



AMERICAN Ductile Iron Flanged Fittings

The principal standard covering flanged fittings is ANSI/AWWA C110/A21.10. 54"–64" flanged fittings are covered in ANSI/AWWA C153/A21.53. These and other standards are referenced throughout this section either by the full ANSI/AWWA designation or by only the AWWA numbering, such as AWWA C110 or C153.

AMERICAN produces a complete line of standard as well as specialized flanged fittings for various types of service including water, sewage, and air.

Fittings ANSI/AWWA C110/A21.10

Most of the flanged fittings furnished by AMERICAN are manufactured in accordance with the requirements of this standard. The tables in this section in which these fittings are listed have heading "ANSI/AWWA C110/A21.10." The AWWA C110 fitting flanges have facing and drilling that match AWWA C115 threaded-on flanges (see Section 8) and also match ANSI B16.1 Class 125 flanges.

AMERICAN manufactures some fittings that are not included in AWWA C110 including long radius 90° bends, reducing bends, wyes, and various other fittings that are commonly used in plant piping. These have AWWA C110 flanges and are listed in the tables with heading "AMERICAN Standard." The pressure ratings shown are AMERICAN standard and are based on AWWA C110 design principles.

The AWWA C110 flanges are adequate for a water working pressure of 250 psi with the body of the fitting being suitable for 150 psi or 250 psi, as indicated in the tables. In some cases, these fittings have been supplied for greater water working pressure applications, particularly when used with AMERICAN Toruseal® gaskets.

Fittings ANSI/AWWA C153/A21.53

54", 60" and 64" fittings are manufactured in accordance with AWWA C153. These fittings are compact, and the bodies are essentially the same as ISO 2531 fittings in these sizes. Tables including these sizes will include "C153/A21.53" in the heading. Flanges match AWWA C115 and ANSI B16.1 (Class 125) flanges and are adequate for a water working pressure of 250 psi. (64" flanges match 66" flanges. See Table No. 6-1.) The bodies of these fittings are suitable for 150 psi or 250 psi as indicated in the tables. In some cases, these fittings have been supplied for greater water working pressure applications, particularly when used with AMERICAN Toruseal® gaskets.

Fittings Class 250 F&D

Except for a transition piece from an ANSI B16.1 Class 250 flange to a standard AWWA C110 flange, AMERICAN no longer makes fittings with flanges faced and drilled per ANSI B16.1 Class 250. As noted in AWWA C111, flange joints in the 24" and smaller sizes may be rated for up to 350 psi with the use of special gaskets such as AMERICAN's Toruseal®.

Furthermore, AMERICAN is able to rate flange pipe and fittings higher than 250 or even 350 psi on special applications. Information on fittings Class 250 F&D previously furnished by AMERICAN can be found in the Historical Data Section of this Pipe Manual.



AMERICAN offers a complete line of 4"– 64" flanged pipe and fittings for treatment plant piping.



