PLIDCO®

PLIDCO® SPLIT+SLEEVE
INSTALLATION INSTRUCTIONS FOR NACE EXPOSED APPLICATIONS

LANGUAGES:
CLICK ON LANGUAGE DESIRED

ENGLISH

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PLIDCO® SPLIT+SLEEVE INSTALLATION INSTRUCTIONS FOR NACE EXPOSED APPLICATIONS USING A193-Gr. B7M & A320-Gr. L7M STUDS

!! WARNING!!

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

Do not use or select a PLIDCO Split+Sleeve until all aspects of the application are thoroughly analyzed. Do not use the PLIDCO Split+Sleeve until you read and understand these installation instructions. If you have any questions, or encounter any difficulties using this product, please contact PLIDCO.

READ CAREFULLY

The person in charge of the repair must be familiar with these instructions and communicate them to all personnel involved in the repair crew.

Safety Check List

Pipeline repairs can be made with the pipeline in operation or shutdown.

- ❑ Read and follow these instructions carefully. Follow your company's safety policy and applicable codes and standards. If the PLIDCO Split+Sleeve is to be installed underwater, be sure to read the *Underwater Installation* section.
- ❑ Whenever a PLIDCO product is modified in any form including adding a vent or 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 material traceability, procedural documentation, quality inspection and experienced workmanship that are employed by The Pipe Line Development Company.
- ❑ The PLIDCO Split+Sleeve should never be used to couple pipe unless sufficient end restraint is provided such as with a PLIDCO Clamp+Ring. The PLIDCO Split+Sleeve has no end restraint rating in its unwelded condition, and if so utilized could result in EXPLOSION, FIRE, DEATH, PERSONAL INJURY, PROPERTY DAMAGE, AND/OR HARM TO THE ENVIRONMENT.
- ❑ Observe the maximum allowable operating pressure (MAOP) and temperature on the label of the PLIDCO product. Do not exceed the MAOP or temperature as indicated on the unit.

- ❑ Verify 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.

  Note: Sour service applications may require seals suitable for H2S such as Aflas. Typical seals such as Viton-B and Buna-N are not compatible with higher levels of H2S.

- ❑ Verify the pipe OD, wall thickness, and ovality are within tolerance at the location of the proposed installation. Contact PLIDCO or an authorized PLIDCO distributor if outside of the listed tolerance.

- ❑ Calibrated torquing or tensioning equipment must be used. Under or over-tightening studs can cause the fitting to leak. Impact and hammer wrenches must not be used for installation.

- ❑ When repairing an active leak, extreme care must be taken to guard personnel. Severe injury or death could result.

- ❑ During the *Pipe Preparation* and *Installation* procedures, those installing the PLIDCO Split+Sleeve must wear, at minimum, Z87+ safety eyewear and steel toe safety footwear.

- ❑ If the pipeline has been shut down, re-pressurizing should be done with extreme caution. Re-pressurizing 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 Split+Sleeve. Personnel should not be allowed near the repair until the seal has been proven.

Pipe Preparation

1. Verify the size and condition of the pipe. The following pipe tolerances must be verified prior installation.
   - Pipe outside diameter tolerance is ± 1% for 6-inch nominal pipe size and smaller. For pipe sizes larger than 6-inch nominal, the tolerance is ± 0.06 inch (± 1.5 mm)
   - The minimum wall thickness for all pipelines 36”and under is schedule 10. Pipelines greater than 36” the minimum wall this is schedule standard.
   - Ovality limits correspond to API Specification 5L.
2. Remove all coatings, rust, and scale from the pipe surface where the circumferential seals of the PLIDCO Split+Sleeve will contact the pipe (see Figure 1). A near-white finish, as noted in SSPC-SP10 / NACE No.2, is preferred 1” (25mm) before and after the seal. The cleaner the pipe surface, the more positive the seal. Sandblasted surfaces should be buffed smooth.
3. Where the circumferential seals will contact any longitudinal welds, circumferential welds, spiral pipe welds, or other protrusions, the welds in this vicinity must be ground flush with the outside diameter of the pipe. The area should extend 1 inch (25mm) inside of the seals and 1inch (25mm) beyond the end of the fitting as shown in Figure 1 designated, *“Pipe area to be cleaned”.*
4. Circumferential & longitudinal pipe welds between the circumferential seals do not need to be ground flush as long as the weld height does not exceed 3/16 inch (4.7 mm) (see Figure 1).

