SECTION 12

AMERICAN Historical Data

AMERICAN Historical Data
Obsolete Piping Materials

Cast iron pipe will often last for centuries. One evidence of this is the world's oldest known cast iron water mains which were installed to supply water to the town and parks of Versailles, France. This pipe provided continuous service for more than 300 years. However, changing requirements and improved manufacturing techniques have resulted in some piping materials' becoming obsolete. Although no longer manufactured, many piping materials continue in service, such as cast iron pipe with caulked bell and spigot joints which was one of the earliest types of joints used for underground service.

Over the years AMERICAN furnished millions of feet of gray cast iron pipe in sizes 2" through 48"; however, ductile iron has replaced gray iron in all of the pipe and fittings now being manufactured. In ductile iron, like in gray cast iron, AMERICAN has continued to make improvements in joints and configurations, eliminating some joints in the process.

This section is included to furnish limited information pertaining to some of these obsolete materials. Contact AMERICAN for additional information if needed.

Note: When connecting to or repairing existing pipelines, it is good practice to carefully examine/measure the items involved prior to procuring materials and prior to commencing labor- and equipment-intensive operations. This would require at least minimal exposure of existing buried pipelines for identification and measurement. Likewise, all OSHA and other safety and governmental regulations should be complied with in such operations.

Cast Iron Pipe – being replaced by a larger main – is taken up after years of service for installation in another location for continued service.

Wall Thicknesses and Outside Diameters of Pit Cast Gray Iron Pipe

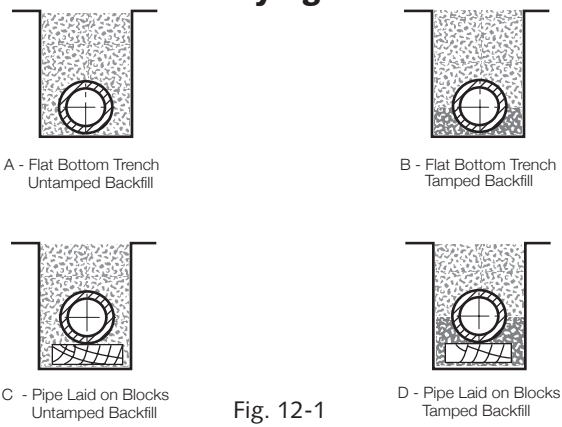
Table No. 12-1

AWWA Standard

Size in.	Wall Thicknesses in Inches				Outside Diameters in Inches			
	Class A 100 Ft. Head	Class B 200 Ft. Head	Class C 300 Ft. Head	Class D 400 Ft. Head	Class A 100 Ft. Head	Class B 200 Ft. Head	Class C 300 Ft. Head	Class D 400 Ft. Head
4	.42	.45	.48	.52	4.80	5.00	5.00	5.00
6	.44	.48	.51	.55	6.90	7.10	7.10	7.10
8	.46	.51	.56	.60	9.05	9.05	9.30	9.30
10	.50	.57	.62	.68	11.10	11.10	11.40	11.40
12	.54	.62	.68	.75	13.20	13.20	13.50	13.50
14	.57	.66	.74	.82	15.30	15.30	15.65	15.65
16	.60	.70	.80	.89	17.40	17.40	17.80	17.80
18	.64	.75	.87	.96	19.50	19.50	19.92	19.92
20	.67	.80	.92	1.03	21.60	21.60	22.06	22.06
24	.76	.89	1.04	1.16	25.80	25.80	26.32	26.32
30	.88	1.03	1.20	1.37	31.74	32.00	32.40	32.74
36	.99	1.15	1.36	1.58	37.96	38.30	38.70	39.16
42	1.10	1.28	1.54	1.78	44.20	44.50	45.10	45.58
48	1.26	1.42	1.71	1.96	50.50	50.80	51.40	51.98
54	1.35	1.55	1.90	2.23	56.66	57.10*	57.80	58.40
60	1.39	1.67	2.00	2.38	62.80	63.40	64.20	64.82
72	1.62	1.95	2.39	-	75.34	76.00	76.88	-
84	1.72	2.22	-	-	87.54	88.54	-	-

* In the time frame from the mid-1960s-1988, AMERICAN also produced centrifugally cast Fastite and various push-on restrained-joint ductile iron pipes with a 57.10" nominal barrel O.D. (see Tables 12-13,14). This specific O.D. 54" ductile iron pipe is no longer produced, and modern 54" pipe has a 57.56" nominal O.D.

AMERICAN Mono-Cast Gray Iron Pipe Standard Laying Conditions



A - Flat Bottom Trench Untamped Backfill

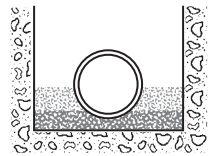
B - Flat Bottom Trench Tamped Backfill

C - Pipe Laid on Blocks Untamped Backfill

D - Pipe Laid on Blocks Tamped Backfill

Fig. 12-1

In the 1970 Revision of ANSI A21.6 and A21.8, laying conditions "C" and "D" were deleted and laying condition "F" was added. See below.



F - Pipe bedded in sand or gravel, tamped backfill

Fig. 12-2

AMERICAN Mono-Cast Bell and Spigot Gray Iron Pipe Centrifugally Cast in Sand-Lined Molds

ANSI A21.8 (AWWA C108) Standard

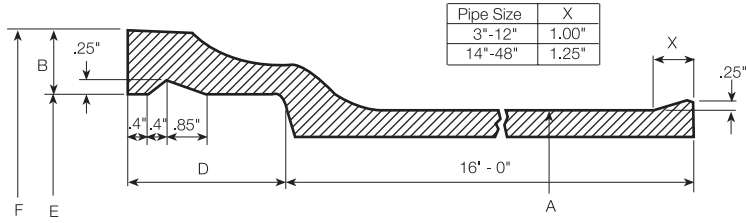


Table No. 12-2

Size in.	A in.	Pattern	Dimensions in Inches			
			B	D	E	F
3	3.96	BCD	1.25	3.50	4.76	7.26
4	4.80	A	1.30	3.50	5.60	8.20
4	5.00	BCD	1.30	3.50	5.80	8.40
6	6.90	A	1.35	3.50	7.70	10.40
6	7.10	BCD	1.35	3.50	7.90	10.60
8	9.05	AB	1.45	4.00	9.85	12.75
8	9.30	CD	1.45	4.00	10.10	13.00
10	11.10	AB	1.55	4.00	11.90	15.00
10	11.40	CD	1.55	4.00	12.20	15.30
12	13.20	AB	1.60	4.00	14.00	17.20
12	13.50	CD	1.60	4.00	14.30	17.50
14	15.30	AB	1.70	4.00	16.10	19.50
14	15.65	CD	1.70	4.00	16.45	19.85
16	17.40	AB	1.75	4.00	18.40	21.90
16	17.80	CD	1.75	4.00	18.80	22.30
18	19.50	AB	1.80	4.00	20.50	24.10
18	19.92	CD	1.80	4.00	20.92	24.52
20	21.60	AB	1.90	4.00	22.60	26.40
20	22.06	CD	1.90	4.00	23.06	26.86
24	25.80	AB	2.05	4.00	26.80	30.90
24	26.32	CD	2.05	4.00	27.32	31.42
30	32.00	B	2.25	4.50	33.00	37.50
36	38.30	B	2.45	4.50	39.30	44.20
42	44.50	B	2.65	5.00	45.50	50.80
48	50.80	B	2.85	5.00	51.80	57.50

AMERICAN Mono-Cast Bell and Spigot Gray Iron Pipe was also manufactured in accordance with Federal Specification WW-P-421 in sizes 4" through 24" Class 150 and Class 250. The standard outside diameter was "CD" pattern for 14" through 24" pipe. Alternate "AB" pattern pipe in these sizes and "B" pattern pipe in 30" through 48" sizes were also produced.

Pressure class thicknesses per ANSI A21.8 (AWWA C108) were the same as for those shown for Mechanical Joint Pipe in Table Nos. 12-8 and 12-9.

Weight of Lead and Jute Per Joint—AWWA

Table No. 12-3

Size in.	Lead lb.	Jute lb.	Size in.	Lead lb.	Jute lb.	Size in.	Lead lb.	Jute lb.
3	6.50	.18	14	24.00	.81	36	77.25	3.00
4	8.00	.21	16	33.00	.94	42	104.25	3.50
6	11.25	.31	18	36.90	1.00	48	119.00	4.00
8	14.50	.44	20	40.50	1.25	54	133.00	5.60
10	17.50	.53	24	52.50	1.50	60	148.00	6.20
12	20.50	.61	30	64.75	2.06	-	-	-

AMERICAN Gray Iron Fastite Joint Pipe

ANSI/AWWA C111/A21.11

Standard Dimensions

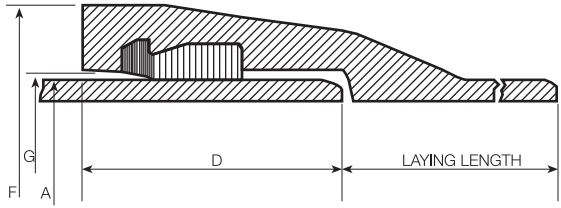


Table No. 12-4

Size in.	Laying Length ft.-in.	Dimensions in Inches			
		A Outside Diameter	D Depth of Socket	F Bell O.D. Maximum	G Bell I.D.
3	20' - 0"	3.96	3.00	6.08	4.07
4	20' - 0"	4.80	3.31	7.13	4.91
6	20' - 0"	6.90	3.38	9.19	7.01
8	20' - 0"	9.05	3.75	11.50	9.16
10	20' - 0"	11.10	3.75	13.75	11.21
12	20' - 0"	13.20	3.75	15.75	13.31

For trim pipe allowance see AWWA C106.

AMERICAN Gray Iron Mechanical Joint Pipe

ANSI/AWWA C111/A21.11

Standard Dimensions

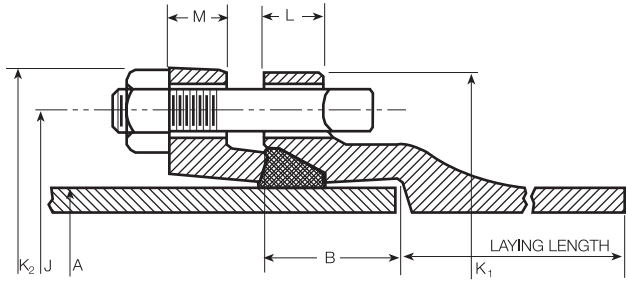


Table No. 12-5

Size in.	Laying Length ft.-in.	Dimensions in Inches							Bolts	
		A	B	J	K_1	K_2	L	M	No. Per Joint	Size in.
3	20' - 1"	3.96	2.5	6.19	7.62	7.69	.94	.62	4	⅝ X 3
4	20' - 1"	4.80	2.5	7.50	9.06	9.12	1.00	.75	4	¾ X 3½
6	20' - 1"	6.90	2.5	9.50	11.06	11.12	1.06	.88	6	¾ X 3½
8	20' - 1"	9.05	2.5	11.75	13.31	13.37	1.12	1.00	6	¾ X 4
10	20' - 1"	11.10	2.5	14.00	15.62	15.62	1.19	1.00	8	¾ X 4
12	20' - 1"	13.20	2.5	16.25	17.88	17.88	1.25	1.00	8	¾ X 4

For trim pipe allowance see AWWA C106.

AMERICAN Gray Iron Pipe
ANSI/AWWA C106/A21.6
Standard Thickness Classes

Table No. 12-6

Size in.	STANDARD CLASSES—Thickness in Inches										
	20	21	22	23	24	25	26	27	28	29	30
3	-	-	**.32**	.35	.38	.41	.44	.48	.52	.56	.60
4	-	.32	**.35**	.38	.41	.44	.48	.52	.56	.60	.65
6	.32	.35	**.38**	.41	.44	.48	.52	.56	.60	.65	.70
8	.35	.38	**.41**	.44	.48	.52	.56	.60	.65	.70	.76
10	.38	.41	**.44**	.48	.52	.56	.60	.65	.70	.76	.82
12	.41	.44	**.48**	.52	.56	.60	.65	.70	.76	.82	.89
14	.43	**.48**	.51	.55	.59	.64	.69	.75	.81	.87	.94
16	.46	**.50**	.54	.58	.63	.68	.73	.79	.85	.92	.99
18	.50	**.54**	.58	.63	.68	.73	.79	.85	.92	.99	1.07
20	.53	**.57**	.62	.67	.72	.78	.84	.91	.98	1.06	1.14
24	.58	**.63**	.68	.73	.79	.85	.92	.99	1.07	1.16	1.25
30	.68	**.73**	.79	.85	.92	.99	1.07	1.16	1.25	1.35	1.46
36	.75	**.81**	.87	.94	1.02	1.10	1.19	1.29	1.39	1.50	1.62
42	.83	**.90**	.97	1.05	1.13	1.22	1.32	1.43	1.54	1.66	1.79
48	.91	**.98**	1.06	1.14	1.23	1.33	1.44	1.56	1.68	1.81	1.95

Bold face figures indicate minimum Class thicknesses for 18/40 iron strength in accordance with AWWA C106.

Thicknesses shown for Classes 20 and 21 were regularly furnished by AMERICAN in higher (21/45) iron strength, designed by the standard AWWA C101 method.

Calculated thicknesses, based on design conditions, were adjusted to the nearest Class thickness, or to the minimum Class thickness if below specified minimum thickness.

AMERICAN Gray Iron Fastite Joint and Mechanical Joint Pipe

ANSI/AWWA C106/A21.6

WORKING PRESSURES

Standard Thicknesses and Weights

3"-12" Sizes

These Classes of pipe were for water or other liquids for pipe under 5 feet of cover, laying condition "B" (see Fig.12-1) and for iron strengths indicated.

Table No. 12-7

Size in.	18/40 Iron							21/45 Iron						
	Wall Thickness in.	Thickness Class	Weight in Pounds					Wall Thickness in.	Thickness Class	Weight in Pounds				
			Per Foot Plain End	FASTITE JOINT		MECHANICAL JOINT				Per Foot Plain End	FASTITE JOINT		MECHANICAL JOINT	
				Per Foot Incl.Bell	Per 20' Length	Per Foot Incl.Bell	Per 20' Length				Per Foot Incl.Bell	Per 20' Length	Per Foot Incl.Bell	Per 20' Length
50 psi Working Pressure														
3	.32	22	11.4	11.9	240	11.9	240	.32	22	11.4	11.9	240	11.9	240
4	.35	22	15.3	16.0	320	16.1	320	.35	22	15.3	16.0	320	16.1	320
6	.38	22	24.3	25.6	510	25.4	510	.35	21	22.5	23.8	475	23.6	470
8	.41	22	34.7	36.8	735	36.2	725	.35	20	29.8	31.8	635	31.3	625
10	.44	22	46.0	48.7	975	48.0	960	.38	20	39.9	42.6	850	41.9	840
12	.48	22	59.8	63.1	1260	62.3	1245	.41	20	51.4	54.7	1095	53.9	1080
100 psi Working Pressure														
3	.32	22	11.4	11.9	240	11.9	240	.32	22	11.4	11.9	240	11.9	240
4	.35	22	15.3	16.0	320	16.1	320	.35	22	15.3	16.0	320	16.1	320
6	.38	22	24.3	25.6	510	25.4	510	.35	21	22.5	23.8	475	23.6	470
8	.41	22	34.7	36.8	735	36.2	725	.35	20	29.8	31.8	635	31.3	625
10	.44	22	46.0	48.7	975	48.0	960	.38	20	39.9	42.6	850	41.9	840
12	.48	22	59.8	63.1	1260	62.3	1245	.41	20	51.4	54.7	1095	53.9	1080
150 psi Working Pressure														
3	.32	22	11.4	11.9	240	11.9	240	.32	22	11.4	11.9	240	11.9	240
4	.35	22	15.3	16.0	320	16.1	320	.35	22	15.3	16.0	320	16.1	320
6	.38	22	24.3	25.6	510	25.4	510	.35	21	22.5	23.8	475	23.6	470
8	.41	22	34.7	36.8	735	36.2	725	.35	20	29.8	31.8	635	31.3	625
10	.44	22	46.0	48.7	975	48.0	960	.38	20	39.9	42.6	850	41.9	840
12	.48	22	59.8	63.1	1260	62.3	1245	.41	20	51.4	54.7	1095	53.9	1080

The 18/40 iron strength was per AWWA C106. The design details and standard thicknesses for pipe with 21/45 iron strength were covered in AWWA C101.
The minimum thickness gray cast iron normally furnished in 4" size was .35" wall thickness (Class 22), and in 6" was .35" wall thickness (Class 21).

