

PLIDCO® HOT TAPPING+SADDLE

Tap into a pressurized line for branch connections or for plugging operations without welding



PLIDCO® Hot Tapping+Saddles are designed to ASME code section VIII and API 6H to make *branch connections* on existing pipelines OR for *plugging* operations without welding. They are easily installed by simply tightening the side bolts. Patented steel GirderRings hold seals in place to protect from damage and displacement during installation. When conditions are favorable PLIDCO® Hot Tapping+Saddles can be permanently welded to the pipeline.

PLIDCO® Hot Tapping+Saddles when used for *plugging* operations are designed to include clamping areas to restrict movement of the fitting when setting the plug. Installation is quick; bolt it on, assemble tapping equipment, perform a hydrotest and proceed with the plugging operation. This product can be reclaimed, reconditioned and used again if it hasn't been welded to the pipeline.

Branches are available in any range of sizes and pressures. Threaded, welded or flanged outlets are available.

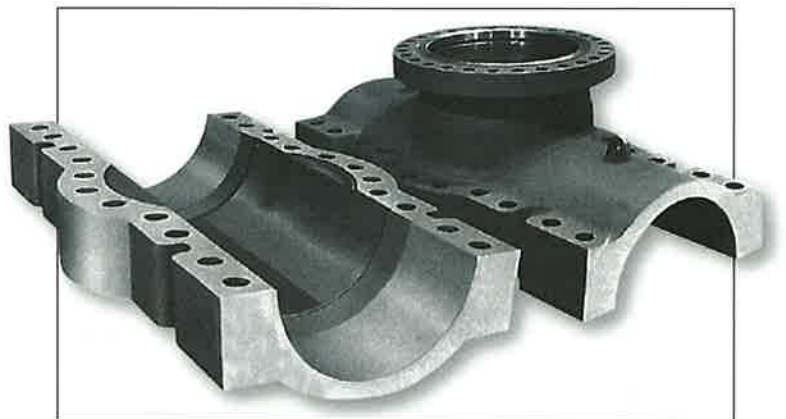
Buna-N packing is standard. Viton, Silicone and other packings are available upon request.

Standard body materials:

- ASTM A106 Gr. C
- ASTM A216 Gr. WCC
- ASTM A516 Gr. 70

Options:

- Marine epoxy paint for corrosion protection
- Hinges for ease of installation
- NACE MR0175 / ISO 15156 compliant materials



PIP052



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"Working together to make hazardous piping safer"

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PLIDCO® HOT-TAPPING+SADDLE with CLAMPING ELEMENTS 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 Hot-Tapping+Saddle until all aspects of the application are thoroughly analyzed. Do not use the Plidco HotTapping+Saddle 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 "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

- 1. Read and follow these instructions carefully. Follow your company's safety policy and applicable codes and standards.
- 2. Be absolutely certain that the correct seal material has been selected for the intended use.
- 3. The Plidco Hot-Tapping+Saddle should never be used to couple pipe. No end restraint is provided with the Plidco WHot-Tapping+Saddle Fitting. Also, consideration should be given to the increased longitudinal stress imposed on the pipeline due to the cut into the pipe.
- 4. Valve and tapping equipment attached to the Plidco HotTapping+Saddle may cause unreasonable loads on the fitting's branch. This equipment may need to be additionally braced or supported against any torsional movement, particularly when hot tapping horizontally. (See section on Plidco Hot-Tapping+Saddle Clamping Elements). please consult Plidco Department 100 for further detail.
- 5. Observe working pressure and temperature on the label of the Plidco Hot-Tapping+Saddle. Do not exceed maximum working pressure or temperature as indicated on the unit. Plidco HotTapping+Saddles for plugging operations typically have a lower pressure rating applicable only during the plugging operation. The maximum plugging pressure is located on the label.
- 6. The Plidco Hot-Tapping+Saddle must be hydrostatically tested before tapping into the pipeline. Testing may be conducted through the Plidco Hot-Tapping+Saddle branch. The test pressure should not exceed the pressure inside the pipe at the time of testing. There is a danger of collapsing the pipe should this pressure be exceeded.
- 7. If the pipeline has been shut down, repressuring after hot tapping 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 installation until the seal has been proven.

