

**SECTION 00 21 14**

**QUESTION ON BID DOCUMENTS (QBD) FORM**

*Potential Bidders must complete this QBD Form and submit to the address below no later than 3 business days before the bid opening date.*

Project: AMADOR STREET INFRASTRUCTURE IMPROVEMENTS

Contract No. 2852

To: Port of San Francisco  
 Pier 1  
 San Francisco, CA 94111  
 Phone: (415) 274-0526  
 Attention: **Noel Aquino**  
 Email: constructionbids@sfport.com

City Use Only	
QBD No. 032	
Received by: Noel A.	
Date Received: 8/13/24	
Addendum Issued? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Date Sent Response:	

BIDDER'S QUESTION			
Company Name:	<u>U.S. Pipe and Foundry LLC</u>	Date	<u>8/13/24</u>
Contact Name:	<u>Devon Burton</u>	Tel:	_____
Title:	<u>Technical Resource Engineer</u>	Fax:	_____
<i>Check One Only (Use separate form for each specification and drawing question.)</i>			
<input checked="" type="checkbox"/> Spec. Section:	<u>33 11 00</u>	Paragraph(s):	_____
<input type="checkbox"/> Drawing Sheet:	_____	Detail(s):	_____
<i>Question:</i>			
Request to substitute U.S. Pipe HDSS pipe in-lieu of U.S. Pipe TR Flex pipe. U.S. Pipe no longer manufacturers TR FLEX pipe and now offers HDSS pipe.			

CITY'S REPLY			
<input type="checkbox"/> Mark this box if the QBD can be answered by Bidder's review of the documents. Reply with location(s) where the information can be obtained.			
<i>Reply:</i>			
Substitution accepted - Make submittals in accordance with Division 1.			
By:	<u>Edison Cayabyab</u>	Bureau/Firm:	<u>CDD</u>
Date:	<u>8/14/24</u>		

The reply is an answer to a Bidder's question. The reply does not change the Bid Documents unless the information contained therein is issued in an Addendum. At the sole discretion of the City, the question and reply may be returned to the questioner and distributed to all bidding general contractors for informational purposes.

**SECTION 00 49 18**

**REQUEST FOR SUBSTITUTION**

This form must be submitted no later than 10 calendar days prior to the date for opening bids. Refer to Section 00 21 13 (Instructions to Bidders – Substitutions) for instructions. If the successful Bidder wishes to propose an “or equal” or other substitutions after Bid Opening, said Bidder must make such request within 10 calendar days after the date of Award. Refer to Section 01 25 13 – Product Substitution Procedures for requirements for obtaining approval of substitutions. *Submit this completed form and necessary data substantiating a request for a substitution to Project Engineer/Architect.*

Contract No.: 2852 RFS No. \_\_\_\_\_  
 Project Name: Amador Street Infrastructure Improvements  
 Spec. Section: Part 2 - Products: 2.01 Contractor-Furnished Materials  
 Drawing Sheet: F. 4-inch through 16-inch Ductile Iron Push-On Joint Pipe  
9. 12-inch and 16-inch Ductile Iron Pipe  
**Proposed Substitution:** Substitute U.S. Pipe HDSS pipe in-lieu of U.S. Pipe TR Flex pipe  
 Manufacturer: U.S. Pipe and Foundry LLC  
 Address/Phone: 2 Chase Corporate Drive, Suite 200 Birmingham, AL 35244  
 Trade Name/Model No.: \_\_\_\_\_  
 On-Site Representative: Devon Burton  
 Address/Phone: 209-986-1012  
 Installer: \_\_\_\_\_  
 Address/Phone: \_\_\_\_\_

Product History:  New  2-5 years old  5-10 years old  More than 10 years old

(a) Differences between proposed substitution and specified product (Attach required point by point comparative data):

HDSS Pipe is a superior performing pipe joint in performance and ease of installation

(b) Reason for not providing specified item: U.S. Pipe no longer manufactures TR FLEX pipe and now offers HDSS pipe

(c) Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

Senter Road Project, Santa Clara, CA - San Jose Water - Ed Lambing

(d) Proposed substitution affecting other parts of Work:  No  Yes: Explain \_\_\_\_\_

(e) Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None

(f) Savings to City for accepting substitution: \_\_\_\_\_ (\$ \_\_\_\_\_)

(g) Proposed substitution changes Contract Time:  No  Yes:

If "Yes"  Add  Deduct \_\_\_\_\_ calendar days.

(h) Supporting data attached:  Product Data  Drawings  Test Reports  Samples  
 Other: **Manufacturer's Statement**

The undersigned certifies that:

1. The proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
2. The proposed substitution conforms in all respects to the requirements of the Contract Documents and is appropriate for the applications intended.
3. The same warranty will be furnished for proposed substitution as for specified product.
4. The proposed substitution will not affect or delay progress schedule.
5. The cost data as stated above is complete. There shall be no claims to the City for additional costs related to an accepted substitution.
6. The proposed substitution does not affect dimensions and functional clearances.
7. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: **Devon Burton** Signature: \_\_\_\_\_

Firm: **U.S. Pipe and Foundry LLC** Date: \_\_\_\_\_

Attachments \_\_\_\_\_

**CITY'S REVIEW AND ACTION**

- Substitution accepted - Make submittals in accordance with Division 1.
- Substitution accepted as noted - Make corrections and submit in accordance with Division 1.
- Substitution rejected - Use specified materials and equipment.
- Substitution Request received too late - Use specified materials.

