HDSS®

High Deflection, High Pressure Restrained Pipe and Fittings

PIPE

FABRICATION

RESTRAINED JOINTS

FITTINGS

GASKETS

COATINGS & LININGS

MADE IN USA

U.S. PIPE

A QUIKRETE® COMPANY

CONTENTS

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
ASTM C595 Standard Specification for Blended Hydraulic Cements

HDSS® Pipe and Fittings can provide a true 350psi working pressure with a flexible restrained push-on joint for 4" through 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°, 14" 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" through 24" TR FLEX® Pipe and Fittings. 4" through 24" TR FLEX fittings have a 350 psi joint rating depending on the class of pipe used.

HDSS fittings are avialable in sizes 24" through 54".

For fire protection service, 4" through 12" pipe and fittings are approved by Factory Mutual for 350 psi.

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 HDSS, 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.

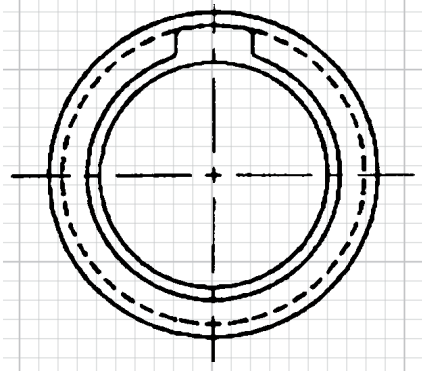
Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/A21.4. Asphaltic outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 for fittings. Unless otherwise requested or specified, all pipe will be double cement lined with sealcoat.

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.

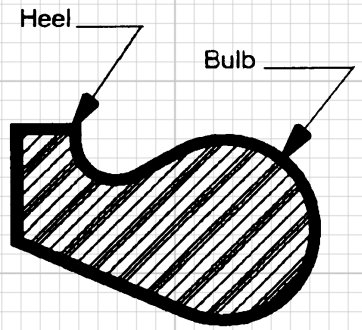
ASSEMBLY INSTRUCTIONS
TYTON JOINT® GASKET INSTALLATION

INSERTION SLOT ORIENTATION

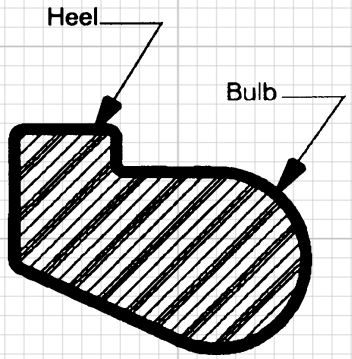


4"–54"

GASKET INSTALLATION



4"–24"



30"–54"

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

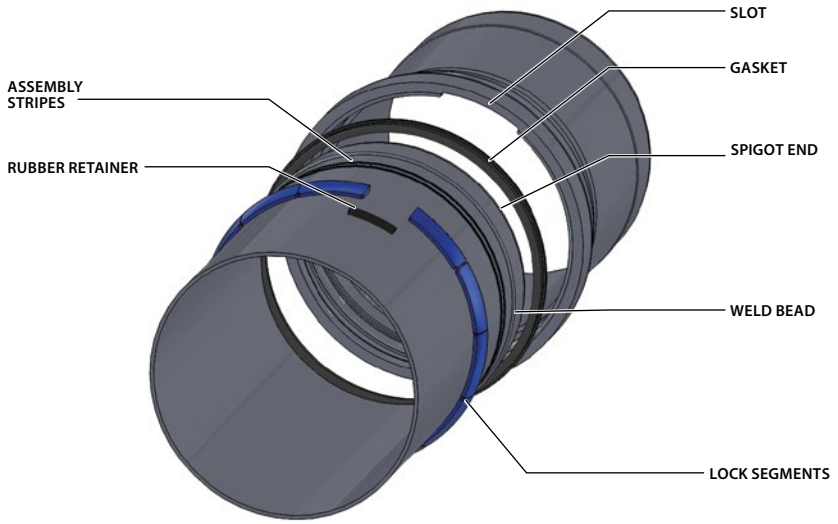
After the gasket has been installed into the bell, a thin film of Tyton Joint Lubricant should be applied to the inside surface of the gasket which will come in contact with the beveled end of the pipe. In warm, dry weather conditions, the lubricant can dry out, especially when applied to warm or hot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

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 in the 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. Extend the joint to remove the slack in the locking segment cavity. Joint extension is necessary to attain the marked laying length on the pipe and to minimize growth or extension of the line as it is pressurized.
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.

Disassembly

To disassemble the HDSS joint, notches in the blue restraining segments allow sliding the individual segments back around and out of the single bell recess. Follow these steps to disassemble the joint: 1) push the spigot in until it fully homes into the bell- the joint should not be deflected when removing the restraining segments. 2) use a small screwdriver that will fit between the pipe barrel, bell and into the notches, or cut outs, in the blue HDSS restraining segments. 3) Slide the segments up to the slot and pull them out. Once all the restraining segments are removed, the joint can be pulled apart.

HDSS PIPE AND FITTINGS SOCKET PULL OUT

(Linear Expansion Within The Assembled Socket)

In HDSS Pipe and Fitting sockets, there is a small amount of slack or pullout available at each joint. This pullout, or expansion capability, is the result of clearance inside the socket required for the insertion of the locking segments. The expansion can be minimized by extending the joint after installing the locking segments and prior to setting the joint deflection.

