ASME B16.10-1992

(REVISION OF ASME/ANSI B16.10-1986)

Face-to-Face and End-to-End Dimensions of Valves

AN AMERICAN NATIONAL STANDARD

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The American Society of Mechanical Engineers

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The 1992 edition of this Standard is being issued with an automatic addenda subscription service. The use of an addenda allows revisions made in response to public review comments or committee actions to be published as necessary; revisions published in addenda will become effective 6 months after the Date of Issuance of the addenda. The next edition of this Standard is scheduled for publication in 1997.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. The interpretations will be included with the above addenda service. Interpretations are not part of the addenda to the Standard.

FOREWORD

(This Foreword is not part of ASME B16.10-1992.)

In 1921 the American Engineering Standards Committee, later the American Standards Association (ASA), organized Sectional Committee B16 to unify and further develop national standards for pipe flanges and fittings (and, later, for valves, gaskets, and valve actuators). Cosponsors of the B16 Committee were the American Society of Mechanical Engineers (ASME), the Heating and Piping Contractors National Association [(now the Mechanical Contractors Association of America (MCAA)], and the Manufacturers Standardization Society of the Valve and Fittings Industry (MSS). Cosponsors were later designated as cosecretariat organizations.

Pioneer work on standardization of end-to-end dimensions of valves began in 1917 under the direction of J. A. Stevens. It was put aside at the end of World War I and interest did not revive until 1926. ASA and ASME agreed to include the topic in the scope of the B16 Committee, and Subcommittee 5 (now Subcommittee E) was established for the purpose. Work began in 1928 and covered ferrous flanged-end gate, globe, angle, and check valves.

Development of a national standard was hindered by the diversity of existing practices and by adverse economic conditions in the early 1930s. A proposed 1933 American Standard for face-to-face dimensions of ferrous flanged valves did not gain acceptance, even though it was largely based on a 1931 Standard Practice of MSS. Further work and industry developments led to a meeting in May 1937, which undertook to reconcile differences among the draft ASA standard, two American Petroleum Institute (API) standards (5-G-1 on pipeline valves and 600A on flanged OS&Y steel wedge gate valves), and a newly updated MSS SP-32.

A revised B16 proposal was voted favorably in June 1938, was approved by ASA, and was published in 1939. The standard was reaffirmed in 1947. Work began on a revision in 1953 to include buttwelding end valves, plug valves, and control valves in both cast iron and steel. That edition was published as ASA B16.10-1957. Further revision was begun in 1964. After reorganization of ASA, first as the United States of America Standards Institute (USASI), then as the American National Standards Institute (ANSI), with the Sectional Committee being redesignated as an American National Standards Committee, a new edition adding ball valves was approved and published as ANSI B16.10-1973.

In 1982 American National Standards Committee B16 was reorganized as an ASME Committee operating under procedures accredited by ANSI. In the 1986 Edition, ductile iron and the alloys covered by ANSI B16.34 were added to the materials covered. Wafer type gate and check valves, Class 150 Y-pattern globe and check valves, and several patterns of butterfly valves were added to the types covered. Inch dimensions were converted from common to two-place decimal fractions.

In 1991 Subcommittee E — Face-to-Face and End-to-End Dimensions of Valves, was combined with Subcommittee N — Steel Valves. In this 1992 Edition, steel offset seat and grooved end butterfly valves were added. Globe and flangeless style control valves, which previously had been included, were removed from the Standard. Information regarding control valve dimensions may be obtained from Instrument Society of America, 67 Alexandria Drive, Research Triangle Park, North Carolina 27709.

Requests for interpretations or suggestions for revisions should be sent to the Secretary, B16 Committee, The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.

Following approval by the B16 Main Committee and the ASME Supervisory Board, this Standard was approved as an American National Standard by ANSI on December 2, 1992.

ASME B16 COMMITTEE
Standardization of Valves, Flanges, Fittings, Gaskets, and Valve Actuators

(The following is the roster of the Committee at the time of approval of this Standard.)

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CONTENTS

FACE-TO-FACE AND END-TO-END DIMENSIONS OF VALVES

1 SCOPE

1.1 General

This Standard covers face-to-face and end-to-end dimensions of straightway valves, and center-to-face and center-to-end dimensions of angle valves. Its purpose is to assure installation interchangeability for valves of a given material, type, size, rating class, and end connection. Face-to-face and center-to-face dimensions apply to flanged end valves with facings defined in paras. 2.3.1 and 2.3.2, and to other valves intended for assembly between flat face or raised face flanges. End-to-end dimensions apply to grooved end, buttwelding end, and flanged end valves with facings defined in para. 2.3.3. Center-to-end dimensions apply to buttwelding end and to flanged end valves with facings defined in para. 2.3.3.

In Tables 1 to 7, *A* or *D* in a column head denotes valves having flanged ends as illustrated; *B* or *E* denotes valves having buttwelding ends.

1.2 Standard Units

The inch is the standard for linear dimensions.[1] (For conversion to metric units, 1 in. = 25.4 mm.)

1.3 Cast Iron Valves

Only flanged end valves (and others intended for assembly between flanges) are covered by this Standard. Mating dimensions and facings of flanged ends conform to those in ASME/ANSI B16.1. Dimensional tables for various types and sizes of valves are as follows.

1.3.1 Gate, Plug, and Check Valves

Class[2] 125 — Table 1
Class 250 — Table 2
Class 800 — Table 4

1.3.2 Globe and Angle Valves

Class 125 — Table 1
Class 250 — Table 2

1.3.3 Wafer Swing Check Valves

Class 125 — Table 8
Class 250 — Table 8

1.3.4 Butterfly Valves

Class 25 — Table 9
Class 125 — Table 9

1.4 Ductile Iron Valves

Only flanged end valves (and others intended for assembly between flanges) are covered. Mating dimensions and facings of flanged ends conform to those in ASME/ANSI B16.42. Valves are rated Class 150 and Class 300. Dimensions can be found in the same tables as corresponding types of cast iron and steel valves.

1.5 Steel and Alloy Valves

This category includes carbon, alloy, and stainless steels, and the nonferrous materials listed in ASME/ANSI B16.34. It includes flanged, buttwelding, and grooved ends, as well as the types of valves intended for assembly between flanges. Mating dimensions and facings of flanged ends conform to those in ASME/ANSI B16.5, ASME B16.47, Series A or MSS SP-44. [For flanged end butterfly valves, refer to Note (3) of Table 9 for flange information.] For flangeless or wafer valves intended for assembly between flanges, refer to Tables 8 and 9 for flange information. Only

[1] Linear dimensions in this Standard are expressed using two-place decimal fractions. These values are actually common fractions of an inch rounded to the nearest two-place decimal value as follows:

0.03 = 1/32	0.44 = 7/16
0.06 = 1/16	0.50 = 1/2
0.12 = 1/8	0.56 = 9/16
0.16 = 5/32	0.62 = 5/8
0.19 = 3/16	0.69 = 11/16
0.22 = 7/32	0.75 = 3/4
0.25 = 1/4	0.88 = 7/8
0.31 = 5/16	0.94 = 15/16
0.38 = 3/8	

[2] For explanation of *Class*, see para. 2.2.

buttwelding end valves in rating classes 150 through 2500 are included in this Standard. Dimensional tables for various types and sizes of valves are as follows.

1.5.1 Gate, Globe, Angle, Check, Plug, and Ball Valves

Class 150 — Table 1
Class 300 — Table 2
Class 400 — Table 3
Class 600 — Table 4
Class 900 — Table 5
Class 1500 — Table 6
Class 2500 — Table 7

1.5.2 Y-Pattern Globe and Y-Pattern Swing Check Valves

Class 150 — Table 1

1.5.3 Wafer Knife Gate Valves

Class 150 — Table 8

1.5.4 Wafer Swing Check Valves

Classes 150 to 2500 — Table 8

1.5.5 Butterfly Valves

Class 150 — Table 9
Class 300 — Table 9
Class 600 — Table 9

1.6 Exclusions

This Standard excludes threaded and socket welding end valves, and all types of copper alloy and aluminum alloy valves.

2 DEFINITIONS

2.1 Nominal Valve Size

2.1.1 Nominal Pipe Size (NPS). The size of a valve is the corresponding nominal size of pipe in which it is used. The stated number is used for designation and is not necessarily the same as the valve inside diameter or port diameter.

2.1.2 Reduced Port Sizes. Venturi gate valves conforming to API 597 and reduced port gate and ball valves conforming to API 6D are designated for size by two numbers, the first being the NPS of the valve ends, the second being the NPS of the port (seats, moving parts, etc.); e.g., NPS 6 × 4 designates a valve of end size NPS 6 with a port to match NPS 4. These valves, conforming to the referenced API specifications, shall have face-to-face or end-to-end dimensions corresponding to valves having the same size end connections; e.g., an NPS 6 × 4 valve shall have the face-to-face or end-to-end dimensions of an NPS 6 valve.

2.2 Pressure–Temperature Rating Number

Valves are designated as one of the following classes of pressure–temperature rating numbers:

(*a*) Cast iron — Classes 25, 125, 250, 800
(*b*) Ductile iron — Classes 150, 300
(*c*) Steel[3] — Classes 150, 300, 400, 600, 900, 1500, 2500

2.3 Flanged Valve Dimensions

2.3.1 Face-to-Face. The face-to-face dimension for flanged valves is the distance between the extreme ends which are the gasket contact surfaces (see Fig. 1). Face-to-face applies to flanged valves having the following flange facings:

(*a*) flat
(*b*) 0.06 in. raised
(*c*) 0.25 in. raised
(*d*) large or small male[4]
(*e*) large or small tongue[4]

2.3.2 Installed Face-to-Face. The installed face-to-face dimension of certain butterfly valves [see Table 9, Note (1)] may include allowances for gasket or resilient-facing compression. Refer to MSS SP-67 for definitive illustrations.

