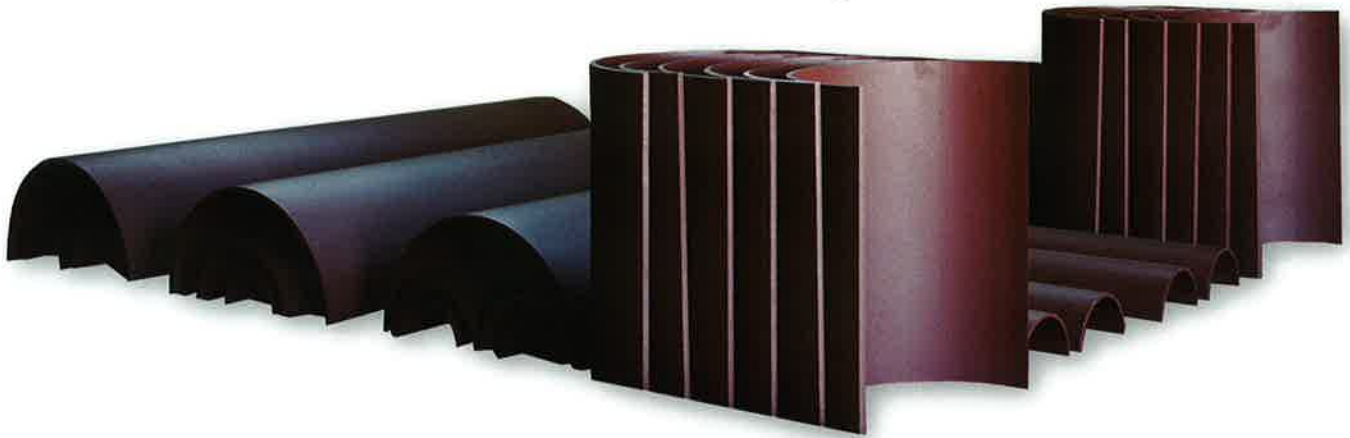


## PLIDCO® SOLE+MATES™

**Welded reinforcing and pressure containing sleeves**



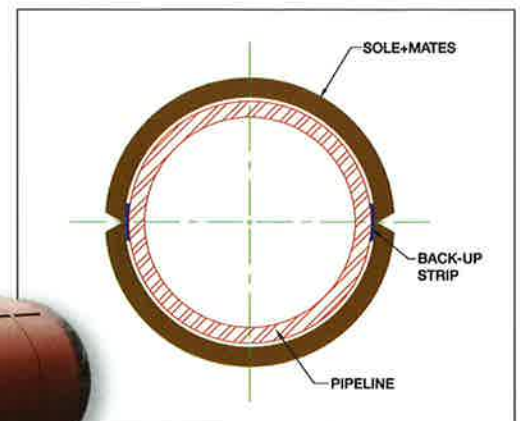
PLIDCO® Sole+Mates™ are designed to reinforce non-leaking, weakened, dented or damaged pipelines. The PLIDCO® Sole+Mates™ must fit snugly around the pipe when used for reinforcement applications. Gaps between the pipe and the sleeve, often caused by dents in the pipe, should be filled with a hard-setting grout. The sleeve must be butt-welded longitudinally but it is not necessary to seal-weld the circumferential ends. The line can remain on-stream. Moisture should be prevented from entering the ends of the sleeve. When used for pressure containment, the PLIDCO® Sole+Mates™ must be fully seal-welded to the pipeline in addition to the longitudinal weld. The line may also remain on-stream but the pressure must be a safe level according to DOT regulation 192.713.

PLIDCO® Sole+Mates™ are fabricated in lengths of 5 or 10 feet. Back-up strips for the longitudinal butt welds are furnished with all sleeves.

PLIDCO® Sole+Mates™ conform to ASME B31.4 and B31.8 as well as US Department of Transportation (US DOT) requirements. Individual company codes and safety practices should be observed. US DOT requires that population density be considered in the installation area for natural and other gas pipelines (DOT section 192.5). Tables showing maximum operating pressure for PLIDCO® Sole+Mates™ by size, materials of construction and class location are shown on the reverse side.

