

TR FLEX®

Restrained Joint Fittings



PIPE
FABRICATION
RESTRAINED JOINTS
FITTINGS
GASKETS
COATINGS & LININGS

U.S. PIPE

A QUIKRETE® COMPANY

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The logo for U.S. PIPE, featuring the letters "U.S." in a large, bold, white sans-serif font above the word "PIPE" in a slightly smaller, bold, white sans-serif font. The text is set against a solid red rectangular background. The entire logo is positioned in the bottom right corner of the page, which has 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.

TR FLEX® 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.

TR FLEX® Fittings provide flexible restrained push-on joints for 4" through 20" Ductile Iron pipe and fittings.

The TR Flex Restrained Joint has a working pressure rating equivalent to the working pressure rating of the parent pipe, with a maximum restrained joint working pressure rating of 350 psi except that 30"-36" have a 100 psi reduction in joint rating for a given parent pipe pressure class e.g. 30"-36" TR Flex Restrained Joints are rated for a maximum 250 psi with Pressure Class 350 parent pipe. Conversely, a 24" PC 200 pipe will have a restrained joint rating of 200 psi.

For fire protection service, 4" through 12" fittings are listed by Underwriters Laboratories for 350 psi and are approved by Factory Mutual for 250 psi.

TR Flex Fittings utilize the conventional Tyton Gasket for 4" through 20" sizes.

Ductile Iron locking segments, inserted through a slot (or slots) in the bell face, provide a positive axial lock between the bell interior surface and a retainer weldment on the spigot end of the pipe.

The standard cement-mortar lining supplied in pipe is ASTM C150 Type II. The lining may be supplied in either single or double thickness. Sulfate resistant Type V cement is available on special order.

*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."

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 a 4" through 20" 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 Ductile Iron 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 joint pipe and fittings shall be U.S. Pipe's TR Flex Pipe and Fittings or approved equal. Restraint of field cut pipe shall be provided with U.S. Pipe's TR Flex Gripper Ring, TR Flex Pipe field weldments or approved equal.

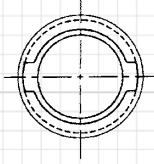
Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/A21.4. Asphaltic outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 for fittings.

Restrained push-on joints for pipe and fittings shall be designed for a water working pressure of 350 psi for sizes 4" through 20".

ASSEMBLY INSTRUCTIONS

FITTINGS

INSERTION SLOT ORIENTATION



4" - 20"

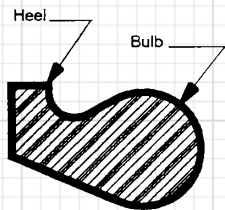
CAUTION: The inside of the socket, the gasket, and the plain end to be inserted, must be kept clean throughout the assembly. Joints are only as watertight as they are clean. If the joint is somewhat difficult to assemble, inspect for proper gasket positioning, adequate lubrication, and removal of foreign matter in the joint.

The recommended orientation of segment insertion slots located in the face of the TR Flex bell is important for ease of assembly and is also used as a reference point for location of welded outlets (refer to U.S. Pipe's Welded Outlet brochure). Therefore particular attention should be paid to that portion of the assembly instructions.

Clean the sockets of all dirt, sand, gravel, or other foreign matter.

Conventional TYTON JOINT® Gaskets are used for TR Flex Fitting sockets in the 4" through 20" size range.

GASKET INSTALLATION



4" - 24"

NOTE: For the 4" through 10" sizes where TR Flex Gripper Rings are not used, it may be preferable to locate the bell slots vertically with only the slot in the 12 o'clock position being used for inserting locking segments.

ASSEMBLY INSTRUCTIONS

FITTINGS (Continued)

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 12" sizes require only one loop.

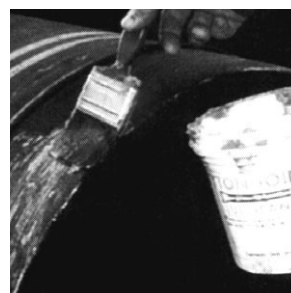
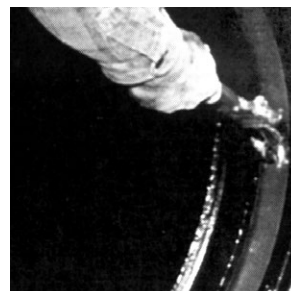
For larger sizes, additional loops may be required: 14" through 20", two to three loops. Evenly space the loops around the socket with each loop raised 4–5 inches. After loops are established, push each loop down to finish installation of the gasket. When installing TYTON JOINT® gaskets in sub-freezing 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 inserted into the gasket seating area of the socket, 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.



NOTE: For underwater installations, a special lubricant is available from U.S. Pipe.

ASSEMBLY INSTRUCTIONS

FITTINGS 4" - 10"

Components required for each joint:

- 1 right-hand locking segment (painted red, marked RH)
- 1 left-hand locking segment (painted black, marked LH)
- 1 rubber retainer
- 1 Tyton Gasket
- Tyton Joint Lubricant



Installation Tips

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

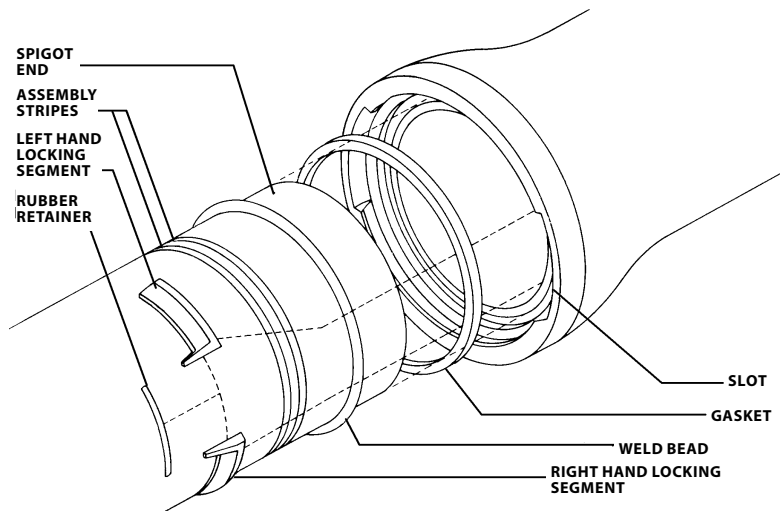


Installation Tips

- 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.