The expansion of the joint in both pipe and fitting sockets must be considered, particularly in the following cases:

a. When HDSS Pipe is used above ground (bridge crossings, on piers, etc.)

b. When HDSS Pipe is used in poor soil conditions (swamps, marshes, etc.)

c. When long lengths of HDSS Pipe are required for restraint due to high operating pressures and/or unfavorable soil parameters

d. Where HDSS Pipe is used inside casing pipe

e. Where HDSS Pipe and Fittings are in vertical alignment

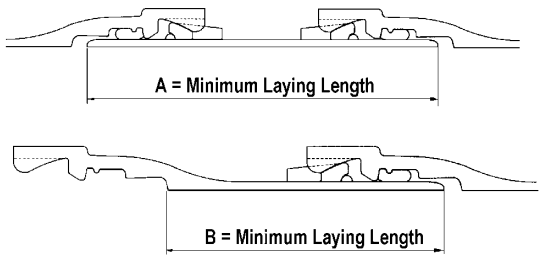
When HDSS Pipe is used inside a casing pipe, it is recommended that the assembled pipe be pulled through the casing. Additional security may be required to ensure that the locking segments are adequately retained in the socket during such installation.

Please note that if the joint is not extended during assembly, the expansion per joint during line pressurization will increase the length of a 1000 foot long installation by 2 to 5 feet, depending upon the pipe size. *(Refer to Table 1 for the Pullout at each joint.)*

INCHES			FEET
SIZE	DIMENSION		PULLOUT
	A	B	Maximum
4	12.75	10.25	0.03
6	14.00	11.00	0.04
8	15.25	12.00	0.04
10	15.75	12.25	0.05
12	16.50	13.00	0.05
14	19.75	15.25	0.05
16	20.25	15.50	0.05
18	21.00	16.00	0.05
20	21.50	16.25	0.05
24	23.00	17.25	0.05
30	26.25	19.00	0.05
36	28.00	20.25	0.05
42	27.25	32.00	0.12
48	28.25	33.00	0.13
54	28.50	33.00	0.10

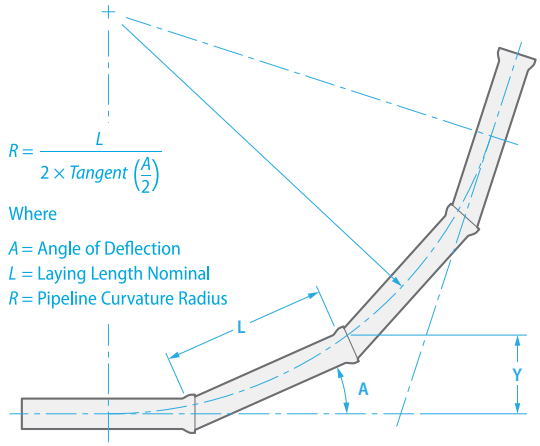
Table 1.

Minimum Laying Lengths and Average Pullout for Each HDSS Pipe or Fittings Socket



MINIMUM LAYING LENGTHS FOR HDSS PIPE

The following drawings and dimensions in Table 1 define the minimum lengths for HDSS pipe when furnished in either ***Plain End x Plain End***, or ***Bell x Plain End***. 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 HDSS Pipe.



ASSEMBLY NOTES

1. Most restrained joints allow for joint take-up after installation. The amount of take-up or slack can vary considerably with the type of joint and installation conditions. Thrust forces produced by internal pressures can result in removal of this joint take-up thereby increasing the length of the restrained section of the line. In any situation or configuration where increases in the line segment length could be detrimental to the pipeline or surrounding structures, the restrained joints should be fully extended during installation.

2. An increase in line segment length can also result in additional joint deflection. If an increase in length or other line movement are anticipated, the deflection of the restrained joints should be limited to only a portion of the joint design deflection during the installation of the pipe.

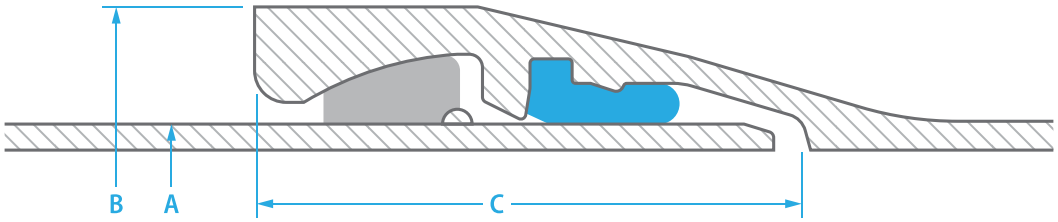
3. In fully extended, totally restrained piping systems, the thrust forces are carried by the piping system, and the resistance to the thrust is not dependent upon the surrounding soil. In situations where there is insufficient space to provide the designed restrained length, or where there are poor soil conditions, the entire section of line should be restrained or other external means of stability or restraint provided.

4. When HDSS Pipe is used in casings, it is preferred that it is pulled. Pulling will fully extend the joints and take up the joint slack prior to making end connections. If the pipe must be pushed contact a U.S. Pipe Sales Representative for special instructions. The length of restraint in the casing should not be considered as part of the designed length of the restraint required to provide the soil resistance to the thrust forces.

5. Above ground lines subject to thrust forces should be fully restrained and extended to remove any slack from the joint. The joint can be extended by pulling out on the pipe after the restrained joint assembly is made. The thrust forces can cause an unexpected increase in length of an above ground line if the slack is not first removed from the joint. When restrained joint pipe are used for bridge crossings or other above ground installations, each length of pipe must be supported in a manner to restrict both vertical and horizontal movement.

6. Vertical applications with HDSS Joints. Joints used in vertical installations up to 45° must be kept extended and a support pier provided at both horizontal pipe sections, or bends, adjacent to the portion of vertical pipe. A support pier is not needed in installations where the bottom bend is buried. Failure to keep joints extended can result in unwanted line growth or joint separation from dynamic impact loading.