PLIDCO HOT-TAPPING+SADDLE CLAMPING ELEMENTS

Line plugging operations require a clamping feature which prevents the saddle from shifting when the plug is inserted into the pipe. This type of clamping may be either **INTEGRAL** or **SEPARATE**.

The **INTEGRAL** type has clamping sections that are one piece with the Hot-Tapping+Saddle. (See Figure 1)

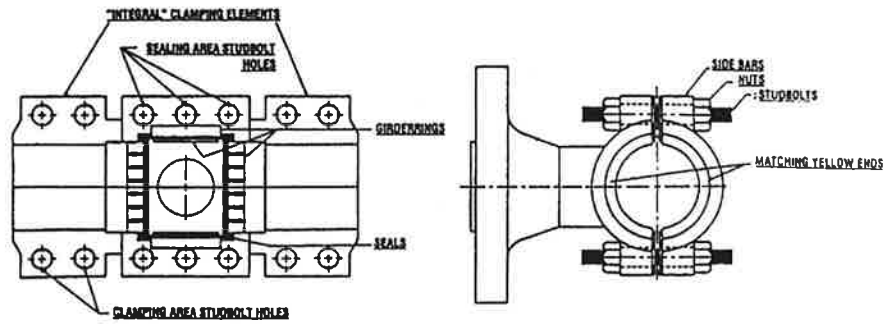


Fig. 1

The **SEPARATE** type uses Clamp+Ring that is not connected to the Hot-Tapping+Saddle. (See Figure 2)

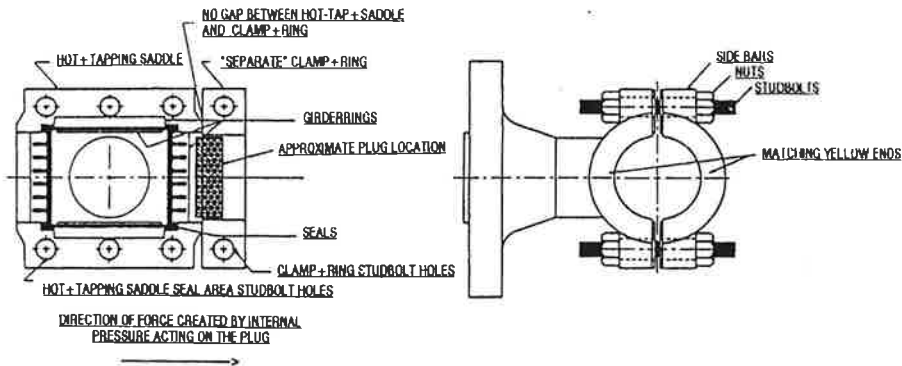


Fig. 2

A clamping feature may also be required to provide torsional restraint when hot tapping from the side. This type of clamping feature must be **INTEGRAL**.

A clamping feature may be required to provide support when hot tapping on a vertical line. This type of clamping feature may be either **INTEGRAL** or **SEPARATE**.

PIPE PREPARATION

1. Remove all coatings, rust and scale from the pipe surface where the circumferential seals of the Plidco Hot-Tapping+Saddle, Clamp Ends or Clamp+Ring, if applicable, will contact the pipe
2. The seal can tolerate minor surface irregularities up to $\pm 1/32"$.

INSTALLATION

The seals and GirderRings 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 Figures 1 & 2)

1. Coat all exposed surfaces of the sealing material with a lubricant. The following chart 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.

