ASME B16.10-2022
(Revision of ASME B16.10-2017)

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

AN AMERICAN NATIONAL STANDARD

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Two Park Avenue • New York, NY • 10016 USA

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The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

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FOREWORD

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 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 the 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 The International Society of Automation (ISA), 67 T. W. Alexander Drive, Research Triangle Park, NC 27709.

In the 2000 Edition, metric dimension tables were added. All tables and references to Class 400 steel and Class 800 cast iron were removed. All tables were renumbered. Following the approvals of the Standards Committee and ASME, approval for the edition was granted by ANSI on June 7, 2000.

In the 2009 Edition, Nonmandatory Appendix A was revised and updated. Also, all affected regions of the Standard were updated to reflect the changes in Nonmandatory Appendix A. PN values and references to API 605 were removed from the Standard. Following approval by the B16 Standards Committee and the ASME Supervisory Board, the Standard was approved as an American National Standard by ANSI on June 15, 2009.

In the 2017 Edition, tolerances for straightway valves were modified and new NPS sizes were added. Singular Face-to-Face dimensions for Class 150 and Class 300 valves, and short and long pattern face-to-face dimensions were added to Tables 7 and I-7.

In ASME B16.10-2022, the U.S. Customary tables in former Mandatory Appendix I have been merged with the SI tables in the main text. The tables have been redesignated, former Mandatory Appendix I has been deleted, and the subsequent Mandatory Appendix has been redesignated. Cross-references have been updated accordingly. Also in this edition, Table 1.3-1 (formerly Tables 1 and I-1), Table 1.3-3 (formerly Tables 7 and I-7), Table 1.5-1 (formerly Tables 3 and I-3), Table 1.5-2 (formerly Tables 4 and I-4), Table 1.5-3 (formerly Tables 5 and I-5), and Table 1.5-4 (formerly Tables 6 and I-6) have been revised. Following approval by the ASME B16 Standards Committee, ASME B16.10-2022 was approved by the American National Standard Institute on April 15, 2022.

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

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

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General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B16 Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Interpretations. Upon request, the B16 Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B16 Standards Committee.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may e-mail the request to the Secretary of the B16 Standards Committee at SecretaryB16@asme.org, or mail it to the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B16 Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B16 Standards Committee.

SUMMARY OF CHANGES

Following approval by the ASME B16 Standards Committee and ASME, and after public review, ASME B16.10-2022 was approved by the American National Standards Institute on April 15, 2022.

In ASME B16.10-2022, the U.S. Customary tables in former Mandatory Appendix I have been merged with the SI tables in the main text. The tables and figures have been redesignated, former Mandatory Appendix I has been deleted, and the subsequent Mandatory Appendix has been redesignated. Cross-references have been updated accordingly. In addition, this edition includes the following changes identified by a margin note, **(22)**. The Record Numbers listed below are explained in more detail in the "List of Changes in Record Number Order" following this Summary of Changes.

Page	*Location*	*Change (Record Number)*
2	2.3.1	Subparagraphs (b) and (c) revised *(22-55)*
3	3.1.2	Revised *(22-55)*
3	3.1.3	Revised *(22-55)*
6	Table 1.3-1	(1) Revised *(19-1665)* (2) Column head spanning columns 9 through 20 revised *(22-55)*
16	Table 1.3-2	Column head spanning columns 1 through 6 and 7 through 17 revised *(22-55)*
20	Table 1.3-3	(1) In Column 13, the rating callout corrected by errata to "2500" *(19-2986)* (2) Note (7) revised *(19-3004)*
24	Table 1.5-1	(1) For NPS 12, Note (4) deleted *(19-3188)* (2) Inserted comma between "Globe" and "Lift Check" in column headers *(18-2248)* (3) Column head spanning columns 1 through 10 revised *(22-55)*
28	Table 1.5-2	(1) Comma inserted between "Globe" and "Lift Check" in headers for columns 5 and 6 *(18-2248)* (2) Column head spanning columns 1 through 10 revised *(22-55)*
31	Table 1.5-3	(1) Comma inserted between "Globe" and "Lift Check" in headers for columns 5 and 6 *(18-2248)* (2) Column head spanning columns 1 through 8 revised *(22-55)*
33	Table 1.5-4	(1) Comma inserted between "Globe" and "Lift Check" in headers for columns 4 and 5 *(18-2248)* (2) Column head spanning columns 1 through 7 revised *(22-55)*
35	Table 3.2-1	(1) Column heads for fourth and fifth columns revised *(22-55)* (2) Notes (4) and (6) revised *(22-55)*
38	Figure 2.3.1-1	Dimensions revised throughout *(22-55)*

