

Body Forms

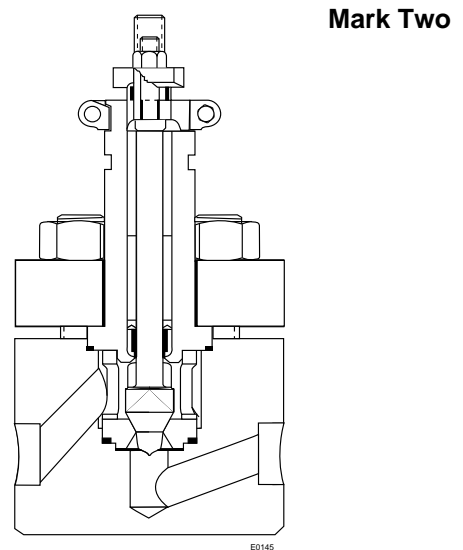
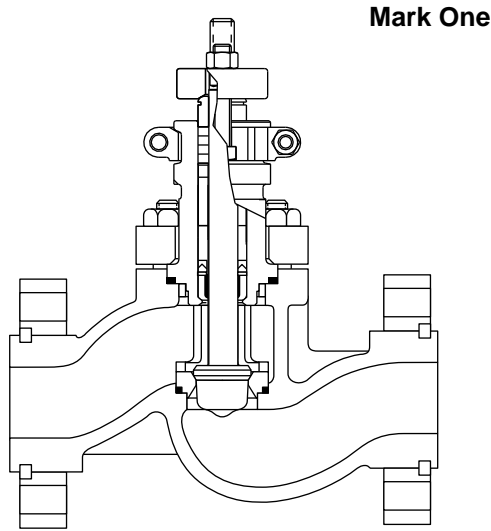


Figure 6-1: In-line Forms

In-line

In-line style bodies feature smooth, streamlined, constant internal area passages with no pockets, permitting high capacity with minimum turbulence. Cast bodies are designed with nearly constant wall thickness, to

eliminate weight and reduce cost. This is particularly important when manufactured in expensive stainless or alloy steels. If necessary, this body form can also be manufactured from barstock.

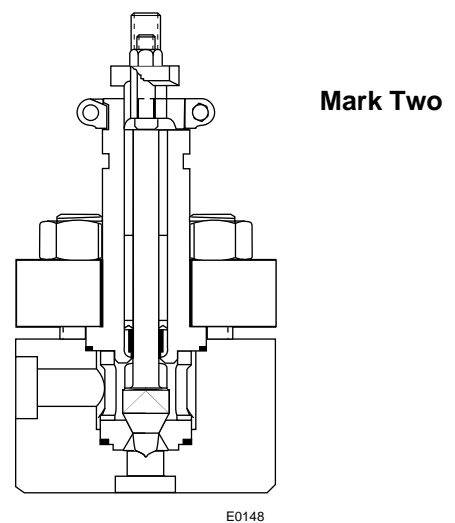
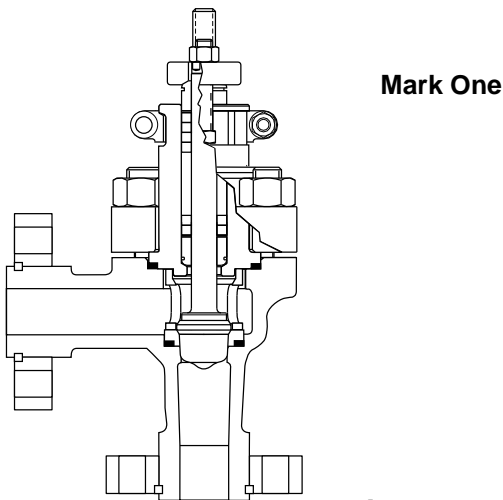


Figure 6-2: Angle Forms

Angle

The angle-style body form is completely interchangeable with the globe-style except for the body – all other valve parts remain the same. If required for additional protection of the body, a special Venturi seat ring, which

extends to the outlet flange, is available for handling erosive fluids. The angle valve incorporates a self-draining design. The design also allows for smaller space requirements than a globe valve.