AMERICAN Gray Iron Fastite Joint and Mechanical Joint Pipe

ANSI/AWWA C106/A21.6

WORKING PRESSURES

Standard Thicknesses and Weights

3"-12" Sizes

These Classes of pipe were for water or other liquids for pipe under 5 feet of cover, laying condition "B" (see Fig.12-1) and for iron strengths indicated.

Table No. 12-7 -Continued

Size in.	18/40 Iron							21/45 Iron						
	Wall Thickness in.	Thickness Class	Weight in Pounds					Wall Thickness in.	Thickness Class	Weight in Pounds				
			Per Foot Plain End	FASTITE JOINT		MECHANICAL JOINT				Per Foot Plain End	FASTITE JOINT		MECHANICAL JOINT	
				Per Foot Incl.Bell	Per 20' Length	Per Foot Incl.Bell	Per 20' Length				Per Foot Incl.Bell	Per 20' Length	Per Foot Incl.Bell	Per 20' Length
200 psi Working Pressure														
3	.32	22	11.4	11.9	240	11.9	240	.32	22	11.4	11.9	240	11.9	240
4	.35	22	15.3	16.0	320	16.1	320	.35	22	15.3	16.0	320	16.1	320
6	.38	22	24.3	25.6	510	25.4	510	.35	21	22.5	23.8	475	23.6	470
8	.41	22	34.7	36.8	735	36.2	725	.35	20	29.8	31.8	635	31.3	625
10	.44	22	46.0	48.7	975	48.0	960	.41	21	43.0	45.7	915	45.0	900
12	.48	22	59.8	63.1	1260	62.3	1245	.44	21	55.0	58.3	1165	57.5	1150
250 psi Working Pressure														
3	.32	22	11.4	11.9	240	11.9	240	.32	22	11.4	11.9	240	11.9	240
4	.35	22	15.3	16.0	320	16.1	320	.35	22	15.3	16.0	320	16.1	320
6	.38	22	24.3	25.6	510	25.4	510	.35	21	22.5	23.8	475	23.6	470
8	.41	22	34.7	36.8	735	36.2	725	.35	20	29.8	31.8	635	31.3	625
10	.44	22	46.0	48.7	975	48.0	960	.41	21	43.0	45.7	915	45.0	900
12	.52	23	64.6	67.9	1360	67.1	1340	.48	22	59.8	63.1	1260	62.3	1245

The 18/40 iron strength was per AWWA C106. The design details and standard thicknesses for pipe with 21/45 iron strength were covered in AWWA C101.
The minimum thickness gray cast iron normally furnished in 4" size was .35" wall thickness (Class 22), and in 6" was .35" wall thickness (Class 21).

AMERICAN Mono-Cast Mechanical Joint Gray Iron Pipe Centrifugally Cast in Sand-Lined Molds 14"-48" Sizes

ANSI A21.8 (AWWA C108) Standard

These Classes of pipe were for water service and other liquids under 5 feet of cover, laying condition "B" (flat bottom trench with tamped backfill), and for iron strengths indicated.

Table No. 12-8

Size in.	Outside Diameter in.	18/40 IRON				21/45 IRON			
		Thickness in.	Weight in Pounds			Thickness in.	Weight in Pounds		
			Per Foot Plain End	Per Foot incl. Bell	Per 16-Foot Length		Per Foot Plain End	Per Foot incl. Bell	Per 16-Foot Length
100 PSI Working Pressure				**CLASS 100**					**231 Feet Head**
14	15.30	.51	73.9	78.8	1260	.48	69.7	74.6	1195
16	17.40	.54	89.2	95.0	1520	.50	82.8	88.7	1420
18	19.50	.58	107.6	114.7	1835	.54	100.4	107.5	1720
20	21.60	.62	127.5	135.9	2175	.57	117.5	125.9	2015
24	25.80	.68	167.4	178.5	2855	.63	155.4	166.5	2665
30	32.00	.79	241.7	259.5	4150	.79	241.7	259.5	4150
36	38.30	.87	319.2	343.9	5500	.87	319.2	343.9	5500
42	44.50	.97	413.9	445.7	7130	.90	384.6	416.5	6665
48	50.80	1.06	516.8	557.1	8915	1.06	516.8	557.1	8915
150 PSI Working Pressure				**CLASS 150**					**346 Feet Head**
14	15.30	.51	73.9	78.8	1260	.48	69.7	74.6	1195
16	17.40	.54	89.2	95.0	1520	.54	89.2	95.0	1520
18	19.50	.58	107.6	114.7	1835	.58	107.6	114.7	1835
20	21.60	.62	127.5	135.9	2175	.62	127.5	135.9	2175
24	25.80	.73	179.4	190.4	3045	.68	167.4	178.5	2855
30	32.00	.85	259.5	277.3	4435	.79	241.7	259.5	4150
36	38.30	.94	344.2	368.9	5900	.87	319.2	343.9	5500
42	44.50	1.05	447.2	479.1	7665	.97	413.9	445.7	7130
48	50.80	1.14	554.9	595.2	9525	1.06	516.8	557.1	8915
250 PSI Working Pressure				**CLASS 250**					**577 Feet Head**
14	15.30	.59	85.1	90.0	1440	.55	79.5	84.4	1350
16	17.40	.63	103.6	109.6	1755	.58	95.6	101.5	1625
18	19.50	.68	125.4	132.5	2120	.63	116.5	123.5	1975
20	21.60	.72	147.4	155.7	2490	.67	137.5	145.9	2335
24	25.80	.79	193.7	204.8	3275	.79	193.7	204.8	3275
30	32.00	.99	300.9	318.7	5100	.85	259.5	277.3	4435
36	38.30	1.10	401.1	425.8	6815	1.02	372.7	397.4	6360
42	44.50	1.22	517.6	549.5	8790	1.13	480.4	512.3	8195
48	50.80	1.33	644.9	685.2	10965	1.23	597.6	637.9	10205

Iron of 18/40 strength was in accordance with ANSI A21.8.

Iron of 21/45 strength was AMERICAN standard with thicknesses designed by the standard ANSI method.

AMERICAN furnished 14" through 24" Gray Iron Pipe in nominal 20-foot lengths for several years prior to discontinuing manufacture of Gray Iron Pipe in these sizes.

AMERICAN currently manufactures Mechanical Joint ductile iron pipe in sizes 4" through 24". See Section 3.

AMERICAN Fastite Joint Gray Iron Pipe
Centrifugally Cast in Sand-Lined Molds
14"-48" Sizes
ANSI A21.8 (AWWA C108) Standard
Federal Specification WW-P-421c

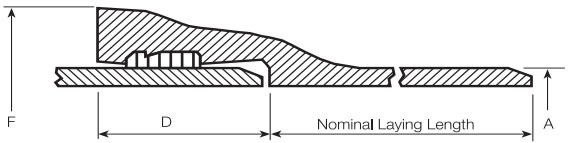


Table No. 12-9

Size in.	Nominal Laying Length ft.	A O.D. in.	D Socket Depth in.	F Bell O.D. Max. in.	Class 150 — 18/40 Iron				Class 150 — 21/45 Iron			
					Wall Thickness in.	Weight in Pounds			Wall Thickness in.	Weight in Pounds		
						Per Foot Plain End	Per Foot Incl. Bell	Per Length		Per Foot Plain End	Per Foot Incl. Bell	Per Length
14	20	15.30	4.50	19.68	.51	73.9	77.8	1555	.48	69.7	73.7	1475
16	20	17.40	4.50	21.68	.54	89.2	94.0	1880	.54	89.2	94.0	1880
18	20	19.50	4.50	23.88	.58	107.6	113.3	2265	.58	107.6	113.3	2265
20	20	21.60	4.75	26.31	.62	127.5	134.2	2685	.62	127.5	134.2	2685
24	20	25.80	4.75	29.90	.73	179.4	188.0	3760	.68	167.4	176.0	3520
30	16	32.00	5.25	37.31	.85	259.5	274.8	4395	.79	241.7	257.0	4110
36	16	38.30	5.25	43.75	.94	344.2	363.5	5815	.87	319.2	338.5	5415
42	16	44.50	5.25	49.38	1.05	447.2	472.2	7555	.97	413.9	438.9	7020
48	16	50.80	5.25	56.19	1.14	554.9	583.0	9330	1.06	516.8	544.9	8720
					Class 250 — 18/40 Iron				Class 250 — 21/45 Iron			
14	20	15.30	4.50	19.68	.59	85.1	89.4	1790	.55	79.5	83.4	1670
16	20	17.40	4.50	21.68	.63	103.6	108.9	2180	.58	95.6	100.4	2010
18	20	19.50	4.50	23.88	.68	125.4	131.7	2635	.63	116.5	122.2	2445
20	20	21.60	4.75	26.31	.72	147.4	154.7	3095	.67	137.5	144.2	2885
24	20	25.80	4.75	29.90	.79	193.7	203.2	4065	.73	179.4	183.0	3760
30	16	32.00	5.25	37.31	.99	300.9	317.8	5085	.85	259.5	274.8	4395
36	16	38.30	5.25	43.75	1.10	401.1	423.2	6770	1.02	372.7	394.8	6315
42	16	44.50	5.25	49.38	1.22	517.6	546.4	8740	1.13	480.4	509.2	8145
48	16	50.80	5.25	56.19	1.33	644.9	680.7	10890	1.23	597.6	633.4	10135

AMERICAN currently manufactures Fastite ductile iron pipe in sizes 4" through 64". See Section 3.

AMERICAN Mechanical Locked Joint Centrifugally Cast Gray Iron Pipe

AMERICAN Standard

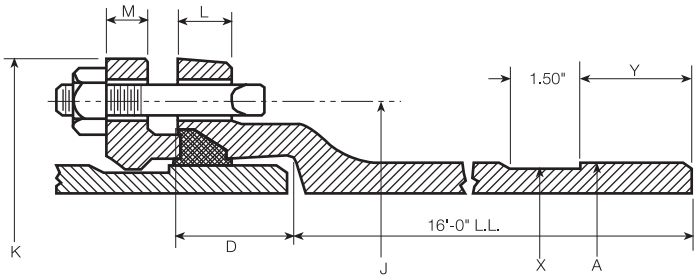


Table No. 12-10

Size in.	Dimensions in Inches								Bolts			Safe End Pull in Tons
	A	X	D	K	J	M	L	Y	No. Per Joint	Size in.	Length in.	
3	3.96	3.71	2.50	7.69	6.19	.62	.94	2.62	4	⅝	3	10
4	4.80	4.55	2.50	9.12	7.50	.75	1.00	2.62	4	¾	3½	12
6	6.90	6.65	2.50	11.12	9.50	.88	1.06	2.62	6	¾	3½	17
8	9.05	8.80	2.50	13.38	11.75	1.00	1.12	2.62	6	¾	4	17
10	11.10	10.85	2.50	15.62	14.00	1.00	1.19	2.62	8	¾	4	23
12	13.20	12.95	2.50	18.00	16.25	1.00	1.25	2.62	8	¾	4	23
14	15.30	15.05	3.50	20.25	18.75	1.25	1.31	3.62	10	¾	4	29
16	17.40	17.15	3.50	22.50	21.00	1.31	1.38	3.62	12	¾	4½	35
18	19.50	19.25	3.50	24.75	23.25	1.38	1.44	3.62	12	¾	4½	35
20	21.60	21.35	3.50	27.00	25.50	1.44	1.50	3.62	14	¾	4½	40
24	25.80	25.55	3.50	31.50	30.00	1.56	1.62	3.62	16	¾	5	46
30	32.00	31.63	4.00	39.12	36.88	2.00	1.81	4.12	20	1	6	97
36	38.30	37.93	4.00	46.00	43.75	2.00	2.00	4.12	24	1	6	114
42	44.50	44.13	4.00	53.12	50.62	2.00	2.00	4.12	28	1¼	6	231
48	50.80	50.43	4.00	60.00	57.50	2.00	2.00	4.12	32	1¼	6	269

Pipe with AMERICAN Mechanical Locked Joints were furnished in a standard thickness class for a limited pressure rating varying with pipe size.
For currently available restrained joints see Section 9.

AMERICAN Flanged Gray Iron Pipe
ANSI A21.15 (AWWA C115) Standard

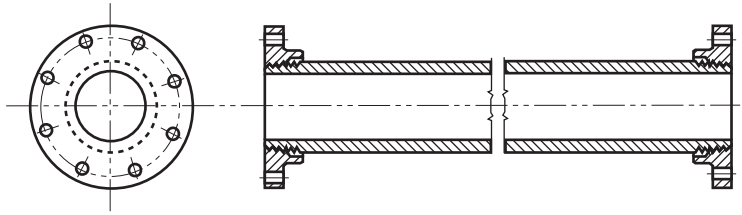


Table No. 12-11

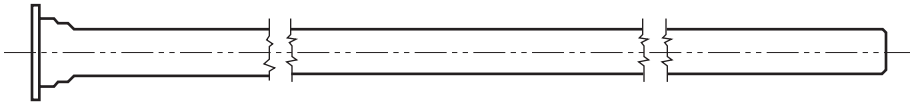
Size in.	Pressure Rating psi	Thickness Class	Wall Thickness in.	Pipe O.D. in.	Standard * Length ft.-in.	Weight in Pounds				
						Per Foot Plain End	ANSI A21.15 Flg**		ANSI 250 B16.1 Flg	
							One Flange	Std. Lgth. Pipe With 2 Flgs	One Flange	Std. Lgth. Pipe With 2 Flgs
2	250	-	.38	2.75	11' - 6"	8.8	4	110	7	115
3	250	24	.38	3.96	11' - 6"	13.3	7	165	12	175
4	250	23	.38	4.80	19' - 6"	16.5	13	350	20	360
6	250	22	.38	6.90	19' - 6"	24.3	17	510	34	540
8	250	22	.41	9.05	19' - 6"	34.7	27	730	50	775
10	250	22	.44	11.10	19' - 6"	46.0	38	975	70	1035
12	150	22	.48	13.20	19' - 6"	59.8	58	1280	-	-
12	250	23	.52	13.20	19' - 6"	64.6	58	1375	102	1465
14	150	22	.51	15.30	20' - 0"	73.9	72	1620	-	-
14	250	24	.59	15.30	20' - 0"	85.1	72	1845	130	1960
16	150	22	.54	17.40	20' - 0"	89.2	90	1965	-	-
16	250	24	.63	17.40	20' - 0"	103.6	90	2250	162	2395
18	150	22	.58	19.50	20' - 0"	107.6	90	2330	-	-
18	250	24	.68	19.50	20' - 0"	125.4	90	2690	200	2910
20	150	22	.62	21.60	20' - 0"	127.5	115	2780	-	-
20	250	24	.72	21.60	20' - 0"	147.4	115	3180	245	3440
24	150	23	.73	25.80	20' - 0"	179.4	160	3910	-	-
24	250	24	.79	25.80	20' - 0"	193.7	160	4195	370	4615
30	150	23	.85	32.00	16' - 0"	259.5	240	4630	-	-
30	250	25	.99	32.00	16' - 0"	300.9	240	5295	530	5875
36	150	23	.94	38.30	16' - 0"	344.2	350	6205	-	-
36	250	25	1.10	38.30	16' - 0"	401.1	350	7120	710	7840
42	150	23	1.05	44.50	16' - 0"	447.2	500	8155	-	-
42	250	25	1.22	44.50	16' - 0"	517.6	500	9280	900	10080
48	150	23	1.14	50.80	16' - 0"	554.9	625	10130	-	-
48	250	25	1.33	50.80	16' - 0"	644.9	625	11570	1350	13020

*Tolerance on length was ± 1/16" for 2" through 10" sizes and ± 1/8" for 12" and larger.

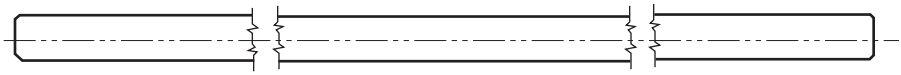
**Standard drilling was for bolt holes to straddle centerline. Special drilling was furnished on request of purchaser. Flanges were not back faced unless specified.