2.3.3 End-to-End. For those flanged valves where the gasket contact surfaces are not located at the extreme ends of the valve, the distance between the extreme ends is described as the end-to-end dimension and applies to flanged valves having the following flange facings:

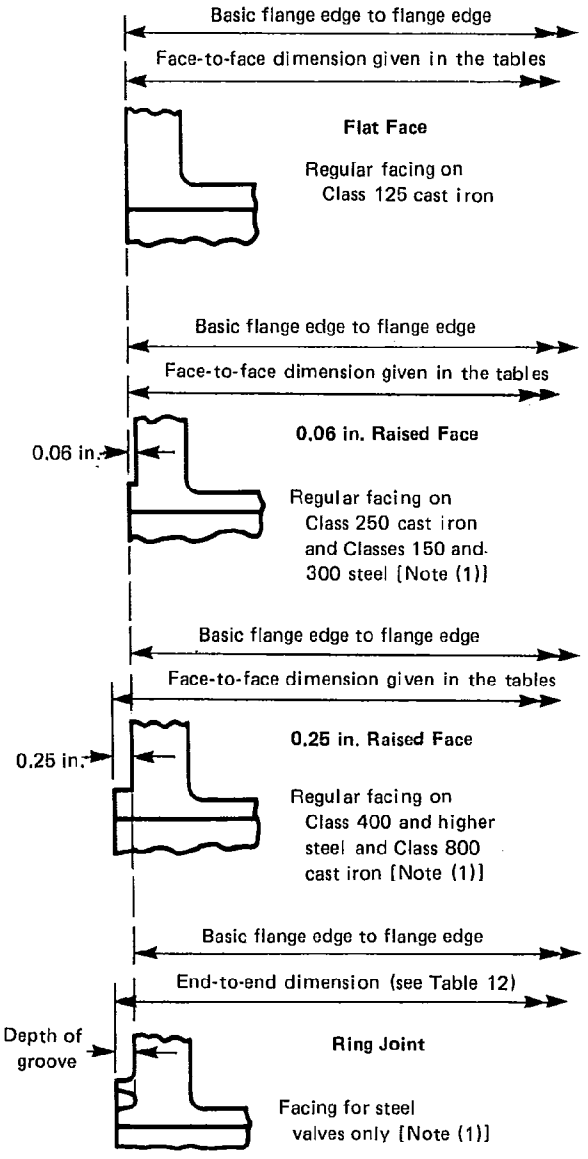
(*a*) ring joint
(*b*) large or small female
(*c*) large or small groove

2.4 Buttwelding End Valve Dimensions (Also See Section 4)

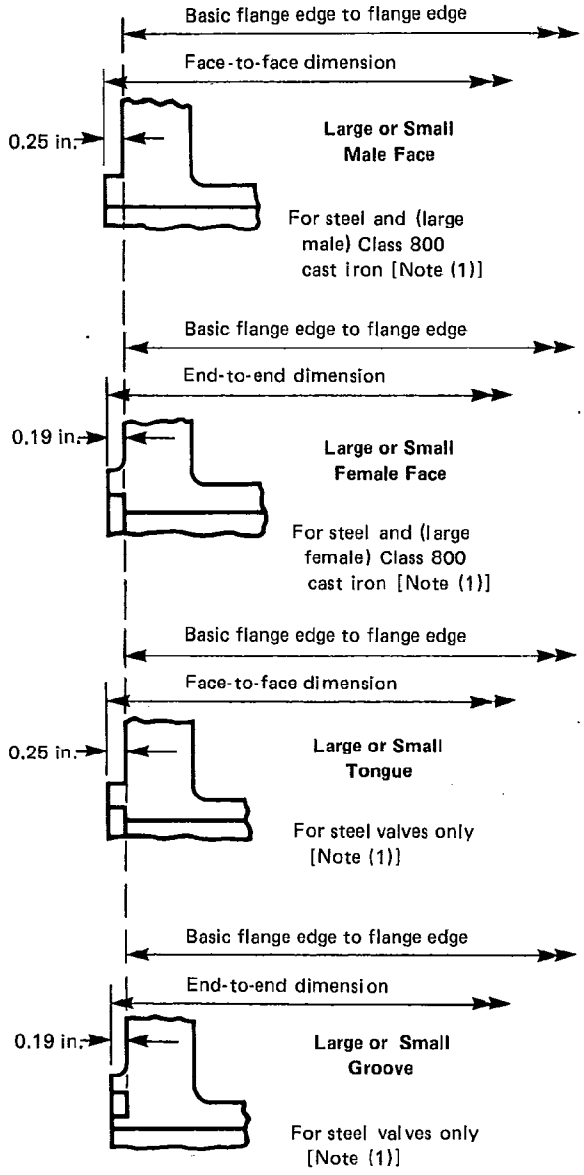
For buttwelding end valves, the end-to-end dimension is the distance between the extreme ends (root faces) of the welding bevels (see Fig. 2).

[3] Includes all ferrous and nonferrous materials in ASME/ANSI B16.34.

[4] Face-to-face dimensions in Tables 1 to 7 must be adjusted as indicated in Table 10.



(a) Regular Standard Facings



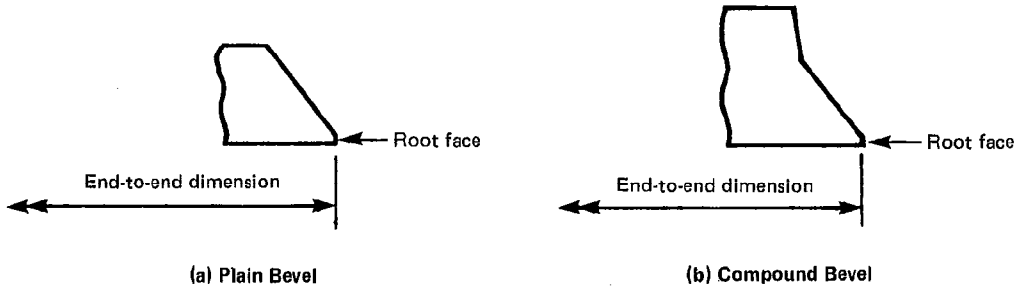
(b) Other Standard Facings

GENERAL NOTE:
Regular flange facings for valves are shown above. Valves normally carried in stock are so faced.

GENERAL NOTE:
Valves are supplied with the facings shown above when specified. See Table 10 to determine face-to-face dimensions of valves with these facings.

NOTE:
(1) Steel includes nonferrous materials in ASME/ANSI B16.34.

FIG. 1 FLANGE FACINGS AND THEIR RELATIONSHIPS



(a) Plain Bevel (b) Compound Bevel

GENERAL NOTE:
Typical bevels are shown for illustration only.

FIG. 2 WELDING ENDS

2.5 Grooved End Valve Dimensions

The end-to-end dimension for grooved end valves is the distance between extreme ends.

2.6 Angle Valves

For flanged angle type valves (those in which the ends are at an angle of 90 deg to each other), the center-to-face dimension is the distance from the centerline of the port to the extreme end which is the gasket contact surface. For flanged angle type valves in which the gasket seating surface is not located at the extreme end and for angle type valves having buttwelding ends, the phrase center-to-end denotes the distance from the centerline of the port to the extreme end.

3 FACINGS OF FLANGED VALVES

Figure 1 shows facings for flanged ends.

3.1 Facings Normally Furnished

3.1.1 Flat Face. Flanges for Classes 25 and 125 cast iron valves are flat faced.

3.1.2 0.06 in. Raised Face. Flanges for Class 250 cast iron and for Classes 150 and 300 steel valves have 0.06 in. raised faces, which are included in the face-to-face (or center-to-face) dimensions. When Classes 150 and 300 valves are required with flat faces, either the full thickness of flange or the thickness with the 0.06 in. raised face removed may be furnished, unless otherwise specified by the customer. Users are reminded that removing the 0.06 in. raised face will make the face-to-face dimension nonstandard.

3.1.3 0.25 in. Raised Face. Flanges for Class 800 cast iron and for Class 400 and higher steel valves have 0.25 in. raised faces, which are included in the face-to-face (or center-to-face) dimensions.

3.2 Other Standard Facings

Table 10 summarizes data on all flange facings and can be used with Tables 1 to 7 in calculating face-to-face and end-to-end dimensions of flanged valves having standard facings other than those described in para. 3.1.

3.3 Ring Joint Facings

The X dimension given in Table 11, when added to the face-to-face dimension of a valve having raised face flanges in Tables 1 to 7, establishes the end-to-end dimension for the valve having flanges with ring joint facings.

4 VARIATIONS OF LENGTH WITHIN A CLASS OF VALVES

4.1 Buttwelding End Valves (Also see para. 2.4)

Tables 1 to 7 include end-to-end dimensions for valves having buttwelding ends. In many cases, the dimensions are different from those of face-to-face dimensions of flanged valves, as evidenced by the differences between dimensions A and B of the tables.

4.1.1 Short Pattern

For pressure seal or flangeless bonnet valves having buttwelding ends in Class 600 and higher, the regular end-to-end dimensions shall be equal to the short pattern dimensions shown in Tables 4 to 7. At the manufacturer's option, the end-to-end dimensions of these valves may be the same as the face-to-face dimensions of raised face flanged valves.

4.1.2 Long Pattern

For flanged bonnet valves having buttwelding ends in Class 600 and higher, the regular end-to-end dimensions shall be equal to the face-to-face dimensions of raised face flanged valves shown in Tables 4 to 7. At the manufacturer's option, the end-to-end dimensions may be the same as the short pattern end-to-end dimensions.

4.2 Narrow, Wide, and Extra Wide Designations

Certain butterfly valves are designated narrow, wide, or extra wide for the purpose of consolidating a diversity of manufacturer's lengths into two or three sets of dimensions for a given size. At the manufacturer's option, any of the two or three dimensions listed for a size may be used.

