

Section 4

AMERICAN Ductile Iron Flex-Ring[®] and Lok-Ring[®] Fittings





AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings

The principal standards covering fittings are ANSI/AWWA C110/A21.10 and ANSI/AWWA C153/A21.53. The principal standard covering joints is ANSI/AWWA C111/A21.11. These and other standards are referenced throughout this section by the full ANSI/AWWA designation or by only the AWWA numbering, such as AWWA C110 or C153.

AMERICAN furnishes a line of 4"–48" Flex-Ring and 54"–64" Lok-Ring fittings meeting the applicable requirements of AWWA C153. These fittings employ the standard Fastite or Fast-Grip gasket seal, and the joints meet the applicable requirements of AWWA C111. Many of these fittings are not specifically listed in the AWWA standards because of joints, outlets, or other variations and are designated as "AMERICAN standard."

When welded joint restraint is desired, Flex-Ring or Lok-Ring fittings should also be used, depending on size. These joints are also essentially boltless and use the standard Fastite gasket for joint sealing. In addition, field adaptable joint restraint is available for 14"–36" Flex-Ring pipe or Flex-Ring fittings by use of AMERICAN's Fast-Grip gaskets or Field Flex-Rings, respectively. See Section 9 for more information on Restrained Joints.

Flex-Ring and Lok-Ring fittings are normally furnished complete with standard Fastite plain rubber gaskets and a sufficient supply of Fastite joint lubricant. Restraining elements for Flex-Ring or Lok-Ring fittings may be shipped either with the fittings or joining pipe, dependent on joint type, fitting configuration, etc. See Section 9.

Flex-Ring and Lok-Ring fittings are furnished of ductile iron only. Fittings for pressure ratings of 250 and 350 psi are furnished as shown in the tables in this Section. Fittings for pressure ratings higher than shown are available for special applications.

Fittings are normally furnished with cement lining in accordance with AWWA C104 and with an outside asphaltic coating. They can also be furnished asphaltic coated or uncoated inside. For special conditions, other types of coatings and linings may be available. See Section 11.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings

General Notes Relating to Flex-Ring and Lok-Ring Fittings

1. Fittings in the following tables with the heading "ANSI/AWWA C153/A21.53" are essentially as specified in that standard. Fittings in tables with the heading "AMERICAN Standard" are either not included in the ANSI/AWWA standard or vary therefrom in weights, dimensions, and/or joints.

2. Fittings are manufactured of ductile iron qualified as per grade 70-50-05 (minimum tensile strength: 70,000 psi; minimum yield strength: 50,000 psi; minimum elongation: 5%) as specified in AWWA C153.

3. Weights of accessories are not included in weights of fittings shown in tables unless specifically noted. For weights of accessories, see Section 2 or Section 9.

4. For allowable joint deflection of Flex-Ring and Lok-Ring fitting joints, see Table 4-3.

5. All pressure ratings are for water service.

6. Some fittings are available with body metal thickness and weights other than shown in the tables. Some fittings are available in different sizes and with different size combinations than shown. All sizes and body metal thicknesses listed may not be available due to equipment changes. Check AMERICAN regarding special requirements.

7. See Section 7 for AMERICAN Specials.

8. Fittings may be furnished by AMERICAN that are manufactured by others. Any such fittings will normally be manufactured in accordance with appropriate ANSI/AWWA standards.

9. The 250 psi rating for 54"–64" fittings is an AMERICAN standard, based on

performance testing. 54"–64" fittings are rated only 150 psi in AWWA C153, although that standard provides for higher pressure ratings by the manufacturer (AMERICAN).

10. Center-to-socket dimensions, wall thicknesses, and weights may vary from those shown in the following tables depending on foundry practice.

11. The locations of taps, bases, or other special options when available on fittings shall be specified by the Purchaser as shown on page 6-5 for similar body type fittings. Likewise, end types and end sizes used in descriptions must be specified in numbering sequence shown on pages 6-5 and 6-6 and the illustrations in this section.

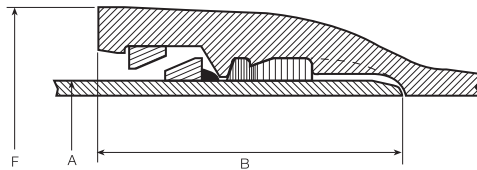
12. Lateral or wye branch fittings with Flex-Ring and Lok-Ring end connections are not shown in this section. For small-diameter varied angle lateral and tangential connections to larger mains, shop-welded outlet pipes are normally preferable and can be furnished with all joining connections as noted in Section 7. For larger or full-opening requirements, some 45° lateral and true wye configurations can also be furnished with these push-on end connections. (Contact AMERICAN for availability.) These wye fittings are special, and for economy and availability, alternative combinations of other standard fittings may be preferable in some cases. (See alternatives as depicted in Sections 5 and 6, etc.)

13. AMERICAN Flex-Ring fittings will work as push-on unrestrained fittings as long as suitable external restraint (thrust blocks, etc.) is applied. Flex-Ring fittings are thus furnished as "Fastite" fittings in many sizes and configurations, at Foundry option.

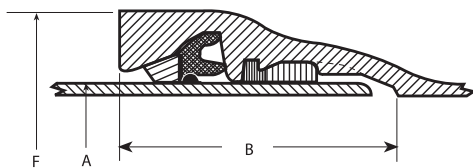


AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53 and AMERICAN Standard

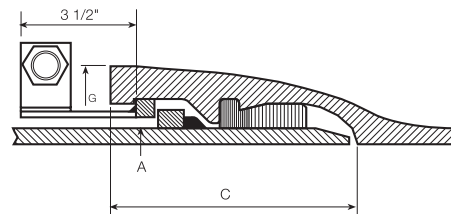
Flex-Ring and Lok-Ring Fittings Joint Dimensions



4"-12" Flex-Ring



16"-48" Flex-Ring



54"-64" Lok-Ring

Table No. 4-1

Size in.	Dimensions in Inches				
	A Outside Diameter	B Socket Depth Flex-Ring	C Socket Depth Lok-Ring	F* Bell O.D. Flex-Ring	G* Bell O.D. Lok-Ring
4	4.80	5.71	-	7.18	-
6	6.90	5.71	-	9.20	-
8	9.05	5.83	-	11.35	-
10	11.10	6.74	-	13.75	-
12	13.20	6.74	-	16.37	-
16	17.40	7.38	-	21.49	-
18	19.50	8.20	-	23.71	-
20	21.60	8.20	-	25.83	-
24	25.80	8.96	-	30.70	-
30	32.00	9.63	-	37.04	-
36	38.30	9.63	-	43.54	-
42	44.50	10.84	-	50.62	-
48	50.80	12.37	-	56.98	-
54	57.56	-	10.07	-	62.14
60	61.61	-	10.57	-	66.27
64	65.67	-	10.57	-	70.45

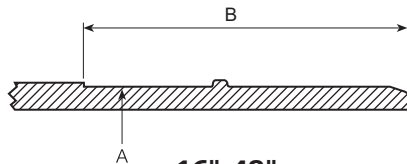
*Dimensions subject to change at our option.
 For Fastite pipe dimensions, see Section 2.
 For Flex-Ring and Lok-Ring pipe dimensions, see Section 9.