TWO BELL SLOTS

1. Lay fitting such that one of the bell slots is accessible.
2. Clean the socket and insert a Tyton Gasket.
3. Clean the pipe spigot end back to the assembly stripes.
4. Lubricate the exposed surface of the gasket and the pipe spigot end back to the weld bead.
5. Make a conventional push-on joint assembly, fully homing the pipe until the first assembly stripe is in the bell socket. Keep the joint in straight alignment during assembly.
6. Insert the right-hand locking segment into a bell slot and slide the segment clockwise around the pipe.
7. Insert the left-hand locking segment into the same bell slot and slide the segment counterclockwise around the pipe.
8. Hold the segments apart and wedge the rubber retainer into the slot between the two locking segments. The opposite bell slot is not used but is required for use with a TR Flex Gripper Ring.
9. Extend the joint to remove the slack in the locking segment cavity. Joint extension is necessary to obtain the marked laying length on the pipe and to minimize growth or extension of the line as it is pressurized. (Refer to the Table on page 21 for average pull-out of each size.)
10. Set the joint deflection as required. (See Table on page 21.)

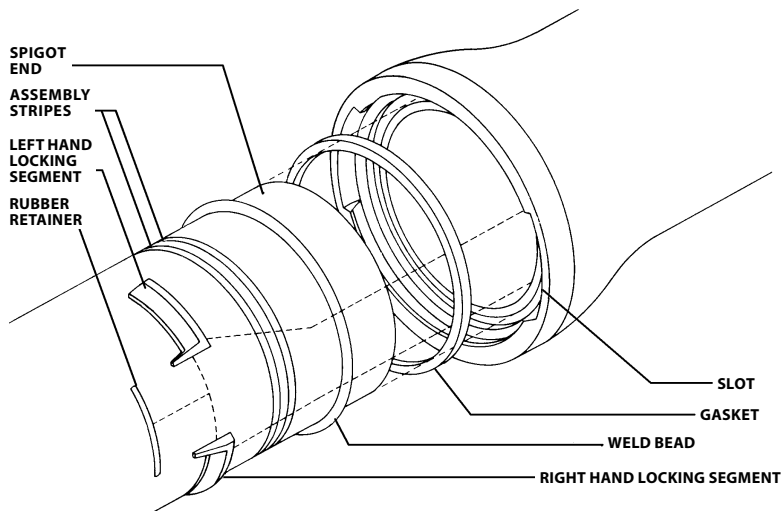


ASSEMBLY INSTRUCTIONS

FITTINGS 12" - 20"

TWO BELL SLOTS

1. Lay fitting such that both of the bell slots are accessible (in the horizontal position if possible).
2. Clean the socket and insert a Tyton Gasket.
3. Clean the pipe spigot end back to the assembly stripes.
4. Lubricate the exposed surface of the gasket and the pipe spigot end back to the weld bead.
5. Make a conventional push-on joint assembly, fully homing the pipe until the first assembly stripe is in the bell socket. Keep the joint in straight alignment during assembly.
6. Insert lower locking segment into a bell slot and slide the segment around the pipe.
7. Insert upper locking segment into the same bell slot and rotate around the pipe.
8. Hold the upper segment in place and wedge the rubber retainer into the slot between the two locking segments.
9. Repeat steps 6–8 for other slot. Make sure that all 4 locking segments and 2 rubber retainers are securely in place.
10. 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. (Refer to the Table on page 21.)
11. Set the joint deflection as required. (See Table on page 21.)



Components required for each joint:

- 2 right-hand locking segments (painted red, marked **RH**)
- 2 left-hand locking segments (painted black, marked **LH**)
- 2 rubber retainers
- 1 Tyton Gasket
- Tyton Joint® Lubricant



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 1/4" 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.

ASSEMBLY INSTRUCTIONS

PIPELINE EXPANSION

TR FLEX FITTINGS SOCKET PULL OUT

(Linear Expansion Within The Assembled Socket)

In TR Flex 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:

- When TR Flex Pipe are used above ground (bridge crossings, on piers, etc.)
- When TR Flex Pipe are used in poor soil conditions (swamps, marshes, etc.)
- When long lengths of TR Flex Pipe are required for restraint due to high operating pressures and/or unfavorable soil parameters
- Where TR Flex Pipe are used inside casing pipe
- Where TR Flex Pipe and Fittings are in vertical alignment

When TR Flex Pipe are 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.)