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
18-2248	Revised column headers 7 and 8 in Table 1.5-1 (former Tables 3 and I-3), column headers 5 and 6 in Table 1.5-2 (former Tables 4 and I-4) and Table 1.5-3 (former Tables 5 and I-5), and column headers 4 and 5 in Table 1.5-4 (Tables 6 and I-6).
19-1665	Revised Table 1.3-1 (former Tables 1 and I-1).
19-2986	Revised Class rating to 2500 for column 13 of Table 1.3-3 (former Tables 7 and I-7).
19-3004	Revised Note (7) of Table 1.3-3 (former Tables 7 and I-7).
19-3188	Deleted Note (4) from NPS 12 for column 7 in Table 1.5-1 (former Tables 3 and I-3).
22-55	Revised paras. 2.3.1, 3.1.2, and 3.1.3, Figure 2.3.1-1 (former Figure 1), and column headers in Table 1.3-1 (former Tables 1 and I-1), Table 1.3-2 (former Tables 2 and I-2), Table 1.5-1 (former Tables 3 and I-3), Table 1.5-2 (former Tables 4 and I-4), Table 1.5-3 (former Tables 5 and I-5), Table 1.5-4 (former Tables 6 and I-6), and Table 3.2-1 (former Tables 9 and I-9) to align flange raised face dimension with ASME B16.5.

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

1 SCOPE

1.1 General

1.1.1 Application. 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 ensure 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 para. 2.3.1 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.

1.1.2 Data Source Reference. Throughout this Standard, data references are cited, e.g., "extracted from" and "compatible with." These data are relevant to the reference standard in place at the date shown in the Foreword for American National Standards Institute approval of this Standard.

1.2 Standard Units

This Standard states values in both SI (Metric) and U.S. Customary units. These systems of units are to be regarded separately as standard. In this Standard, the U.S. Customary units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, it is required that each system of units be used independently of the other. Combining values from the two systems constitutes nonconformance with this Standard.

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 B16.1. Dimensional tables for various types and sizes of valves are specified in paras. 1.3.1 through 1.3.4.

1.3.1 Gate, Plug, and Check Valves

(a) Class 125 — Table 1.3-1
(b) Class 250 — Table 1.3-2

1.3.2 Globe and Angle Valves

(a) Class 125 — Table 1.3-1
(b) Class 250 — Table 1.3-2

1.3.3 Wafer Swing Check Valves

(a) Class 125 — Table 1.3-3
(b) Class 250 — Table 1.3-3

1.3.4 Butterfly Valves

(a) Class 25 — Table 1.3-4
(b) Class 125 — Table 1.3-4

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 B16.42. Valves are rated Class 150 and Class 300. The following cast iron and steel dimensional tables are also used for ductile valves:

(a) Class 150 — Table 1.3-1
(b) Class 300 — Table 1.3-2

1.5 Steel and Alloy Valves

This category includes carbon, alloy, stainless steels, and the nonferrous materials listed in ASME 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 B16.5, ASME B16.47, Series A, or MSS SP-44. [For flanged end butterfly valves, refer to Note (2) of Table 1.3-4 for flange information.] For flangeless or wafer valves intended for assembly between flanges, refer to Tables 1.3-3 and 1.3-4 for flange information. Only buttwelding end valves in rating Classes 150 through 2500 are included in this Standard. Dimensional tables for various types and sizes of valves are specified in paras. 1.5.1 through 1.5.5.