SPECIFICATIONS
BASIC DIMENSIONS



INCHES	INCHES					POUNDS	DEGREES	FEET
SIZE	A Spigot Outside Diameter	B Bell Outside Diameter	C Socket Depth	SEGMENTS[a]	RUBBER LOCKING RETAINERS	ACCESSORY WEIGHTS[b]	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	19.15	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	23.78	8.19	6	1	17	4.0	0.05
20	21.60	26.07	8.40	6	1	23	4.0	0.05
24	25.80	30.66	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	107	2.0	0.12
48	50.80	56.95	11.01	15	1	145	2.0	0.13
54	57.56	63.72	11.12	15	1	150	2.0	0.10

NOTE: These deflections are based on joints with nominal dimensions.
[a]Number of segments.
[b]Accessory weights include segments, gaskets, and rubber retainers.

SPECIFICATIONS

PRESSURE CLASS (Thickness, Dimension & Weight)

INCHES	PSI	INCHES		POUNDS		
SIZE	PRESSURE CLASS	NOMINAL THICKNESS	OUTSIDE DIAMETER[a]	WEIGHT PER LENGTH[b]		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
4	350	0.25	4.80	213	-	10.9
6	350	0.25	6.90	313	345	16.0
8	350	0.25	9.05	417	459	21.1
10	350	0.26	11.10	538	592	27.1
12	350	0.28	13.20	725	765	34.8
14	250	0.28	15.30	-	925	40.4
14	300	0.3	15.30	-	983	43.3
14	350	0.31	15.30	-	1011	44.7
16	250	0.30	17.40	1029	1128	49.3
16	300	0.32	17.40	1087	1192	52.5
16	350	0.34	17.40	1146	1258	55.8
18	250	0.31	19.50	-	1312	57.2
18	300	0.34	19.50	-	1420	62.6
18	350	0.36	19.50	-	1492	66.2
20	250	0.33	21.60	1414	1549	67.5
20	300	0.36	21.60	1522	1669	73.5
20	350	0.38	21.60	1594	1749	77.5
24	200	0.33	25.80	1723	1885	80.8
24	250	0.37	25.80	1898	2079	90.5
24	300	0.40	25.80	2028	2223	97.7
24	350	0.43	25.80	2157	2367	104.9
30	150	0.34	32.00	2246	2398	103.5
30	200	0.38	32.00	2464	2633	115.5
30	250	0.42	32.00	2682	2869	127.5
30	300	0.45	32.00	2845	3046	136.5
30	350	0.49	32.00	3061	3280	148.4
36	150	0.38	38.30	3018	-	138.5
36	200	0.42	38.30	3279	-	152.9
36	250	0.47	38.30	3605	-	170.9
36	300	0.51	38.30	3866	-	185.3
36	350	0.56	38.30	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[a]	WEIGHT PER LENGTH[b]		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
42	150	0.41	44.50	3820	-	173.8
42	200	0.47	44.50	4272	-	198.9
42	250	0.52	44.50	4650	-	219.9
42	300	0.57	44.50	5025	-	240.7
42	350	0.63	44.50	5475	-	265.7
48	150	0.46	50.80	-	5355	222.6
48	200	0.52	50.80	-	5930	251.3
48	250	0.58	50.80	-	6500	280.0
48	300	0.64	50.80	-	7075	308.6
48	350	0.70	50.80	-	7645	337.1
54	150	0.51	57.56	-	6657	279.7
54	200	0.58	57.56	-	7417	317.7
54	250	0.65	57.56	-	8175	355.6
54	300	0.72	57.56	-	8931	393.4
54	350	0.79	57.56	-	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.

[a]Tolerance of O.D. of spigot end: (4-12 in., ±0.06 in.), (14–24 in., +0.05 in., -0.08 in.), (30–54 in., +0.08 in., -0.06 in.).

[b]Including bell; calculated weight of pipe rounded off to nearest 5 lbs.

SPECIFICATIONS

THICKNESS CLASS (Thickness, Dimension & Weight)

INCHES		INCHES		POUNDS		
SIZE	THICKNESS CLASS	NOMINAL THICKNESS	OUTER DIAMETER[a]	WEIGHT PER LENGTH[b]		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
4	51	0.26	4.80	220	241	11.3
4	52	0.29	4.80	244	267	12.6
4	53	0.32	4.80	265	290	13.8
4	54	0.35	4.80	287	314	15.0
4	55	0.38	4.80	307	336	16.1
4	56	0.41	4.80	328	360	17.3
6	50	0.25	6.90	312	343	16.0
6	51	0.28	6.90	345	378	17.8
6	52	0.31	6.90	378	414	19.6
6	53	0.34	6.90	410	451	21.4
6	54	0.37	6.90	443	486	23.2
6	55	0.4	6.90	475	521	25.0
6	56	0.43	6.90	506	555	26.7
8	50	0.27	9.10	447	488	22.8
8	51	0.3	9.10	491	535	25.2
8	52	0.33	9.10	536	584	27.7
8	53	0.36	9.10	578	631	30.1
8	54	0.39	9.10	622	679	32.5
8	55	0.42	9.10	663	725	34.8
8	56	0.45	9.10	707	772	37.2
10	50	0.29	11.10	592	652	30.1
10	51	0.32	11.10	648	714	33.2
10	52	0.35	11.10	700	774	36.2
10	53	0.38	11.10	752	833	39.2
10	54	0.41	11.10	806	892	42.1
10	55	0.44	11.10	860	952	45.1
10	56	0.47	11.10	910	1010	48.0
12	50	0.31	13.20	790	837	38.4
12	51	0.34	13.20	855	909	42.0
12	52	0.37	13.20	920	981	45.6
12	53	0.4	13.20	985	1053	49.2
12	54	0.43	13.20	1049	1125	52.8
12	55	0.46	13.20	1112	1195	56.3
12	56	0.49	13.20	1177	1267	59.9