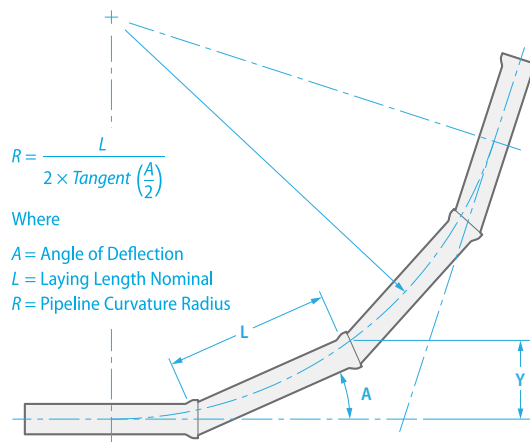
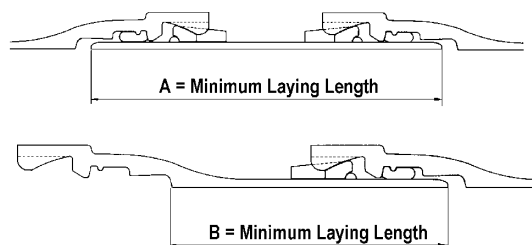
MINIMUM LAYING LENGTHS FOR TR FLEX PIPE

The following drawings and dimensions in Table 1 define the minimum lengths for TR Flex 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 TR Flex Pipe.

SIZE	INCHES		FEET
	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	0.06
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

Table 1.

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



ASSEMBLY INSTRUCTIONS

FIELD CUT PIPE

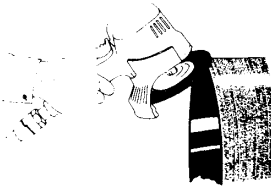
SIZE	INCHES	
	Min.	Max.
4	4.74	4.86
6	6.84	6.96
8	8.99	9.11
10	11.04	11.16
12	13.14	13.26
14	15.22	15.35
16	17.32	17.45
18	19.42	19.55
20	21.52	21.65

Table 2.

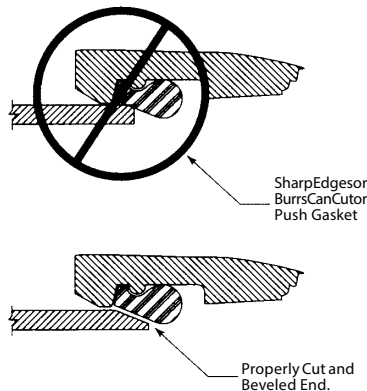
NOTE: For accuracy, a diameter tape graduated in 100ths must be used.

MAKING A FIELD CUT

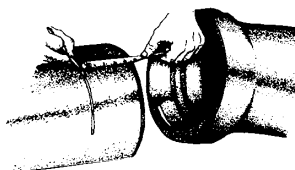
When field cutting pipe up to 12" to within approximately 2 feet of the bell chime or closer, the pipe diameter should be measured with a diameter tape graduated in 100ths before cutting. Abrasive saws are commonly used to cut pipe in the field, the cut end may be readily conditioned so that it can be used to make up the next joint.



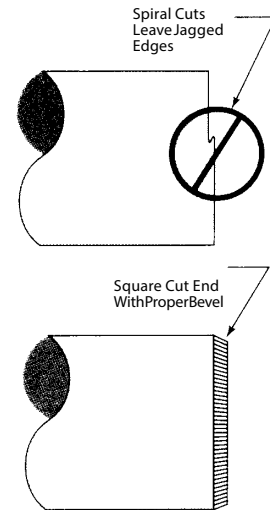
The outside of the cut end should be beveled with a portable grinder or disk grinder, refer to a shop manufactured bevel as a guide for proper shape.



Additional grinding may be required to further bevel the pipe if difficulty in assembly of the joint is encountered. This operation removes any sharp, rough edges that otherwise might damage the gasket. The pipe must be cut as square as is practical. A field cut end that is not square may leak, especially if the joint is fully deflected. Measure from the factory manufactured spigot end to the desired cut location.



Mark the measured distance around the diameter of the pipe at sufficient intervals to determine a square cut-line (a line perpendicular to the axis of the pipe). Scribe the square cut-line around the O.D. of the pipe.



When ductile iron pipe 14" and larger is to be cut in the field, the material should be ordered as "Gauged Pipe." A Gauged Pipe is a pipe whose barrel circumference is within the spigot dimensional specifications as determined by diameter tape measurements over the pipe's length to within approximately 2 feet of the bell chime. Pipe that is "gauged" is specially marked to avoid confusion with a green paint mark on the bell face. ANSI/AWWA C151/A21.5 Standard for Ductile Iron pipe requires factory gauging of the spigot end. Accordingly, pipe selected for field cutting should also be field gauged in the location of the cut and ensured to be within the tolerances shown in Table 2. In the field a mechanical joint gland can be used as a gauging device, however, for accuracy it is recommended that a diameter tape graduated in 100th's be used.

NOTE: When necessary, pipe may be rounded in accordance with U.S. Pipe's Brochure, recommended methods for rounding the cut ends of out-of-round 14" and larger diameter ductile iron pipe.

ASSEMBLY INSTRUCTIONS

FIELD CUT PIPE (Continued)

CLEAN SPIGOT END

Clean the pipe spigot end of any excess coating, cement, dirt, etc. In general, if the peen pattern is not visible on the pipe surface, the coating can be assumed to be too thick and must be removed prior to assembly of the joint.