### Standard body materials:

- ASTM A36
- ASTM A572 Gr. 50



## Recommended Working Pressures (PSI)

### Class I Sparsely Populated Areas



API Nominal Pipe Size (In.)	A-36 Steel Plate				A-572-GR.50 Steel Plate			
	1/4" WALL	5/16" WALL	3/8" WALL	1/2" WALL	1/4" WALL	5/16" WALL	3/8" WALL	1/2" WALL
4	2529	3086	3617	4608	3512	4286	5023	6400
6	1788	2197	2592	3345	2483	3051	3600	4645
8	1401	1728	2046	2658	1946	2400	2842	3692
10	1139	1409	1672	2183	1582	1957	2323	3032
12	969	1200	1427	1868	1346	1667	1982	2595
14	866	1098	1307	1714	1231	1525	1815	2380
16	780	967	1152	1514	1083	1343	1600	2102
18	696	864	1030	1355	966	1200	1430	1882
20	628	781	931	1227	873	1084	1293	1704
22	573	712	850	1121	796	989	1180	1557
24	526	655	782	1032	731	909	1085	1433
26	487	606	723	956	676	841	1005	1327
28	453	563	673	890	629	783	935	1236
30	423	527	630	833	588	732	874	1157

### Class II Fringe Areas Around Urban Centers



API Nominal Pipe Size (In.)	A-36 Steel Plate				A-572-GR.50 Steel Plate			
	1/4" WALL	5/16" WALL	3/8" WALL	1/2" WALL	1/4" WALL	5/16" WALL	3/8" WALL	1/2" WALL
4	2107	2571	3014	3840	2927	3571	4186	5333
6	1490	1831	2160	2787	2069	2542	3000	3871
8	1168	1440	1705	2215	1622	2000	2388	3077
10	949	1174	1394	1819	1319	1630	1935	2526
12	807	1000	1189	1557	1121	1389	1651	2162
14	738	915	1089	1428	1026	1271	1513	1983
16	650	806	960	1261	902	1119	1333	1752
18	580	720	858	1129	805	1000	1192	1569
20	524	651	776	1022	727	904	1078	1420
22	477	593	708	934	663	824	984	1297
24	439	545	651	860	609	758	905	1194
26	406	505	603	796	563	701	837	1106
28	377	470	561	742	524	652	779	1030
30	353	439	525	694	490	610	729	964

### Class III Average Commercial and Residential Areas



API Nominal Pipe Size (In.)	A-36 Steel Plate				A-572-GR.50 Steel Plate			
	1/4" WALL	5/16" WALL	3/8" WALL	1/2" WALL	1/4" WALL	5/16" WALL	3/8" WALL	1/2" WALL
4	1756	2143	2512	3200	2439	2976	3488	4444
6	1241	1525	1800	2323	1724	2119	2500	3226
8	973	1200	1421	1846	1351	1667	1974	2564
10	791	978	1161	1516	1099	1359	1613	2105
12	673	833	991	1297	935	1157	1376	1802
14	615	763	908	1190	855	1059	1261	1653
16	541	672	800	1051	752	933	1111	1460
18	483	600	715	941	671	833	993	1307
20	436	542	647	852	606	753	898	1183
22	398	495	590	778	552	687	820	1081
24	365	455	543	716	508	631	754	995
26	338	421	502	664	469	584	698	922
28	314	391	468	618	437	543	649	858
30	294	366	437	578	408	508	607	803

### Class IV Densely Populated Areas



API Nominal Pipe Size (In.)	A-36 Steel Plate				A-572-GR.50 Steel Plate			
	1/4" WALL	5/16" WALL	3/8" WALL	1/2" WALL	1/4" WALL	5/16" WALL	3/8" WALL	1/2" WALL
4	1405	1714	2009	2560	1951	2381	2791	3556
6	993	1220	1440	1858	1379	1695	2000	2581
8	778	960	1137	1477	1081	1333	1579	2051
10	633	783	929	1213	879	1087	1290	1684
12	538	667	793	1038	748	926	1101	1441
14	492	610	726	952	684	847	1008	1322
16	433	537	640	841	602	746	889	1168
18	387	480	572	753	537	667	795	1046
20	349	434	517	682	485	602	719	947
22	318	396	472	623	442	549	656	865
24	292	364	434	573	406	505	603	796
26	270	336	402	531	376	467	558	737
28	252	313	374	494	349	435	519	687
30	235	293	350	463	327	407	486	643

$$P = \frac{2St}{D} \times E \times F \times T$$

(D.O.T. 192.105\*)

P = Design Pressure

t = Sole-Mate Wall Thickness

S = Specified Min. Yield Strength

T = Temperature Derating Factor

Note: Formula applies to data in table for Class I through IV locations using a Joint Efficiency Factor of 1 and temperature less than 250°F.