Pressure rating designated in table above was maximum water working pressure.

AMERICAN Abrasion-Resistant Pipe
BHN 285 Minimum



MJ and PE Pipe



PE and PE Pipe

Table No. 12-12

Size in.	O.D. in.	Thickness		Nominal Laying Length*	
		Minimum in.	Maximum in.	MJ & PE ft.	PE & PE ft.-in.
6	6.90	.32	.55	20'	19' - 6"
8	9.05	.35	.65	20'	19' - 6"
10	11.10	.38	.68	20'	19' - 6"
12	13.20	.41	.70	20'	19' - 6"
14	15.30	.43	.70	20'	19' - 6"
16	17.40	.46	.70	20'	19' - 6"

*Laying lengths were nominal and were subject to trim variations.

Special O.D. pipe were available in some sizes.

Standard AWWA C151 thickness classes as well as special thicknesses between the minimum and maximum specified above, were furnished.

Lower or higher hardness grades were furnished. The higher grades were limited to plain end joints.

For field cuts of abrasive-resistant pipe, abrasive cut-off wheels are recommended.

AMERICAN Ductile Iron Lok-Set Joint Pipe
Standard Dimensions

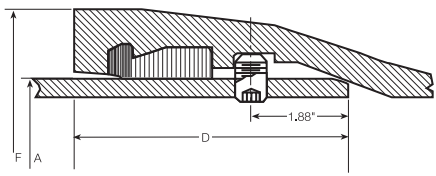


Table No. 12-13

Size in.	Dimensions in Inches			Size Set Screws* in.	No. Set Screws Required for Internal Pressure		
	A	D	F		100 psi	150 psi	200 psi
24	25.80	5.75	29.94	¾ x 1¼	6	10	12
30	32.00	6.50	35.75	¾ x 1¼	8	12	16
36	38.30	6.50	42.25	⅞ x 1¼	10	16	20
42	44.50	6.50	48.00	⅞ x 1¼	12	18	24
48	50.80	6.50	54.56	⅞ x 1¼	14	20	28
54	57.10	6.50	61.44	⅞ x 1¼	16	24	32

*Stainless Steel, Type 416.

Minimum Class Ductile Iron Pipe for Lok-Set Joint 24" and 30" sizes was Class 51; for 36" - 54" sizes was Class 50. Nominal laying length — which was subject to trim allowance — was 20'. If exact lengths were required figure 19'-11" for 24" and 18' for 30" - 54". See Section 3 for weights.

Either Lok-Set Joint fittings or Lok-Fast Joint fittings were normally furnished for installation with Lok-Set Joint Pipe. A pipe with combination of Lok-Set bell and Lok-Fast gland end facilitated the use of Lok-Fast fittings.

AMERICAN Ductile Iron Lok-Fast Joint Pipe
Standard Dimensions

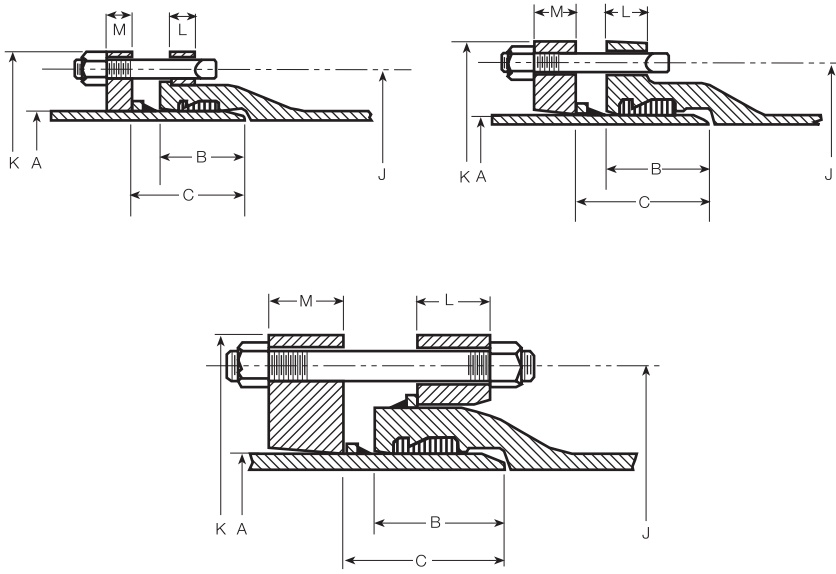


Table No. 12-14 **1-80000**

Size in.	A Outside Diameter in.	Nominal Laying Length ft.-in.	B Socket Depth in.	C Plain End to Gland in.	J Bolt Circle in.	K O.D.Gland and Flange in.	Thickness of Flange and Gland	
							L in.	M in.
4	4.80	20	3.31	4.03	8.06	9.56	.75	.75
6	6.90	20	3.38	4.25	10.25	11.75	.87	.87
8	9.05	20	3.75	4.56	12.50	14.00	1.00	1.00
10	11.10	20	3.75	4.62	14.69	16.19	1.00	1.00
12	13.20	20	3.75	4.62	16.75	18.25	1.00	1.00
14	15.30	20	5.23	6.00	18.75	20.50	1.00	1.50
16	17.40	20	5.23	6.00	21.00	22.75	1.12	1.56
18	19.50	20	5.50	6.75	23.25	25.12	1.12	1.62
20	21.60	20	5.50	6.75	25.50	27.38	1.25	1.69
24	25.80	20	5.50	6.75	30.00	31.88	1.25	1.81
30	32.00	20	6.50	7.25	36.88	39.12	1.50	2.25
36	38.30	20	6.50	7.25	43.75	46.00	1.63	2.44
42	44.50	20	4.75	6.00	50.62	53.12	1.50	2.62
48	50.80	20	4.75	6.00	57.50	60.00	1.50	2.81
54	57.10	20	5.25	6.50	64.38	66.88	3.00	3.00

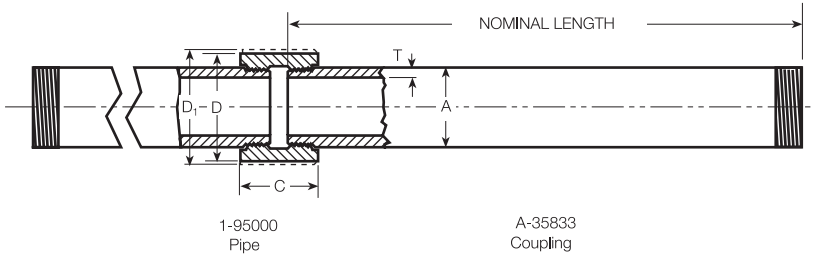
Center-to-socket dimensions for Lok-Fast fittings were normally the same as those for Mechanical Joint fittings.

Socket depths of 14"- 36" Lok-Fast fittings differed from those shown above.

The dimensions for 42"- 54" Lok-Fast Pipe were, where applicable, the same for Lok-Fast fittings.

Lok-Fast joints were made in the various configurations shown in various combination of diameters. Dimensions in this table relate to a certain combination of diameters and configurations and may not apply to other combinations.

AMERICAN Ductile Iron Threaded Joint Pipe with Ductile Couplings



AMERICAN Ductile Iron Threaded Joint Pipe offered several advantages over other pipe materials, namely, long life, uniformity of product, high physical strength properties, and easy threading.

Table No. 12-15

Size in.	A in.	T Wall Thickness in.	Pipe—1-95000 Weight in Pounds		Coupling—A-35833 Dimensions in Inches			Weight lb
			Per Foot	Per 19'-6" Length	C	D	D_1 Over-Ribs*	
4	4.80	.32	13.8	270	4.00	5.75	6.00	10
6	6.90	.34	21.4	415	4.50	7.88	8.12	16
8	9.05	.36	30.1	585	5.00	10.12	10.38	25
10	11.10	.38	39.2	765	5.25	12.50	12.75	40
12	13.20	.40	49.2	960	5.75	14.62	14.88	55
14	15.30	.42	60.1	1170	6.25	16.88	17.12	75
16	17.40	.43	70.1	1365	6.75	19.25	19.50	110
18	19.50	.44	80.6	1570	7.00	21.38	21.62	125
20	21.60	.45	91.5	1785	7.50	23.62	23.88	155
24	25.80	.47	114.4	2230	8.25	28.12	28.38	235

*Ribs were furnished on couplings only when specified.

Special threading and long couplings could be furnished as desired. Tabulated wall thicknesses are special Class 53; heavier wall thicknesses could be furnished. Maximum length was 19' - 6".

Design was for 250 psi water working pressure.

"D" dimension on coupling had normal tolerance of ±0.12".

Threaded Joint Pipe was furnished to the applicable requirements of ANSI/AWWA C151/A21.51 with standard ductile iron outside diameters. Threads were taper pipe threads in accordance with ANSI B2.1 adapted to standard ductile iron pipe outside diameters, as shown above. This pipe could be furnished with linings and coatings as described in Section 11.

AMERICAN Molox Ball Joint Pipe
Technical Data

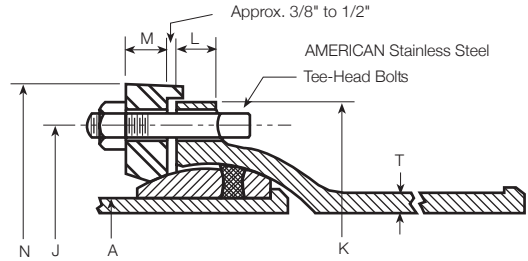


Table No. 12-16

Size in.	Dimensions in inches						Bolts			Approx. Joint Deflection
	A	K	N	J	M	L	No. Per Joint	Size in.	Length in.	
4	4.80	11.00	12.00	9.50	1.12	1.12	8	¾	4	15°
6	6.90	13.00	14.06	11.50	1.25	1.31	12	¾	4	15°
8	9.05	15.50	16.75	14.00	1.38	1.38	12	¾	4½	15°
10	11.10	18.25	19.62	16.62	1.50	1.50	16	¾	4½	15°
12	13.20	21.25	22.75	19.50	1.75	1.62	16	¾	5	15°
14	15.30	24.12	25.75	22.12	1.88	1.75	18	1	6	15°
16	17.40	27.25	28.75	25.00	1.94	1.75	20	1	6	15°
18	19.50	29.00	30.75	27.00	2.06	1.88	22	1	6	15°
20	21.60	32.38	34.12	30.25	2.19	2.00	24	1	6	15°
24	25.80	37.00	38.75	34.75	2.38	2.12	24	1	6½	15°
30	32.00	44.25	46.12	42.00	2.50	2.50	28	1¼	7½	12½°
36	38.30	51.88	53.88	49.38	2.75	2.75	32	1¼	8	12½°
42	44.50	59.38	61.50	56.62	3.00	3.00	36	1½	8½	12½°
48	50.80	66.50	68.69	63.75	4.25	3.25	44	1½	10	12½°
54	57.10	74.00	76.31	71.25	5.25	3.25	44	1½	11	12½°

Contact AMERICAN for thickness "T" dimensions.

Laying Length/Overall Length

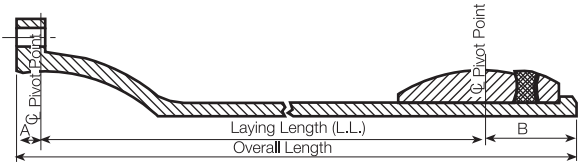


Table No. 12-17

Size in.	A in.	B in.	Laying Length Socket and Ball	
			G.I.	D.I.
4	.81	2.31	18' - 0"	20' - 2"
6	.94	2.44	18' - 0"	20' - 2"
8	1.06	2.69	18' - 0"	20' - 2"
10	1.12	3.50	17'-10½"	20' - 2"
12	1.25	4.25	15'-10½"	20' - 2"
14	1.37	4.88	15' - 9½"	15' - 10"
16	1.50	5.25	15' - 9"	15' - 9½"
18	1.62	5.50	15' - 9"	15' - 9½"
20	1.75	6.38	15' - 8"	15' - 8½"
24	2.12	6.38	15' - 8"	15' - 8½"
30	2.50	7.00	15' - 6½"	15' - 7"
36	2.69	7.81	15' - 6½"	15' - 7"
42	2.94	8.56	-	19' - 6"
48	3.19	9.19	-	19' - 6"
54	3.59	9.75	-	19' - 6"

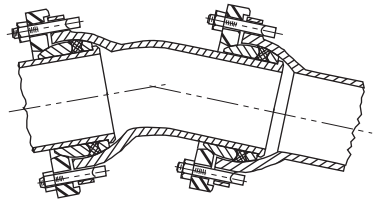
To obtain overall lengths of Molox Ball Joint Pipe when used in combination with other conditions, the following formulas were applicable:

Molox Socket & Molox Ball..A+B+L.L.*
Molox Socket & Flange.....A+L.L.*
Molox Socket & Plain End.....A+L.L.*
Molox Ball & Flange.....B+L.L.*
Molox Ball & Plain End.....B+L.L.*
Molox Ball & Molox Ball.....2B+L.L.*

*Each "L.L." listed above refers to the laying length of the pipe with the particular combination of joints specified.

The manufacture of 4" through 36" Molox Pipe was discontinued in 1975 and 42"-54" was discontinued in 1991. Prior to 1975 some 4" through 12" Molox Pipe was furnished of ductile iron with threaded-on bells; dimensions in Table No. 12-16 applied. See Section 10 for 4"-54" Flex-Lok Pipe.

AMERICAN Molox Ball Joint Bends



When deflection in excess of that allowed for one joint was required, the necessary deflection would often be made in two or more successive joints. If the installation conditions did not allow this, increased deflections would be obtained by the use of AMERICAN Molox Ball Joint Bends, as shown above. These bends were installed at any joint in the Molox Ball Joint pipeline. Bends were usually furnished with 22½° and 45° curvature, but other degrees of curvature were furnished when required.

In the event AMERICAN Molox Ball Joint Bends were not adaptable to the particular piping installation, the use of AMERICAN Ball Joint Double Hubs to provide additional deflection was recommended.

AMERICAN Molox Ball Joint Double Hubs

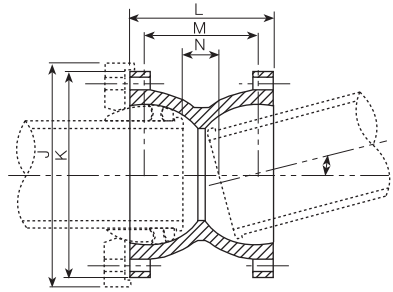


Table No. 12-18

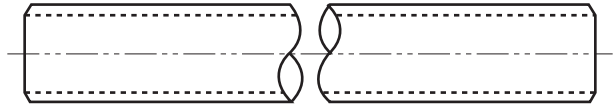
Size in.	Dimensions in inches					Weight lb	Maximum Deflection Provided
	L	M	N	K	J		
4	8.00	6.50	2.00	11.00	12.00	60	30°
6	9.00	7.12	2.25	13.00	14.06	90	30°
8	11.00	8.88	3.50	15.50	16.75	140	30°
10	13.00	10.75	3.75	18.25	19.62	200	30°
12	15.50	13.00	4.50	21.25	22.75	300	30°
14	17.50	14.75	5.00	24.12	25.75	390	30°
16	18.50	15.50	5.00	27.25	28.75	520	30°
18	20.75	17.51	6.50	29.00	30.75	650	30°
20	22.75	19.25	6.50	32.38	34.12	880	30°
24	24.50	20.25	7.50	37.00	38.75	1200	30°
30	28.00	23.00	9.00	44.25	46.12	1840	25°
36	31.50	26.12	10.50	51.88	53.88	2670	25°

The angle of deflection provided by each end of the Molox Ball Joint Bend or Double Hub was the same as that indicated in Table No. 12-16 for the corresponding size of AMERICAN Molox Ball Joint Pipe.