Signed Edison Cayabyab Date 8/14/2024

Note: The City's acceptance of Contractor's submittal of shop drawings, product data, or samples supporting this Substitution Request shall not constitute approval of submittals which do not conform to the requirements of the Contract Documents.

Additional Comments: \_\_\_\_\_

**END OF SECTION**



Two Chase Corporate Drive  
Suite 200  
Birmingham, Alabama 35244

Devon Burton, PE  
Technical Resource Engineer

CELL: (209) 986-1012  
E-Mail: dburton@uspipe.com

November 28, 2023

To Whom It May Concern:

Re: U.S. Pipe Transition from TR FLEX<sup>®</sup> and HP LOK<sup>®</sup> to HDSS<sup>®</sup>

As we continue to pursue continual product innovation, we are pleased to announce HDSS as our newest addition to the U.S. Pipe ductile iron product line. HDSS was designed and developed as a high pressure restrained joint pipe with added deflection and ease of joint assembly. U.S. Pipe has been manufacturing and supplying HDSS restrained joint ductile iron pipe since 2016 and we are pleased to notify you of the finalization of the full range of HDSS 4-inch through 54-inch diameters. The HDSS product line will permanently replace our 4-inch through 36-inch TR FLEX and 30-inch through 54-inch HP LOK restrained joint pipe products. Foundries and associated manufacturing equipment are being converted to produce only HDSS in these diameters of restrained joint ductile iron pipe.

HDSS was designed through lessons learned and adaptation of the integral restraint concepts used in both TR FLEX and HP LOK to produce a superior ductile iron restrained joint pipe and we are confident you will see the benefits. HDSS restrained joint pipe has a working pressure rating of 350 pounds per square inch (PSI) in all diameters as well as matching or exceeding allowable deflection angles in all diameters of TR FLEX and HP LOK restrained joint pipe. Additionally, to facilitate quick, easy, and trouble-free installation, ductile iron locking segments are inserted through a single slot in the bell face and slid into position around the bell to provide axial lock between the bell interior surface and a retainer weldment on the spigot end of the pipe.

Restrained joint fittings for HDSS pipe are currently offered in TR FLEX in 4-inch through 36-inch diameters and HP LOK in 30-inch through 54-inch diameters. HDSS fittings are currently undergoing design and development but will be available once finished.

Since 2016, hundreds of thousands of U.S. Pipe's HDSS pipe have been installed throughout the United States and internationally. HDSS restrained joint ductile iron pipe provided by U.S. Pipe is manufactured and tested to meet or exceed all applicable ANSI/AWWA standards and requirements.

Thank you for your patience and understanding as we make this transition. Should you have questions or need additional information please feel free to give me a call at (209) 986-1012.

Sincerely,



Devon Burton  
2023.11.28  
18:02:08 -07'00'

Devon Burton, PE  
Technical Resource Engineer

**HDSS<sup>®</sup>**

High Deflection, High  
Pressure Restrained Pipe



**PIPE**

FABRICATION

RESTRAINED JOINTS

FITTINGS

GASKETS

COATINGS & LININGS

**U.S.  
PIPE**

**A QUIKRETE<sup>®</sup> COMPANY**

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**U.S.  
PIPE**

The logo features the text "U.S." in a large, bold, white sans-serif font above the word "PIPE" in a smaller, bold, white sans-serif font. Both are set against a solid red square background. The entire logo is positioned in the bottom right corner of the page, partially overlapping a background image of water splashing.

### ANSI/AWWA STANDARDS

#### **ANSI/AWWA C151/A21.51 "Ductile-Iron Pipe, Centrifugally Cast, for Water."**

Asphaltic outside coating and inside lining are in accordance with ANSI/AWWA C151/A21.51.

#### **ANSI/AWWA C153/A21.53 "Ductile-Iron Compact Fittings For Water Service" or ANSI/AWWA C110/A21.10 "Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., For Water."**

HDSS Fittings conform to applicable requirements of ANSI/AWWA C153/A21.53 or ANSI/AWWA C110/A21.10.

#### **ANSI/AWWA C104/A21.4 "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water."**

Cement lining, in accordance with ANSI/AWWA C104 or special linings and/or coatings can be furnished for specific conditions.

#### **ASTM A746-03 Standard Specification for Ductile Iron Gravity Sewer Pipe.**

#### **ASTM A716-08 Standard Specification for Ductile Culvert Pipe.**

#### **ASTM A536 Standard Specification for Ductile Iron Castings.**

#### **ASTM C150 Standard Specification for Portland Cement**

HDSS® Pipe can provide a true 350psi working pressure with a flexible restrained push-on joint for 4" - 54" ductile Iron pipe. The HDSS Restrained Joint has a working pressure rating that matches the class of pipe it is used with. 36" through 54" HDSS provide 2.0° deflection, 30" provides 2.5°, 16" through 24" HDSS provides up to 4.0° deflection, and 4" through 12" provides up to 5° deflection to allow for alignment and settlement issues in buried applications. The simple robust design, high deflection coupled with the strongest joint on the market also make it ideal for; bridge piping, horizontal directional drilling (HDD) and pipe bursting applications.

