

Rovanco® Piping Systems

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Pexgol Large Diameter PEX with Split Sleeves for Field Insulation Installation Instructions

INS-PXG

Revised 08/02/24

GENERAL

This instruction manual will give you all the information needed in terms of techniques, tools, and accessories required to install ROVANCO Pexgol PEX Piping. If you follow the instructions carefully, the end result will be a high quality 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 pieces shown. With your paperwork, you will receive two copies of the installation drawings. These drawings will show the location of each piece of piping.

UNLOADING

ROVANCO systems are manufactured to withstand normal field handling but, like any piping material, damage can occur from careless handling. The piping should be unloaded from the truck using a cherry picker or other suitable equipment. Lift the pieces carefully so as not to damage piping & fittings. Do not use chains or chokers in direct contact with any piping or fittings. Do not materials because this can damage the piping, insulation or fittings.

STORAGE

Do not stack Pexgol coils. 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. Cartons of material (i.e. glue, foam kits, fiberglass adhesives, etc.) should be stored in a dry area at 60° to 80°F. Freezing or high temperatures may affect the product’s ability to perform their functions. IF these steps are not taken, warranty will be void.



TESTING

All pipe should be pressure tested prior to insulating or backfilling the system. Failure to comply with testing procedures will void warranty.

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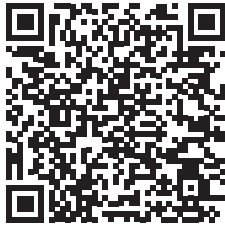
Testing

All carrier pipe must either be air or hydro tested per specifications prior to 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.

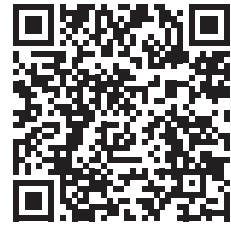
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NOTE: For the Pexgol Decoiling Process Instructions scan this QR Code.



NOTE: To see a video demonstration of Pexgol Decoiling Process scan this QR Code.



Section 1: Performing Pressure Tests

Electrofusion fittings can be used to connect Pexgol cross-linked polyethylene pipes.

The pipes and fitting are connected by means of fusion welding creating a leak-proof seal.

A sealing ring is not needed.

During the electrofusion process a current is transported through a heating wire.

- The surrounding material around the wire is melted and welds the pipe to the fitting.
- Electrofusion system is one of Pexgol's connector systems, providing all connection technologies for Pexgol pipes.
- Electrofusion fittings are the main means of connection in municipal water and industrial distribution systems.
- Fittings are tested and have a lifetime of 50 years, according to the European standards a working pressures of 16 atm in water networks.
- Lightweight and small volume welding connectors.
- Economical use especially for big diameters in water transportation.
- Connectors are offered in diameters ranging from 20mm to 630 mm as well as in a wide variety: couplers, elbows, end plugs, Tees, saddles, tapping saddles (for connecting new outlets to "live line").

The entire electrofusion process is executed and fully monitored by the computerized control box ensuring safe, reliable connections.

Installation instructions for electrofusion fittings: Installation performed only by trained workers who have received a valid certificate showing that they have been trained by a person authorized by Pexgol.

Type of electrofusion fittings: Use only electrofusion fittings approved for fusion with Pexgol cross-linked polyethylene pipes.

Wall thickness defined as follows:

25 – 75 mm pipes, minimum S.D.R. 11

90 – 355 mm pipes, minimum S.D.R. 16.2

Pressures:

PN 16 electrofusion fittings are suitable for working together with Pexgol pipes which are rated up to pressures of P.N. 15 in water or 10 bars in gas (only PE spigot connectors are produced in two levels, P.N. 10 and P.N. 16).



Section 2: Instructions For Electrofusion Fittings

For a quality fusion and for easy insertion, rounding the pipe is compulsory. This is achieved by using rounding tools which are placed on the pipe end. The tools maintain a rounded pipe during the welding process.

Support of the fitting during the welding process:

When welding pipes in diameters 90 mm and higher, the pipe should be inserted into the fitting by means of spanners (come-alongs) which allow controlled insertion and ensure the coupler does not move during the welding process.

Cooling time

Please note the cooling time that appears on a sticker on each fitting.

Do not disassemble spanners and rounding devices until the cooling time has elapsed.

When the fusion process is completed, note the hour and add the cooling time. The result is the disassemble time. Mark this time on the fitting and do not disassemble it earlier than this time!

Pexgol electrofusion fittings are allowed for use at the following temperatures: In case of higher pressures please consult the Pexgol Field Service.



Working instructions:

1. Preparing the fittings for welding: Preparation and welding can be conducted at ambient temperature. If the weather is windy (with dust) or rain or other sources of humidity, the welding area should be protected by a cover or welding should be halted until the weather conditions are suitable.
2. Preparation (cleaning and scrubbing) must be done close to the welding time. Do not prepare pipes and fittings for welding if you plan to weld at a later stage.
3. Scraping and peeling of the pipe: universal or hand scraper must be in perfect working condition with a sharp blade. The blade in the universal scraper should be replaced when no longer sharp. The blade of the hand scraper should be sharpened from time to time using a fine iron file.

The thickness of the scraped layer should be as follows:

- Diameter: 20 - 25 mm, 0.15 - 0.20 mm
- Diameter: 32 - 75 mm, 0.15 - 0.25 mm
- Diameter: 90 - 355 mm, 0.20 - 0.30 mm

Section 3: Electrofusion Welding

A. Marking the pipe for cutting

The pipe must be free of dirt and dust.

1. Use a plastic marking tape long enough to go around the pipe circumference.
2. Mark the welding location around the pipe with a marker.



B. Cutting the pipe

1. Use a cutting tool for plastic pipes up to diameter 160 mm. From diameter 180 mm and higher use a JigSaw cutter, with a suitable plastic saw.



C. Rounding of the pipe and scraping the oxidized layer

1. Round the pipe prior to scraping it.
2. Place the rounding device on the pipe so that the distance from the pipe to the rounder is equal to the depth insertion of the pipe into the fitting plus 4 centimeters.

