PLIDCO®

PLIDCO® HALF WELD ENDS
INSTALLATION INSTRUCTIONS

LANGUAGES:
CLICK ON LANGUAGE DESIRED

ENGLISH

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PLIDCO® HALF WELD+END INSTALLATION INSTRUCTIONS

!! WARNING!!

IMPROPER SELECTION OR USE OF THIS PRODUCT CAN RESULT IN EXPLOSION, FIRE, DEATH, PERSONAL INJURY, PROPERTY DAMAGE AND/OR HARM TO THE ENVIRONMENT.

READ CAREFULLY

The person in charge of the installation must be familiar with these instructions and communicate them to all personnel involved. Do not use or select a PLIDCO Half Weld+End until all aspects of the application are thoroughly analyzed. Do not use the PLIDCO Half Weld+End until you read and understand these installation instructions. Every effort has been made to securely package this product prior to shipment. Thoroughly inspect for any damage that may have occurred during shipment. If you have any questions, or encounter any difficulties using this product, please contact:
PLIDCO 440-871-5700

Safety Check List

- ❑ Read and follow these instructions carefully. Follow your company's safety policy and applicable codes and standards.
- ❑ Whenever a PLIDCO product is modified in any form including changing seals by anyone other than the Engineering and Manufacturing Departments of The Pipe Line Development Company or a PLIDCO certified repacking company, the product warranty is voided. Products that are field modified do not have the benefit of the material traceability, procedural documentation, quality inspection and experienced workmanship that are employed by The Pipe Line Development Company.
- ❑ During the *Pipe Preparation for Mechanical End* and *Installation* procedures, those installing the PLIDCO Half Weld+End must wear, at minimum, Z87+ safety eyewear and steel toe safety footwear.
- ❑ Be absolutely certain that the correct seal material has been selected for the intended use. Contact PLIDCO or an authorized PLIDCO distributor if there are any questions about the seal compatibility with the pipeline chemicals and temperatures.

- ❑ Determine the type of joint that the PLIDCO Half Weld+End is expected to connect. See (a) and (b) below and determine the appropriate maximum allowable operating pressure (MAOP) from the ratings listed on the label of the PLIDCO Half Weld+End.

  (a) Pipe Unanchored

  A PLIDCO Half Weld+End is considered "Unanchored" only if it is installed with the clamp and thrust screws, and not welded to the pipe or installed with any other appropriate means of limiting pipe movement and end pull forces.

  (b) Anchored Pipe

  A PLIDCO Half Weld+End is considered "Anchored" if it is welded to the pipe line, or the end pull forces are restricted by other means.

- ❑ The total end pull rating of an Unanchored PLIDCO Half Weld+End is primarily determined by the ability of the clamp screws to resist the PLIDCO Half Weld+End from being pulled off of the pipe. The rating is provided in terms of pressure. The force can be calculated from the following equation.

$$Force := \frac{Unanchored\_rating \cdot \pi \cdot (Pipe\_OD)^2}{4}$$

Any combination of forces beyond the unachored rating can cause the fitting to slide or slip off the pipe. Those forces include, but are not limited to: pressure spikes caused by re-pressurizing the pipe too quickly causing an impact load, earth loading such as earthquakes, vibration, gravity loads by supporting large sections of pipes, thermal stresses, excessive pressure beyond the unanchored rating, bending moments, etc.

- ❑ Pipe wall thickness less than those listed may be pushed inward by the force of the clamp screws. Contact PLIDCO for the recommended maximum allowable operating pressure and revised clamp screw torque values for pipe wall thicknesses thinner than listed in Table 1.

Minimum Pipe Wall Thickness for a PLIDCO Half Weld+End	
Nominal Pipe Size (inches)	Wall Thickness (inches)
1½	0.200 (5.1 mm)
2	0.218 (5.5 mm)
2½	0.276 (7.0 mm)
3	0.237 (6.0 mm)
4	0.237 (6.0 mm)
6	0.280 (7.1 mm)
8	0.322 (8.2 mm)
10	0.365 (9.3 mm)
12	0.406 (10.3 mm)
14	0.438 (11.1 mm)
16 & larger	0.500 (12.7 mm)

Table 1

- ❑ A PLIDCO Clamp+Ring should be considered whenever the wall thickness is less than those listed. A PLIDCO Clamp+Ring should also be considered where high external forces (such as underwater currents or thermal contractions) are anticipated, even if the pipe has an adequate wall thickness.

- ❑ Pipelines should be carefully supported or restrained at elbows and bends to prevent pullouts caused by internal and external forces; or a PLIDCO Clamp+Ring should be used. The pipeline should be evenly supported before re-pressuring. Follow applicable B31 codes during re-pressuring.
- ❑ If the PLIDCO Half Weld+End is welded according to our instructions, or a suitable PLIDCO Clamp+Ring is used, it can be considered an anchored joint.
- ❑ Observe the pressure and temperature ratings on the label of the PLIDCO Half Weld+End. Re-pressuring should be accomplished slowly and steadily without surges that could vibrate the pipeline and fitting. Industry codes and standards are a good source of information on this subject. Except for testing purposes, do not exceed the design pressure of the PLIDCO Half Weld+End. Refer to the *Field Testing* section for precautions. Personnel should not be allowed near the installation until the seal has been proven.
- ❑ Accurate clamp screw torque values are very important when the PLIDCO Half Weld+End is used on a pipeline joint that is UNANCHORED. DO NOT exceed the *Pipe Unanchored* rating listed on the label of the PLIDCO Half Weld+End until subsequent welding has been completed or the pipe is anchored by other means, such as a PLIDCO Clamp+Ring. FAILURE TO DO SO CAN RESULT IN EXPLOSION, FIRE, DEATH, PERSONAL INJURY, PROPERTY DAMAGE AND/OR HARM TO THE ENVIRONMENT.

Configuration

The configuration of the Half Weld+End consists of a socket weld assembly on one end and a mechanical connection with a single clamp & thrust screws on the other end. Unless otherwise stated, these instructions are to be used in applications where the Half Weld+End is welded as a socket joint on one end and a mechanical connection on the other end as shown in Figure 1.

