

PLIDCO®

The Pipe Line Development Company

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PLIDCO® SPLIT+REPAIR ELL INSTALLATION INSTRUCTIONS

!! WARNING !!

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

Do not use or select a Plidco Split+Repair-Ell until all aspects of the application are thoroughly analyzed. Do not use the Plidco Split+Repair-Ell 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 800-848-3333**

READ CAREFULLY

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

SAFETY CHECK LIST

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

- ❑ 1. Read and follow these instructions carefully. Follow your company's safety policy and applicable codes and standards.
- ❑ 2. The Plidco Split+Repair-Ell should never be used to couple pipe unless sufficient end restraint is provided such as with the Plidco Clamp+Ring. The Plidco Split+repair-Ell 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.
- ❑ 3. Observe working pressure and temperature on the label of the Plidco Split_Repair-Ell. Do not exceed maximum working pressure or temperature as indicated on the unit.

- ❑ 4. When repairing an active leak, extreme care must be taken to guard personnel. Severe injury or death could result.
- ❑ 5. If the pipeline has been shut down, repressuring to test the seals after repair should be done with extreme caution. Repressuring should be accomplished slowly and steadily without surges which could vibrate the pipeline and fitting. Industry codes and standards are a good source of information on this subject. Do not exceed maximum working pressure. Personnel should not be allowed near the repair until the seal has been proven.