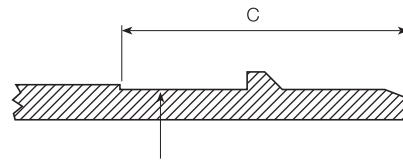
AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53 and AMERICAN Standard

Flex-Ring End and Lok-Ring End

Standard Dimensions



**16"-48"
Flex-Ring End**



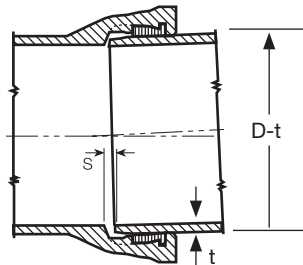
54"-64" Lok-Ring End

Table No. 4-2

Size in.	A Outside Diameter in.	B Flex-Ring Minimum Gauge Length in.	C Lok-Ring Minimum Gauge Length in.
16	17.4	9	-
18	19.5	9	-
20	21.6	9	-
24	25.8	10	-
30	32.0	10	-
36	38.3	10	-
42	44.5	11 1/2	-
48	50.8	13	-
54	57.56	-	12
60	61.61	-	13
64	65.67	-	13



Maximum Allowable Separation Push-On Fitting Joints



Maximum allowable separation, "S", in a push-on fitting joint is approximately equal to the median pipe diameter in inches times the sine of the deflection angle. This is provided for information only and should not be used to determine precise joint deflection.

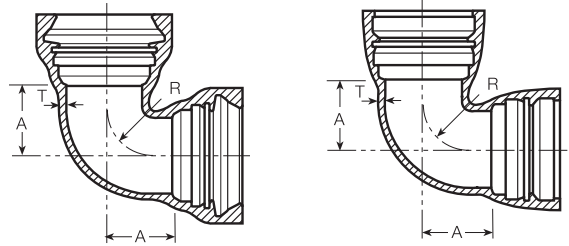
Allowable Deflection Push-On Fitting Joints

Table No. 4-3

Size in.	Flex-Ring	Lok-Ring
	Deflection Angle (Deg.)	Deflection Angle (Deg.)
4	5	—
6	5	—
8	5	—
10	5	—
12	5	—
16	3.75	—
18	3.75	—
20	3.50	—
24	3.00	—
30	2.50	—
36	2.00	—
42	2.00	—
48	1.50	—
54	—	0.5
60	—	0.5
64	—	0.5



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard
90° Bends (1/4th)



Flex-Ring Bell-Bell**

Lok-Ring Bell-Bell**

Table No. 4-4

Size in.	Pressure† Rating psi	Dimensions in Inches			Weight in Pounds	
		T	A	R	Flex-Ring	Lok-Ring
4	350	0.34	4.00	3.00	46	–
6	350	0.36	5.00	4.00	64	–
8	350	0.38	6.50	5.38	91	–
10	350	0.40	7.50	6.25	143	–
12	350	0.42	9.00	7.50	232	–
16	350	0.50††	15.00	12.50	515	–
18	350	0.75	16.50	14.00	720	–
20	350	0.80	18.00	15.50	815	–
24	350	0.61	17.00	15.50	760	–
30	250	0.66	22.75	20.50	1290	–
36	250	0.74	25.75	23.50	1810	–
42	250	0.82	29.25	26.50	2784	–
48	250	0.90	33.25	30.50	3960	–
54	250	0.90	37.00	34.25	–	3930
60	250	0.94	39.50	36.50	–	4620
64	250	0.99	42.00	38.75	–	5385

*AWWA C153 configurations with shorter center-to-socket dimensions, etc. may be furnished in some cases in the 18"–20" size range. **Contact AMERICAN** if dimensions are critical.

**30" and larger Flex-Ring and Lok-Ring 90° Bends may be furnished with Flex-Ring Ends or Lok-Ring Ends. See Table No. 4-2.

† Higher pressure ratings are available on special applications. Pressure ratings may be limited below the values shown by the pressure rating of the pipe to which fitting is attached, or the restrained joint used.

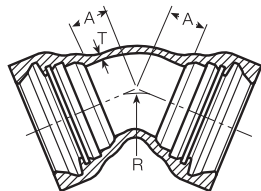
Based on performance testing per AWWA C153, AMERICAN can rate 30"–48" C153 bends 350 psi. Contact AMERICAN.

See General Notes on page 4-2.

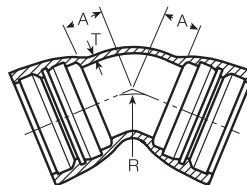
†† 16" Flex-Ring fittings may have greater "T" dimensions than those shown.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard
45° Bends (1/8th)



Flex-Ring Bell-Bell**



Lok-Ring Bell-Bell**

Table No. 4-5

Size in.	Pressure† Rating psi	Dimensions in Inches			Weight in Pounds	
		T	A	R	Flex-Ring	Lok-Ring
4	350	0.34	2.00	2.41	43	—
6	350	0.36	3.00	4.83	60	—
8	350	0.38	3.50	5.75	80	—
10	350	0.40	4.50	7.85	130	—
12	350	0.42	5.50	9.66	213	—
16	350	0.50††	8.00	13.25	425	—
18	350	0.75	8.50	14.50	595	—
20	350	0.80	9.50	16.88	665	—
24	350	0.61	7.50	14.50	620	—
30	250	0.66	10.50	19.92	1010	—
36	250	0.74	12.00	23.54	1395	—
42	250	0.82	14.00	27.20	2235	—
48	250	0.90	15.00	29.60	2960	—
54	250	0.90	20.28	42.32	—	3070
60	250	0.94	21.26	44.08	—	3560
64	250	0.99	22.24	45.85	—	4085

*AWWA C153 configurations with shorter center-to-socket dimensions, etc., may be furnished in some cases in the 18"-20" size range. **Contact AMERICAN** if dimensions are critical.