Note: Figure 1 does not represent all applications of a Half Weld+End.

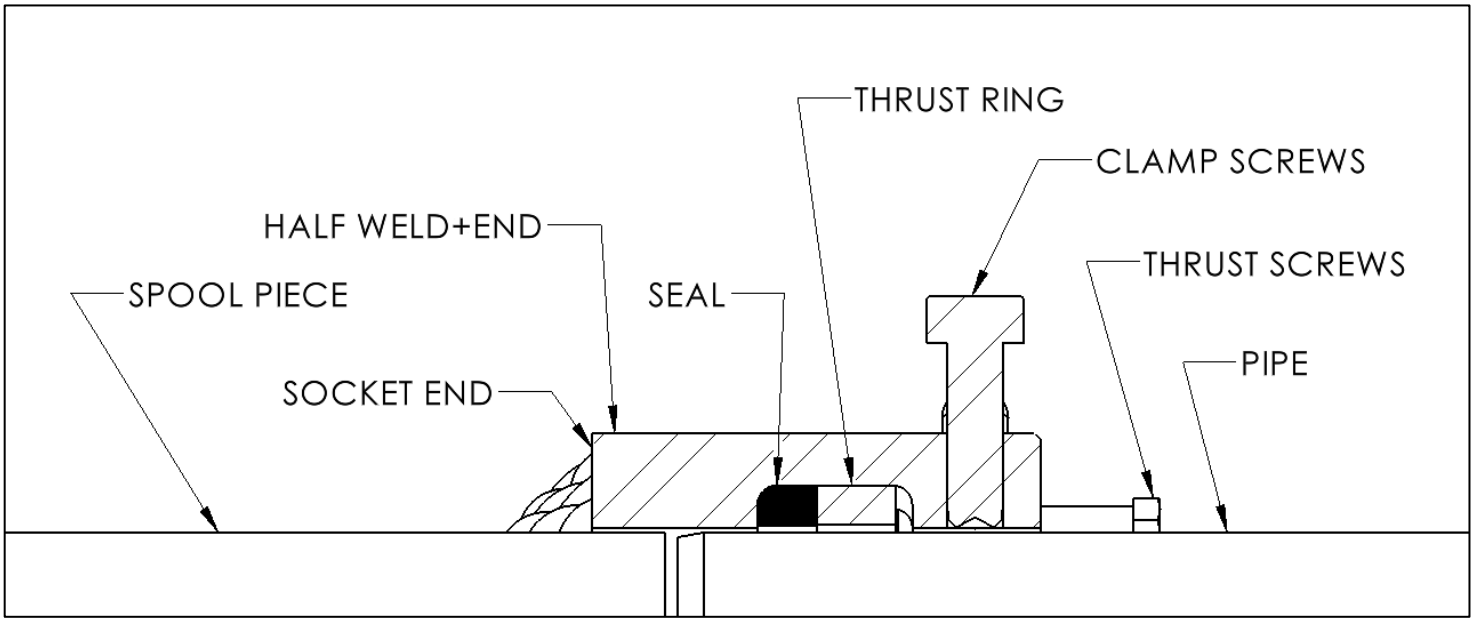

Figure 1

Socket Weld Joint Attachment

Typically, the socket weld end of the Half Weld+End is pre-weld to the spool piece, cap, or flange prior to attaching the mechanical connection end to the existing pipe line. The assembly is then slid over the existing piping where the mechanical connection is made. The following instructions detail this procedure.

1. The pipe end of the spool piece must be cut reasonably square.
2. Any longitudinal, circumferential, or spiral weld must be removed where the Half Weld+End will slide over the end of the spool piece. In-addition, all welds must be ground flush where the fillet weld is to be applied on the socket end.
3. The location of the spool piece attachment to the Half Weld+End must be carefully welded to ensure that the seal lands on smooth pipe and there is adequate room for the pipe that will be inserted into the mechanical end. The seal should have a minimum of ½" (12.7mm) – 1" (25.4mm) from the start of the pilot bevel as shown in Figure 2.