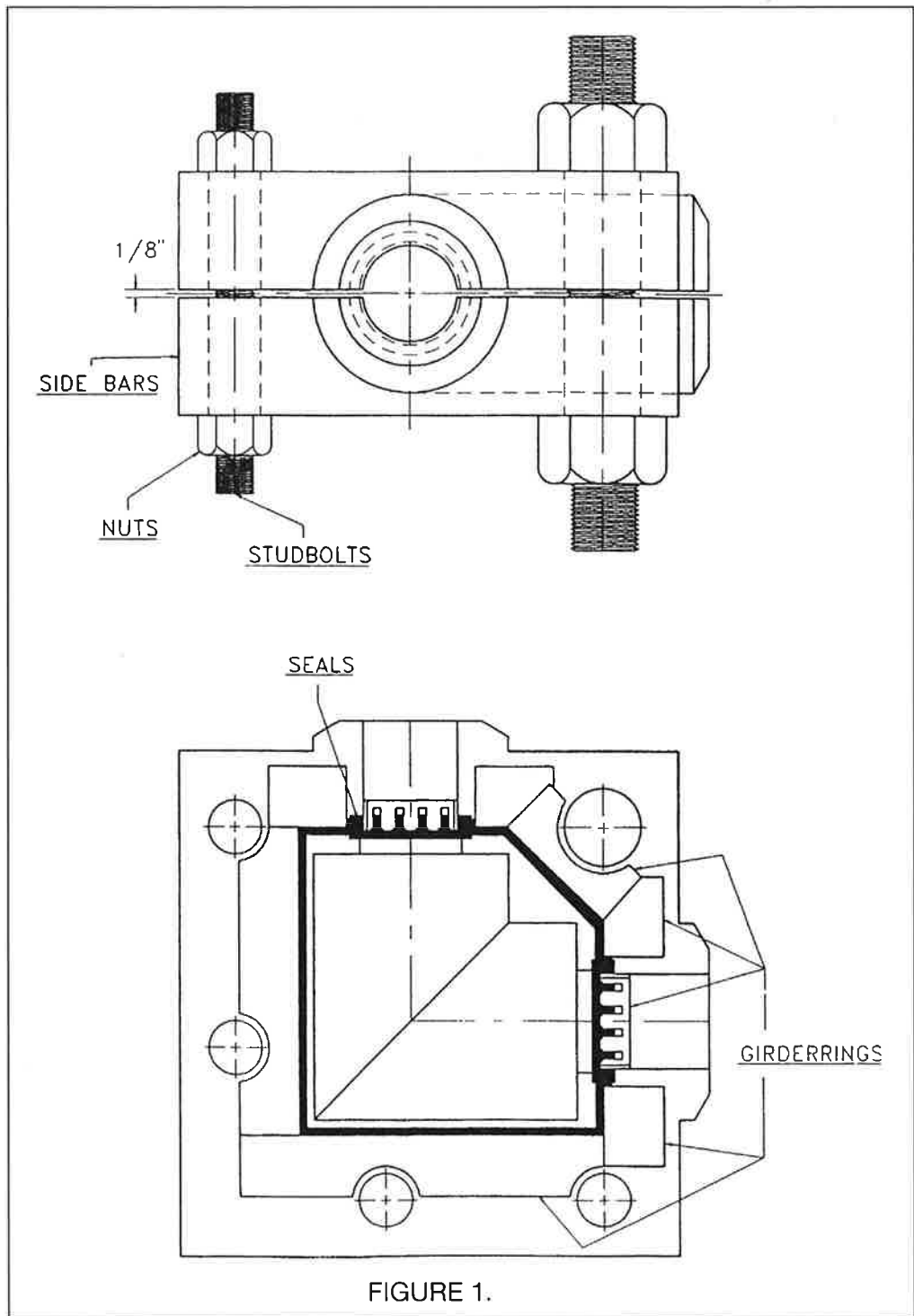
PIPE PREPARATION

1. Remove all coatings, rust and scale from the elbow and adjacent pipe surface, especially where the circumferential seals of the Plidco Split+Repair-Ell will contact the pipe.
2. The seal can tolerate minor surface irregularities up to $\pm 1/32$ ".

INSTALLATION

The seals and Girder-Rings can be damaged by careless handling. Lifting devices such as chains, cables or lift truck forks should not contact the seals or GirderRings. Contact can result in the seals being pulled from their grooves. (See Figure 1)

1. Coat all exposed surfaces of the sealing material with a lubricant. The chart below indicates the lubricants that are recommended for the various seals. The customer must determine if the lubricant is compatible with the product in the pipeline.
2. Clean and lubricate all studbolts and nuts, and prove free and easy nut running prior to installation.
3. Assemble the Plidco Split+Repair-Ell over the elbow. The studbolt diameters may be different. Be sure that each is inserted into the correct studbolt hole.
4. All studbolts and nuts should be uniformly torqued as indicated by the **Plidco Torque Chart** on page 4. The best results are obtained by maintaining an equal gap all around between side bars while tightening the bolts.
5. To complete assembly, ALL studbolts should be rechecked at the recommended torque. Keep in mind, the slightest increase in torque on one studbolt can cause a decrease in torque on neighboring studbolts.
6. The side bars are gapped approximately 1/8" when the Plidco Split+Repair-Eli is fully tightened.



Petroleum based lubricant	= A
Silicone based lubricant	= B
Glycerine based lubricant	= C
Buna-N	A, B, C
Viton	A, B, C
Silicone	C
Ethylene Propylene.....	B, C
Neoprene	B, C
Aflas	A, B, C
Teflon	A, B, C
Kevlar	A, B, C

FIELD WELDING INSTRUCTIONS

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

PIPELINE SHOULD BE FULL AND UNDER FLOW

If the pipeline has been shut down, repressuring to test the seals after repair should be done with extreme caution.

Repressuring should be accomplished slowly and steadily without surges which could vibrate the pipeline and fitting. Industry codes and standards are a good source of information on this subject. Do not exceed maximum working pressure. Personnel should not be allowed near the repair until the seal has been proven.

Use absolutely dry electrodes which are of 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 heavy reinforced convex weld with an undercut. Improper weld shape can lead to rapid fatigue failure which can cause leakage, rupture or explosion with attendant serious consequences.

Welders and weld procedures should be qualified in accordance with API Standard 1104 "Welding of Pipelines and Related Facilities," or RP 1107 "Recommended Pipeline Maintenance Welding

Practices," latest edition. API 1104 and 1107 have easy-to-follow directions for procedure qualification.

We encourage the use of low hydrogen electrodes (E-XX18) because of their high resistance to moisture pick-up and hydrogen cracking. They are also the preferred electrode for seal welding the studbolts and nuts.