Petroleum based lubricant = A
 Silicone based lubricant = B
 Glycerin 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

3. Assemble the Plidco Hot-Tapping+Saddle around the pipe making sure the yellow painted ends are matched and that the fitting is centered over the area to be hot tapped. If the SEPARATE Clamp+Ring is to be used, it must be assembled adjacent to the Plidco Hot-Tapping+Saddle at the end nearest to where the plug will be positioned. There can be no gap between the Plidco Hot-Tapping+Saddle and the SEPARATE Clamp+Ring. The forces acting on the plug are transferred to the Clamp+Ring thereby preventing axial movement of the Plidco Hot-Tapping+Saddle. (See Figures 2 & 3)

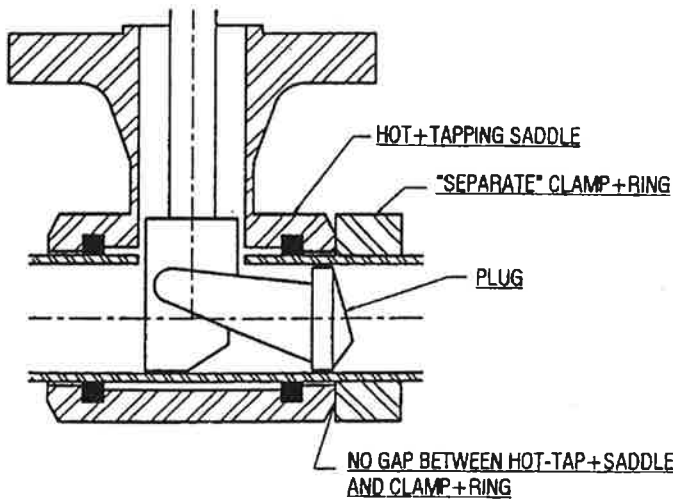


Fig. 3

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. Higher torque values are provided for the bolts located within the clamping areas of the Plidco Hot-Tapping +Saddle or the Clamp+Ring's bolts if applicable.
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" at the sealing area when the Plidco Hot-Tapping+Saddle is fully tightened. The gap between the side bars on a clamping element is typically greater than 1/8" and is dependent on the pipe size.
7. Consult the manufactures instructions for valve and tapping equipment that is attached to the Plidco Hot-Tapping+Saddle. This equipment may need to be additionally braced or supported against any torsional movement or unreasonable loads on the fitting's branch, particularly when hot tapping horizontally. (See section on Plidco Hot-Tapping+Saddle Clamping Elements)

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.

If a **SEPARATE** Clamp+Ring was required for the hot tapping operation it must be removed prior to welding, but only after the forces that were being restrained by the Clamp+Ring have been eliminated.

PIPELINE SHOULD BE FULL AND UNDER FLOW

If the pipeline has been shut down, repressuring to test the seals 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 installation 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 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.

Shielding metal arc welding (SMAW) filler 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 probethermometers. 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 Hot-Tapping+Saddle 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 help to 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 4)
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.

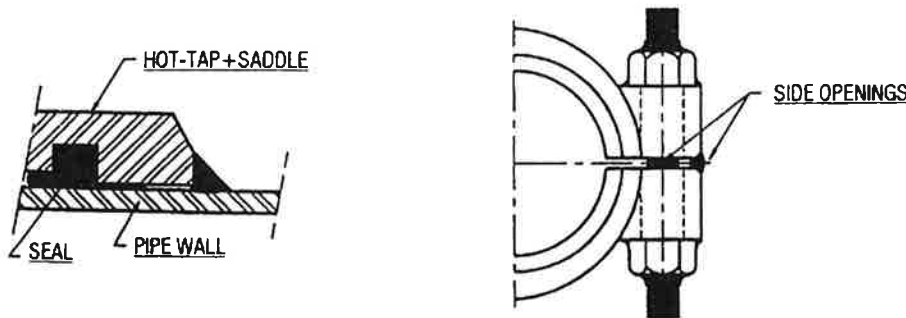


Fig. 4

FIELD TESTING THE PLIDCO HOT-TAPPING+SADDLE

The Plidco Hot-Tapping+Saddle is capable of being field tested up to 1-1/2 times its design pressure.

STORAGE INSTRUCTIONS

Plidco Hot-Tapping+Saddles 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 HotTapping+Saddles can cause the seal material to become cracked and brittle and lose its ability to seal.