Elevated Pressure/Temperature Applications

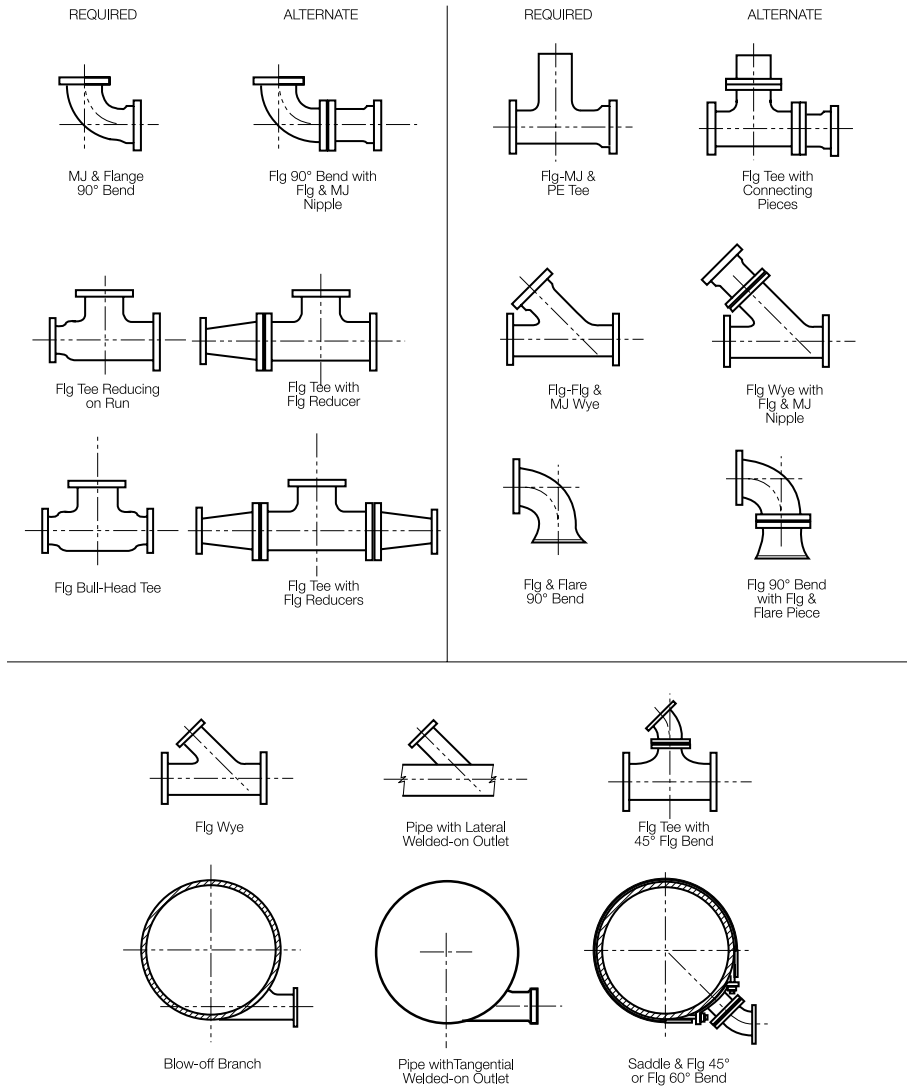
Contact AMERICAN for elevated pressure and/or temperature capabilities of ductile iron flanges.

General Notes Relating to Flanged Fittings

1. Fittings in the following tables headed "ANSI/AWWA C110/A21.10 or C153/A21.53" are as specified in these standards, except as noted. Fittings listed in tables headed "AMERICAN Standard" are either not included in this ANSI/AWWA standard or vary in weights and/or dimensions. AMERICAN does not manufacture any fittings to the requirements of ANSI B16.1 except for laying dimensions, and facing and drilling as specifically noted.
2. Fittings are manufactured of ductile iron grade 70-50-05 (minimum tensile strength: 70,000 psi; minimum yield strength: 50,000 psi; minimum elongation: 5%) as specified in AWWA C110 or C153.
3. Flanges can be tapped for studs when specified. (See Section 8, Table No. 8-3.)
4. All pressure ratings shown are for water service.
5. Unless otherwise specified, flanges will have bolt holes straddling centerline. Bolt hole drilling can be rotated when so specified.
6. Center-to-face dimensions of reducing tees and crosses, with or without side outlet, and of reducing wyes are as follows (See Table No. 6-2).
 - a. 16" and smaller sizes have the same center-to-face dimensions as straight sizes corresponding to the size of the largest opening.
 - b. The center-to-face dimensions of 18" and larger sizes are governed by the size of the branch or side outlet; for fittings with both branch and side outlet, the larger of the two governs.
7. Tees, crosses and wyes, reducing on the run only, have the same dimensions center-to-face and face-to-face as straight size fittings corresponding to the size of the largest opening.
8. Reducing bends have the same center-to-face dimensions as straight size bends corresponding to the size of the largest opening.
9. Reducers and eccentric reducers for all reductions have the same face-to-face dimensions based on the larger opening.
10. Flanged fittings are manufactured to the following tolerances:
 - Flange thickness—
 - Sizes 2"-12" inclusive, ± 0.12 in.
 - Sizes 14"-24" inclusive, ± 0.19 in.
 - Sizes 30"-64" inclusive, ± 0.25 in.
 - Laying Length—
 - Sizes 2"-10" inclusive, ± 0.06 in.
 - Sizes 12"-64" inclusive, ± 0.12 in.Laying length tolerances are for face-to-face dimensions; the center-to-face tolerances are one half of the face-to-face tolerances.
11. The largest opening of the fitting governs the laying length tolerances for all openings. For compliance with the flange thickness tolerance, flanges may be back faced or spot faced, AMERICAN's option.
12. Some fittings are available with body metal thickness other than as listed. Some fittings are available in different sizes and with different size combinations than shown. All sizes and body metal thicknesses listed may not be available due to changes in foundry practice. Check AMERICAN regarding any special requirements.
13. Weights of fittings can vary due to changes in foundry practice.
14. See Section 7 for AMERICAN specials.
15. AMERICAN may furnish fittings manufactured by others. Any such fittings will be manufactured in accordance with appropriate ANSI/AWWA standards.
16. While AWWA C153 shows 54"-64" with 150 psi ratings, AMERICAN rates most 54"-64" fittings 250 psi as AMERICAN standard based on performance testing.