To facilitate quick, easy and trouble free installation, ductile Iron locking segments are inserted through a single slot in the bell face and slid into position around the bell to provide a positive axial lock between the bell interior surface and a retainer weldment on the spigot end of the pipe. A rubber retainer installed between the locking segments completes the installation and insures the segments stay in place while the joint is extended to engage the restraint. The HDSS joint can be easily disassembled by reversing the installation procedure with no need of special tools or shims.

HDSS Pipe utilizes the conventional TYTON JOINT® Gasket for reliable sealing.

HDSS spigot ends are compatible with 4"–36" TR FLEX® Pipe and Fittings. When 30"-36" TR Flex Fittings are used the fitting joint rating will be 250 psi or less depending on the class of pipe used. 4" through 24" TR FLEX fittings have a 350 psi joint rating depending on the class of pipe used.

Pipe for wastewater service may be furnished in accordance with ASTM 746 Standard Specification for Ductile Iron Gravity Sewer Pipe. For certain wastewater applications, a ceramic quartz filled, amine cured, novalac epoxy lining is available — see PROTECTO 401™ Ceramic Epoxy Lined Pipe and Fittings brochure.

\*For higher pressure ratings, consult your U.S. Pipe Sales Representative.

For a suggested design procedure for the restraint of thrust forces in pressurized, buried Ductile Iron piping systems, the design engineer should refer to the current DIPRA publication "Thrust Restraint Design for Ductile Iron Pipe" or the U.S. Pipe Brochure "The Use And Application of Restrained Joints for Ductile Iron Pipelines."

Ductile iron pipe manufactured by U.S. Pipe is natural, safe, sustainable, and produced in the United States of America. The raw material for U.S. Pipe ductile iron pipe has an average minimum content consisting of 90% recycled iron and steel that is sourced from local scrap suppliers. Ductile iron pipe itself is 100% recyclable. With a service life of 100+ years, Ductile iron pipe is an environmentally superior pipe with lower greenhouse gas emissions in both the production and operation phase, as it requires less energy and has a lower environmental impact.

**NOTE:** If specifiers or users believe that corrosive soils will be encountered where our products are to be installed, please refer to ANSI/AWWA C105/A21.5 "Polyethylene Encasement for Ductile Iron Pipe Systems" for proper external protection procedures.

For certain wastewater applications a ceramic epoxy lining is available—see PROTECTO 401™ Ceramic Epoxy Lined Pipe and Fittings Brochure.

**NOTE:** Each of the following is a nationally recognized standards organization: American National Standards Institute (ANSI), American Water Works Association (AWWA), American Society for Testing and Materials (ASTM), Underwriters Laboratories (UL), National Fire Protection Association (NFPA), National Sanitation Foundation (NSF), Factory Mutual (FM)

# GENERAL INFO

## SUGGESTED SPECIFICATION WORDING

When joint restraint for 4" - 54" push-on joint pipe installation is required and indicated in the project plans and specifications, restrained push-on joint pipe and fittings utilizing Ductile Iron components shall be provided.

Restrained joint pipe shall be Ductile Iron manufactured in accordance with the requirements of ANSI/AWWA C151/A21.51. Push-on joints for such pipe shall be in accordance with ANSI/AWWA C111/A21.11 "Rubber-Gasket Joints for Ductile-Iron Pipe and Fittings." Pipe thickness shall be designed in accordance with ANSI/AWWA C150/A21.50 "Thickness Design of Ductile-Iron Pressure Pipe," and shall be based on laying conditions and internal pressures as stated in the project plans and specifications.

Restrained joint fittings and the restraining components shall be manufactured of Ductile Iron per grade 70-50-05 in accordance with applicable requirements of ANSI/AWWA C110/A21.10 and/or C153/A21.53 with the exception of the manufacturer's proprietary design dimensions. Push-on joints for such fittings shall be in accordance with ANSI/AWWA C111/A21.11.

Restrained push-on joints for pipe and fittings shall utilize individual Ductile-iron locking segments that are inserted through a single slot in the bell face and be easily removed. The pressure rating of the joint shall equal the pressure rating of the pipe when deflected to its maximum joint deflection. Restrained joint pipe shall be U.S. Pipe's HDSS Pipe, and Fittings shall be U.S. Pipe's TR Flex or HP LOK® or approved equal. Restraint of field cut pipe shall be provided with U.S. Pipe's HDSS Pipe field weldments or approved equal.

Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/A21.4. Asphaltic outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 for fittings.