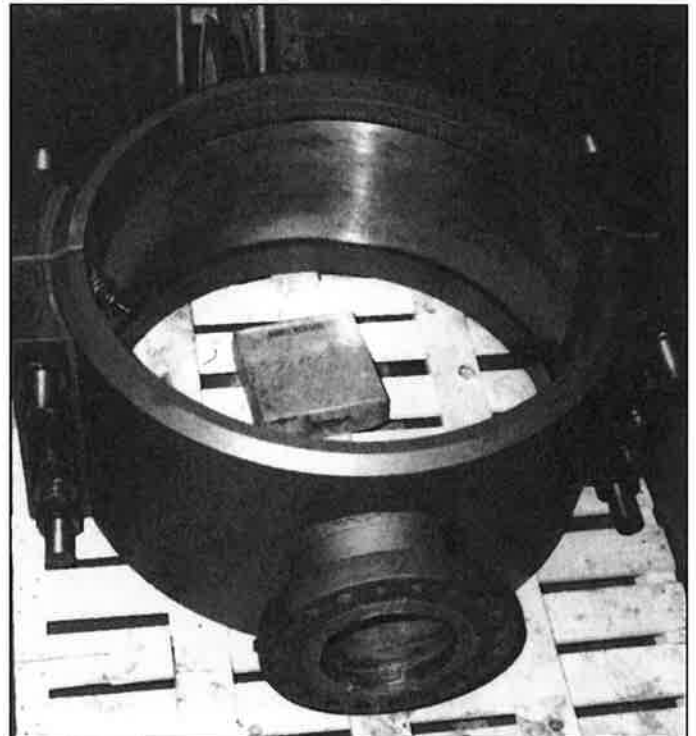
Plidco Fittings with Sealing & Clamping Areas		Sealing Area Studbolts				Clamping Area Studbolts			
		0.08 (COF) Torque		0.15 (COF) Torque		0.08 (COF) Torque		0.15 (COF) Torque	
		(ft Lbs)	(Nm)	(ft Lbs)	(Nm)	(ft Lbs)	(Nm)	(ft Lbs)	(Nm)
Nominal Diameter of Studbolt (Inches)	Wrench Opening Across Flats (Inches)	*	*	*	*	#	#	#	#
5/8 - 11	1-1/16	33	45	56	76	70	95	118	160
3/4 - 10	1-1/4	57	77	98	133	120	162	206	280
7/8 - 9	1-7/16	91	123	156	212	192	259	328	446
1 - 8	1-5/8	135	183	233	316	284	385	490	664
1-1/8 - 8	1-13/16	197	267	342	464	414	561	719	975
1-1/4 - 8	2	274	372	480	651	576	782	1008	1368
1-3/8 - 8	2-3/16	370	502	651	883	777	1055	1368	1855
1-1/2 - 8	2-3/8	485	658	857	1162	1019	1382	1800	2441
1-5/8 - 8	2-9/16	617	837	1096	1486	1296	1758	2302	3121
1-3/4 - 8	2-3/4	782	1060	1394	1890	1643	2226	2928	3969
1-7/8 - 8	2-15/16	968	1313	1730	2346	2033	2758	3633	4927
2 - 8	3-1/8	1180	1600	2116	2869	2478	3360	4444	6025
2-1/4 - 8	3-1/2	1695	2298	3053	4140	3560	4826	6412	8694
2-1/2 - 8	3-7/8	2340	3173	4231	5737	4914	6664	8886	12048
2-3/4 - 8	4-1/4	**	**	**	**	##	##	##	##
3 - 8	4-5/8	2880	3904	5224	7083	5947	8064	10787	14628
3-1/4 - 8	5	3785	5133	6885	9336	7816	10598	14218	19280
3-1/2 - 8	5-3/8	4826	6545	8799	11931	9966	13514	18170	24639
3-3/4 - 8	5-3/4	6043	8194	11037	14967	12478	16921	22794	30908
4 - 8	6-1/8	7447	10099	13626	18477	15380	20856	28140	38157
		9055	12278	16590	22497	18699	25355	34262	46460
4-1/4 - 8	6-1/2	***	***	***	***	###	###	###	###
4-1/2 - 8	6-7/8	8891	12057	16313	22120	17735	24050	32540	44123
4-3/4 - 8	7-1/4	10569	14331	19413	26324	21082	28586	38723	52508
5 - 8	7-5/8	12444	16874	22882	31028	24822	33659	45643	61891
5-1/4 - 8	8	14530	19703	26743	36263	28983	39302	53344	72334
5-1/2 - 8	8-3/8	16837	22830	31014	42055	33585	45539	61864	83887
5-3/4 - 8	8-3/4	19375	26272	35717	48433	38647	52405	71245	96609
6 - 8	9-1/8	22156	30044	40873	55425	44195	59929	81529	110556
		25191	34160	46504	63059	50249	68139	92761	125783
		* 25,000 PSI Stress Level				# 52,500 PSI Stress Level			
		** 23,000 PSI Stress Level				## 47,500 PSI Stress Level			
		*** 18,800 PSI Stress Level				### 37,500 PSI Stress Level			

