



The Pipe Line Development Company
 870 Canterbury Road • Westlake, Ohio 44145
 Phone: (440) 871-5700 • Fax: (440) 871-9577
 Toll Free: 1-800-848-3333
 web: www.plidco.com • e-mail: pipeline@plidco.com

PLIDCO® FLANGE+REPAIR RING 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.

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

**PLIDCO “DEPARTMENT 100” at 440-871-5700
 toll free U.S. & Canada at 800-848-3333**

READ CAREFULLY

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

Safety Check List

- The PLIDCO Flange+Repair Ring may be used with the pipeline in operation or shut down.
- The PLIDCO Flange+Repair Ring should be considered a temporary repair for the reason noted in the section on *Buried or Inaccessible Flanges*.
- Read and follow these instructions carefully. Follow your company’s safety policy and applicable codes and standards.
- Be absolutely certain that the correct seal material has been selected for the intended use.
- The PLIDCO Flange+Repair Ring must never be used to couple flanges. No end restraint is provided with the PLIDCO Flange+Repair Ring.
- Observe the working pressure and temperature on the label of the PLIDCO Flange+Repair Ring. Do not exceed the maximum working pressure or temperature as indicated on the label.
- Verify the tightness of all threaded vents and connections.
- Review the sections on *Buried or Inaccessible Flanges* and *Underwater Installation* if either of these cases is applicable.

Preparation

1. Remove all coatings, rust and scale from the flange surface where the circumferential seals of the PLIDCO Flange+Repair Ring will contact the flanges. A near-white finish, as noted in SSPC-SP10 / NACE No.2, is preferred. The cleaned the flange outside diameter surface the more positive the seal.
2. The seals can tolerate minor surface irregularities up to $\pm 1/32$ inch (± 0.8 mm). Outside diameter tolerance is ± 0.06 inch (± 1.5 mm).
3. Make sure the gap between the flanges is open to the flange stud bolts. This will ensure injected sealant can reach the stud bolts. For flat face or insulating flanges, contact PLIDCO.
4. Clean and lubricate all PLIDCO Flange+Repair Ring studs and nuts. Ensure the nuts are free and easy running prior to installation.
5. Coat all exposed surfaces of the seals with a lubricant. The chart below lists the lubricants that are recommended and the maximum temperature limit for the various seals. The customer must determine if the lubricant is compatible with the product in the pipeline.

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)
Teflon	A, B, C, D	500°F (260°C)
Kevlar	A, B, C, D	750°F (399°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.

Installation

Careless handling can damage the seals and GirderRings (gasket retainers). Lifting devices such as chains, cables or lift truck forks should not be allowed to contact the seals or GirderRings. Contact can result in the seals being pulled from their grooves.

1. If the two PLIDCO Flange+Repair Ring 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 Flange+Repair Ring. Failure to remove the spacers will prevent proper compression of the seals
2. Assemble the PLIDCO Flange+Repair Ring around the flanges making sure the fitting is centered over the gap between the flanges and the yellow painted ends are matched.
3. Assemble the studs and nuts hand tight.

4. All stud bolts and nuts should be uniformly torqued as indicated by the *PLIDCO Torque Chart*. The torque values shown apply up to and including 700°F (371°C). For higher temperatures, contact PLIDCO for recommended torque values.
5. The best results are obtained by maintaining an equal gap between the side bars while tightening the bolts. Ensure a minimum of 1/4 inch (6 mm) of stud bolt extends beyond the nut.
6. To complete assembly the stud bolts should be rechecked at the recommended torque. The side bars are gapped approximately 1/8 to 3/16 inch (3 to 5 mm) when the PLIDCO Flange+Repair Ring is fully tightened.

Sealant Injection

One or more sealant cocks are supplied with each PLIDCO Flange+Repair Ring. These may be used for venting by removing the button heads while the cocks are closed. Open the sealant cocks to allow product to vent while bolting, if desired. Close cocks and re-install button heads. Be sure cocks are open before injecting sealant.

Connect a sealant gun to the fitting and inject sealant through all button head fittings a little at a time until the PLIDCO Flange+Repair Ring. Leakage will usually slow down to a whisper through the flange bolts.

Injection should proceed slowly, injecting a little at a time through the button head nearest the leak until total seal off is attained. Sometimes a total seal off is instant, in which case all sealant injection should be stopped. Observe for a while to see if a leak develops.

Generally, as the rate of leakage decreases the rate of sealant injection should be decreased proportionately. Often, during the final phases of seal off, there is an impulse to pump sealant zealously. This does not always give desirable results. The confined sealant, having no where to go, is forced out a previously sealed bolt hole or gasket.