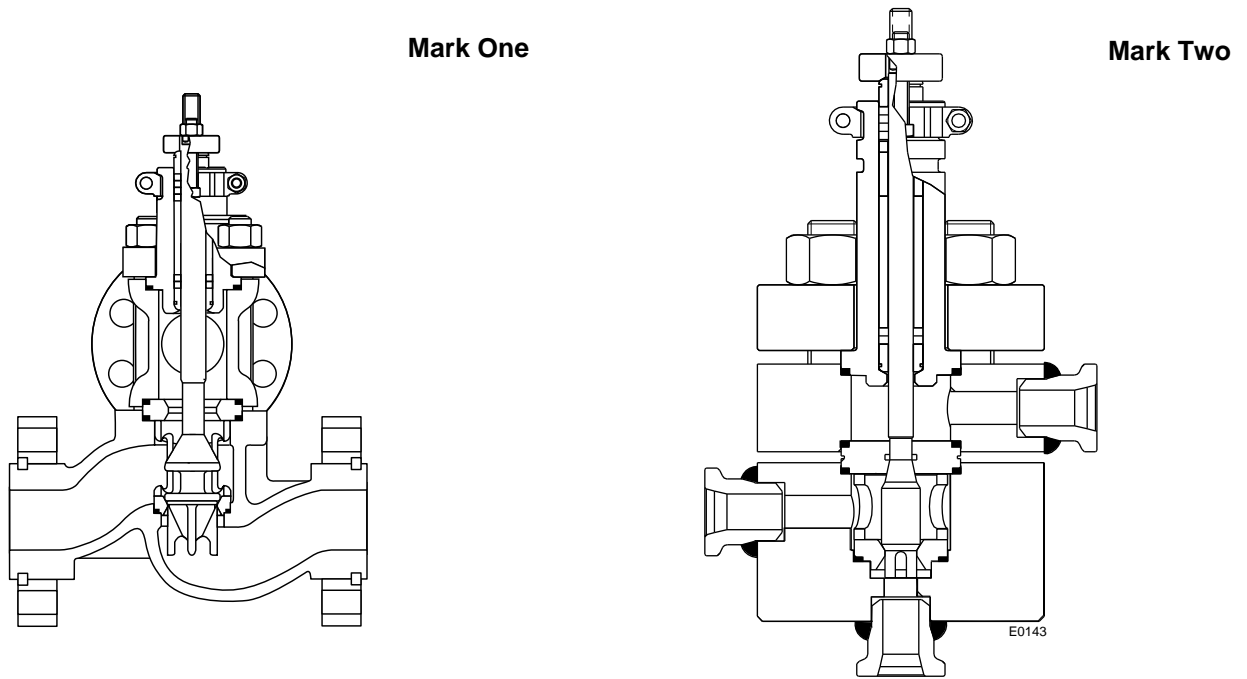


Figure 6-3: Three-way Forms

Three-way

Three-way bodies are used for either combining or diverting services. Due to Valtek’s excellent parts interchangeability, a standard globe valve easily converts to

three-way service with the addition of a three-way adaptor, upper seat ring, two gaskets, a three-way plug, and bonnet flange bolting.