TORQUE VALUES

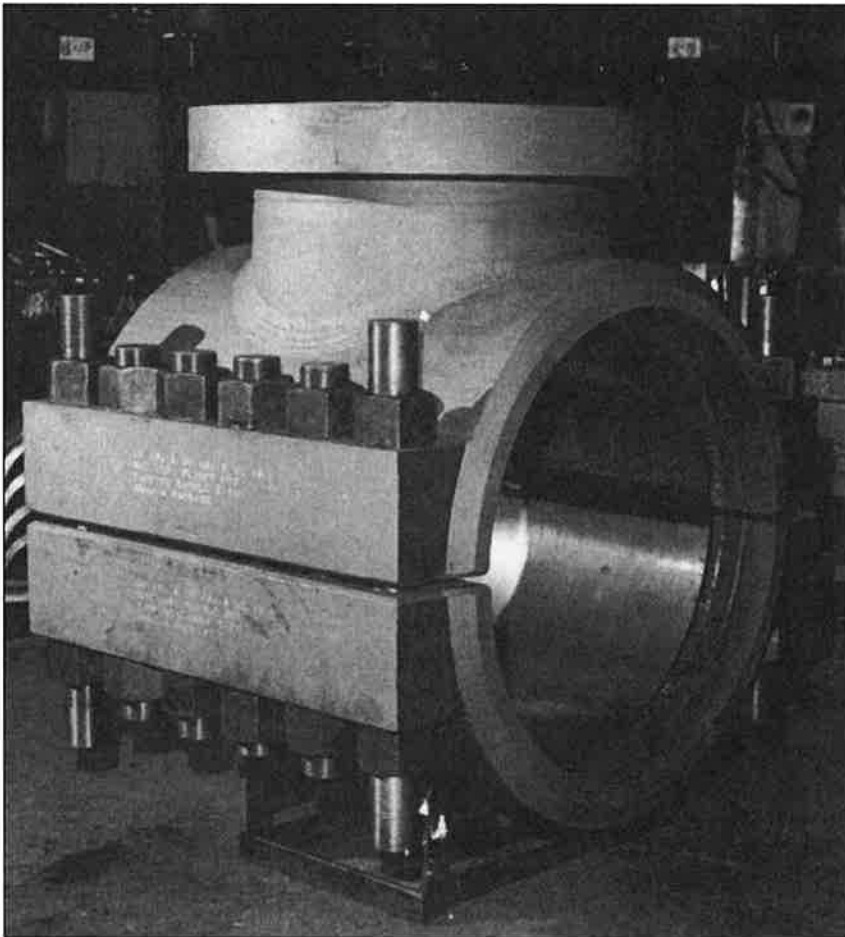
Torque values shown in the table represent two different coefficients of friction (C.O.F.), .08 and .15. When the C.O.F. is .08, it is assumed that the studbolts and nuts are clean, free running, free of obvious surface flaws and lubricated with a high grade graphite-oil thread lubricant. When the C.O.F.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