**30 and larger Flex-Ring and Lok-Ring 45° Bends may be furnished with Flex-Ring Ends or Lok-Ring Ends. See Table No. 4-2.

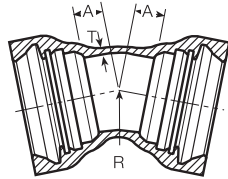
† Higher pressure ratings are available on special applications. **Based on performance testing per AWWA C153, AMERICAN can rate 30"-48" C153 bends 350 psi. Contact AMERICAN.**

†† 16" Flex-Ring fittings may have greater "T" dimensions than those shown.

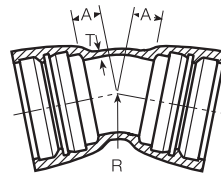
See General Notes on page 4-2.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard
22 1/2° Bends (1/16th)



Flex-Ring Bell-Bell**



Lok-Ring Bell-Bell**

Table No. 4-6

Size in.	Pressure† Rating psi	Dimensions in Inches			Weight in Pounds	
		T	A	R	Flex-Ring	Lok-Ring
4	350	0.34	1.50	2.51	42	—
6	350	0.36	2.00	5.03	56	—
8	350	0.38	2.50	6.94	76	—
10	350	0.40	3.00	8.80	120	—
12	350	0.42	3.50	10.05	198	—
16	350	0.50††	8.00	27.62	430	—
18	350	0.75	8.50	30.19	600	—
20	350	0.80	9.50	35.19	670	—
24	350	0.61	4.50	15.10	525	—
30	250	0.66	6.75	22.60	900	—
36	250	0.74	7.75	27.70	1220	—
42	250	0.82	9.00	31.40	1972	—
48	250	0.90	10.00	36.50	2630	—
54	250	0.90	10.24	37.65	—	2305
60	250	0.94	10.63	38.36	—	2650
64	250	0.99	11.02	39.06	—	3000

*AWWA C153 configurations with shorter center-to-socket dimensions, etc., may be furnished in some cases in the 18"-20" size range. Contact AMERICAN if dimensions are critical.

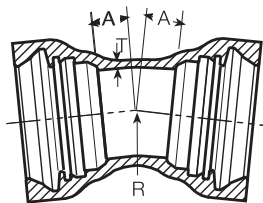
**30" and larger Flex-Ring and Lok-Ring 22 1/2° bends may be furnished with Flex-Ring Ends or Lok-Ring Ends. See Table No. 4-2.

† Higher pressure ratings are available on special applications. Based on performance testing per AWWA C153, AMERICAN can rate 30"-48" C153 bends 350 psi. Contact AMERICAN.

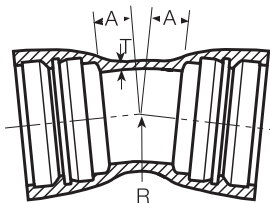
†† 16" Flex-Ring fittings may have greater "T" dimensions than those shown. See General Notes on page 4-2.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard
11 1/4° Bends (1/32nd)



Flex-Ring Bell-Bell**



Lok-Ring Bell-Bell**

Table No. 4-7

Size in.	Pressure† Rating psi	Dimensions in Inches			Weight in Pounds	
		T	A	R	Flex-Ring	Lok-Ring
4	350	0.34	1.25	2.54	41	—
6	350	0.36	1.50	5.08	54	—
8	350	0.38	1.75	6.40	72	—
10	350	0.40	2.00	7.61	114	—
12	350	0.42	2.25	7.61	187	—
16	350	0.50††	8.00	55.81	430	—
18	350	0.75	8.50	60.94	605	—
20	350	0.80	9.50	71.06	675	—
24	350	0.89	3.00	15.33	490	—
30	250	0.66	4.75	25.40	830	—
36	250	0.74	5.00	27.90	1100	—
42	250	0.82	6.00	33.00	1934	—
48	250	0.90	6.50	33.50	2350	—
54	250	0.90	6.50	38.07	—	2000
60	250	0.94	7.00	40.61	—	2320
64	250	0.99	7.00	38.07	—	2590

*AWWA C153 configurations with shorter center-to-socket dimensions, etc., may be furnished in some cases in the 18"–20" size range. Contact AMERICAN if dimensions are critical.

**30" and larger Flex-Ring and Lok-Ring 11 1/4° bends may be furnished with Flex-Ring Ends or Lok-Ring Ends. See Table No. 4-2.

† Higher pressure ratings are available on special applications. Based on performance testing per AWWA C153, AMERICAN can rate 30"–48" C153 bends 350 psi. Contact AMERICAN.

††16" Flex-Ring fittings may have greater "T" dimensions than those shown.

See General Notes on page 4-2.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard