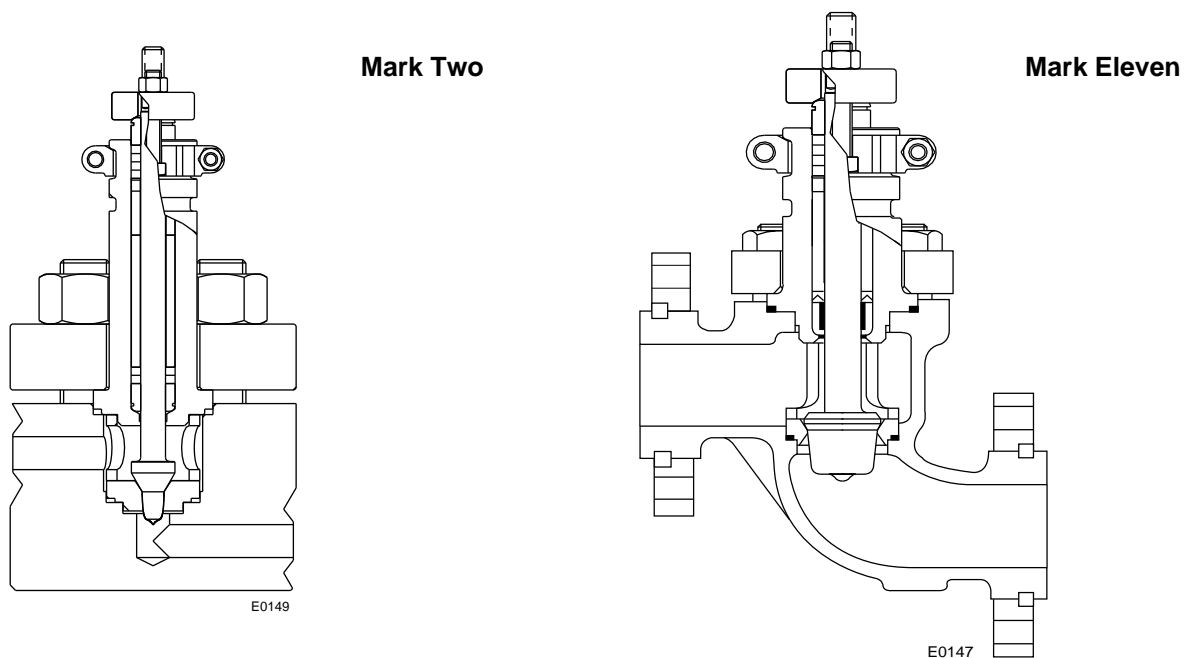


Figure 6-4: Offset Forms

Offset

When inlet and outlet piping can be offset, this design is the simplest, least expensive barstock style. A Mark Eleven works best in self cleaning applications. Other

than the body, the offset design is completely interchangeable with the standard Valtek globe valve.

Mark One-X

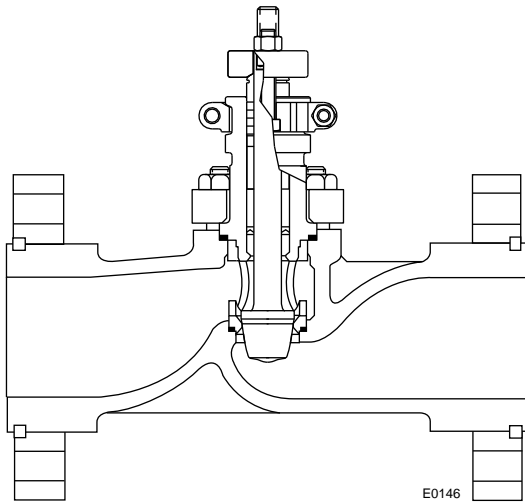


Figure 6-5: Expanded Outlet Form

Expanded Outlet

The expanded outlet valve, such as a Mark One-X, permits the installation of a small valve in a larger line without using line reducers or expanders. The valve is a standard in-line globe valve, except for the body which incorporates expanded outlets. Therefore, all parts – except the body – are interchangeable with the Mark One. Because line expanders and reducers are not used, field installation expenses are reduced. The expanded outlet valve is less costly than a full-size Mark One with the same size end connections.

END CONNECTIONS

Standard globe valve bodies have a raised face hub for either separable or integral flanges. Separable flanges are highly recommended because less expensive carbon steel separable flanges can be specified for use on alloy valves as a cost-saving measure. (Stainless steel flanges may be required with a high temperature/pressure service. See factory for specific limitations.) Separable flange valves are also easier to install with the mating piping because the flanges can be rotated to fit the line flange hole pattern. To achieve better sealing with the mating piping, the flange face is machined with groove serrations.

Integral flanges can also be provided with a flat face, RTJ (ring-type joint), or tongue and groove connections – depending upon the user's requirements.

NPT (National Pipe Threads) connections are provided for small valves (2-inch and smaller). They are designed with a female NPT to mate with piping using

Mark One

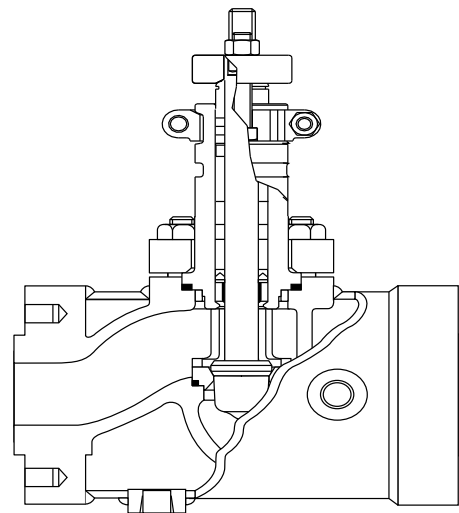


Figure 6-6: Steam Jacketed Form

Steam Jacketed

Steam jackets are used to heat the fluid passing through the control valve. The steam jacketed valve body uses a standard globe-style body with oversized, blind flanges for a full jacket or standard flanges for a partial jacket. The jacket usually is rated for 150 psi and comes equipped with ³/₄-inch NPT supply and drain connection.

male NPT threads, and are usually used in pressures less than ANSI Class 600. Because of the threaded connection, these connections are limited to non-corrosive services. See Figure 6-9.