Table continued on next page. ▶

SPECIFICATIONS

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

INCHES		INCHES		POUNDS		
SIZE	THICKNESS CLASS	NOMINAL THICKNESS	OUTER DIAMETER[a]	WEIGHT PER LENGTH[b]		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
14	50	0.33	15.30	-	1067	47.5
14	51	0.36	15.30	-	1151	51.7
14	52	0.39	15.30	-	1235	55.9
14	53	0.42	15.30	-	1319	60.1
14	54	0.45	15.30	-	1401	64.2
14	55	0.48	15.30	-	1485	68.4
14	56	0.51	15.30	-	1567	72.5
16	50	0.34	17.40	1146	1258	55.8
16	51	0.37	17.40	1233	1354	60.6
16	52	0.4	17.40	1319	1450	65.4
16	53	0.43	17.40	1404	1545	70.1
16	54	0.46	17.40	1490	1640	74.9
16	55	0.49	17.40	1577	1736	79.7
16	56	0.52	17.40	1661	1830	84.4
18	50	0.35	19.50	-	1456	64.4
18	51	0.38	19.50	-	1564	69.8
18	52	0.41	19.50	-	1672	75.2
18	53	0.44	19.50	-	1780	80.6
18	54	0.47	19.50	-	1888	86.0
18	55	0.5	19.50	-	1994	91.3
18	56	0.53	19.50	-	2102	96.7
20	50	0.36	21.60	1522	1669	73.5
20	51	0.39	21.60	1630	1789	79.5
20	52	0.42	21.60	1738	1909	85.5
20	53	0.45	21.60	1846	2029	91.5
20	54	0.48	21.60	1954	2149	97.5
20	55	0.51	21.60	2060	2267	103.4
20	56	0.54	21.60	2166	2385	109.3

Table continued on next page.

SPECIFICATIONS

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

INCHES		INCHES		POUNDS		
SIZE	THICKNESS CLASS	NOMINAL THICKNESS	OUTER DIAMETER[a]	WEIGHT PER LENGTH[b]		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
24	50	0.38	25.80	1941	2127	92.9
24	51	0.41	25.80	2071	2271	100.1
24	52	0.44	25.80	2200	2415	107.3
24	53	0.47	25.80	2328	2557	114.4
24	54	0.5	25.80	2458	2701	121.6
24	55	0.53	25.80	2587	2845	128.8
24	56	0.56	25.80	2715	2987	135.9
30	50	0.39	32.00	2518	2692	118.5
30	51	0.43	32.00	2736	2928	130.5
30	52	0.47	32.00	2954	3164	142.5
30	53	0.51	32.00	3170	3397	154.4
30	54	0.55	32.00	3387	3631	166.3
30	55	0.59	32.00	3603	3865	178.2
30	56	0.63	32.00	3817	4097	190.0
36	50	0.43	38.30	3344	-	156.5
36	51	0.48	38.30	3670	-	174.5
36	52	0.53	38.30	3994	-	192.4
36	53	0.58	38.30	4319	-	210.3
36	54	0.63	38.30	4641	-	228.1
36	55	0.68	38.30	4964	-	245.9
36	56	0.73	38.30	5286	-	263.7
42	50	0.47	44.50	4272	-	198.9
42	51	0.53	44.50	4724	-	224.0
42	52	0.59	44.50	5176	-	249.1
42	53	0.65	44.50	5624	-	274.0
42	54	0.71	44.50	6072	-	298.9
42	55	0.77	44.50	6519	-	323.7
42	56	0.83	44.50	6963	-	348.4

Table continued on next page. ▶

SPECIFICATIONS

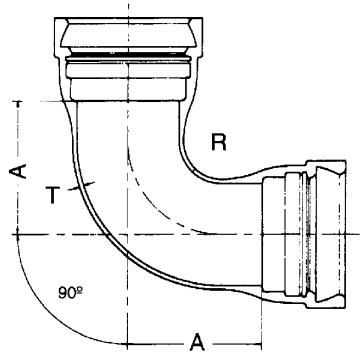
THICKNESS CLASS (Thickness, Dimension & Weight) *Continued*

INCHES		INCHES		POUNDS		
SIZE	THICKNESS CLASS	NOMINAL THICKNESS	OUTER DIAMETER[a]	WEIGHT PER LENGTH[b]		BARREL WEIGHT
				18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH	PER FOOT
48	50	0.51	50.80	-	5835	246.6
48	51	0.58	50.80	-	6500	280.0
48	52	0.65	50.80	-	7170	313.4
48	53	0.72	50.80	-	7835	346.6
48	54	0.79	50.80	-	8500	379.8
48	55	0.86	50.80	-	9160	412.9
48	56	0.93	50.80	-	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.
[a]Tolerance of O.D. of spigot end: (4-12 in., ±0.06 in.), (14–24 in., +0.05 in., -0.08 in.), (30–54 in., +0.08 in., -0.06 in.).
[b]Including bell; calculated weight of pipe rounded off to nearest 5 lbs.
[c]Consult with USP for higher pressure applications

SPECIFICATIONS - FITTINGS

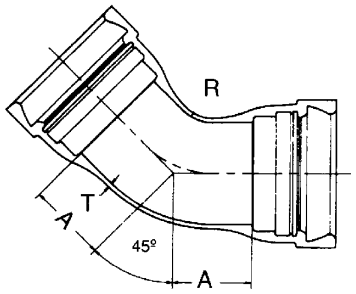
BENDS (Thickness & Dimensions)



90° Bend

DOMESTIC

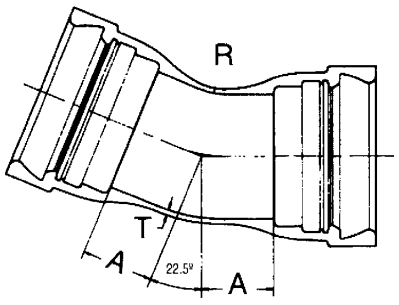
INCHES SIZE	PSI PRESSURE RATING	INCHES DIMENSIONS			POUNDS WEIGHT
		T	A	R	
24	350	0.89	22.00	18.50	1247
30	350	1.03	23.00	21.00	2051
36	350	1.15	26.00	24.00	2740
42	350	0.82	29.25	25.71	3086
48	350	0.90	33.25	30.03	4303
54	350	1.05	37.00	34.04	5890