Shielded metal arc welding (SMAW) filler metals listed in API 1104 and 1107 include the cellulose coated electrodes (E-XX10 series) which are often preferred because of the excellent downhill welding characteristics. These are acceptable filler metals, provided they are proven by procedure qualification. Cellulose coated electrodes (E-XX10) are not recommended for seal welding the studbolts and nuts.

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

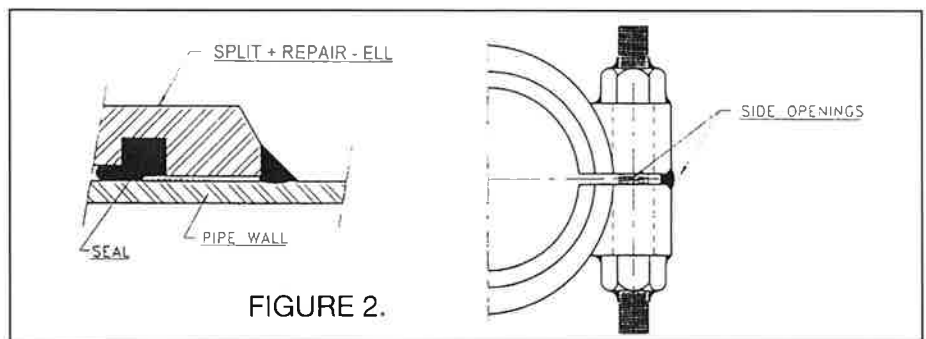
represented by the physical tests performed on the procedure qualification test specimen.

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 B-7 studbolts of a Plidco Split+Repair-Ell is the most difficult phase of field welding. They are made of AISI 4140 steel with a high carbon equivalence. By using low hydrogen electrodes (E-XX18) and a modest preheat (do not exceed 200 degrees F), the problem of hydrogen cracking and pin holes can be reduced. The preheat will dry out any moisture, oil dampness or thread lubricant that may be present in the seal weld area.

WELDING SEQUENCE

1. 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 retorque the studbolts and nuts periodically during field welding because weld contraction causes them to loosen.
2. Fillet weld ends to pipe. (See Figure 2)
3. Seal weld side openings.
4. Retorque studbolts and nuts.
5. Seal weld around bottoms of nuts to side bar.
6. Seal weld nuts to studbolts.



FIELD TESTING THE PLIDCO SPLIT+REPAIR-ELL

The Plidco Split+Repair-Ell can be fitted up to 1-1/2 times its design working pressure.

STORAGE INSTRUCTIONS

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

PLIDCO SPLIT+REPAIR-ELL TORQUE CHART

Nominal Diameter of Studbolt (inches)	Wrench Opening Across Flats (inches)	0.08 (COF) Torque		0.15 (COF) Torque	
		(ft lbs)	(nm)	(ft lbs)	(nm)
(*)					
5/8 - 11	1-1/16	33	45	56	76
3/4 - 10	1-1/4	57	77	98	133
7/8 - 9	1-7/16	91	123	156	212
1 - 8	1-5/8	135	183	233	316
1-1/8 - 8	1-13/16	197	267	342	464
1-1/4 - 8	2	274	372	480	651
1-3/8 - 8	2-3/16	370	502	651	883
1-1/2 - 8	2-3/8	485	658	857	1162
1-5/8 - 8	2-9/16	617	837	1096	1486
1-3/4 - 8	2-3/4	782	1060	1394	1890
1-7/8 - 8	2-15/16	968	1313	1730	2346
2 - 8	3-1/8	1180	1600	2116	2869
2-1/4 - 8	3-1/2	1695	2298	3053	4140
2-1/2 - 8	3-7/8	2340	3173	4231	5737
(**)					
2-3/4 - 8	4-1/4	2880	3904	5224	7083
3 - 8	4-5/8	3785	5133	6885	9336
3-1/4 - 8	5	4826	6545	8799	11931
3-1/2 - 8	5-3/8	6043	8194	11037	14967
3-3/4 - 8	5-3/4	7447	10099	13626	18477
4 - 8	6-1/8	9055	12278	16590	22497
(***)					
4-1/4 - 8	6-1/2	8891	12075	16313	22120
4-1/2 - 8	6-7/8	10569	14331	19413	26324
4-3/4 - 8	7-1/4	12444	16874	22882	31028
5 - 8	7-5/8	14530	19703	26743	36263
5-1/4 - 8	8	16837	22830	31014	42055
5-1/2 - 8	8-3/8	19375	26272	35717	48433
5-3/4 - 8	8-3/4	22156	30044	40873	55425
6 - 8	9-1/8	25191	34160	46504	63059