Socketweld connections are usually used in high pressure, high temperature fluids in sizes 2-inch and smaller. The connection uses a bore in the body end which mates with the corresponding piping. A weld is then applied between the body face and the pipe. See Figure 6-10.

For high pressure, high temperature services above 2-inch, buttweld connections are used. Butt welds are common to steam and water services in power plants. Usually, the butt weld angle machined into the body matches the angle machined into the piping. A full penetration weld is then applied to the butt joint. The material in the body and piping should be compatible to ensure proper welding. See Figure 6-11.

Table 6-I provides specification information concerning each of the end connections mentioned on page 6-3:

Table 6-I: Typical End Connections

Type	Valve Size (inch)	Pressure Class	Standard Face-to-Face	Optional Face-to-Face	Standard Finish or Preparation	Optional Finish or Preparation	
Separable Flange Raised face	1/2 - 4 6 - 8	150 - 600 300 - 600	ANSI (a) ISA (b)	ISA (b)	125 - 250 R _a	250 - 500 R _a	
Integral Flange Raised Face	1/2 - 6 (f)	150 - 600	ISA (b)		125 - 250 R _a	250 - 500 R _a	
	1 - 6	900 - 2500	VS (c)		125 - 250 R _a	250 - 500 R _a	
	8 - 24	150 - 600	ISA (g)		125 - 250 R _a	250 - 500 R _a	
	8 - 24	900 - 2500	ANSI (d)		125 - 250 R _a	250 - 500 R _a	
	Flat Face	1 - 6 (f)	150 - 600	ISA (b)		125 - 250 R _a	250 - 500 R _a
		8 - 24	150 - 600	ISA (g)		125 - 250 R _a	250 - 500 R _a
	RTJ	1 - 6 (f)	150 - 600	ISA (b)		N/A	N/A
		1 - 6	900 - 2500	VS (c)		N/A	N/A
8 - 24		150 - 600	ISA (g)		N/A	N/A	
8 - 12		900 - 2500	ANSI (d)		N/A	N/A	
Tongue & Groove	1 - 6	150 - 600	ISA (b)		N/A	N/A	
	1 - 6	900 - 2500	VS (c)		N/A	N/A	
	8 - 24	150 - 600	ISA (g)		N/A	N/A	
	8 - 12	900 - 2500	ANSI (d)		N/A	N/A	
Threaded	1/2 - 2	150 - 600	ANSI (a)		NPT	Straight	
	1/2 - 2	900 - 2500	VS (c)		NPT	Straight	
Socketweld	1/2 - 2	150 - 600	ANSI (a)	ISA (b)	ANSI B16.11		
	1/2 - 2	900 - 2500	VS (c)		ANSI B16.11		
Buttweld	1/2 - 4 (e)	150 - 600	ANSI (a)	ISA (b)	ANSI B16.25	User Standard	
	6 - 24	150 - 600	ISA (g)		ANSI B16.25	User Standard	
	1 - 6 (e)	900 - 2500	VS (c)		ANSI B16.25	User Standard	
	8 - 12	900 - 2500	ANSI (d)		ANSI B16.25	User Standard	

(a) ANSI B16.10, Class 600 Globe Valves

(b) ANSI / ISA S75.03

(c) Valtek Standard

(d) ANSI B16.10, 1986

(e) Normally valves 2-inch and less are socketweld, not buttweld

(f) Integral flange available as an option in sizes 1/2 through 4-inch ISA or ANSI face-to-face

(g) ANSI / ISA S75.03 covers valve sizes 1/2 through 16-inch. Larger sizes are Valtek standard