Note: To ensure perfect, symmetric roundness of the pipe, make sure that the rounding device is placed in such a way that the screws will be on the flattened sides of the pipe (on the narrow axis of the oval) and fasten them until perfect roundness of the pipe is reached.

3. Use the universal rotational scraper according to the instructions.



D. Pipe Preparation

1. The pipe must be marked to prepare insertion of the fitting.
2. Move the rounding device until the marking of the full insertion.
3. It is absolutely necessary to clean entire welding surface. This is performed with a special cleaning solution of 95% ethanol (or equivalent) and new clean paper wipers to ensure that no fibers are left on the surface.



Section 4: Welding Of Saddles

E. Installing the fitting onto the pipe

1. Remove the fitting from its original packaging, only when you are ready to start the welding process. Clean the inner side of the fitting with the special cleaning solution. Clean the pipe surface again.
2. Install the fitting onto the prepared pipe and make sure that the pipe is fully inserted into the fitting up to the end. The fitting should fit easily into the pipe.



F. Preparation of the opposite pipe end for insertion

1. Clean, mark and place the rounding device as described.
2. Pull the pipe into the fitting by means of 2 spanners from each side until the rounder and the coupler meet.
3. Make sure to insert the pipe straight and precisely along the axis of the fitting by guiding both spanners. Make sure that there are no "angles" between the pipe's axis and the fitting's axis.



G. Welding

Please follow carefully installation instructions for the electrofusion control box.

1. Connect the terminals from the control box to the fitting. Make sure to connect "black to black" and "red to red", and make sure that the electric cable is loose, not pulled tight.
2. Operate the control box and start the welding process.



H. Cooling time

At the end of the fusion carefully remove the black and red terminals from the fitting.

1. The correct cooling time is shown on the barcode label on each fitting. Mark on the coupler the exact hour when the coupler can be removed (adding the correct cooling time to the exact hour when the fusion was completed).
2. Dismantle the clamps and rounding equipment only at the end of the cooling time.

Note:

Since pressure testing requires lower temperatures of the joint, we recommend waiting twice the cooling time after fusion before pressurizing the pipe and waiting 3 times the cooling time after fusion before beginning pressure testing.

Section 5: Installation Instructions For Saddles

A. Pipe must be marked

The pipe must be free of dirt and dust.

1. Place the lower part of the saddle on the place intended for fusion, mark the location of the outlet by marking a line all around the pipe. Use the lower part of the saddle for marking in order to avoid dirtying the upper part prior to welding.
2. Mark 3 lines on each side of the line at a distance of 30 mm from each other.
3. Remove the lower part and scrape the marked area with a manual scraper until all lines are scraped (except for the center line).

Note: The manual scraper should be very sharp! Sharpen it by rotating the knife from time to time (4 positions) and by sharpening it with a fine iron file. Use a manual scraper and scrape using two hands to achieve best results.



B. Pipe preparation and mounting of the saddle

1. Clean the pipe with a special cleaning solution for PE cleaning (ethanol) as any other fluid may damage the joint. To apply the solution, use clean wipes.
2. Clean the inner side of the upper saddle and install it to the pipe.
3. Close the saddle screws so that the upper and lower parts meet.
4. Fasten the screws.

Note: The hole should be drilled only after the welding is completed.



C. Welding

Please follow carefully installation instructions of the welding device.

1. Connect the terminals from the generator to the saddle "red to red", "black to black".
2. Operate the generator and start welding process.



D. Cooling time and drilling of hole

Cooling time:

1. At the end of the fusion carefully remove the black and red terminals from the fitting.
2. Mark on the coupler the exact hour when the coupler can be removed (adding the correct cooling time to the exact hour when the fusion was completed).
3. Dismantle the clamps and rerounding equipment only at the end of the cooling time. After cooling, drill the outlet hole using a hole saw tool.

Installation Instructions For Saddles

Note: the following data for installing Golan brass saddles, electrofusion saddles and Krausz stainless steel saddles to Pexgol pipes.

Install all saddles onto the pipe prior to drilling the outlet hole.

Table No. 98.1: Dimensions of drills for outlet hole in brass saddles

Dimensions of drills for outlet hole in brass saddles		
Brass saddles dimensions	Thread	Diameter and drill type
32 x ¾"	Female	13 mm drill
32 x ½"	Male	13 mm drill
40 x ¾"	Female	13 mm drill
40 x ½"	Male	13 mm drill
50 x ¾"	Male	22 mm hole saw tooth
63 x ¾"	Male	19 mm hole saw tooth
63 x 1"	Male	24 mm hole saw tooth
63 x 2"	Female	45 mm hole saw tooth
75 x 1 ½"	Male	35 mm hole saw tooth
75 x 2"	Female	45 mm hole saw tooth
90 x 1 ½"	Male	33 mm hole saw tooth
90 x 2"	Female	45 mm hole saw tooth
110 x 2"	Female	45 mm hole saw tooth
160 x 2"	Female	45 mm hole saw tooth

Notes:

- Saddles up to 63 mm – 11 mm wrench
- Saddles 75 mm and 90 mm – 14 mm wrench
- Tighten the saddles until the two halves meet.

Table No. 98.2: Dimensions of drills for outlet hole in stainless steel saddles

Dimensions of drills for outlet hole in stainless steel saddles			
Outlet type	Outlet size	Drill type	Drill diameter
Female outlet thread	1 ½"	Hole saw tooth	40
Female outlet thread	2"	Hole saw tooth	51
Flanged outlet	2"	Hole saw tooth	40
Flanged outlet	3"	Hole saw tooth	70
Flanged outlet	4"	Hole saw tooth	92
Flanged outlet	6"	Hole saw tooth	140

Install electrofusion saddles of all manufacturers (Plasson, Friatec, GF/Wavin) and Plasson mechanical saddles according to the manufacturer's instructions.