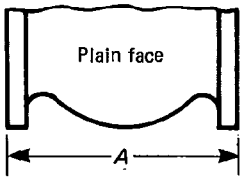
5 TOLERANCES

5.1 Straightway Valves

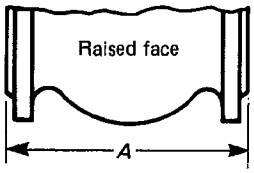
A tolerance of ±0.06 in. shall be allowed on face-to-face and end-to-end dimensions of valves of NPS 10 and smaller, and a tolerance of ±0.12 in. shall be allowed for NPS 12 and larger. For exceptions as related to wafer type and butterfly valves, see General Note (b) in Table 8 and Notes (4) and (5) in Table 9.

5.2 Angle Valves

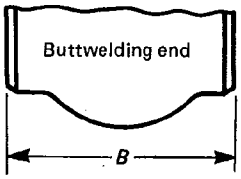
The tolerances on center-to-face and center-to-end dimensions of angle type valves shall be one-half those listed in para. 5.1.



Class 125 Cast Iron



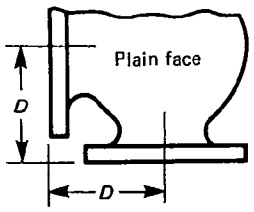
Class 150 Steel



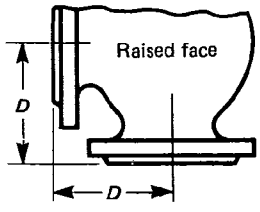
Class 150 Steel

TABLE 1 CLASS 125 CAST IRON FLANGED AND CLASS 150 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

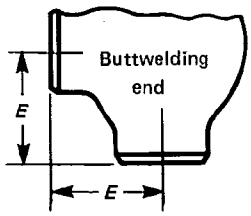
	1	2	3	4	5	6	7	8	9	10
	Class 125 Cast Iron						Class 150 Steel			
	Flanged End (Flat Face)						Flanged End (0.06 in. Raised Face) and Welding End			
		Plug					Gate			Plug
Nom. Valve Size, NPS	Gate, Solid Wedge and Double Disc *A*	Short Pattern *A*	Regular and Venturi Pattern *A*	Round Port, Full Bore *A*	Globe, Lift Check, and Swing Check (1) *A*	Angle and Lift Check *D*	Solid Wedge and Double Disc *A*	Conduit *A*	Solid Wedge, Double Disc, and Conduit *B*	Short Pattern *A*
1/4	...	...	...	...	...	...	4.00	...	4.00	...
3/8	...	...	...	...	...	...	4.00	...	4.00	...
1/2	...	...	...	...	...	...	4.25	...	4.25	...
3/4	...	...	...	...	...	...	4.62	...	4.62	...
1	...	5.50	5.50 (3)	5.50	...	...	5.00	...	5.00	5.50
1 1/4	...	...	6.50 (3)	6.00	...	...	5.50	...	5.50	...
1 1/2	...	6.50	6.50 (3)	6.50	...	...	6.50	...	6.50	6.50
2	7.00	7.00	7.50 (3)	7.50	8.00	4.00	7.00	7.00	8.50	7.00
2 1/2	7.50	7.50	8.25 (3)	8.25	8.50	4.25	7.50	7.50	9.50	7.50
3	8.00	8.00	9.00 (3)	9.00	9.50	4.75	8.00	8.00	11.12	8.00
4	9.00	9.00	9.00 (3)	12.00	11.50	5.75	9.00	9.00	12.00	9.00
5	10.00	10.00	14.00 (3)	15.00	13.00	6.50	10.00	...	15.00	10.00
6	10.50	10.50	15.50	18.00	14.00	7.00	10.50	10.50	15.88	10.50
8	11.50	11.50	18.00	22.00	19.50	9.75	11.50	11.50	16.50	11.50
10	13.00	13.00	21.00	26.00	24.50	12.25	13.00	13.00	18.00	13.00
12	14.00	14.00	24.00	30.00	27.50	13.75	14.00	14.00	19.75	14.00
14	15.00 (2)	...	27.00	...	31.00	15.50	15.00	15.00	22.50	...
16	16.00 (2)	...	30.00	...	36.00 (5)	18.00	16.00	16.00	24.00	...
18	17.00 (2)	...	34.00	...	...	...	17.00	17.00	26.00	...
20	18.00 (2)	...	36.00	...	...	...	18.00	18.00	28.00	...
22	...	...	...	...	...	...	...	20.00	30.00	...
24	20.00 (2)	...	42.00 (4)	...	...	...	20.00	20.00	32.00	...
26	...	...	...	...	...	...	22.00	22.00	34.00 (6)	...
28	...	...	...	...	...	...	24.00	24.00	36.00 (6)	...
30	...	...	51.00 (4)				24.00	26.00	36.00 (6)	...
32	...	...	...	...	...	...	...	28.00	38.00 (6)	...
34	...	...	...	...	...	...	...	30.00	40.00 (6)	40.00
36	...	...	63.00 (4)				28.00	32.00	40.00 (6)	...



Class 125 Cast Iron



Class 150 Steel



Class 150 Steel

TABLE 1 CLASS 125 CAST IRON FLANGED AND CLASS 150 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

	11	12	13	14	15	16	17	18	19	20	21
	Class 150 Steel										
	Flanged End (0.06 in. Raised Face) and Welding End							Flanged End		Welding End	
	Plug							Ball			
Nom. Valve Size, NPS	Regular Pattern *A*	Short and Regular Pattern *B*	Venturi Pattern *A*	Round Port, Full Bore *A*	Globe, Lift Check, and Swing Check (1) *A* and *B*	Angle and Lift Check *D* and *E*	Y-Globe and Y-Swing Check *A* and *B*	Long Pattern *A*	Short Pattern *A*	Long Pattern *B*	Short Pattern *B*
1/4	...	...	...	...	4.00	2.00	...	...	...	...	...
3/8	...	...	...	...	4.00	2.00	...	...	...	...	...
1/2	...	...	...	...	4.25	2.25	5.50	4.25	4.25	...	5.50
3/4	...	...	...	...	4.62	2.50	6.00	4.62	4.62	...	6.00
1	...	...	...	7.00	5.00	2.75	6.50	5.00	5.00	...	6.50
1 1/4	...	...	...	...	5.50	3.00	7.25	5.50	5.50	...	7.00
1 1/2	...	...	...	8.75	6.50	3.25	8.00	6.50	6.50	7.50	7.50
2	...	10.50	7.00	10.50	8.00	4.00	9.00	7.00	7.00	8.50	8.50
2 1/2	...	12.00	...	11.75	8.50	4.25	11.00	7.50	7.50	9.50	9.50
3	...	13.00	8.00	13.50	9.50	4.75	12.50	8.00	8.00	11.12	11.12
4	12.00	14.00	9.00	17.00	11.50	5.75	14.50	9.00	9.00	12.00	12.00
5	15.00	15.00	...	...	14.00 (7)	7.00	...	...	...	...	...
6	15.50	18.00	15.50	...	16.00 (7)	8.00	18.50	15.50	10.50	18.00	15.88
8	18.00	20.50	18.00	...	19.50	9.75	23.50	18.00	11.50	20.50	16.50
10	21.00	22.00	21.00	...	24.50	12.25	26.50	21.00	13.00	22.00	18.00
12	24.00	25.00	24.00	...	27.50	13.75	30.50	24.00	14.00	25.00	19.75
14	27.00	...	27.00	...	31.00	15.50	...	27.00	15.00	30.00	22.50
16	30.00	...	30.00	...	36.00 (8)	18.00	...	30.00	16.00	33.00	24.00
18	34.00	...	34.00	...	38.50 (9)	...	...	34.00	...	36.00	26.00
20	36.00	...	36.00	...	38.50 (9)	...	...	36.00	...	39.00	28.00
22	...	...	...	...	42.00 (9)	...	...	...	...	43.00	...
24	42.00	...	42.00	...	51.00 (9)	...	...	42.00	...	45.00	32.00
26	...	...	...	...	51.00 (9)	...	...	...	...	49.00	...
28	...	...	...	...	57.00 (9)	...	...	...	...	53.00	...
30	...	...	...	...	60.00 (9)	...	...	...	...	55.00	...
32	...	...	...	...	...	...	...	...	...	60.00	...
34	...	...	...	...	...	...	...	...	...	64.00	...
36	...	...	...	...	77.00 (9)	...	...	...	...	68.00	...

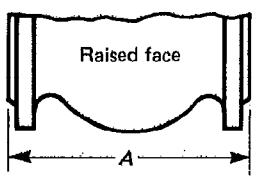
(See Notes on p. 8)

TABLE 1 (CONT'D)

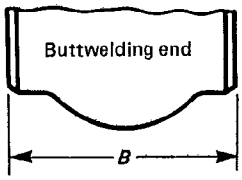
GENERAL NOTES:
(a) Dimensions are in inches.
(b) See Table 10 for adjustments to tabulated dimensions which may be required for certain flange facings.

NOTES:
(1) These dimensions are not intended to cover the type of check valve having the seat angle at approximately 45 deg to the run of the valve, or the "Underwriter Pattern," or other patterns where large clearances are required.
(2) Solid wedge only.
(3) Regular pattern only. The face-to-face dimension of NPS 4 may be 12.00 at the manufacturer's option.
(4) Venturi pattern only.
(5) Globe and horizontal lift check only.
(6) Double disc and conduit only.
(7) Globe and horizontal lift check only. The face-to-face and end-to-end dimension for Class 150 steel flanged and buttwelding end swing check valves in NPS 5 is 13.00 and in NPS 6 is 14.00.
(8) Globe and horizontal lift check only. The face-to-face and end-to-end dimension for Class 150 steel flanged and buttwelding end swing check valves in NPS 16 is 34.00.
(9) Swing check only.

Table 2 begins on next page.