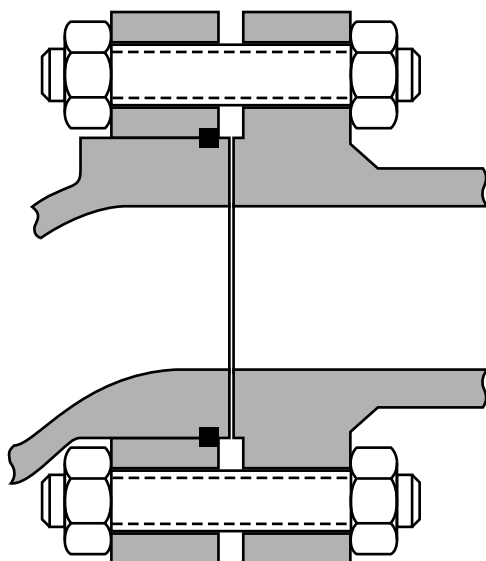


Figure 6-7: Separable Flange Connection

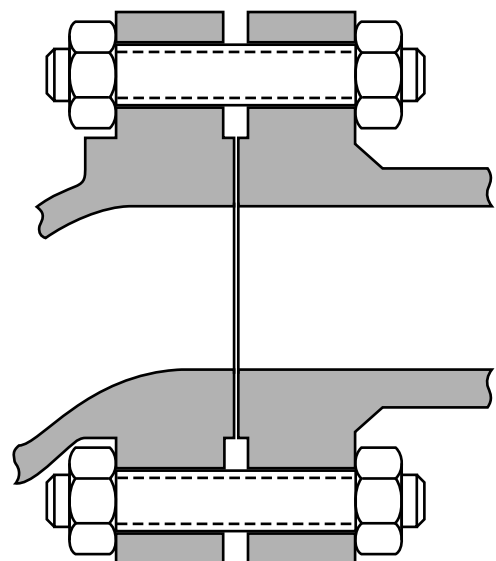
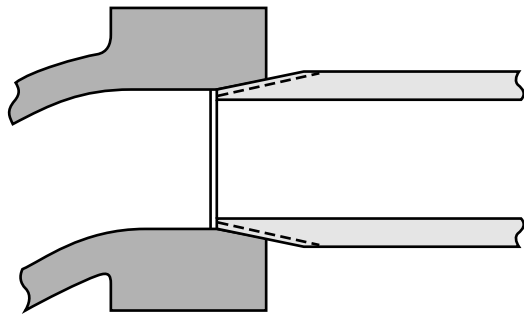
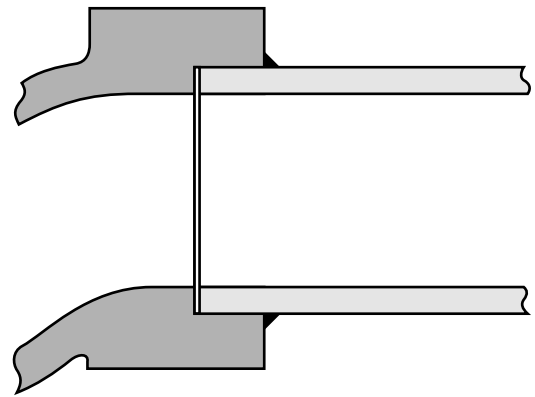


Figure 6-8: Integral Flange Connection



**Figure 6-9:
Threaded End Connection (NPT)**



**Figure 6-10:
Socketweld End Connection**

Separable Flange Material

Interchangeable separable flanges are standard for Mark One valve bodies through 4 inch in Class 150, 300 and 600 ANSI ratings, and for 6 and 8 inch bodies in Class 300 and 600. With separable end flanges, a Class 600 body can be adapted for Class 150, 300, or 600 service by simply changing to the proper end flanges.

Separable flanges are usually furnished in carbon steel for maximum cost savings, although other alloys can be specified if the atmospheric conditions or the temperature warrants it.

NOTE: Carbon steel bodies, carbon steel end and bonnet flanges should not be used when temperatures are 800 degrees Fahrenheit or greater.

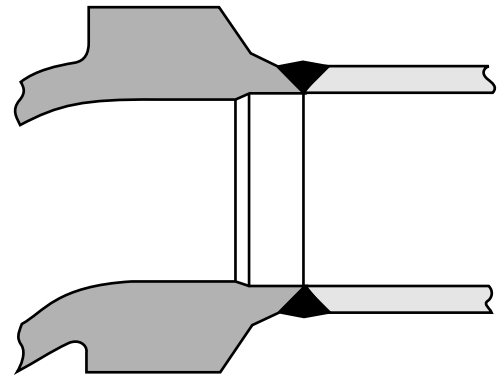


Figure 6-11: Buttweld End Connection

End Flange Dimensions

Tables 6-III thru 6-VIII provide standard dimensions for Valtek end flanges (both separable and integral) according to ANSI B16.5, 1988.