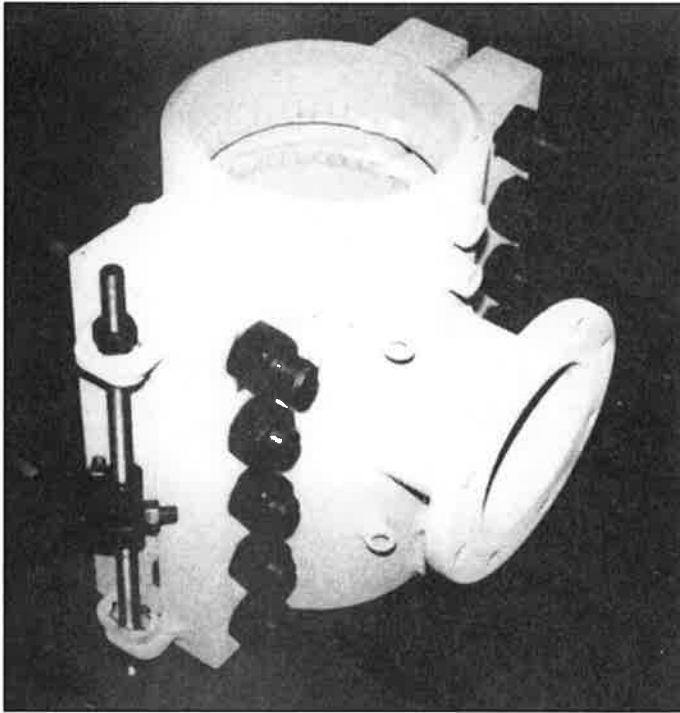
Nuts: ASTM A-194 Grade 2H



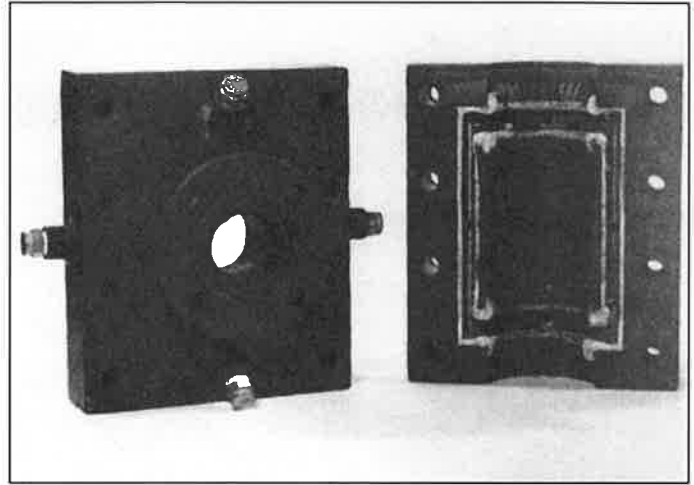
48" x 48 " x 12" 600# Plidco Hot Tapping+Saddle.



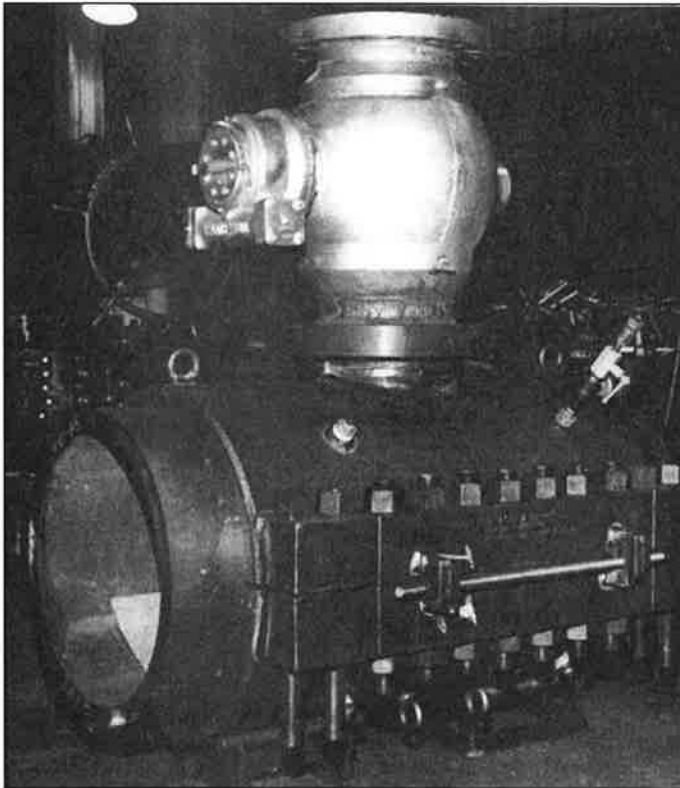
30" x 30" Plidco Hot Tapping+Saddle with a 20" 900# branch, designed for 2160 psig working pressure.



