



HDSS® FIELD WELD PROCEDURE



PIPE

FABRICATION

RESTRAINED JOINTS

FITTINGS

GASKETS

COATINGS & LININGS



U.S. PIPE

A QUIKRETE® COMPANY

CONTENTS

MATERIALS	2
MARK CUT PIPE END LOCATION	3
BEVEL THE CUT END	4
MARK FIELD WELD BAR LOCATION	5
FIELD WELD BAR PREPARATION	6
SECURE THE FIELD WELD BAR FOR WELDING	7
CONTINUE WELD AROUND CIRCUMFERENCE	8
APPLY THE PROTECTIVE COATING	9
HDSS® FIELD WELD PROCEDURE <i>(Kit Version)</i>	10
SPECIFICATIONS	13
NOTES	14

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.



**U.S.
PIPE**

MATERIALS

These instructions cover the basic procedure for applying a field weld bar on the plain end or cut end of HDSS pipe to effect restraint.

This procedure is to be applied by those qualified in the art of Shielded Metal Arc Welding (SMAW).

MATERIALS:

1. AWS 5.15 (Class ENiFe-CI) Electrodes: 1/8" or 5/32" for 4" through 36" pipe and 3/16" or smaller for 42" through 54" pipe. INCO Alloys International, Inc. NI-ROD 55 electrodes meet this specification.
2. The welding fixture can be used for 4" through 54" pipe. It is not necessary to order a Field Weld kit for every ring size if multiple sizes are needed for a project.
3. U.S. Pipe HDSS Field Weld Kit (*Includes 2 welding fixtures and 2 "C" clamps along with instructions.*) Additional clamps are required for welding special lined pipe
4. HDSS Field Weld Ring (*Mild steel bar pre-rolled to fit pipe barrel O.D. and available from U.S. Pipe.*)

STEP 1: MEASURE THE PIPE DIAMETER



To determine if the pipe is suitable for cutting, measure the pipe diameter or circumference; (diameter = circumference divided by 3.142) 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 2, select another pipe and repeat this procedure.

MARK CUT PIPE END LOCATION

STEP 2: MARK CUT PIPE END LOCATION



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. Any marking material can be used. Chalk is shown here and is a good choice for marking on areas to be welded as it will not contaminate the weld.

STEP 3: CUT THE PIPE



Cut the pipe to the desired length. Make sure the pipe cut is square to the pipe or joint assembly could be difficult or impossible. An abrasive saw is an acceptable means to cut pipe in the field.

BEVEL THE CUT END

STEP 4: BEVEL THE CUT END



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.

STEP 5: ADJUST THE COLLET POSITION



Set the collet on the welding fixtures to the correct pipe size. The face of the collet closest to the V notch of the fixture (bar) should be aligned with the mark in the fixture. The thumbscrew will rest in the corresponding hole on the back side of the fixture.

MARK FIELD WELD BAR LOCATION

STEP 6: MARK FIELD WELD BAR LOCATION



Mark the bar location from the cut end using the welding fixture as a guide. Again chalk may be used for this operation. Since this is an area that will be welded, avoid using marking instruments that contain lead, grease or other contaminants. Mark the complete circumference of the pipe making sure the mark is straight around the pipe.

STEP 7: SURFACE PREPARATION



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.

FIELD WELD BAR PREPARATION

STEP 8: FIELD WELD BAR PREPARATION



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 $\frac{1}{2}$ " gap between the bars ends on 4" through 36" sizes and about a 1" gap on 42" through 54" sizes. The bar will lengthen during the welding operation.

STEP 9: SECURE THE FIELD WELD BAR TO THE PIPE



Clamp one end of the bar to the pipe using one of the welding fixtures and a "C" clamp to position the bar in the correct location for the pipe being welded.

SECURE THE FIELD WELD BAR FOR WELDING

STEP 10: SECURE THE FIELD WELD BAR FOR WELDING



Clamp a second fixture six to eight inches from the first fixture. If in doubt, clamp the second fixture to the bar closer than you believe necessary. If too much length is left between clamping fixtures, the bar will move out of position during welding due to the thermal expansion of the bar as it is heated and the joint will not be able to be assembled.