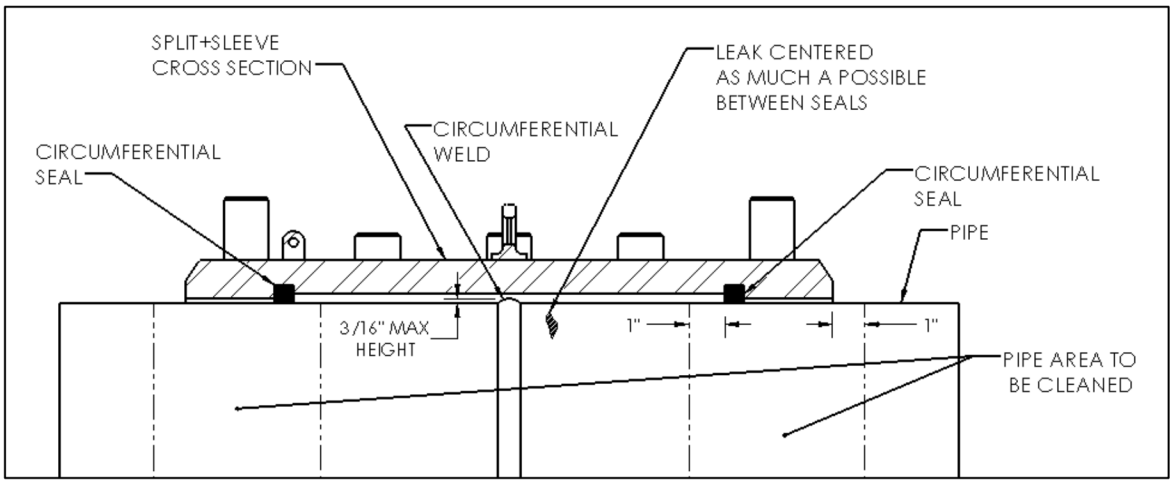

Figure 1

5. The seal can tolerate minor surface irregularities up to ± 1/32 inch (0.8 mm) deep. Grooves traversing seals must be ground out or filled. The defective surfaces may be rendered suitable for sealing by applying a suitable epoxy such as Belzona 1161 and sanding or filing the surface to match the required outer diameter.

   Note: Epoxy may only be applied to the area where the seals will land. It is not intended to rebuild the pipe wall to the nominal OD, or to repair large sections of exterior corrosion.

6. A PLIDCO Split+Sleeve is capable of sealing on out-of-round pipe within the specific tolerance. This is based on the ability of the bolting to reshape the pipe. For very thick wall pipe, the bolting may not be able to reshape the pipe. Severely out-of-round pipe may require repositioning the PLIDCO Split+Sleeve or use of a different length PLIDCO Split+Sleeve to ensure the circumferential seals are positioned on round pipe.

7. A PLIDCO Split+Sleeve is not capable of reshaping flattened or dented pipe.

Lifting & Handling

When not being moved or transported on a pallet, PLIDCO Split+Sleeves should always be lifted, transported, or installed using the installed lifting eyes as shown in Figures 2 & 3. All Split+Sleeves that exceed 50 lbs. per half or are too heavy to move and install by hand are provided with lifting eyes on each half. Longer fittings are provided with two lifting eyes as shown in Figure 3. If two lifting eyes per half are provided, both lifting eyes are required to lift the fitting. Chains, hooks, shackles, or straps suitable for the weight of the fitting(s) shall be used and must be securely inserted through the lifting eyes.

The lifting eyes are designed to support the weight of a fully assembled Split+Sleeve. The lifting eyes are installed on both halves of the fitting and should be used to maneuver or lower Split+Sleeve onto the pipeline.

Vertical installations or installations that require special rigging due to space, obstructions, or location may require additional lifting eyes to be added in locations other than shown in Figures 2 & 3. These can be added prior to ordering or sent back to a PLIDCO manufacturing facility to be added by PLIDCO personnel.

Note: Careless handling can damage the seals and GirderRings (seal retainers). Lifting devices such as chains, cables, or straps should never contact the seals or GirderRings. Never lift the fitting by inserting the forks from a fork lift inside of the fitting. Contact on the seals or GirderRings can result in the seals being pulled from their grooves. (See Figure 4)

