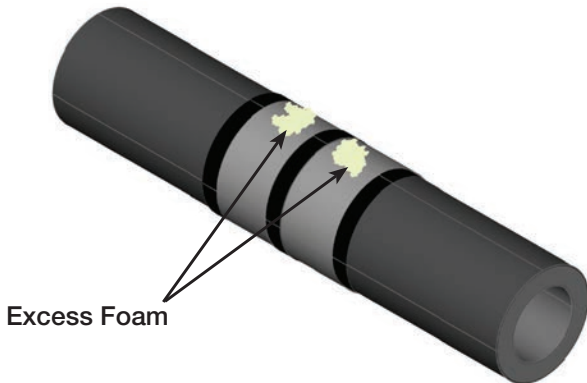
Fig. 8.6



Pour the mixed foam into (1) of the 1" holes in the mold for the joint you are insulating. The hole not used for pouring will serve as a vent hole which allows the insulation to flow out evenly within the joint when it starts expanding. **See figure 8.6**

Spin the mixing bit clean in an empty cup or box. If foam build up occurs it can be cleaned off with a utility knife or similar tool after it has cured.

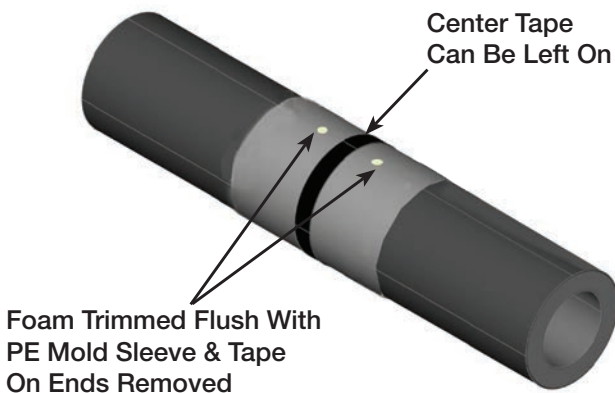
Fig. 8.7



After the poured foam stops rising and is dry to the touch, foam should be sufficiently cured. Cut any excess foam off with a knife or sharp object so it is as level with the polyethylene mold sleeve as possible. Remove the tape from both ends of the polyethylene sleeve before applying shrink wrap. The center piece of tape can stay on the sleeve during the shrink wrap process.

See figures 8.7 & 8.8

Fig. 8.8



A wrap around shrink sleeve must be heated and shrunk over the split polyethylene sleeve, this material is 24" or 36" wide and should be centered over the joint area. This is necessary to protect the joint, and ensure a water tight system. A closure strip will be shrunk over the longitudinal seam. These steps are shown in the next section.

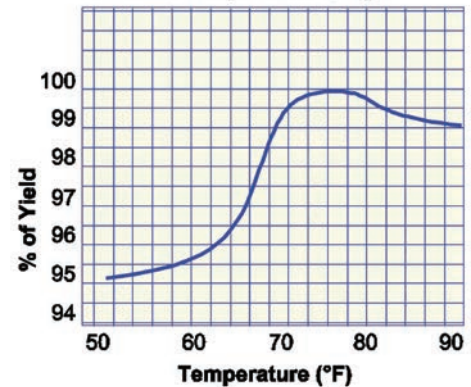
Note: For best results, store and maintain A & B components as close to 70 degrees (f) as possible. In temperatures below 70° F, for best performance, pre-heat pipe and molds. Read S.D.S thoroughly, you are using chemicals which could present a hazard if used improperly. This page illustrates the proper mixing quantities for Parts A & B of the 300° F Hi-Temp Foam Kits. Please use these charts when mixing your quantities of foam.

NOTE: Mixing Ratio Is NOT 50/50

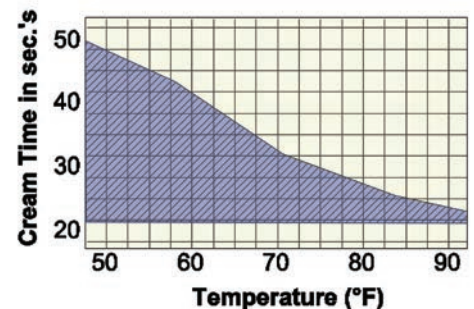
Measuring Chart for Mid-Temp Foam Insulation