E = Joint Efficiency Factor

F = Class Locations Factor: I = .72, II = .6, III = .5, IV = .4

D = Sole-Mate Outside Diameter = Pipe OD + 2t + 1/8 In. (for back-up strips)

# PLIDCO®

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## PLIDCO® SOLE+MATE™ INSTALLATION GUIDELINES

Plidco Sole+Mates, typically called full-encirclement welded split sleeves, are referenced in many pipeline codes. As such, most pipeline companies and contractors have already written their own installation procedures. The installation guidelines herein are not intended to override already established procedures, but are intended as a guide to those unfamiliar with Sole+Mates. Any helpful hints or recommendations are always appreciated from the end user so that we may incorporate them into these guidelines. 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**

### Installation

Plidco Sole+Mates are typically used for two applications; pressure containing and non-pressure containing.

The application is pressure containing when the Sole+Mate is installed over a known leak. For a pressure containing application, the wall thickness of the Sole+Mate and all welds must be able to contain the full operating pressure of the pipeline. The longitudinal weld joint formed by the two halves of the Sole+Mate must be a full thickness butt weld. The circumferential joint formed by the Sole+Mate welded to the pipeline must be a full thickness fillet weld.

The application is non-pressure containing if the Sole+Mates is not installed over a known leak and the intended use is only to reinforce a damaged area of the pipe. The longitudinal weld joint formed by the two halves of the Sole+Mate may be a full thickness butt weld. The circumferential joint does not have to be welded, but should be sealed with a coating to prevent ground water from penetrating the crevice between the sleeve and the pipe. If the circumferential joint is welded, the application should be assumed to be pressure containing and all the requirements of a pressure containing application now apply.

To properly reinforce the pipe for a non-pressure containing application, the Sole+Mate halves should fit snugly around the pipeline. Consideration should be given to filling and re-contouring dents, flat spots, etc., with a hard setting grout. If injection of a grout is required, vents can be added to the Sole+Mate on request.

It is helpful to tack weld the backing strips into the bottom half of the sleeve before installing the top half as shown in Figure 1. Various chain clamps with jackscrew or hydraulic rams are available commercially and can provide assistance in achieving a tight, uniform fit. It may be helpful to use guide shims (not provided) or other tools such as screwdrivers, as shown in Figure 1, to guide the second half over the backing strips.

The temporary use of gap blocks, as shown in Figure 2, may be helpful in maintaining an equal gap on both sides of the sleeve while the sleeve halves are drawn together. The gap blocks may be tack welded in place, but must be removed before the sleeve halves are welded. Due to the diameter tolerance of the pipe, the exact size of the gap block is difficult to predict. A 0.25 inch (6 mm) block is a reasonable starting size.

## Field Welding Instructions

Make certain there is not a combustible mixture inside the pipeline prior to welding. Completely welding the longitudinal joints first will assist in pulling the two halves of the sleeve tightly around the pipe. Mild steel backup strips are provided for the longitudinal welds. If the circumferential ends are to be welded, they should be welded last.

For the longitudinal welds, use weld material that meets or exceeds the tensile strength of the Sole+Mate. For the circumferential welds, use weld materials that meets or exceeds the tensile strength of the Sole+Mate or pipe, whichever is greater.

Carefully control the size and shape of the circumferential fillet welds. For a pressure containing application the circumferential fillet welds must be full thickness fillet welds. 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 attendant serious consequences.

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.

To avoid severe thermal strains and produce a ductile circumferential weld, some companies use an overlapping back-stepping procedure. Even though the general weld progression may be from right to left, short bead segments, 4 to 8 inches long, are deposited left to right, overlapping half the previous welded bead. Another procedure used for the circumferential weld is buttering or surfacing of the pipe with weld metal prior to welding the fillet root pass.