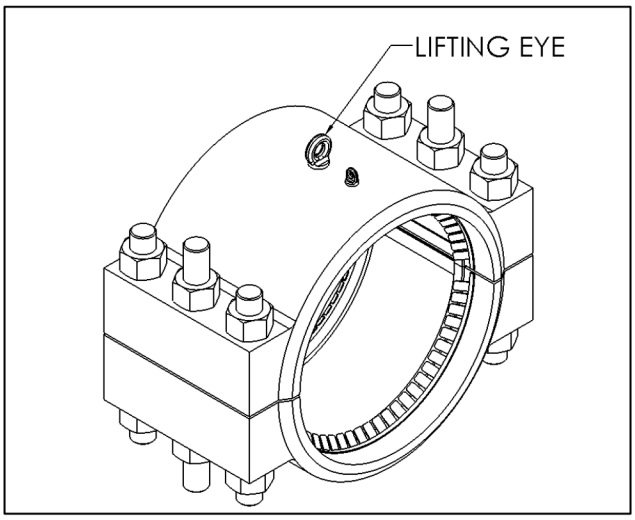

Figure 2

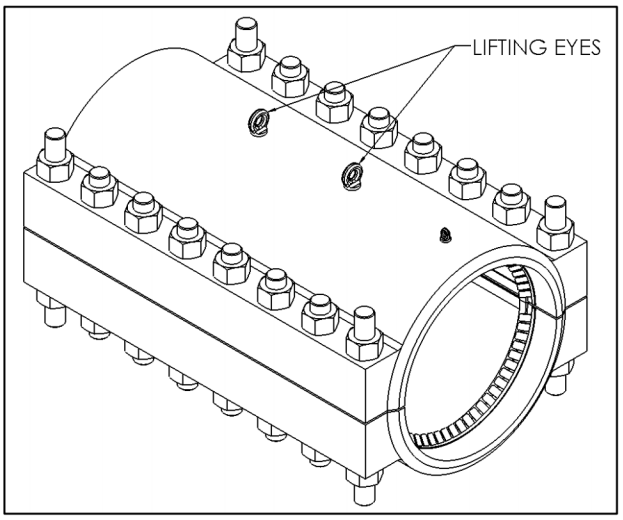

Figure 3

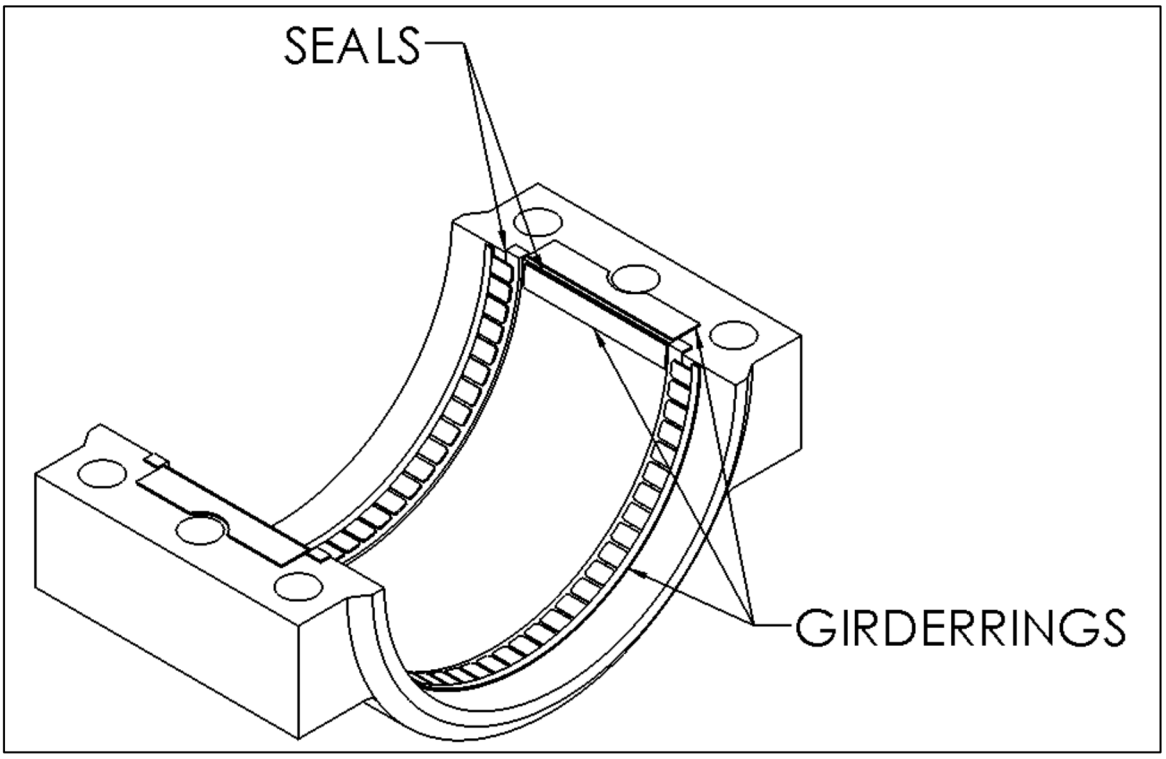

Figure 4

Installation

This section defines the general procedure for installation of a PLIDCO Split+Sleeve.

1. If the two sleeve halves were shipped as an assembled unit, it would have been shipped with spacers between the two halves to prevent damage to the longitudinal seals and ends of the circumferential seals. Typically, small diameter nuts are used for the spacers. The spacers must be removed and discarded before installing the PLIDCO Split+Sleeve. Failure to remove the spacers will prevent proper compression of the seals.
2. Coat all exposed surfaces of elastomer seals with a lubricant. Table 1 lists the lubricants that are recommended for the various seal types. The customer must determine if the lubricant is compatible with the product in the pipeline. Lubricant is not recommended for underwater installations or braided packing. Refer to the section on *Underwater Installations*.

	Seals Type							
Lubricant Type	**Viton & FKM**	**Buna-N (Nitrile)**	**Neoprene**	**Aflas**	**Silicone**	**EPDM**	**Hycar**	**HNBR**
Petroleum Based Lubricants (3)	C	C	P	C	NC	NC	C	C
Polyalphaolefin (PAO) Synthetic Lubricants	C	C	C	C	P	NC	C	C
Polyglycol (PAG) Based Lubricants	C	P	NC	C	C	P	P	P
Silicone Based Lubricants	C	C	C	C	NC	C	C	C
PFPE Based Lubricants	C	C	C	C	C	C	C	C
Petrolatum	C	C	C	C	P	NC	C	C
Super Lube® Silicone O-Ring Grease (2)	C	C	C	C	NC	C	C	C
Super Lube® Multi-Purpose Synthetic Grease with Syncolon (PTFE)(2)	C	C	C	C	P	NC	C	C
Molykote® 55 O-Ring Grease	C	C	C	C	NC	C	C	C
Parker Super-O-Lube	C	C	C	C	NC	C	C	C
Deacon® PFPE Grease	C	C	C	C	C	C	C	C
	C-Excellent Compatibility P- Partial Compatibility NC- Not Compatible							
Notes: 1) Avoid lubricants dispersed using aerosols or spray cans. The propellant often contains additives or petroleum-based chemicals that can degrade seals. Grease from tubs or grease guns should be used. 2) Food Grade. 3) Avoid penetrating oils and petroleum-based lubricants with additives or detergents that are aggressive towards elastomers.								

Table 1: Approved Lubricants

3. Clean and lubricate all studs and nuts. Verify that each nut threads on freely prior to the installation. Lubricant is not recommended for underwater installations.

   Note: The type of lubricant can dictate the torque value per the PLIDCO torque chart on page 14.

4. Assemble the PLIDCO Split+Sleeve around the pipe making sure the yellow painted ends are matched. The fitting should be centered over the leak and/or damaged area as much as possible as shown in Figure 5. At no point should the leak be closer than ½" (12.7mm) from the circumferential seals. Try to avoid having any leak spraying directly onto the longitudinal seals.