Section 6: Connecting Pexgol Pipe with Flared Ends

The flared-end connection is suitable for both hot and cold media. Special fixpoint clamps should be used before and after the flared ends (see pages 57 & 73). Flange material is carbon steel A37. Other carbon steel or stainless steel grades can be ordered.

In case of sub zero temperatures, special restraining techniques should be employed to prevent pulling out of the flared end from the flanges.

No gasket is needed when connecting two Pexgol pipes with flared ends and flanges or when connecting

a Pexgol pipe with a flared end to a flanged fitting.

Tighten the bolts evenly around the flange until all the bolts are all tight.

If torque wrenches are applied, use the recommended values in the following table. Tighten the bolts evenly using 75% of the recommended torque values and then tighten to the final value.

No retorquing is necessary in the flared ends of Pexgol pipes.

Table No. 99.1: Tightening torque values for Pexgol flared ends

Pexgol pipe dia.	Flange size	Bolt diameter	Torque N x m		Torque ft x lbs	
			Min.	Max.	Min.	Max.
63	2"	5/8" 16 mm	34	48	25	35
75	2 1/2"	5/8" 16 mm	34	48	25	35
90	3"	5/8" 16 mm	48	68	35	50
110	4"	5/8" 16 mm	48	68	35	50
125	4"	5/8" 16 mm	61	88	45	65
140	6"	3/4" 20 mm	68	100	50	75
160	6"	3/4" 20 mm	68	100	50	75
180	6"	3/4" 20 mm	68	100	50	75
200	8"	3/4" 20 mm	108	163	80	120
225	8"	3/4" 20 mm	108	163	80	120
250	10"	7/8" 22 mm	108	163	80	120
280	10"	7/8" 22 mm	108	163	80	120
315	12"	7/8" 22 mm	142	217	105	160
355	14"	1" 25 mm	244	370	180	270
400	16"	1" 25 mm	244	370	180	270
450	18"	1 1/8" 28 mm	270	405	200	300
500	20"	1 1/8" 28 mm	270	405	200	300
560	22"	1 1/8" 28 mm	352	530	260	390
630	24"	1 1/8" 28 mm	395	590	290	435

Section 7: Connecting Pexgol HDPE Pipe with Victaulic Fittings

NOTE: For the the installation of Victaulic Fittings on Pexgol pipe scan this QR Code.



Section 8: Repair Instructions

1. Small hole (up to 5 cm diameter)

- 1.1 Uncover the pipe, 2 meters along the pipe and 0.5 meter below the pipe.
- 1.2 Carefully clean the soil from the pipe and make sure no scratches extend beyond the repair area.
- 1.3 Use a repair fitting, supplied by Golan or use a branch-off saddle.
- 1.4 In case of vertical installation (dewatering line), the fitting must be protected by a fixpoint bridge.



Repair Mechanical Fitting



Repair EF Fitting

2. Large hole requiring (replacing a pipe section)

- 2.1 Uncover the pipe, 3 meters along the pipe and 0.5 meters below the pipe.
- 2.2 Cut out the section of the pipe with the hole and replace with a new section.
- 2.3 In most cases, the maximum length of the section to be replaced does not exceed 1 meter in length.
- 2.4 The new section will be connected by:
 - Two electrofusion repair couplers
 - Four Golan flanged couplings
 - Two Plasson mechanical couplers (for pipes up to 160 mm)

Notes:

- Only technicians trained by Golan's field service personnel are authorized to perform the repair.
- If necessary, can stop water flow using common squeeze-off techniques.
- In case of a vertical installation (dewatering line), the pipe must be secured by a fixpoint bridge prior to cutting the pipe.
- Follow the instructions according to the size of the hole in the pipe.

Section 9: Instructions For Underground Installations

For all Pexgol pipe classes, the minimum recommended depth of the trench is 60 cm, to prevent mechanical damage to the pipe. If the pipe is to be covered only to prevent solar heating, the designer may reduce this depth. In cold areas the installation depth may be increased by the designer to prevent freezing of the transported fluids.

For the maximum allowed installation depth for each pipe class, please contact the application engineer.

If required, the width can be increased to allow more comfortable work in the trench. The minimum recommendation depth of the trench is 60 cm, to prevent mechanical damage of the pipe.

For a route change, for example a 90° angle, it is recommended to dig the trench with a suitable radius.

See Natural bending radius in page 78.

The following table shows the minimum required trench width for Pexgol pipes.

Table No. 101.1: Trench width

Outside pipe diameter	Minimum trench width (mm)
90	250
110	250
125	265
140	280
160	300
180	350
200	400
225	400
280	450
315	550
355	650
450	750
500	850
630	1000

Section 10: Above Ground Installation

Above-ground installation of Pexgol pipes is advantageous in the following cases:

- Slurry lines which are frequently relocated.
- Installation through marshes or areas with difficult access.
- Quick installation of temporary pipelines.

Pexgol pipes withstand exposure to sunlight for pipe lifetime.

The coefficient of expansion of Pexgol pipes is high compared to steel pipes, but the forces generated by thermal stresses are much lower. The reason is the low modulus of elasticity and the fact that the Pexgol pipes feature stress relaxation.

Pexgol pipes installed above ground might increase in length as a result of temperature increases and tend to undergo "snaking". Longitudinal elongation and contraction of the pipe is not uniform due to the coefficient of friction between the pipe and the ground varies. However, the toughness and the exceptional abrasion resistance of Pexgol pipes enable the pipes to move across the soil without affecting strength or service life.

Above ground installation instructions for Pexgol pipes laid on the ground

when the design temperature is lower than the installation temperature. The pipe tends to contract. The contraction creates axial stresses in the pipes which tend to pullout the pipes from the fittings.

Installing Pexgol pipes above the ground with a calculated slack rather than in a straight line, is a way to reduce thermal stresses.

This procedure reduces the tendency of the pipe to pull out of its fittings.

The slack (calculated according to the Pexgol coefficient of thermal contraction) is 0.2% or 2 mm for every meter per 10°C.