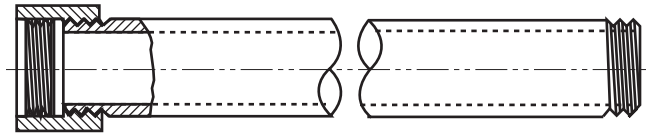
AMERICAN Monoloy Centrifugally Cast Gray Iron Pipe

Manufactured to Steel Pipe Outside Diameters

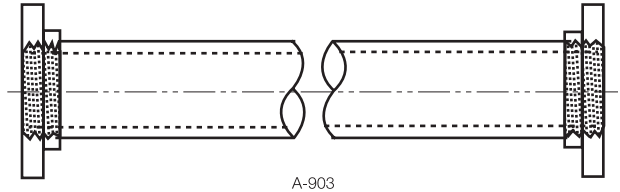
AMERICAN Standard



A-900
Plain End Pipe



A-901
Threaded and Coupled Pipe



A-903
Flanged Pipe

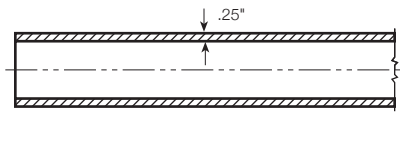
Table No. 12-19

Size in.	Pipe O.D. in.	Pipe I.D. in.	Wall Thickness in.	Standard Length ft.-in.	Weight in Pounds			
					Per Foot Plain End	Per Length Plain End	Per Flange	A-902 Per Coupling
2	2.38	1.88	.25	11' - 6"	5.2	60	4	3
3	3.50	2.78	.36	16' - 0"	11.1	180	7	5
4	4.50	3.76	.37	16' - 0"	15.0	240	12	7
5	5.56	4.80	.38	16' - 0"	19.3	310	14	10
6	6.62	5.82	.40	16' - 0"	24.4	390	17	13
8	8.62	7.70	.46	16' - 0"	36.8	590	25	20
10	10.75	9.71	.52	16' - 0"	52.1	835	35	35
12	12.75	11.59	.58	16' - 0"	69.2	1105	55	50

AMERICAN Monoloy Mechanical Joint Pipe (A-905) was also available.
AMERICAN Monoloy Pipe was discontinued in 1972.
Threaded Joint Ductile Iron Pipe, 4"-24", is still available with ductile iron pipe outside diameters. See Section 2.

AMERICAN 2" and 2¼" Centrifugally Cast Gray Iron Pipe

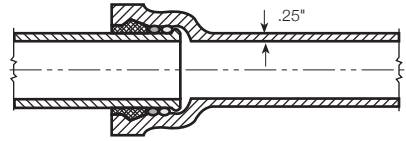
ANSI A21.12 Standard



A-700
2"

Plain End Pipe

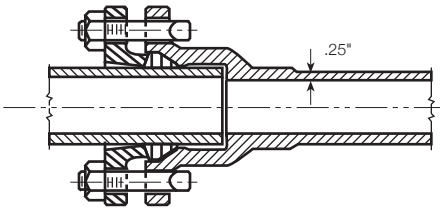
A-800
2 1/4"



A-701
2"

Bell and Spigot Pipe

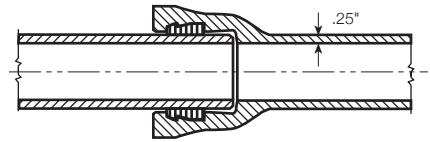
A-801
2 1/4"



A-702
2"

Mechanical Joint Pipe

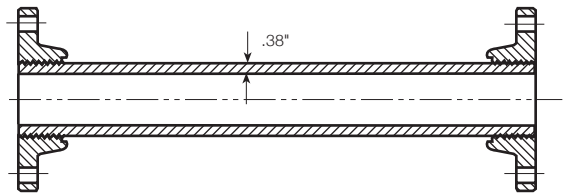
A-802
2 1/4"



A-703
2"

Fastite Pipe

A-803
2 1/4"



A-706
2"

Flange and Flange Pipe

Table No. 12-20

Type Joint	2" Pipe					2¼" Pipe				
	Max. Laying Length ft.-in.	Weight in Pounds				Max. Laying Length ft.-in.	Weight in Pounds			
		Bell or Flange	Per Foot Plain End	Per Foot Incl. Bell	Max. Laying Length		Bell or Flange	Per Foot Plain End	Per Foot Incl. Bell	Max. Laying Length
Plain End	11' - 6"	-	5.5	-	63	11' - 6"	-	6.12	-	70
Bell	12' - 0"	4	5.5	5.83	70	12' - 0"	4.6	6.12	6.5	78
Mechanical	12' - 0"	4	5.5	5.83	70	12' - 0"	4.6	6.12	6.5	78
Fastite	12' - 0"	4	5.5	5.83	70	12' - 0"	4.6	6.12	6.5	78
Flange	11' - 6"	4	8.8	-	*109	-	-	-	-	-

*With two flanges.
The manufacture of 2" and 2¼" Pipe was discontinued in 1975.
On Flange and Flange Pipe flanges were threaded on one or both ends.

AWWA Bell and Spigot Fittings
AWWA C100
Standard Dimensions

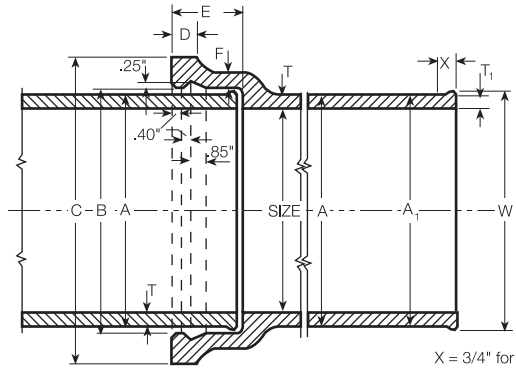
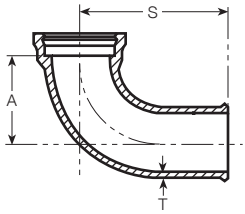


Table No. 12-21

Size in.	Class	Dimensions in Inches									
		A	A_1	B	C	D	E	F	T	T_1	W
3	D	3.96	3.96	4.66	7.26	1.25	3.50	.65	.48	.48	4.34
4	D	5.00	4.90	5.70	8.30	1.50	4.00	.65	.52	.47	5.28
6	D	7.10	7.00	7.80	10.60	1.50	4.00	.70	.55	.50	7.38
8	D	9.30	9.18	10.00	13.00	1.50	4.00	.75	.60	.54	9.56
10	D	11.40	11.25	12.10	15.30	1.50	4.00	.80	.68	.60	11.63
12	D	13.50	13.35	14.20	17.60	1.50	4.00	.85	.75	.68	13.73
14	B	15.30	15.30	16.10	19.50	1.50	4.00	.85	.66	.66	15.80
14	D	15.65	15.65	16.45	20.05	1.50	4.00	.90	.82	.82	16.15
16	B	17.40	17.40	18.40	22.00	1.75	4.00	.90	.70	.70	17.90
16	D	17.80	17.80	18.80	22.60	1.75	4.00	1.00	.89	.89	18.30
18	B	19.50	19.50	20.50	24.30	1.75	4.00	.95	.75	.75	20.00
18	D	19.92	19.92	20.92	25.12	1.75	4.00	1.05	.96	.96	20.42
20	B	21.60	21.60	22.60	26.60	1.75	4.00	1.00	.80	.80	22.10
20	D	22.06	22.06	23.06	27.66	1.75	4.00	1.15	1.03	1.03	22.56
24	B	25.80	25.80	26.80	31.00	2.00	4.00	1.05	.89	.89	26.30
24	D	26.32	26.32	27.32	32.32	2.00	4.00	1.25	1.16	1.16	26.82
30	A	31.74	31.74	32.74	37.34	2.00	4.50	1.15	.88	.88	32.24
30	B	32.00	32.00	33.00	37.60	2.00	4.50	1.15	1.03	1.03	32.50
30	C	32.40	32.40	33.40	38.60	2.00	4.50	1.32	1.20	1.20	32.90
30	D	32.74	32.74	33.74	39.74	2.00	4.50	1.50	1.37	1.37	33.24
30	*B/D	32.74	32.00	33.00	39.00	2.00	4.50	1.50	1.37	1.03	32.50
36	A	37.96	37.96	38.96	43.96	2.00	4.50	1.25	.99	.99	38.46
36	B	38.30	38.30	39.30	44.90	2.00	4.50	1.40	1.15	1.15	38.80
36	C	38.70	38.70	39.70	45.90	2.00	4.50	1.60	1.36	1.36	39.20
36	D	39.16	39.16	40.16	46.96	2.00	4.50	1.80	1.58	1.58	39.66
36	*B/D	39.16	38.30	39.30	46.10	2.00	4.50	1.80	1.58	1.15	38.80
42	A	44.20	44.20	45.20	50.80	2.00	5.00	1.40	1.10	1.10	44.70
42	B	44.50	44.50	45.50	51.50	2.00	5.00	1.50	1.28	1.28	45.00
42	C	45.10	45.10	46.10	52.90	2.00	5.00	1.75	1.54	1.54	45.60
42	D	45.58	45.58	46.58	54.18	2.00	5.00	1.95	1.78	1.78	46.08
42	*B/D	45.58	44.50	45.50	53.10	2.00	5.00	1.95	1.78	1.28	45.00
48	A	50.50	50.50	51.50	57.50	2.00	5.00	1.50	1.26	1.26	51.00
48	B	50.80	50.80	51.80	58.40	2.00	5.00	1.65	1.42	1.42	51.30
48	C	51.40	51.40	52.40	60.00	2.00	5.00	1.95	1.71	1.71	51.90
48	D	51.98	51.98	52.98	61.38	2.00	5.00	2.20	1.96	1.96	52.48
48	*B/D	51.98	50.80	51.80	60.20	2.00	5.00	2.20	1.96	1.42	51.30

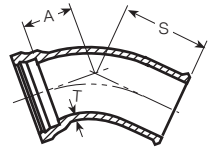
*B/D was an AMERICAN designation for fittings 30" and larger having Class B socket and spigot diameters with Class D metal thickness.

AWWA Bell & Spigot Fittings
Standard Bell & Bell and Bell & Spigot Bends — Laying Dimensions
AWWA C100



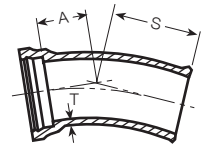
A-201
Bell & Spigot
90° Bend

A-200
Bell & Bell
90° Bend



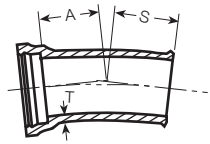
A-203
Bell & Spigot
45° Bend

A-202
Bell & Bell
45° Bend



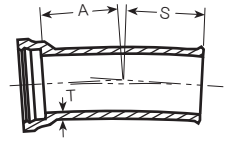
A-205
Bell & Spigot
22 1/2° Bend

A-204
Bell & Bell
22 1/2° Bend



A-207
Bell & Spigot
11 1/4° Bend

A-206
Bell & Bell
11 1/4° Bend



A-209
Bell & Spigot
5 5/8° Bend

A-208
Bell & Bell
5 5/8° Bend

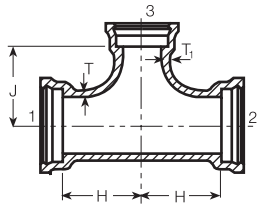
Table No. 12-22

Dimensions in Inches										
Size in.	90° Bend (¼th)		45° Bend (⅛th)		22½° Bend (1/16th)		11¼° Bend (1/32nd)		5⅝° Bend (1/64th)	
	A	S	A	S	A	S	A	S	A	S
3	16	24	9.94	15.94	9.55	15.55	11.82	11.82	-	-
4	16	24	9.94	15.94	9.55	15.55	11.82	11.82	-	-
6	16	24	9.94	15.94	9.55	15.55	11.82	11.82	-	-
8	16	26	9.94	15.94	9.55	15.55	11.82	11.82	-	-
10	16	28	9.94	15.94	9.55	15.55	11.82	11.82	-	-
12	16	28	9.94	15.94	9.55	15.55	11.82	11.82	-	-
14	18	30	14.91	20.91	14.32	14.32	17.73	17.73	-	-
16	24	36	14.91	20.91	14.32	14.32	17.73	17.73	-	-
18	24	36	14.91	20.91	14.32	14.32	17.73	17.73	-	-
20	24	36	19.88	25.88	19.10	19.10	23.64	23.64	23.58	23.58
24	30	42	24.85	30.85	23.87	23.87	23.64	23.64	23.58	23.58
30	36	48	24.85	30.85	23.87	23.87	23.64	23.64	23.58	23.58
36	48	60	37.28	37.28	35.80	35.80	23.64	23.64	23.58	23.58
42	48	60	37.28	37.28	35.80	35.80	23.64	23.64	23.58	23.58
48	54	66	37.28	37.28	35.80	35.80	23.64	23.64	23.58	23.58
54	-	-	37.28	37.28	35.80	35.80	23.64	23.64	23.58	23.58
60	-	-	37.28	37.28	35.80	35.80	23.64	23.64	23.58	23.58

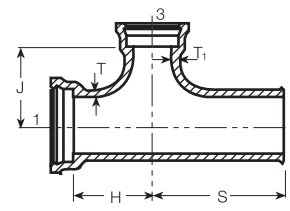
All fittings were furnished Bell and Bell as well as Bell and Spigot.
For "T" see Table No. 12-1.

AWWA Bell & Spigot Fittings
Standard All Bell and Bell & Spigot Tees and Crosses — Laying Dimensions

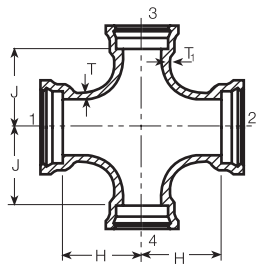
AWWA C100



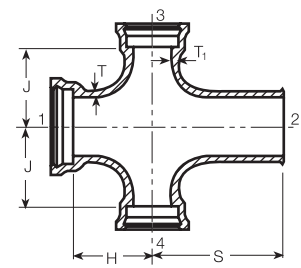
A-214
All Bell Tee



A-215
Bell - Spigot
& Bell Tee



A-21
All Bell o



A-21
Bell - Spigot -
Bell & Bell o

Table No. 12-23

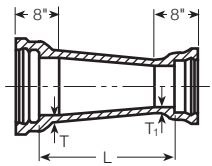
Dimensions in Inches											
Size in.	H	J	S	Size in.	H	J	S	Size in.	H	J	S
3	10	10	22	30 x 18	20	26	34	42 x 18	20	32	34
4	11	11	23	30 x 20	21	26	36	42 x 20	21	32	36
6	12	12	24	30 x 24	23	26	38	42 x 24	23	32	38
8	13	13	25	30 x 30	26	26	43	42 x 30	26	32	43
10	14	14	26	36 x 8	14	27	26	42 x 36	29	32	46
12	15	15	27	36 x 10	15	27	27	42 x 42	32	32	49
14	16	16	28	36 x 12	16	27	28	48 x 12	17	33	29
16	17	17	29	36 x 14	18	29	30	48 x 14	18	35	30
18	18	18	30	36 x 16	19	29	31	48 x 16	19	35	31
20	19	19	31	36 x 18	20	29	34	48 x18	20	35	34
24	21	21	33	36 x 20	21	29	36	48 x 20	21	35	36
30 x 6	13	24	25	36 x 24	23	29	38	48 x 24	23	35	38
30 x 8	14	24	26	36 x 30	26	29	43	48 x 30	26	35	43
30 x 10	15	24	27	36 x 36	29	29	46	48 x 36	29	35	46
30 x 12	15	24	27	42 x 12	16	30	28	48 x 42	32	35	49
30 x 14	18	26	30	42 x 14	18	32	30	48 x 48	35	35	52
30 x 16	19	26	31	42 x 16	19	32	31	-	-	-	-

Reducing tees and crosses in sizes up to and including 24" had same laying dimensions as straight sizes. Large diameter tees and crosses were furnished with ribs as required.

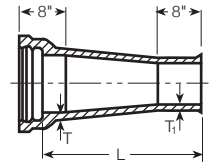
For "T" see Table No. 12-1.