Tees and Crosses

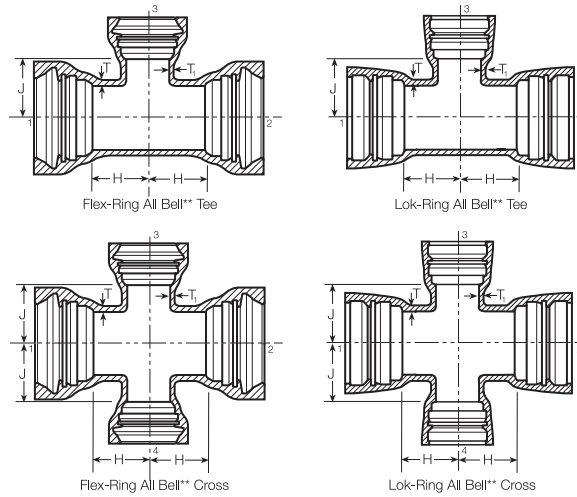


Table No. 4-8

Size in.		Pressure Rating psi †	Dimensions in Inches				Weight in Pounds			
Run	Branch		T	T ₁	H	J	Tee		Cross	
							**Flex-Ring All Bell	**Lok-Ring All Bell	**Flex-Ring All Bell	**Lok-Ring All Bell
4	4	350	0.34	0.34	4.00	4.00	68	-	-	-
6	4	350	0.36	0.34	4.00	5.00	84	-	-	-
6	6	350	0.36	0.36	5.00	5.00	93	-	-	-
8	4	350	0.38	0.34	4.00	6.50	104	-	-	-
8	6	350	0.38	0.36	5.00	6.50	115	-	-	-
8	8	350	0.38	0.38	6.50	6.50	131	-	-	-
10	4	350	0.40	0.34	4.00	7.50	148	-	-	-
10	6	350	0.40	0.36	5.00	7.50	160	-	-	-
10	8	350	0.40	0.38	6.50	7.50	178	-	-	-
10	10	350	0.40	0.40	7.50	7.50	204	-	-	-
12	4	350	0.42	0.34	4.00	8.75	222	-	-	-
12	6	350	0.42	0.36	5.00	8.75	237	-	-	-
12	8	350	0.42	0.38	6.50	8.75	257	-	-	-
12	10	350	0.42	0.40	7.50	8.75	284	-	-	-
12	12	350	0.42	0.42	8.75	8.75	330	-	-	-
16	4	350	.50††	.34††	15.0	15.0	645	-	-	-
16	6	350	.50††	.36††	15.0	15.0	655	-	705	-
16	8	350	.50††	.38††	15.0	15.0	670	-	730	-
16	10	350	.50††	.40††	15.0	15.0	705	-	-	-
16	12	350	.50††	.42††	15.0	15.0	730	-	850	-
16	14	350	.50††	.47††	15.0	15.0	775	-	-	-
16	16	350	.50††	.50††	15.0	15.0	805	-	1000	-

16" and 24"-64" fittings are generally per AWWA C153. While AWWA C153 shows 54"-64" fittings with 150 psi ratings, AMERICAN rates many 54"-64" fittings 250 psi as AMERICAN Standard based on performance testing. **30" and larger Flex-Ring and Lok-Ring Tees and Crosses may be furnished on the runs with Flex-Ring Ends or Lok-Ring Ends. See Table No. 4-2.

† Higher pressure ratings are available on special applications. Contact AMERICAN.

Note: Tees and Crosses with smaller reductions may be available; however, welded-on outlets are normally preferable in these cases from a layout, installation, and economical standpoint. See Section 7.

†† 16" Flex-Ring fittings may have greater "T" and "T₁" dimensions than those shown.

See General Notes on page 4-2.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard
Tees and Crosses

Table No. 4-8 —Continued

Size in.		Pressure Rating psi †	Dimensions in Inches				Weight in Pounds			
			T	T ₁	H	J	Tee		Cross	
Run	Branch						**Flex-Ring All Bell	**Lok-Ring All Bell	**Flex-Ring All Bell	**Lok-Ring All Bell
18	6	350	0.75	0.55	13.0	15.5	810	—	850	—
18	8	350	0.75	0.60	13.0	15.5	820	—	880	—
18	10	350	0.75	0.68	13.0	15.5	855	—	940	—
18	12	350	0.75	0.75	13.0	15.5	875	—	990	—
18	14	350	0.75	0.66	16.5	16.5	1015	—	1185	—
18	16	350	0.75	0.70	16.5	16.5	1045	—	1240	—
18	18	350	0.75	0.75	16.5	16.5	1125	—	1405	—
20	6	350	0.80	0.55	14.0	17.0	905	—	950	—
20	8	350	0.80	0.60	14.0	17.0	920	—	980	—
20	10	350	0.80	0.68	14.0	17.0	950	—	1040	—
20	12	350	0.80	0.75	14.0	17.0	975	—	1090	—
20	14	350	0.80	0.66	14.0	17.0	1020	—	1175	—
20	16	350	0.80	0.70	18.0	18.0	1170	—	1365	—
20	18	350	0.80	0.75	18.0	18.0	1255	—	1530	—
20	20	350	0.80	0.80	18.0	18.0	1270	—	1565	—
24	6	350	0.61	0.36	13.0	17.0	920	—	870	—
24	8	350	0.61	0.38	13.0	17.0	930	—	900	—
24	10	350	0.61	0.40	13.0	17.0	950	—	935	—
24	12	350	0.61	0.42	13.0	17.0	965	—	965	—
24	14	350	0.61	0.47	13.0	17.0	990	—	1020	—
24	16	350	0.61	0.50	13.0	17.0	1005	—	1060	—
24	18	350	0.61	0.54	17.0	17.0	1035	—	1225	—
24	20	350	0.61	0.57	17.0	17.0	1050	—	1265	—
24	24	350	0.61	0.61	17.0	17.0	1130	—	1380	—
30	20	250	0.66	0.57	16.5	21.0	1500	—	—	—
30	24	250	0.66	0.61	22.0	22.0	1840	—	2070	—
30	30	250	0.66	0.66	22.0	22.0	2000	—	2480	—
36	24	250	0.74	0.61	18.5	26.0	2070	—	—	—
36	30	250	0.74	0.66	26.0	26.0	2670	—	3390	—
36	36	250	0.74	0.74	26.0	26.0	2740	—	3400	—

16" and 24"-64" fittings are generally per AWWA C153. While AWWA C153 shows 54"-64" fittings with 150 psi ratings, AMERICAN rates many 54"-64" fittings 250 psi as AMERICAN Standard based on performance testing.

**30" and larger Flex-Ring and Lok-Ring Tees and Crosses may be furnished on the runs with Flex-Ring Ends or Lok-Ring Ends. See Table No. 4-2.

† Higher pressure ratings are available on special applications. **Contact AMERICAN.**

Note: Tees and Crosses with smaller reductions may be available; however, welded-on outlets are normally preferable in these cases from a layout, installation, and economical standpoint. See Section 7.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard
Tees and Crosses

