

2013 EDITION

4"–36"

FIELD CUTTING AND WELDING

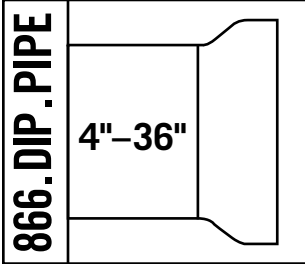
Procedure for TR FLEX® Pipe



FOR FIRE PROTECTION, WATER & WASTEWATER

MORE
THAN
JUST
PIPE.





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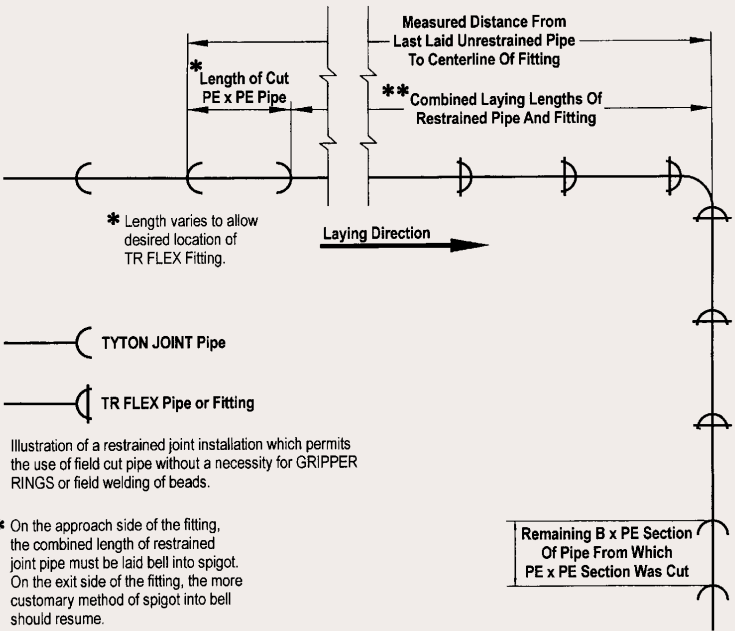
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NOTICE: *The procedures described in this brochure are intended to be used by persons having skill in the practice of manual electric arc welding of ferrous materials and exercising reasonable care in the execution of the instructions contained herein. Since conditions of use are beyond our control, United States Pipe and Foundry Company, LLC. makes no warranties, express or implied, and assumes no responsibility concerning the use of these procedures, nor can United States Pipe and Foundry Company, LLC. assume any responsibility for product defects arising from the use of these procedures. In case of doubt, contact your nearest Sales Representative for assistance.*

Field Cutting and Welding Procedure

Alternate Method For Field Cut Pipe

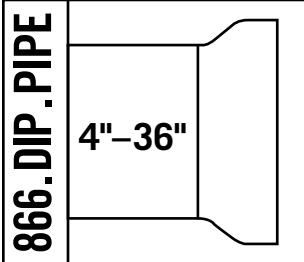


Pipe installations may require field cutting, particularly where fittings are used. By planning ahead, many field cuts can be made in the portion of the line involving standard TYTON JOINT® Pipe thus eliminating the need to field weld the TR FLEX Pipe.

TR FLEX GRIPPER® Rings may be used with field cut TR FLEX Pipe for sizes 4" through 36". Your U.S. Pipe Sales Representative can provide more information on TR FLEX GRIPPER Rings.

In the event field cuts are required in the restrained portion of the line, the following recommended procedure may be used. This procedure describes how to weld a preformed round steel bar to the plain end of field cut TR FLEX Pipe to be used instead of the factory applied weld bead furnished on TR FLEX Pipe. Pittsburgh Testing Laboratory [now called Professional Service Industries, Inc. (PSI)] certified tests on TR FLEX Pipe which were welded following this procedure.

NOTE: TR FLEX®, TYTON JOINT® and TR FLEX GRIPPER® are Registered Trademarks of U.S. Pipe and Foundry Co., LLC.