AWWA Bell & Spigot Fittings

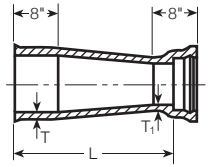
Standard Reducers — Laying Dimensions



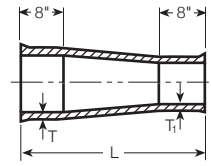
A-224
Bell & Bell
Reducer



A-225
Large End
Bell Reducer



A-226
Small End
Bell Reducer



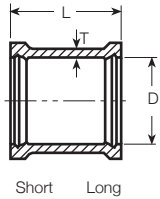
A-227
Spigot &
Spigot Reducer

Table No. 12-24

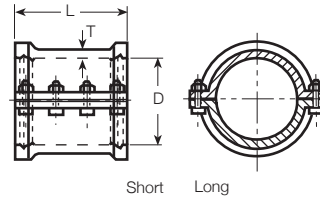
Dimensions in Inches									
Size in.	Laying Length (L)				Size in.	Laying Length (L)			
	Bell & Bell	Large End Bell	Small End Bell	Spigot Ends		Bell & Bell	Large End Bell	Small End Bell	Spigot Ends
3	18.0	20.5	21.5	24	36 x 24	39.5	43.5	44.0	48
*4	16.5	20.0	20.5	24	36 x 24	73.5	77.5	78.0	82
*6	26.0	30.0	30.0	34	36 x 30	39.0	43.5	43.5	48
*8	26.0	30.0	30.0	34	36 x 30	73.0	77.5	77.5	82
10	26.0	30.0	30.0	34	42 x 20	39.0	43.0	44.0	48
12	26.0	30.0	30.0	34	42 x 20	73.0	77.0	78.0	82
14	28.0	32.0	32.0	36	42 x 24	39.0	43.0	44.0	48
16	28.0	32.0	32.0	36	42 x 24	73.0	77.0	78.0	82
18	28.0	32.0	32.0	36	42 x 30	38.5	43.0	43.5	48
20	34.0	38.0	38.0	42	42 x 30	72.5	77.0	77.5	82
24	34.0	38.0	38.0	42	42 x 36	38.5	43.0	43.5	48
30 x 18	33.5	37.5	38.0	42	42 x 36	72.5	77.0	77.5	82
30 x 20	33.5	37.5	38.0	42	48 x 30	72.5	77.0	77.5	82
30 x 20	73.5	77.5	78.0	82	48 x 30	138.5	143.0	143.5	148
30 x 24	33.5	37.5	38.0	42	48 x 36	72.5	77.0	77.5	82
30 x 24	73.5	77.5	78.0	82	48 x 36	138.5	143.0	143.5	148
36 x 20	39.5	43.5	44.0	48	48 x 42	72.0	77.0	77.0	82
36 x 20	73.5	77.5	78.0	82	48 x 42	138.0	143.0	143.0	148

*In sizes 3" through 24", laying length was the same for all reductions except as noted below:
4 x 2 Reducers Small End Bell had a laying length of 21 inches.
4 x 2 Reducers Bell & Bell had a laying length of 17.5 inches.
6 x 2 Reducers Bell & Bell had a laying length of 27.5 inches.
6 x 3 Reducers Small End Bell had a laying length of 30.5 inches.
6 x 3 Reducers Bell & Bell had a laying length of 26.5 inches.
8 x 3 Reducers Bell & Bell had a laying length of 26.5 inches.
For "T" see Table No. 12-1.

AMERICAN Specials
Caulked Joint Sleeves and Split Sleeves



A-01760
Solid Sleeve



A-01780
Split Sleeve

Table No. 12-25

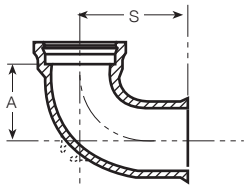
Size in.	AWWA C100 Class	Dimensions in Inches				Weight in Pounds			
		D	T	L Length		Solid Sleeves A-01760		Split Sleeves A-01780	
				Short	Long	Short	Long	Short	Long
4	D	5.80	.65	10	15	45	65	65	100
6	D	7.90	.70	10	15	65	90	90	130
8	D	10.10	.75	12	15	100	120	135	165
10	D	12.20	.80	12	18	130	180	165	245
12	D	14.30	.85	14	18	185	225	230	295
14	B	16.20	.85	15	18	215	255	275	310
14	D	16.50	.90	15	18	235	275	300	355
16	B	18.50	.90	15	24	270	400	330	510
16	D	18.90	1.00	15	24	300	445	370	575
18	B	20.60	.95	15	24	320	470	380	585
18	D	21.00	1.05	15	24	360	530	430	685
20	B	22.70	1.00	15	24	370	540	435	665
20	D	23.10	1.15	15	24	435	640	505	800
24	B	26.90	1.05	15	24	470	685	535	820
24	D	27.40	1.25	15	24	575	840	670	1010
30	B	33.10	1.15	15	24	630	920	-	1060
30	D	33.80	1.50	15	24	860	1250	-	1415
36	B	39.40	1.40	15	24	920	1340	-	1500
36	D	40.20	1.80	15	24	1195	1750	-	1945
42	B	45.60	1.50	15	24	1140	1660	-	1855
42	D	46.70	1.95	15	24	1530	2230	-	2460
48	B	51.90	1.65	15	24	1435	2080	-	2290
48	D	53.10	2.20	15	24	1950	2845	-	3100
54	B	58.20	1.80	15	24	1800	2595	-	-

Weight of Split Sleeve includes weight of side flange bolts and gaskets.
Fittings were normally gray iron but were furnished of ductile iron when specified.

Short Body Bell & Spigot Fittings

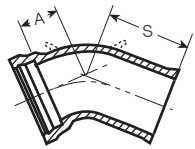
ANSI A21.10 Standard

AMERICAN Standard



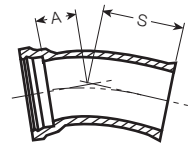
A-101
Bell & Spigot
90° Bend

A-100
Bell & Bell
90° Bend



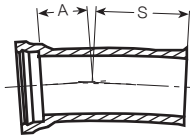
A-103
Bell & Spigot
45° Bend

A-102
Bell & Bell
45° Bend



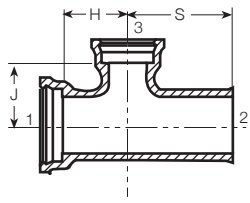
A-105
Bell & Spigot
22 1/2° Bend

A-104
Bell & Bell
22 1/2° Bend



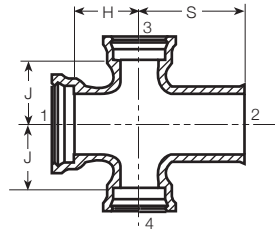
A-107
Bell & Spigot
11 1/4° Bend

A-106
Bell & Bell
11 1/4° Bend



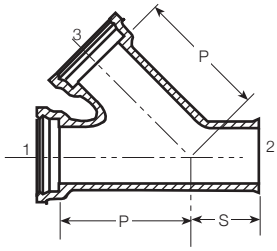
A-115
Bell - Spigot
& Bell Tee

A-114
All Bell Tee



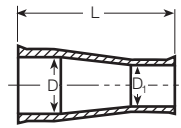
A-117
Bell - Spigot -
Bell & Bell Cross

A-116
All Bell Cross



A-123
Bell, Spigot &
Bell Wye

A-122
All Bell Wye



A-127
Spigot & Spigot
Reducer

A-124
Bell & Bell
Reducer

A-125
Large End
Bell Reducer

A-126
Small End
Bell Reducer

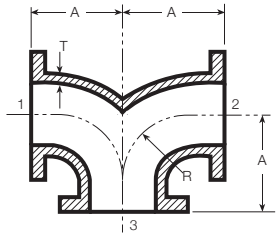
Fig. 12-3

AMERICAN furnished a complete line of Short Body Bell and Spigot Fittings per ANSI A21.10 and AMERICAN Standard as shown above. Bell and Bell as well as Bell and Spigot Fittings (including Spigot and Spigot Reducers) were furnished. The laying length dimensions and "R" dimensions were the same as those of the corresponding mechanical joint and flange fittings per AWWA C110. See Sections 5 and 6.

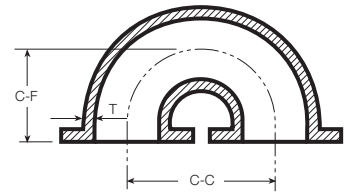
AMERICAN Ductile Iron Flanged Fittings

AMERICAN Standard

Flanged Double Branch 90° Bends and Return Bends



A-30380
Double Branch 90° Bend



A-30740
Return Bend

Table No. 12-26

Size in.	Pressure Rating psi	T in.	A-30380 Double Branch 90° Bend			A-30740 Return Bend		
			Dimensions in inches		Weight lb	Dimensions in inches		Weight lb
			A	R		C-C	C-F	
4	250	.52	6.5	4.5	60	9.5	6.5	55
6	250	.55	8.0	6.0	95	12.0	8.0	95
8	250	.60	9.0	7.0	155	20.0	9.0	170
10	250	.68	11.0	9.0	240	20.0	10.0	245
12	250	.75	12.0	10.0	345	24.0	12.0	380

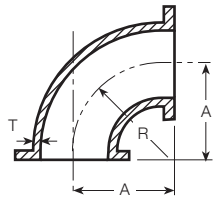
Some larger size Return Bends are available.
Numerals on cut indicate standard order of specifying size of fitting.
See general notes on page 6-2.

AMERICAN Flanged Fittings

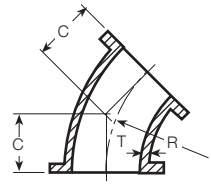
AWWA C100

90° and 45° Bends

Flanges F&D to Match ASA B16.1 Class 125



A-500
90° Bend



A-502
45° Bend

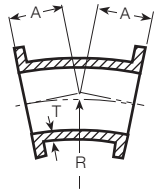
Table No. 12-27

Size in.	Class	T in.	90° Bend			45° Bend		
			R in.	A in.	Weight lb	R in.	C in.	Weight lb
3	D	.48	16	16	45	24	9.94	35
4	D	.52	16	16	70	24	9.94	60
6	D	.55	16	16	100	24	9.94	80
8	D	.60	16	16	145	24	9.94	125
10	D	.68	16	16	205	24	9.94	170
12	D	.75	16	16	285	24	9.94	240
14	B	.66	18	18	330	36	14.91	330
14	D	.82	18	18	380	36	14.91	385
16	B	.70	24	24	495	36	14.91	405
16	D	.89	24	24	590	36	14.91	475
18	B	.75	24	24	575	36	14.91	465
18	D	.96	24	24	690	36	14.91	550
20	B	.80	24	24	690	48	19.88	690
20	D	1.03	24	24	830	48	19.88	830
24	B	.89	30	30	1105	60	24.85	1105
24	D	1.16	30	30	1350	60	24.85	1350
30	B	1.03	36	36	1845	60	24.85	1600
30	D	1.37	36	36	2315	60	24.85	1985
36	B	1.15	48	48	3180	90	37.28	3015
36	D	1.58	48	48	4145	90	37.28	3915
42	B	1.28	48	48	4200	90	37.28	3985
42	D	1.78	48	48	5485	90	37.28	5185
48	B	1.42	54	54	5815	90	37.28	5005
48	D	1.96	54	54	7610	90	37.28	6475

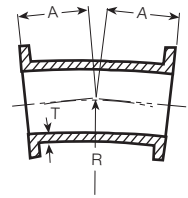
The bends listed above and in Table No. 12-28, as well as the other flanged fittings referenced on page 12-32, were produced with wall thicknesses and laying lengths in accordance with the AWWA C100 Standard.

AMERICAN Flanged Fittings
AWWA C100
22½°, 11¼° and 5⅝° Bends

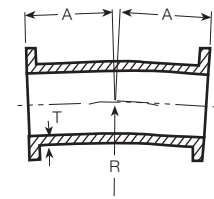
Flanges F&D to Match ASA B16.1 Class 125



A-504
22½° Bend



A-506
11¼° Bend



A-508
5⅝° Bend

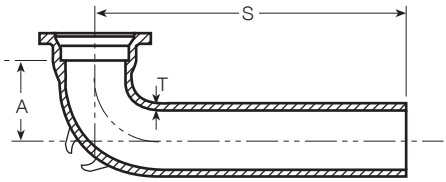
Table No. 12-28

Size in.	Class	T in.	22½° Bend			11¼° Bend			5⅝° Bend		
			R in.	A in.	Weight lb	R in.	A in.	Weight lb	R in.	A in.	Weight lb
3	D	.48	48	9.55	35	120	11.82	45	-	-	-
4	D	.52	48	9.55	60	120	11.82	65	-	-	-
6	D	.55	48	9.55	80	120	11.82	95	-	-	-
8	D	.60	48	9.55	125	120	11.82	145	-	-	-
10	D	.68	48	9.55	170	120	11.82	195	-	-	-
12	D	.75	48	9.55	240	120	11.82	270	-	-	-
14	B	.66	72	14.32	330	180	17.73	385	-	-	-
14	D	.82	72	14.32	385	180	17.73	455	-	-	-
16	B	.70	72	14.32	405	180	17.73	470	-	-	-
16	D	.89	72	14.32	475	180	17.73	565	-	-	-
18	B	.75	72	14.32	465	180	17.73	545	-	-	-
18	D	.96	72	14.32	550	180	17.73	655	-	-	-
20	B	.80	96	19.10	690	240	23.64	820	480	23.58	820
20	D	1.03	96	19.10	830	240	23.64	1000	480	23.58	1000
24	B	.89	120	23.87	1105	240	23.64	1105	480	23.58	1105
24	D	1.16	120	23.87	1350	240	23.64	1345	480	23.58	1345
30	B	1.03	120	23.87	1600	240	23.64	1600	480	23.58	1600
30	D	1.37	120	23.87	1985	240	23.64	1985	480	23.58	1985
36	B	1.15	180	35.80	3015	240	23.64	2195	480	23.58	2195
36	D	1.58	180	35.80	3915	240	23.64	2770	480	23.58	2770
42	B	1.28	180	35.80	3985	240	23.64	2920	480	23.58	2920
42	D	1.78	180	35.80	5185	240	23.64	3685	480	23.58	3685
48	B	1.42	180	35.80	5005	240	23.64	3655	480	23.58	3655
48	D	1.96	180	35.80	6475	240	23.64	4590	480	23.58	4590

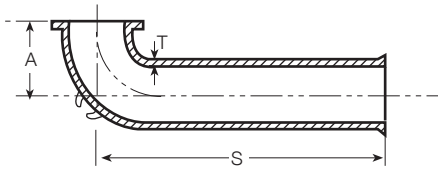
In addition to bends shown in this Table and in Table No. 12-27, AMERICAN also produced AWWA C100 Flanged Tees, Crosses and Reducers which had the same laying length dimensions as the AWWA All Bell Fittings listed in Table Nos. 12-23 and 12-24.

Mechanical Joint/Flanged and Long PE 90° Bends

AMERICAN Standard



A-311
MJ and Long PE



A-411
Flange and Long PE

Table No. 12-29

Size in.	Pressure Rating psi	Iron Strength psi (1000's)	Dimensions in Inches			Weight in Pounds	
			T	A	S	A-311 MJ & PE	A-411 Flg & PE
4	250	30	52	6.5	42.0	120	115
6	250	30	55	8.0	42.0	160	150
8	250	30	60	9.0	42.0	240	230
10	250	30	68	11.0	42.0	325	315
12	250	30	75	12.0	42.0	440	430

These bends were furnished with lugs as indicated when specified.

AMERICAN Ductile Iron Flanged Fittings

ANSI B16.1

Class 25 and Class 250 F&D Flanges

ANSI B16.1 covers both threaded flanges and flanged fittings for general service at ambient and elevated temperatures. The pressure ratings set forth are not primarily for water or other liquid service as are those in AWWA C110. ANSI B16.1 flanges and fittings are referenced here only for dimensional information.

Fittings: Class 25

AMERICAN manufactures flanged fittings to the strength requirements of AWWA C110 and with standard C110 flanges except with drilling to match the ANSI B16.1 Class 25 flanges when specified.