AMERICAN Ductile Iron Flanged Fittings Applications of Standard Fittings



In many cases, special fittings for various conditions are required. Some of the more common of these are shown above in columns headed "Required." Under the columns headed "Alternate," are shown combinations of standard fittings that in some situations will provide the desired connection. For economy and/or shipment from stock, it is often advantageous to use the standard fittings.

***Note:** In lieu of tees, blow-off branches, and wyes (and particularly those with reduced-size branches), the designer should consider for optimum design, layout, and installation the use of fabricated outlet pipe, tangential outlet pipe, and lateral outlets as explained in Sec. 7.



AMERICAN Ductile Iron Flanged Fittings
ANSI/AWWA C110/A21.10, C111/A21.11 or C153/A21.53
Flange Details O.D.

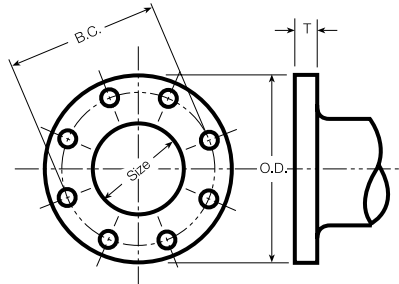


Table No. 6-1

Size in.	O.D. in.	B.C. in.	T in.	Bolt Hole Diameter in.	Bolts	
					No. Per Joint	Size in.
3	7.50	6.00	.75	3/4	4	5/8 x 2 1/2
4	9.00	7.50	.94	3/4	8	5/8 x 3
6	11.00	9.50	1.00	7/8	8	3/4 x 3 1/2
8	13.50	11.75	1.12	7/8	8	3/4 x 3 1/2
10	16.00	14.25	1.19	1	12	7/8 x 4
12	19.00	17.00	1.25	1	12	7/8 x 4
14	21.00	18.75	1.38	1 1/8	12	1 x 4 1/2
16	23.50	21.25	1.44	1 1/8	16	1 x 4 1/2
18	25.00	22.75	1.56	1 1/4	16	1 1/8 x 5
20	27.50	25.00	1.69	1 1/4	20	1 1/8 x 5
24	32.00	29.50	1.88	1 3/8	20	1 1/4 x 5 1/2
30	38.75	36.00	2.12	1 3/8	28	1 1/4 x 6 1/2
36	46.00	42.75	2.38	1 3/8	32	1 1/2 x 7
42	53.00	49.50	2.62	1 5/8	36	1 1/2 x 7 1/2
48	59.50	56.00	2.75	1 5/8	44	1 1/2 x 8
54	66.25	62.75	3.00	2	44	1 3/4 x 8 1/2
60	73.00	69.25	3.12	2	52	1 3/4 x 9
**64	80.00	76.00	3.38	2	52	1 3/4 x 9

**The dimensions of 64" flange correspond with applicable dimensions of 66" Class E in ANSI/AWWA C207, and 64" ductile iron flanges can be connected to those flanges.