Carrier	Cross Section	Straight Joint		Elbow		Tee	
	Jacket	Cup "A"	Cup "B"	Cup "A"	Cup "B"	Cup "A"	Cup "B"
1"	4	1/2	1/4	1/2	1/4	3/4	3/8
	6	1	1/2	1 1/4	2/3	2	1
	8	2	1	2 1/2	1 1/4	3 1/2	1 3/4
1 1/4"	4	1/2	1/4	1/2	1/4	3/4	3/8
	6	1	1/2	1 1/4	2/3	2	1
	8	2	1	2 1/2	1 1/4	3 1/2	1 3/4
1 1/2"	4	1/2	1/4	1/2	1/4	2/3	1/3
	6	1	1/2	1 1/4	2/3	1 3/4	7/8
	8	2	1	2 1/2	1 1/4	3 1/2	1 3/4
2"	6	1	1/2	1 1/8	2/3	1 3/4	7/8
	8	2	1	2 1/2	1 1/4	3 1/2	1 3/4
	10	3 1/2	1 3/4	3 1/2	1 3/4	5 1/3	2 2/3
2 1/2"	6	1	1/2	1	1/2	1 5/8	3/4
	8	2	1	2	1	3 1/2	1 3/4
	10	3	1 1/2	3 1/2	1 3/4	5 1/3	2 2/3
3"	6	1	1/2	1	1/2	1 3/8	2/3
	8	2	1	2	1	3	1 1/2
	10	3	1 1/2	3 1/2	1 3/4	5 1/4	2 2/3
4"	8	1 1/2	3/4	2	1	2 3/4	1 1/3
	10	2 3/4	1 1/4	3 1/3	1 3/4	5	2 1/2
	12	4	2	5 1/3	2 2/3	7 2/3	3 3/4
5"	10	2 3/8	1 1/4	3	1 1/2	4 1/2	2 1/4
	12	4	2	4 7/8	2 1/2	7 1/3	3 3/4
6"	10	2	1	2 1/2	1 1/4	3 1/2	1 3/4
	12	3 1/2	1 3/4	4 1/2	2 1/4	6 2/3	3 1/3
8"	12	2 3/8	1 1/4	3 1/2	1 3/4	5	2 1/2
	14	4	2	6	3	9	4 1/2
10"	14	2 3/4	1 1/4	4	2	6	3
	16	5	2 1/2	7 1/2	3 3/4	11	5 1/2
12"	16	3 1/2	1 3/4	5 1/3	2 2/3	7 1/2	3 3/4
	18	5 1/2	2 3/4	9	4 1/2	13 1/3	6 2/3
	20	8	4	13 1/8	6 2/3	20	10
14"	18	4 3/8	2 1/4	7 1/2	3 3/4	11	5 1/2
	20	7	3 1/2	12	6	18	9
16"	20	5	2 1/2	8 3/4	4 1/2	13	6 1/2
	22	8	4	14	7	20 3/4	10 3/8
18"	22	5 1/2	2 3/4	10 1/4	5 1/4	15 1/2	7 3/4
	24	8 1/2	4 1/4	16	8	24 1/4	12 1/8
20"	24	6	3	12	6	18	9
	26	9 3/8	4 3/4	18 1/2	9 1/4	28	14
22"	26	6 1/2	3 1/4	13 5/8	6 3/4	20 1/3	10 1/4
	28	10 1/4	5 1/8	21 1/4	10 2/3	32	16
24"	28	7	3 1/2	15 1/2	7 3/4	23 1/8	11 3/4
	30	11	5 1/2	24	12	36	18

Yield vs. Temperature Graph



Cream Time vs. Temperature Graph



Correct Mixture Ratio = 2 Parts "A" to 1 Part "B" w Cup = 8 ounces
DOUBLE amounts for Insul-800 joint

Section 9: Applying Heat Activated Shrink Wrap

Description:

Shrink wrap is shipped in predetermined bulk rolls 24" or 36" in width. It is to be applied over the insulated joint that has been enclosed in a polyethylene wrap or sleeve. The shrink wrap is necessary to protect the joint, and ensure a water tight system. A closure strip will be shrunk over the horizontal seam. The adhesive is built into the wrap, and only becomes apparent upon heat activation, protecting it from environmental factors. Closure strips are supplied as a separate component, and come in various lengths to match the width of respective wrap being installed. The table below serves as a guide as to what length you should cut the shrink wrap relative to the jacket size.

Shrink Wrap Cut Length Chart			
Jacket Pipe Size	Cut Length	Jacket Pipe Size	Cut Length
6"	2' - 1"	22"	6' - 3"
8"	2' - 7"	24"	6' - 10"
10"	3' - 2"	26"	7' - 4"
12"	3' - 8"	28"	7' - 10"
14"	4' - 2"	30"	8' - 4"
16"	4' - 8"	32"	9' - 0"
18"	5' - 3"	34"	9' - 5"
20"	5' - 9"	36"	10' - 0"

Suggested Equipment Necessary:

Propane tank, hose, torch with regulator (minimum torch size to be 150,000 BTU/hr.), surface prep tools to scuff the area, knife, roller, rags and cleanser, digital thermometer with probe, and necessary safety equipment (gloves, goggles, hard hat, steel toe boots, etc.).

General Product Guidelines:

- Overlap – each section should be cut to provide for a minimum of 4" overlap around the pipe.
- Closure Strip – Closure strip should be sized appropriately to match the width of shrink wrap being installed.
- It is important to make sure the shrink wrap and closure have no visible damage or contamination.
- **IMPORTANT** – Shrink wrap must be wrapped on the pipe around in the direction as it is spooled off the roll, failure to do so will inhibit the shrinking process from working properly.