Table 6-II: End Flange Material

Body Material	Size	Class	Std. Flange Material	Opt. Flange Material
Carbon Steel	1/2 - 4	150 - 600	Carbon	Stainless
	6 - 8	300 - 600	Steel (a)	Steel (b)
Stainless Steel	1/2 - 4	150 - 600	Carbon	Stainless
	6 - 8	300 - 600	Steel (a)	Steel (b)
Alloys	1/2 - 4	150 - 600	Carbon	Stainless
	6 - 8	300 - 600	Steel (a)	Steel (b)(c)

(a) Carbon steel end flanges with zinc plated steel half rings can be used in most all corrosive applications since the flanges are not wetted by the fluid.

(b) Stainless steel flanges and half-rings are usually only necessary when atmospheric conditions or temperature limitations require stainless steel. Carbon steel will usually suffice.

(c) Optional alloys are also available.

Table 6-III: Class 150 Flange Dimensions

1	2	3	4	5	6
Nominal Pipe Size	Outside Diameter of Flange O	Drilling			
		Diameter of Bolt Circle	Diameter of Bolts Holes	Number of Bolts	Diameter of Bolts
1/2	3.50	2.38	0.62	4	1/2
3/4	3.88	2.75	0.62	4	1/2
1	4.25	3.12	0.62	4	1/2
1 1/4	4.62	3.50	0.62	4	1/2
1 1/2	5.00	3.88	0.62	4	1/2
2	6.00	4.75	0.75	4	5/8
2 1/2	7.00	5.50	0.75	4	5/8
3	7.50	6.00	0.75	4	5/8
3 1/2	8.50	7.00	0.75	8	5/8
4	9.00	7.50	0.75	8	5/8
5	10.00	8.50	0.88	8	3/4
6	11.00	9.50	0.88	8	3/4
8	13.50	11.75	0.88	8	3/4
10	16.00	14.25	1.00	12	7/8
12	19.00	17.00	1.00	12	7/8
14	21.00	18.75	1.12	12	1
16	23.50	21.25	1.12	16	1
18	25.00	22.75	1.25	16	1 1/8
20	27.50	25.00	1.25	20	1 1/8
24	32.00	29.50	1.38	20	1 1/4

Table 6-IV: Class 300 Flange Dimensions

1	2	3	4	5	6
Nominal Pipe Size	Outside Diameter of Flange O	Drilling			
		Diameter of Bolt Circle	Diameter of Bolts Holes	Number of Bolts	Diameter of Bolts
1/2	3.75	2.62	0.62	4	1/2
3/4	4.62	3.25	0.75	4	5/8
1	4.88	3.50	0.75	4	5/8
1 1/4	5.25	3.88	0.75	4	5/8
1 1/2	6.12	4.50	0.88	4	3/4
2	6.50	5.00	0.75	8	5/8
2 1/2	7.50	5.88	0.88	8	3/4
3	8.25	6.62	0.88	8	3/4
3 1/2	9.00	7.25	0.88	8	3/4
4	10.00	7.88	0.88	8	3/4
5	11.00	9.25	0.88	8	3/4
6	12.50	10.62	0.88	12	3/4
8	15.00	13.00	1.00	12	7/8
10	17.50	15.25	1.12	16	1
12	20.50	17.75	1.25	16	1 1/8
14	23.00	20.25	1.25	20	1 1/8
16	25.50	22.50	1.38	20	1 1/4
18	28.00	24.75	1.38	24	1 1/4
20	30.50	27.00	1.38	24	1 1/4
24	36.00	32.00	1.62	24	1 1/2

(Reprinted from ANSI B16.5, 1988 with permission from the American Society of Mechanical Engineers)

Table 6-V: Class 600 Flange Dimensions

1	2	3	4	5	6
Nominal Pipe Size	Outside Diameter of Flange O	Drilling			
		Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
1/2	3.75	2.62	0.62	4	1/2
3/4	4.62	3.25	0.75	4	5/8
1	4.88	3.50	0.75	4	5/8
1 1/4	5.25	3.88	0.75	4	5/8
1 1/2	6.12	4.50	0.88	4	3/4
2	6.50	5.00	0.75	8	5/8
2 1/2	7.50	5.88	0.88	8	3/4
3	8.25	6.62	0.88	8	3/4
3 1/2	9.00	7.25	1.00	8	7/8
4	10.75	8.50	1.00	8	7/8
5	13.00	10.50	1.12	8	1
6	14.00	11.50	1.12	12	1
8	16.50	13.75	1.25	12	1 1/8
10	20.00	17.00	1.38	16	1 1/4
12	22.00	19.25	1.38	20	1 1/4
14	23.75	20.75	1.50	20	1 3/8
16	27.00	23.75	1.62	20	1 1/2
18	29.25	25.75	1.75	20	1 5/8
20	32.00	28.50	1.75	24	1 5/8
24	37.00	33.00	2.00	24	1 7/8