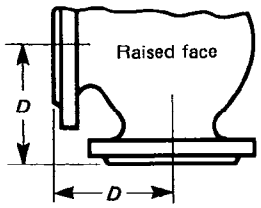
Class 250 Cast Iron and Class 300 Steel



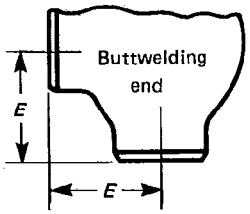
Class 300 Steel

TABLE 2 CLASS 250 CAST IRON FLANGED AND CLASS 300 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

	1	2	3	4	5	6	7	8	9
	Class 250 Cast Iron						Class 300 Steel		
	Flanged End (0.06 in. Raised Face)						Flanged and Welding End		
		Plug					Ball		
Nom. Valve Size, NPS	Gate, Solid Wedge and Double Disc *A*	Short Pattern *A*	Regular Pattern *A*	Venturi Pattern *A*	Globe, Lift Check, and Swing Check *A*	Angle and Lift Check *D*	Long Pattern *A*	Short Pattern *A* and *B*	Long Pattern *B*
1/2	...	...	...	...	...	...	5.50	5.50	...
3/4	...	...	...	...	...	...	6.00	6.00	...
1	...	...	6.25	...	...	...	6.50	6.50	...
1 1/4	...	...	...	...	...	...	7.00	7.00	...
1 1/2	...	...	7.50	...	...	...	7.50	7.50	7.50
2	8.50	7.25	8.50	...	10.50	5.25	8.50	8.50	8.50
2 1/2	9.50	8.00	9.50	...	11.50	5.75	9.50	9.50	9.50
3	11.12	9.25	11.12	...	12.50	6.25	11.12	11.12	11.12
4	12.00	10.50	12.00	...	14.00	7.00	12.00	12.00	12.00
5	15.00	...	15.25	...	15.75	7.88	...	...	...
6	15.88	14.88	16.75	15.88	17.50	8.75	15.88	15.88	18.00
8	16.50	...	19.75	16.50	21.00	10.50	19.75	16.50	20.50
10	18.00	22.38	23.50	18.00	24.50	12.25	22.38	18.00	22.00
12	19.75	25.50	28.00	19.75	28.00	14.00	25.50	19.75	25.00
14	22.50	...	...	30.00	...	...	30.00	22.50	30.00
16	24.00	...	...	33.00	...	...	33.00	24.00	33.00
18	26.00	...	...	36.00	...	...	36.00	26.00	36.00
20	28.00	...	...	39.00	...	...	39.00	28.00	39.00
22	...	...	...	44.00	...	...	43.00	...	43.00
24	31.00	...	...	45.00	...	...	45.00	32.00	45.00
26	...	...	...	...	...	...	49.00	...	49.00
28	...	...	...	...	...	...	53.00	...	53.00
30	...	...	...	...	...	...	55.00	...	55.00
32	...	...	...	...	...	...	60.00	...	60.00
34	...	...	...	...	...	...	64.00	...	64.00
36	...	...	...	...	...	...	68.00	...	68.00



Class 250 Cast Iron and Class 300 Steel



Class 300 Steel

TABLE 2 CLASS 250 CAST IRON FLANGED AND CLASS 300 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

	10	11	12	13	14	15	16	17
	Class 300 Steel							
	Flanged End (0.06 in. Raised Face) and Welding End							
Nom. Valve Size, NPS	Gate, Solid Wedge, Double Disc, and Conduit *A* and *B*	Plug				Globe and Lift Check *A* and *B*	Angle and Lift Check *D* and *E*	Swing Check *A* and *B*
		Short and Venturi Pattern *A*	Short and Venturi Pattern *B*	Regular Pattern *A*	Round Port, Full Bore *A* and *B*			
1/2	5.50 (1)	...	...	...	...	6.00	3.00	...
3/4	6.00 (1)	...	...	...	...	7.00	3.50	...
1	6.50 (1)	6.25 (2)	...	...	7.50	8.00	4.00	8.50
1 1/4	7.00 (1)	...	...	...	...	8.50	4.25	9.00
1 1/2	7.50	7.50 (2)	...	...	9.50	9.00	4.50	9.50
2	8.50	8.50	10.50 (2)	...	11.12	10.50	5.25	10.50
2 1/2	9.50	9.50	12.00 (2)	...	13.00	11.50	5.75	11.50
3	11.12	11.12	13.00 (2)	...	15.25	12.50	6.25	12.50
4	12.00	12.00	14.00 (2)	...	18.00	14.00	7.00	14.00
5	15.00	...	...	...	...	15.75	7.88	15.75
6	15.88	15.88	18.00	15.88	22.00	17.50	8.75	17.50
8	16.50	16.50	20.50	19.75	27.00	22.00	11.00	21.00
10	18.00	18.00	22.00	22.38	32.50	24.50	12.25	24.50
12	19.75	19.75	25.00	28.00	38.00	28.00	14.00	28.00
14	30.00	30.00 (3)	30.00 (3)	30.00	...	...	...	33.00
16	33.00	33.00 (3)	33.00 (3)	33.00	...	...	...	34.00
18	36.00	36.00 (3)	36.00 (3)	36.00	...	...	...	38.50
20	39.00	39.00 (3)	39.00 (3)	39.00	...	...	...	40.00
22	43.00	43.00 (3)	43.00 (3)	43.00	...	...	...	44.00
24	45.00	45.00 (3)	45.00 (3)	45.00	...	...	...	53.00
26	49.00	49.00 (3)	49.00 (3)	49.00	...	...	...	53.00
28	53.00	53.00 (3)	53.00 (3)	53.00	...	...	...	59.00
30	55.00	55.00 (3)	55.00 (3)	55.00	...	...	...	62.75
32	60.00	60.00 (3)	60.00 (3)	60.00	...	...	...	...
34	64.00	64.00 (3)	64.00 (3)	64.00	...	...	...	...
36	68.00	68.00 (3)	68.00 (3)	68.00	...	...	...	82.00

(See Notes on p. 12)

TABLE 2 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) See Table 10 for adjustments to tabulated dimensions which may be required for certain flange facings.

NOTES:
(1) Solid wedge only.
(2) Plug — short pattern only.
(3) Venturi pattern only.

Table 3 begins on next page.

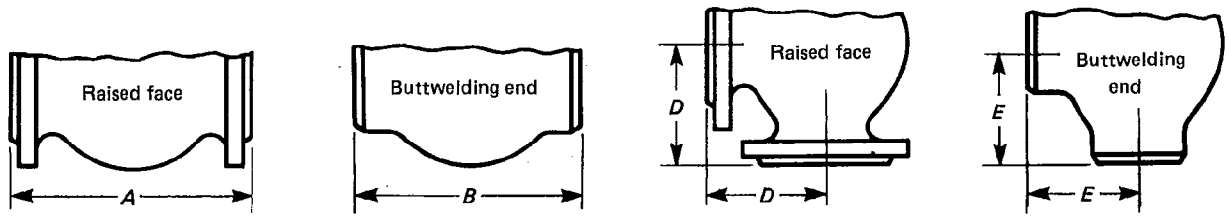


TABLE 3 CLASS 400 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

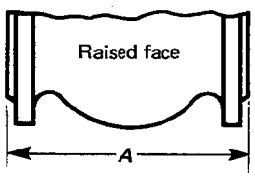
Nominal Valve Size, NPS	1	2	3	4	5	6	7
	Class 400 Steel						
	Flanged End (0.25 in. Raised Face) and Welding End						
		Plug					Ball
	Gate, Solid Wedge, Double Disc, and Conduit *A* and *B*	Regular and Venturi Pattern *A* and *B*	Round Port, Full Bore *A*	Round Port, Full Bore *B*	Globe, Lift Check, and Swing Check *A* and *B*	Angle and Lift Check *D* and *E*	Long Pattern *A* and *B*
1/2 (1)	6.50 (2)	...	...	...	6.50	3.25	6.50
3/4 (1)	7.50 (2)	...	...	...	7.50	3.75	7.50
1 (1)	8.50	8.50 (4)	10.00	...	8.50	4.25	8.50
1 1/4 (1)	9.00	9.00 (4)	...	...	9.00	4.50	9.00
1 1/2 (1)	9.50	9.50 (4)	12.50	...	9.50	4.75	9.50
2 (1)	11.50	11.50 (4)	13.00	...	11.50	5.75	11.50
2 1/2 (1)	13.00	13.00 (4)	15.00	...	13.00	6.50	13.00
3 (1)	14.00	14.00 (4)	17.50	...	14.00	7.00	14.00
4	16.00	16.00 (4)	19.00	22.00	16.00	8.00	16.00
5	18.00	...	...	...	18.00	9.00	...
6	19.50	19.50	24.00	28.00	19.50	9.75	19.50
8	23.50	23.50	29.00	33.25	23.50	11.75	23.50
10	26.50	26.50	35.00	35.00	26.50	13.25	26.50
12	30.00	30.00	40.00	40.00	30.00	15.00	30.00
14	32.50	32.50	...	...	35.00 (6)	...	32.50
16	35.50	35.50	...	...	35.50 (6)	...	35.50
18	38.50	38.50 (5)	...	...	40.00 (6)	...	38.50
20	41.50	41.50 (5)	...	...	41.50 (6)	...	41.50
22	45.00	45.00 (5)	...	...	45.00 (6)	...	45.00
24	48.50	48.50 (5)	...	...	55.00 (6)	...	48.50
26	51.50 (3)	51.50 (5)	...	...	55.00 (6)	...	51.50
28	55.00 (3)	55.00 (5)	...	...	63.00 (6)	...	55.00
30	60.00 (3)	60.00 (5)	...	...	65.00 (6)	...	60.00
32	65.00 (3)	65.00 (5)	...	...	...	...	65.00
34	70.00 (3)	70.00 (5)	...	...	...	...	70.00
36	74.00 (3)	74.00 (5)	...	...	82.00 (6)	...	74.00

(See Notes on p. 15)

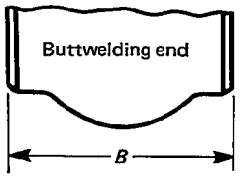
TABLE 3 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) See Table 10 for adjustments to tabulated dimensions which may be required for certain flange facings.