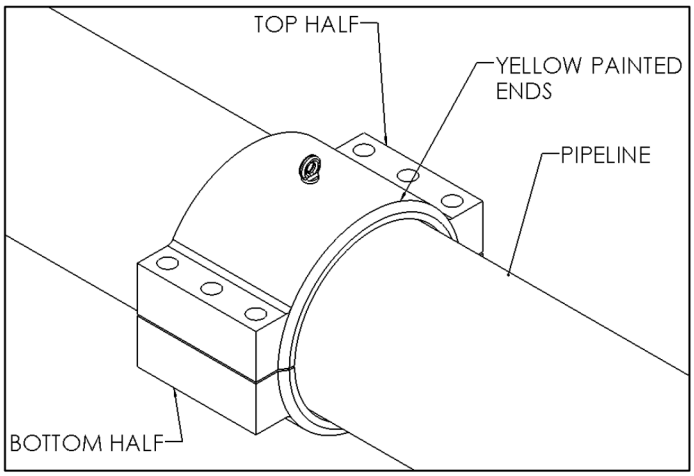

Figure 5

5. Install the studs and nuts through the holes in the Split+Sleeve as shown in Figure 6. Most Split+Sleeves will have two different stud lengths. Make sure the longer studs are in the proper holes. PLIDCO Split+Sleeves with 3 holes per side should have the longer studs in the two center holes (see Figure 7). Sleeves with more than 3 holes per side should have the longer studs in the four corner holes (see Figures 8).

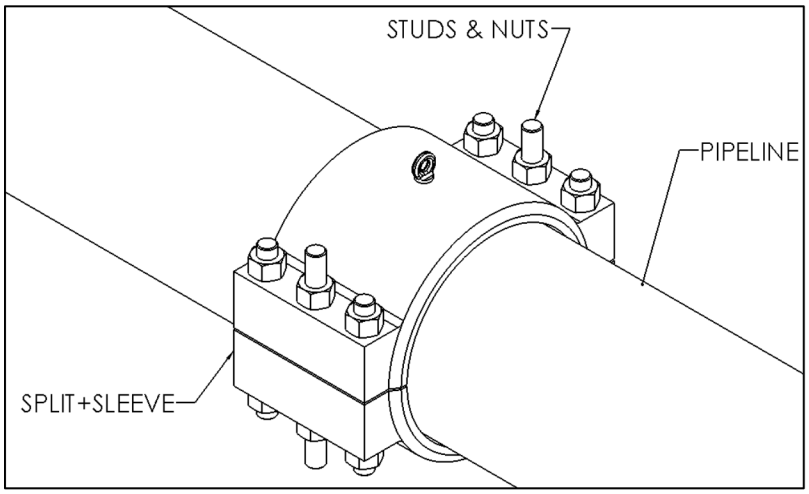

Figure 6

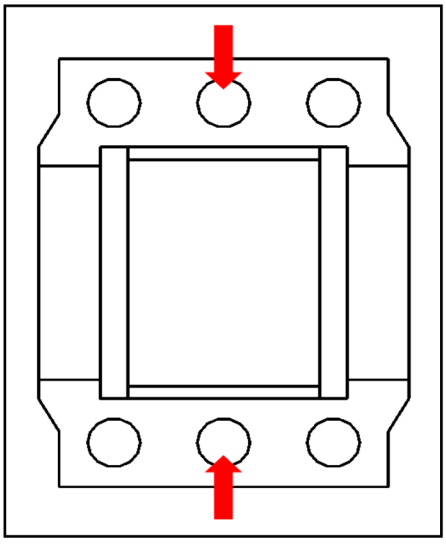

Figure 7

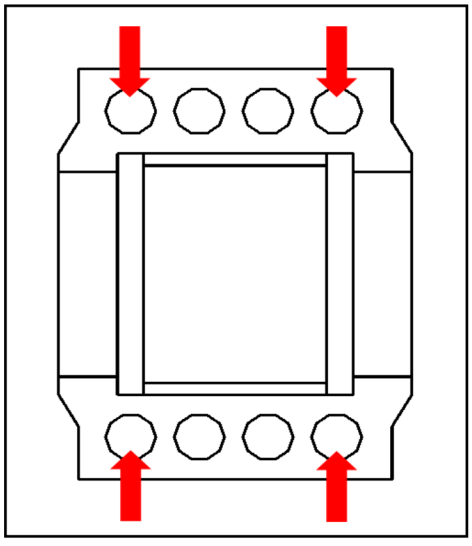

Figure 8

Sometimes it is helpful to loosely assemble the PLIDCO Split+Sleeve to one side of the leak with the studs loosely secured, then reposition it centered over the leak.

6. Torque the studs uniformly as indicated by the corresponding value per stud size from the **PLIDCO Torque Chart** located on page 14 of these instructions. The best results are obtained by maintaining an equal gap all around the side bars while tightening the studs. Ensure there is full thread engagement by having a minimum of 1/4 inch (6.4 mm) of stud extending beyond the nut. The sequence for torquing the studs should follow the pattern as shown in Figure 9, and should be executed repeatedly as follows:

    a. 1st time- Hand tight or 10% of the minimum torque value to bring the 2 halves together.

    b. 2nd time - 50% torque.

    c. 3rd time- 100% torque.

    d. Repeat the sequence at 100% torque until all the studs and nuts are unable to continue spinning.

    Note: The torque values listed on the PLIDCO Torque Chart represent residual torque. The initial torque value may need to be slightly higher due to bolt relaxation. Applicable industry methods should be used to verify bolt preload. A rechecking of torque is recommended at 4 and 24 hours after installation.