Flanges, Bolts and Gaskets Standard Dimensions Class 25

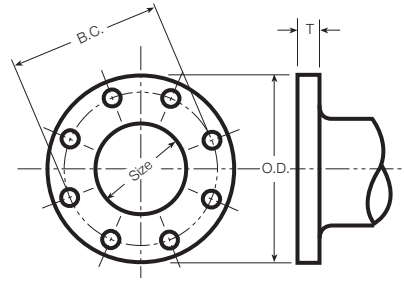


Table No. 12-30

Size in.	Dimensions in inches						
	O.D. Dia. of Flange	T Thickness*	B.C. Dia.of Bolt Circle	Bolts		Bolt Hole Diameter	Size of Ring Gasket
				No. Per Joint	Size		
4	9.00	.75	7.50	8	⅝ x 2½	¾	4 x 6⅞
6	11.00	.75	9.50	8	⅝ x 2½	¾	6 x 8⅞
8	13.50	.75	11.75	8	⅝ x 2½	¾	8 x 11⅛
10	16.00	.88	14.25	12	⅝ x 2¾	¾	10 x 13⅜
12	19.00	1.00	17.00	12	⅞ x 3	¾	12 x 16⅜
14	21.00	1.12	18.75	12	¾ x 3½	⅞	14 x 18
16	23.50	1.12	21.25	16	¾ x 3½	⅞	16 x 20½
18	25.00	1.25	22.75	16	¾ x 3¾	⅞	18 x 22
20	27.50	1.25	25.00	20	¾ x 3¾	⅞	20 x 24¼
24	32.00	1.38	29.50	20	¾ x 4	⅞	24 x 28¾
30	38.75	1.50	36.00	28	⅞ x 4½	1	30 x 35⅛
36	46.00	1.62	42.75	32	⅞ x 4¾	1	36 x 41⅛
42	53.00	1.75	49.50	36	1 x 5¼	1⅛	42 x 48½
48	59.50	2.00	56.00	44	1 x 5¾	1⅛	48 x 55

*Thickness furnished is the same as AWWA C110 flange.

AMERICAN Ductile Iron Flanged Fittings

ANSI B16.1

Class 25 and Class 250 F&D Flanges—Continued

Fittings: Class 250

AMERICAN manufactures a limited number of special fittings in accordance with AWWA C110 except with laying dimensions per ANSI B16.1 Class 250 and with flanges faced and drilled to match the Class 250 flanges. *AMERICAN does not manufacture any fittings to the requirements of ANSI B16.1 as listed in the following tables except for laying dimensions and facing and drilling as specifically noted.*

Flanges, Bolts and Gaskets
Standard Dimensions
Class 250

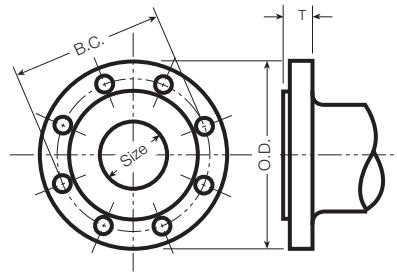


Table No. 12-31

Size in.	Dimensions in Inches							
	O.D. Dia. of Flange	T Thickness	B.C. Dia. of Bolt Circle	Dia. of Raised Face	Bolts		Bolt Hole Diameter	Size of Ring Gasket
					No. Per Joint	Size		
2	6.50	.88	5.00	4.19	8	⅝ x 2¾	¾	2 x 4⅜
3	8.25	1.12	6.62	5.69	8	¾ x 3½	⅞	3 x 5⅞
4	10.00	1.25	7.88	6.94	8	¾ x 3¾	⅞	4 x 7⅛
5	11.00	1.38	9.25	8.31	8	¾ x 4	⅞	5 x 8½
6	12.50	1.44	10.62	9.69	12	¾ x 4	⅞	6 x 9⅛
8	15.00	1.62	13.00	11.94	12	⅞ x 4½	1	8 x 12⅛
10	17.50	1.88	15.25	14.06	16	1 x 5¼	1⅛	10 x 14¼
12	20.50	2.00	17.75	16.44	16	1⅛ x 5½	1¼	12 x 16⅝
14	23.00	2.12	20.25	18.94	20	1⅛ x 6	1¼	14 x 19⅛
16	25.50	2.25	22.50	21.06	20	1¼ x 6¼	1⅜	16 x 21¼
18	28.00	2.38	24.75	23.31	24	1¼ x 6½	1⅜	18 x 23½
20	30.50	2.50	27.00	25.56	24	1¼ x 6¾	1⅜	20 x 25¾
24	36.00	2.75	32.00	30.31	24	1½ x 7½	1⅝	24 x 30½
30	43.00	3.00	39.25	37.19	28	1¾ x 8½	2	30 x 37½
36	50.00	3.38	46.00	43.69	32	2 x 9½	2¼	36 x 44
42	57.00	3.69	52.75	50.44	36	2 x 10	2¼	42 x 50¾
48	65.00	4.00	60.75	58.44	40	2 x 10¾	2¼	48 x 58¾

ANSI B16.1 Class 250 Flanges have 0.06" raised face; this raised face is included in center-to-face and face-to-face dimensions. These B16.1 Class 250 Flanges can be furnished "special" without raised face; when so required, flanges should be specified "faced and drilled ANSI B16.1 Class 250, except flat faced."

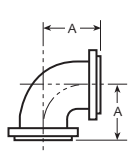
On special order, AMERICAN furnishes pipe and fittings in some—but not all—sizes with flanges faced and drilled ANSI B16.1 Class 250.

Drilling of flanges can be rotated when required; for those sizes with an even number of bolt holes in each quadrant, fitting can be rotated 45° with standard drilling.

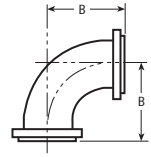
AMERICAN Ductile Iron Flanged Fittings

ANSI B16.1

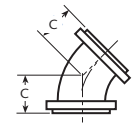
Dimensions of Class 250 Flanged Fittings



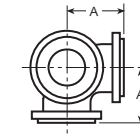
90° Bend



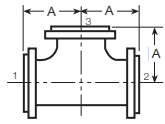
90° Long Radius Bend



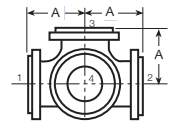
45° Bend



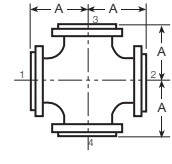
Side Outlet 90° Bend



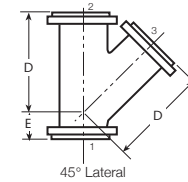
Tee



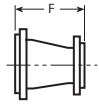
Side Outlet Tee



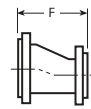
Cross



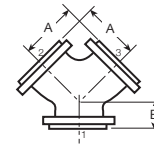
45° Lateral



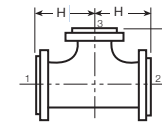
Reducer



Eccentric Reducer



True Wye

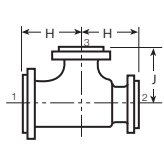


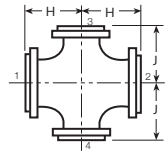
Tee Reducing on Branch

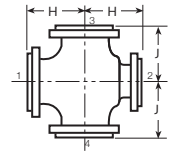
Table No. 12-32

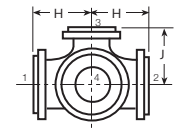
Nominal Pipe Size in.	Straight Size Fittings						Reducing (Short Body)		
							Tees, Crosses		
	A Center to Face 90° Bend, Tees, Crosses, & True "Y" in.	B Center to Face 90° Long Radius Bend in.	C Center to Face 45° Bend in.	D Center to Face Lateral in.	E Short Center to Face True "Y" and Lateral in.	F Face to Face Reducer in.	Size of Branch and Smaller in.	H Center to Face Run in.	J Center to Face Outlet or Side Outlet in.
3	6.00	7.75	3.50	11.00	3.00	6.0	All reducing tees and crosses sizes 16 in. and smaller shall have same center-to-face dimensions as straight size fittings, corresponding to the size of the largest opening.		
3½	6.50	8.50	4.00	12.50	3.00	6.5			
4	7.00	9.00	4.50	13.50	3.00	7.0			
5	8.00	10.25	5.00	15.00	3.50	8.0			
6	8.50	11.50	5.50	17.50	4.00	9.0			
8	10.00	14.00	6.00	20.50	5.00	11.0			
10	11.50	16.50	7.00	24.00	5.50	12.0			
12	13.00	19.00	8.00	27.50	6.00	14.0			
14	15.00	21.50	8.50	31.00	6.50	16.0			
16	16.50	24.00	9.50	34.50	7.50	18.0			
18	18.00	26.50	10.00	37.50	8.00	19.0	12	14.0	17.0
20	19.50	29.00	10.50	40.50	8.50	20.0	14	15.5	18.5
24	22.50	34.00	12.00	47.50	10.00	24.0	16	17.0	21.5
30	27.50	41.50	15.00	-	-	30.0	20	20.5	25.5
36	32.50	49.00	18.00	-	-	36.0	24	23.5	29.5
42	37.00	56.50	21.00	-	-	42.0	24	26.5	33.5
48	42.00	64.00	24.00	-	-	48.0	30	29.0	37.5

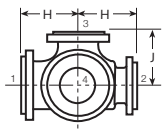
AMERICAN Ductile Iron Flanged Fittings
ANSI B16.1
Dimensions of Class 250 Flanged Fittings — Continued

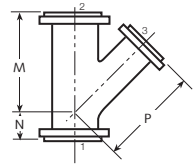

Tee Reducing on One Run and Branch

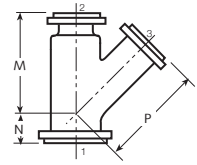

Cross Reducing on Both Branches

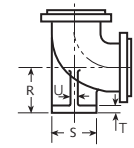

Cross Reducing on Run

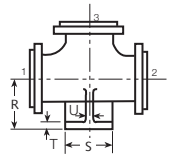

Side Outlet Tee or Cross Reducing on Branches


Side Outlet Tee or Cross Reducing on Run and Branches


45° Lateral Reducing on Branch


45° Lateral Reducing on Run and Branch


Base Bend


Base Tee

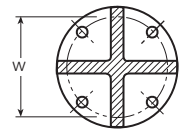
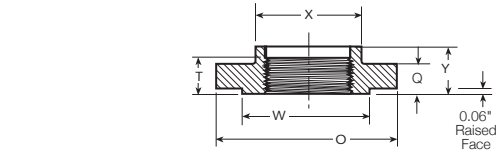

Round Base

Table 12-32 – Continued

Nominal Pipe Size in.	Reducing (Short Body) Laterals: Size of Branch and Smaller in.	M Center to Face Run in.	N Center to Face Run in.	P Center to Face Branch in.	Base Bends and Base Tees: R Center to Base in.	S Dia. of Round Base in.	T Thick-ness of Base in.	U Thick-ness of Ribs in.	Size of Support-ing Pipe for Base in.	Base Drilling: W Bolt Circle in.	Dia. of Holes in.
3	All reducing lateral sizes 16 in. and smaller shall have same center-to-face dimensions as straight size fittings, corresponding to the size of the largest opening.				5.25	6.12	.81	.62	1½	4.50	.88
3½					5.62	6.12	.81	.62	1½	4.50	.88
4					6.00	6.50	.88	.62	2	5.00	.75
5					6.75	7.50	1.00	.75	2½	5.88	.88
6					7.50	7.50	1.00	.75	2½	5.88	.88
8					9.00	10.00	1.25	.88	4	7.88	.88
10					10.50	10.00	1.25	.88	4	7.88	.88
12					12.00	12.50	1.44	1.00	6	10.62	.88
14					13.50	12.50	1.44	1.00	6	10.62	.88
16					14.75	12.50	1.44	1.12	6	10.62	.88
18	8	31	3	32.5	16.25	15.00	1.62	1.12	8	13.00	1.00
20	10	34	3	36.0	17.88	15.00	1.62	1.25	8	13.00	1.00
24	12	41	3	43.0	20.75	17.50	1.88	1.25	10	15.25	1.12
30	-	-	-	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	-	-

AMERICAN Ductile Iron Flanged Fittings
ANSI B16.1
Threaded Companion Flanges and Blind Flanges
Class 250



A-33881
Ductile Companion Flange
(for Steel Pipe O.D.)

Flat
8" and Smaller

A-33880
Blind Flanges

Dished
10" and Larger

Table No. 12-33

Nominal Pipe Size in.	O Dia. of Flange in.	Q Thick-ness of Flange (Min) in.	W Dia. of Raised in.	A-33880 Blind Flanges		A-33881 Companion Flanges		
				I Dia. of Port in.	V Wall Thick-ness in.	X Dia. Hub (Min) in.	Y Length Through Hub in.	T Length of Threads in.
1	4.88	.69	2.69	1.00	-	2.06	.88	.68
1¼	5.25	.75	3.06	1.25	-	2.50	1.00	.81
1½	6.12	.81	3.56	1.50	-	2.75	1.12	.87
2	6.50	.88	4.19	2.00	-	3.31	1.25	1.00
2½	7.50	1.00	4.94	2.50	-	3.94	1.43	1.13
3	8.25	1.12	5.69	3.00	-	4.62	1.56	1.19
3½	9.00	1.19	6.31	3.50	-	5.25	1.62	1.25
4	10.00	1.25	6.94	4.00	-	5.75	1.75	1.31
5	11.00	1.38	8.31	5.00	-	7.00	1.88	1.44
6	12.50	1.44	9.69	6.00	-	8.12	1.94	1.56
8	15.00	1.62	11.94	8.00	-	10.25	2.19	1.75
10	17.50	1.88	14.06	10.00	.94	12.62	2.38	1.94
12	20.50	2.00	16.44	12.00	1.00	14.75	2.56	2.19
14	23.00	2.12	18.94	13.25	1.12	16.25	2.69	2.25
16	25.50	2.25	21.06	15.25	1.25	18.38	2.88	2.50
18	28.00	2.38	23.31	17.00	1.38	-	-	-
20	30.50	2.50	25.56	19.00	1.50	-	-	-
24	36.00	2.75	30.31	23.00	1.62	-	-	-
30	43.00	3.00	37.19	29.00	2.00	-	-	-
*36	50.00	3.38	43.69	-	-	-	-	-
*42	57.00	3.69	50.44	-	-	-	-	-
*48	65.00	4.00	58.44	-	-	-	-	-

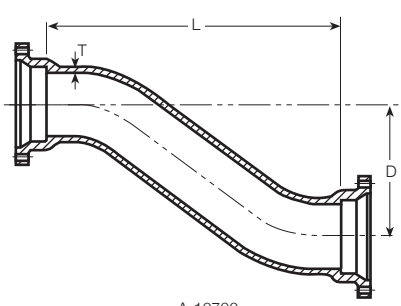
*Fittings in these sizes are not produced and used in sufficient quantities to warrant standardization; however, the flange dimensions are included for convenience where special fittings larger than 30 in. are required.

All Blind Flanges for sizes 10 in. and larger must be dished with inside radius equal to the port diameter.

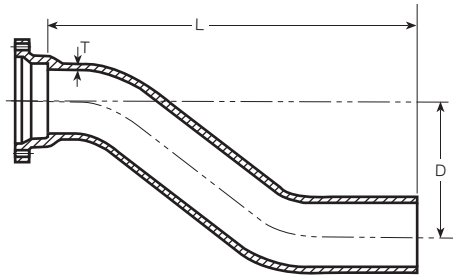
Companion Flanges are furnished of ductile iron only and are threaded for fabrication on pipe of standard steel pipe outside diameter unless specified otherwise.

See Section 8 for Companion Flange F&D ANSI B16.1 Class 250 for threading on ductile iron pipe.

AMERICAN Mechanical Joint Fittings
ANSI/AWWA C110/A21.10
Offsets



A-10700
MJ and MJ



A-10701
MJ and PE

Table No. 12-34

Size in.	Pressure Rating psi	Iron Strength psi (1000's)	D in.	T in.	A-10700 MJ & MJ		A-10701 MJ & PE	
					L in.	Weight lb	L in.	Weight lb
4	250	25	6	.52	19	75	27	70
4	350	DI	6	.52	19	75	27	70
4	250	25	12	.52	22	85	30	80
4	350	DI	12	.52	22	85	30	80
4	250	25	18	.52	30	105	38	100
4	350	DI	18	.52	30	105	38	100
*4	250	25	24	.52	30	125	38	120
*4	350	DI	24	.52	30	125	38	120
6	250	25	6	.55	20	110	28	105
6	350	DI	6	.55	20	110	28	105
6	250	25	12	.55	26	135	34	130
6	350	DI	12	.55	26	135	34	130
6	250	25	18	.55	33	165	41	160
6	350	DI	18	.55	33	165	41	160
*6	250	25	24	.55	33	195	41	190
*6	350	DI	24	.55	33	195	41	190
8	250	25	6	.60	21	160	29	155
8	350	DI	6	.60	21	160	29	155
8	250	25	12	.60	28	200	36	195
8	350	DI	12	.60	28	200	36	195
8	250	25	18	.60	35	245	43	240
8	350	DI	18	.60	35	245	43	240
10	250	25	6	.68	22	220	30	220
10	350	DI	6	.68	22	220	30	220
10	250	25	12	.68	30	280	38	280
10	350	DI	12	.68	30	280	38	280
10	250	25	18	.68	38	340	46	340
10	350	DI	18	.68	38	340	46	340
*10	250	25	24	.68	38	400	46	400
*10	350	DI	24	.68	38	400	46	400
12	250	25	6	.75	26	320	34	320
12	350	DI	6	.75	26	320	34	320
12	250	25	12	.75	37	420	45	420
12	350	DI	12	.75	37	420	45	420
12	250	25	18	.75	48	520	56	520
12	350	DI	18	.75	48	520	56	520

*Not included in AWWA C110.
The user is directed to "off-set capabilities" of deflected pipe and fitting joints as shown elsewhere in this manual.