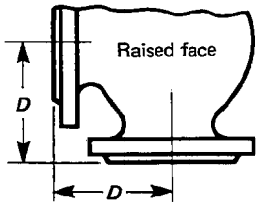
NOTES:
(1) The face-to-face dimensions and connecting end flanges for Class 400 valves, NPS 3 and smaller, are identical with those for Class 600 valves.
(2) Solid wedge only.
(3) Double disc and conduit only.
(4) Regular pattern only.
(5) Venturi pattern only.
(6) Swing check only.



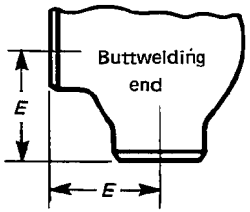
Class 800 Cast Iron and Class 600 Steel



Class 600 Steel



Class 800 Cast Iron and Class 600 Steel



Class 600 Steel

TABLE 4 CLASS 800 CAST IRON FLANGED AND CLASS 600 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13
	Class 800 Cast Iron			Class 600 Steel									
	Flanged End (0.25 in. Raised Face)			Flanged End (0.25 in. Raised Face) and Welding End									
				Ball	Gate		Plug						
Nom. Valve Size, NPS	Gate, Solid Wedge and Double Disc *A*	Plug *A*	Swing Check *A*	Long Pattern *A* and *B*	Solid Wedge, Double Disc, and Conduit, Long Pattern *A* and *B*	Short Pattern (1) *B*	Regular and Venturi Pattern *A* and *B*	Round Bore, Full Port *A*	Round Bore, Full Port *B*	Globe, Lift Check, and Swing Check, Long Pattern *A* and *B*	Globe, Lift Check, and Swing Check, Short Pattern (1) *B*	Angle and Lift Check, Long Pattern *D* and *E*	Angle and Lift Check, Short Pattern (1) *E*
1/2	...	...	...	6.50	6.50 (2)	...	...	...	...	6.50	...	3.25	...
3/4	...	...	...	7.50	7.50 (2)	...	...	...	...	7.50	...	3.75	...
1	...	...	...	8.50	8.50	5.25	8.50 (4)	10.00	...	8.50	5.25	4.25	...
1 1/4	...	...	...	9.00	9.00	5.75	9.00 (4)	...	...	9.00	5.75	4.50	...
1 1/2	...	...	...	9.50	9.50	6.00	9.50	12.50	...	9.50	6.00	4.75	...
2	11.50	11.50	11.50	11.50	11.50	7.00	11.50	13.00	...	11.50	7.00	5.75	4.25
2 1/2	13.00	13.00	13.00	13.00	13.00	8.50	13.00	15.00	...	13.00	8.50	6.50	5.00
3	14.00	14.00	14.00	14.00	14.00	10.00	14.00	17.50	...	14.00	10.00	7.00	6.00
4	17.00	17.00	17.00	17.00	17.00	12.00	17.00	20.00	22.00	17.00	12.00	8.50	7.00
5	...	...	...	...	20.00	15.00	...	...	...	20.00	15.00	10.00	8.50

TABLE 4 CLASS 800 CAST IRON FLANGED AND CLASS 600 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS (CONT'D)

	1	2	3	4	5	6	7	8	9	10	11	12	13
	Class 800 Cast Iron			Class 600 Steel									
	Flanged End (0.25 in. Raised Face)			Flanged End (0.25 in. Raised Face) and Welding End									
				Ball	Gate		Plug						
Nom. Valve Size, NPS	Gate, Solid Wedge and Double Disc *A*	Plug *A*	Swing Check *A*	Long Pattern *A* and *B*	Solid Wedge, Double Disc, and Conduit, Long Pattern *A* and *B*	Short Pattern (1) *B*	Regular and Venturi Pattern *A* and *B*	Round Bore, Full Port *A*	Round Bore, Full Port *B*	Globe, Lift Check, and Swing Check, Long Pattern *A* and *B*	Globe, Lift Check, and Swing Check, Short Pattern (1) *B*	Angle and Lift Check, Long Pattern *D* and *E*	Angle and Lift Check, Short Pattern (1) *E*
6	22.00	22.00	22.00	22.00	22.00	18.00	22.00	26.00	28.00	22.00	18.00	11.00	10.00
8	26.00	26.00	26.00	26.00	26.00	23.00	26.00	31.25	33.25	26.00	23.00	13.00	...
10	31.00	31.00	31.00	31.00	31.00	28.00	31.00	37.00	40.00	31.00	28.00	15.50	...
12	33.00	33.00	33.00	33.00	33.00	32.00	33.00	42.00	42.00	33.00	32.00	16.50	...
14	...	...	...	35.00	35.00	35.00	35.00	...	...	35.00 (6)	...	...	...
16	...	...	...	39.00	39.00	39.00	39.00	...	...	39.00 (6)	...	...	...
18	...	...	...	43.00	43.00	43.00	43.00 (5)	...	...	43.00 (6)	...	...	...
20	...	...	...	47.00	47.00	47.00	47.00 (5)	...	...	47.00 (6)	...	...	...
22	...	...	...	51.00	51.00	...	51.00 (5)	...	...	51.00 (6)	...	...	...
24	...	...	...	55.00	55.00	55.00	55.00 (5)	...	...	55.00 (6)	...	...	...
26	...	...	...	57.00	57.00	...	57.00 (5)	...	...	57.00 (6)	...	...	...
28	...	...	...	61.00	61.00	...	...	...	...	63.00 (6)	...	...	...
30	...	...	...	65.00	65.00	...	65.00 (5)	...	...	65.00 (6)	...	...	...
32	...	...	...	70.00	70.00 (3)	...	70.00 (5)	...	...	...	...	...	...
34	...	...	...	76.00	76.00 (3)	...	76.00 (5)	...	...	...	...	...	...
36	...	...	...	82.00	82.00 (3)	...	82.00 (5)	...	...	82.00 (6)	...	...	...

GENERAL NOTES:
(a) Dimensions are in inches.
(b) See Table 10 for adjustments to tabulated dimensions which may be required for certain flange fittings.

NOTES:
(1) These dimensions apply to pressure seal or flangeless bonnet valves. They may be applied at the manufacturer's option to valves with flanged bonnets.
(2) Solid wedge only.
(3) Double disc and conduit only.
(4) Regular pattern only.
(5) Venturi pattern only.
(6) Swing check only.

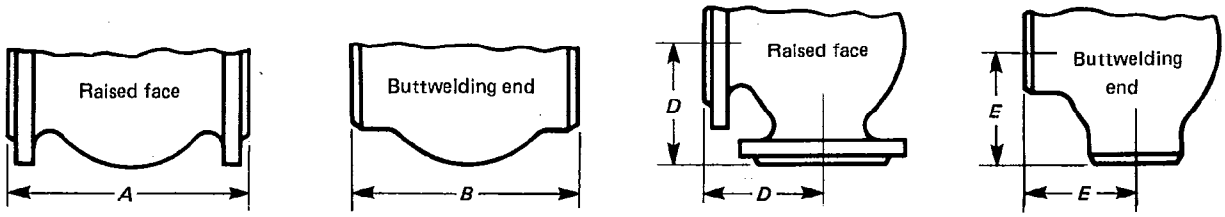


TABLE 5 CLASS 900 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

	1	2	3	4	5	6	7	8	9
	Class 900 Steel Valves								
	Flanged End (0.25 in. Raised Face) and Welding End								
	Gate		Plug						Ball
Nom. Valve Size, NPS	Solid Wedge, Double Disc, and Conduit, Long Pattern *A* and *B*	Short Pattern (1) *B*	Regular and Venturi Pattern *A* and *B*	Round Port, Full Bore *A*	Globe, Lift Check, and Swing Check, Long Pattern *A* and *B*	Globe, Lift Check, and Swing Check, Short Pattern (1) *B*	Angle and Lift Check, Long Pattern *D* and *E*	Angle and Lift Check, Short Pattern (1) *E*	Long Pattern *A* and *B*
3/4 (2)	...	...	...	...	9.00	...	4.50	...	...
1 (2)	10.00 (3)	5.50	10.00 (4)	...	10.00	...	5.00	...	10.00
1 1/4 (2)	11.00 (3)	6.50	11.00 (4)	...	11.00	...	5.50	...	11.00
1 1/2 (2)	12.00 (3)	7.00	12.00 (4)	14.00	12.00	...	6.00	...	12.00
2 (2)	14.50	8.50	14.50 (4)	15.00	14.50	...	7.25	...	14.50
2 1/2 (2)	16.50	10.00	16.50 (4)	17.00	16.50	10.00	8.25	...	16.50
3	15.00	12.00	15.00 (4)	18.50	15.00	12.00	7.50	6.00	15.00
4	18.00	14.00	18.00 (5)	22.00	18.00	14.00	9.00	7.00	18.00
5	22.00	17.00	...	...	22.00	17.00	11.00	8.50	...
6	24.00	20.00	24.00	29.00	24.00	20.00	12.00	10.00	24.00
8	29.00	26.00	29.00	32.00	29.00	26.00	14.50	13.00	29.00
10	33.00	31.00	33.00	38.00	33.00	31.00	16.50	15.50	33.00
12	38.00	36.00	38.00	44.00	38.00	36.00	19.00	18.00	38.00
14	40.50	39.00	...	...	40.50	39.00	20.25	19.50	40.50
16	44.50	43.00	44.50 (5)	...	44.50 (6)	43.00	26.00	...	44.50
18	48.00	...	...	...	48.00 (6)	...	29.00	...	48.00
20	52.00	...	52.00 (5)	...	52.00 (6)	...	32.50	...	52.00
22	...	...	...	...	...	...	...	...	...
24	61.00	...	...	...	61.00 (6)	...	39.00	...	61.00

(See Notes on p. 19)

TABLE 5 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) See Table 10 for adjustments to tabulated dimensions which may be required for certain flange facings.

