AMERICAN Restrained Ductile Iron Pipe Joints

Field Welding Instructions

In most instances, careful planning and/or measuring ahead to position required field cuts in unrestrained sections of a pipeline can eliminate the need for any field-fabricated restrained joints. Also, it is generally and technically preferable in most 4"-36" restrained joint areas to restrain field-cut joints where possible with Fast-Grip gaskets or Field Flex-Rings which do not require field welding. In some cases, however, unforeseen circumstances may make it impossible to plan ahead, and at such times AMERICAN offers the following procedure whereby ductile iron or alloy steel rings can be field welded onto the barrels of ductile iron pipe to be used in restrained joint applications. **All operations required for field welding should never begin until the area where the welding will be performed has been appropriately checked for any potentially hazardous conditions per standard industry practice and/or as required by local, state, OSHA or any other federal requirements.**

When these procedures are followed by welders skilled in the art, strong, dependable restrained joints should be produced. **In presenting this procedure, American Cast Iron Pipe Company assumes no responsibility for the performance of field-welded pipe joints or pipe systems.**

WELDING EQUIPMENT AND MATERIALS

Welds should be applied using a D.C. arc welder and appropriate welding electrodes or wire. Welding should be accomplished using reverse polarity and amperage ranges recommended by the electrode or wire manufacturer, with appropriate operator adjustment for the actual welding conditions on ductile iron pipe.

Suitable Pipe Diameters for Field Cuts and Restrained Joint Field Fabrication

Table No. 9-12

Nominal Pipe Size in.	Min. Pipe Dia. in.	Max. Pipe Dia. in.	Min. Pipe Circumference in.	Max. Pipe Circumference in.
4	4.74	4.86	14 23/32	15 3/32
6	6.84	6.96	21 1/2	21 7/8
8	8.99	9.11	28 1/4	28 5/8
10	11.04	11.17	34 1/16	35 3/32
12	13.14	13.26	41 3/32	41 21/32
14	15.22	15.35	47 13/16	48 7/32
16	17.32	17.45	54 13/32	54 13/16
18	19.42	19.55	61	61 13/32
20	21.52	21.65	67 19/32	68
24	25.72	25.85	80 13/16	81 7/32
30	31.94	32.08	100 1/32	100 25/32
36	38.24	38.38	120 1/8	120 9/16
42	44.44	44.58	139 5/8	140 1/16
48	50.74	50.88	159 13/32	159 27/32
54	57.46	57.60	180 17/32	180 31/32
60	61.51	61.65	193 1/4	193 1/16
64	65.57	65.71	206	206 7/16

Above table based on ANSI/AWWA C151/A21.51 guidelines for push-on joints.
*54" dimensions based on nominal O.D. of 57.56". If existing 57.10" O.D. pipe is being field-fabricated, dimensions must be adjusted accordingly and proper ring material must be used. Check AMERICAN for details.

Caution should be taken when taking on any field pipe modification or repair operations, etc., that might involve or include an ignition source, (i.e., grinding, cutting or welding, etc., on pipe fittings or valves). All applicable safety codes, precautions and procedures should be followed; including making sure the work atmosphere is safe for such operation.

AMERICAN Restrained Ductile Iron Pipe Joints

Field Welding Instructions—Continued

The weld electrodes or wire used to deposit the required amount of fillet weld should be in conformance with Class designations AWS A5.15 Class ENiFeT3-CI, or AWS A5.6 (ASME SFA 5.6) Class Cu A1-A2. These electrodes shall be capable of producing suitable welds without preheating or postheating of the pipe and ring. A recommended semi-automatic welding wire, with appropriate weld specifications, is as follows:

Stoody® Castweld Ni 55-0/S/G, 3/32" diameter, D.C., reverse polarity (electrode positive), 325-400 amps.

PROCEDURE USING WELDING FIXTURES AND HAND-HELD ELECTRODES

This procedure is intended to be used for manual welding. Contact AMERICAN when semi-automatic welding setups are desirable.