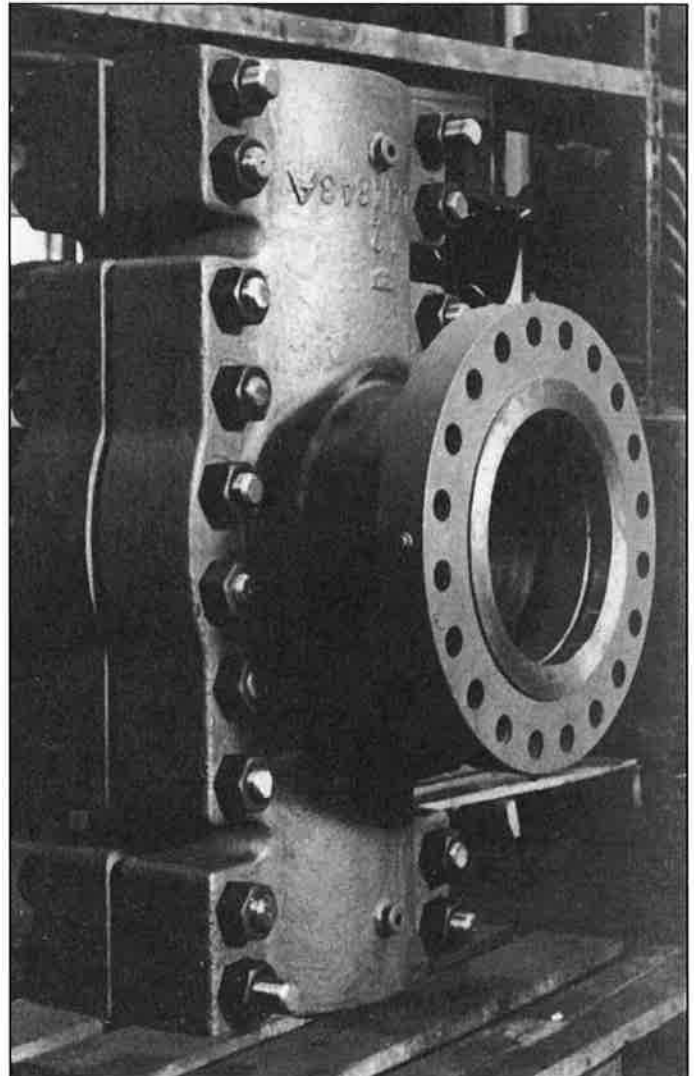
8" x 8" x 6" 150# Plidco Hot Tapping+Saddle with hinges, double row of packing and white marine epoxy paint.