The actual value depends on the temperature difference between the installation temperature and the lowest temperature.

The slack can be maintained by pushing the mid span of the pipe slightly sidewise during the installation.

Axially unrestrained fittings should be secured and protected from pull out, (see page 56).

Maintaining Pexgol pipeline in a straight line, on the ground or on pipe racks

If a straight pipeline is required, guiding the pipeline at intervals is a good method of limiting and controlling thermal expansion and contraction of the pipeline.

The smaller the distance between the guides, the smaller the theoretic increase in pipe length. As a result, lateral deflections decrease and the pipeline remains straight.

Determining the maximum distance between two guides

The distance between two adjacent guides is calculated according to the following formula:

$L = F \times D$ where:

L is the distance (in m) between the guides.

D = outside pipe diameter (in mm).

F is a coefficient which depends on the temperature increase ΔT between the installation temperature and the design temperature (See table 70.1)

The formula allows for a maximum sidewise deflection of 50 mm between two adjacent guides.

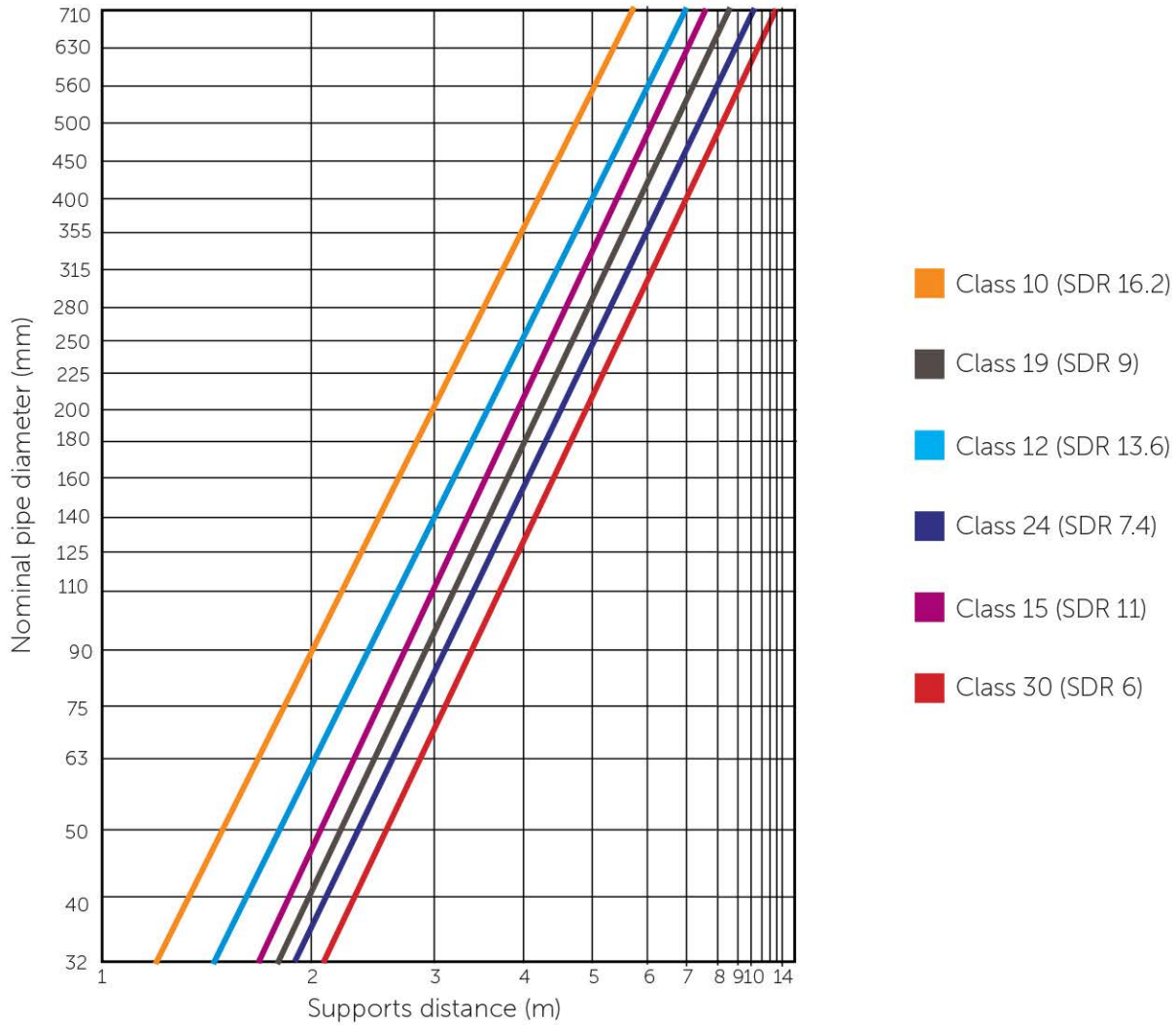
Example: Pipe diameter 200 mm, installation temperature 20°C, maximum ambient temperature 40°C, design temperature is 20 + 40 = 60°C.
 $\Delta T = 60^\circ - 20^\circ = 40^\circ$ | $F = 0.064$ | $L = 0.064 \times 200 = 12.8$ m

Table No. 102.1: Coefficients F

ΔT	Coefficient F
10°	0.25
20°	0.125
30°	0.085
40°	0.064
50°	0.05
60°	0.04
70°	0.036
80°	0.03

Section 11: Horizontally Supported Pipes

Figure 103.1: Maximum supports distance



The values shown in Figure 103.1 must be multiplied by the following correction factors in Table 103.2.

Table No. 103.2: Correction factors for figure 103.1

Design temperature	Correction factor
0°	1.15
10°	1.11
20°	1.07
30°	1.03
40°	0.99
50°	0.95
60°	0.91
70°	0.87
80°	0.83
90°	0.79
100°	0.75

Section 12: Introduction to Split Sleeve Insulation with HDPE Jacket

Following are general guidelines for the field insulation of an underground Pexgol & fittings system using 10' length split sleeve of polyisocyanurate foam with HDPE outer jacket. Since lengths are split in half, they are to be applied in clam shell style and secured in place with mastic tape.