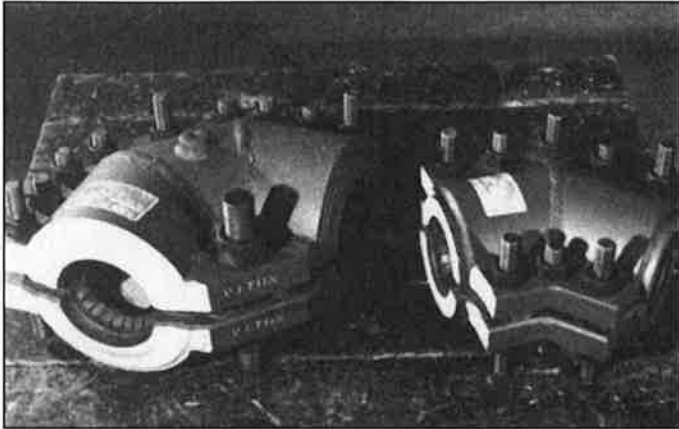
- (*) 25,000 PSI Stress Level
- (**) 23,000 PSI Stress Level
- (***) 18,800 PSI Stress Level

TORQUE VALUES

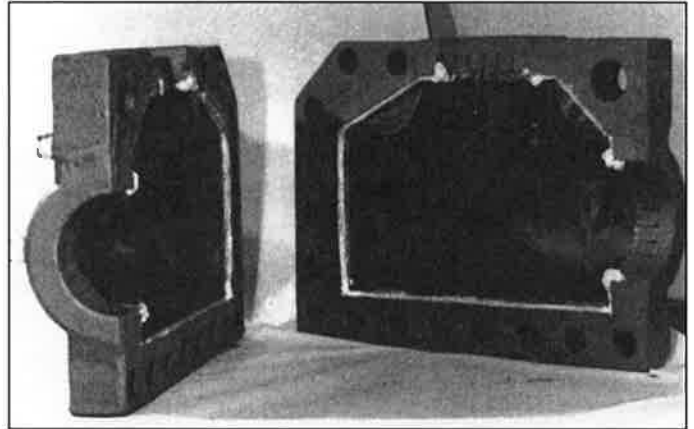
Torque values shown in the table represent two different coefficients of friction (C.O.F.), .08 and .15. When the C.O.F. is .08, it is assumed that the studbolts and nuts are clean, free running, free of obvious surface flaws and lubricated with a high grade graphite-oil thread lubricant. When the C.O.F. is .15 it is assumed that the studbolts and

nuts are clean, free running, free of obvious surface flaws and lubricated with a light weight machine oil. The torque values are safe minimums and approximately represents the corresponding studbolt pre-stress.