ASSEMBLY STRIPE TAPE

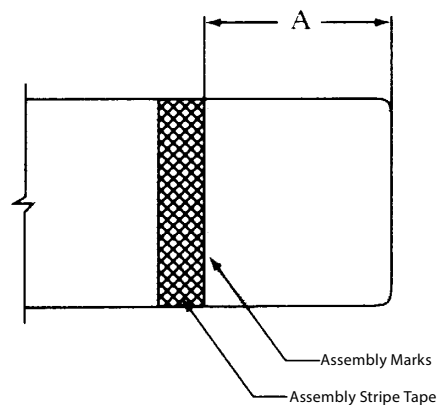
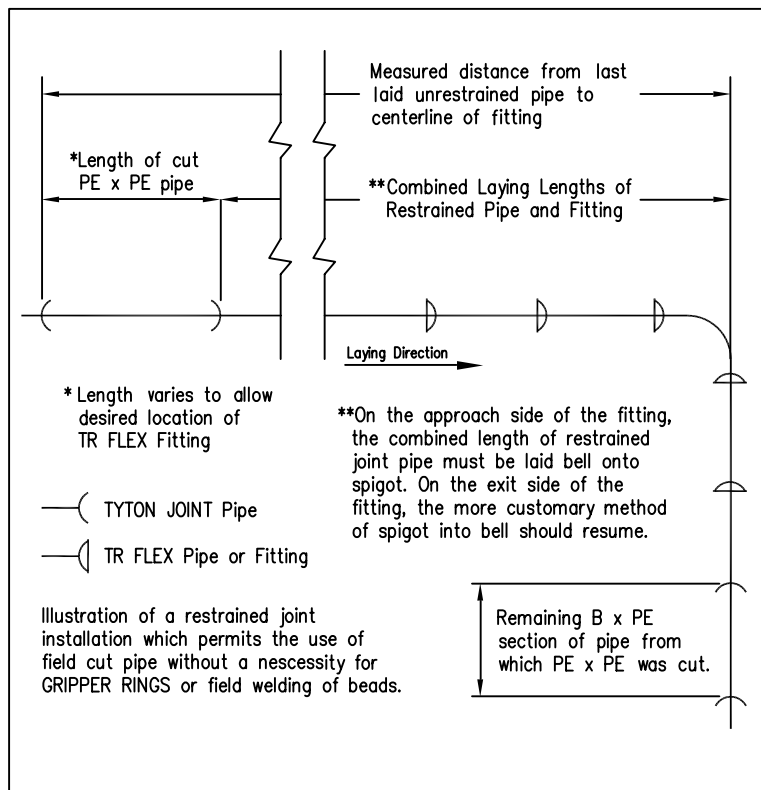
It is important to have a highly visible assembly mark accurately located on the pipe spigot end. It is recommended that 2 inch duct tape, or a similar type tape, be used for this assembly stripe.

Measure from the square field cut end to the location shown in the Table 3 and make several marks around the pipe barrel at the measured distance. Apply the tape around the pipe spigot such that the spigot end of the tape is aligned with the marks.

INCHES	
SIZE	DIMENSION
	A
4	4.375
6	4.875
8	5.375
10	5.625
12	5.875
14	7.375
16	7.500
18	7.750
20	8.000

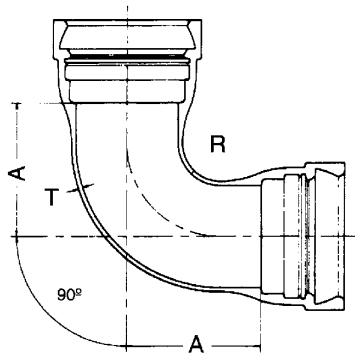
UNRESTRAINED FIELD CUT PIPE INSTRUCTION METHOD

The following schematic illustrates the use of a field cut pipe in the unrestrained portions of the line, thus eliminating the requirements for TR Flex Gripper Rings or field weldments.



SPECIFICATIONS - FITTINGS

BENDS (Thickness & Dimensions)



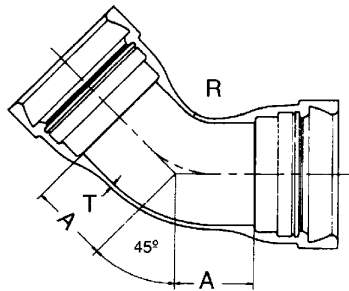
90°
Bend



INCHES	PSI	INCHES			POUNDS
SIZE	PRESSURE RATING	DIMENSIONS			WEIGHT
		T	A	R	
4	350	0.34	5.66	3.99	35
6	350	0.36	6.78	4.99	70
8	350	0.39	8.83	6.97	125
10	350	0.41	10.63	8.71	180
12	350	0.44	12.60	10.61	255
14	350	0.66	14.00	11.50	435
16	350	0.70	15.00	12.50	520
18	350	0.75	16.50	14.00	670
20	350	0.80	18.00	12.38	745

SPECIFICATIONS - FITTINGS

BENDS (Thickness & Dimensions)



45°
Bend

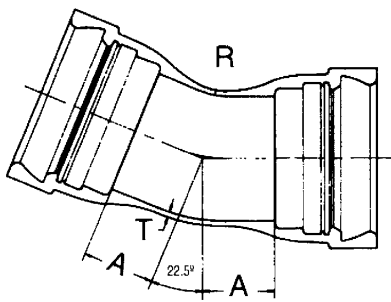


IMPORT

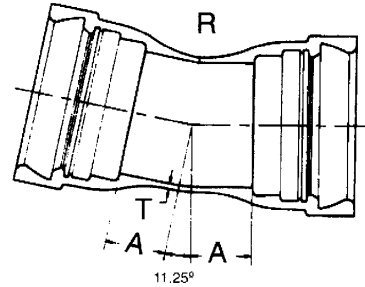
INCHES	PSI	INCHES			POUNDS
SIZE	PRESSURE RATING	DIMENSIONS			WEIGHT
		T	A	R	
4	350	0.34	3.33	3.99	35
6	350	0.36	3.86	4.99	65
8	350	0.39	4.74	6.97	110
10	350	0.41	5.22	7.98	150
12	350	0.44	5.91	9.47	210
14	350	0.66	7.50	12.06	370
16	350	0.70	8.00	13.25	430
18	350	0.75	8.50	14.50	550
20	350	0.80	9.50	16.88	685

SPECIFICATIONS - FITTINGS

BENDS (Thickness & Dimensions)