Section 13: Insulation Storage & Handling

Insulation may be unloaded from the trucks by hand but done carefully as not to damage the insulation. The lengths should be stored on a smooth surface such as sand, soil or smooth fine gravel. Do not store on sharp rock bedding. Do not stack insulation in more than a 1 meter height.

Insulation is relatively lightweight, so make sure that pieces are protected from wind and gusts, by covering the stock and anchoring the cover in place.

Section 14: Tools & Materials You Will Need for Insulating with Split Sleeves

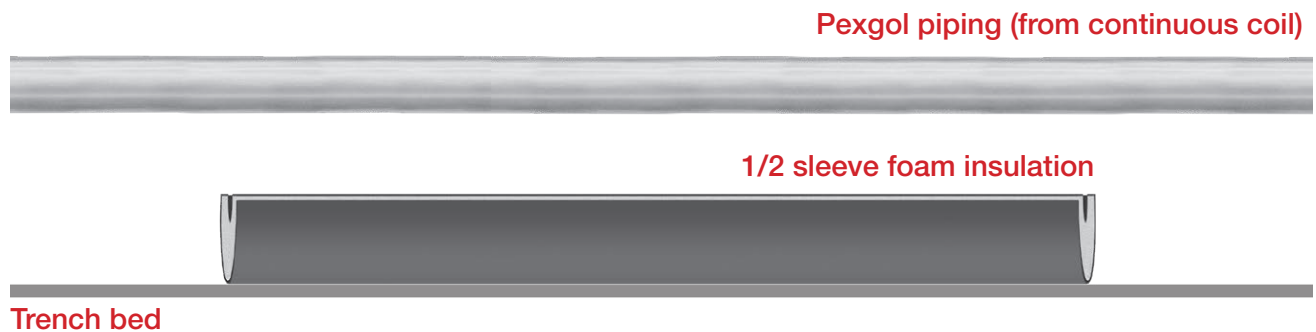
- Mastic tape, amount based on size of system
- 1 handsaw
- 1 utility knife
- 1 Sharpie or paint pen (white)
- 1 tube of Gorilla polyurethane expanding glue
- 1 water spray bottle
- Safety gloves
- Dust mask
- Eye protection
- Measuring cup
- Cleaning cloth

Section 15: Insulating Straight Lengths

The following 3 sections (Sections 15-17) of these instructions are a general guidelines for the field insulation of an underground Pexgol & fittings system using 10' length split sleeve of polyisocyanurate foam with HDPE outer jacket. Since lengths are split in half, they are to be applied in clam shell style and secured in place with mastic tape.

There may be a need to lift the piping to get the insulation under it. This may require more than one installer based on piping size & weight, environment and/or other circumstances effecting installation. Use good judgement during the installation process & seek out help when process requires more than a single person to install. It is recommended insulation be installed as follows.

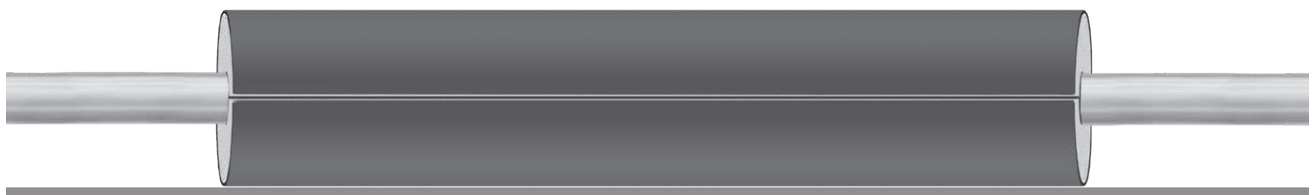
1. After piping is uncoiled and put in placed in a properly prepared trench, start by slipping 1/2 of a split sleeve insulation length under the piping. **See below**



2. The piping should fit into the foam cavity in the insulation 1/2 sleeve. **See below**



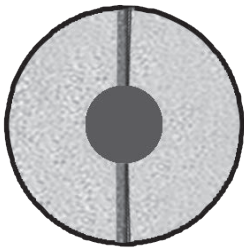
3. Place the other 1/2 of the split sleeve insulation over the Pexgol piping to form an insulation clamshell. Be sure to confirm the piping is craddles in the foam cavity on both 1/2's of the split sleeve insulation. **See below**



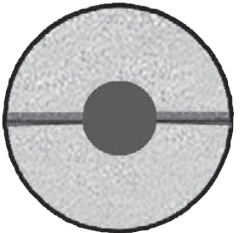
4. Use mastic tape to seal the horizontal seam from one end of the split sleeve foam insulation length to the other.
See below -- NOTE: This will need to be done to the seam on the opposite side as well, so both seams are sealed.



1st Seam
Vertical to ground



2nd Seam
Horizontal to ground



5. IMPORTANT: When applying split sleeve insulation, rotate sleeves so seam from previous length **DOES NOT** line up with current one being installed. It is recommended after two halves of insulation are on the PEX, secure with a single wrap of tape in the middle of the length. Carefully rotate sleeve to position seam so it is opposite of previous sleeve's seam. Then secure both ends of the split sleeve insulation section with the mastic tape.