Storage of Product:

It is important to understand that this shrink wrap product contains a built in adhesive that is activated by heat. Precautions should be taken to ensure proper storage where temperature is sufficiently below product adhesive activation temperature. Additional information about this product can be on its data sheet. Temperature considerations should take radiant heat from direct sunlight into account. In addition, extreme cold can cause damage to shrink wrap. Shrink wrap must be stored out of the sun or other harsh weather conditions, and at temperatures above -4 °F (20°C) and below 95 °F (65°C).

Surface Preparation:

1. Using some type of abrasive, preferably sandpaper, scuff up the polyethylene sleeve, the tape you used to secure it and the HDPE jacket at least 2" beyond the edges of the polyethylene sleeve to ST3/SP3. This will assure ends of shrink wrap will have a strong seal to the HDPE jacket and polyethylene sleeve. Also remove any burs or loose pieces that may be present and that should effect shrink wrap material.
2. Wipe complete sanded area with a clean cloth and rubbing alcohol (or acetone) to remove any debris or contaminants before applying shrink wrap.
3. Pipe needs to be totally dry before shrink wrap can be applied.

Applying the Shrink Wrap:

4. Pre-heat the joint area to a minimum of 150 °F (65°C). Confirm temperature reached using digital thermometer with probe.
5. After centering the wrap over the joint, gently heat first 6 inches of wrap to activate the adhesive. A visual sign the adhesive has been activated is when it becomes shiny & looks to be wet. Position the starting edge you heated between 10 & 2 o'clock position on the pipe. This will assure the seam and the applying of the closure strip is in an area that will make it easier to accomplish. Press down firmly so starting edge is secured in place.
6. To assure wrap has been cut to the proper length, do a test fit by firmly pulling shrink wrap material around the joint so the closing end overlaps the starting end by at least 4". **Note** – if length measured properly, the closing edge of the wrap should overlap the starting edge and seam will end up somewhere near the top half of the pipe. Be sure you keep the edges of the wrap aligned as close as possible as you wrap the shrink around the pipe.
7. Once wrap length is confirmed as adequate, unwrap enough so you can heat the closing edge of the shrink wrap. Again pull wrap firmly and secure the heated closing edge in place by pressing down with a gloved hand.

Applying the Closure Strip:

8. Pre-heat one end of the closure strip to activate adhesive. Position closure strip so it is centered over the seam and edge is aligned with shrink wrap edge. Press down firmly with a gloved hand to secure in place.
9. Continue heating closure strip as you work toward the other end, pressing down with a gloved hand as you go. Be sure to keep the closure strip in alignment so it remains centered on seam.
10. You can use a gloved hand or gentle pressure from a roller to work out any wrinkles or air pockets. This must be done after closure strip has been heated enough to activate the adhesive.

Shrinking Down Wrap & Finishing Closure Strip:

11. Starting in the center, heat the shrink wrap with the torch using long continual passes up and down the shrink wrap working around the full diameter of the pipe. Start in the middle and work toward one end of the shrink wrap. Repeat again working from the middle to the other end, again working the full diameter of the shrink wrap and pipe. If closure strip requires additional heat for areas not totally shrunk down, you can do that as you heat the shrink wrap.
It is important to remain patient when shrinking down the wrap. DO NOT keep torch concentrated on a single area of the wrap. Keep the torch moving in a circular motion around the circumference of the shrink wrap until the wrap is fully shrunk down everywhere.
12. As the wrap shrinks down to the pipe, pressing down with a gloved hand or gently using a roller over entire surface will help work out air bubbles and wrinkles if they appear. This must be done while the shrink wrap is still hot and/or after it has been heated enough to activate the adhesive, but do not attempt when actively using the torch of you could get burned. It may be necessary to re-heat areas and pressing down again to fully complete this step.
13. The process will be complete when the wrap & closure strip are totally shrunk down on the pipe and adhesive is seen coming out the edges of shrink wrap, all the way around the full circumference of the pipe and on both ends.

Completion and Verification Measures:

14. Ensure the area is free from visual flaws. Be sure the shrink wrap is in full contact in all areas & totally shrunk down. Adhesive has flowed out of both edges of the shrink wrap all the way around the diameter of the pipe. There are no cracks or holes in the shrink wrap from over heating, sharp objects or mishandling.
15. Inspect closure strip to be sure it is fully shrunk down and has totally sealed the shrink wrap seam.
16. Allow shrink wrap to cool a minimum of 2 hours prior to backfilling and burying pipe.
17. Certain backfill material may damage shrink wrap and reduce corrosion protection provided by the shrink wrap. Make sure backfill material is free from sharp stones or other large particles. If this cannot be achieved, further protection of the shrink wrap may be necessary.

NOTE: The application of the shrink wrap & closure strip instructions above are repeated on page 16 in a Step-By-Step process and supported with pictures that might lend some additional visual guidance.