Tap the bar down with a hammer, if necessary, to fit the bar to the pipe surface. The bar must remain in close contact with the pipe or the integrity of the joint cannot be assured. Assembly may also be difficult or impossible if the bar changes position in relation to the pipe surface or cut end during welding.

STEP 11: MAKE THE INITIAL WELD



Weld the first pass on 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. Complete the first pass around the pipe. Then return and weld the second and third passes *(where required)*.

CONTINUE WELD AROUND CIRCUMFERENCE

STEP 12: CONTINUE WELD AROUND CIRCUMFERENCE



After making the initial weld pass 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. 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 approximately 1 inch. The ends cannot be welded together nor can they be allowed to touch during the welding procedure. If this occurs, it is very likely that the growth of the weld ring due to the heat of welding will raise the bar off of the pipe surface. This will create a weak structure that could fail and may also prevent joint assembly.

STEP 13: COMPLETED BEAD



The completed weld bead should be similar in appearance to the picture above. See Table 2 and Figures on page 7 for weld dimensions.

APPLY THE PROTECTIVE COATING

STEP 14: APPLY THE PROTECTIVE COATING



HDSS® FIELD WELD PROCEDURE *(Kit Version)*

INCHES	
PIPE SIZE	NO CLOSER THAN (A)
4	2 3/4
6	2 3/4
8	2 7/8
10	2 7/8
12	2 7/8
14	4
16	4
18	4
20	4
24	4
30	4 3/4
36	4 3/4
42	5
48	5 1/2
54	5 1/2

Table 1: Epoxy Limit

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 either Asphalt paint or an approved two-part epoxy such as Carboline Bitumastic 300M, Induron PE-70 or an equivalent coating. The only exception to this rule is if application of a coating on the bar would be incompatible with any additional top coat required by the customers purchase specification.

In that case, a compatible corrosion inhibiting coating may be applied. An epoxy coating shall not extend into the gasket sealing area of the spigot (*No closer than "A" from the spigot end*).

STEP 15: PRODUCT LINING/COATING REPAIRS

The linings of all cement-lined pipe that are welded shall be checked for cracks and excessive looseness. Any poorly bonded lining resulting from the welding procedure 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, PQS-101, Cement-Mortar Linings, and Technical Advisory TA-001 (*Procedure for Patching Damaged Cement Linings in the Field*). Repaired cement linings shall be coated with an approved asphaltic paint that is approved for potable water. Refer to PQS-001, Asphaltic Coatings and USP-003, Asphaltic Coatings. Any damage to special linings such as epoxy shall be repaired in accordance with the lining material manufacturer's recommendations. See U.S. Pipe's HDSS Field Weld Procedure at WWW.USPIPE.COM for details and parameters for welding special lined pipe.

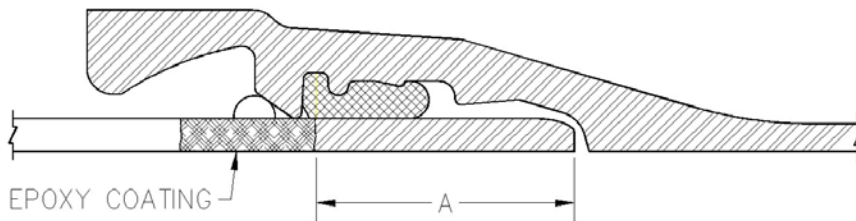


Figure 1: Epoxy Limit

HDSS® FIELD WELD PROCEDURE *(Kit Version)*

TABLE AND FIGURES

INCHES								PASSES	RODS	INCHES
CIRCUMFERENCE										
SIZE	BAR FROM CUT END DIST.	MAX. PIPE O.D.	MIN. PIPE O.D.	MAX.	MIN.	BAR DIAM.	BAR I.D.	MIN. NO. OF WELD PASSES	APPROX. NO. OF WELDING RODS REQ.	FILLET SIZE L
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 1/2	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 1/8	5/16	38.30	2	36	5/16
42	6 7/16	44.58	44.44	140 1/16	139 5/8	1/2	44.50	3	65	5/8L x 3/8H
48	6 7/16	50.88	50.74	159 27/32	159 3/8	1/2	50.80	3	75	5/8L x 3/8H
54	6 1/2	57.60	57.46	180 31/32	180 17/32	1/2	57.56	3	85	5/8L x 3/8H

Table 2: Bar Size, Location and Dimensional Specifications

HDSS® FIELD WELD PROCEDURE *(Kit Version)*

Weld bar and pipe. The weld shall not exceed bar height.