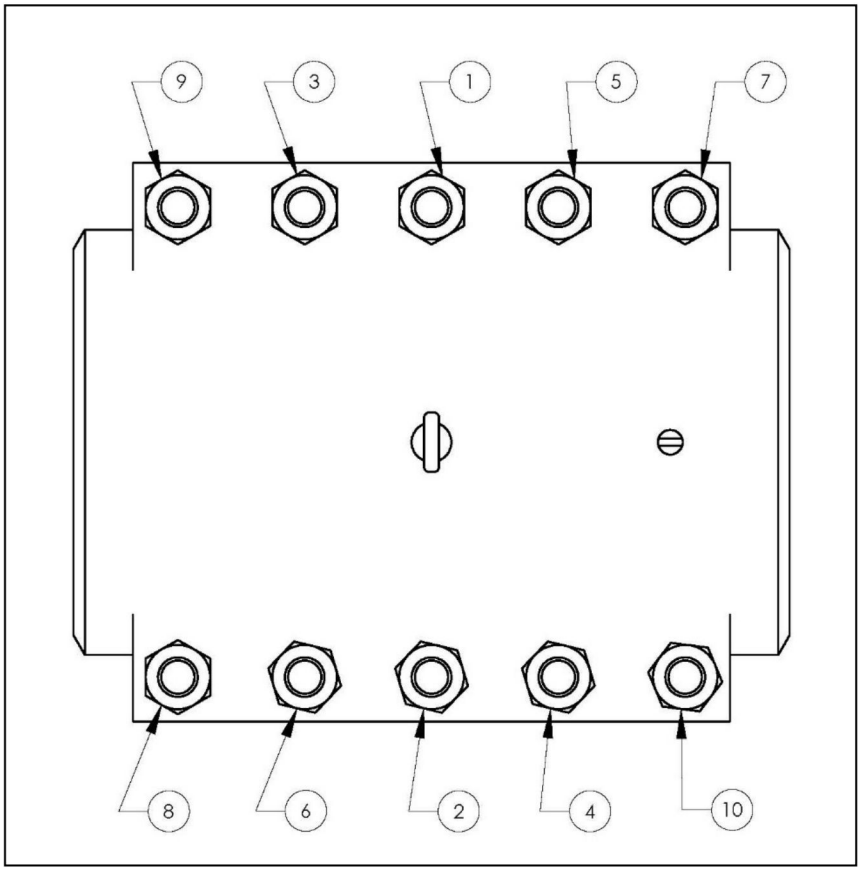

Figure 9

7. The side bars are gapped approximately 1/8 inch (3.2 mm) or less when the PLIDCO Split+Sleeve is fully tightened.

8. The ends of the fitting need to be aligned as close as possible. The overlap of the ends should be less than 1/16” (1.5mm) between the top and bottom half. This helps the circumferential seals align.

9. Verify that the leak has been contained by visually inspecting for leaks or performing a field hydrotest.
10. If the fitting was supplied with vents, verify that the vents are snug. For all vents that were removed during installation or for hydrotesting, new Teflon tape, thread sealant, or anerobic thread sealant must be reapplied to the threads.

Hinged Split+Sleeve Installation

This section defines the general procedure for Split+Sleeve Installation on a horizontal pipe. Vertical or angled pipe installations may require additional lifting devices, and/or a different hinge design and operation.

1. Orient the Split+Sleeve and remove all studs and nuts as shown in Figures 10 & 11.
2. Attach shackles to the lifting eyes. Smaller fittings typically only have lifting eyes in the center of the shell as shown in Figure 10. Larger diameter fittings have additional lifting eyes on an angle as shown in Figure 11. For larger diameter fittings, the angled lifting eyes are to be used during installation with hinges.