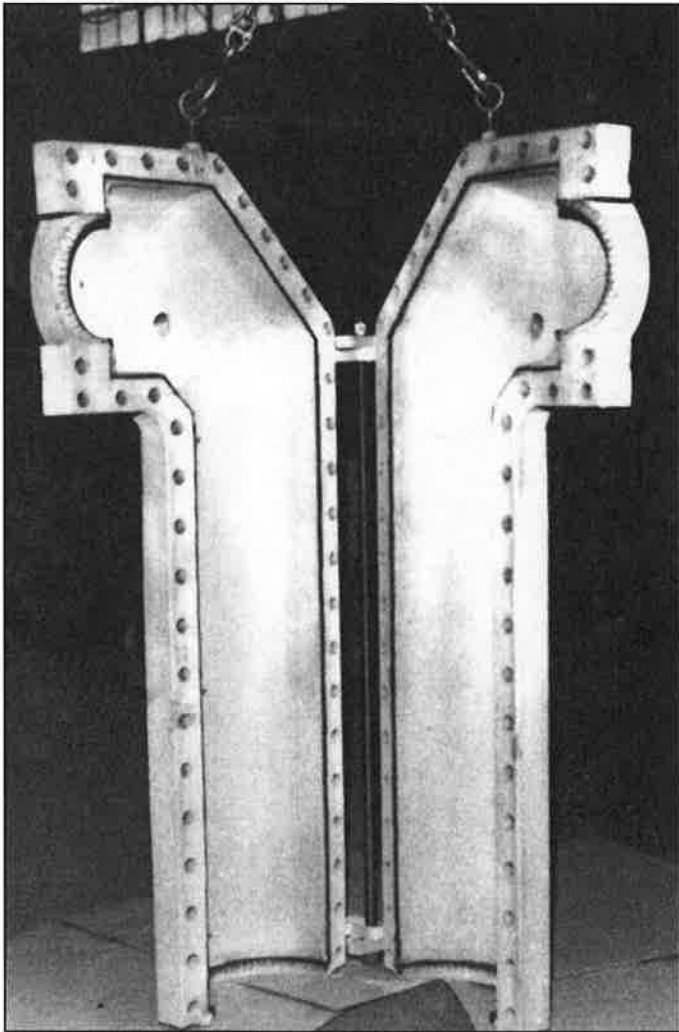
Studbolts: ASTM A-193 Grade B7
Nuts: ASTM A-194 Grade 2H



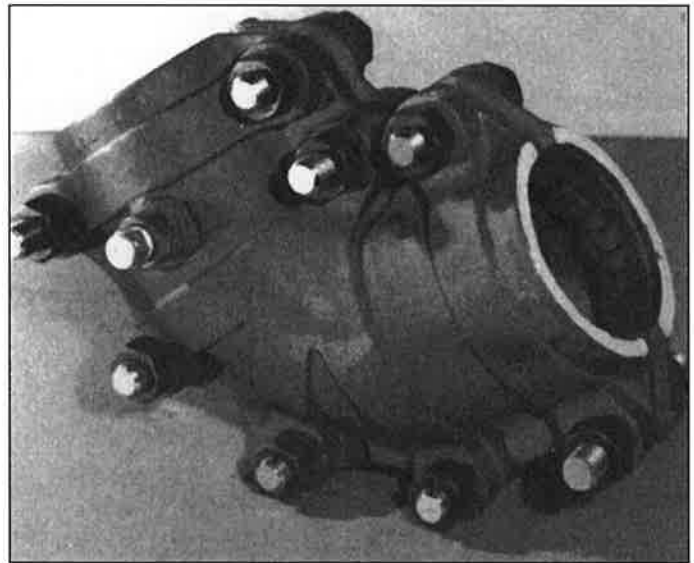
4" 90° and 4" 45° Plidco Split+Repair Ells