Materials and Equipment

The materials and equipment needed to do the field welding are as follows:

1. DC arc welder using reversed polarity operating within the electrode manufacturer's recommended amperage ranges for the electrode size used.
2. AWS 5.15 (Class ENiFe Cl) electrodes, 1/8" or 5/32" for 4" through 36" pipe sizes. INCO Alloys International, Inc. NI-ROD 55 electrodes meet this specification. **NOTE:** *Electrode specifications are different for field welding epoxy or specially lined TR FLEX Pipe. Refer to page 11 of this brochure.*
3. Grinder to remove oxide from pipe surface (a torch may be used to burn off paint on all but epoxy lined pipe.)
4. Proper size ring as per Table 1.
5. At least two (2) welding fixtures and "C" clamps*. For welding epoxy lined pipe, additional clamps are required.
6. Two (2) component coal tar epoxy, such as Carboline BITUMASTIC® 300M for corrosive soil environments and asphalt paint for other environments.

*The welding fixtures and "C" clamps are available from U.S. Pipe.

Figure 1

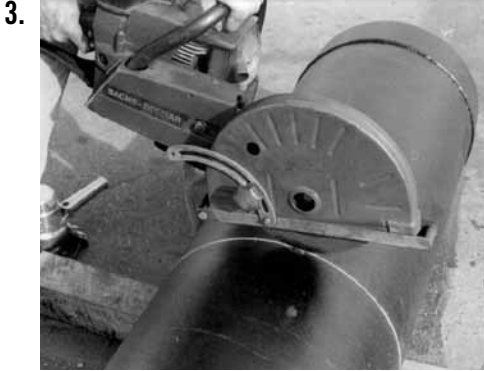
To determine if the pipe is suitable for cutting, measure the pipe diameter (or circumference) at the location to be cut. Take this measurement square with the longitudinal axis of the pipe. If the dimensions are outside the range given in Table 1, select another pipe and repeat this procedure. **NOTE:** *Where the installation requires precise lay lengths, the joint pullout included in Table 2 must be taken into consideration.*

Figure 2

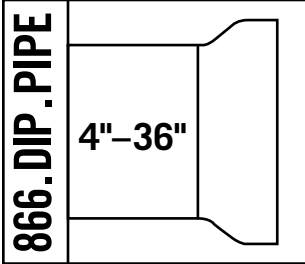
A line must be scribed or otherwise marked on the circumference of the pipe at the proposed cut location to ensure that the cut will be square.

Figure 3

Cut the pipe (preferably with an abrasive saw).



NOTE: BITUMASTIC® is a Registered Trademark of Carboline Company.



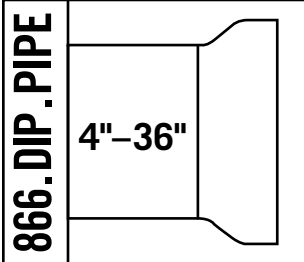
Materials and Equipment (cont.)

Figure 4
Bevel the cut end using a grinder. The outside of the field cut end (or any other pipe without a bevel) should match the bevel on a factory beveled pipe. Round the leading edge of the spigot end and remove any sharp, rough edges which might cut or snag the gasket. Additional grinding may be required to further bevel the pipe if difficulty in assembly is noted.

Figure 5
Set the collet on the welding fixtures to the correct pipe size.

Figure 6
Mark the bar location from the cut end using the welding fixture as a guide.





Materials and Equipment (cont.)

Figure 7

Burn the paint from the pipe at the bar location with a torch; then grind the pipe surface over a width of about 2 inches. It is very important that the pipe surface be clean and freshly ground all the way through the pipe dimples anywhere weld will contact the pipe.

Mark the bar location again as in step 6. The mark should be in the ground area of the pipe. Again, take care to use chalk or other marking device that does not contain lead, grease or other contaminants.

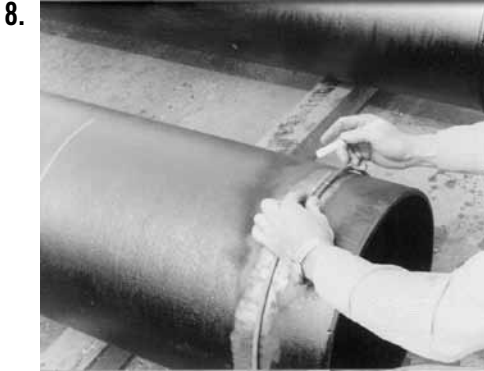
The circumferential area of the pipe where the field weld bar is to be attached, shall be cleaned to remove contaminants and ground to remove surface oxides to provide a sound, bright, clean area for welding. All surface laminations should be ground through and eliminated.