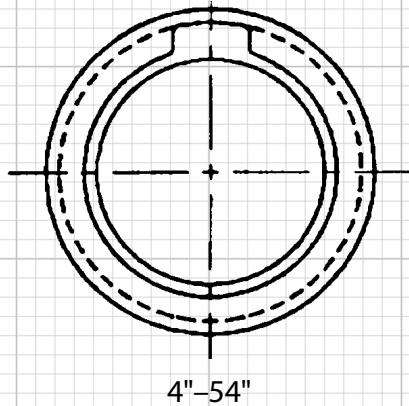
### **NOTE FOR FIELD WELDING**

U.S. Pipe does not recommend, suggest or condone welding on zinc coated pipe without the zinc coating being removed from the weld location. All safety and health precautions as per ANSI/AWS D11.2 Guide for Welding Iron Castings – Section 10 and Appendix F – Safety and Health Fact Sheets, should be followed for safe welding practices and the removal of the zinc coating prior to welding.

# ASSEMBLY INSTRUCTIONS

## TYTON JOINT® GASKET INSTALLATION

### INSERTION SLOT ORIENTATION



All foreign matter in the socket must be removed, i.e., mud, sand, cinders, gravel, pebbles, trash, frozen material, etc. The gasket seat should be thoroughly inspected to be certain it is clean. Foreign matter in the gasket seat may cause a leak. The gasket must be wiped clean with a clean cloth, flexed, and then placed into the socket with the rounded bulb end entering first.

Looping the gasket in the initial insertion will facilitate seating the gasket heel evenly around the retainer seat. 4" through 10" require one loop, 12" through 20" require one to two loops, 24" through 36" require two to three loops, 42" through 54" require three to four loops. Evenly space the loops around the socket with each loop raised 4-5 inches. After loops are established, push each loop down to finish installation of the gasket. When installing Tyton Joint Pipe in sub-freezing weather, the gaskets, prior to their use, must be kept at a temperature of at least 40°F by suitable means, such as storing in a heated area or keeping them immersed in a tank of warm water. If the gaskets are kept in warm water, they should be dried before placing in the pipe socket.

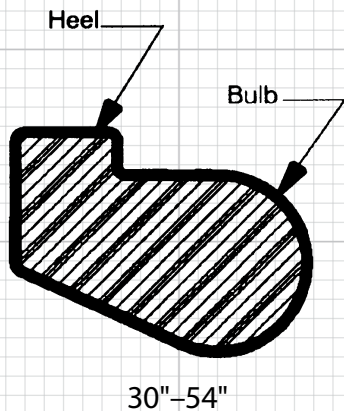
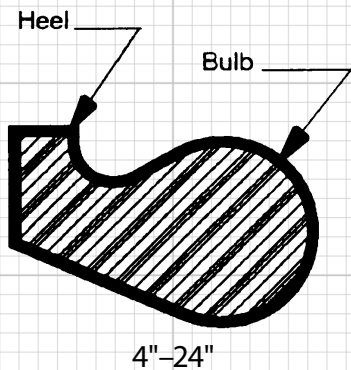
### LUBRICATION

After the gasket has been installed into the bell, a thin film of Tyton Joint Lubricant should be applied to the inside surface of the gasket which will come in contact with the beveled end of the pipe. In warm, dry weather conditions, the lubricant can dry out, especially when applied to warm or hot pipe, it will be necessary to add a small amount of water to hydrate the lubricant. Only Tyton Joint Lubricant should be used.

**CAUTION:** The use of spray-on lubricant is not recommended. Experience has determined that spray-on lubricant may not have sufficient lubricity to allow joint assembly without gasket displacement.

Clean the spigot end of the pipe back to the assembly stripes. Apply Tyton Joint Lubricant to the cleaned spigot end. Do not allow the lubricated surface to touch the ground or trench sides prior to installation.