A good practice during installation is to alternate seams of every section of insulation as shown to the left. **See graphic to left**

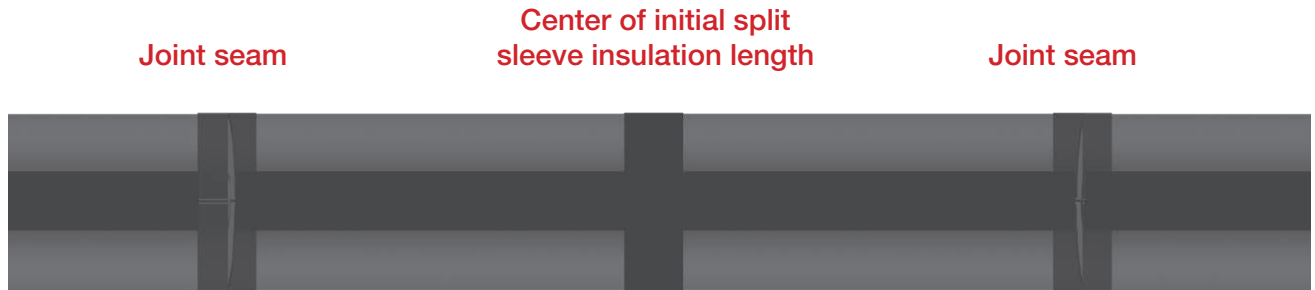
Therefore the 1st seam would be perpendicular to ground, the 2nd parallel to ground, 3rd perpendicular to ground, 4th parallel to ground and so on. This will allow you to achieve the best insulating results.

6. Wrap a piece of mastic tape around the center of both 1/2's of the split sleeve insulation. Tape end should overlap the starting end by at least 2". **See below**

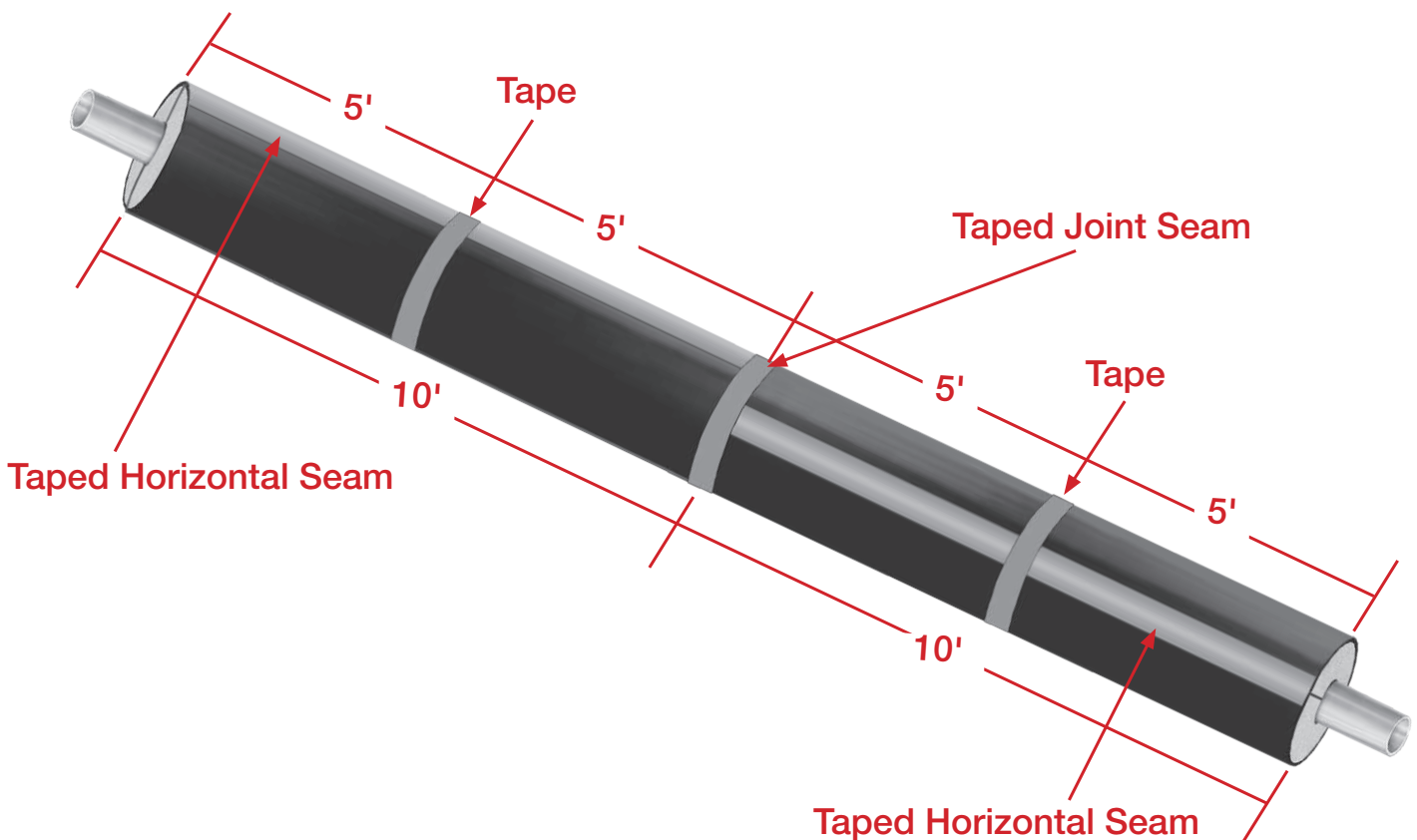


7. Repeat steps 1-6 for the next length of split sleeve insulation. You will also need to mastic tape the seam where the two lengths meet. **See below**

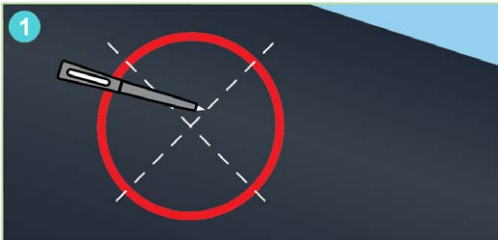
NOTE: Be sure you tape both horizontal seams & rotate the newly added length of insulation before taping the seam joint with mastic tape.



8. When you have completely installed (2) lengths of split sleeve foam insulation, your completed section should be secured with tape as shown in this like graphic below.