Table 6-VII: Class 1500 Flange Dimensions

1	2	3	4	5	6
Nominal Pipe Size	Outside Diameter of Flange O	Drilling			
		Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
1/2	4.75	3.25	0.88	4	3/4
3/4	5.12	3.50	0.88	4	3/4
1	5.88	4.00	1.00	4	7/8
1 1/4	6.25	4.38	1.00	4	7/8
1 1/2	7.00	4.88	1.12	4	1
2	8.50	6.50	1.00	8	7/8
2 1/2	9.62	7.50	1.12	8	1
3	10.50	8.00	1.25	8	1 1/8
4	12.25	9.50	1.38	8	1 1/4
5	14.75	11.50	1.62	8	1 1/2
6	15.50	12.50	1.50	12	1 3/8
8	19.00	15.50	1.75	12	1 5/8
10	23.00	19.00	2.00	12	1 7/8
12	26.50	22.50	2.12	16	2
14	29.50	25.00	2.38	16	2 1/4
16	32.50	27.75	2.62	16	2 1/2
18	36.00	30.50	2.88	16	2 3/4
20	38.75	32.75	3.12	16	3
24	46.00	39.00	3.62	16	3 1/2

Table 6-VI: Class 900 Flange Dimensions

1	2	3	4	5	6
Nominal Pipe Size	Outside Diameter of Flange O	Drilling			
		Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
1/2	Use Class 1500 dimensions in these sizes				
3/4					
1					
1 1/4					
1 1/2					
2					
2 1/2					
3	9.50	7.50	1.00	8	7/8
4	11.50	9.25	1.25	8	1 1/8
5	13.75	11.00	1.38	8	1 1/4
6	15.00	12.50	1.25	12	1 1/8
8	18.50	15.50	1.50	12	1 3/8
10	21.50	18.50	1.50	16	1 3/8
12	24.00	21.00	1.50	20	1 3/8
14	25.25	22.00	1.62	20	1 1/2
16	27.75	24.25	1.75	20	1 5/8
18	31.00	27.00	2.00	20	1 7/8
20	33.75	29.50	2.12	20	2
24	41.00	35.50	2.62	20	2 1/2

Table 6-VII: Class 1500 Flange Dimensions

1	2	3	4	5	6
Nominal Pipe Size	Outside Diameter of Flange O	Drilling			
		Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
1/2	5.25	3.50	0.88	4	3/4
3/4	5.50	3.75	0.88	4	3/4
1	6.25	4.25	1.00	4	7/8
1 1/4	7.25	5.12	1.12	4	1
1 1/2	8.00	5.75	1.25	4	1 1/8
2	9.25	6.75	1.12	8	1
2 1/2	10.50	7.75	1.25	8	1 1/8
3	12.00	9.00	1.38	8	1 1/4
4	14.00	10.75	1.62	8	1 1/2
5	16.50	12.75	1.88	8	1 3/4
6	19.00	14.50	2.12	8	2
8	21.75	17.25	2.12	12	2
10	26.50	21.25	2.62	12	2 1/2
12	30.00	24.38	2.88	12	2 3/4