Step-By-Step

Step 1. Preparation

- Ensure joint area is free of debris and contaminants to ensure proper bonding. See "Suggested Surface Preparation" on Page 14 for optimal results.
- Cut shrink wrap to desired length to properly overlap a minimum of 4" (10 cm). The table on page 14 shows the wrap length relative to the jacket size.
- Cut closure strip should properly span entire seam. Check this before apply closure strip and trim as necessary if it is not.

Step 2. Tack Shrink Wrap To Surface

- Pre-heat the joint area to a minimum of 150° F (65° C)
- Gently heat first 6 inches (15 cm) of wrap and for the full width to activate adhesive and tack it to the pipe at the 2 o'clock position
- Center wrap over the joint and wrap from backside under the joint then up and back over the front so closing end finishes at approximately 12 o'clock.
- Firmly wrap the pipe joint to ensure the proper overlap. Confirm the ending seam is at approximately the 12 o'clock position, or close to it.
- Use same gentle heating technique the full width of the wrap's closing end until adhesive is activated. Tack overlap into place. You may have to heat more of the shrink wrap in colder conditions to hold it in place before applying closure strip and fully shrinking it down.

Step 3. Apply The Closure Strip

- Pre-heat closure strip on one end to activate adhesive. Center closure strip on the seam/overlap and align closure strip end with end of shrink wrap. Press firmly to ensure closure strip holds.
- Heat closure strip as you go to fully activate adhesive, patting it down periodically with a gloved hand. Be sure closure strip remains centered on the seam.
- Continue process moving from one end to the other until closure strip is fully bonded. Closure strip should end aligned with the other end of the shrink wrap.
- While closure strip is still hot, press down or use a roller to remove air bubbles or wrinkles.

Step 4. Shrink The Wrap

- As you shrink down the wrap, you can additional heat to the closure strip if there are areas that have not fully shrunk down.
- Starting from the center and working toward one end, begin heating the shrink wrap in the center, using long continual passes up and down the wrap applying heat around the full diameter of the pipe. The shrink wrap should settle into place snug to the pipe with no bubbles or wrinkles. Smooth out with a gloved hand or apply gentle pressure with a roller to remove any bubbles or wrinkles while wrap is still hot but you are not actively heating it with the torch so you don't get burned.
- Repeat previous process beginning back in the center and working toward other end of shrink wrap not yet shrunk down.

It is important to remain patient when shrinking down the wrap. DO NOT keep torch concentrated on a single area of the wrap. Keep the torch moving back and forth over the full area of the shrink wrap until the wrap is fully shrunk down everywhere.

- Process is complete when adhesive is seen coming out the edges of the wrap, all the way around the full circumference of the pipe, and on both ends. Failure to continue heating until adhesive can be visually seen flowing out edges as described will void warranty.
- To work out any pockets of glue build up, continue heating from side to side around entire area. See "Completion and Verification Measures" on page 15 for some practices that will confirm the process has been finalized.

Step 1



Step 2



Step 3

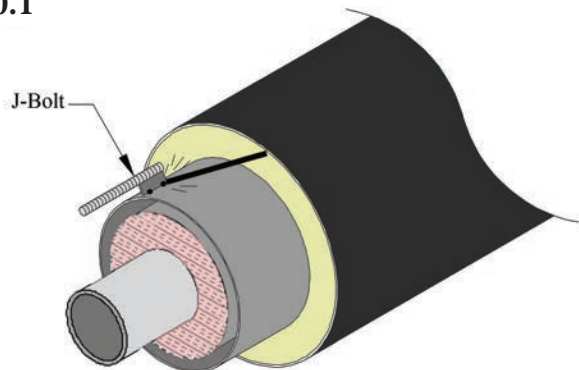


Step 4



Section 10: Test Can Applications

Fig. 10.1

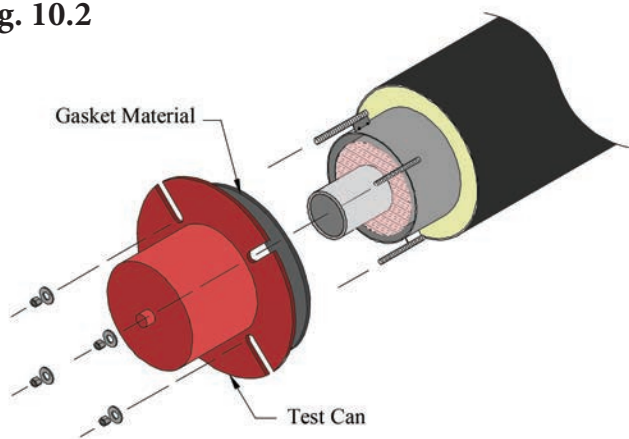


After Rovanco receives a release to manufacture, Rovanco's customer service will email test can purchase form to customer. Test cans need to be ordered before the first truck ships so they can ship with the job to save on freight cost.