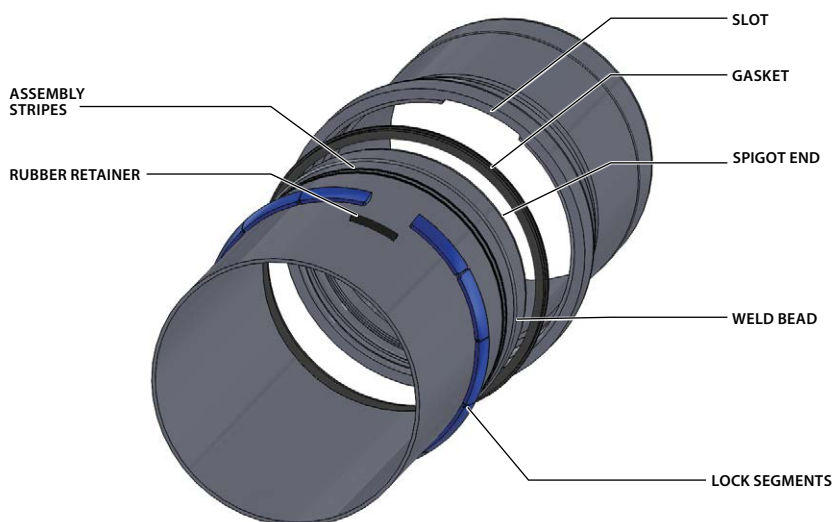
### GASKET INSTALLATION



# ASSEMBLY INSTRUCTIONS

## PIPE 4"–54"

1. The gasket and HDSS locking segment cavity of the bell must be clean and free of debris or any foreign matter.
2. Install the gasket in the bell. Do not lubricate gasket prior to installing bell.
3. Lubricate the gasket and spigot end of the mating pipe with TYTON JOINT® Lubricant.
4. Position the pipe so that the slot in the bell is in a 10 to 2 o'clock location, this will enable easy installation of the locking segments, especially in larger pipe sizes.
5. Insert the spigot end into the bell. The installer must make sure that the spigot end is fully homed in the bell and not deflected.
6. Insert the locking segments (large end first) into the slot in the bell and slide the segment left or right allowing it to slide to the bottom of the bell. Continue sliding the segments around the pipe until all are inserted and positioned as shown, See photos to right.
7. Install the Rubber retainer in between the locking segments at the Bell Slot.
8. Pull back on the inserted pipe to extend the joint and remove the slack and deflect the joint as needed but not to exceed the listed joint deflection.
9. Subaqueous/underwater applications notes. Underwater installations are difficult and require special attention to be successful. If pipe will be assembled under water, please contact USP for additional assistance that will aid underwater assembly. USP does not recommend choker straps or cables be used to assemble pipe joints underwater. Experience has shown the use of such devices do not provide enough axial force for assembly. Additionally, use of choking type devices can damage special coatings and polyethylene encasement meant to protect the pipe from corrosion. The preferred method to assemble joints underwater is to use the back-hoe bucket to push against the bell. Special subaqueous lube must also be used for the gasket and spigot.



### Components required for each joint:

- 3 HDSS Locking Segments for 4"–10"
- 5 HDSS Locking segments for 12"
- 6 HDSS Locking segments for 14–20"
- 12 HDSS Locking Segments for 24"–36"
- 15 HDSS Locking Segments for 42"–54"
- 1 Tyton Joint Gasket
- 1 Rubber Retainer
- Tyton Joint Lubricant (refer to page 4)
- Pipe Bell
- Pipe Spigot
- Weld Bead



### Installation Tips

- Fold and insert rubber retainer/s in a "U" shape as shown for normal buried applications.

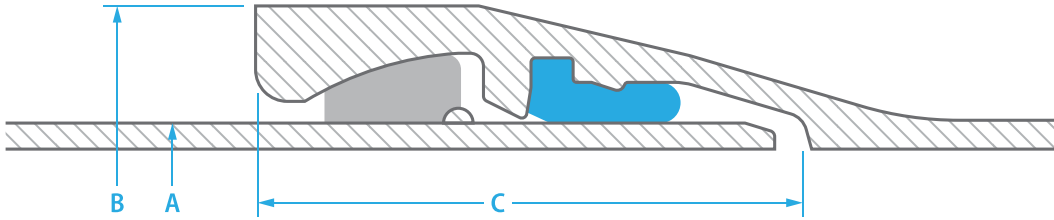


### Installation Tips

- For applications involving HDD, pipe bursting, bridge crossings, pipe in casings and above ground use. Trim rubber retainer/s 0.25" longer than the gap between the locking segments when they are inserted into the segment cavity. Drive the rubber retainer to the back of the cavity. The rubber is in compression and secure.

# SPECIFICATIONS

## BASIC DIMENSIONS



INCHES	INCHES				POUNDS	DEGREES	FEET	
SIZE	A	B	C	SEGMENTS <sup>a</sup>	RUBBER LOCKING RETAINERS	ACCESSORY WEIGHTS <sup>b</sup>	DEFLECTION	PULLOUT
4	4.80	7.00	4.84	3	1	2	5.0	0.03
6	6.90	9.27	5.27	3	1	2	5.0	0.04
8	9.05	11.68	5.82	3	1	3	5.0	0.04
10	11.10	14.12	6.03	3	1	5	5.0	0.05
12	13.20	16.43	6.30	5	1	8	5.0	0.05
14	15.30	18.80	7.75	6	1	12	4.0	0.05
16	17.40	21.46	7.95	6	1	15	4.0	0.05
18	19.50	23.40	8.19	6	1	17	4.0	0.05
20	21.60	26.07	8.40	6	1	28	4.0	0.05
24	25.80	30.25	8.86	12	1	36	4.0	0.05
30	32.00	36.38	10.28	12	1	60	2.5	0.05
36	38.30	43.35	10.87	12	1	85	2.0	0.05
42	44.50	50.28	10.71	15	1	92	2.0	0.12
48	50.80	56.95	11.01	15	1	129	2.0	0.13
54	57.56	63.96	11.12	15	1	135	2.0	0.10

**NOTE:** These deflections are based on joints with nominal dimensions.

<sup>a</sup>Number of segments.

<sup>b</sup>Accessory weights include segments, gaskets, and rubber retainers.