All dimensions are in inches

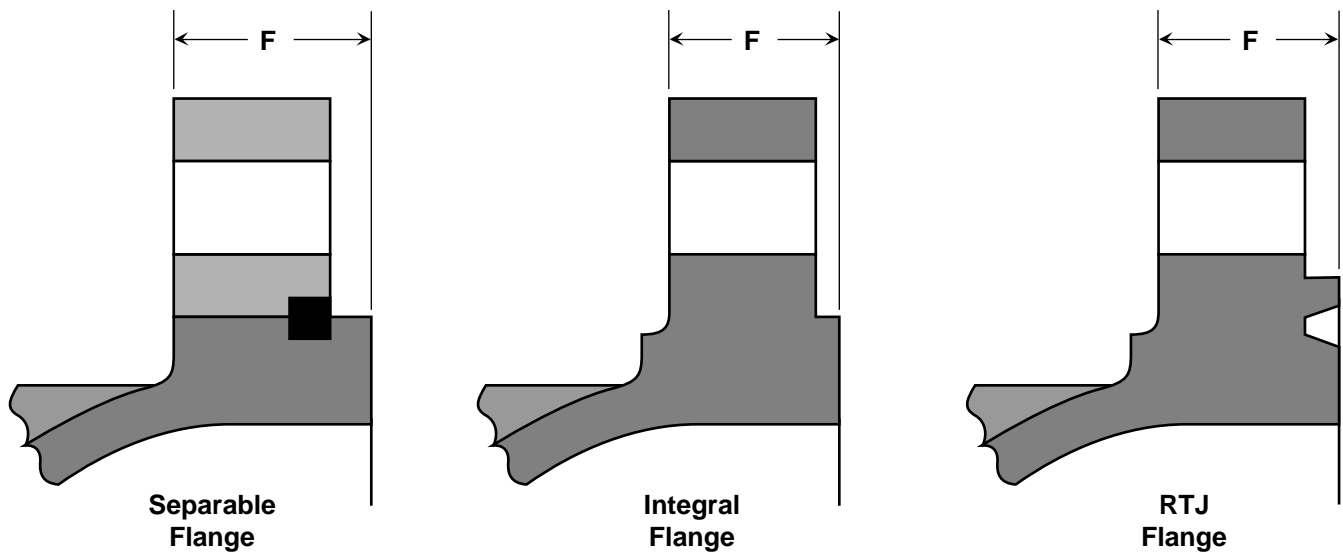


Table 6-IX: Dimension F (inches) – Valve Face to Back of Flange

Valve Size (inches)	ANSI Class														
	150			300			600			900		1500		2500	
	SEP	INT	RTJ	SEP	INT	RTJ	SEP	INT	RTJ	INT	RTJ	INT	RTJ	INT	RTJ
1/2	.88	.44		.94	.56	.78	.94	.81	.78	1.12	1.12	1.12	1.12	1.44	1.44
3/4	.91	.50		1.16	.62	.88	1.16	.88	.88	1.25	1.25	1.25	1.25	1.44	1.44
1	.91	.56	.81	1.16	.69	.94	1.16	.94	.94	1.38	1.38	1.38	1.38	1.62	1.62
1 1/2	1.03	.69	.94	1.28	.81	1.06	1.28	1.12	1.12	1.50	1.50	1.50	1.50	2.00	2.06
2	1.06	.75	1.00	1.31	.88	1.19	1.44	1.25	1.31	1.75	1.81	1.75	1.81	2.25	2.31
3	1.38	.94	1.19	1.62	1.12	1.44	1.75	1.50	1.56	1.75	1.81	2.12	2.19	2.88	3.00
4	1.44	.94	1.19	1.69	1.25	1.56	2.06	1.75	1.81	2.00	2.06	2.38	2.44	3.25	3.44
6		1.00	1.25	1.82	1.44	1.75	2.79	2.12	2.19	2.44	2.50	3.50	3.62	4.50	4.75
8		1.12	1.38	2.11	1.62	1.94	3.14	2.44	2.50	2.75	2.81	3.88	4.06	5.25	5.56
10		1.19	1.44		1.88	2.19		2.75	2.81	3.00	3.06	4.50	4.69	6.75	7.19
12		1.25	1.50		2.00	2.31		2.88	2.94	3.38	3.44	5.12	5.44	7.50	7.94
14		1.38	1.63		2.12	2.44		3.00	3.06	3.62	3.81	5.50	5.88		
16		1.44	1.69		2.25	2.56		3.25	3.31	3.75	3.94	6.00	6.44		
18		1.56	1.81		2.38	2.69		3.50	3.56	4.25	4.50	6.62	7.06		
20		1.69	1.94		2.50	2.88		3.75	3.88	4.50	4.75	7.25	7.69		
24		1.88	2.12		2.75	3.19		4.25	4.38	5.75	6.12	8.25	8.81		

Notes:

1. Integral and RTJ flange information from ANSI B16.5.
2. Separable flanges are not available in ANSI Classes 900, 1500 or 2500, valve sizes 10-inch and larger; or in valve sizes 6 and 8-inch in Class 150.