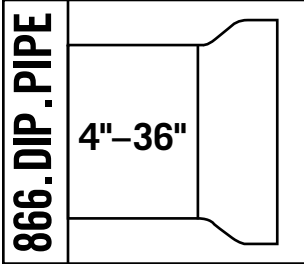
Figure 8

Clean any rust from the bar with a wire brush. Fit the bar around the pipe. Mark and cut the bar to leave about a 1/2" gap between the bar ends on 4" through 36" sizes. The bar will lengthen during the welding operation.

Figure 9

Clamp one end of the bar to the pipe using one of the welding fixtures and a "C" clamp.





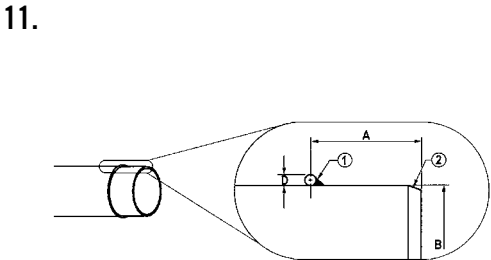
Materials and Equipment (cont.)

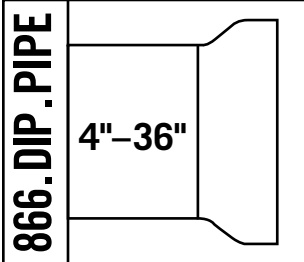
Figure 10
Clamp a second fixture six to eight inches from the first fixture. If necessary, tap the bar down to fit the pipe surface closely.

Figure 11
4" through 24" sizes of pipe require (1) weld pass. 30" and 36" sizes of pipe require two (2) weld passes.

Figure 12
Weld the portion of the bar between the two (2) welding fixtures. Weld on the side of the bar next to the cut end of the pipe. Field welds for sizes 4" through 24" can be accomplished with one (1) weld pass. Sizes 30" and 36" require two (2) weld passes. The first weld pass must be directed mainly into the pipe wall to achieve good penetration. The second pass should tie the bar to the first weld pass. Table 1 indicates the required size of the fillet weld.

After making the weld passes between the two (2) "C" clamp fixtures, unclamp the first fixture and reattach it approximately six to eight inches farther around the pipe and bar for 4" through 36" sizes. The other clamp fixture can now be removed and welding continued with only one (1) clamp fixture since the trailing weld will hold the bar onto the pipe. After welding in the described method, the ends of the bar should be welded to the pipe with a gap of 1". The ends cannot be welded together. It is important that the bar ends do not touch during this procedure so that growth does not raise the bar from the pipe surface interfering with later assembly.





Materials and Equipment (cont.)

Figure 13

After completion of welding, remove all weld flux and splatter from the bar and pipe.

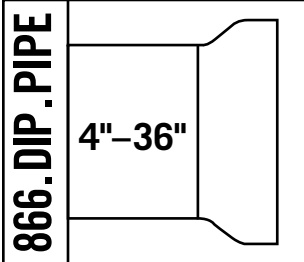
Figure 14

After the welding is completed, remove all of the weld flux and spatter from the bar and pipe by grinding or other suitable means. The weld bar, weld fillet/s and any ground surfaces shall be coated with a two-part epoxy for corrosive soil environments or asphaltic paint for other environments. The only exception to this is if the application of a coating on the bar and weld area are incompatible with any additional top coat required by the customers purchase specification. In that case, a compatible corrosion inhibiting coating may be applied. This epoxy coating shall not extend into the gasket sealing area of the spigot.

Figure 15

The linings of all cement-lined pipe that are welded shall be checked for cracks and looseness. Any poorly bonded lining shall be removed, and the exposed pipe surfaces shall be patched in accordance with the requirements of ANSI/AWWA C104/A21.4, *Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water*. Repaired cement linings shall be coated with an approved asphaltic paint that is approved for potable water. Any damage to special linings shall be repaired in accordance with the lining material manufacturer's recommendations.

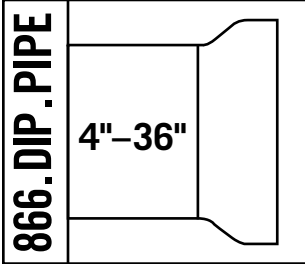




Field Cutting and Welding Specifications

Table 1.