# SPECIFICATIONS

## PRESSURE CLASS (Thickness, Dimension & Weight)

INCHES SIZE	PSI PRESSURE CLASS	INCHES		POUNDS		
		NOMINAL THICKNESS	OUTSIDE DIAMETER <sup>a</sup>	WEIGHT PER LENGTH <sup>b</sup>		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
4	350	0.25	4.8	213	-	10.9
6	350	0.25	6.9	313	345	16.0
8	350	0.25	9.05	417	459	21.1
10	350	0.26	11.1	538	592	27.1
12	350	0.28	13.2	725	765	34.8
14	250	0.28	15.3	-	925	40.4
14	300	0.3	15.3	-	983	43.3
14	350	0.31	15.3	-	1011	44.7
16	250	0.30	17.4	1029	1128	49.3
16	300	0.32	17.4	1087	1192	52.5
16	350	0.34	17.4	1146	1258	55.8
18	250	0.31	19.5	-	1312	57.2
18	300	0.34	19.5	-	1420	62.6
18	350	0.36	19.5	-	1492	66.2
20	250	0.33	21.6	1414	1549	67.5
20	300	0.36	21.6	1522	1669	73.5
20	350	0.38	21.6	1594	1749	77.5
24	200	0.33	25.8	1723	1885	80.8
24	250	0.37	25.8	1898	2079	90.5
24	300	0.40	25.8	2028	2223	97.7
24	350	0.43	25.8	2157	2367	104.9
30	150	0.34	32.0	2246	2398	103.5
30	200	0.38	32.0	2464	2633	115.5
30	250	0.42	32.0	2682	2869	127.5
30	300	0.45	32.0	2845	3046	136.5
30	350	0.49	32.0	3061	3280	148.4
36	150	0.38	38.3	3018	-	138.5
36	200	0.42	38.3	3279	-	152.9
36	250	0.47	38.3	3605	-	170.9
36	300	0.51	38.3	3866	-	185.3
36	350	0.56	38.3	4190	-	203.2

Table continued on next page. ►

# SPECIFICATIONS

## PRESSURE CLASS (Thickness, Dimension & Weight) *Continued*

INCHES	PSI	INCHES		POUNDS		
SIZE	PRESSURE CLASS	NOMINAL THICKNESS	OUTSIDE DIAMETER <sup>a</sup>	WEIGHT PER LENGTH <sup>b</sup>		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
42	150	0.41	44.5	3820	-	173.8
42	200	0.47	44.5	4272	-	198.9
42	250	0.52	44.5	4650	-	219.9
42	300	0.57	44.5	5025	-	240.7
42	350	0.63	44.5	5475	-	265.7
48	150	0.46	50.8	-	5355	222.6
48	200	0.52	50.8	-	5930	251.3
48	250	0.58	50.8	-	6500	280.0
48	300	0.64	50.8	-	7075	308.6
48	350	0.70	50.8	-	7645	337.1
54	150	0.51	57.6	-	6657	279.7
54	200	0.58	57.6	-	7417	317.7
54	250	0.65	57.6	-	8175	355.6
54	300	0.72	57.6	-	8931	393.4
54	350	0.79	57.6	-	9685	431.1

**NOTE:** Per ANSI/AWWA C150/A21.50 the thicknesses in above table include the 0.08" service allowance and the casting tolerance by size ranges.

Pressure Classes are defined as the rated water pressure of the pipe in psi. The thicknesses shown are adequate for the rated water working pressure plus a surge allowance of 100 psi. Calculations are based on a minimum yield strength of 42,000 and a 2.0 safety factor times the sum of the working pressure and 100 psi surge allowance.

Thicknesses and dimensions of 4" through 54" Ductile Iron pipe conform to ANSI/AWWA C151/A21.51.

Weights may vary from the standard because of differences in bell weights.

<sup>a</sup>Tolerance of O.D. of spigot end: (4-12 in., ±0.06 in.), (16-24 in., +0.05 in., -0.08 in.), (30-54 in., +0.08 in., -0.06 in.).

<sup>b</sup>Including bell; calculated weight of pipe rounded off to nearest 5 lbs.

# SPECIFICATIONS

## THICKNESS CLASS (Thickness, Dimension & Weight)

INCHES SIZE	THICKNESS CLASS	INCHES		POUNDS		
		NOMINAL THICKNESS	OUTER DIAMETER <sup>a</sup>	WEIGHT PER LENGTH <sup>b</sup>		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
4	51	0.26	4.8	220	241	11.3
4	52	0.29	4.8	244	267	12.6
4	53	0.32	4.8	265	290	13.8
4	54	0.35	4.8	287	314	15.0
4	55	0.38	4.8	307	336	16.1
4	56	0.41	4.8	328	360	17.3
6	50	0.25	6.9	312	343	16.0
6	51	0.28	6.9	345	378	17.8
6	52	0.31	6.9	378	414	19.6
6	53	0.34	6.9	410	451	21.4
6	54	0.37	6.9	443	486	23.2
6	55	0.4	6.9	475	521	25.0
6	56	0.43	6.9	506	555	26.7
8	50	0.27	9.1	447	488	22.8
8	51	0.3	9.1	491	535	25.2
8	52	0.33	9.1	536	584	27.7
8	53	0.36	9.1	578	631	30.1
8	54	0.39	9.1	622	679	32.5
8	55	0.42	9.1	663	725	34.8
8	56	0.45	9.1	707	772	37.2
10	50	0.29	11.1	592	652	30.1
10	51	0.32	11.1	648	714	33.2
10	52	0.35	11.1	700	774	36.2
10	53	0.38	11.1	752	833	39.2
10	54	0.41	11.1	806	892	42.1
10	55	0.44	11.1	860	952	45.1
10	56	0.47	11.1	910	1010	48.0
12	50	0.31	13.2	790	837	38.4
12	51	0.34	13.2	855	909	42.0
12	52	0.37	13.2	920	981	45.6
12	53	0.4	13.2	985	1053	49.2
12	54	0.43	13.2	1049	1125	52.8
12	55	0.46	13.2	1112	1195	56.3
12	56	0.49	13.2	1177	1267	59.9