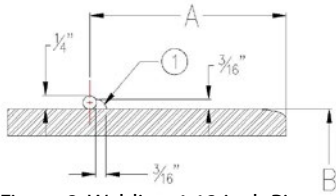


Figure 2: Welding 4-12 inch Pipe

Weld bar and pipe. The weld shall not exceed bar height.

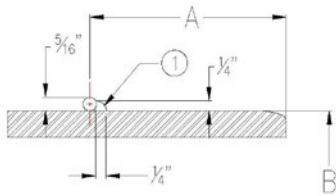


Figure 3: Welding 14-24 inch Pipe

Weld bar and pipe. Weld bar and to first pass. The weld shall not exceed bar height.

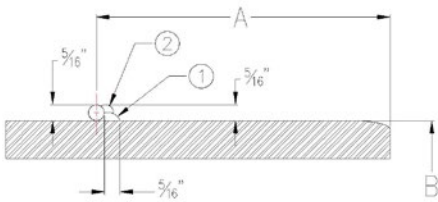


Figure 4: Welding 30 and 36 inch pipe

Weld bar and pipe. Weld to first pass and pipe extending weld length to 5/8". Weld to bar and existing welds. The weld shall not exceed bar height.

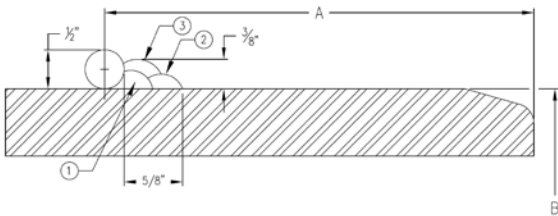


Figure 5: Welding 42 - 54 inch Pipe

SPECIFICATIONS

PRODUCTS FOR WATER, WASTEWATER & FIRE PROTECTION

Our products are manufactured in conformance with National and International 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.

Push-on Joint	SIZE RANGE
TYTON JOINT® Pipe	3"–64" Ductile Iron

Restrained Joints	
Mechanical Joint Pipe	4"–12" Ductile Iron
HDSS® Pipe	4"–54" Ductile Iron
HP LOK™ Restrained Joint	30"–42" Ductile Iron
Flanged Pipe	4"–64" Ductile Iron
MJ FIELD LOK® Gaskets	4"–12", 16"
FIELD LOK 350® Gaskets	4"–24"
TR FLEX GRIPPER® Rings	4"–36" Ductile Iron
TR TELE FLEX® Assemblies	4"–24" Ductile Iron

Ductile Iron Fittings	
TYTON® Fittings	14"–64" Ductile Iron
M-FLEX™ Restrained Joint Ball Fitting	12"–36"
TRIM TYTON® Fittings	4"–12" Ductile Iron
TR FLEX® Fittings & TR FLEX® Telescoping Sleeves	4"–36" Ductile Iron
Mechanical Joint Fittings	3"–48" Ductile Iron
HP LOK™ Fittings	30"–64" Ductile Iron
TRIM TYTE® MJ Fittings	3"–48" Ductile Iron
Flanged Fittings	3"–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
RING FLANGE-TYTE™ Gaskets	4"–36"
FULL FACE FLANGE-TYTE™ Gaskets	4"–64"
Saddle Outlets	Various Ductile Iron
Welded Outlets	Various Ductile Iron
Polyethylene Encasement	4"–64"

NOTES

U.S. Pipe, A Quikrete® Company, is the leading manufacturer and a principal supplier of highly engineered ductile iron pipe and fabrication in the United States and Canada. Providing custom solutions to owners, engineers and contractors for even the most demanding applications, including water transmission and distribution lines, plant piping, intake and outfall lines, and other diverse applications.

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HDSS Field Weld Document

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Materials and specifications are subject to change without notice.

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A QUIKRETE® COMPANY

Headquarters

U.S. Pipe
Two Chase Corporate Drive
Suite 200
Birmingham, AL 35244

866-347-7473

international@uspipe.com

www.uspipe.com