Table No. 4-8 —Continued

Size in.		Pressure Rating psi †	Dimensions in Inches				Weight in Pounds			
			T	T ₁	H	J	Tee		Cross	
Run	Branch					**Flex-Ring All Bell	**Lok-Ring All Bell	**Flex-Ring All Bell	**Lok-Ring All Bell	
42	24	250	0.82	0.61	22.0	27.5	3370	—	3570	—
42	30	250	0.82	0.66	22.0	29.5	3340	—	3860	—
42	36	250	0.82	0.74	30.0	30.0	3300	—	4670	—
42	42	250	0.82	0.82	30.0	30.0	4830	—	6970	—
48	24	250	0.90	0.61	23.0	32.0	3820	—	—	—
48	30	250	0.90	0.66	23.0	32.0	4180	—	4610	—
48	36	250	0.90	0.74	33.5	32.3	5190	—	5760	—
48	42	250	0.90	0.82	33.5	33.5	5600	—	6550	—
48	48	250	0.90	0.90	33.5	33.5	6130	—	7680	—
54	30	250	1.05	1.03	29.3	37.0	—	5086	—	5729
54	36	250	1.05	1.15	29.28	37.0	—	—	—	6380
54	42	250	1.05	1.28	38.59	39.0	—	6557	—	—
54	48	250	1.05	1.42	38.59	39.0	—	7001	—	—
54	54	250	1.05	1.05	38.59	38.59	—	8279	—	15774
60	36	250	1.10	1.15	29.53	39.0	—	—	—	6760
60	42	250	1.10	1.28	29.53	41.0	—	6428	—	—
60	48	250	1.10	1.42	40.95	41.0	—	8025	—	—
60	54	250	1.10	1.05	40.95	40.7	—	8913	—	11125
60	60	250	1.10	1.10	40.95	40.95	—	9975	—	12619
64	36	250	1.16	1.15	34.25	42.0	—	—	—	8360
64	42	250	1.16	1.28	34.25	42.0	—	7622	—	8708
64	48	250	1.16	1.42	34.25	44.0	—	8815	—	—
64	54	250	1.16	1.05	43.31	44.0	—	10336	—	—
64	60	250	1.16	1.10	43.31	44.0	—	10770	—	—
64	64	250	1.16	1.16	43.31	43.31	—	11806	—	14884

16" and 24"–64" fittings are generally per AWWA C153. While AWWA C153 shows 54"–64" fittings with 150 psi ratings, AMERICAN rates many 54"–64" fittings 250 psi as AMERICAN Standard based on performance testing.

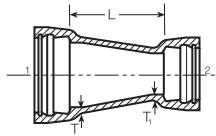
† Higher pressure ratings are available on special applications. **Contact AMERICAN.**

Note: Tees and Crosses with smaller reductions may be available; however, welded-on outlets are normally preferable in these cases from a layout, installation, and economical standpoint. See Section 7.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard

Reducers



Bell and Bell

Table No. 4-9

Size in.		Pressure Rating psi†	Thickness in Inches		Bell x Bell	
Large End	Small End		T Large End	T ₁ Small End	L Laying Length in.	Weight lb
6	4	350	0.36	0.34	4	49
8	4	350	0.38	0.34	5	60
8	6	350	0.38	0.36	4	64
10	4	350	0.40	0.34	7	85
10	6	350	0.40	0.36	5	88
10	8	350	0.40	0.38	4	93
12	4	350	0.42	0.34	9	128
12	6	350	0.42	0.36	7	130
12	8	350	0.42	0.38	5	133
12	10	350	0.42	0.40	4	149
16	6	350	.50††	.36††	11	135
16	8	350	.50††	.38††	9	137
16	10	350	.50††	.40††	7	139
16	12	350	.50††	.42††	5	137
16	14	350	.50††	.47††	4	160
18	8	350	0.75	0.60	19	410
18	10	350	0.75	0.68	19	449
18	12	350	0.75	0.75	19	491
18	14	350	0.75	0.66	19	533
18	16	350	0.75	0.70	19	565
20	8	350	0.80	0.60	20	423
20	10	350	0.80	0.68	20	467
20	12	350	0.80	0.75	20	504
20	14	350	0.80	0.66	20	546
20	16	350	0.80	0.70	20	583
20	18	350	0.80	0.75	20	579
24	12	350	0.89	0.75	24	706
24	14	350	0.89	0.66	24	748
24	16	350	0.89	0.70	24	785
24	18	350	0.89	0.75	24	786
24	20	350	0.89	0.80	24	885
30	12	250	1.03	0.75	30	910
30	16	250	1.03	0.70	30	985
30	18	250	1.03	0.75	30	1030
30	20	250	1.03	0.80	30	1080
30	24	250	1.03	0.89	30	1210

*AWWA C153 configurations with shorter center-to-socket dimensions, etc., may be furnished in some cases in the 18"-48" size range.

Contact AMERICAN if dimensions are critical.

† Higher pressure ratings are available on special applications. Contact AMERICAN.

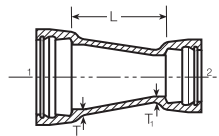
†† 16" Flex-Ring fittings may have greater "T" and "T₁" dimensions than those shown.

See General Notes on page 4-2.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
ANSI/AWWA C153/A21.53* and AMERICAN Standard

Reducers



Bell and Bell

Table No. 4-9 — Continued

Size in.		Pressure Rating psi†	Thickness in Inches		Bell x Bell**	
Large End	Small End		T Large End	T ₁ Small End	L Laying Length in.	Weight lb
36	20	250	1.15	0.80	36	1490
36	24	250	1.15	0.89	36	1635
36	30	250	1.15	1.03	36	1925
42	20	250	1.28	0.80	42	1710
42	24	250	1.28	0.89	42	1875
42	30	250	1.28	1.03	42	2200
42	36	250	1.28	1.15	42	2540
48	24	250	1.42	0.89	48	2430
48	30	250	1.42	1.03	48	2790
48	36	250	1.42	1.15	48	3170
48	42	250	1.42	1.28	48	3315
54	30	250	0.90	1.00	31.25	2035
54	36	250	0.90	1.15	27.25	2180
54	42	250	0.90	1.25	19.25	1850
54	48	250	0.90	1.40	15.25	1890
60	30	250	0.94	1.00	35.5	2345
60	36	250	0.94	1.15	31.5	2505
60	42	250	0.94	1.25	23.5	2175
60	48	250	0.94	1.40	19.5	2230
60	54	250	0.94	0.90	10.25	1815
64	30	250	0.99	1.00	39.25	2690
64	36	250	0.99	1.15	35.25	2860
64	42	250	0.99	1.25	27.25	2525
64	48	250	0.99	1.40	23.25	2590
64	54	250	0.99	0.90	14.5	2145
64	60	250	0.99	0.94	10.25	2050

*AWWA C153 configurations with shorter center-to-socket dimensions, etc., may be furnished in some cases in the 18"-48" size range.

Contact AMERICAN if dimensions are critical.