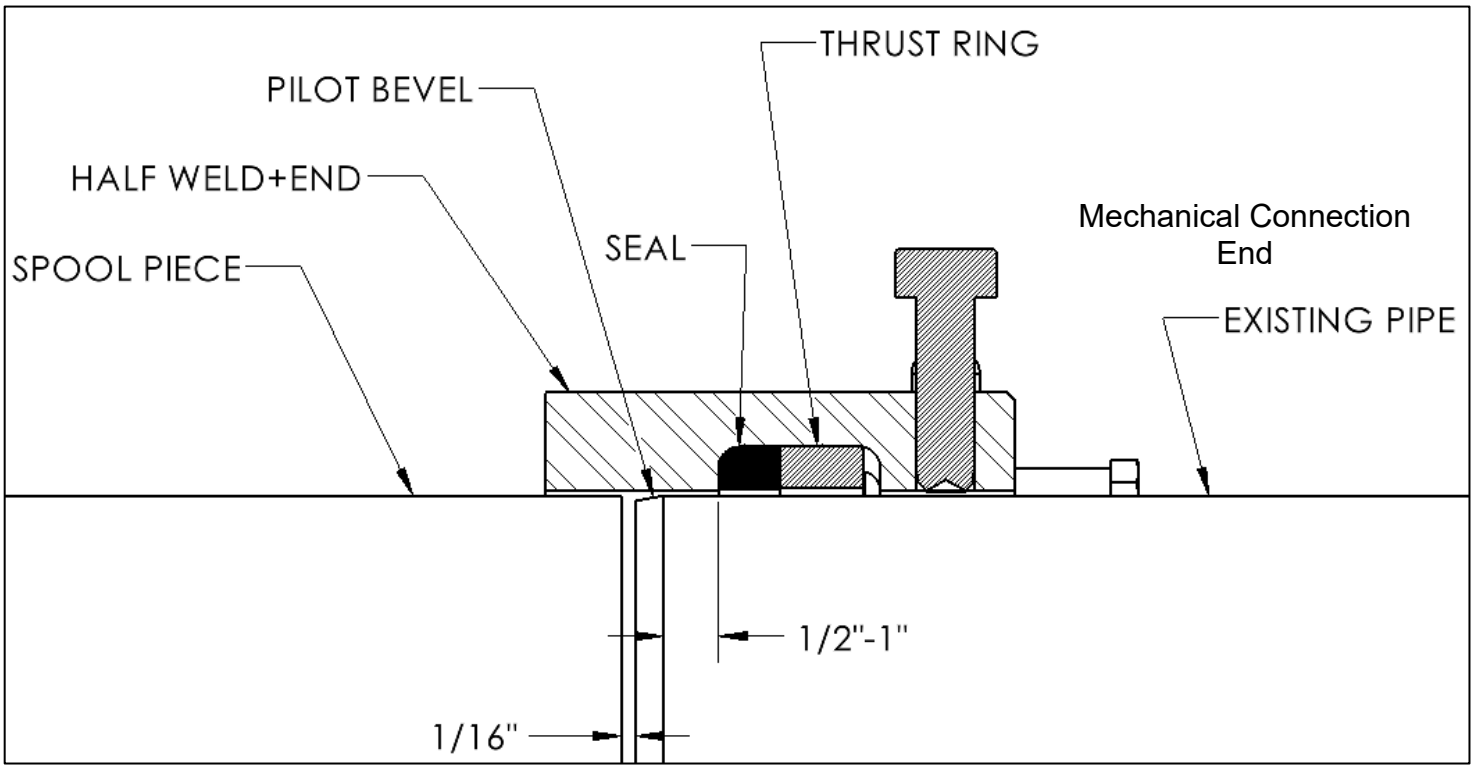

Figure 2

4. It is recommended to remove the elastomeric seal to avoid damaging the seal while welding the Half Weld+End to the spool piece. When replacing the seal after welding, it must be positioned on the inside of the metal thrust ring. Also note the placement of the radius on the seal as shown in Figure 2. DO NOT place the seal back in until the fitting has cooled down to under 100° F.
5. Weld the Half Weld+End to the spool piece using an appropriate welding code, such as API 1104, and a qualified weld procedure for making the external fillet weld. The size of the weld leg should be at least 1½ times the pipe wall thickness.

Pipe Preparation for the Mechanical End

1. The existing pipe end should be cut reasonably square with any sharp ends or burrs removed. A generous taper or pilot bevel is recommended for misaligned or out-of-round pipe to allow for easy assembly as shown in Figure 2.
2. The pipe surface underneath the Half Weld+End needs to be cleaned. Large debris, coatings, and burrs should be removed to allow the fitting to easily slide over the pipe.
3. The area around the location where the seal will come into contact with the pipe must have a finer cleaning. A near-white finish, as noted in SSPC-SP10 / NACE No.2, is preferred in and around the seal area as shown in Figure 3. The cleaner the pipe surface, the more positive the seal. Any longitudinal, circumferential, or spiral weld must be ground flush with the OD of the pipe where the Half Weld+End will slide over the end of the existing pipe. It is recommended to clean the pipe at least 1" past the end of the fitting as shown in figure 3.

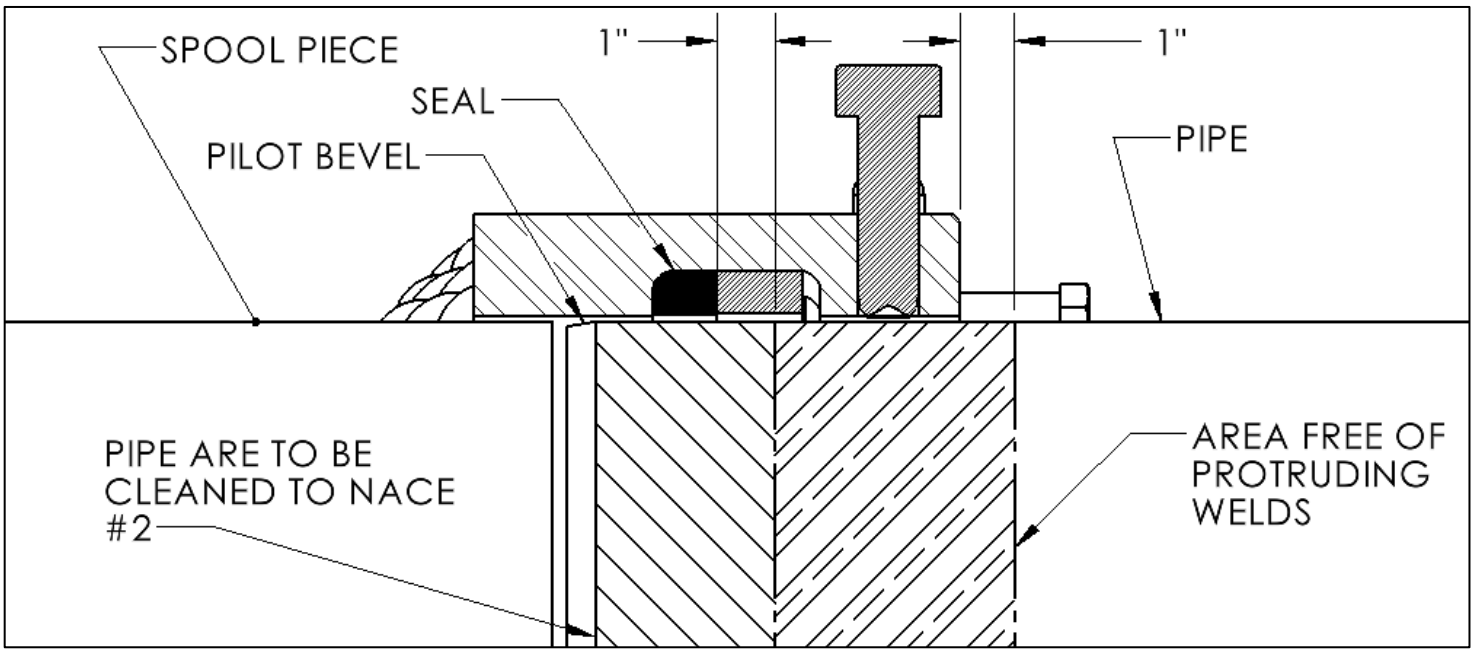

Figure 3

4. The seals can tolerate minor surface irregularities of up to ± 1/32 inch (0.8 mm). High weld reinforcement or steeply sided welds will need to be ground flush with the pipe outside diameter surface.
5. Pipe outside tolerance is as follows:
   Nominal pipe size 6-inch and smaller; ± 1% of the nominal diameter
   Greater than 6-inch through 14-inch; + 1/16 inch (1.6 mm), - 1/8 inch (3.2 mm)
   Greater than 14-inch nominal diameter; ± 5/32 inch (4.0 mm)