45° Bend

DOMESTIC

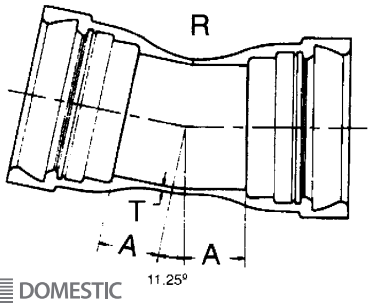
INCHES SIZE	PSI PRESSURE RATING	INCHES DIMENSIONS			POUNDS WEIGHT
		T	A	R	
24	350	0.89	11.00	18.12	977
30	350	1.03	10.50	20.52	1589
36	350	1.15	11.50	22.94	2980
42	350	0.82	14.00	25.26	2507
48	350	0.90	15.00	28.45	3427
54	350	1.05	20.25	41.74	4932



22.5° Bend

DOMESTIC

INCHES SIZE	PSI PRESSURE RATING	INCHES DIMENSIONS			POUNDS WEIGHT
		T	A	R	
24	350	0.89	17.00	16.70	987
30	350	1.03	7.00	25.14	1305
36	350	1.15	8.00	30.16	1858
42	350	0.82	9.00	29.99	2281
48	350	0.90	10.00	34.10	3112
54	350	1.05	10.25	36.64	4081



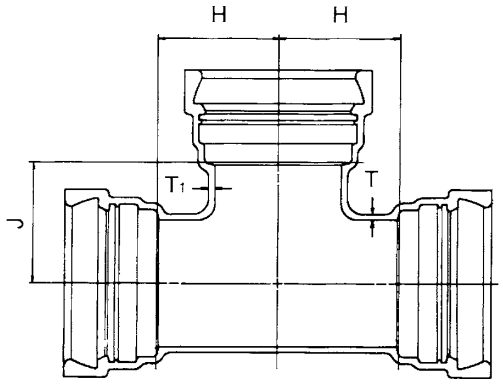
11.25° Bend

DOMESTIC

INCHES SIZE	PSI PRESSURE RATING	INCHES DIMENSIONS			POUNDS WEIGHT
		T	A	R	
24	350	0.89	11.00	76.12	992
30	350	1.03	7.00	50.77	1363
36	350	1.15	8.00	60.94	1862
42	350	0.82	6.00	30.11	2116
48	350	0.90	6.50	33.34	2871
54	350	1.05	5.00	35.27	3735

SPECIFICATIONS - FITTINGS

TEES (Thickness & Dimensions)



DOMESTIC

INCHES		PSI	INCHES				POUNDS
SIZE		PRESSURE RATING	DIMENSIONS				WEIGHT
RUN	BRANCH		T	T1	H	J	
24	24	350	0.89	0.89	16.00	16.00	1217
30	6	350	1.03	0.55	11.00	23.00	1565
30	8	350	1.03	0.60	11.00	23.00	1583
30	10	350	1.03	0.80	11.00	23.00	1602
30	12	350	1.03	0.75	11.00	23.00	1627
30	14	350	1.03	0.66	13.50	23.00	1799
30	16	350	1.03	0.70	13.50	23.00	1824
30	18	350	1.03	0.75	18.00	23.00	2089
30	20	350	1.03	0.80	18.00	23.00	2110
30	24	350	1.03	0.89	21.00	25.00	2435
30	30	350	1.03	1.03	21.00	25.00	2662
36	6	350	1.15	0.55	17.50	26.00	2558
36	8	350	1.15	0.60	17.50	26.00	2575
36	10	350	1.15	0.68	17.50	26.00	2593
36	12	350	1.15	0.75	17.50	26.00	2616
36	14	350	1.15	0.66	17.50	26.00	2658
36	16	350	1.15	0.70	17.50	26.00	2680
36	18	350	1.15	0.75	17.50	26.00	2709
36	20	350	1.15	0.80	17.50	26.00	2727
36	24	350	1.15	0.89	17.50	26.00	2852
36	30	350	1.15	1.03	20.00	26.00	3215
36	36	350	1.15	1.15	20.00	26.00	3443

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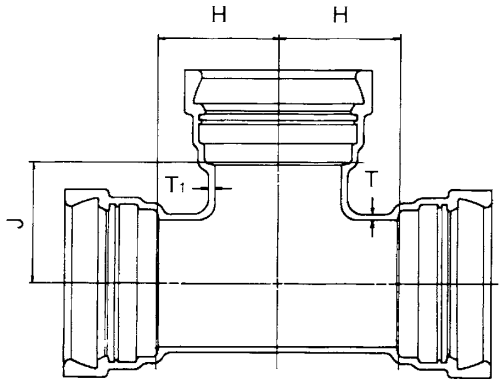
SPECIFICATIONS - FITTINGS

TEES CONTINUED (Thickness & Dimensions)