FACING: Flanges are plain faced and are finished smooth or with shallow serrations (AMERICAN's option).

BACK FACING: Flanges may be back faced or spot faced, AMERICAN's option, for compliance with the flange thickness tolerance.

FLANGES: The flanges shown above are adequate for water service of 250 psi working pressure and should not be confused with Class 250 flanges per ANSI B16.1. The bolt circle and the bolt holes match those of ANSI B16.1 Class 125. If flanges are required to be made in accordance with other ratings or other standards, this must be specified on the purchase order. 24" and smaller flanges are rated equal to the fittings to which they are attached and are adequate for water service of greater than 350 psi only with the use of AMERICAN's Toruseal® gaskets.

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 recommends AMERICAN Toruseal® gaskets shown on page 6-21 be used for normal water service.

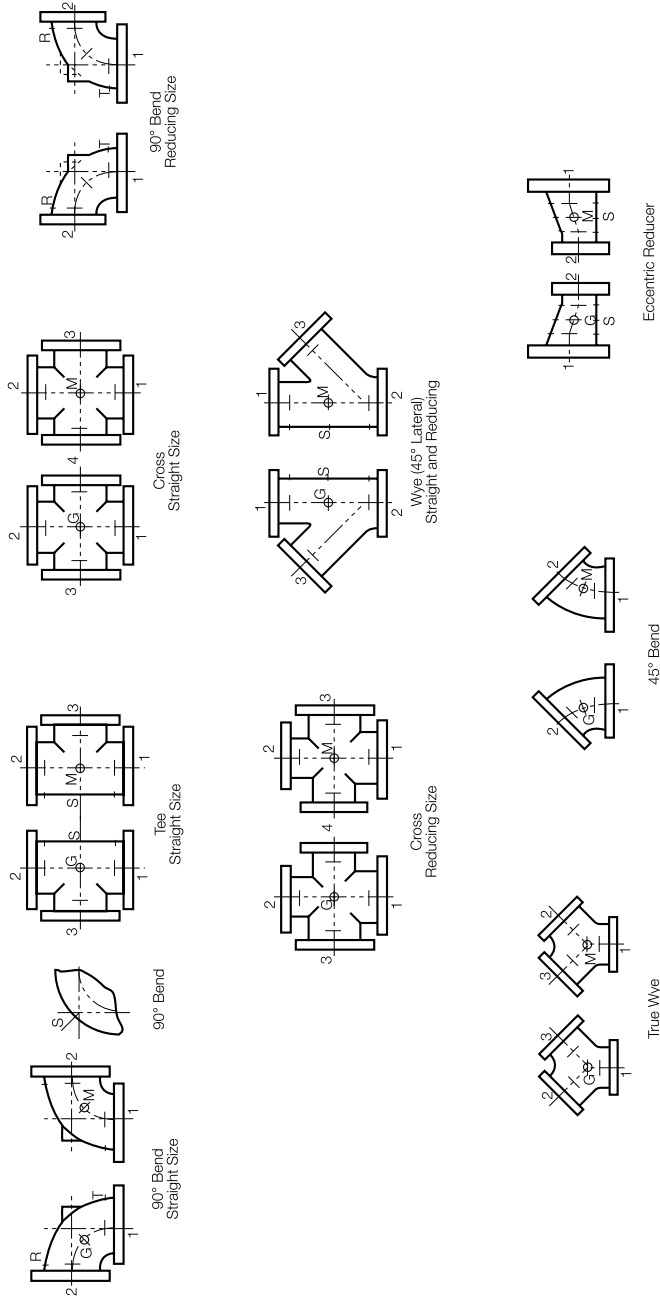
See Section 8, Table No. 8-3 for information on bolts and studs.

See General Notes on page 6-2.