1. Measure the candidate pipe diameter (or circumference) at the desired location of the cut to confirm the dimensions. The allowable pipe diameter and circumference should fall in the ranges as shown in Table 9-12. Any cut pipe with substantial out-of-roundness should be temporarily rounded with a mechanical jack and shaped timbers, then braced in the rounded shape for this field welding procedure. The rounding timber or brace should normally be left in place inside the pipe until after complete joint assembly in the field, at which time it should be removed for service.

2. Cut the pipe at the desired location and bevel the cut end for joint assembly. (See Section 3.) It is imperative that field cuts for restrained joint welding be smooth, regular, and as square as possible with the axis of the pipe, inasmuch as the cut end is usually used as a reference plane to position the welded rings from the end of the pipe.

3. Clean and grind the weld location on the pipe to bright metal (Photo 1) prior to positioning the ring. Asphaltic coating in the weld area should be removed with a torch or with a solvent wash prior to grinding. Also, the corresponding edge of the ring to be welded should be cleaned and ground to bright metal. Loose locking rings or glands (if required for the particular joint configuration) should be placed on the pipe barrel beyond the weld ring location at this point. (See illustrations on the next page and Photo 2.)

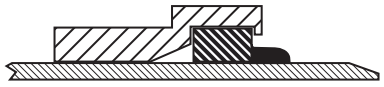

Fig. 9-1
Circular Welding Fixture

4. Clamp the joint weld ring securely on the pipe in the correct location. (See Table 9-13.) This may be accomplished using a special welding fixture (Photo 3). An example of a recommended ring welding fixture available from AMERICAN is shown in Figure 9-1. If clamping devices not furnished by AMERICAN are utilized for the ring-clamp operation, they should

AMERICAN Restrained Ductile Iron Pipe Joints

Field Welding Instructions—Continued

be capable of holding the ring securely in the proper position and straight on the pipe until all weld is applied.

NOTE: *If clamps are used, care should be taken to cushion the clamps where they bear on the inside of the pipe to minimize damage to the pipe lining. The cement linings routinely supplied by AMERICAN are normally not adversely affected by the welding procedures described in this brochure. If significant cement lining damage occurs due to any cause, it should be patched in accordance with recommended procedures as noted in Section 11. Contact AMERICAN for requirements involving field welding of pipes with special linings.*

5. Weld the ring to the pipe with the final weld dimensions as shown in Table 9-13. Appropriate flat or down-hand techniques for field welding ductile iron should be used. In manual electrode welding, pipe welding rotators or rolling the pipe on timbers or rails is normally necessary to keep the work flat or "downhand." For the same reason, field welding of restrained ends should generally not be done "in situ" (i.e., in the ditch, assembled), as the pipe cannot easily be rolled or rotated to keep the position "downhand." The use of short, overlapping weld passes in manual welding will minimize heat buildup, cracking, and thermal stresses as the metal cools. Weld passes should be thoroughly cleaned (peened) and inspected before cooling and prior to the addition of adjoining passes. Also, the ends of the adjoining passes should not coincide but should be slightly overlapped before the arc is broken. The resulting weld fillet should be of a slightly convex shape and free of significant weld defects. Weld cracks, if they occur, should be ground away and repaired with a weld overlay.

When a recommended welding fixture is utilized (Photo 4), start the weld at one end of the ring and work continuously and progressively through the other end.

After the entire ring has been field welded to the pipe, weld the ring ends to the pipe and weld in the small space remaining between the ring ends to ensure proper weld height at the ring ends.

6. Wire brush the weld and ring to remove all slag or weld spatter (Photo 5). Particular care must be taken to brush or chip away any weld spatter which may have accumulated on the pipe spigot which could interfere with proper gasket sealing or joint assembly. Any significant weld bead lumps or irregularities which might interfere with proper joint assembly or performance should also be removed.