Remove any burrs on conduit ends that may have been caused by removing the shipping bar to ensure a proper seal. J bolts are then welded to the outer edge of the conduit. **See Figure 10.1**

The test can butts up to an open end unit, is sealed with a gasket, and tightened down with bolts. **It is helpful if a little contact cement or repositionable adhesive is applied to the gasket to help it stay in position on the test can.** Attach a safety chain around the test can and to other end of conduit. **See Figures 10.2 and 10.3**

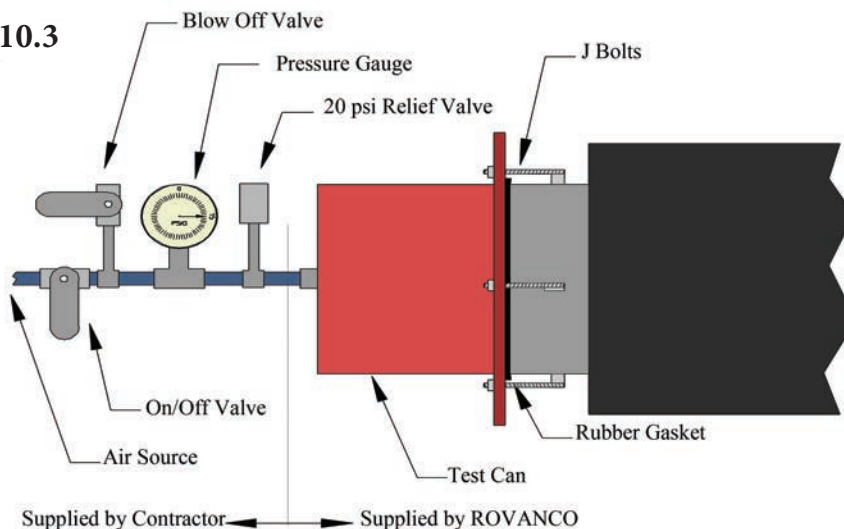
Fig. 10.2



CAUTION: No one in the area is to step in front of the test can during pressurization.

After testing is complete, remove the test can and gasket and cut the J bolts off of conduit and grind or file down any burrs.

Fig. 10.3



Section 11: Drying Inner Conduit Casing

IF water enters the conduit, make note of the location in the system and contact Rovanco immediately so you can be instructed as to how to dry out the system. Before the piping line can be put into service, it must be completely dried out. The internal pipe is heated from the boiler, force air through the air space utilizing a desiccant air dryer (so drying air is void of moisture) at a flow rate not less than 3 cfm. The air being pumped in will force the moisture out of the system. The drying air should be forced in the direction of open atmosphere and not toward a building or closed-in structure.

IF piping system utilizes aerogel or mineral wool insulation & it gets wet, there is the possibility the insulation could emit an ammonia odor that should dissipate as the system dries out but could persist until the system is totally dried out.

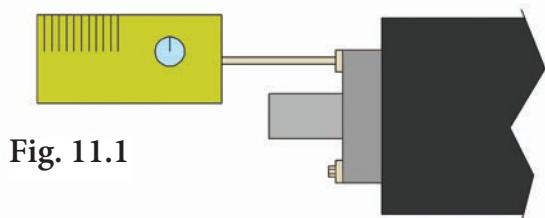


Fig. 11.1

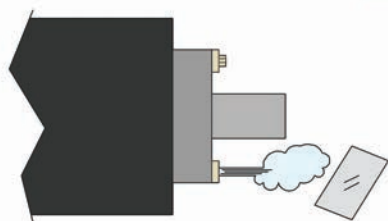


Fig. 11.2

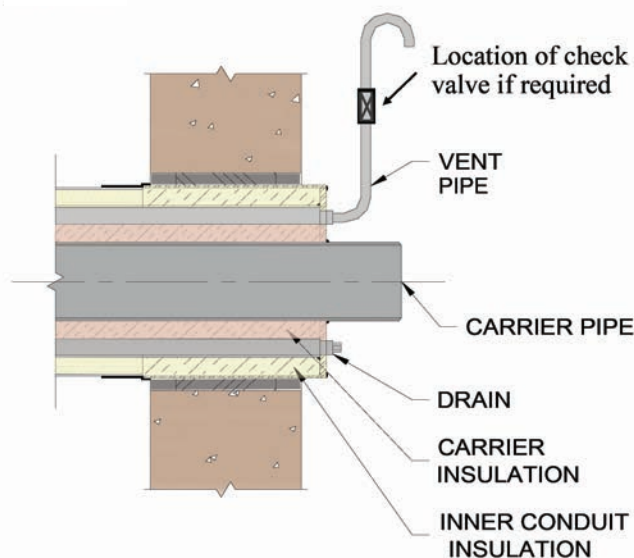
Utilize a mirror or humidity reader to confirm system is dried out & void of any moisture.

CAUTION: personnel should not to stand in front of the drain during the drying process to avoid getting burned by scalding water.