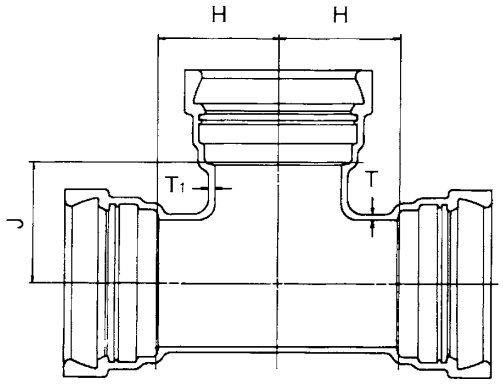
DOMESTIC

INCHES		PSI	INCHES				POUNDS
SIZE		PRESSURE RATING	DIMENSIONS				WEIGHT
RUN	BRANCH		T	T1	H	J	
42	12	350	1.28	0.75	20.00	30.00	3637
42	14	350	1.28	0.66	20.00	30.00	3676
42	16	350	1.28	0.70	20.00	30.00	3698
42	18	350	1.28	0.75	20.00	30.00	3727
42	20	350	1.28	0.80	20.00	30.00	3744
42	24	350	1.28	0.89	20.00	30.00	3866
42	30	350	1.28	1.15	31.00	31.00	5062
42	36	350	1.28	1.15	31.00	31.00	5269
42	42	350	0.82	0.82	30.00	30.00	4466
48	12	350	1.42	0.75	26.00	34.00	5418
48	14	350	1.42	0.66	26.00	34.00	5455
48	16	350	1.42	0.70	26.00	34.00	5478
48	18	350	1.42	0.75	26.00	34.00	5506
48	20	350	1.42	0.80	26.00	34.00	5522
48	24	350	1.42	0.89	26.00	34.00	5642
48	30	350	1.42	1.03	26.00	34.00	5816
48	36	350	1.42	1.15	34.00	34.00	6912
48	42	350	1.42	1.28	34.00	34.00	7165
48	48	350	0.90	0.90	33.50	33.50	6123

Table continued on next page.

SPECIFICATIONS - FITTINGS

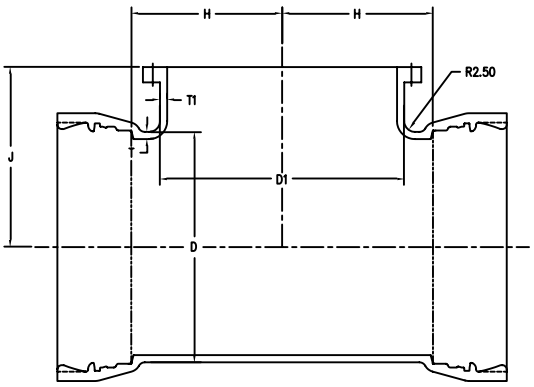
TEES CONTINUED(Thickness & Dimensions)



DOMESTIC

INCHES		PSI	INCHES				POUNDS
SIZE		PRESSURE RATING	DIMENSIONS				WEIGHT
RUN	BRANCH		T	T1	H	J	
54	24	350	1.55	0.89	19.00	39.00	6052
54	30	350	1.55	1.03	31.00	37.00	7892
54	36	350	1.55	1.15	31.00	37.00	8053
54	42	350	1.55	1.28	31.00	39.00	8361
54	48	350	1.55	1.42	31.00	39.00	8724
54	54	350	1.05	1.05	35.80	39.00	8278

SPECIFICATIONS
TEES WITH FLANGE BRANCH



DOMESTIC

INCHES						POUNDS
SIZE		DIMENSIONS				WEIGHT
RUN	BRANCH	T	T1	H	J	
24	24	0.89	0.89	17.00	22.00	1591
30	6	1.03	0.55	11.00	23.00	1556
30	8	1.03	0.60	11.00	23.00	1567
30	10	1.03	0.68	11.00	23.00	1580
30	12	1.03	0.75	11.00	23.00	1600
30	14	1.03	0.66	13.50	23.00	1732
30	16	1.03	0.70	13.50	23.00	1748
30	18	1.03	0.75	18.00	23.00	1988
30	20	1.03	0.80	18.00	23.00	2012
30	24	1.03	0.89	21.00	25.00	2251
30	30	1.03	1.03	21.00	25.00	2366
36	6	1.15	0.55	17.50	26.00	2549
36	8	1.15	0.60	17.50	26.00	2559
36	10	1.15	0.68	17.50	26.00	2570
36	12	1.15	0.75	17.50	26.00	2589
36	14	1.15	0.66	17.50	26.00	2590
36	16	1.15	0.70	17.50	26.00	2604
36	18	1.15	0.75	17.50	26.00	2608
36	20	1.15	0.80	17.50	26.00	2628
36	24	1.15	0.89	17.50	26.00	2667
36	30	1.15	1.03	20.00	26.00	3564
36	36	1.15	1.15	20.00	26.00	3891

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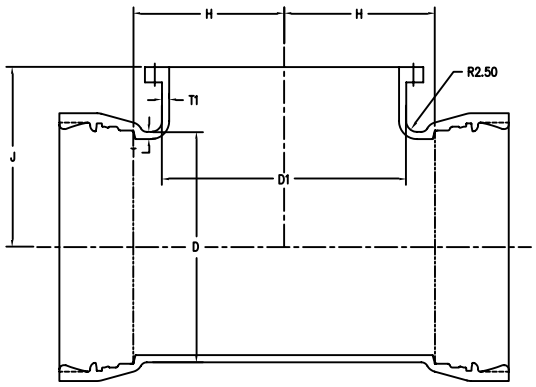
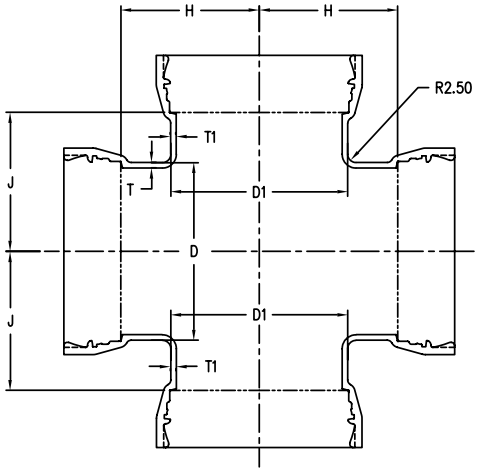
SPECIFICATIONS
TEES WITH FLANGE BRANCH CONTINUED