22.5°
Bend



11.25°
Bend



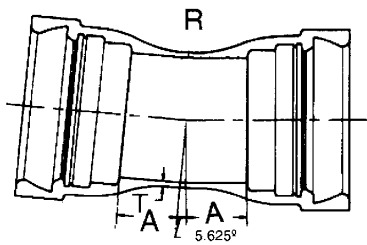
INCHES	PSI	INCHES			POUNDS
SIZE	PRESSURE RATING	DIMENSIONS			WEIGHT
		T	A	R	
4	350	0.34	2.47	3.99	30
6	350	0.36	3.07	6.41	60
8	350	0.39	3.24	6.97	100
10	350	0.41	3.51	7.98	140
12	350	0.44	3.76	8.95	190
14	350	0.66	7.50	25.12	375
16	350	0.70	8.00	27.62	435
18	350	0.75	8.50	30.19	560
20	350	0.80	9.50	35.19	695



INCHES	PSI	INCHES			POUNDS
SIZE	PRESSURE RATING	DIMENSIONS			WEIGHT
		T	A	R	
4	350	0.34	2.07	3.99	30
6	350	0.36	2.42	6.35	60
8	350	0.39	2.55	6.97	95
10	350	0.41	2.71	7.98	135
12	350	0.44	2.87	8.95	185
14	350	0.66	7.50	50.75	375
16	350	0.70	8.00	55.81	440
18	350	0.75	8.50	60.94	560
20	350	0.80	9.50	71.06	695

SPECIFICATIONS - FITTINGS

BENDS (Thickness & Dimensions)



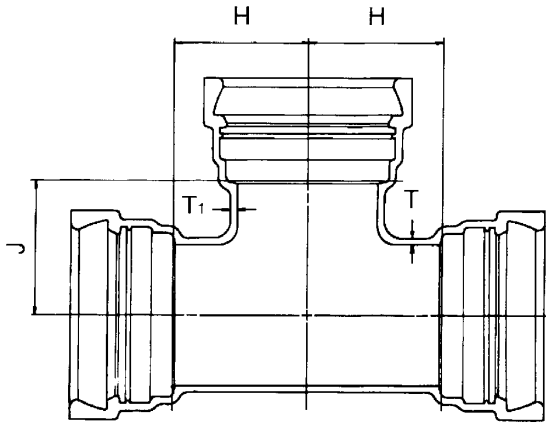
5.625°
Bend

 IMPORT

INCHES	PSI	INCHES			POUNDS
SIZE	PRESSURE RATING	DIMENSIONS			WEIGHT
		T	A	R	
20	350	0.80	5.00	57.59	575

SPECIFICATIONS - FITTINGS

TEES (Thickness & Dimensions)

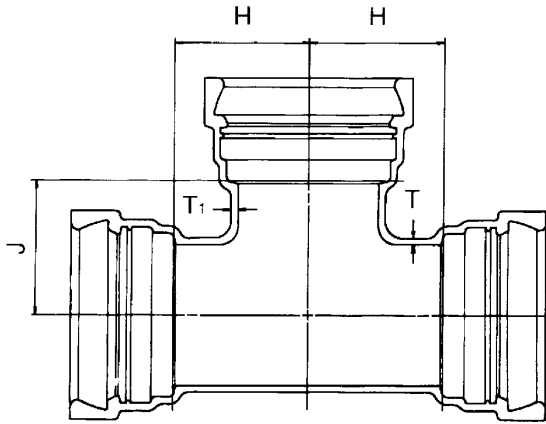


INCHES		PSI	INCHES				POUNDS
SIZE		PRESSURE RATING	DIMENSIONS				WEIGHT
RUN	BRANCH		T	T1	H	J	
4	4	350	0.34	0.34	5.16	5.16	50
6	4	350	0.36	0.34	5.17	6.15	85
6	6	350	0.36	0.36	6.16	6.16	100
8	4	350	0.39	0.34	5.18	7.64	125
8	6	350	0.39	0.36	6.20	7.65	145
8	8	350	0.39	0.39	7.65	7.65	170
10	4	350	0.41	0.34	5.24	8.63	165
10	6	350	0.41	0.36	6.27	9.03	190
10	8	350	0.41	0.39	7.66	8.65	215
10	10	350	0.41	0.41	8.65	8.65	235
12	4	350	0.44	0.34	5.30	9.63	220
12	6	350	0.44	0.36	6.33	10.23	245
12	8	350	0.44	0.39	7.66	9.64	270
12	10	350	0.44	0.41	8.66	9.64	295
12	12	350	0.44	0.44	9.65	9.65	325
14	6	350	0.66	0.55	14.00	14.00	515
14	8	350	0.66	0.60	14.00	14.00	535
14	10	350	0.66	0.68	14.00	14.00	560
14	12	350	0.66	0.75	14.00	14.00	590
14	14	350	0.66	0.66	14.00	14.00	603
16	6	350	0.70	0.55	12.25	13.25	550
16	8	350	0.70	0.60	12.25	13.25	570
16	10	350	0.70	0.68	12.25	13.25	590
16	12	350	0.70	0.75	12.25	13.25	620
16	14	350	0.70	0.66	12.25	13.25	631
16	16	350	0.70	0.70	12.25	13.25	675
18	6	350	0.75	0.55	13.00	15.50	700
18	8	350	0.75	0.60	13.00	15.50	720
18	10	350	0.75	0.68	13.00	15.50	740
18	12	350	0.75	0.75	13.00	15.50	744
18	14	350	0.75	0.66	16.50	16.50	884
18	16	350	0.75	0.70	16.50	16.50	920
18	18	350	0.75	0.75	16.50	16.50	955