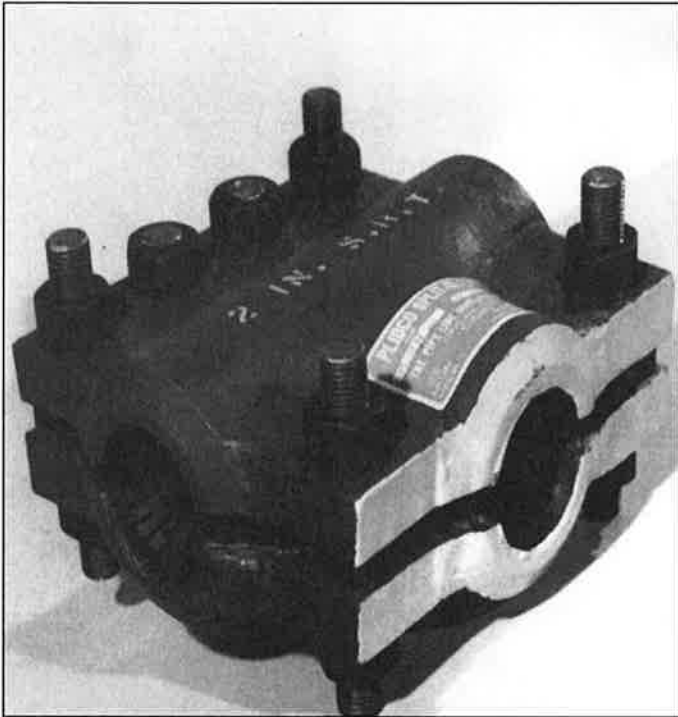
Special 4" 90° Plidco Split+Repair Ell



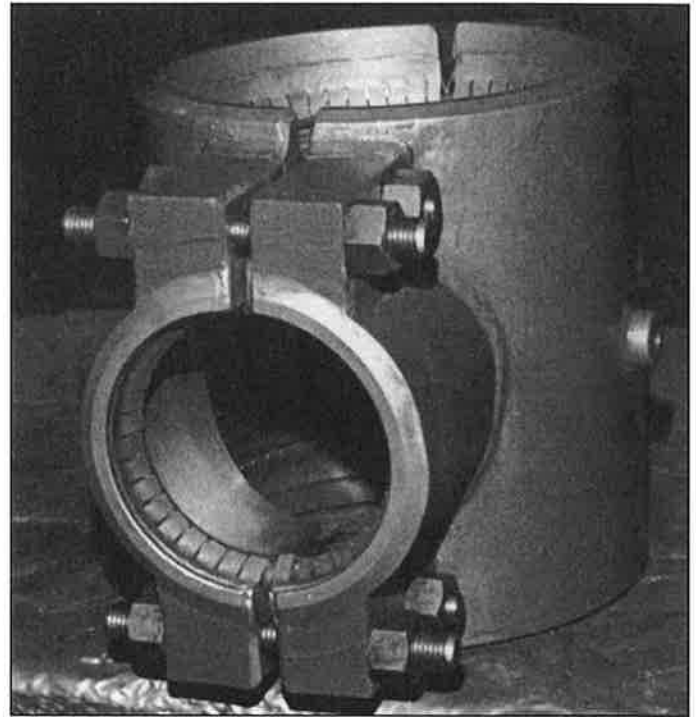
Special 12" to 8" Reducing Plidco Split+Repair Ell used on a pipeline riser manifold, designed for 275 psig working pressure, 66-1/2" O/A length.