The line is dry when you can not fog a cool mirror with the air coming out of the conduit at the low end drain plug or when a humidity reader does not detect the presence of moisture in the air exiting the system. Drying time of insulation will vary with the amount of saturation, and the type, size, and thickness of the insulation. After the system is dry, pipe up the vents at the ends of the system with a goose neck and leave open for venting. Close the drain plugs at all ends of the pipe system. **See Figures 11.1 & 11.2**

Section 12: Manhole & Building Entries

Fig. 12.1



See Figure 12.1 for the proper building entry or manhole entry detail. Also, as mentioned in the previous section, be sure before turning the job over to the owner that the vent on each end of the system is piped up above any potential water level and goose necked for venting. This is done so that water can not get high enough to enter the system. The vent piping and check valve are not supplied by ROVANCO. The drains should remain closed. It is recommended that at least 3" of the polyethylene jacket enter through the wall before our system ends.

NOTE: If the gooseneck cannot be installed above the potential high water mark, then a check valve must be installed in the vertical riser of the vent pipe.

It is mandatory all carrier pipe either be air or hydro tested per specifications prior to insulating and pouring thrust blocks around anchors or backfilling the system. Failure to comply with testing procedures will void warranty. Plastic carrier pipe must be hydro tested only, do not air test.

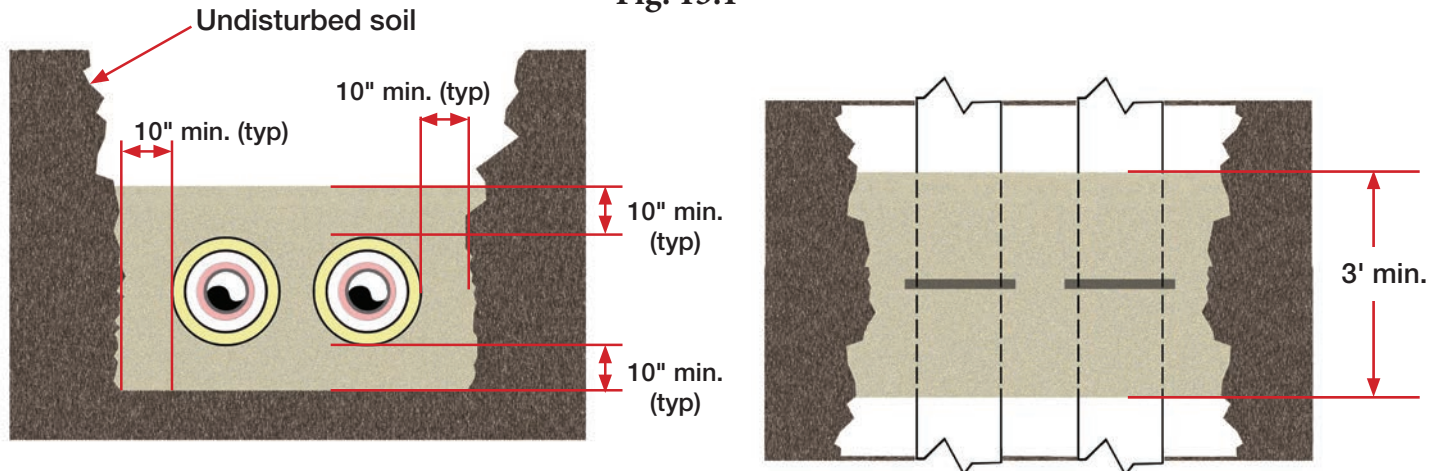
Section 13: Pouring Concrete Anchors

ROVANCO recommends that the forms for the concrete anchor plates be done with sandbags or wood. These forms do not need to be stripped. The block should be 10" larger than the anchor plate, and 3' thick.

See Figure 13.1

Make sure that the block is large enough to anchor it to undisturbed earth. **AT NO TIME** should wood be touching the steel anchor. Contractor must make sure to have concrete completely encapsulate the anchor, especially underneath.

Fig. 13.1



Section 14: Backfilling The System

The first foot of backfill must be free of frozen soil, rocks, or other debris. ROVANCO recommends the use of clean backfill material without sharp stones. If the project specifications require a specific backfill material, we recommend the installer follow the specification. Hand tamp in 6" layers to one foot above the conduit. After this, a mechanical tamper may be used. **See Figure 14.1**

Note: that you need 24" of cover tamped to 95% compaction to obtain H-20 traffic load conditions. However, this is not adequate for railroad crossings. In that case, contact our Engineering Department in Joliet, Illinois. If 24" is not obtainable, put 6" of 95% compacted sand above the pipe, and then a 4" to 6" reinforced concrete pad. The pad should overlap the edges of the trench by 1'. Then continue the backfilling to grade as usual.