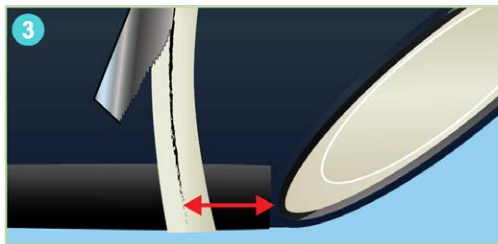
Section 16: Insulating Elbows



Based on the radius & angle, mark the black outer jacket with a white Sharpie for the appropriate miter angle.



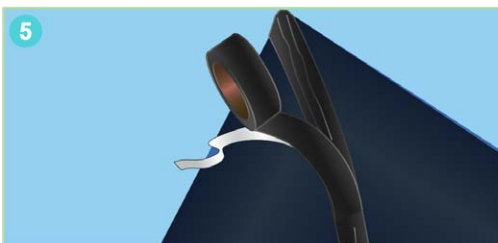
Using a handsaw, cut the split sleeve insulation along your marks.



Make sure when cutting the pieces on each end of the elbow they have at least a 2" wide edge for taping with other half of the elbow.



Fit the sections of the elbow together. If there are small gaps or slight imperfections, apply a small amount of glue on one side of the facing section of the insulation and wait for glue to set a little before joining the two elbow pieces.

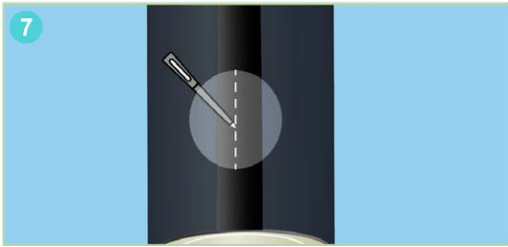


Once the mitered ends are joined together, secure the elbow seam with black mastic tape. Be sure to tape around the complete circumference of the elbow seam.

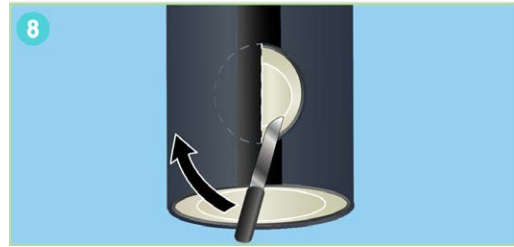


Using the black mastic tape, secure the fitting insulation (elbow insulation) to the next section of straight piping insulation.

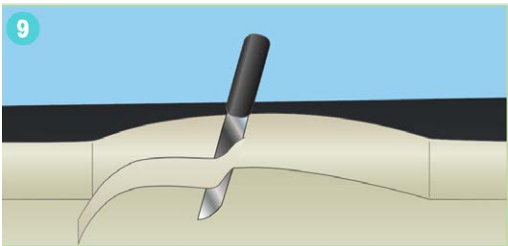
Section 17: Insulating Tees



Measure the length of the tee main. If the tee length is smaller than the outside diameter of the insulation, use the length of the tee main. Mark the opening required for the tee branch on the seam of the insulation.



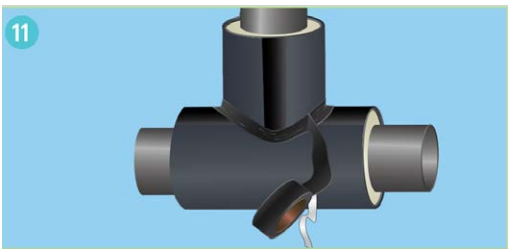
Carve out the circle you have drawn using a utility knife.



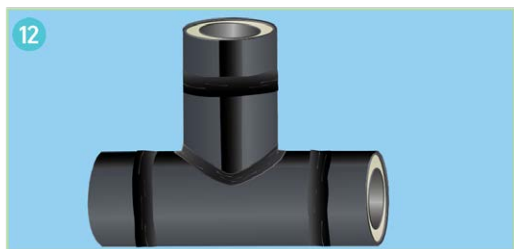
Trim the chimney opening at an angle in order to allow closing around the bare fitting branch.



Measure the height of the tee branch from the center of the main to the top of the branch. If the height is less than half the insulation diameter, then add 6" to the insulation section to be cut for the chimney. Cut the bottom of the insulation chimney section into a saddle shape so it rests on top the main insulation.



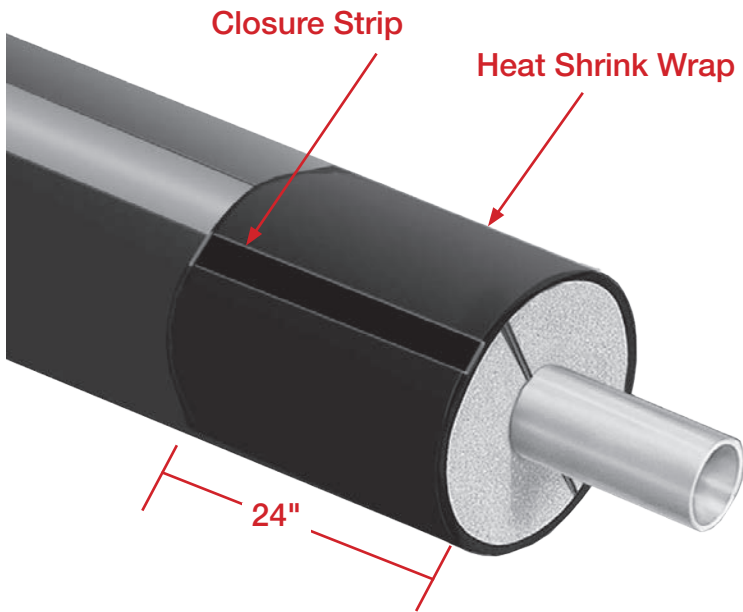
Apply glue to the connecting sections & allow glue to set up. Once set, apply black mastic tape around all seams of the tee to secure connection.



Apply black mastic tape around the ends of the insulation tee fitting to secure the insulating pieces in place. Ends are now ready to accept additional straight section of insulation. These seams will need to be sealed with mastic tape as well.