Table continued on next page. ►

SPECIFICATIONS - FITTINGS

TEES (Thickness & Dimensions)

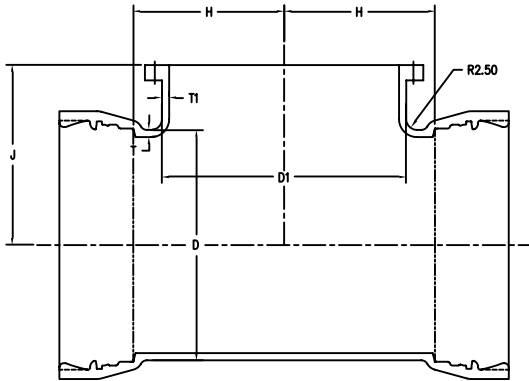


IMPORT

INCHES		PSI	INCHES				POUNDS
SIZE		PRESSURE RATING	DIMENSIONS				WEIGHT
RUN	BRANCH		T	T1	H	J	
20	6	350	0.80	0.55	11.00	16.00	770
20	8	350	0.80	0.60	11.00	16.00	790
20	10	350	0.80	0.68	11.00	16.00	810
20	12	350	0.80	0.75	11.00	16.00	935
20	14	350	0.80	0.66	14.00	17.00	1032
20	16	350	0.80	0.70	15.00	15.00	1105
20	18	350	0.80	0.75	18.00	18.00	1150
20	20	350	0.80	0.80	15.00	15.00	1185

SPECIFICATIONS

TEES WITH FLANGE BRANCH

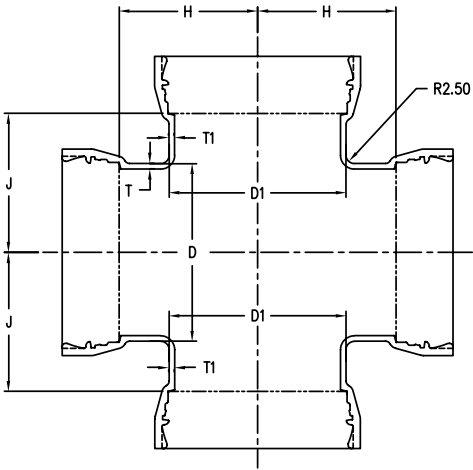


INCHES						POUNDS
SIZE		DIMENSIONS				WEIGHT
RUN	BRANCH	T	T1	H	J	
4	4	0.34	0.34	5.16	6.5	57
6	4	0.36	0.34	5.17	8.0	84
6	6	0.36	0.36	6.16	8.0	90
8	4	0.39	0.34	5.18	9.0	124
8	6	0.39	0.36	6.20	9.0	152
8	8	0.39	0.39	7.65	9.0	185
10	4	0.41	0.34	5.24	11.0	164
10	6	0.41	0.36	6.27	11.0	197
10	8	0.41	0.39	7.66	11.0	230
10	10	0.41	0.41	8.65	11.0	257
12	4	0.44	0.34	5.30	12.0	342
12	6	0.44	0.36	6.33	12.0	252
12	8	0.44	0.39	7.66	12.0	360
12	12	0.44	0.44	9.65	12.0	350
14	6	0.66	0.55	14.00	14.0	508
14	14	0.66	0.66	14.00	14.0	566
16	6	0.70	0.55	12.25	15.0	580
16	8	0.70	0.60	12.25	15.0	642
16	12	0.70	0.75	12.25	15.0	678
16	16	0.70	0.70	12.25	15.0	703

INCHES						POUNDS
SIZE		DIMENSIONS				WEIGHT
RUN	BRANCH	T	T1	H	J	
18	6	0.75	0.55	13.00	15.5	685
18	12	0.75	0.75	13.00	15.5	737
18	18	0.75	0.75	16.50	16.5	855
20	6	0.80	0.55	11.00	17.0	845
20	8	0.80	0.60	11.00	17.0	835
20	12	0.80	0.75	11.00	17.0	847
20	14	0.80	0.66	14.00	17.0	900
20	18	0.80	0.75	18.00	18.0	1039

SPECIFICATIONS - FITTINGS

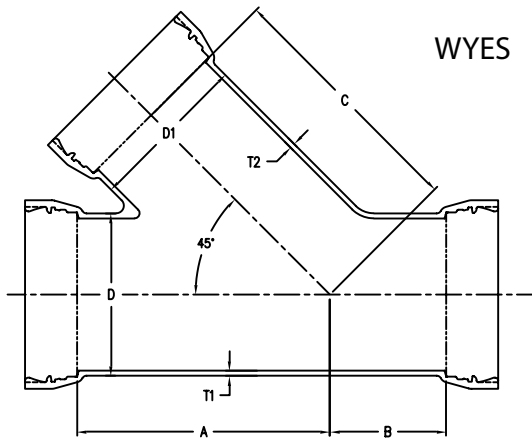
CROSSES



SIZE		INCHES				POUNDS
		DIMENSIONS				WEIGHT
RUN	BRANCH	T	T1	H	J	
16	12	0.70	0.75	15.00	15.0	810
16	16	0.70	0.70	15.00	15.0	958
18	18	0.75	0.75	16.50	16.5	1161
20	6	0.80	0.55	14.00	17.0	889
20	8	0.80	0.60	14.00	17.0	931
20	20	0.80	0.80	18.00	18.0	1426