**Reducers may be furnished with Flex-Ring or Lok-Ring bells and Flex-Ring or Lok-Ring ends in larger sizes. Dimensions (including laying lengths in some cases) and weights will be different than those shown above. Plain ends on available reducers may or may not be beveled/smoothed for push-on joint assembly. If push-on assembly is required, such ends may require field bevel/smoothing.

Contact AMERICAN if further information is needed. See Table No. 4-2 and 7-4.

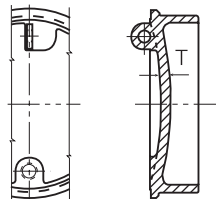
† Higher pressure ratings are available on special applications. Contact AMERICAN.

See General Notes on page 4-2.

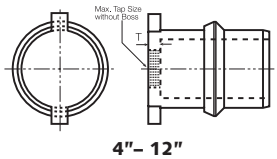


American Ductile Iron Flex-Ring® and Lok-Ring® Fittings American Standard

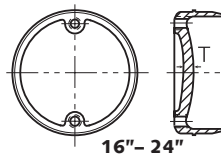
Plugs



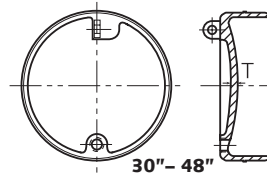
54"-64" Lok-Ring Plugs



4"- 12"



16"- 24"



30"- 48"

Table No. 4-10

Flex-Ring Plugs

Size in.	Pressure† Rating psi	T in.	Weight in Pounds		
			Push-On	Flex-Ring	Lok-Ring
4	350	0.75	See Table No. 4-11	19	—
6	350	0.75		27	—
8	350	0.75		39	—
10	350	0.87		55	—
12	350	0.87		70	—
16	250††	—	—	180	—
18	250††	—	—	220	—
20	250††	—	—	290	—
24	250††	1.16	350	440	—
30	250	1.37	565	620	—
36	250	1.58	785	1050	—
42	250	1.78	1355	1270	—
48	250	1.96	1670	1800	—
54	250	2.16	2415	—	1804
60	250	2.50	2680	—	2417
64	250	2.75	3230	—	2865

† Higher pressure ratings are available on special applications. Contact **AMERICAN**.

†† 16"-24" Flex-Ring Plugs are rated 350 psi.

All 4"-24" Push-On plugs are furnished with internal set-screw restraint. See Table No. 4-10 (above) for descriptions and ratings.

Fast-Grip® gaskets should not be used with plugs if disassembly would ever be required. Except as noted below, taps are furnished only when specified.

Steel eyebolts with 1" or 1 1/2" NPT male pipe threads can be obtained from AMERICAN to be threaded into these standard tapped holes to aid in non-destructive plug removal (pulling or jacking) operations.

16"-64" Lok-Ring and Flex-Ring plugs have one 1" (14"-24" sizes) or one 1 1/2" (30"-64" sizes) boss and tap (plugged) at invert and lifting eyes 180° from the boss. These taps facilitate testing and disassembly. If a different size or location of taps is required, it must be specified.

See General Notes on page 4-2.

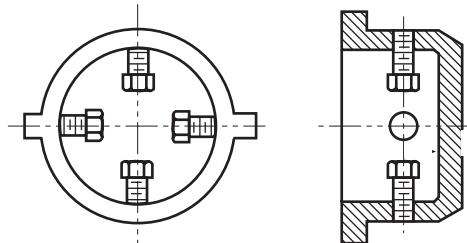
It is not recommended to install 16"-48" Flex-Ring plugs into Flex-Ring valves.



Ductile Iron Push-On Restrained Plugs

Table No. 4-11

Size in.	Pressure Rating psi	Weight lb
4	250	15
6	250	30
8	250	50
10	250	70
12	250	100
14	250	155
16	250	200
18	250	260
20	250	410
24	250	-



A-20803 Restrained Plug

The Fastite Restrained Plug provides positive locking against joint separation and allows for future removal. This plug is also useful as a test plug.

Fastite Conductive gaskets should not be used with Fastite Restrained Plugs.

See General Notes on page 4-2.

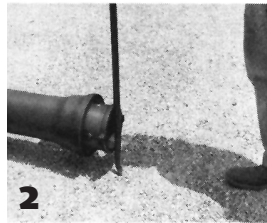
If desired, a 2" NPT tap can be ordered in 6"-20" plugs. A 1" tap can be supplied in 4" plugs.

Push-On Plug Assembly Instructions

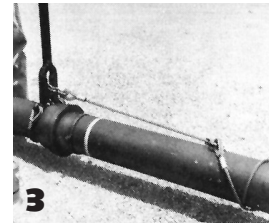
The pictures illustrating these instructions are of small-diameter, restrained Fastite or Push-On plug assembly; however, other sizes and other push-on-type joint plugs may be assembled/disassembled with similar principles. In the case of various restrained joint plug designs, it is generally necessary to lock the plugs in accordance with the respective joint assembly instructions when restraint is desired, and also to appropriately unlock same if/when it is desired to remove them.



1. Clean the pipe socket of any foreign matter and insert the gasket. Lubricate the end of the plug and inside surface of gasket with a thin film of lubricant. A non-soluble lubricant, such as Fastite underwater lubricant, may be used to facilitate removal of the plug after testing.



2. Place the tapered end of the plug in contact with the gasket in the pipe. Push the plug "home" into the pipe socket with a bar, lever, or jack, as required.



3. Larger sizes are easily assembled by placing another pipe against the plug and pushing or pulling the plug "home" using standard Fastite assembly tools or methods.

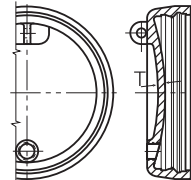
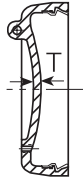
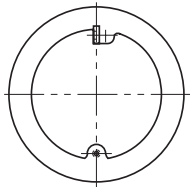


4. Firmly install the locking means if needed for restraint in the case of small-diameter Push-On plugs, tighten all cap screws inside the plug, and the assembly is then complete.

To remove the plug, release any locking mechanism present in accordance with normal joint disassembly instructions. In the case of Push-On plugs, back out the cap screws. Then, pull or jack the plug out of the socket. In the case of small-diameter, Push-On plugs, the plug can often be pried out with bars placed between the pipe bell and the cast lugs on the plug.