Table continued on next page. ▶

# SPECIFICATIONS

## THICKNESS CLASS (Thickness, Dimension & Weight) *Continued*

INCHES SIZE	THICKNESS CLASS	INCHES		POUNDS		
		NOMINAL THICKNESS	OUTER DIAMETER <sup>a</sup>	WEIGHT PER LENGTH <sup>b</sup>		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
14	50	0.33	15.3	-	1067	47.5
14	51	0.36	15.3	-	1151	51.7
14	52	0.39	15.3	-	1235	55.9
14	53	0.42	15.3	-	1319	60.1
14	54	0.45	15.3	-	1401	64.2
14	55	0.48	15.3	-	1485	68.4
14	56	0.51	15.3	-	1567	72.5
16	50	0.34	17.4	1146	1258	55.8
16	51	0.37	17.4	1233	1354	60.6
16	52	0.4	17.4	1319	1450	65.4
16	53	0.43	17.4	1404	1545	70.1
16	54	0.46	17.4	1490	1640	74.9
16	55	0.49	17.4	1577	1736	79.7
16	56	0.52	17.4	1661	1830	84.4
18	50	0.35	19.5	-	1456	64.4
18	51	0.38	19.5	-	1564	69.8
18	52	0.41	19.5	-	1672	75.2
18	53	0.44	19.5	-	1780	80.6
18	54	0.47	19.5	-	1888	86.0
18	55	0.5	19.5	-	1994	91.3
18	56	0.53	19.5	-	2102	96.7
20	50	0.36	21.6	1522	1669	73.5
20	51	0.39	21.6	1630	1789	79.5
20	52	0.42	21.6	1738	1909	85.5
20	53	0.45	21.6	1846	2029	91.5
20	54	0.48	21.6	1954	2149	97.5
20	55	0.51	21.6	2060	2267	103.4
20	56	0.54	21.6	2166	2385	109.3

Table continued on next page. ►

# SPECIFICATIONS

## THICKNESS CLASS (Thickness, Dimension & Weight) *Continued*

INCHES SIZE	THICKNESS CLASS	INCHES		POUNDS		
		NOMINAL THICKNESS	OUTER DIAMETER <sup>a</sup>	WEIGHT PER LENGTH <sup>b</sup>		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
24	50	0.38	25.8	1941	2127	92.9
24	51	0.41	25.8	2071	2271	100.1
24	52	0.44	25.8	2200	2415	107.3
24	53	0.47	25.8	2328	2557	114.4
24	54	0.5	25.8	2458	2701	121.6
24	55	0.53	25.8	2587	2845	128.8
24	56	0.56	25.8	2715	2987	135.9
30	50	0.39	32	2518	2692	118.5
30	51	0.43	32	2736	2928	130.5
30	52	0.47	32	2954	3164	142.5
30	53	0.51	32	3170	3397	154.4
30	54	0.55	32	3387	3631	166.3
30	55	0.59	32	3603	3865	178.2
30	56	0.63	32	3817	4097	190.0
36	50	0.43	38.3	3344	-	156.5
36	51	0.48	38.3	3670	-	174.5
36	52	0.53	38.3	3994	-	192.4
36	53	0.58	38.3	4319	-	210.3
36	54	0.63	38.3	4641	-	228.1
36	55	0.68	38.3	4964	-	245.9
36	56	0.73	38.3	5286	-	263.7
42	50	0.47	44.5	4272	-	198.9
42	51	0.53	44.5	4724	-	224.0
42	52	0.59	44.5	5176	-	249.1
42	53	0.65	44.5	5624	-	274.0
42	54	0.71	44.5	6072	-	298.9
42	55	0.77	44.5	6519	-	323.7
42	56	0.83	44.5	6963	-	348.4

*Table continued on next page.* ►

# SPECIFICATIONS

## THICKNESS CLASS (Thickness, Dimension & Weight) *Continued*

INCHES SIZE	THICKNESS CLASS	INCHES		POUNDS		
		NOMINAL THICKNESS	OUTER DIAMETER <sup>a</sup>	WEIGHT PER LENGTH <sup>b</sup>		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
48	50	0.51	50.8	-	5835	246.6
48	51	0.58	50.8	-	6500	280.0
48	52	0.65	50.8	-	7170	313.4
48	53	0.72	50.8	-	7835	346.6
48	54	0.79	50.8	-	8500	379.8
48	55	0.86	50.8	-	9160	412.9
48	56	0.93	50.8	-	9820	445.9
54	50	0.57	57.56	-	7309	312.3
54	51	0.65	57.56	-	8175	355.6
54	52	0.73	57.56	-	9039	398.8
54	53	0.81	57.56	-	9901	441.9
54	54	0.89	57.56	-	10761	484.9
54	55	0.97	57.56	-	11617	527.7
54	56	1.05	57.56	-	12471	570.4

Thicknesses and dimensions of 4" through 54" Ductile Iron pipe conform to ANSI/AWWA C151/A21.51.