7. Paint the ring, weld, and clean pipe metal area (Photo 6) with a smooth uniform coat of asphaltic paint or mastic which meets the requirements for ductile iron pipe outside coating per ANSI/AWWA C151/A21.51.


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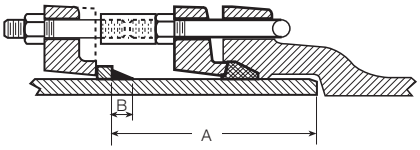
AMERICAN Restrained Ductile Iron Pipe Joints

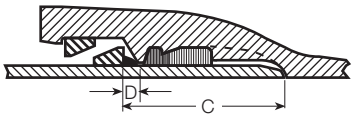
Field Welding of Restrained Joints

MJ Coupled Joint

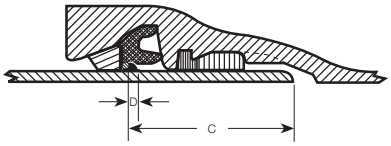


Note: Sizes 30"-48" use rectangular cross-section spigot glands in lieu of ductile MJ gland shown above.

Flex-Ring® Joint 4"-12"

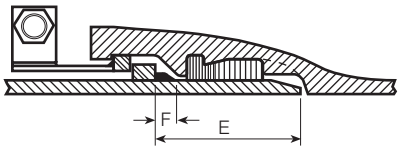


Flex-Ring® Joint 14"-48"



Note: Contact AMERICAN for applications involving field welding of 14"-48" Flex-Ring Joint.*

Lok-Ring® Joint



Dimensions

Table No. 9-13

Size in.	MJ Coupled Joint				Flex-Ring Joint				Lok-Ring Joint			
	A ±⅛	B ±⅛	Weld Height Min.	Weld Weight lbs	C ±⅛	D +3/16-0	Weld Height +⅛-0	Weld Weight lbs	E ±1/16	F ±⅛	Weld Height Min.	Weld Weight lbs
4	5.84	.50	.20	.4	3.80	.25	.19	.1	-	-	-	-
6	6.00	.50	.20	.3	3.80	.25	.19	.2	-	-	-	-
8	6.14	.50	.20	.6	3.92	.25	.19	.2	-	-	-	-
10	6.21	.50	.20	.7	4.50	.25	.19	.3	-	-	-	-
12	6.27	.50	.20	.8	4.50	.25	.19	.4	-	-	-	-
14	8.38	.50	.20	.9	4.63	.25	-	-	-	-	-	-
16	8.38	.50	.20	1.0	4.63	.25	-	-	-	-	-	-
18	8.38	.50	.20	1.1	5.25	.25	-	-	-	-	-	-
20	8.38	.50	.20	1.2	5.25	.25	-	-	-	-	-	-
24	8.38	.50	.20	1.3	5.38	.37	-	-	-	-	-	-
30	10.38	.75	.25	2.8	6.00	.50	-	-	-	-	-	-
36	10.38	.75	.25	3.4	6.00	.50	-	-	-	-	-	-
42	11.13	.75	.25	3.9	6.07	.50	-	-	-	-	-	-
48	11.13	.75	.25	4.5	7.38	.50	-	-	-	-	-	-
54	-	-	-	-	-	-	-	-	6.38	.88	.30	4.5
60	-	-	-	-	-	-	-	-	6.38	.88	.30	4.9
64	-	-	-	-	-	-	-	-	6.38	.88	.30	5.3

Contact AMERICAN for alternative field welding considerations for 14"-48" Flex-Ring pipes.

Dimensions are in inches.

Note: Dimensions shown are for current AMERICAN products and are subject to change. Check AMERICAN for field welding applications for connecting to existing piping.

Note: For alternative preferred method of restraining field-cut ends in most 4"-30" Flex-Ring Joint Systems, see pg. 9-2 "Fast-Grip® Gasket."

***Note: Field Flex-Rings are normally recommended in lieu of field welding for restraining field-cut ends in 14"-36" Flex-Ring Joint Systems, see pg. 9-16 "Field Flex-Ring®."**