Mechanical Installation

The seals can be damaged by careless handling. Lifting devices such as chains, cables or lift truck forks shall not contact the seals. Failure to prevent contact with the seals can result in the seals being damaged or pulled from their grooves.

1. Measure and record the inside distance to the seal; dimension “A” as shown in Figure 4. This will be needed later if the mechanical end of the Half Weld+End is to be fully welded to the pipe.

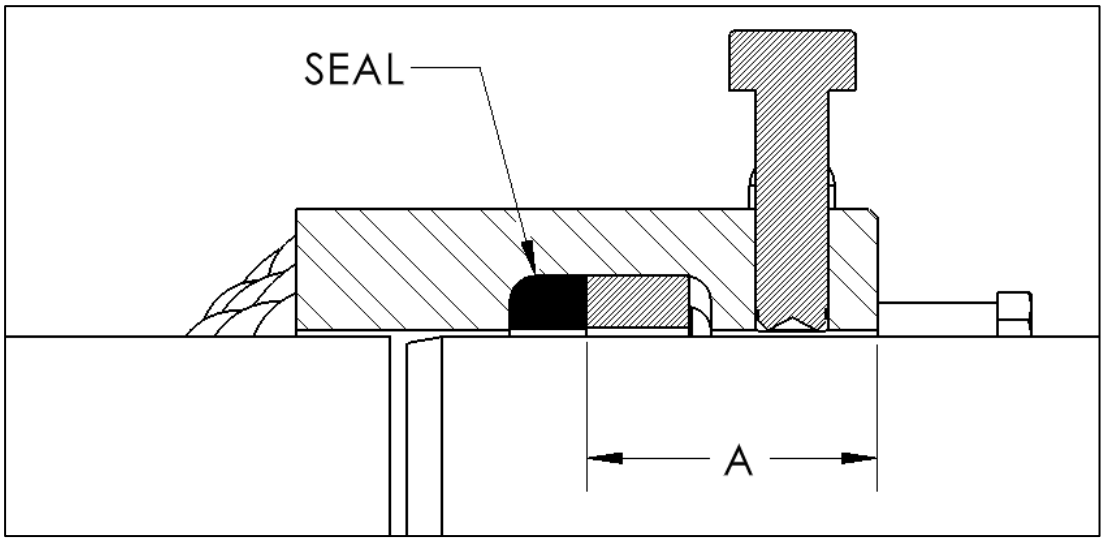

Figure 4

2. Coat all exposed surfaces of the seal material with a lubricant. Table 2 indicates the lubricants that are recommended for the various seal materials. The customer must determine if the lubricant is compatible with the product in the pipeline. Fittings using braided packing DO NOT require any lubrication.

Petroleum based lubricants	= A	
Silicone based lubricants	= B	
Glycerin based lubricants	= C	
Super Lube® Grease (1)	= D	
		Temperature (2)
Buna-N	A, B, C, D	225°F (107°C)
Viton	A, B, C, D	250°F (121°C)
Silicone	C, D	300°F (149°C)
Neoprene	B, C, D	250°F (121°C)
Aflas	A, B, C, D	225°F (107°C)
Hycar	A, B, C, D	180°F (82°C)

(1) Super Lube® Grease is a product of Synco Chemical Corporation. (www.super-lube.com)

(2) Temperature limit is for the seal material only and does not imply the pressure rating is necessarily applicable at this limit.

Table 2

NOTE: Do not use a lubricant for underwater applications. Sand, silt, or debris could adhere to the lubricant affecting the sealing ability and the accuracy of the torque values.

3. Slide the Half Weld+End with the pipe to which it is welded over the end of the pipe to which it will be mechanically joined until it bottoms out on the welded pipe. Then back the Half Weld+End away from the welded pipe approximately 1/16 inch as shown in Figure 2. Note that the end of the pipe or the start of the pilot bevel on the mechanical end must be beyond the seal groove by 1/2 inch to 1 inch as shown in Figure 2.

   Note: It can be helpful to measure the distance from the end of the Half Weld+End to the end of the seal, and marking the location where the Half Weld+End will land prior to installing.

4. Determine which clamp screw size is being used, measure the diameter of the threaded end of the clamp screw (measured in inches). As noted in the *Safety Check List*, contact PLIDCO for the maximum allowable operating pressure and the revised clamp screw torque value for thin wall pipe.

5. Center the PLIDCO Half Weld+End to the pipe. Advance the clamp screws to obtain equal spacing and stick out between the inner diameter of the Half Weld+End and the outside diameter of the pipe.

6. Clamp screws must be tightened evenly, maintaining an equal space between the pipe and the coupling using the recommended torque values. Tighten the clamp screws one at a time (torque values in Table 3) in a repeated sequence that matches Figure 5. The first time through the sequence, tighten the screws to 25% of the minimum torque. The second time through, tighten the screws to 50% minimum torque. The third time through, tighten the screws at 100% torque. Then, repeat the sequence at 100% torque until the clamp screws are unable to continue spinning (see Table 4 for torque percentage for each sequence).