AMERICAN Ductile Iron Flanged Fittings AMERICAN Standard

Method of Designating Location of Tapped Holes and Sequence of Openings



Taps are made directly into the wall of the flanged fitting. Tap diameter depends on the fitting wall thickness and will vary on the diameter of the fitting. In the designation of the openings of reducing fittings, they should be read in the order indicated by the sequence of the numbers 1, 2, 3 and 4 as shown. Maximum tap diameter depends on the fitting wall thickness.
 Note that numbering sequence for wye ends differs from that shown in ANSI B16.1 standard (for gray cast iron flanged items).



AMERICAN Ductile Iron Flanged Fittings
ANSI/AWWA C110/A21.10, C153/A21.53, or AMERICAN Standard
Flanged Fittings Dimensions

Table No. 6-2

Size in.	Dimensions in Inches Reducing Tees										Reducing Tees and Crosses				Reducing Wyes*			
	A	B	C	D**	E**	F	R	S (Dia.)	T	U	Size of Branches and Smaller ***	H	J	Size of Branches and Smaller	M	N	P	
3	5.5	7.75	3.0	10.0	3.0	6	4.88	5.00	.56	.50	-	†	†	-	††	††	††	
4	6.5	9.00	4.0	12.0	3.0	7	5.50	6.00	.62	.50	-	†	†	-	††	††	††	
6	8.0	11.50	5.0	14.5	3.5	9	7.00	7.00	.69	.62	-	†	†	-	††	††	††	
8	9.0	14.00	5.5	17.5	4.5	11	8.38	9.00	.84	.88	-	†	†	-	††	††	††	
10	11.0	16.50	6.5	20.5	5.0	12	9.75	9.00	.94	.88	-	†	†	-	††	††	††	
12	12.0	19.00	7.5	24.5	5.5	14	11.25	11.00	1.00	1.00	-	†	†	-	††	††	††	
14	14.0	21.50	7.5	27.0	6.0	16	12.50	11.00	1.00	1.00	-	†	†	-	††	††	††	
16	15.0	24.00	8.0	30.0	6.5	18	13.75	11.00	1.00	1.00	-	†	†	-	††	††	††	
18	16.5	26.50	8.5	32.0	7.0	19	15.00	13.50	1.12	1.12	12	13	15.5	8	25.0	1.00	27.5	
20	18.0	29.00	9.5	35.0	8.0	20	16.00	13.50	1.12	1.12	14	14	17.0	10	27.0	1.00	29.5	
24	22.0	34.00	11.0	40.5	9.0	24	18.50	13.50	1.12	1.12	16	15	19.0	12	40.5	9.00	40.5	
30	25.0	41.50	15.0	See Table No. 6-8	See Table No. 6-8	30	23.00	16.00	1.19	1.15	20	18	23.0	-	See Table No. 6-8	-	-	
36	28.0	49.00	18.0	See Table No. 6-8	See Table No. 6-8	36	26.00	19.00	1.25	1.15	24	20	26.0	-	-	-	-	
42	31.0	56.50	21.0	See Table No. 6-8	See Table No. 6-8	42	30.00	23.50	1.44	1.28	24	23	30.0	-	-	-	-	
48	34.0	64.00	24.0	See Table No. 6-8	See Table No. 6-8	48	34.00	25.00	1.56	1.42	30	26	34.0	-	-	-	-	
54	39.0	-	20.5	-	-	§	38.00	27.50	1.69	1.55	§§	§§	§§	-	-	-	-	
60	43.0	-	23.5	-	-	§	42.00	32.00	1.88	1.75	§§	§§	§§	-	-	-	-	
64	48.0	-	25.0	-	-	§	44.00	38.75	2.12	1.75	§§	§§	§§	-	-	-	-	

*AWWA C110 and C153 do not include data on wyes of any size.

**See footnote to Table No. 6-8.

***For larger branches, use "A" dimensions.

†††For these smaller diameter reducing tees and crosses, the "A" dimension applies as shown in "cut" of standard tee and cross.

††††For these smaller diameter reducing wyes, the "D" and "E" dimensions apply as shown in "cut" of standard wye.

See General Notes on page 6-2.

§††††† dimensions for 54 - 64" reducers vary with diameters of reduction.

§§††††† dimensions for 54 - 64" tees and crosses vary with diameters of reduction.