AMERICAN Ductile Iron Flex-Ring® and Lok-Ring® Fittings
AMERICAN Standard
Caps



4"-48" Flex-Ring Caps

54"-64" Lok-Ring Caps

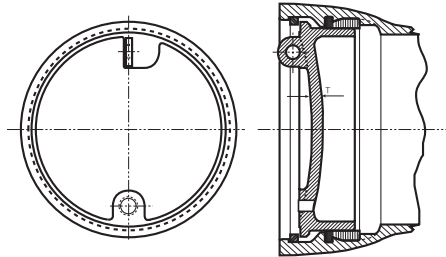
Table No. 4-12

Size in.	Pressure† Rating psi	T in	Weight in Pounds	
			Flex-Ring	Lok-Ring
4	350	0.75	21	—
6	350	0.75	33	—
8	350	0.75	51	—
10	350	0.75	67	—
12	350	0.75	86	—
16	250††	0.89	273	—
18	250††	0.96	341	—
20	250††	1.03	429	—
24	250††	1.16	611	—
30	250	1.37	894	—
36	250	1.58	1321	—
42	250	2.25	2190	—
48	250	2.38	2625	—
54	250	2.43	—	3307
60	250	2.50	—	3853
64	250	2.75	—	4554

† Higher pressure ratings are available on special applications. Contact AMERICAN.
 †† 16"-24" Flex-Ring Caps are rated 350 psi.
 16"-64" Lok-Ring or Flex-Ring caps have one 1" (16"-24" sizes) or one 1 1/2" (30"-64" sizes) boss and tap (plugged) at invert and lifting eyes 180° from the boss. These taps facilitate testing or disassembly. If different size or location of taps is required, it must be specified.
 See General Notes on page 4-2.



ASSEMBLY OF LOK-RING® PLUGS



Typical Lok-Ring Plug

NOTE: A Lok-Ring plug, in effect, simulates the spigot end of a Lok-Ring pipe or fitting, with the outside face of the plug bulkhead plate roughly even with the bearing face of the plug abutment (simulating the weld ring on a pipe end). The Lok-Ring plug is normally shipped with the Lok-Ring bolted down (in effect, backward) on the beveled plain end barrel of the plug. This Lok-Ring is completely removed prior to insertion of the plug completely inside a socket, then the Lok-Ring is inserted and spread completely into the socket locking groove (in effect, behind the plug) to restrain it in the socket.

Assembly Instructions:

1. Remove (unbolt) the Lok-Ring completely off the plug by wrenching or manipulating only the outside closure nut opposite the locked (nut) side of the closure mechanism.
2. Prepare spigot and sockets, insert gasket, and lubricate the plug spigot end and gasket in accordance with basic Fastite (and Lok-Ring) joint assembly instructions. See page 2-10.
3. Push or pull the plug completely inside the socket. Due to the short nature of the push-on joint plug, some means is normally necessary to stabilize or brace the plug so that it does not pivot or “buck sideways” in joint assembly. A longer pipe, the end of which can be placed against the outside face of the plug, or a (large bearing face) timber braced between the plug face and the flat lower face of a backhoe bucket are normally quite effective for this purpose. Of course, if the end of a pipe is used to push the plug in, any conventional pipe assembly means could be used to pull or push the pipe and the plug into the socket. Sufficient socket locking groove “width” should be clearly visible after pushing the plug inside the socket to allow insertion of the Lok-Ring.
4. Compress the ends of the loose Lok-Ring together and push it completely into the socket locking groove to restrain the plug in the socket.
5. Wrenching only the inside spreader nut opposite the locked side of the closure mechanism, mechanically spread the Lok-Ring into firm contact with the inner socket surface of the socket locking groove.
6. Inspect the installed Lok-Ring making sure that the ring is completely inserted in the socket locking groove and completely restrained by the socket restraint lip from one end of the ring to the other end all around the joint. If the ring is out of the groove at any point, correct this condition prior to applying any pressure load to the plug.



PUSH-ON FITTING ASSEMBLY INSTRUCTIONS

ASSEMBLY INSTRUCTIONS

Assembling AMERICAN Lok-Ring® and Flex-Ring® fittings is simple. It is very similar to the assembly of Fastite pipe shown in Section 2. (For instructions on complete assembly of Fast-Grip®, Flex-Ring, Field Flex-Ring®, and Lok-Ring joints, check Section 9.)

Fast-Grip gaskets may be used in lieu of standard Fastite gaskets in the bells of same size (4" -30") Fastite and Flex-Ring joint pipe or fittings where easy, field-adaptable restraint is desired in pipelines with working pressure from 150-350 psi, depending on size. No Flex-Ring restraining mechanism is necessary when using Fast-Grip gaskets in Flex-Ring bells.

Push-on fittings may be assembled on individual pipe aboveground, or assembled onto the pipeline belowground. Many installers, however, do prefer to pull restrained joint fittings, in particular Fast-Grip, Flex-Ring, etc., onto a piece of pipe aboveground. This is sometimes accomplished by simply bracing one end of the pipe against a heavy piece of equipment (e.g. backhoe) and pulling the fitting onto the far end of the pipe using the method shown below. Then the pipe and fitting can be lowered as a single unit into the trench. Fittings may be assembled above ground if a situation arises that would make trench assembly difficult. However, in this case the assembly yokes and pulling sling must be kept safely in place and the sling must remain taut while the assembly is lowered into the ground. This should prevent the fitting from slipping off the end of the pipe.

While it may be possible to "rotate" some push-on fittings (after they are assembled to fixed/in-situ piping), AMERICAN recommends that fittings be assembled in their actual service orientation.

1. CLEANING OF SOCKET AND SPIGOT

Clean the socket and plain end of the pipe thoroughly, removing mud, sand, gravel, ice, frozen material, or other matter that could prevent a proper joint seal. Material in the gasket grooves may cause the gasket to protrude into the path of the entering spigot. Therefore, **it is important that all joint recesses be kept clean during insertion of the gasket and assembly of the joint to prevent gasket dislodgment and/or subsequent leakage.**

2. PLACEMENT OF GASKET

Wipe the gasket clean. After flexing one or more "loops" in the gasket, insert the gasket in the gasket recess of the socket with the large sealing end of the gasket toward the rear of the socket (Photo 1). If Fast-Grip gaskets are used, the center of the gasket loops should be positioned between tooth locations. Press the gasket into the mating socket recesses so the metal-carrying retainer end of the gasket is seated completely and uniformly in the socket groove. Take care that no gasket loops or bulges protrude into the path of the entering pipe spigot. In extremely cold weather conditions, gaskets should be warmed before installing.