Wrench Opening Across Flats (inches)	Cup Point Clamp Screws (inches)	Minimum Torque (ft-lbf)	Minimum Torque (Nm)
15/16	5/8-11	100	136
1	3/4-10	150	204

Table 3

Number of Times Through Torque Sequence	Percentage of Minimum Torque
1	25%
2	50%
3	100%
4+ (Circular Sequence)	100%

Table 4

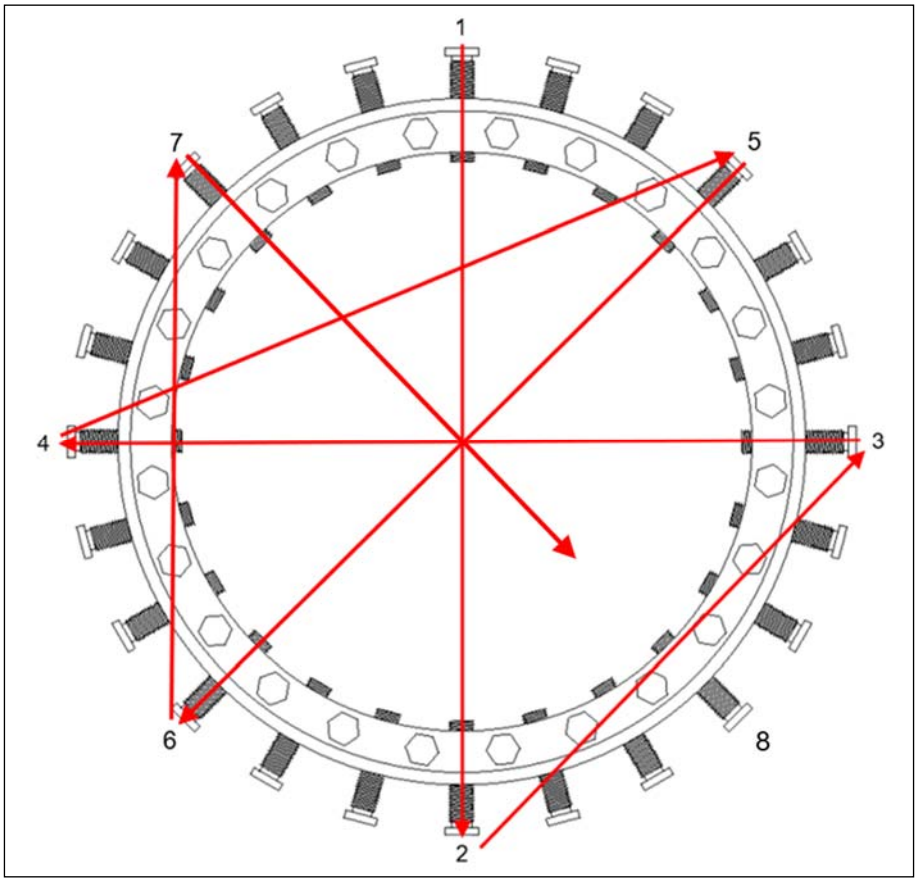

Figure 5

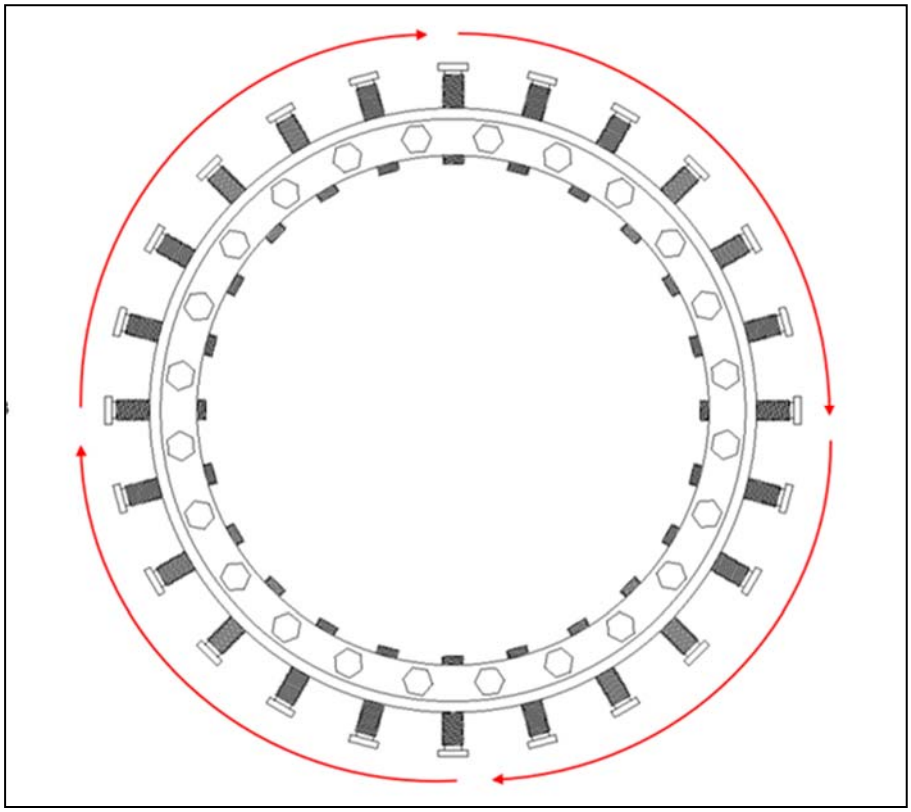

Figure 6

7. Snug all the thrust screws firmly and evenly around the circumference, while maintaining an equal stick out from the end of the Half Weld+End.

8. Torque the thrust screws one at a time (torque values in Table 5) in a repeated crisscrossed star sequence that matches Figure 7. The first time through the sequence, tighten at 25% of the minimum torque. The second time through, at 50% of the minimum torque. The third time through, at 100% of the minimum torque. Then, follow a circular tightening sequence, that matches Figure 8, at 100% torque, until the thrust screws are unable to continue spinning (see Table 4 for torque percentage for each sequence).