AMERICAN Mechanical Joint Fittings
ANSI/AWWA C110/A21.10
Offsets

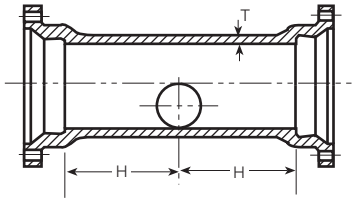
Table No. 12-34 – Continued

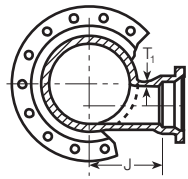
Size in.	Pressure Rating psi	Iron Strength psi (1000's)	D in.	T in.	A-10700 MJ & MJ		A-10701 MJ & PE	
					L in.	Weight lb	L in.	Weight lb
14	150	25	6	.66	27	380	35	365
14	250	25	6	.82	27	435	35	420
14	350	DI	6	.66	27	380	35	365
14	150	25	12	.66	38	480	46	465
14	250	25	12	.82	38	560	46	545
14	350	DI	12	.66	38	480	46	465
14	150	25	18	.66	49	585	57	570
14	250	25	18	.82	49	680	57	665
14	350	DI	18	.66	49	585	57	570
16	150	30	6	.70	27	460	35	440
16	250	30	6	.89	27	535	35	515
16	350	DI	6	.70	27	460	35	440
16	150	30	12	.70	40	600	48	580
16	250	30	12	.89	40	715	48	690
16	350	DI	12	.70	40	600	48	580
16	150	30	18	.70	50	710	58	690
16	250	30	18	.89	50	850	58	830
16	350	DI	18	.70	50	710	58	690
*16	250	30	24	.89	50	1030	58	1030
*18	250	30	6	.96	28	660	36	670
*18	250	30	12	.96	40	865	48	870
*18	250	30	18	.96	51	1055	59	1060
*20	150	30	6	.80	28	670	36	640
*20	250	DI	6	.80	28	670	36	640
*20	150	30	12	.80	40	855	48	825
*20	250	DI	12	.80	40	855	48	825
*20	250	30	18	1.03	52	1275	60	1275
*24	250	30	6	1.16	28	1040	36	1045
*24	150	30	12	.89	40	1140	48	1100
*24	250	DI	12	.89	40	1140	48	1100
*24	250	30	18	1.16	52	1785	60	1790
*24	150	30	24	.89	48	1420	56	1380
*24	250	DI	24	.89	48	1420	56	1380
*30	150	30	18	1.03	56	2300	64	2195
*30	250	DI	18	1.03	56	2300	64	2195

*Not included in AWWA C110.

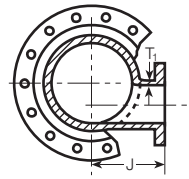
AMERICAN could furnish fittings for all of the pressure ratings listed above; however, in some few larger sizes where two thickness/iron options are shown, both thicknesses listed for a particular fitting may not have been available.

AMERICAN Specials
Blow-Off Branches





A-10120
All MJ Blow-Off Branch



A-30127
MJ, MJ and Flg
Blow-Off Branch

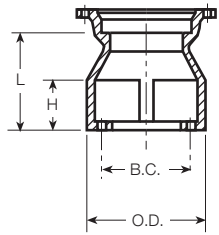
Table No. 12-35

Size in.		Pressure Rating* psi	Iron Strength psi (1000's)	Dimensions in Inches				Weight lb (All MJ)
Run	Branch			T	T_1	H	J	
6	4	250	30	.55	.52	12	7	140
8	4	250	30	.60	.52	12	7	185
8	6	250	30	.60	.55	12	7	190
10	4	250	30	.68	.52	12	8	250
10	6	250	30	.68	.55	12	8	255
12	4	250	30	.75	.52	12	10	310
12	6	250	30	.75	.55	12	10	325
14	4	150	30	.66	.52	12	11	390
14	6	150	30	.66	.55	12	11	395
16	4	150	30	.70	.52	12	12	465
16	6	150	30	.70	.55	12	12	480
16	8	150	30	.70	.60	12	12	495
18	4	150	30	.75	.52	12	13	560
18	6	150	30	.75	.55	12	13	570
18	8	150	30	.75	.60	12	13	580
20	4	150	30	.80	.52	12	14	660
20	6	150	30	.80	.55	12	14	665
20	8	150	30	.80	.60	12	14	675
24	4	150	30	.89	.52	12	16	870
24	6	150	30	.89	.55	12	16	880
24	8	150	30	.89	.60	12	16	890
30	4	150	30	1.03	.52	13	20	1440
30	6	150	30	1.03	.55	13	20	1455
30	8	150	30	1.03	.60	13	20	1470
30	10	150	30	1.03	.68	13	20	1485
30	12	150	30	1.03	.75	13	20	1500
36	6	150	30	1.15	.55	13	23	1990
36	8	150	30	1.15	.60	13	23	2005
36	10	150	30	1.15	.68	13	23	2020
36	12	150	30	1.15	.75	13	23	2040
42	6	150	30	1.28	.55	15	26	2730
42	8	150	30	1.28	.60	15	26	2750
42	10	150	30	1.28	.68	15	26	2770
42	12	150	30	1.28	.75	15	26	2795
42	16	150	30	1.28	.70	15	26	2820
48	12	150	30	1.42	.75	17	30	3775
48	16	150	30	1.42	.70	17	30	3795

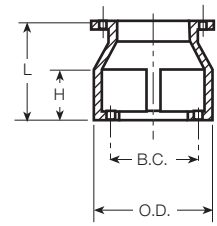
*All sizes of Blow-Off Branches could be furnished of ductile iron. The ductile iron 14" through 48" Blow-Off Branches were rated at 250 psi.

Blow-offs may be accomplished using tangential welded-on outlets as shown in Section 7 or by using a tapping saddle and bend combination.

AMERICAN Specials
Sludge Shoes



A-10752
MJ Sludge Shoe



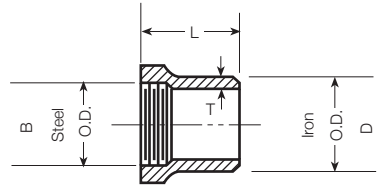
A-30752
Flanged Sludge Shoe

Table No. 12-36

Size in.	Dimensions in Inches			Anchor Bolt Holes			Weight in Pounds	
	L Laying Length	H Height of Opening	O.D. Shoe Diameter	B.C. Bolt Circle	No.	Size in.	A-10752 MJ	A-30752 Flg
4	12	6	8.50	7.00	4	¾	40	35
6	12	6	9.50	7.87	4	⅞	55	45
8	12	6	11.75	10.12	4	⅞	75	65
10	12	6	14.00	12.25	4	1	100	85
12	12	6	17.00	15.25	4	1	130	120

Fittings were normally gray iron but could be furnished of ductile iron when specified.
Holes for anchor bolts were drilled in base setting ring when specified. Four legs were provided on all sizes.

Tapped and Plain End Adapters



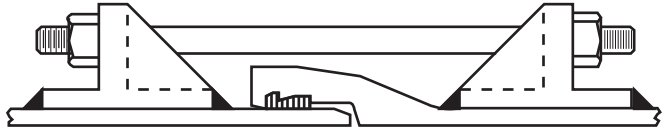
A-35822
Tapped and PE Adapter

Table No. 12-37

Size in.	Pressure Rating psi	Dimensions in Inches				Weight lb
		B	D	L	T	
4	250	4.50	4.80	9.25	.52	20
6	250	6.62	6.90	9.25	.55	30
8	250	8.62	9.05	12.00	.60	55
10	250	10.75	11.10	12.00	.68	80
12	250	12.75	13.20	12.00	.75	100

Fittings were normally gray iron but could be furnished of ductile iron when specified.
Adapters were used to connect steel threaded pipe to ductile iron or gray iron pipe of same nominal size. Plain ends were furnished gaged for Fastite bell.

AMERICAN Ductile Iron Lugged Fastite Joint Materials



Lugged Fastite Joint

Table No. 12-38

Size in.	Joint Assembly				Type Lugs	
	Pipe to Pipe		Fitting to Pipe			
	Rod Size in.	Rod Weight* lb	Rod Size in.	Rod Weight* lb	Pipe Lug Weight Per Lug lb	Fitting Lug Weight Per Lug lb
14	1 x 23	5.8	1 x 14	3.8	20	8
16	1 x 23	5.8	1 x 14	3.8	20	8
18	1 x 24	6.0	1 x 14	3.8	20	8
20	1 x 24	6.0	1 x 14	3.8	20	8
24	1¼ x 24	9.7	1¼ x 15	6.6	20	8
30	1¼ x 26	10.5	1¼ x 16	7.0	24	9
36	1¼ x 26	10.5	1¼ x 16	7.0	24	9
42	1¼ x 26	10.5	1¼ x 15	6.6	25	9
48	1¼ x 26	10.5	1¼ x 15	6.6	25	9
54	1¼ x 26	10.5	1¼ x 15	6.6	28	9

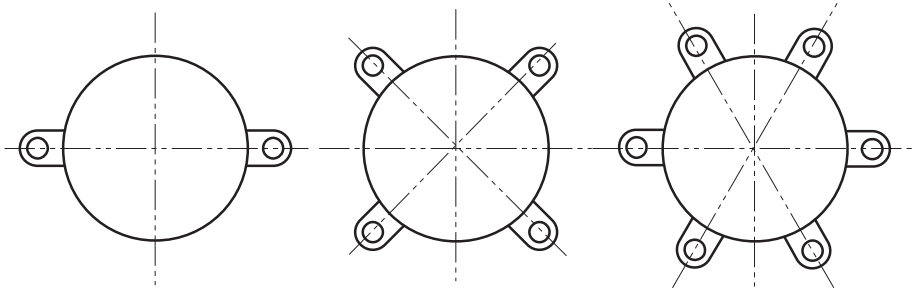
*Weight of rod includes weight of two nuts.

Pipe lugs were welded on; fitting lugs were cast on.

See Section 3 for classes (Thickness Class 50, or heavier) and weights of Fastite Ductile Iron Pipe on which lugs were welded. Two, four or six pairs of lugs were furnished on 30"-54" pipe and fittings, and only two or four pairs on 14"-24".

Rods for use in pulling joint together were 5" longer than standard lengths shown above and were furnished only when specifically ordered.

Normal Orientation of Lugs on Pipe and Fittings



2 Pair 4 Pair 6 Pair

Ductile Iron Mechanical Joint Retainer Glands

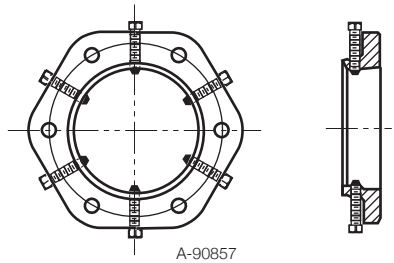
Mechanical Joint Retainer Glands—for use with Ductile Iron pipe 3" through 24"—are cast of Ductile Iron, Grade 60-42-10, and equipped with special alloy steel cupped end set screws. They provide restraint against possible separation of unblocked joints due to internal pressure when assembled on AMERICAN Mechanical Joint Pipe or fittings or on other Standardized Mechanical Joints.

A typical application of this Retainer Gland is restraining fire hydrants and their associated valves and hydrant leads against separation due to internal water pressure. These glands provide restrained joint piping that can be cut to suit in the field, eliminating the necessity of special shop fabricated lengths. However, AMERICAN highly recommends the use of improved methods of joint restraint such as Fast-Grip, Flex-Ring, Field Flex-Ring, and Lok-Ring in lieu of retainer glands. These newer restrained joints offer improved performance, reliability, and less labor-intensive installation requirements than retainer glands.

NOTE: The technical data furnished by AMERICAN pertains only to retainer glands manufactured by AMERICAN and may not apply to those glands manufactured by others but furnished by AMERICAN. ***Also, we will not warrant retainer glands manufactured by others for use on our piping products, whether furnished by AMERICAN or not. Furthermore, we do not recommend the use of retainer glands on minimum classes of ductile iron pipe.***

AMERICAN manufactures 4" through 12" Mechanical Joint Ductile Iron pipe in accordance with AWWA C151 and AWWA C111 and Mechanical Joint fittings up through 48" in accordance with AWWA C153, AWWA C110, and AWWA C111, as described therein. However, AMERICAN does not warrant the performance of third-party mechanical retainer glands or joints using third-party retainer glands, since the design, manufacturing, and installation methods are beyond our control. AMERICAN does manufacture a number of restrained joints such as Fast-Grip®, Flex-Ring®, Field Flex-Ring®, Lok-Ring®, Flex-Lok®, and other devices, where we warrant the joint as well as the associated pipe and fittings of our manufacture.

Ductile Iron Mechanical Joint Retainer Glands



A-90857

Table No. 12-39

Size in.	Pressure Rating psi	No. of Set Screws*	Weight lb
3	350	4	5
4	350	4	8
6	350	6	12
8	250	9	22
10	250	16	28
12	250	16	34
**14	250	20	46
**16	250	24	53
**18	200	24	67
**20	200	28	77
**24	150	32	106

*All set screws are 5/8" size with cupped ends and 5/8" square heads.

**Sizes 14" through 24" are for installation only on ductile iron pipe or on plain end of ductile iron fitting.

The tee-head bolts for joint assembly for the 3" and 4" MJ Retainer Glands are standard length in accordance with AWWA C111; for 6"-24" sizes, bolts are 1/2" longer than the standard lengths.

Note: Information in this table may not apply to retainer glands furnished by AMERICAN manufactured by others.

Ductile Iron Mechanical Joint Retainer Glands
Assembly Instructions*

1. Wash socket and plain end with soapy water. Loosen set screws in gland and slip gland over pipe end. Place gasket on plain end of pipe and thick section of gasket facing gland. Coat gasket with soapy water (Photo 1).

2. Position fitting on plain end of pipe and push gasket into place, making sure it is evenly seated in the socket. Slide gland into position, insert joint bolts and run hex nuts up finger tight (Photo 2).

3. Tighten the mechanical joint tee-head bolts uniformly to the recommended torque: 60 foot-pounds for 3" glands and 90 foot-pounds for 4"-24" glands. Bolts 180° apart should be tightened alternately in order to draw gland up evenly (Photo 3). Bolts for the 3" and 4" Mechanical Joint Retainer Glands are standard length in accordance with ANSI/AWWA C111/A21.11; bolts are ¾" x 4" for 6" glands, ¾" x 4½" for 8"-12" glands, ¾" x 5" for 14"-20" glands, and ¾" x 5½" for 24" glands. These bolts for 6"-24" glands are ½" longer than standard.

4. Run all set screws down until they are in firm contact with the plain end of the jointed pipe. Tighten set screws progressively once around the joint to approximately 40 foot-pounds torque. Finally, tighten the set screws progressively twice around the joint to the following approximate torques (Photo 4):

3"-12" glands, 80 foot-pounds
14"-24" glands, 65 foot-pounds

This assembly procedure, when properly followed, will provide excellent restraint against joint separation under normal operating conditions.

***Note:** *Assembly instructions for retainer glands furnished by AMERICAN manufactured by others may differ from these.*

Joints using retainer glands should be made in reasonably straight alignment and any deflection necessary should be made before tightening the joint bolts or set screws. See Section 2, Table No. 2-9 for allowable deflection.