Section 18: Manhole or Building Entries

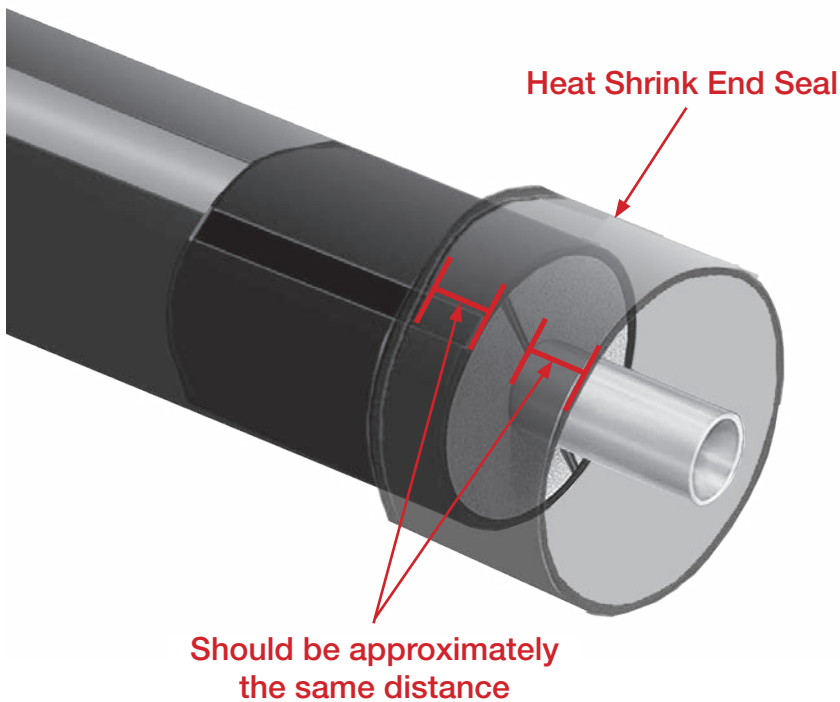
Figure 18.1



1. End of pipe entering manhole or building needs to be wrapped with a 24" wide shrink wrap. This protects the end of the pipe from damage. See below for shrink wrap application instructions.

See Figure 18.1

Figure 18.2



2. End of pipe line penetration manhole or building needs to have an shrink end seal applied to seal the end of the pipe and protect the foam from moisture ingress.

See Figure 18.2

Section 19: Applying Heat Activated Shrink Wrap

Description:

Shrink wrap is shipped in predetermined bulk rolls 24" in width. 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, such as a wire brush or sandpaper, scuff up the HDPE jacket on the insulation split sleeve area at least 2" beyond where the shrink wrap ends to ST3/SP3. This will assure ends of shrink wrap will have a strong seal to the HDPE jacket. Also remove any burs or loose pieces that may be present and that should effect shrink wrap material.
2. Wipe area with a clean cloth and rubbing alcohol or solvent cleaner to remove any debris or contaminants before applying shrink wrap.
3. Pipe needs to be totally dry before shrink wrap can be applied.
4. Pre-heat the joint area to a minimum of 150 °F (65°C). Confirm temperature reached using digital thermometer with probe.

Applying the Shrink Wrap:

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 20: Backfilling the System (for Below Ground Systems)

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 containment. After this, a mechanical tamper may be used.

See Figure 20.1

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'.

See Figure 20.2

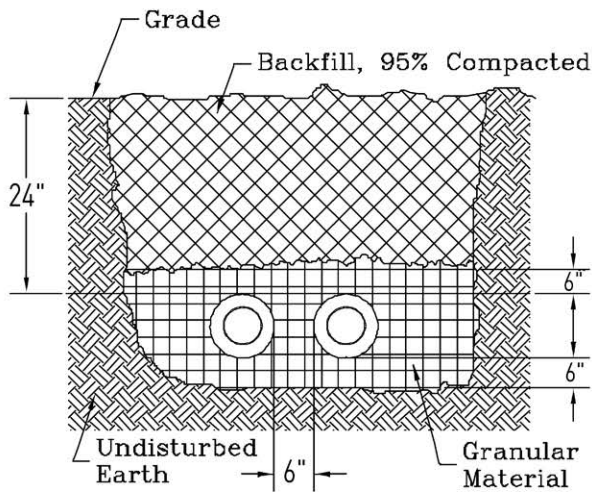


Fig. 20.1

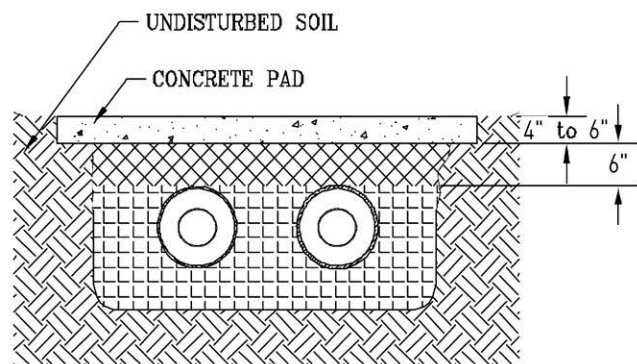


Fig. 20.2

OR Pexgol's Non-Committal Explanation Below...

Backfilling of the Trench

The excellent scratch resistance of the Pexgol pipes enables laying the pipes in trenches with no sand bedding; **if sand bedding is required by the pipe designer**, fill the trench with sand 10 cm above the pipe. Backfilling the trench using the earth originally removed from the trench is allowed **(in accordance with ISO 14531, Part 4)**; if corrosive soil is used to cover Pexgol pipes that are connected with metal fittings, cover the fittings with sand, not with the corrosive soil.

No compacting is required for any class of Pexgol pipes regardless of the depth of the trench. Installation below a road or a pavement can be done without any protective sleeves. In this case, controlled compacting of the soil/ground, **according to the designer's instructions**, should be applied when covering the pipe to prevent the ground sinking.

It is recommended to insulate hot water underground Pexgol pipes to reduce energy losses.

Section 21: 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.

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.
- (if applicable) 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.
- (if applicable) 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.