Wrench Opening Across Flats (inches)	Thrust Screws Nominal Diameter (inches)	Torque Range (ft-lbf)	Torque Range (Nm)
7/16	3/8-16	20 - 25	28 - 34
9/16	1/2-13	30 - 40	41 - 55
13/16	5/8-11	70 - 80	95 - 109

Table 5

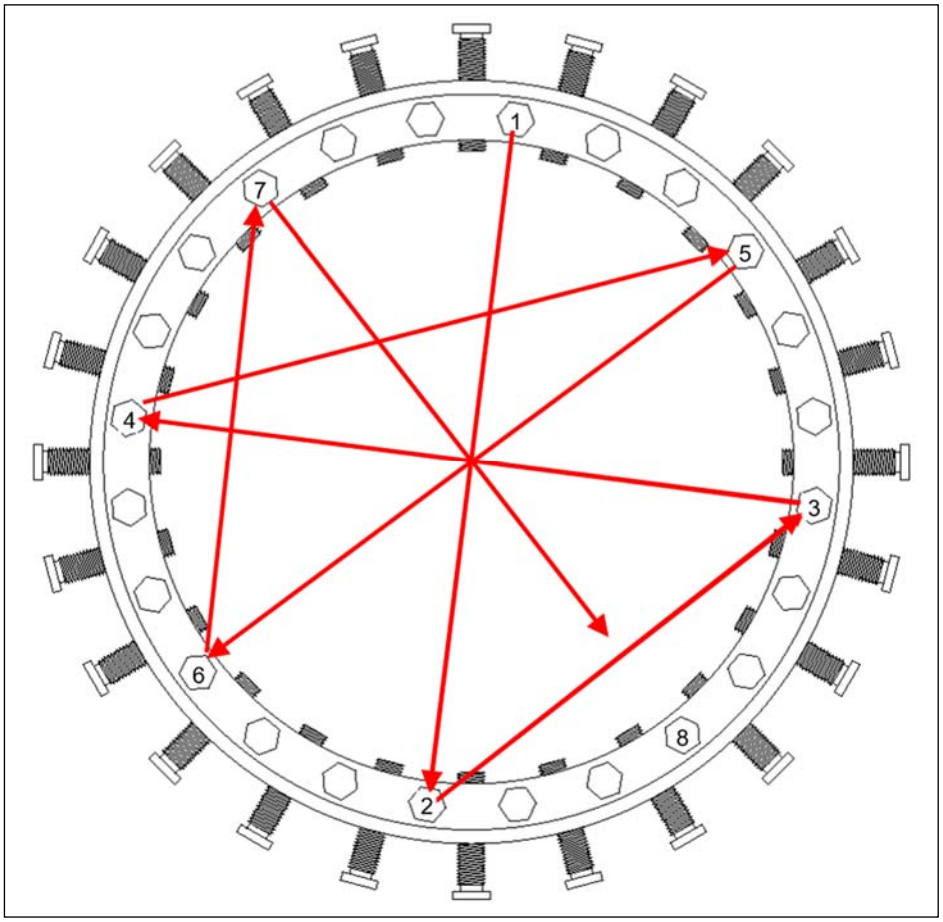

Figure 7

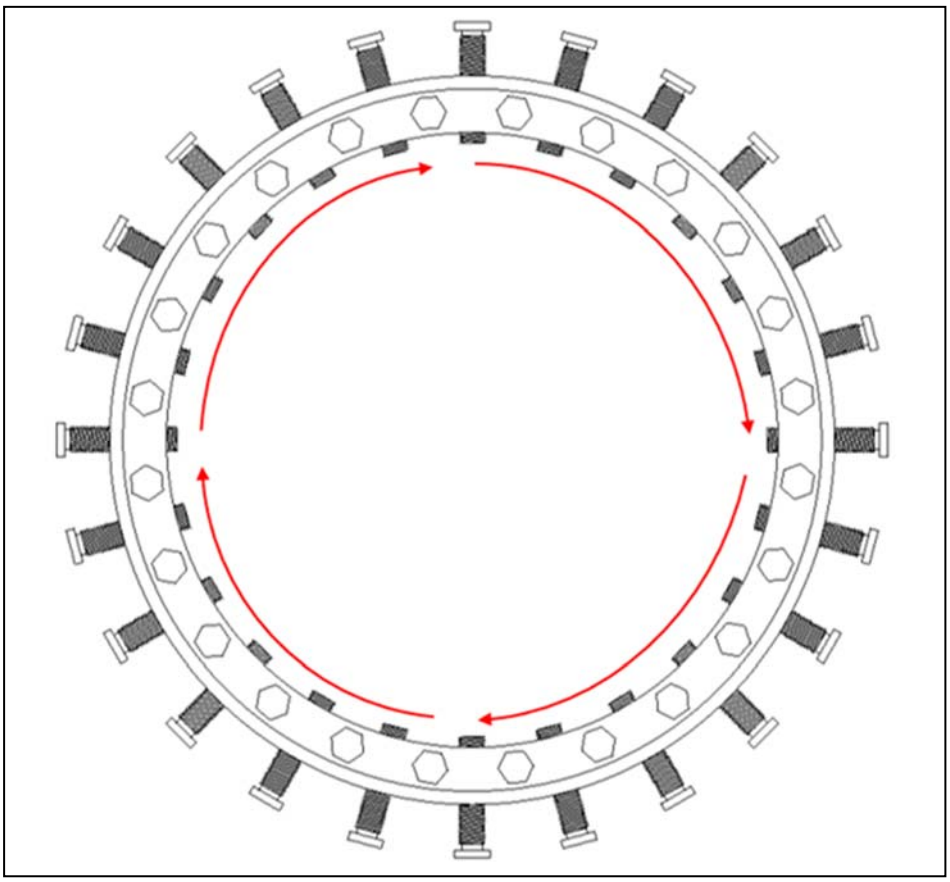

Figure 8

Re-pressuring and Field Testing

If the pipeline has been shut down, re-pressuring should be done with extreme caution. Re-pressuring should be accomplished slowly and steadily, without surges that could vibrate the pipeline or produce a sudden impact load that could pull the fitting off the pipe. Industry codes and standards are a good source of information on this subject.