SPECIFICATIONS - FITTINGS

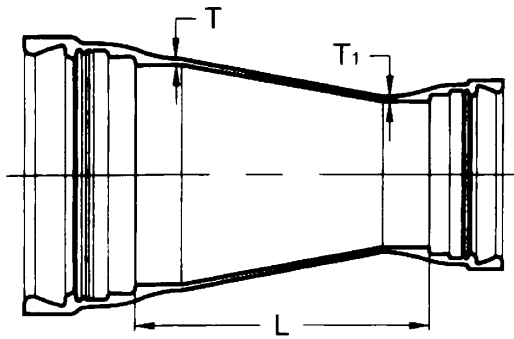
WYE BRANCHES & WYES



SIZE		INCHES				POUNDS
		THICKNESS		DIMENSIONS		WEIGHT
RUN	BRANCH	T	T1	A & C	B	
10	10	0.80	0.80	20.5	5.0	430
12	8	0.75	0.60	24.5	5.5	500
12	12	0.75	0.75	24.5	5.5	570
14	8	0.82	0.60	27	6.0	641
14	14	0.82	0.82	27	6.0	800
16	12	0.89	0.75	30	6.5	888
16	16	0.89	0.89	30	6.5	1027
18	12	0.96	0.75	32	7.0	1065
18	18	0.96	0.96	32	7.0	1270
20	8	1.03	0.60	35	8.0	1228
20	12	1.03	0.75	35	8.0	1308
20	16	1.03	0.89	35	8.0	1447
20	20	1.03	1.03	35	8.0	1592

SPECIFICATIONS - FITTINGS

CONCENTRIC REDUCERS



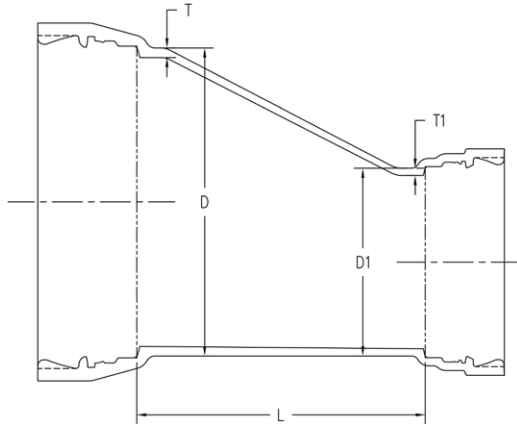
IMPORT

INCHES		PSI	INCHES			POUNDS
SIZE		PRESSURE RATING	DIMENSIONS			WEIGHT
LARGE	SMALL		T	T1	L	
6	4	350	0.36	0.34	6.62	50
8	4	350	0.39	0.34	9.84	75
8	6	350	0.39	0.36	5.91	80
10	4	350	0.41	0.34	12.92	100
10	6	350	0.41	0.36	10.02	110
10	8	350	0.41	0.39	6.93	120
12	6	350	0.44	0.36	13.23	145
12	8	350	0.44	0.39	10.15	155
12	10	350	0.44	0.41	7.06	165
14	6	350	0.66	0.55	16.00	240
14	8	350	0.66	0.60	16.00	265
14	10	350	0.66	0.68	16.00	290
14	12	350	0.66	0.75	16.00	330
16	6	350	0.70	0.55	18.00	280
16	8	350	0.70	0.60	18.00	305
16	10	350	0.70	0.68	18.00	340
16	12	350	0.70	0.75	18.00	375
16	14	350	0.70	0.66	18.00	400
18	8	350	0.75	0.60	19.00	370
18	10	350	0.75	0.68	19.00	405
18	12	350	0.75	0.75	19.00	445
18	14	350	0.75	0.66	19.00	450
18	16	350	0.75	0.70	19.00	525

INCHES		PSI	INCHES			POUNDS
SIZE		PRESSURE RATING	DIMENSIONS			WEIGHT
LARGE	SMALL		T	T1	L	
20	6	350	0.80	0.55	20.00	415
20	8	350	0.80	0.60	20.00	440
20	10	350	0.80	0.68	20.00	470
20	12	350	0.80	0.75	20.00	510
20	14	350	0.80	0.66	20.00	561
20	16	350	0.80	0.70	20.00	590
20	18	350	0.80	0.75	20.00	650

SPECIFICATIONS - FITTINGS

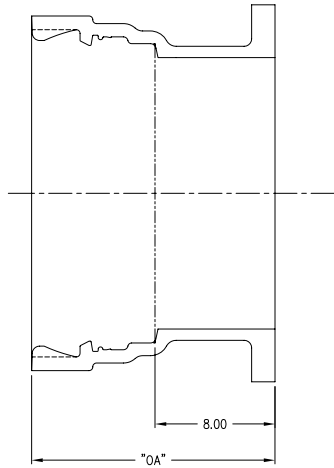
ECCENTRIC REDUCERS



INCHES		PSI	INCHES			POUNDS
SIZE		PRESSURE RATING	DIMENSIONS			WEIGHT
LARGE	SMALL		T	T1	L	
10	8	350	0.41	0.39	6.93	150
12	4	350	0.44	0.34	16.13	159
12	6	350	0.44	0.36	13.23	176
12	8	350	0.44	0.39	10.15	171
12	10	350	0.44	0.41	7.06	235
14	8	350	0.66	0.60	16.00	270
14	12	350	0.66	0.75	16.00	334
16	6	350	0.70	0.55	18.00	268
16	8	350	0.70	0.60	18.00	300
16	12	350	0.70	0.75	18.00	391
16	14	350	0.70	0.66	18.00	425
18	16	350	0.75	0.70	19.00	540
20	10	350	0.80	0.68	20.00	473
20	12	350	0.80	0.75	20.00	514
20	16	350	0.80	0.70	20.00	609
20	18	350	0.80	0.75	20.00	658