3. LUBRICATION OF THE JOINT

With a clean brush, apply a liberal amount of regular Fastite lubricant completely over the exposed inner surface of the gasket after it is placed in the socket (Photo 2). Also, apply lubricant completely over the plain end of the pipe, the spigot radius, and the outer surface of the pipe up to the assembly stripe (Photo 3). Use only lubricant provided by AMERICAN. For underwater or very wet conditions, special AMERICAN underwater lubricant is recommended and is available upon request. This special lubricant for underwater service is relatively insoluble in water immersion or exposure to flowing water.

4. INITIAL PLACEMENT OF BEVEL END INTO SOCKET†

The spigot end of the pipe should be in reasonably straight alignment when entered in the socket. Center the spigot in the installed gasket, so it makes firm and even contact with the inner surface of the gasket. Do not place pipe spigot in socket while in a substantially deflected position.

† Joints using Fast-Grip gaskets should be assembled in proper orientation so as to avoid rotation of the fitting after assembly. See Fast-Grip Gasket Assembly Instructions in Section 9.



PUSH-ON FITTING ASSEMBLY INSTRUCTIONS

ASSEMBLY INSTRUCTIONS-Continued

5. PULL-ON ASSEMBLY OF PUSH-ON FITTINGS AND RIGGING

Fittings may normally then be pulled readily onto pipe ends by first firmly supporting the fitting in aligned assembly position, and then pulling on the center of a wire rope or chain sling attached to the fitting bell with any suitable pulling mechanism (such as a backhoe, come-along(s), pry bar, etc.) until the spigot is fully inserted into the socket.

Larger-diameter fittings can be assembled with field-made rigging similar in function to the smaller custom steel yokes, but instead using a chain or wire rope sling, etc., looped under the spigot to, in similar effect, direct a single-point pulling force into two pulling sling legs straight at the springline. (See Photo 3.)

6. COMPLETE ASSEMBLY OF PLAIN END INTO SOCKET

Pull the sling with smooth, steady force until the fitting is "pulled up" and the plain end uniformly contacts the rear of the socket. It is best practice to make assemblies smoothly and progressively in one motion, without repeated "wobbling" (or joint deflection) back and forth. Desired joint deflection may then be set. Any abnormal joint assembly loads or behavior, such as unexplained exposure of the assembly stripe outside the bell, may indicate improper cleaning, gasket insertion, spigot placement, or lubrication. In any such

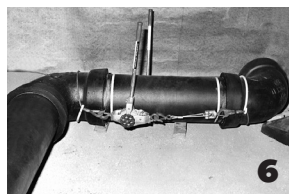
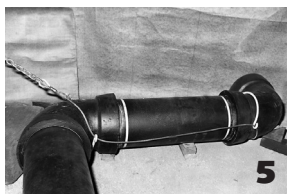
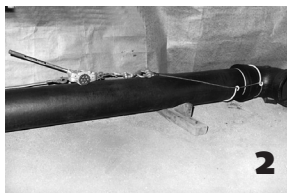
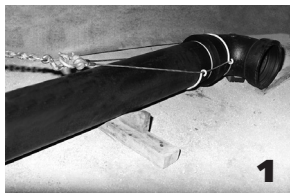
case, it may be advisable to feel for correct gasket positioning by passing a thin (automotive or other) feeler gauge between the bell and spigot all around the assembled joint.

Any joint with apparent problems (pushed gasket locations found by the probe, etc.) should be disassembled and corrected prior to filling or testing the pipeline. (See Section 9 for disassembly involving Fast-Grip gaskets or Field Flex-Rings.)

DOUBLE FITTING ASSEMBLY

In areas involving short lengths of pipe between two fittings, it may be desirable to simultaneously assemble the two fittings onto a single piece of pipe. This may be accomplished with AMERICAN push-on joint fittings due to the self-centering nature of the joints.

This "double assembly" procedure is similar to the single fitting assembly procedure mentioned earlier. In fact, Steps 1 through 4 are identical. For Step 5, place one yoke over the bell end of one of the fittings. Then, place the second yoke under the bell of the other fitting (Photo 4). Attach a wire rope sling (or other similar device) to the yokes in a manner similar to Step 5 (Photo 5). Note that both yokes can also be placed on the bottoms of the fittings for the same effect, if desired. Complete the assembly by simply pulling the ends of the sling with a pulling mechanism as in Step 5.





PUSH-ON FITTING ASSEMBLY INSTRUCTIONS

ASSEMBLY INSTRUCTIONS-Continued

Another method for the “double assembly” may be more convenient for pipes of sufficient length and any in-trench applications where there may not be easy means for sufficient bracing of the fitting. This method involves the use of two come-alongs (one on each side of the pipe) in order to provide a reasonably steady, evenly distributed assembly force. The assembly procedure is similar to the previously mentioned procedure. Place yokes on the fittings in the same manner as the other “double assembly” procedure (Photo 9). Then, place one short assembly sling under each of the two fittings and attach the sling to the yokes. Position the come-alongs on each side of the assembly and attach the sling thimbles or loops to both sides of the come-alongs (Photo 6). Work the come-alongs simultaneously to make a smooth, even assembly.

FIELD-CUT PIPE

When pipe is cut in the field, the cut end must be properly prepared prior to assembly

into the push-on socket. Using a portable grinder, place an approximately 1/4” to 1/2” long smooth assembly chamfer or bevel on the outside end of the pipe. This bevel should make an angle of 30°-40° with the axis of the pipe. Care should be taken to ensure that all corners are rounded and no sharp or rough edges remain that might damage or dislodge the gasket. Finally, it is good practice to mark at least a rough assembly stripe on the newly beveled pipe. The distance from the beveled end of the pipe to the opposite edge of the stripe should be about 1/8” less than the socket depth. (See Table No. 4-1 for typical socket depths of pipe or fittings, or measure same in the field.) This stripe is helpful in confirming proper joint insertion and also as an indication of joint deflection.

FIELD RIGGING EXAMPLE

Assembly of a larger push-on joint fitting.



NOTES:

*Larger-diameter fittings which cannot be assembled with equipment shown may be assembled using a similar procedure with heavier or stronger field rigging and more powerful equipment. (See example photos above.)

Final restrained joint pipe/fitting assemblies (connections to previously installed/fixed piping) should be assembled in proper orientation so as to avoid rotation of the fitting after assembly. See Fast-Grip Gasket Assembly Instructions in Restrained Joint Pipe (Section 9).