Except for testing purposes, do not exceed the MAOP of the PLIDCO fitting. The PLIDCO fitting is designed to be tested up to 1½ times its design pressure. For hydrotesting, PLIDCO recommends following API Recommended Practice 2201, Procedures for Welding or Hot Tapping on Equipment in Service, Section 6.5. The test pressure should be at least equal to operating pressure of the line or vessel, but not to exceed internal pressure by 10%. This is meant to avoid possible internal collapse of the pipe or vessel wall. However, if prevailing conditions could cause collapse of the pipe or pressure walls, the test pressure may be reduced. (See API Standard 510 Section 5.8 for pressure testing precautions.) Personnel should not be allowed near the repair until the seal has been proven.

Field Welding Instruction of the Mechanical End

Welding is not a requirement for the pressure sealing ability of the PLIDCO Half Weld+End. The issue of welding is dependent on your company's requirements, applicable codes, and if longitudinal loads exceed the rating of the clamp screws.

!! WARNING!!

Failure to follow field welding instructions could result in explosion, fire, death, personal injury, property damage and/or harm to the environment.

All of the aspects for in-service welding of PLIDCO Half Weld+End are not addressed by this document. ASME PCC-2, API 1104 Appendix B, ASME Section IX, PRCI L52047, PRCI Hot Tap® Model, and other industry information pertaining to in-service welding must be considered when planning in-service welding. Refer to IP-019, Welding Considerations for addition information.

It is recommended that the pipeline should be full and under flow.

Welders and weld procedures should be qualified in accordance with API Standard 1104, *Welding of Pipelines and Related Facilities*, Appendix B, *In-Service Welding*. We strongly recommend the use of a low hydrogen welding process such as GMAW or SMAW, using low hydrogen electrodes (E-XX18) because of their high resistance to moisture pick-up and hydrogen cracking. SMAW electrodes must be absolutely dry. It is very important that the field welding procedure closely follow the essential variables of the qualified procedure, so that the quality of the field weld is represented by the mechanical tests performed for the procedure qualification.

Use weld material with equal or greater tensile strength than the pipe. Carefully control the size and shape of the circumferential fillet welds. The weld is required to anchor the joint and give longitudinal stability to the pipeline. The size of the fillet weld should be at least 1.4 times the wall thickness of the pipe. This assumes a 1.0 joint efficiency. You may need to select a different joint efficiency based on your level of inspection or your company's welding policy.

Strive for a concave-faced fillet weld, with streamlined blending into both members; avoid notches and undercuts. The smoother and more streamlined the weld, the greater the resistance to fatigue failure. The worst possible shape would be a heavy reinforced convex weld with an undercut. Improper weld shape can lead to rapid fatigue failure, which can cause leakage, rupture, or an explosion, with potentially serious consequences.

It is very important that the field welding procedure closely follow the essential variables of the qualified procedure, so that the quality of the field weld is represented by the mechanical tests performed for the procedure qualification.

We do not recommend the use of thermal blankets for pre-heating. Thermal blankets can generate hot spots and reduce the ability of the PLIDCO Half Weld+End to dissipate welding heat in the vicinity of the seals. We recommend a small torch, such as a cutting torch, being careful not to aim the flame directly into the gap between the PLIDCO Half Weld+End and the pipe towards the seals. The flame from a preheat torch is helpful in burning off oils and other contaminates. Do not use a large torch, commonly called a rosebud, because of the difficulty controlling the size of the area being preheated.

During welding the temperature around the seals must be monitored. Dimension "A", as measured during the initial installation, should now be used to mark off location "B", as shown in Figure 4. To prevent damage to the seals, monitor the heat generated by welding or preheating, particularly at location "B", by using temperature crayons or probe thermometers. If the heat generated approaches the temperature limit of the seal material, which is indicated in the seal lubrication chart, welding should be discontinued or sequenced to another part of the fitting so that the affected area has a chance to cool.

The clamp and thrust screws of PLIDCO Half Weld+Ends are specially fabricated studs. They are made from mild carbon steel to increase weldability.

Welding Sequence

Caution should be observed so that welding or preheating does not overheat the seals. Sequence the welding so that the heat is not concentrated in one area.