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

(a) Class 150 — Table 1.3-1
(b) Class 300 — Table 1.3-2
(c) Class 600 — Table 1.5-1
(d) Class 900 — Table 1.5-2
(e) Class 1500 — Table 1.5-3
(f) Class 2500 — Table 1.5-4

1.5.2 Y-Pattern Globe and Y-Pattern Swing Check Valves Class 150 — Table 1.3-1

1.5.3 Wafer Knife Gate Valves

(a) Class 150 — Table 1.3-3
(b) Class 300 — Table 1.3-3

1.5.4 Wafer Swing Check Valves Class 150 to 2500 — Table 1.3-3

1.5.5 Butterfly Valves

(a) Class 150 — Table 1.3-4
(b) Class 300 — Table 1.3-4
(c) Class 600 — Table 1.3-4

1.6 Convention

For determining conformance with this Standard, the convention for fixing significant digits where limits (maximum and minimum values) are specified shall be as defined in ASTM A29. This requires that an observed or calculated value be rounded off to the nearest unit in the last right-hand digit used for expressing the limit. Decimal values and tolerances do not imply a particular method of measurement.

2 DEFINITIONS

2.1 Valve Size Designation

2.1.1 Nominal Diameter (DN). The size of a valve is designated by the nominal size of its end connections. This is denoted by DN, a dimensionless number indirectly related to the physical size of the connecting pipe [see Tables 1.3-1 through 3.3-1]. The valve size is not necessarily the same as the inside diameter or port diameter.

2.1.2 Valve Size Designation. NPS, followed by a dimensionless number, is the designation for nominal valve size. NPS is related to the reference *nominal diameters*, DN, used in international standards. The relationship is, typically, as follows:

DN	NPS
8	¼
10	⅜
15	½
20	¾
25	1
32	1¼
40	1½
50	2
65	2½
80	3
100	4

GENERAL NOTE: For NPS ≥ 4, the related DN = 25 multiplied by the NPS number.

2.1.3 Reduced Port Valves

(a) Reduced port, gate, and ball valves conforming to API 6D are designated for size by two numbers, the first being the NPS on the valve ends and 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 shall have face-to-face or end-to-end dimensions corresponding to valves having the same size end connections; i.e., a NPS 6 × 4 valve shall have the face-to-face or end-to-end dimensions of a NPS 6 valve.

(b) Reduced port, pressure seal bonnet, gate, globe, and check valves are designated for size by three numbers, the first and last being the NPS of the valve ends, the second being the NPS of the port; e.g., NPS 6 × 4 × 6 designates a valve having ends matching NPS 6 with a port to match NPS 4. Likewise, NPS 6 × 4 × 4 would designate a valve having one end matching NPS 6, the other matching NPS 4, and the port matching NPS 4. These valves shall have face-to-face or end-to-end dimensions corresponding to valves having the same port size; i.e., either a NPS 6 × 4 × 6 or a NPS 6 × 4 × 4 valve shall have the face-to-face or end-to-end dimensions of a NPS 4 valve.

2.2 Pressure Rating Designations

Class, followed by a dimensionless number, is the standardized designation for pressure temperature-ratings used for valves. The numerical designations in use are as follows:

(a) for cast iron: 25, 125, 250
(b) for ductile iron: 150, 300
(c) for steel:[1] 150, 300, 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 that the gasket contact surfaces (see Figure 2.3.1-1). Face-to-face applies to flanged valves having the following nominal flange facing identifiers: (22)

(a) flat
(b) 1.5 mm (0.06 in.) raised
(c) 6.4 mm (0.25 in.) raised
(d) large or small male[2]
(e) large or small tongue[2]

2.3.2 Installed Face-to-Face. The installed face-to-face dimension of certain butterfly valves [see Table 1.3-4, Note (6)] 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

[1] Includes all ferrous and nonferrous materials in ASME B16.34.
[2] Face-to-face dimensions in Tables 1.3-1 through 1.5-4 must be adjusted as indicated in Table 3.2-1.

described as the end-to-end dimension and applies to flanged valves having the following nominal flange facing identifiers:

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

2.4 Buttwelding End Valve Dimensions

For buttwelding end valves, the end-to-end dimension is the distance between the extreme ends (root faces) of the welding bevels (see Figure 2.4-1).

Also see section 4.

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 that 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 2.3.1-1 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.