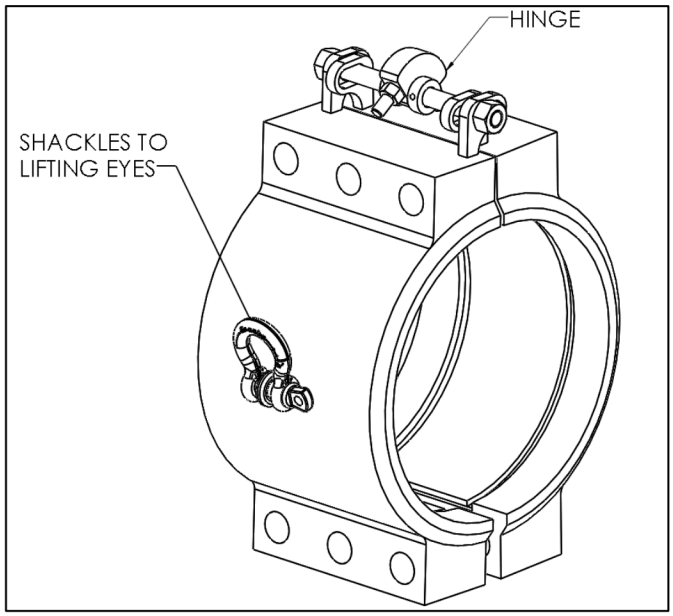

Figure 10

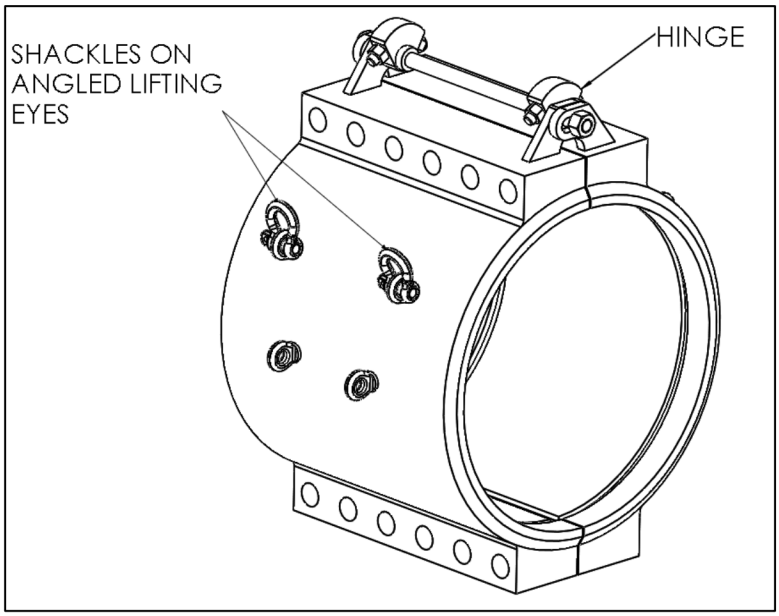

Figure 11

3. Attach properly sized rigging such as chains, cables, or straps to a single point crane attachment. The rigging should be sufficiently long enough that the rigging doesn't interfere with opening and closing of the fitting as shown in Figure 12.
4. Lift the fitting up from the single point crane attachment. The Split+Sleeve will open as shown in Figure 12.
5. Position the fitting over the pipeline and slowly lower the fitting onto the pipeline as shown in Figure 12. The inside of the fitting should come in contact with the pipeline, and the fitting will start to close as it is lowered. Some fittings may require some additional side force to close the fitting around the pipe. Keep all body parts clear of the inside of the fitting as the fitting is being lowered onto the pipe. This is to ensure safety in the event the fitting slams shut rapidly.
6. Once the fitting is wrapped around the pipe, insert the studs through the holes and thread on the nuts as shown in Figure 13. Proceed to tighten the studs and nuts per these installation instructions.

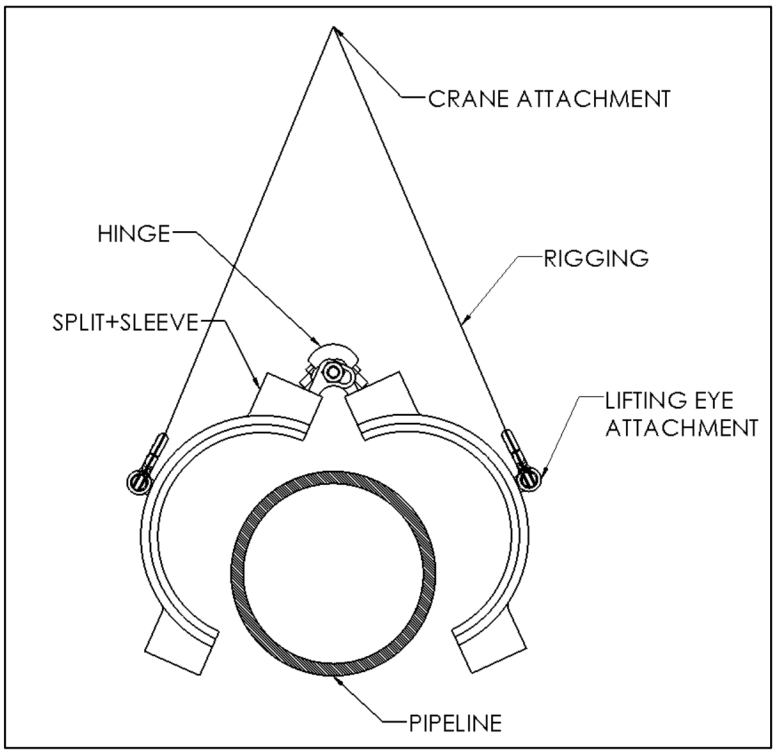

Figure 12

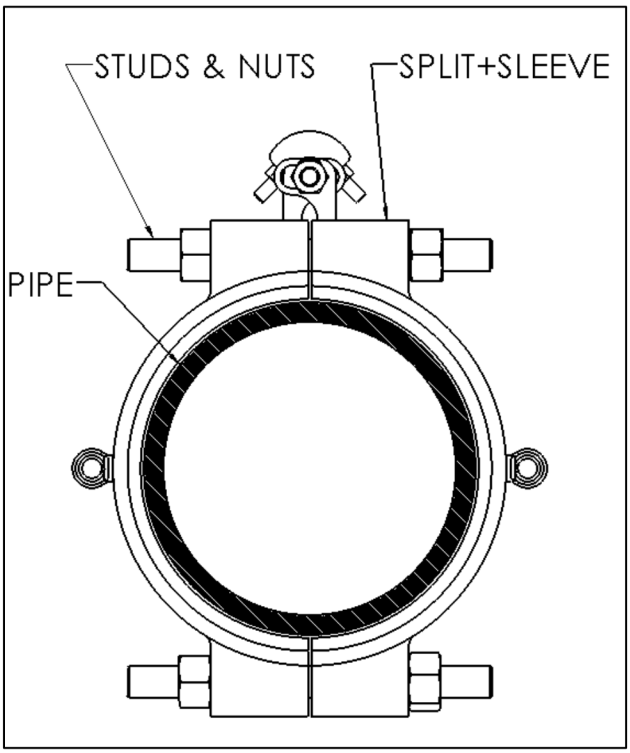

Figure 13

Sealant Injection

Sealant Injection is not required for a PLIDCO Split+Sleeve to achieve a leak tight seal provided the sleeve was installed with elastomer seals, was installed per these installation instructions, and the temperature and pressure of the pipeline are within the design limitations of the PLIDCO Split+Sleeve. However, PLIDCO Split+Sleeves are capable of being injected with sealant, grout, hardenable epoxy, or sealant. Please note: *Split+Sleeves installed with braiding style packing such as Kevlar, Carbon Fiber, or Teflon require sealant injection to achieve a leak tight seal.*

For standard Split+Sleeves to be injected with sealant, the fitting must come from the factory with a minimum of one vent in each half. For fittings without vents, please contact PLIDCO or an authorized representative for options to add vents on existing fittings.