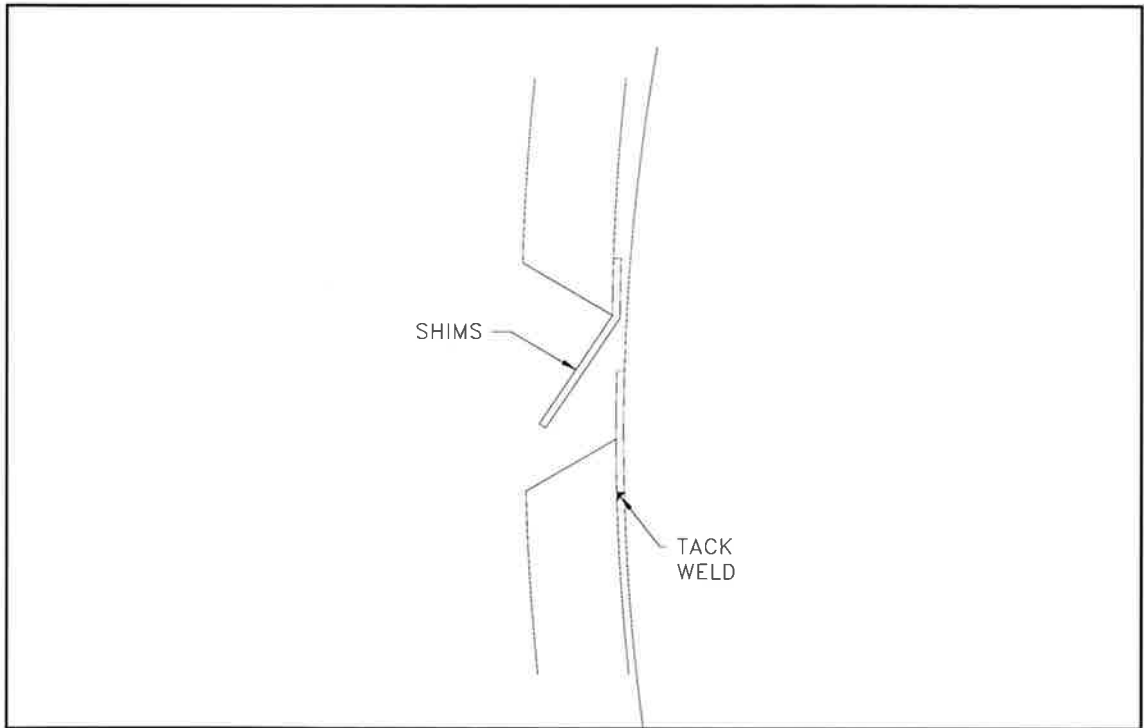


Figure 1

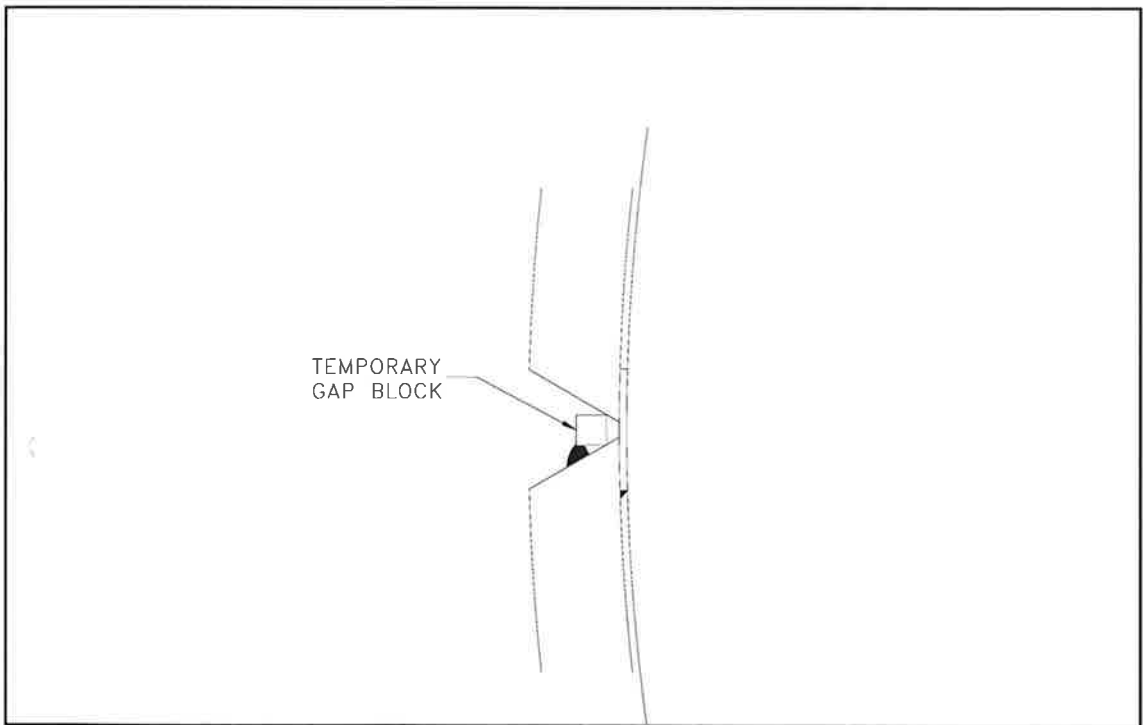


Figure 2

**Notes**