SIZE Inches	A	B		C		D		MINIMUM NO. OF WELD PASSES	APPROX. NO. OF WELDING RODS REQUIRED	FILLET SIZE L Inches
	BAR FROM CUT END DISTANCE Inches	MAXIMUM PIPE O.D. Inches	MINIMUM PIPE O.D. Inches	CIRCUMFERENCE		BAR DIAMETER Inches	BAR I.D. Inches			
				MAXIMUM Inches	MINIMUM Inches					
4	3 3/32	4.86	4.74	15 9/32	14 7/8	1/4	4.80	1	3	3/16
6	3 5/16	6.96	6.84	21 7/8	21 15/32	1/4	6.90	1	4	3/16
8	3 5/8	9.11	8.99	28 5/8	28 1/4	1/4	9.05	1	5	3/16
10	3 5/8	11.16	11.04	35 1/16	34 11/16	1/4	11.10	1	7	3/16
12	3 5/8	13.26	13.14	41 21/32	41 9/32	1/4	13.20	1	8	3/16
14	4 13/16	15.35	15.22	48 7/32	47 13/16	5/16	15.30	1	9	1/4
16	4 13/16	17.45	17.32	54 13/16	54 13/32	5/16	17.40	1	10	1/4
18	4 13/16	19.55	19.42	61 13/32	61	5/16	19.50	1	12	1/4
20	4 13/16	21.65	21.52	68 1/32	67 19/32	5/16	21.60	1	13	1/4
24	4 13/16	25.85	25.72	81 7/32	80 25/32	5/16	25.80	1	15	1/4
30	5 13/16	32.08	31.94	100 25/32	100 11/32	5/16	32.00	2	30	5/16
36	5 13/16	38.38	38.24	120 9/16	120 1/32	5/16	38.30	2	35	5/16



Minimum Laying Lengths

Figure 16 and Table 2 define the minimum lengths for TR FLEX Pipe either as Plain End x Plain End pipe, or Bell x Plain End pipe. The minimum laying lengths are determined on the basis of the socket depth and the minimum space required in front of the pipe bell face to insert the locking segments. These minimum laying lengths must be considered when ordering factory cut lengths or field cutting TR FLEX Pipe.

Figure 16

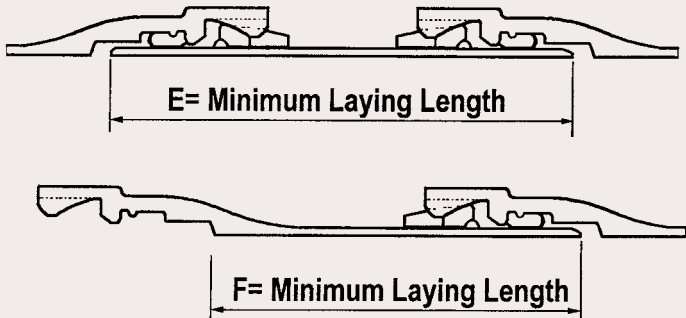
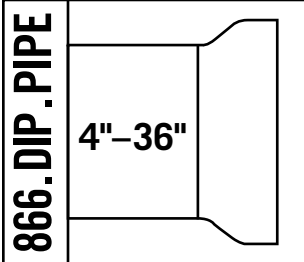


Table 2.

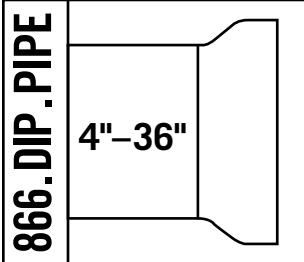
SIZE Inches	E Inches	F Inches	PULL OUT Inches
4	12 3/4	10 1/4	.36
6	14	11	.48
8	15 1/4	12	.48
10	15 3/4	12 1/4	.60
12	16 1/2	13	.72
14	19 3/4	15 1/4	.60
16	20 1/4	15 1/2	.60
18	21	16	.60
20	21 1/2	16 1/4	.60
24	23	17 1/4	.60
30	26 1/4	19	.60
36	28	20 1/4	.60



Procedure for PROTECTO 401™ Epoxy Lined TR FLEX® Pipe

The following describes the recommended procedure and materials to be used for the field welding of a steel bar to an epoxy or Polymeric Lined TR FLEX Pipe that has been cut in the field.