NOTES:
(1) These dimensions apply to pressure seal or flangeless bonnet valves. They may be applied at the manufacturer's option to valves with flanged bonnets.
(2) The connecting end flanges for Class 900 valves, NPS 2½ and smaller, are identical to those of Class 1500 valves. The face-to-face dimensions for all Class 900 valves, NPS 2½ and smaller, except round port full bore plug valves (column 4), are identical with those of Class 1500 valves.
(3) Solid wedge only.
(4) Regular pattern only.
(5) Venturi pattern only.
(6) Swing check only.

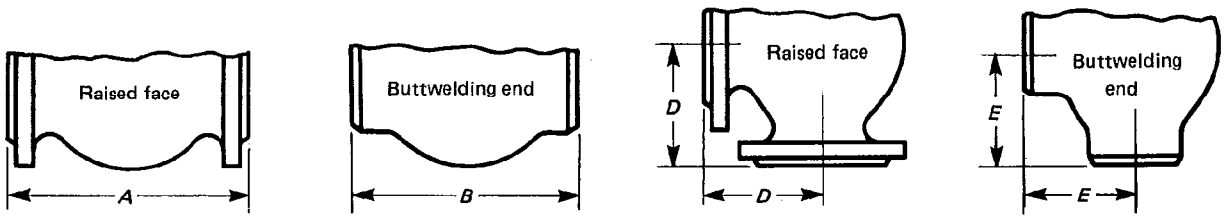


TABLE 6 CLASS 1500 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

Nom. Valve Size, NPS	1	2	3	4	5	6	7	8
	Class 1500 Steel							
	Flanged End (0.25 in. Raised Face) and Welding End							
	Gate		Plug					Ball
	Solid Wedge, Double Disc, and Conduit, Long Pattern *A* and *B*	Short Pattern (1) *B*	Regular and Venturi Pattern *A* and *B*	Round Port, Full Bore *A*	Globe, Lift Check, and Swing Check, Long Pattern *A* and *B*	Globe, Lift Check, and Swing Check, Short Pattern (1) *B*	Angle and Lift Check, Long Pattern *D* and *E*	Long Pattern *A* and *B*
½	...	...	...	...	8.50 (5)	...	4.25	...
¾	...	...	...	...	9.00	...	4.50	...
1	10.00 (2)	5.50	10.00 (3)	...	10.00	...	5.00	...
1¼	11.00 (2)	6.50	11.00 (3)	...	11.00	...	5.50	...
1½	12.00 (2)	7.00	12.00 (3)	...	12.00	...	6.00	...
2	14.50	8.50	14.50 (3)	15.38	14.50	8.50	7.25	14.50
2½	16.50	10.00	16.50 (3)	17.88	16.50	10.00	8.25	16.50
3	18.50	12.00	18.50 (3)	20.62	18.50	12.00	9.25	18.50
4	21.50	16.00	21.50 (3)	24.62	21.50	16.00	10.75	21.50
5	26.50	19.00	...	...	26.50	19.00	13.25	...
6	27.75	22.00	27.75	31.00	27.75	22.00	13.88	27.75
8	32.75	28.00	32.75	35.00	32.75	28.00	16.38	32.75
10	39.00	34.00	39.00	42.00	39.00	34.00	19.50	39.00
12	44.50	39.00	44.50	48.00	44.50	39.00	22.25	44.50
14	49.50	42.00	...	...	49.50	42.00	24.75	49.50
16	54.50	47.00	54.50 (4)	...	54.50 (6)	47.00	...	54.50
18	60.50	53.00	...	...	60.50 (6)	...	...	...
20	65.50	58.00	...	...	65.50 (6)	...	...	...
22	...	...	...	...	...	...	...	...
24	76.50	...	...	...	76.50 (6)	...	...	...

(See Notes on p. 21)

TABLE 6 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) See Table 10 for adjustments to tabulated dimensions which may be required for certain flange facings.

NOTES:
(1) These dimensions apply to pressure seal or flangeless bonnet valves. They may be applied at the manufacturer's option to valves with flanged bonnets.
(2) Solid wedge only.
(3) Regular pattern only.
(4) Venturi pattern only.
(5) Globe and lift check only.
(6) Swing check only.

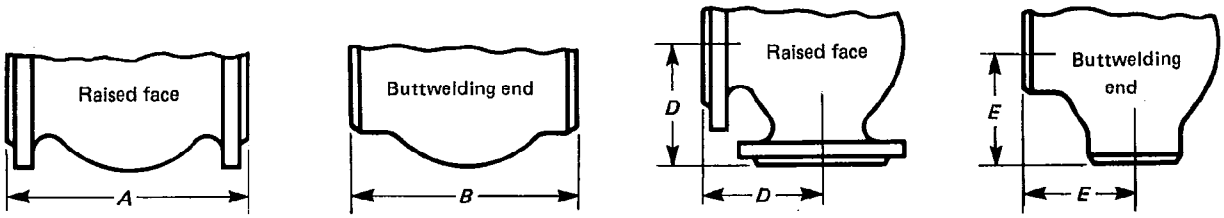


TABLE 7 CLASS 2500 STEEL FLANGED AND BUTTWELDING END VALVES, FACE-TO-FACE AND END-TO-END DIMENSIONS

Nominal Valve Size, NPS	1	2	3	4	5	6	7
	Class 2500 Steel						
	Flanged End (0.25 in. Raised Face) and Welding End						
	Gate						Ball
	Solid Wedge and Double Disc, Long Pattern *A* and *B*	Short Pattern (1) *B*	Plug, Regular Pattern *A* and *B*	Globe, Lift Check, and Swing Check, Long Pattern *A* and *B*	Globe, Lift Check, and Swing Check, Short Pattern (1) *B*	Angle and Lift Check, Long Pattern *D* and *E*	Long Pattern *A* and *B*
1/2	10.38 (2)	...	...	10.38	...	5.19	...
3/4	10.75 (2)	...	...	10.75	...	5.38	...
1	12.12 (2)	7.31	12.12	12.12	...	6.06	...
1 1/4	13.75 (2)	9.12	...	13.75	...	6.88	...
1 1/2	15.12 (2)	9.12	15.12	15.12	...	7.56	...
2	17.75	11.00	17.75	17.75	11.00	8.88	17.75
2 1/2	20.00	13.00	20.00	20.00	13.00	10.00	20.00
3	22.75	14.50	22.75	22.75	14.50	11.38	22.75
4	26.50	18.00	26.50	26.50	18.00	13.25	26.50
5	31.25	21.00	31.25	31.25	21.00	15.62	...
6	36.00	24.00	36.00	36.00	24.00	18.00	36.00
8	40.25	30.00	40.25	40.25	30.00	20.12	40.25
10	50.00	36.00	50.00	50.00	36.00	25.00	50.00
12	56.00	41.00	56.00	56.00	41.00	28.00	56.00
14	...	44.00	...	...	...	...	...
16	...	49.00	...	...	...	...	...
18	...	55.00	...	...	...	...	...

GENERAL NOTES:
(a) Dimensions are in inches.
(b) See Table 10 for adjustments to tabulated dimensions which may be required for certain flange facings.

NOTES:
(1) These dimensions apply to pressure seal or flangeless bonnet valves. They may be applied at the manufacturer's option to valves with flanged bonnets.
(2) Solid wedge only.

TABLE 8 CLASSES 125 AND 250 CAST IRON AND CLASSES 150 TO 2500 STEEL WAFER TYPE VALVES, FACE-TO-FACE DIMENSIONS

Nom. Valve Size, NPS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Steel (1)	Cast Iron (2)		Steel												
	Bonnetless Knife Gate, Class 150 Flange Mating Dimensions	Swing Check, Single and Dual Plate, Installation Between Standard ANSI Flanges		Swing Check, Single and Dual Plate, Installation Between Standard ANSI Flanges (3)												
		Class		Class							Class					
		125	250	150	300	400	600	900	1500	2500	150	300	400	600	900	1500
				Long Pattern (4)							Short Pattern (5)					
2	1.88	2.12	2.12	2.38	2.38	2.38	2.38	2.75	2.75	2.75	0.75	0.75	0.75	0.75	0.75	0.75
2½	...	2.38	2.38	2.62	2.62	2.62	2.62	3.25	3.25	3.25	0.75	0.75	0.75	0.75	0.75	0.75
3	2.00	2.62	2.62	2.88	2.88	2.88	2.88	3.25	3.25	3.38	0.75	0.75	0.75	0.75	0.75	0.88
4	2.00	2.62	2.62	2.88	2.88	3.12	3.12	4.00	4.00	4.12	0.75	0.75	0.88	0.88	0.88	1.25
5	2.25	3.25	3.25	...	...	...	...	...	...	...	...	...	...	...	...	...
6	2.25	3.75	3.75	3.88	3.88	5.38	5.38	6.25	6.25	6.25	0.75	0.88	1.00	1.12	1.38	1.75
8	2.75	5.00	5.00	5.00	5.00	6.50	6.50	8.12	8.12	8.12	1.12	1.12	1.25	1.50	1.75	2.25
10	2.75	5.50	5.50	5.75	5.75	8.38	8.38	9.50	9.75	10.00	1.12	1.50	2.00	2.25	2.25	2.88
12	3.00	7.12	7.12	7.12	7.12	9.00	9.00	11.50	12.00	12.00	1.50	2.00	2.25	2.38	...	...
14	3.00	7.25	8.75	7.25	8.75	10.75	10.75	14.00	14.00	...	1.75	2.00	2.50	2.62	...	...
16	3.50	7.50	9.12	7.50	9.12	12.00	12.00	15.12	15.12	...	2.00	2.00	2.50	2.88	...	...
18	3.50	8.00	10.38	8.00	10.38	14.25	14.25	17.75	18.44	...	2.38	3.00	3.25	3.25	...	...
20	4.50	8.38	11.50	8.62	11.50	14.50	14.50	17.75	21.00	...	2.50	3.25	3.50	3.62	...	...
24	4.50	8.75	12.50	8.75	12.50	15.50	17.25	19.50	22.00	...	...	...	...	...	...	...
30	...	12.00	14.50	12.00	14.50	18.12	19.88	...	...	...	...	...	...	...	...	...
36	...	14.50	19.00	14.50	19.00	25.00	25.00	...	...	...	...	...	...	...	...	...
42	...	17.00	22.38	17.00	22.38	27.62	27.62	...	...	...	...	...	...	...	...	...
48	...	20.62	24.75	20.62	24.75	...	...	...	...	...	...	...	...	...	...	...