DOMESTIC

INCHES						POUNDS
SIZE		DIMENSIONS				WEIGHT
RUN	BRANCH	T	T1	H	J	
42	12	1.28	0.75	20.00	30.00	3602
42	14	1.28	0.66	20.00	30.00	3606
42	16	1.28	0.70	20.00	30.00	3623
42	18	1.28	0.75	20.00	30.00	3629
42	20	1.28	0.80	20.00	30.00	3674
42	24	1.28	0.89	20.00	30.00	3700
42	30	1.28	1.03	31.00	31.00	4788
42	36	1.28	1.15	31.00	31.00	4986
42	42	1.28	1.28	30.00	30.00	5292
48	12	1.42	0.75	26.00	34.00	5455
48	14	1.42	0.66	26.00	34.00	5455
48	16	1.42	0.70	26.00	34.00	5464
48	18	1.42	0.75	26.00	34.00	5466
48	20	1.42	0.80	26.00	34.00	5500
48	24	1.42	0.89	26.00	34.00	5542
48	30	1.42	1.03	26.00	34.00	5620
48	36	1.42	1.15	34.00	34.00	6678
48	42	1.42	1.28	34.00	34.00	6906
48	48	1.42	1.42	33.50	34.00	7371
54	30	1.55	1.03	31.00	37.00	7539
54	36	1.55	1.15	31.00	37.00	7661
54	42	1.55	1.28	31.00	39.00	7912
54	48	1.55	1.42	31.00	39.00	8134
54	54	1.55	1.55	35.8	39	9370

SPECIFICATIONS - FITTINGS
CROSSES



DOMESTIC

INCHES						POUNDS
SIZE		DIMENSIONS				WEIGHT
RUN	BRANCH	T	T1	H	J	
30	6	1.03	0.55	13.50	23.0	1711
30	8	1.03	0.60	13.50	23.0	1755
30	10	1.03	0.68	13.50	23.0	1805
30	12	1.03	0.75	13.50	23.0	1867
30	14	1.03	0.66	13.50	23.0	1974
30	16	1.03	0.70	13.50	23.0	2014
30	18	1.03	0.75	18.00	23.0	2355
30	20	1.03	0.80	18.00	23.0	2414
30	24	1.03	0.89	21.00	25.0	2824
30	30	1.03	1.03	21.00	25.0	3278
36	8	1.15	0.60	17.50	26.0	2608
36	10	1.15	0.68	17.50	26.0	2656
36	12	1.15	0.75	17.50	26.0	2718
36	14	1.15	0.66	17.50	26.0	2825
36	16	1.15	0.70	17.50	26.0	2865
36	18	1.15	0.75	17.50	26.0	2970
36	20	1.15	0.80	17.50	26.0	3029
36	24	1.15	0.89	17.50	26.0	3250
36	30	1.15	1.03	28.00	28.0	4393
36	36	1.15	1.15	28.00	28.0	4862
42	12	1.28	0.75	23.00	30.00	3971
42	14	1.28	0.66	23.00	30.00	4079
42	16	1.28	0.70	23.00	30.00	4122
42	18	1.28	0.75	23.00	30.00	4230
42	20	1.28	0.80	23.00	30.00	4460
42	24	1.28	0.89	23.00	30.00	4460
42	30	1.28	1.03	31.00	31.00	5597
42	36	1.28	1.15	31.00	31.00	6012
42	42	1.28	1.28	31.00	31.00	6587

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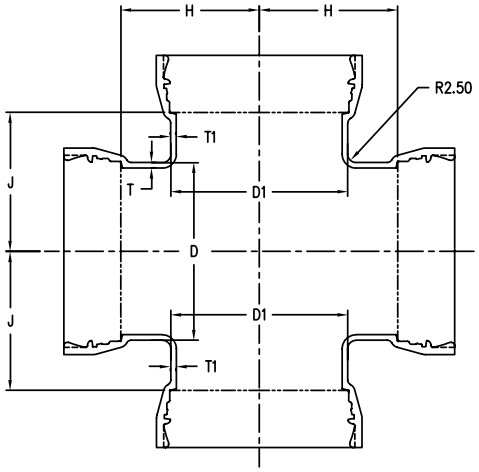
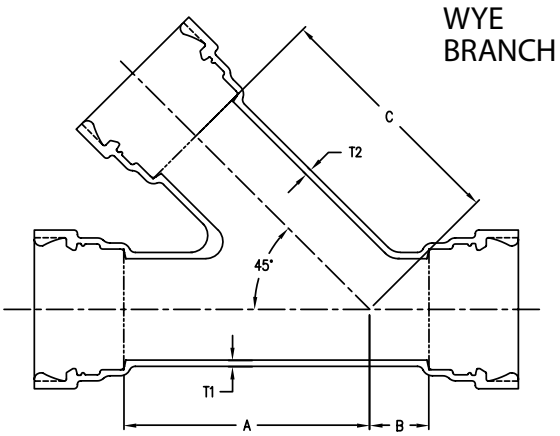
SPECIFICATIONS - FITTINGS
CROSSES CONTINUED



DOMESTIC

INCHES						POUNDS
SIZE		DIMENSIONS				WEIGHT
RUN	BRANCH	T	T1	H	J	
48	12	1.42	0.75	26.00	34.00	5519
48	14	1.42	0.66	26.00	34.00	5595
48	16	1.42	0.70	26.00	34.00	5638
48	18	1.42	0.75	26.00	34.00	5694
48	20	1.42	0.80	26.00	34.00	5726
48	24	1.42	0.89	26.00	34.00	5965
48	30	1.42	1.03	26.00	34.00	6314
48	36	1.42	1.15	34.00	34.00	7594
48	42	1.42	1.28	34.00	34.00	8101
48	48	1.42	1.42	34.00	34.00	8885
54	30	1.55	1.03	31.00	37.00	8338
54	36	1.55	1.15	31.00	37.00	8660
54	42	1.55	1.28	31.00	39.00	9276
54	48	1.55	1.42	31.00	39.00	10003
54	54	1.55	1.55	35.8	35.8	11076