The Split+Sleeve must be installed and fully tightened prior to injecting sealant.

Please see IP-033, *PLIDCO Sealant Injection Instructions*, for additional information for injecting sealant.

Re-Pressurizing and Field Testing

If the pipeline has been shut down, re-pressurizing should be done with extreme caution. Re-pressurizing should be accomplished slowly and steadily without surges that could vibrate the pipeline or produce a sudden impact load. 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 fitting. The PLIDCO fitting is designed to be tested up to 1½ times its design pressure. However, 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 the 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 Instructions

Welding is not a requirement for the pressure sealing ability of the PLIDCO Split+Sleeve. The issue of welding is dependent on your company's requirements, applicable codes, and if longitudinal loads need to be carried by the PLIDCO Split+Sleeve.

!! WARNING!!

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

All aspects for in-service welding of PLIDCO Split+Sleeves 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 additional 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*. PLIDCO strongly recommends 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. These are also the preferred welding processes for seal welding the studs and nuts.

Use weld material with equal or greater tensile strength than the pipe. Carefully control the size and shape of the circumferential fillet welds. 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. 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 heavily reinforced convex weld with an undercut. Improper weld shape can lead to rapid fatigue failure, which can cause leakage, rupture, or an explosion with attendant serious consequences.

It is very important that the field welding procedure closely follows 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.

PLIDCO does not recommend the use of thermal blankets for pre-heating. Thermal blankets can generate hot spots and reduce the ability of the PLIDCO Split+Sleeve 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 Split+Sleeve 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.

Monitor the heat generated by welding or preheating, particularly near the area of the seals, by using temperature crayons or probe thermometers. If the heat generated approaches the temperature limit of the seal material, which is indicated on the label, welding should be discontinued or sequenced to another part of the fitting so that the affected area has a chance to cool.

Seal welding the grade B7 studs of the PLIDCO Split+Sleeve is the most difficult phase of field welding. They are made of AISI 4140 steel with a high carbon equivalence. By using a low hydrogen welding process with high preheat, the problem of hydrogen cracking and pinholes can be reduced. The preheat will dry out any moisture, oil dampness, or thread lubricant that may be present in the weld area. If the stud lengths need to be cut back, allow at least 1/4 inch (6.4 mm) of stud beyond the nut for the fillet weld. Preheat the stud and nut, and then weld the nut to the stud. Check the preheat and then weld the nut to the sidebar. It is recommended to apply a multi-pass fillet weld alternating the starts and stops for all stud to nut and nut to body welds.

WELDING AFTER A CONSIDERABLE TIME LAPSE AFTER THE INITIAL INTALLATION

PLIDCO recommends that if the PLIDCO Split+Sleeve is to be welded, the welding be completed as soon as possible after the installation; as conditions permit. Welding at a significantly later date relies heavily on whether proper installation procedures were followed and the compatibility of the elastomeric gaskets with the product in the pipeline.

After the installation of the PLIDCO Split+Sleeve, there is no meaningful test that can be performed to determine the condition of the seals or the remaining service life of the seals. There are many variables that can affect the condition of the gaskets over which PLIDCO has no control.

If the PLIDCO Split+Sleeve is to be welded at a significant time lapse from the installation, the following precautions should be taken:

1. The PLIDCO Split+Sleeve must be closely inspected for any leakage that may have developed.
2. The studs and nuts should be retightened per the recommended torque value.
3. If possible, the pressure in the line should be reduced.
4. Some flow in the line may still be required to dissipate the welding heat to prevent damage to the elastomeric seals.
5. Follow the recommended welding practices as listed under *Field Welding Instructions*.

Welding Sequence

Caution should be observed so that welding does not overheat the seals. Sequence the welding so that the heat is not concentrated in one area. It will be necessary to re-torque the studs and nuts periodically during field welding because weld contraction causes them to loosen.

1. Fillet weld ends to pipe. (See Figure 14)
2. Seal weld side openings.
3. Re-torque studs and nuts.
4. Seal weld nuts to studs.
5. Seal weld nuts to side bars.
6. Seal weld vent plugs, if applicable.