GENERAL NOTES:
(a) Dimensions are in inches.
(b) The tolerances of para. 5.1 apply to face-to-face dimensions for sizes NPS 24 and smaller. For sizes NPS 30 and larger, the tolerance shall be ±0.25 in.

NOTES:
(1) These data for knife gate valves are extracted from TAPPI TIS 405-8 and MSS SP-81.
(2) These data for cast iron swing check valves are extracted from API 594.
(3) Valves of sizes NPS 30 and larger in Classes 150, 300, 400, and 600 shall have body outside diameters and gasket surface dimensions compatible with flange standards specified in the purchase order, e.g., API 605 or MSS SP-44.
(4) These data for long pattern steel swing check valves in sizes NPS 24 and smaller are extracted from API 6D and API 594. Data for larger sizes are extracted from API 594.
(5) These data for short pattern steel swing check valves are extracted from API 6D.

TABLE 9 CLASSES 25 AND 125 CAST IRON AND CLASSES 150 TO 600 STEEL BUTTERFLY VALVES, FACE-TO-FACE DIMENSIONS

Nom. Valve Size, NPS	1	2	3	4	5	6	7	8	9
	Cast Iron and Class 150 Steel (2)(3)(4)					Steel Grooved End (2)(4)	Steel Offset Seat Lug and Wafer Style (5)(6)		
	Flanged End		Lug and Wafer Style (1)			Class 150	Class 150	Class 300	Class 600
	Narrow	Wide	Narrow	Wide	Extra Wide				
1½	...	...	1.31	1.44	1.50	3.38	...	...	...
2	...	...	1.69	1.75	1.81	3.19	...	...	...
2½	...	...	1.81	1.94	2.00	3.81	...	...	...
3	5.00	5.00	1.81	1.94	2.00	3.81	1.88	1.88	2.12
4	5.00	7.00	2.06	2.19	2.25	4.56	2.12	2.12	2.50
5	5.00	7.50	2.19	2.50	2.56	5.81	...	...	...
6	5.00	8.00	2.19	2.75	2.81	5.81	2.25	2.31	3.06
8	6.00	8.50	2.38	2.81	2.94	5.25	2.50	2.88	4.00
10	8.00	15.00	2.69	3.00	3.12	6.25	2.81	3.25	4.62
12	8.00	15.00	3.06	3.25	3.38	6.50	3.19	3.62	5.50
14	8.00	16.00	3.06	3.62	3.75	7.00	3.62	4.62	6.12
16	8.00	16.00	3.12	4.00	4.12	7.00	4.00	5.25	7.00
18	8.00	16.00	4.00	4.50	4.62	8.00	4.50	5.88	7.88
20	8.00	18.00	4.38	5.00	5.12	8.50	5.00	6.25	8.50
24	8.00	18.00	...	6.06	6.19	10.00	6.06	7.12	9.13
30	12.00	22.00	...	6.50	...	...	...	...	...
36	12.00	22.00	...	7.88	...	...	...	...	...
42	12.00	24.00	...	9.88	...	...	...	...	...
48	15.00	26.00	...	10.88	...	...	...	...	...
54	15.00	28.00	...	...	...	...	...	...	...
60	15.00	30.00	...	...	...	...	...	...	...
66	18.00	34.00	...	...	...	...	...	...	...
72	18.00	36.00	...	...	...	...	...	...	...

GENERAL NOTE: Dimensions are in inches.

NOTES:

(1) The installed face-to-face dimension is the dimension of the valve face-to-face after installation in the pipeline. It does not include the thickness of gaskets where separate gaskets are used. It does include the compressed (installed) thickness of gaskets or seals that are an integral part of the valve.

(2) These butterfly valves are of the design generally having concentric location of disc and seat, covered by MSS SP-67, from which these data are extracted.

(3) These valves are dimensionally compatible with flanges conforming to ASME/ANSI B16.1 Class 25 or Class 125, ASME/ANSI B16.5 Class 150, ASME B16.24 Class 150, ASME/ANSI B16.42 Class 150, or AWWA C-207.

(4) For these butterfly valves, a tolerance of ±0.06 in. shall be allowed on face-to-face dimensions of valves of NPS 6 and smaller, and a tolerance of ±0.13 in. on NPS 8 and larger, except that for single flange and flangeless valves of NPS 30 and larger, a tolerance of ±0.25 in. shall be allowed.

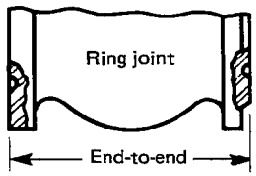
(5) For these valves, a tolerance of ±0.13 in. shall be allowed on the face-to-face dimensions for all sizes and pressure classes.

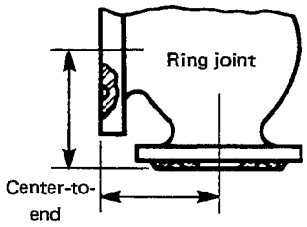
(6) The data for offset seat valves, columns 7–9, are extracted from MSS SP-68 and API 609 (except 16 "-24" Class 600, which are only in MSS SP-68).

TABLE 10 DETERMINATION OF FACE-TO-FACE AND END-TO-END DIMENSIONS OF FLANGED VALVES HAVING VARIOUS FLANGE FACINGS

Material	Class	Face-to-Face (1 – 3)					End-to-End (1 – 3)		
		Flat Face	0.06 in. Raised Face	0.25 in. Raised Face	Large or Small		Ring Type Joint	Large or Small	
					Male Face	Tongue Face		Female Face	Groove Face
Cast iron	125	(4)	...	...	...	...	...	...	...
	250	...	(4)	...	...	...	...	...	...
	800	...	...	(4)	(6), (7)	...	...	−0.12 (7)	...
Steel	150	(5)	(4)	...	+0.50	+0.50	(8)	+0.38	+0.38
	300	(5)	(4)	...	+0.50	+0.50	(8)	+0.38	+0.38
	400 to 2500	...	...	(4)	(6)	(6)	(8)	−0.12	−0.12

NOTES:
(1) Dimensions are in inches.
(2) To determine the face-to-face or end-to-end dimensions of valves having both flanges as tabulated in this table, adjust the face-to-face (*not* the buttweld end-to-end) dimensions shown for the valve type (gate, globe, etc.), material, class, and size in Tables 1 to 7 by the amount shown.
(3) For center-to-face or center-to-end dimensions of angle type valves, use one-half the numerical adjustment shown herein.
(4) These face-to-face dimensions are listed in Tables 1 to 7. (See table of desired class.)
(5) For Class 150 and for Class 300 steel valves having flat faces, either the full thickness of the flange or the thickness with the 0.06 in. raised face removed may be supplied unless otherwise specified. For full thickness of flange, the face-to-face dimensions listed for 0.06 in. raised face apply. Users are reminded that removing the 0.06 in. raised faces will make the face-to-face dimensions nonstandard.
(6) These face-to-face dimensions are those listed for 0.25 in. raised face in Tables 3 to 7.
(7) When used for Class 800 cast iron, applies to large face only.
(8) The *X* dimensions given in Table 11 added to the appropriate raised face flange face-to-face dimensions of Tables 1 to 7 establish the end-to-end dimensions of steel valves having flanges with ring joint facings.





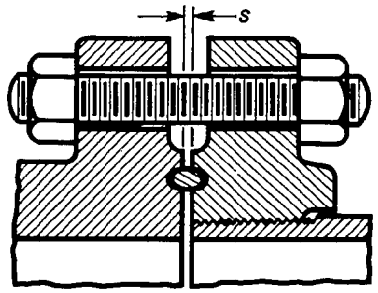


TABLE 11 CLASSES 150 TO 2500 STEEL VALVES HAVING END FLANGES WITH RING JOINT FACINGS, END-TO-END DIMENSIONS

Nom. Valve Size, NPS	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Class 150		Class 300		Class 400		Class 600		Class 900		Class 1500		Class 2500	
	X	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*
1/2	...	...	0.44	0.12	−0.06 (3)	0.12	−0.06 (3)	0.12	0	0.16	0	0.16	0	0.16
3/4	...	...	0.50	0.16	0	0.16	0	0.16	0	0.16	0	0.16	0	0.16
1	0.50	0.16	0.50	0.16	0	0.16	0	0.16	0	0.16	0	0.16	0	0.16
1 1/4	0.50	0.16	0.50	0.16	0	0.16	0	0.16	0	0.16	0	0.16	0.12	0.12
1 1/2	0.50	0.16	0.50	0.16	0	0.16	0	0.16	0	0.16	0	0.16	0.12	0.12
2	0.50	0.16	0.62	0.22	0.12	0.19	0.12	0.19	0.12	0.12	0.12	0.12	0.12	0.12
2 1/2	0.50	0.16	0.62	0.22	0.12	0.19	0.12	0.19	0.12	0.12	0.12	0.12	0.25	0.12
3	0.50	0.16	0.62	0.22	0.12	0.19	0.12	0.19	0.12	0.16	0.12	0.12	0.25	0.12
4	0.50	0.16	0.62	0.22	0.12	0.22	0.12	0.19	0.12	0.16	0.12	0.12	0.38	0.16
5	0.50	0.16	0.62	0.22	0.12	0.22	0.12	0.19	0.12	0.16	0.12	0.12	0.50	0.16
6	0.50	0.16	0.62	0.22	0.12	0.22	0.12	0.19	0.12	0.16	0.25	0.12	0.50	0.16
8	0.50	0.16	0.62	0.22	0.12	0.22	0.12	0.19	0.12	0.16	0.38	0.16	0.62	0.19
10	0.50	0.16	0.62	0.22	0.12	0.22	0.12	0.19	0.12	0.16	0.38	0.16	0.88	0.25
12	0.50	0.16	0.62	0.22	0.12	0.22	0.12	0.19	0.12	0.16	0.62	0.19	0.88	0.31
14	0.50	0.12	0.62	0.22	0.12	0.22	0.12	0.19	0.38	0.16	0.75	0.22	...	...
16	0.50	0.12	0.62	0.22	0.12	0.22	0.12	0.19	0.38	0.16	0.88	0.31	...	...
18	0.50	0.12	0.62	0.22	0.12	0.22	0.12	0.19	0.50	0.19	0.88	0.31	...	...
20	0.50	0.12	0.75	0.22	0.25	0.22	0.25	0.19	0.50	0.19	0.88	0.38	...	...
22	0.50 (1)	(2)	0.88 (1)	0.25	0.38 (1)	0.25	0.38 (1)	0.22	...	...	...	...	...	...
24	0.50	0.12	0.88	0.25	0.38	0.25	0.38	0.22	0.75	0.22	1.12	0.44	...	...