SPECIFICATIONS - FITTINGS
WYE BRANCHES & WYES

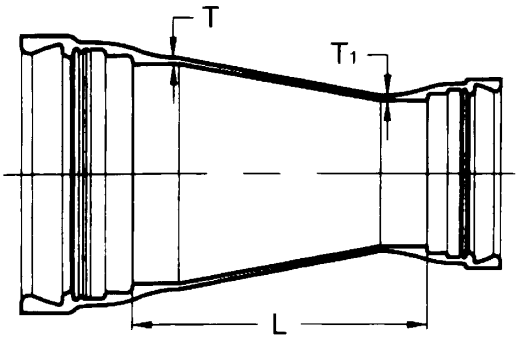


WYE
BRANCH

DOMESTIC

INCHES						POUNDS
SIZE		THICKNESS		DIMENSIONS		WEIGHT
RUN	BRANCH	T1	T2	A & C	B	
30	12	1.37	0.75	49.0	10.0	3264
30	16	1.37	0.89	49.0	10.0	3416
30	18	1.37	0.96	49.0	10.0	3495
30	20	1.37	1.03	49.0	10.0	3565
30	24	1.37	1.16	49.0	10.0	3770
30	30	1.37	1.37	49.0	10.0	4240
36	14	1.58	0.82	60.0	19.5	5472
36	16	1.58	0.89	60.0	19.5	5545
36	18	1.58	0.96	60.0	19.5	5635
36	20	1.58	1.03	60.0	19.5	5717
36	24	1.58	1.16	60.0	19.5	5944
36	30	1.58	1.37	60.0	19.5	6458
36	36	1.58	1.58	60.0	19.5	7010
42	24	1.78	1.16	69.0	19.5	8167
42	30	1.78	1.37	69.0	19.5	8700
42	36	1.78	1.58	69.0	19.5	9269
42	42	1.78	1.78	69.0	19.5	10050
48	24	1.96	1.16	77.5	21.5	11093
48	30	1.96	1.37	77.5	21.5	11645
48	36	1.96	1.58	77.5	21.5	12215
48	42	1.96	1.78	77.5	21.5	12933
48	48	1.96	1.96	77.5	21.5	13856

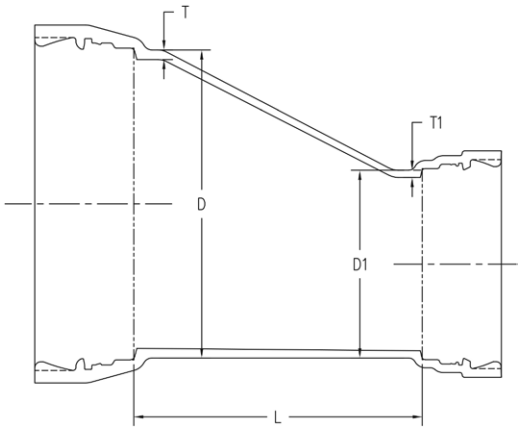
SPECIFICATIONS - FITTINGS
CONCENTRIC REDUCERS



DOMESTIC

INCHES		PSI	INCHES			POUNDS
SIZE		PRESSURE RATING	DIMENSIONS			WEIGHT
LARGE	SMALL		T	T1	L	
30	12	350	1.03	0.75	30.00	1066
30	16	350	1.03	0.70	30.00	1156
30	18	350	1.03	0.75	30.00	1213
30	20	350	1.03	0.80	24.00	1148
30	24	350	1.03	0.89	24.00	1318
36	18	350	1.15	0.75	36.00	1656
36	20	350	1.15	0.80	36.00	1713
36	24	350	1.15	0.89	22.00	1563
36	30	350	1.15	1.03	22.00	1806
42	20	350	1.28	0.80	42.00	2303
42	24	350	1.28	0.89	42.00	2519
42	30	350	1.28	1.03	20.00	2106
42	36	350	1.28	1.15	20.00	2337
48	24	350	1.42	0.89	48.00	3307
48	30	350	1.42	1.03	48.00	3668
48	36	350	1.42	1.15	36.00	3511
48	42	350	1.42	1.28	36.00	3889
54	24	350	1.55	0.89	38.00	3607
54	30	350	1.55	1.03	32.00	3652
54	36	350	1.55	1.15	28.00	3741
54	42	350	1.55	1.28	25.00	3883
54	48	350	1.55	1.42	18.00	3838

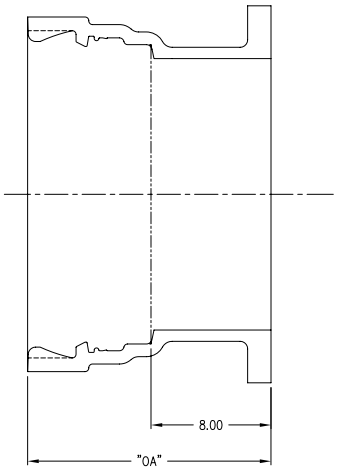
SPECIFICATIONS - FITTINGS
ECCENTRIC REDUCERS



DOMESTIC

INCHES		PSI	INCHES			POUNDS
SIZE		PRESSURE RATING	DIMENSIONS			WEIGHT
LARGE	SMALL		T	T1	L	
30	16	350	1.03	0.70	30.00	1140
30	18	350	1.03	0.75	24.00	1091
30	20	350	1.03	0.80	24.00	1135
30	24	350	1.03	0.89	24.00	1313
36	20	350	1.15	0.80	36.00	1690
36	24	350	1.15	0.89	24.00	1585
36	30	350	1.15	1.03	24.00	1857

SPECIFICATIONS - FITTINGS
FLANGE CONNECTING PIECES



DOMESTIC

INCHES		POUNDS
SIZE	OA	WEIGHT
		125
4	12.84	45
6	13.27	65
8	13.82	107
10	14.03	135
12	14.30	185
30	10.00	1009
36	10.00	1524

HDSS Submittal Document *(Rev. 05/2026)*

Materials and specifications are subject to change without notice.

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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