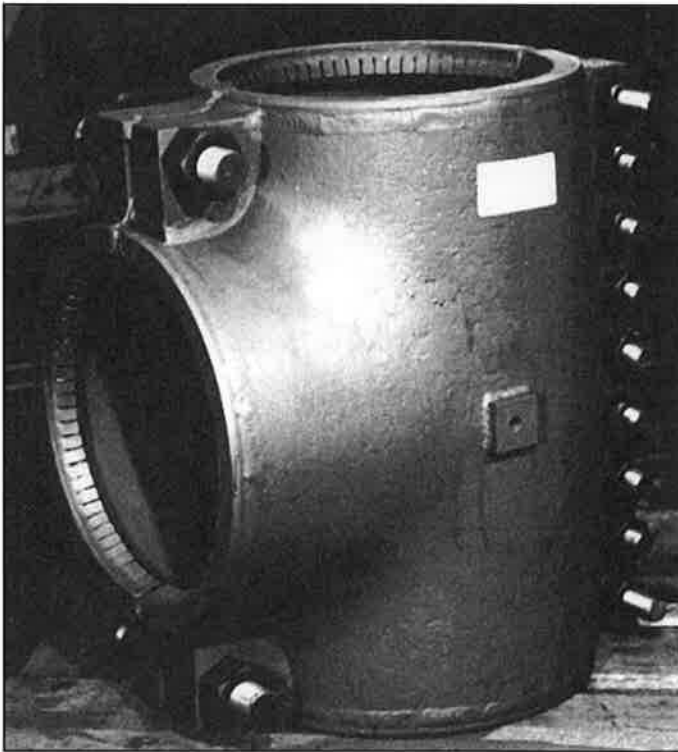
4" 90° Plidco Split+Repair Ell



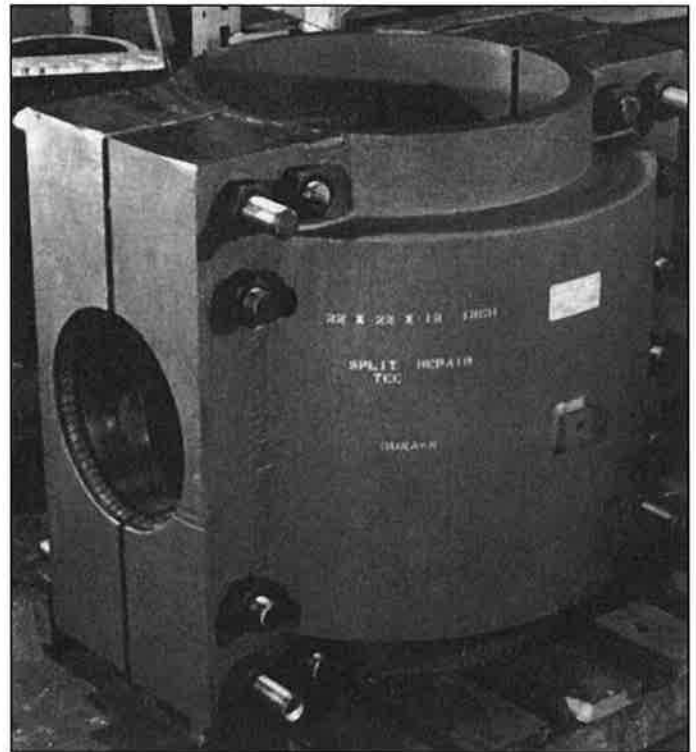
21" Plidco Split+Repair Tee



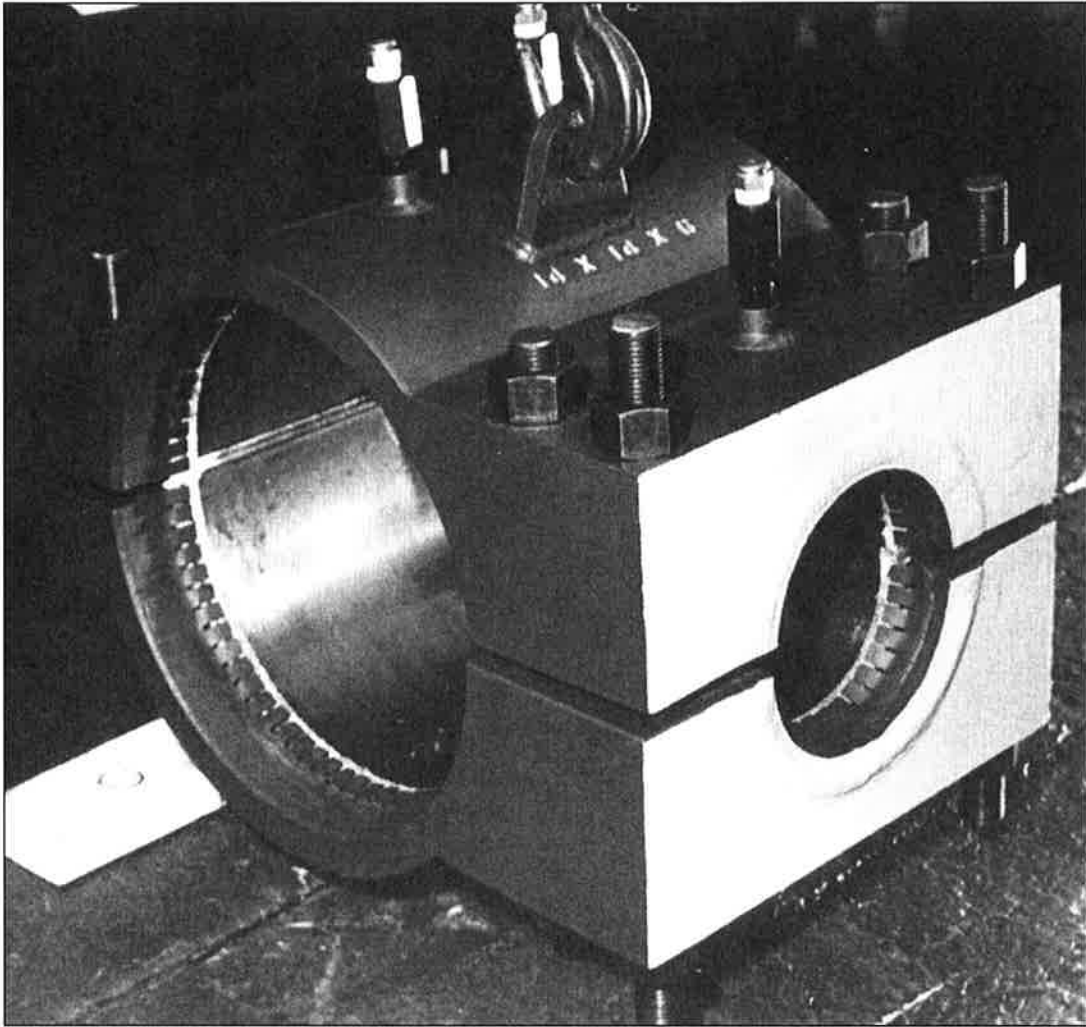
10" X 10" X 6" Plidco Split+Repair Tee



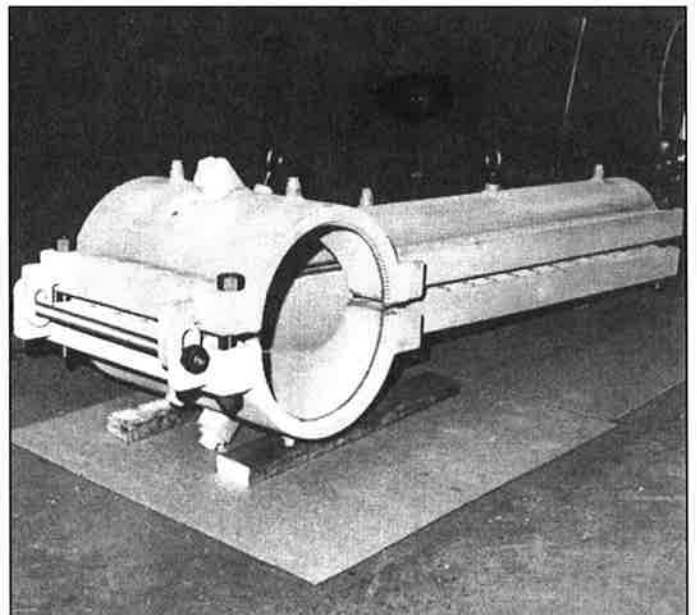
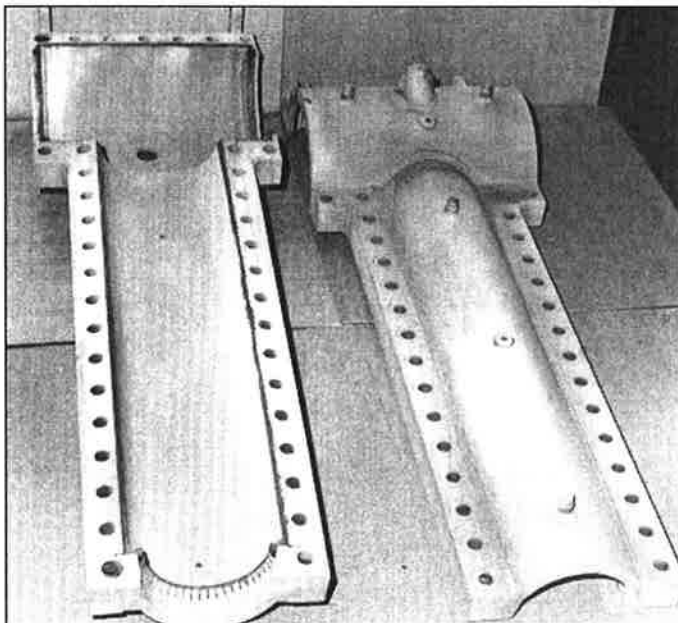
16" Plidco Split+Repair Tee



22" X 22" X 12" Plidco Split+Repair Tee



Plidco Split+Repair Tee for 14" pipe with a 6" branch and button head fittings. For steam service.



8" Special Plidco Split+Repair Tee to seal on 8" flanged tee and 8" pipe. Overall length: 66-1/2", designed for 275 psig working pressure.