TABLE 11 CLASSES 150 TO 2500 STEEL VALVES HAVING END FLANGES WITH RING JOINT FACINGS, END-TO-END DIMENSIONS (CONT'D)

Nom. Valve Size, NPS	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Class 150		Class 300		Class 400		Class 600		Class 900		Class 1500		Class 2500	
	X	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*
26	...	...	1.00 (1)	0.25	0.50 (1)	(2)	0.50 (1)	0.22	...	...	...	...	...	...
28	...	...	1.00 (1)	0.25	0.50 (1)	(2)	0.50 (1)	0.22	...	...	...	...	...	...
30	...	...	1.00 (1)	0.25	0.50 (1)	(2)	0.50 (1)	0.22	...	...	...	...	...	...
32	...	...	1.12 (1)	(2)	0.62 (1)	(2)	0.62 (1)	(2)	...	...	...	...	...	...
34	...	...	1.12 (1)	(2)	0.62 (1)	(2)	0.62 (1)	(2)	...	...	...	...	...	...
36	...	...	1.12 (1)	(2)	0.62 (1)	(2)	0.62 (1)	(2)	...	...	...	...	...	...

GENERAL NOTES:
(a) Dimensions are in inches.
(b) Flanges conform to those of ASME/ANSI B16.5 for the corresponding size and pressure class, except in NPS 22, NPS 26, and larger sizes. See Note (1).
(c) To determine the end-to-end dimensions of valves having flanges with ring joint facings, the *X* dimensions must be added to the nominal raised face flange face-to-face dimensions of Tables 1 to 7. For angle and angle lift check valves, one-half of the *X* dimensions as listed in this table must be added to the nominal dimensions for center-to-end dimensions.

For approximate distance between ends of flanges having octagonal or oval ring gaskets, when rings are compressed, use *S* dimensions as listed in this table.

NOTES:
(1) Flanges for NPS 22, NPS 26, and larger sizes conform to those of MSS SP-44 for the corresponding size and pressure class.
(2) *S* dimension is not determined.
(3) This dimension has a minus value because the height of the applicable ring joint face is 0.22 in., whereas the height of the raised face is 0.25 in.

ANNEX A
REFERENCES

(This Annex is an integral part of ASME B16.10-1992 and is placed after the main text for convenience.)

The following is a list of standards and specifications referenced in this Standard, showing the applicable edition or year of approval.

API Publications

API 6D, Twentieth Edition	Pipeline Valves (Steel Gate, Plug, Ball, and Check Valves)
API 594, Fourth Edition	Wafer and Wafer-Lug Check Valves
API 609, Fourth Edition	Lug-and-Wafer-Type Butterfly Valves

ASME Publications

ASME/ANSI B16.1-1989	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
ASME/ANSI B16.5-1988	Pipe Flanges and Flanged Fittings
ASME B16.24-1991	Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500, and 2500
ASME/ANSI B16.34-1988	Valves — Flanged and Buttwelding End — Steel, Nickel Alloy, and Other Special Alloys
ASME/ANSI B16.42-1987	Ductile Iron Pipe Flanges and Flanged Fittings, Class 150 and 300
ASME B16.47-1990	Large Diameter Steel Flanges NPS 26 through NPS 60

AWWA Publications

AWWA C207-86	Steel Pipe Flanges

ISA Publications

ISA S75.03-1985	Face-to-Face Dimensions for Flanged Globe Style Control Valve Bodies
ANSI/ISA S75.04-1985	Face-to-Face Dimensions for Flangeless Control Valves

MSS Publications

MSS SP-44-1991	Steel Pipe Line Flanges
MSS SP-67-1990	Butterfly Valves
MSS SP-81-1981 (R 1991)	Stainless Steel Bonnetless, Flanged Knife Gate Valves

TAPPI Publications

TAPPI TIS 405-8-1981	Recommendations for Stainless Steel, Bonnetless, Flanged, Wafer, and Knife Gate Valves

Publications of the following organizations appear on the above list:

API	American Petroleum Institute Production Department 2535 One Main Place Dallas, TX 75201-3688 American Petroleum Institute Refining Department 1220 L Street, N.W. Washington, D.C. 20005
ASME	The American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017 ASME Order Department 22 Law Drive Box 2300 Fairfield, NJ 07007-2300
AWWA	American Water Works Association 6666 W. Quincy Avenue Denver, CO 80235
ISA	Instrument Society of America 67 Alexander Drive P. O. Box 12277 Research Triangle Park, NC 27709
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, N.E. Vienna, VA 22180
TAPPI	Technical Association of the Pulp and Paper Industry Technology Park/Atlanta P. O. Box 105113 Atlanta, GA 30348

Publications appearing above which have been approved as American National Standards may also be obtained from:

ANSI	American National Standards Institute 11 West 42nd Street New York, NY 10036

AMERICAN NATIONAL STANDARDS FOR PIPING, PIPE FLANGES, FITTINGS, AND VALVES

Scheme for the Identification of Piping Systems ..... A13.1-1981(R1985)
Pipe Threads, General Purpose (Inch) ..... B1.20.1-1983(R1992)
Dryseal Pipe Threads (Inch) ..... B1.20.3-1976(R1991)
Cast Iron Pipe Flanges and Flanged Fittings B16.1-1989
Malleable Iron Threaded Fittings B16.3-1992
Gray Iron Threaded Fittings B16.4-1992
Pipe Flanges and Flanged Fittings B16.5-1988
Factory-Made Wrought Steel Buttwelding Fittings B16.9-1986
Face-to-Face and End-to-End Dimensions of Valves B16.10-1992
Forged Fittings, Socket-Welding and Threaded B16.11-1991
Cast Iron Threaded Drainage Fittings B16.12-1991
Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads B16.14-1991
Cast Bronze Threaded Fittings, Class 125 and 250 ..... B16.15-1985
Cast Copper Alloy Solder Joint Pressure Fittings B16.18-1984
Ring-Joint Gaskets and Grooves for Steel Pipe Flanges B16.20-1973
Nonmetallic Flat Gaskets for Pipe Flanges B16.21-1992
Wrought Copper and Copper Alloy Solder Joint Pressure Fittings B16.22-1989
Cast Copper Alloy Solder Joint Drainage Fittings — DWV B16.23-1992
Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500, and 2500 ..... B16.24-1991
Buttwelding Ends B16.25-1992
Cast Copper Alloy Fittings for Flared Copper Tubes B16.26-1988
Wrought Steel Buttwelding Short Radius Elbows and Returns B16.28-1986
Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings — DWV B16.29-1986
Cast Copper Alloy Solder Joint Fittings for Sovent Drainage Systems B16.32-1992
Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psig (Sizes ½ Through 2) B16.33-1990
Valves — Flanged, Threaded, and Welding End B16.34-1988
Orifice Flanges B16.36-1988
Large Metallic Valves for Gas Distribution (Manually Operated, NPS 2½ to 12, 125 psig Maximum) ... B16.38-1985
Malleable Iron Threaded Pipe Unions, Classes 150, 250, and 300 ..... B16.39-1986
Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems B16.40-1985
Functional Qualification Requirements for Power Operated Active Valve Assemblies for Nuclear Power Plants ..... B16.41-1983(R1989)
Ductile Iron Pipe Flanges and Flanged Fittings, Class 150 and 300 ..... B16.42-1987
Wrought Copper and Copper Alloy Solder Joint Fittings for Sovent® Drainage Systems B16.43-1982
Cast Iron Fittings for Sovent® Drainage Systems B16.45-1987
Large Diameter Steel Flanges (NPS 26 Through NPS 60) B16.47-1990
Power Piping B31.1-1989
Fuel Gas Piping B31.2-1968
Chemical Plant and Petroleum Refinery Piping B31.3-1990
Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia, and Alcohols B31.4-1989
Refrigeration Piping B31.5-1987
Gas Transmission and Distribution Piping Systems B31.8-1989
Building Services Piping B31.9-1988
Slurry Transportation Piping Systems B31.11-1989
ASME Guide for Gas Transmission and Distribution Piping Systems — 1986 (not an ANSI Standard) .....
Manual for Determining the Remaining Strength of Corroded Pipelines (not an ANSI Standard) B31G-1991
Welded and Seamless Wrought Steel Pipe B36.10M-1985
Stainless Steel Pipe B36.19M-1985
Self-Operated and Power-Operated Safety-Related Valves Functional Specification Standard .. N278.1-1975(R1984)

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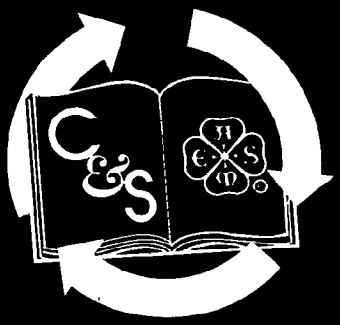

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