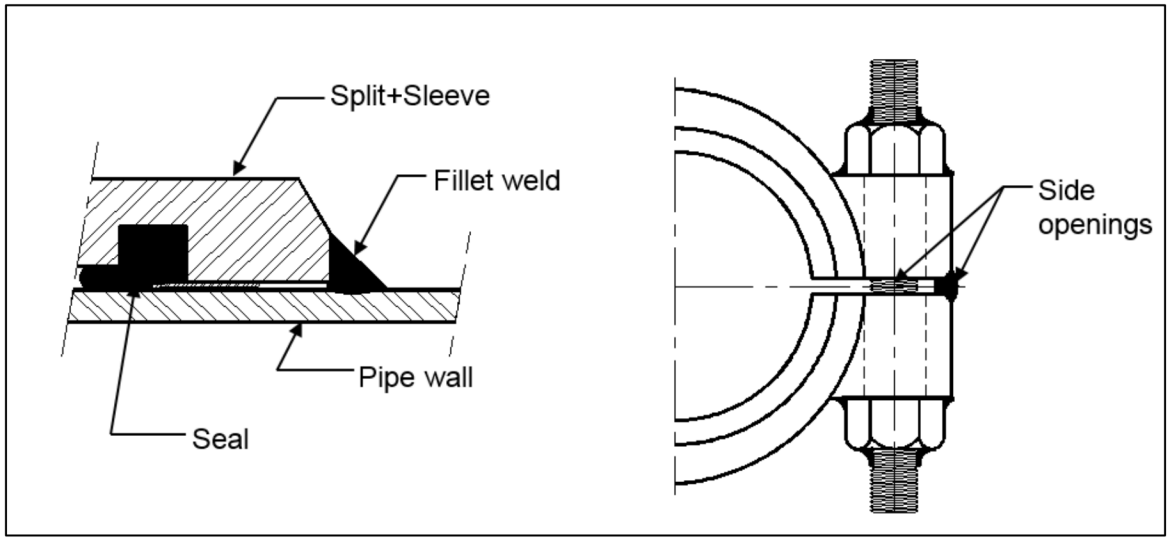

Figure 14

Storage Instructions

PLIDCO Split+Sleeves should be stored in a dry environment to prevent the unpainted surfaces from rusting. Storage temperatures should be between 32°F(0°C) & 120°F(49°C). Cover with dark polyethylene to keep the direct sunlight away from the seals. It is best to exclude contamination, light, ozone, and radiation. Improperly stored PLIDCO Split+Sleeves can cause the seal material to become cracked and brittle and lose its ability to seal.

Traceability

PLIDCO Split+Sleeves 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

The following is a recommended inspection schedule for PLIDCO Split+Sleeves in both the Fully Welded and Un-Welded condition.

Fully Welded

1. Fully welded fittings should have all seal welds inspected by magnetic particle or dye penetrant inspection methods after the welds have cooled to ambient temperature.
2. The fitting should be identified and included in the existing pipeline inspection schedule to check for visible signs of leakage, general wear, or corrosion.

   Note: In lieu of periodic physical inspection, a pressure monitoring system of the pipeline is an acceptable alternative.

Un-Welded

1. After the pipeline is re-pressurized and field tested (see *Re-Pressurizing and Field Testing*) the torque values should be checked 4 hours after installation. The torque values should be checked again after 24 hours.
2. Torque striping should be applied from the nuts to the sidebar of the PLIDCO Split+Sleeve so any loosening of the studs can be visually seen during an inspection.
3. A yearly visual inspection is recommended that checks for visible signs of leakage, stud/nut loosening, general wear, or corrosion.

   Note: In lieu of periodic physical inspection, a pressure monitoring system of the pipeline is an acceptable alternative.

Underwater Installation

WARNING!

When assembling a PLIDCO Split+Sleeve product under water (or submerged in any liquid) it is possible to build up thousands of pounds of pressure in the annulus between the fitting and the pipe. The pressure is caused by compressing the fluid trapped in the annulus as the two fitting halves are closed and tightened. The pressure trapped in the annulus may have the following effects:

The pressure rating of the split product is exceeded causing leakage or damage to the fitting.

The pipe on which the fitting is installed is damaged.

Personal injury or death due to subsequent removal of a vent plug.

RECOMMENDATIONS

The Pipe Line Development Company strongly recommends the following all underwater installations:

1. Install a fitting supplied with vents.
2. Leave the vents open during installation.

Additionally, the Pipe Line Development Company does not recommend using lubricant on the seals or on the stud and nut threads. This is to prevent sand, gravel, or debris from sticking to the lubricant and possibly interfering with sealing and/or obtaining accurate torque reading on the studs.

PLIDCO Torque Chart for Split+Sleeve

Nominal Diameter of Stud (inches)	Wrench Opening Across Flats (inches)	Torque Values (see Note 1)	
		0.15 C_f	
		ft-lbs	Nm
5/8--11	1-1/16	45	61
3/4--10	1-1/4	79	107
7/8--9	1-7/16	125	170
1--8	1-5/8	187	253
1-1/8--8	1-13/16	274	372
1-1/4--8	2	384	521
1-3/8--8	2-3/16	521	707
1-1/2--8	2-3/8	686	930
1-5/8--8	2-9/16	877	1190
1-3/4--8	2-3/4	1120	1520
1-7/8--8	2-15/16	1390	1880
2--8	3-1/8	1700	2300
2-1/4--8	3-1/2	2450	3320
2-1/2--8	3-7/8	3390	4590
2-3/4--8	4-1/4	4550	6160
3--8	4-5/8	5990	8120
3-1/4--8	5	7660	10400
3-1/2--8	5-3/8	9600	13100
3-3/4--8	5-3/4	11900	16100
4--8	6-1/8	14500	19600
4-1/4--8	6-1/2	17400	23700
4-1/2--8	6-7/8	20700	28200
4-3/4--8	7-1/4	24300	33300
5--8	7-5/8	28500	38900
5-1/4--8	8	33000	45100
5-1/2--8	8-3/8	38000	52000
5-3/4--8	8-3/4	43500	59400
6--8	9-1/8	49500	67600

Studs: ASME SA193 Grade B7M & SA320 Grade B7M

Note 1: The torque values listed are residual torque. This is the torque value and residual stress after bolt relaxation. The values listed assume that the nuts are properly lubricated with a lubricant having an approximate coefficient of friction (μ) 0.15 or k factor of 0.19 such as light weight machine oil. If a lower coefficient of friction lubricant is used, such as graphite, please contact PLIDCO's Engineering department for appropriate torque values.

Note 2: Use a pre-stress value of 20,000 psi if tensioners are to be used. Follow the tensioner manufacturer's instructions.

Note 3: This chart is also to be used for all PTFE (Teflon) coated studs. Lubricant is not recommended for use with PTFE studs.