See Figure 14.2

Fig. 14.1

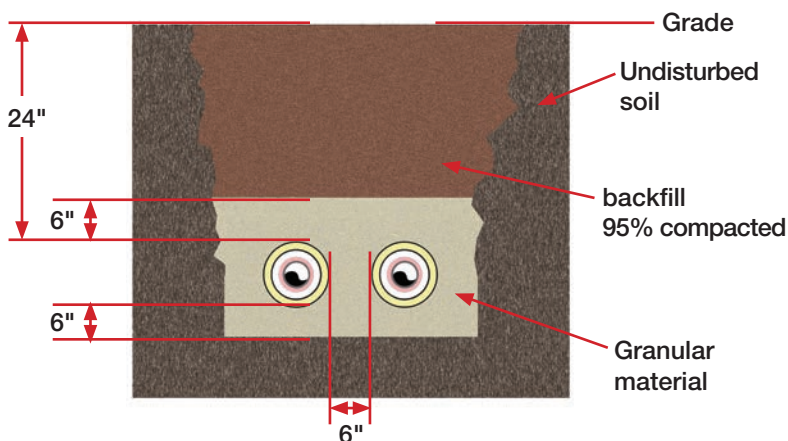
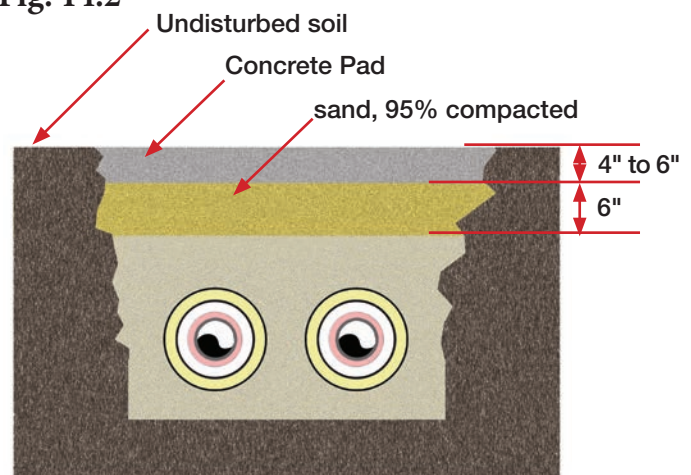


Fig. 14.2



Section 15: Operation & Maintenance for Steam Conduit

Annual: Remove the drain plugs to check for the presence of water in the air space yearly. When removing the drain plug, be alert for a possible steam flash. If water is found follow the repair procedure outlined below. The drain plugs must be replaced after the inspection to insure water does not inadvertently enter the air space from a flooded manhole or mechanical room.

CAUTION: Extreme caution must be exercised when entering steam manholes and opening vents and drains.

Also do an air test of the conduit yearly. Using an air compressor, pressurize the air space to 15 psig and hold for one (1) hour. If the pressure can not be maintained, see the repair procedure below. Warranty will void if this is not done and logged year to year.

Repair: If a leak in the casing is found, it should be repaired, tested, coated, and backfilled as it was originally installed.

If a leak in the carrier pipe is found, at least a 2' section of pipe should be removed and replaced. The carrier pipe should then be hydrostatically tested at 1½ times it's operating pressure, not to exceed 500 psig. Re-insulate the carrier pipe as specified. Repair the inner conduit casing using a split sleeve, similar to the connector band used in assembling the field joints. Air test the inner conduit casing, then insulate as specified. Cover with a polyethylene sleeve and seal with a wrap around shrink sleeve.

Insulation: If insulation within the conduit becomes wet, then force ventilate the air space in the system at a rate of not less than 3 cubic feet per minute, and apply heat through the internal piping. Introduce the air through the system's high point vent, and force out the low point drain. Caution personnel regarding the possibility of a steam flash out of the low point drain while air is being forced through the system. Place a cool mirror at the exhaust point for a short time at appropriate intervals and position to indicate maximum fogging due to moisture. Continue ventilation until the mirror exhibits no visible fogging.

System Shutdown: If the system is shut down for any length of time, seal the system vents by plugging the goose neck or removing it and installing a plug. Purge with dry nitrogen before sealing system. The vents must be opened and the goose neck replaced before the system is turned on again. This will prevent moisture entry during shutdown.

Manholes: Automatic sump pumps, if any, should be thoroughly inspected for proper operation annually. Steam traps, if any, should be routinely inspected and/or replaced, based upon the recommendations of the manufacturer. All flanges should be checked for leakage and tightened if necessary. Any evidence of groundwater leakage should be investigated and repaired. Gland seals, end seals, and the inside wall of prefabricated steel manholes should be routinely inspected for leaks and/or corrosion. Sand and repaint any corrosion to match the existing coating. Check valves routinely for leaks and repack when necessary. Insulation and jacketing of internal piping and equipment should routinely be checked and replaced when necessary. Warranty will void if manholes flood over Rovanco's piping systems.

If you have any questions about anything in this instruction manual, or have any difficulty in completing the work please feel free to contact ROVANCO's Customer Service Department at our main office in Joliet, Illinois (815) 741-6700.

Thank you once again for showing your confidence in ROVANCO by purchasing our Hi-Temp Insul-8 products. We want you to know that we have a full line of pre-insulated and pre-fabricated piping systems for almost any temperature, pressure, or site condition.

If you are not familiar with our complete product line and you would like to know more about our product or would like to have our local Manufacturer's Representative call on you, call ROVANCO at (815) 741-6700, at rovanco.com, or email us at marketing@rovanco.com

Section 16: Parameters For Properly Installing & Operating Systems

Rovanco's pre-insulated and pre-fabricated products are carefully engineered to function as intended. If these products are properly installed, fully-tested, maintained and operated within the parameters for which they were designed, these systems should provide the user with years of trouble-free, efficient operation.