- 1. AWS 5.15 (Class ENiFe Cl) electrodes**
Use electrodes with a diameter of 3/32" for 4" through 12" pipe sizes and 1/8" diameter electrodes for 14" through 36" pipe sizes. INCO Alloys International, Inc. NI-ROD 55 electrodes meet this specification.
2. For field welding instructions, refer to Figures 1 – 14 (pages 4 through 8) in this brochure.
3. Field cuts, holidays, and any damaged areas from the welding process to the protective lining must be repaired. Follow the manufacturer's repair and touch-up procedures that accompany the PROTECTO 401™ repair kits for the damaged lining areas.

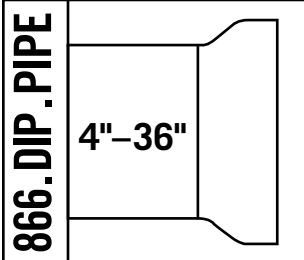


Procedure for PROTECTO 401™ Epoxy Lined TR FLEX® Pipe (cont.)

1. AWS 5.15 (Class ENiFe Cl) electrodes of the diameters specified in Table 3 shall be used for the field welding of epoxy lined TR FLEX Pipe. INCO Alloys International Inc. NI-ROD55 electrodes meet this specification.
2. The outside surface of the pipe to be welded must be free of paint, oil, dirt, etc. before being ground. Removal of these materials is best accomplished by washing and wiping the area to be ground with a well soaked rag containing mineral spirits or other suitable solvent. (The precautions for safe use of these flammable materials must be observed.)

Table 3.

PIPE DIAMETER Inches	BAR DIAMETER Inches	FILLET SIZE Inches	ELECTRODE DIAMETER Inches	WELDING AMPERAGE	MINIMUM NUMBER OF WELDING PASSES
4–12	1/4	5/32	3/32	70, max.	1
14–24	5/16	3/16	1/8	95, max.	1
30–36	5/16	5/16	1/8	95, max.	2



Products for Water, Wastewater and Fire Protection

Ductile Iron Pipe	SIZE RANGE
TYTON JOINT® Pipe	3"-64" Ductile Iron
Mechanical Joint Pipe	4"-12" Ductile Iron
TR FLEX® Pipe	4"-36" Ductile Iron
HP LOK® Pipe	30"-64" Ductile Iron
Flanged Pipe	3"-64" Ductile Iron
Grooved Pipe	4"-36" Ductile Iron
USIFLEX® Boltless Ball Joint Pipe For Subaqueous Installations	4"-48" Ductile Iron
Restrained Joints	
TR FLEX® Restrained Joint	4"-36" Ductile Iron
HP LOK® Restrained Joint	30"-64" Ductile Iron
MJ FIELD LOK® Gaskets	4"-24"
FIELD LOK 350® Gaskets	4"-24"
FIELD LOK® Gasket	30" & 36"
TR FLEX GRIPPER® Rings	4"-36" Ductile Iron
TR TELE FLEX® Assemblies	4"-24" Ductile Iron
Fittings	
TYTON® Fittings	14"-24" Ductile Iron
TRIM TYTON® Fittings	4"-12" Ductile Iron
TR FLEX® Fittings and TR FLEX® Telescoping Sleeves	4"-36" Ductile Iron
HP LOK® Fittings and HP LOK® Telescoping Sleeves	30"-64" Ductile Iron
Mechanical Joint Fittings	30"-48" Ductile Iron
Flanged Fittings	30"-64" Ductile Iron
XTRA FLEX® Couplings	4"-24" Ductile Iron
Miscellaneous Products	
PROTECTO 401™ Lined Ductile Iron Pipe for Domestic Sewage and Industrial Wastes	4"-64" Ductile Iron
GLASS Lined Ductile Iron Pipe for Wastewater Treatment Plants	4"-30" Ductile Iron
RING FLANGE-TYTE® Gaskets	4"-36"
FULL FACE FLANGE-TYTE® Gaskets	4"-64"
MJ Harness-Lok	4"-48" Ductile Iron
Saddle Outlets	Various Ductile Iron
Welded Outlets	Various Ductile Iron
Polyethylene Encasement	4"-64"

Our products are manufactured in conformance with National Standards so that our customers may be assured of getting the performance and longevity they expect. Use of accessories or other appurtenances that do not comply with recognized standards may jeopardize the performance and longevity of the project.

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