Weights may vary from the standard because of differences in bell weights.

<sup>a</sup>Tolerance of O.D. of spigot end: (4-12 in., ±0.06 in.), (16-24 in., +0.05 in., -0.08 in.), (30-54 in., +0.08 in., -0.06 in.).

<sup>b</sup>Including bell; calculated weight of pipe rounded off to nearest 5 lbs.

<sup>c</sup>Consult with USP for higher pressure applications

# NOTES

# 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 Submittal Document (Rev. 03/2024)

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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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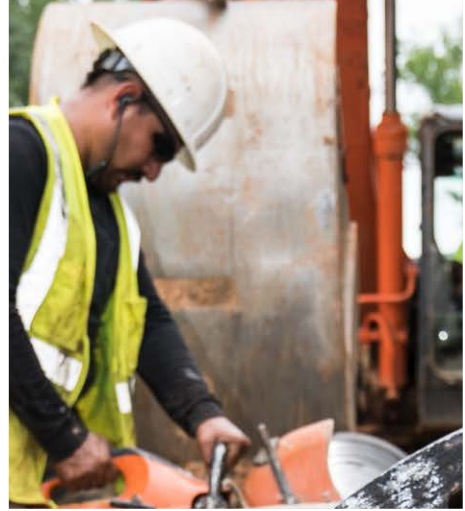
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# HDSS<sup>®</sup> FIELD WELD PROCEDURE



## PIPE

FABRICATION

RESTRAINED JOINTS

FITTINGS

GASKETS

COATINGS & LININGS



# U.S. PIPE

**A QUIKRETE<sup>®</sup> COMPANY**

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# 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](http://WWW.USPIPE.COM) for details and parameters for welding special lined pipe.

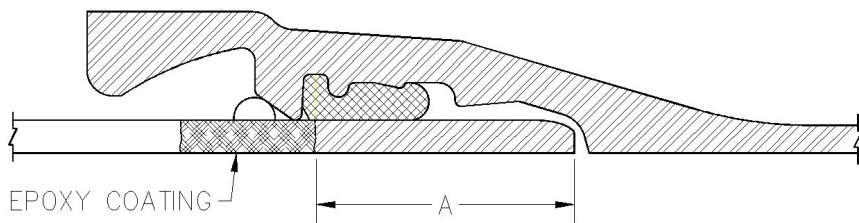


Figure 1: Epoxy Limit

# HDSS® FIELD WELD PROCEDURE *(Kit Version)*

## TABLE AND FIGURES

INCHES						PASSES	RODS	INCHES		
SIZE	BAR FROM CUT END DIST.	MAX. PIPE O.D.	MIN. PIPE O.D.	CIRCUMFERENCE		BAR DIAM.	BAR I.D.	MIN. NO. OF WELD PASSES	APPROX. NO. OF WELDING RODS REQ.	FILLET SIZE L
				MAX.	MIN.					
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.

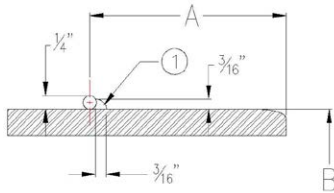


Figure 2: Welding 4-12 inch Pipe

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

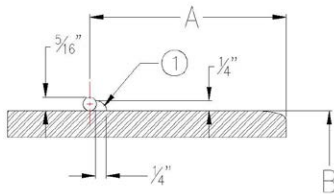


Figure 3: Welding 14-24 inch Pipe

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

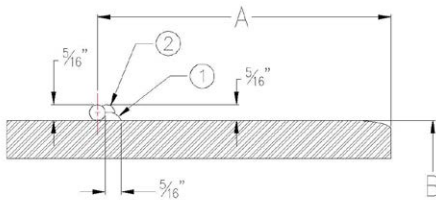


Figure 4: Welding 30 and 36 inch pipe

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.

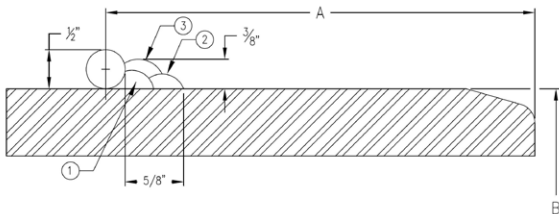


Figure 5: Welding 42 - 54 inch Pipe

# 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

(Rev. 10/2023)

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