Refer to Rovanco's Installation Instruction(s) and the associated documentation from Rovanco's Engineering Department for important information and instructions that will carefully detail installation, testing, operating, and maintenance procedures. If needed, you are always welcome to contact Rovanco for assistance.

Failure to comply with the procedures as outlined in the Installation Instructions and Engineering support documentation could result in product damage, reduced product service life, costly repairs due to product failure, hazardous conditions which could result in injury to people, property and/or equipment. In addition, it will void Rovanco's warranty.

If any Rovanco product does not perform as it is intended to, please inform Rovanco immediately.

Some problems and their potential causes are listed below. Although this list is not all-inclusive, you may be able to find additional information in Rovanco's Installation Instruction(s) and/or the Engineering Department documentation.

General Piping System Care:

- Wet insulation does not perform as intended and causes the premature failure of the system. Therefore, it is important the system's insulation is kept dry at all times. This includes during storage, installation and when system is operating.
- Our systems have been engineered to operate within a specific temperature & pressure range and under appropriate environmental conditions. Therefore, do not install or put our systems into service if these parameters are not within the product's specifications.
- If you find it is necessary to alter a Rovanco piping system, review the planned alterations with Rovanco or a qualified piping system designer before making any changes.
- Maintenance plays an important role in assuring you get the full service-life out of the system. Rovanco systems are designed to provide years of trouble-free operation, but changing conditions can affect that. So, systems should be inspected regularly to verify they are in good operating condition and functioning as intended. If repairs are required, make them promptly.

Pre-Insulated Foam Systems:

- Piping systems must be kept dry. Moisture of any amount can corrode carrier pipe and prematurely break-down insulation. This will shorten piping system service-life and/or prevent it from operating properly. Keep all piping system dry during storage, installation and when it is operating.
- Assure field joints are completed correctly. This includes the proper field insulating and enclosing the outer jacket in the joint area. Improper completion of field joints could result in water ingress effecting carrier pipe and/or insulation.
- Damage to jacketing must be repaired immediately. Failure to do so could allow moisture to reach the insulations and/or carrier pipe.
- When installing piping systems designed for underground use that require external expansion pads, you must assure these expansion pads are properly installed according to specifications. Proper installation will allow for associated thermal expansion. Improperly installed expansion pads will put unwanted stress on a piping system that could damage it.

Conduit & Containment Systems:

- Moisture negatively affects a systems functionality and shortens its service-life. Moisture will corrode carrier, conduit & containment piping, leak detection or pull cables and it will degrade insulation. It is important that the air space in these systems is kept dry. If water enters the system, make note of the location in the system and contact Rovanco immediately so you can be instructed as to how to dry out the system. **If piping system utilizes aerogel or mineral wool insulation & gets wet, there is the possibility the insulation could emit an ammonia odor that should dissipate as the system dries out but could persist until the system is totally dried out.** If possible & ideally the system should be returned to a dry state before installation and operation unless manufacturer recommends otherwise.
- A combination of moisture in the air space and high operating temperatures will accelerate the destruction of piping, its coating and any insulation. This can result in costly repairs, system damage and possibly system failure. Therefore, do not ever operate these systems under the negative conditions of moisture presence and high temperatures.
- Gland seals provide a seal against a service pipe while still allowing that service pipe to have axial movement. Therefore, it is important all gland seals are adjusted properly to these conditions are met and there is no binding of the service pipe.
- End seal vents and drain piping play an important role in keeping the air space dry. They allow the annular air space to vent and drain as well as prevent moisture ingress. So it is important end seal vents and drain piping is installed properly. This will allow them to function as intended.
- One important detail that will help keep the air space dry and drainable is to assure the piping system is installed with the proper slope so any moisture can drain as intended.

Systems Intended For Underground Installation:

- Plan for adverse weather conditions prior to installation. If trenches gather water, they must be drained prior to the installation of the piping.
- Inspect all steel piping that will be buried prior to backfilling using a Holiday tester. Any holidays or damage to coating must be repaired in accordance with Rovanco's installation instructions prior to backfilling. Failure to repair voids or damage to coating will promote premature corrosion and effect system performance and length of service.
- Prior to backfilling, all carrier pipe, conduit and containment piping must be tested. If piping system integrity is not tested prior to backfilling, it will result in costly excavating and will not be Rovanco's responsibility.
- Cathodic protection system must be installed with thin-coated steel conduit or containment that will be direct buried. The cathodic protection will prevent the premature corrosion of thin-coated steel piping system.
- Line trench accordingly before piping installation. Backfill and compact post-installation in accordance with Rovanco's installation instructions. If these procedures are performed properly, it will help prevent damage to the system when the ground settles.
- Manholes must be kept dry at all times. Installing sump pumps, keeping end seals above water levels and not installing manholes in low points will help prevent water from draining into them.