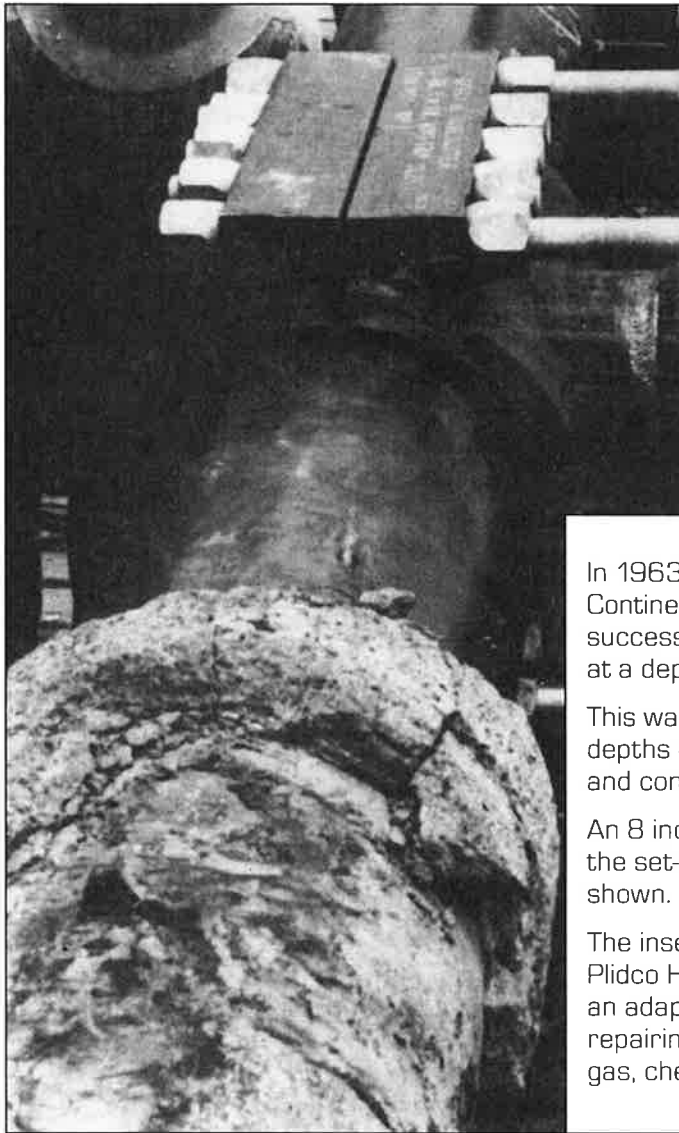
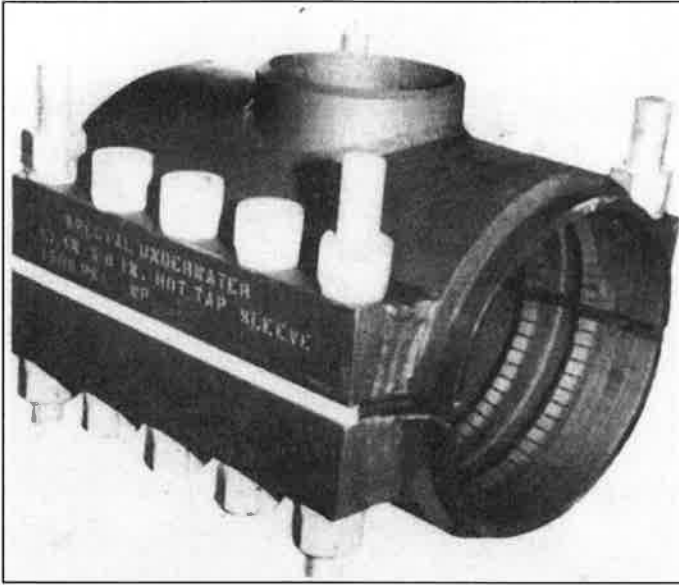
3" X 3" x 2" 150# Plidco Hot Tapping+Saddle with a double row of packing.



28" x 28" Special Plidco Hot Tapping+Saddle with a 12" 400# valve branch, double row of packing and clamping area.



12" x 12" x 12" 600# Plidco Hot Tapping+Saddle for stopple with a LOR flange.



In 1963, the CATC Group of oil companies, consisting of Continental, Atlantic, Tidewater and Cities Service, were successful in an undertaking to connect underwater pipelines at a depth of 130 feet, 20 miles offshore in the Gulf of Mexico.

This was the first underwater connection of pipelines at such depths ever achieved in any part of the world so far as it is known and considered to be an important advance in pipeline technology.

An 8 inch pipeline was tapped into a 12" crude oil pipeline using the set-up pictured here. The pipe is coated with concrete as shown. Maximum working pressure was 1500 psi.

The inset shows the key element in the tapping set-up, the Plidco Hot Tapping+Saddle, formerly called the Split-Tee. It is an adaptation of the Plidco Split+Sleeve, successfully used for repairing leaks in onshore and offshore pipelines carrying oil, gas, chemical, steam and other products.