(22) **3.1.2 1.5 mm (0.06 in.) Raised Face.** Flanges for Class 250 cast iron and for Classes 150 and 300 steel, alloy, and ductile iron valves have 1.5 mm (0.06 in.) raised faces, which are included in the face-to-face (or center-to-face) dimension. When Classes 150 and 300 valves are required with flat faces, either the full thickness of flange or the thickness with the 1.5 mm (0.06 in.) raised face removed may be furnished, unless otherwise specified by the customer. Users are reminded that removing the 1.5 mm (0.06 in.) raised face will make the face-to-face dimension nonstandard.

(22) **3.1.3 6.4 mm (0.25 in.) Raised Face.** Flanges for Class 600 and higher steel and alloy valves have 6.4 mm (0.25 in.) raised faces, which are included in the face-to-face (or center-to-face) dimensions.

3.2 Other Standard Facings

Table 3.2-1 summarizes data on all flange facings and can be used with Tables 1.3-1 through 1.5-4 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 3.3-1, when added to the face-to-face dimension of a valve having raised face flanges in Tables 1.3-1 through 1.5-4, 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

Tables 1.3-1 through 1.5-4 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.

Also see para. 2.4.

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 1.5-1 through 1.5-4. 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 1.5-1 through 1.5-4. 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 ±1.5 mm (±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 ±3.0 mm (±0.12 in.) shall

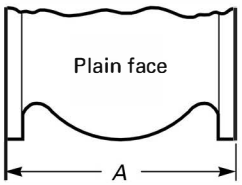
be allowed for NPS 12 and larger. For exceptions as related to wafer type and butterfly valves, see Table 1.3-3, General Note (b), and Table 1.3-4, Notes (3) and (4).

5.2 Angle Valves

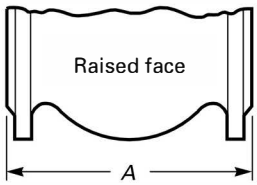
The tolerances on center-to-face and center-to-end dimensions of angle type valves shall be one-half those listed in para. 5.1.

TABLE STARTS ON NEXT PAGE

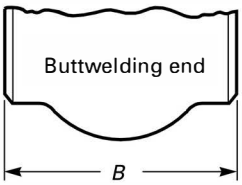
Table 1.3-1
(22) Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions



Class 125 Cast Iron



Class 150 Steel



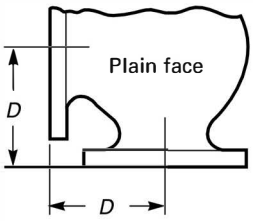
Class 150 Steel

Nominal Valve Size, DN (NPS)	1	2	3	4	5	6
				Regular and Ventrui Pattern, *A*	Round Port, Full Bore, *A*	Globe, Lift Check and Swing Check Type A, AWWA C508, *A* [Note (1)]
8 (1/4)	...	...	...	...	...	...
10 (3/8)	...	...	...	...	...	...
15 (1/2)	...	...	...	...	...	...
20 (3/4)	...	...	...	...	...	...
25 (1)	...	140 (5.50)	...	140 (5.50) (2)	140 (5.50)	...
32 (1 1/4)	...	...	...	165 (6.50) (2)	152 (6.00)	...
40 (1 1/2)	...	165 (6.50)	...	165 (6.50) (2)	165 (6.50)	...
50 (2)	178 (7.00)	178 (7.00)	...	190 (7.50) (2)	190 (7.50)	203 (8.00)
65 (2 1/2)	190 (7.50)	190 (7.50)	...	210 (8.25) (2)	210 (8.25)	254 (10.00)
80 (3)	203 (8.00)	203 (8.00)	...	229 (9.00) (2)	229 (9.00)	279 (11.00)
100 (4)	229 (9.00)	229 (9.00)	...	229 (9.00) (2)	305 (12.00)	330 (13.00)
125 (5)	254 (10.00)	254 (10.00)	...	356 (14.00) (2)	381 (15.00)	...
150 (6)	267 (10.50)	267 (10.50)	...	394 (15.50)	457 (18.00)	406 (16.00)
200 (8)	292 (11.50)	292 (11.50)	...	457 (18.00)	559 (22.00)	495 (19.50)
250 (10)	330 (13.00)	330 (13.00)	...	533 (21.00)	660 (26.00)	559 (22.00)
300 (12)	356 (14.00)	356 (14.00)	...	610 (24.00)	762 (30.00)	660 (26.00)
350 (14)	381 (15.00) (5)	432 (17.00) (6)	...	686 (27.00)	...	762 (30.00)
400 (16)	406 (16.00) (5)	451 (17.75) (6)	610 (24.00)	762 (30.00)	...	775 (30.50)
450 (18)	432 (17.00) (5)	546 (21.50) (6)	762 (30.00)	864 (34.00)	...	851 (33.50)
500 (20)	457 (18.00) (5)	597 (23.50) (6)	914 (36.00)	914 (36.00)	...	1 016 (40.00)
550 (22)	...	...	...	...	...	...
600 (24)	508 (20.00) (5)	762 (30.00) (6)	1 067 (42.00)	1 067 (42.00) (11)	...	1 168 (46.00)
650 (26)	...	...	...	...	...	...
700 (28)	...	...	...	...	...	...
750 (30)	...	952 (37.50) (6)	1 295 (51.00)	1 295 (51.00) (11)	...	1524 (60.00)
800 (32)	...	...	...	...	...	...