SPECIFICATIONS - FITTINGS

FLANGE CONNECTING PIECES



INCHES		POUNDS	
SIZE	OA	WEIGHT	
		125	250
4	12.84	45	—
6	13.27	65	—
8	13.82	107	—
10	14.03	135	—
12	14.30	185	—
14	15.75	250	—
16	15.95	300	—
18	16.19	350	—
20	16.40	425	—

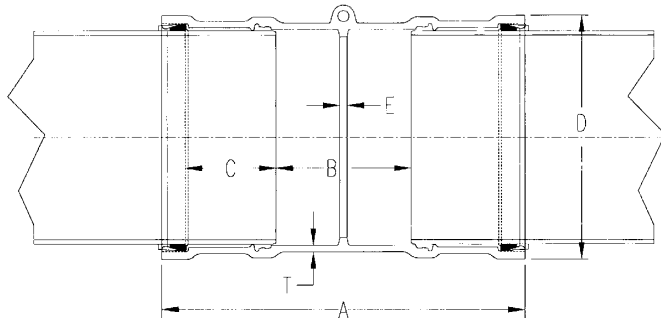
NOTE: The U.S. Pipe TR FLEX Telescoping Sleeve is a Ductile Iron restrained joint fitting. The TR FLEX Telescoping Sleeve may be used in lieu of a mechanical joint sleeve where joint restraint of a Ductile Iron pipeline is required. The TR FLEX Telescoping Sleeve is ideally suited for use as a closure piece when connecting a new restrained joint pipeline to an existing one. Repairs to an existing restrained joint pipeline can be made with the use of a TR FLEX Telescoping Sleeve. This sleeve may also be used to facilitate the installation of fittings or valves in an existing restrained joint pipeline.

For additional information on TR FLEX Telescoping Sleeves, see U.S. Pipe's Telescoping Sleeve Brochure or contact your U.S. Pipe representative.

• Weld bead location for Telescoping Sleeve end pieces.

SPECIFICATIONS - FITTINGS

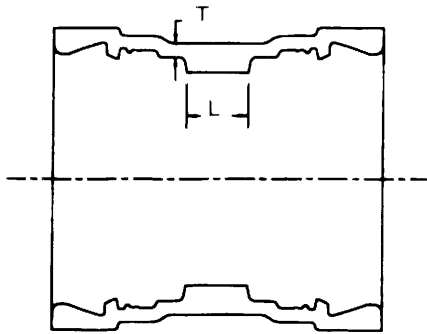
TELESCOPING SLEEVES



INCHES	PSI	INCHES						POUNDS
SIZE	PRESSURE RATING	DIMENSIONS						WEIGHT
		A	B	C ^a	D	E	T	
4	350	29.10	10.68	7.72	7.10	1.00	0.34	82
6	350	31.70	11.54	8.39	9.39	1.00	0.36	134
8	350	35.48	12.64	9.49	11.84	1.00	0.39	149
10	350	37.14	13.06	9.96	14.12	1.00	0.41	249
12	350	38.96	13.60	10.33	16.45	1.00	0.44	319
16	350	49.00	17.10	13.25	21.32	1.00	0.50	742
18	350	49.40	17.88	12.82	23.52	1.50	0.75	736
20	350	50.80	18.44	13.03	25.74	1.64	0.80	867

SPECIFICATIONS - FITTINGS

SLEEVE CONNECTING PIECES

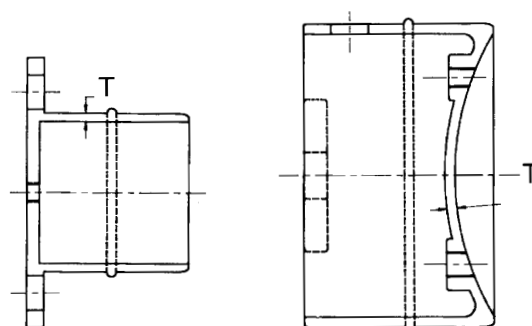
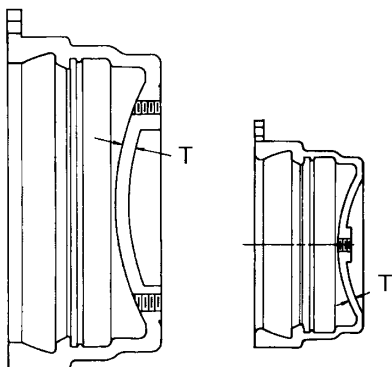


IMPORT

INCHES	PSI	INCHES		POUNDS
SIZE	PRESSURE RATING	DIMENSIONS		WEIGHT
		T	L	
6	350	0.36	1.00	48
8	350	0.39	1.00	90
10	350	0.41	1.00	125
12	350	0.44	1.50	141
14	350	0.66	1.50	244
16	350	0.70	1.50	325
18	350	0.75	4.00	430
20	350	0.80	4.36	510

SPECIFICATIONS - FITTINGS

CAPS & PLUGS



IMPORT

INCHES SIZE	PSI PRESSURE RATING	INCHES DIMENSIONS T	POUNDS WEIGHT
4	350	0.34	30
6	350	0.36	40
8	350	0.39	60
10	350	0.41	80
12	350	0.44	110
14	350	0.66	200
16	350	0.70	207
18	350	0.75	501
20	350	0.80	370

IMPORT

INCHES SIZE	PSI PRESSURE RATING	INCHES DIMENSIONS T	POUNDS WEIGHT
4	350	0.33	15
6	350	0.36	30
8	350	0.39	45
10	350	0.41	70
12	350	0.44	65
14	350	0.47	90
16	350	0.50	110
18	350	0.75	290
20	350	0.80	360

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TR Flex Submittal Document (Rev. 4/2026)

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A QUIKRETE® COMPANY

Headquarters

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

866-347-7473

info@uspipe.com

www.uspipe.com