Occasionally, the surfaces to be sealed are unreasonably gapped or badly corroded. These may require sealants which are very coarse and which cannot be pumped through the restriction of standard button heads. These sealants can be injected directly through the sealant cock. Please contact PLIDCO for supplementary instructions.

Buried or Inaccessible Flanges

Due to the nature of sealants and/or the exact application, it is possible for a leak to redevelop over time. As such, the PLIDCO Flange+Repair Ring should be considered a temporary repair. If a leak does develop, additional sealant may have to be injected into the PLIDCO Flange+Repair Ring. For this reason, PLIDCO cautions the end user against using a PLIDCO Flange+Repair Ring for a buried, sub-sea, or any other installation in which subsequent access is not feasible.

Storage Instructions

PLIDCO Flange+Repair Ring should be stored in a dry environment to prevent any unpainted surfaces from rusting. Storage temperatures should not exceed 120°F (49°C). Cover with dark polyethylene to keep direct sunlight from the seal material. It is best to exclude contamination, light, ozone and radiation. Improper storage can cause the seal material to become cracked and brittle and lose its ability to seal.

Traceability

PLIDCO Flange+Repair Ring, as 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.

Underwater Installation

WARNING!

This warning is only applicable to a non-leaking, underwater installation. When assembling a PLIDCO Flange+Repair Ring under water (or under any liquid) it is possible to build up thousands of pounds of pressure in the annulus between the fitting and the flanges. The pressure is caused by compressing the fluid trapped in the annulus as the two fitting halves are closed and tightened. For installations over a leak, pressure in the annulus equalizes with the pressure in the pipe. The pressure trapped in the annulus may have the following effects:

- The pressure rating of the PLIDCO Flange+Repair Ring is exceeded causing leakage or damage.
- The flanges on which the PLIDCO Flange+Repair Ring is installed are damaged.
- Personal injury or death due to subsequent removal of a button head fitting or pipe plug.

PLIDCO strongly recommends that the sealant cocks are open and the button head fittings removed before installing the PLIDCO Flange+Repair Ring. Caution: only the button head fittings threaded into a sealant cock should be removed. It may be extremely difficult to reinstall a button head against line pressure without the benefit of closing the sealant cock. (Additionally, please read the cautionary note under the section titled *Buried or Inaccessible Flanges*.)

PLIDCO Torque Chart

Nominal Diameter of Studbolt (inches)	Wrench Opening Across Flats (inches)	Torque Values			
		0.08 C _f		0.15 C _f	
		ft-lbs	Nm	ft-lbs	Nm
		25,000 psi pre-stress			
5/8	1-1/16	33	45	56	76
3/4	1-1/4	57	77	98	133
7/8	1-7/16	91	123	156	212
1	1-5/8	135	183	233	316
1-1/8	1-13/16	197	267	342	464
1-1/4	2	274	372	480	651
1-3/8	2-3/16	370	502	651	883
1-1/2	2-3/8	485	658	857	1162
1-5/8	2-9/16	617	837	1096	1486
1-3/4	2-3/4	782	1060	1394	1890
1-7/8	2-15/16	968	1313	1730	2346
2	3-1/8	1180	1600	2116	2869
2-1/4	3-1/2	1695	2298	3053	4140
2-1/2	3-7/8	2340	3173	4231	5737
		23,000 psi pre-stress			
2-3/4	4-1/4	2880	3904	5224	7083
3	4-5/8	3785	5133	6885	9336
3-1/4	5	4826	6545	8799	11931
3-1/2	5-3/8	6043	8194	11037	14967
3-3/4	5-3/4	7447	10099	13626	18477
4	6-1/8	9055	12278	16590	22497
		18,800 psi pre-stress			
4-1/4	6-1/2	8891	12057	16313	22120
4-1/2	6-7/8	10569	14331	19413	26324
4-3/4	7-1/4	12444	16874	22882	31028
5	7-5/8	14530	19703	26743	36263
5-1/4	8	16837	22830	31014	42055
5-1/2	8-3/8	19375	26272	35717	48433
5-3/4	8-3/4	22156	30044	40873	55425
6	9-1/8	25191	34160	46504	63059

Studs: ASTM A193 Grade B7 - Nuts: ASTM A194 Grade 2H

Torque values shown in the table represent two different coefficients of friction (C_f); 0.08 and 0.15. When C_f equals 0.08, it is assumed the studs and nuts are clean, free running, free of obvious flaws and lubricated with a high-grade graphite-oil thread lubricant. When C_f equals 0.15, it is assumed the studs and nuts are clean, free running, free of obvious flaws and lubricated with a light weight machine oil. The torque values are safe minimums and represent approximately the bolt pre-stress values.

Figure 1