AMERICAN Ductile Iron Mechanical Joint Pipe

ANSI/AWWA C111/A21.11
Standard Dimensions
14"-48"

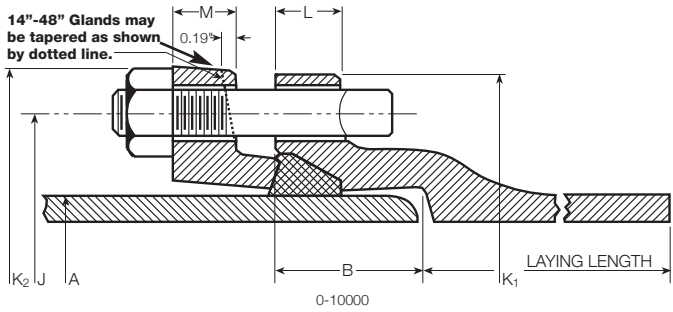


Table No. 12-40

Size in.	Nominal Laying Length ft.	Dimensions in Inches							Bolts	
		A	B	J	K_1*	K_2	L **	M	No. per Joint	Size in.
14	20	15.30	3.5	18.75	20.25	20.25	1.02	1.25	10	¾ X 4½
16	20	17.40	3.5	21.00	22.50	22.50	1.08	1.31	12	¾ X 4½
18	20	19.50	3.5	23.25	24.75	24.75	1.14	1.38	12	¾ X 4½
20	20	21.60	3.5	25.50	27.00	27.00	1.20	1.44	14	¾ X 4½
24	20	25.80	3.5	30.00	31.50	31.50	1.26	1.56	16	¾ X 5
30	20	32.00	4.0	36.88	39.12	39.12	1.38	2.00	20	1 X 6
36	20	38.30	4.0	43.75	46.00	46.00	1.50	2.00	24	1 X 6
40	20	44.50	4.0	50.62	53.12	53.12	1.50	2.00	28	1 ¼ X 6
48	20	50.80	4.0	57.50	60.00	60.00	1.50	2.00	32	1 ¼ X 6

*These dimensions for pipe only. Refer to Table No. 5-1 for fitting joint dimensions.
**The bell flanges may be furnished thicker than specified under "L" above as provided in AWWA C111.
Bolt holes are ⅛" larger than bolt diameters.

AMERICAN Ductile Iron Flex-Ring Joint Pipe

Field-Adaptable Spigot Rings for 4"-12" Flex-Ring Joints

Field closures or other restraint can be made by using AMERICAN's Fast-Grip® gasket, which is available in 4"-16" sizes (See page 9-2) or AMERICAN's Field Flex-Ring in the 14"-36" sizes. (See page 9- 16).

4"-12" AMERICAN Flex-Ring Joints may also be made field-adaptable* by the use of ductile iron set-screw spigot rings especially designed for this purpose. Where field cuts are anticipated, the ring may be provided in lieu of the factory welded-on spigot ring of the regular Flex-Ring Joint. With the aid of this product and an Allen wrench, a strong, dependable restrained joint system, rated for 350 psi working pressure, may be completed without the need for elaborate tools, equipment, or highly specialized labor.

The field-adaptable spigot ring is manufactured from annealed ductile iron. Table No. 9-3 shows the number of Allen head, cup point set screws required for each pipe size.

*Note: It may be possible to avoid field cuts altogether in the restrained joint segment of the pipeline. One way to accomplish this in some situations is by measuring ahead and making the field cut in the unrestrained portion.

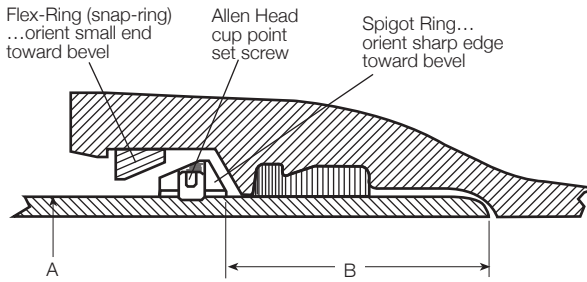


Table No.12-41

Pipe Size in.	A Nominal Pipe O.D. in.	B In. (± 1/8")	Number Allen Head Set Screws
4	4.80	3.56	6
6	6.90	3.56	8
8	9.05	3.69	12
10	11.10	4.25	18
12	13.20	4.25	24

AMERICAN Ductile Iron Flex-Ring Joint Pipe

Hinged Locking Ring Style
14"-36"

In the period from approximately 1985-1996, 14"-36" Flex-Ring pipe was manufactured with a hinged locking ring which closed into locking position on the spigot by virtue of a strong, stainless steel spring attached to the locking ring ends (instead of the current rubber-backed, flex-ring design as shown in Section 9). The pipe bell and spigots are exactly the same, meaning former or current locking ring designs can be used interchangeably in former or current joints, providing proper assembly procedure for the respective locking ring designs is followed. What follows is a description of the assembly and disassembly procedures for joints with the hinged/spring locking ring design.

Assembly Instructions

1. Remove screws and slotted shipping plate from the segmented ring ends inside the bell. (The Flex-Ring Joint is normally shipped with the joint locking ring in place for assembly.)

2. Clean the socket and insert the gasket. (Note: Flex-Ring Joints use standard Fastite gaskets.) Clean the outside of the spigot end from the end of the pipe to the assembly stripe. Apply a thin film of regular American Fastite Joint Lubricant (or special underwater lubricant recommended for underwater or very wet trench installations) to the outside pipe surface between the weld bead and the end of the pipe and also to the inside surface of the inserted gasket.

With the pipes in reasonably straight alignment, insert the spigot completely into the socket per normal Fastite Joint assembly procedure (see Section 2). The orientation of the spigot stripe relative to the bell face is an indication of pipe alignment. The spigot stripe will pass into the bell during correct joint assembly.

3. Remove the clip between the ring ends and away from the face of the bell, allowing the ring to close firmly onto the barrel of the pipe. Verify the correct positioning of the assembled ring by visual inspection (or by "feeler" gauge if installed in conditions of poor visibility). The ring will normally spring directly into the correct assembled position. However, if the ring should not come down firmly onto the pipe at any location, deflect the pipe slightly in that direction, and/or move the locking ring with a wire hook inserted in the end of the spring, thereby causing the ring to seat itself correctly.

After joint assembly, deflect the joint, if required, within the range of allowable joint deflection for the size of pipe being assembled.

AMERICAN Ductile Iron Flex-Ring Joint Pipe
Assembly Instructions
14"-36"

DISASSEMBLY OF 14"-36" FLEX-RING

The AMERICAN Flex-Ring Joint may easily be disassembled if the need arises. If the joint has been extended to the locked position, it will be necessary to push or pull the spigot completely to the rear of the socket to accomplish disassembly. Once the spigot is in this position, shims* with a thickness roughly equal to the weld height should be driven between the ring segments and the pipe spigot and up to (but not over) the weld bead as shown above. Sufficient numbers and spacing of disassembly shims should be used to allow the weld bead to pass underneath the segments and connecting spring and out of the socket. One shim should be located under the center of the spring to prevent spring deformation or damage during disassembly. Once disassembly shims have been placed (with the pipes in reasonably straight alignment) the spigot should be pulled or jacked out of the socket.

* Although special disassembly shims can be furnished by AMERICAN upon request, shims of virtually any suitable material, shape, and approximate thickness of the weld height may be used effectively to disassemble the joint.

FIELD ASSEMBLY OF SEGMENTED FLEX-RING

The segmented flex-ring is normally shipped in the bell for the convenience of the installer. Should it be necessary to install a Flex-Ring in the socket in the field, this may be accomplished per the following procedure:

Field Assembly of Loose 14"-36" Flex-Rings in Socket

1. Clean the socket ring cavity and Flex-Ring.
2. Insert the loose Flex-Ring into the socket ring cavity in "gasket-like" fashion.
3. Using a large C-clamp, firmly clamp one end segment of the ring to the bell (Photo A).

**4. Thread a common ⅝" U.N.C. eye-bolt substantially into the threaded hole of the opposite end segment and, grasping the eye-bolt, spread the ring ends apart sufficiently to allow insertion of the bell clip (Photo B).

**5. Quickly spread the limbs of the bell clip to allow wedging of the bell clip over the bell restraining shoulder and spring, with the inner limb of the bell clip positioned between the ends of the segmented ring. When this is performed, the center of the spring should be between the inner limb of the bell clip and the inner socket surface (as in the case of factory ring assembly). The locking ring is then in proper position for joint assembly.

** In operations (4) and (5) above, take care to securely hold members to avoid "pinching fingers" under strong spring action.

AMERICAN Ductile Iron Lok-Ring® Joint Pipe 14"-36"

Centrifugally Cast for Water, Sewage or Other Liquids

AMERICAN Lok-Ring Pipe is ductile iron, grade 60-42-10, manufactured and tested in accordance with AWWA C151. It is normally furnished standard asphaltic coated outside and cement lined in accordance with AWWA C104. When specified, other special coatings or linings can be furnished as described in Section 11.

A full complement of AMERICAN Lok-Ring ductile iron fittings is available. These fittings are available in both bell-bell and bell-plain end configurations for installation versatility and economy. Lok-Ring fittings meet applicable requirements of ANSI/AWWA C110/A21.10 or ANSI /AWWA C153/A21.53 and are pressure rated for at least 250 psi in most configurations. Check AMERICAN if higher pressure required. See Section 4.

Standard Dimensions

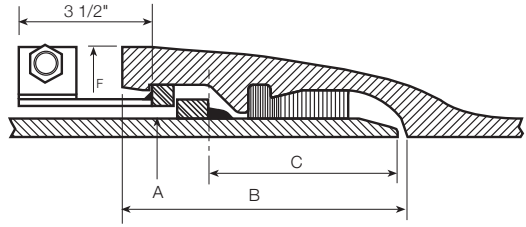


Table No. 12-42

Size in.	Working Pressure* psi	Nominal Laying Length** ft.	A Outside Diameter in.	B Socket Depth in.	C Plain End to Retaining Ring in.	F Bell O.D.† in.	Retainer Ring	Lok-Ring
14	350	20	15.30	5.81	3.87	18.13	½" sq.	½" sq.
16	350	20	17.40	5.81	3.87	20.25	½" sq.	½" sq.
18	350	20	19.50	6.15	4.14	22.50	½" sq.	½" sq.
20	350	20	21.60	6.15	4.14	24.63	½" sq.	½" sq.
24	350	20	25.80	6.15	4.14	28.88	½" sq.	½" sq.
30	250	20	32.00	7.45	5.00	36.00	⅝" sq.	⅝" sq.
36	250	20	38.30	7.45	5.00	42.63	⅝" sq.	⅝" sq.

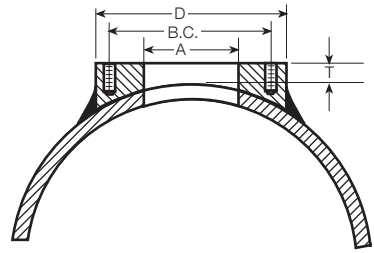
*Working pressure is the maximum pressure rating of the joint and is based on its capability to resist thrust due to internal pressure.

**Laying length is nominal 20 feet. Where exact lengths are required, contact AMERICAN. (See minimum laying lengths tabulated below.)

†Dimensions subject to change at our option. Check AMERICAN if smaller or exact dimensions required.

AMERICAN Ductile Iron Specials

Welded-On Bosses for Ductile Iron Pipe



A-96946
Welded-On Boss Faced and Tapped
for AWWA C110 or C115 Flange Connection

Table No. 12-43

A Dia. of Bossed Outlet Nominal Size in.	Parent Pipe		Boss Water Working Pressure psi	Boss			Studs**	
	Min. Dia. in.	Min. Pressure Class		D Dia. in.	T Min. Thickness in.	BC Bolt Circle in.	No. Req'd.	Size in.
2*	6	350	250	6.0	1.00	4.75	4	⅝ x 2½
3	10	350	250	7.5	1.00	6.00	4	⅝ x 2½
4	12	350	250	9.0	1.00	7.50	8	⅝ x 3
6	16	250	250	11.0	1.25	9.50	8	¾ x 3½
8	18	250	250	13.5	1.25	11.75	8	¾ x 3½
10	24	250	250	16.0	1.25	14.25	12	⅞ x 4
12	30	250	250	19.0	1.25	17.00	12	⅞ x 4
14	30	250	250	21.0	1.50	18.75	12	1 x 4½
16	36	250	250	23.5	1.50	21.25	16	1 x 4½
18	36	250	250	25.0	1.75	22.75	16	1⅛ x 5
20	42	350	250	27.5	2.00	25.00	20	1⅛ x 5
24	48	350	250	32.0	2.25	29.50	20	1¼ x 5½

*Not included in AWWA C110.

**Shown for information only. Joint materials are not routinely furnished for flanged connections, although AMERICAN Toruseal® flange gaskets are available and recommended for optimum joint assembly and security.

Dimensions for ANSI B16.1 Class 250 flange connection can be furnished on request.

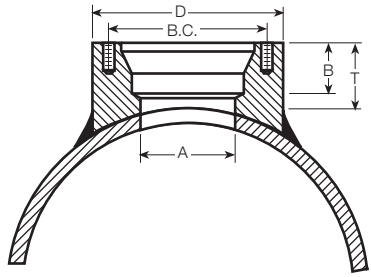
Bosses must be located a minimum of 1/2 Boss Diameter (D) plus 10" from 4"-16" threaded flanges and 1/2 Boss Diameter (D) plus 14" from 18"-64" threaded flanges. (Note: Dimensions are stated from centerline of boss to face of flange.) Bosses welded on pipe other than flange pipe should be located a minimum of 6'-0" from the plain end and 3'-0" from the bell end of the pipe. (Note: Dimensions are stated from centerline of boss to extreme ends of pipe.)

Where flanged outlet bosses must be installed underground, system design and installation should be such so as to avoid bending loads on the flanged joints and/or bosses. It may be necessary in such cases to locate a flexible joint very close to the boss. The Appendix to ANSI/AWWA C115/A21.15 notes that underground use of the flanged joint is generally not recommended because of the rigidity of the joint.

This is a shop fabricated product and is not intended for field fabrication.

AMERICAN Ductile Iron Specials

Welded-On Bosses for Ductile Iron Pipe



A-96945
Welded-On Boss Drilled and Tapped
for AWWA C111 Mechanical Joint Connection

Table No. 12-44

A Dia. of Bossed Outlet Nominal Size in.	Parent Pipe		Boss Working Pressure psi	Boss				Studs	
	Min. Dia. in.	Min. Pressure Class		D Dia. in.	T Min. Thickness in.	B Socket Depth in.	BC Bolt Circle in.	No. Req'd.	Size in.
4	12	350	250	9.12	3.50	2.50	7.50	4	¾ x 3½
6	16	250	250	11.12	3.50	2.50	9.50	6	¾ x 3½
8	18	250	250	13.37	3.50	2.50	11.75	6	¾ x 4
10	24	250	250	15.75	3.50	2.50	14.00	8	¾ x 4
12	30	250	250	18.00	3.50	2.50	16.25	8	¾ x 4
14	30	250	250	20.50	4.50	3.50	18.75	10	¾ x 4½
16	36	250	250	22.75	4.50	3.50	21.00	12	¾ x 4½
18	36	250	250	25.12	4.50	3.50	23.25	12	¾ x 4½
20	42	350	250	27.38	4.50	3.50	25.50	14	¾ x 4½
24	48	350	250	31.88	4.50	3.50	30.00	16	¾ x 5

AMERICAN regularly furnished pipe with welded-on bosses for proven effectiveness and simplicity of layout and installation. Bosses were positioned circumferentially by rotating the pipe. Normally, they should be positioned at the center of the pipe length. In cases where more precise longitudinal placement is necessary, the boss can be positioned anywhere along the pipe barrel within the following limitations: Bosses must be located a minimum of 1/2 Boss Diameter (D) plus 10" from 4"-16" threaded flanges and 1/2 Boss Diameter (D) plus 14" from 18"-64" threaded flanges. (Note: Dimensions are stated from centerline of boss to face of flange.) Bosses welded on pipe other than flange pipe should be located a minimum of 6'-0" from the plain end and 3'-0" from the bell end of the pipe. (Note: Dimensions are stated from centerline of boss to extreme ends of pipe.)

This is a shop fabricated product and is not intended for field fabrication.

AMERICAN HISTORICAL DATA—OBSOLETE PIPING MATERIALS

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DUCTILE IRON PIPE

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