1. Cut thrust screws so they are flush with the PLIDCO Half Weld+End. (See Figure 9)

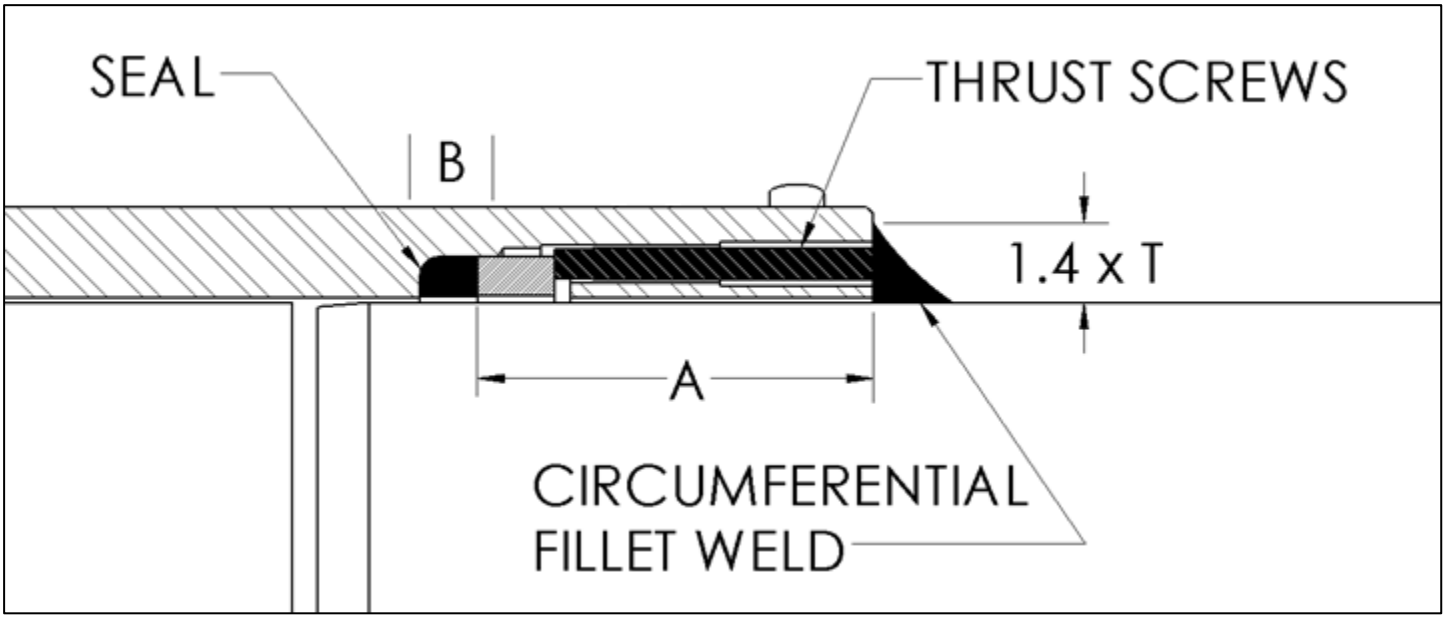

Figure 9

2. Add a fillet weld to the end of the Half Weld+End around the circumference of the pipe, and seal weld the End of the cut off thrust screws. (See Figure 9)
3. After the circumferential fillet welds are finished, one clamp screw per end may be removed to serve as a vent while welding the remaining clamp screws and also as a final test point for leakage if so required. Cut or burn off the clamp screws approximately 3/16” (4.8 mm) above the outside surface of the fitting and seal weld. (See Figure 10)

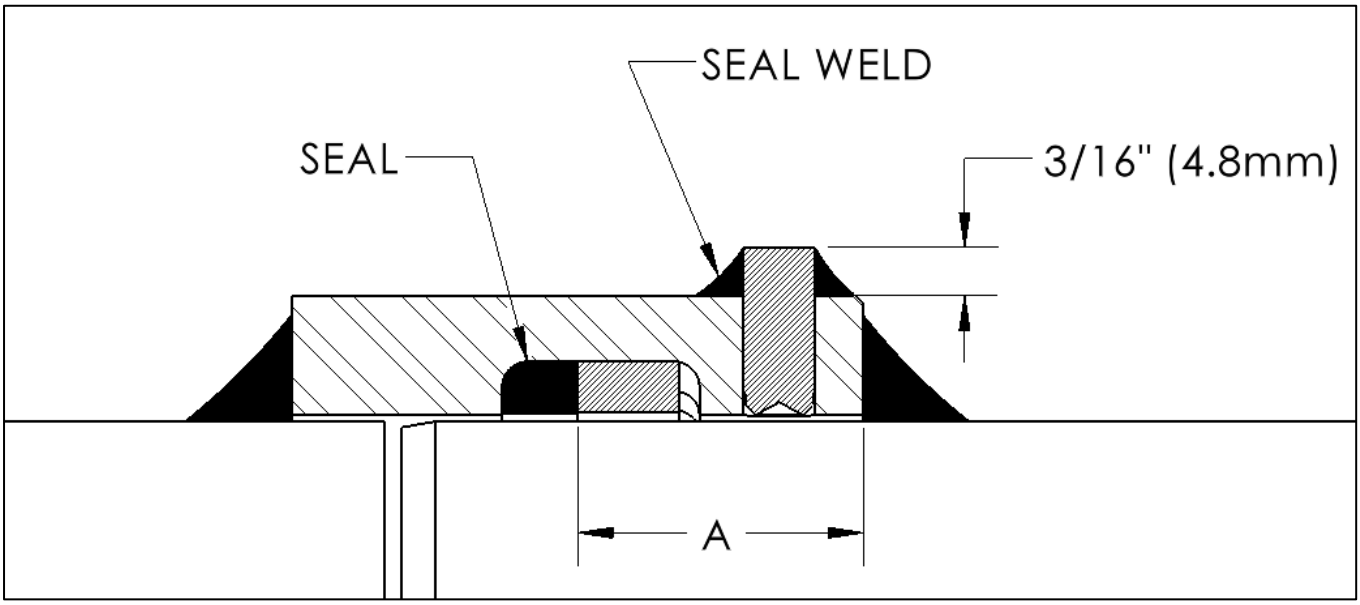

Figure 10

For information on optional hydrotesting of the welds before putting into service, read IP-053, (CLAMP SCREW TEST PORT INSTALLATION INSTRUCTIONS). Contact PLIDCO for additional information.

4. If one clamp screw was removed for venting and/or hydrotesting, reinsert the clamp screw and seal weld the screw to the body after testing is completed.

Storage Instructions

PLIDCO Half Weld+Ends should be stored in a dry environment to prevent the unpainted surfaces from rusting. Storage temperatures should not exceed 120ºF (50ºC). Cover with a tarp made of dark polyethylene, box, etc. to keep the direct sunlight away from the seals. It is best to exclude contamination, light, ozone and radiation. Improperly stored PLIDCO Half Weld+Ends can cause the gasket material to become cracked and brittle and lose its ability to seal.

Traceability

PLIDCO Half Weld+Ends, as with most PLIDCO products, have a unique serial number by which the fitting is fully traceable. Additionally, all elastomer seals have a unique batch number by which the seal material is traceable.

Recommended Inspection Schedule

1. After the pipeline is re-pressurized and field tested, (see *Re-pressuring and Field Testing* for precautions) the torque values should be checked again 4 hours after installation. Then, the torque values should be checked again 24 hours after that.

   NOTE: This is only applicable for non-welded applications.

2. It is recommended that torque striping be applied from the threads of all the screws to the body of the PLIDCO Half Weld+End so that any loosening of the screws can be visually seen during an inspection.

   NOTE: This is only applicable for non-welded applications.

3. 6 months after installation it is recommended that a visual inspection occurs that checks for visible signs of leakage, bolt/nut loosening, and general wear or corrosion.

4. After the 6-month inspection occurs, a yearly visual inspection is recommended that checks for visible signs of leakage, bolt/nut loosening, and general wear or corrosion.