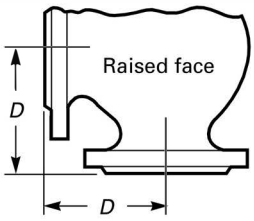
Table 1.3-1
Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions

7	8	9	10	11	12	
Flanged End (Flat Face)		Flanged End [1.5 mm (0.06 in.) Raised Face] and Welding End				
		Gate			Plug	
Globe, Lift Check, and Swing Check Type B, AWWA C508, *A* [Note (1)]	Angle, and Lift Check, *D*	Solid Wedge and Double Disc, *A*	Conduit, *A*	Solid Wedge, Double Disc, and Conduit, *B*	Short Pattern, *A*	Nominal Valve Size, DN (NPS)
						1/4)
...	...	102 (4.00)	...	102 (4.00)	...	10 (3/8)
...	...	108 (4.25)	...	108 (4.25)	...	15 (1/2)
...	...	117 (4.62)	...	117 (4.62)	...	20 (3/4)
...	...	127 (5.00)	...	127 (5.00)	140 (5.50)	25 (1)
...	...	140 (5.50)	...	140 (5.50)	...	32 (1 1/4)
...	...	165 (6.50)	...	165 (6.50)	165 (6.50)	40 (1 1/2)
203 (8.00)	102 (4.00)	178 (7.00)	178 (7.00)	216 (8.50)	178 (7.00)	50 (2)
216 (8.50)	108 (4.25)	190 (7.50)	190 (7.50)	241 (9.50)	190 (7.50)	65 (2 1/2)
241 (9.50)	121 (4.75)	203 (8.00)	203 (8.00)	282 (11.12)	203 (8.00)	80 (3)
292 (11.50)	146 (5.75)	229 (9.00)	229 (9.00)	305 (12.00)	229 (9.00)	100 (4)
330 (13.00)	165 (6.50)	254 (10.00)	...	381 (15.00)	254 (10.00)	125 (5)
356 (14.00)	178 (7.00)	267 (10.50)	267 (10.50)	403 (15.88)	267 (10.50)	150 (6)
495 (19.50)	248 (9.75)	292 (11.50)	292 (11.50)	419 (16.50)	292 (11.50)	200 (8)
622 (24.50)	311 (12.25)	330 (13.00)	330 (13.00)	457 (18.00)	330 (13.00)	250 (10)
698 (27.50)	349 (13.75)	356 (14.00)	356 (14.00)	502 (19.75)	356 (14.00)	300 (12)
787 (31.00)	394 (15.50)	381 (15.00)	381 (15.00)	572 (22.50)	...	350 (14)
914 (36.00) (7)	457 (18.00)	406 (16.00)	406 (16.00)	610 (24.00)	...	400 (16)
1 016 (40.00) (9)	...	432 (17.00)	432 (17.00)	660 (26.00)	...	450 (18)
1 016 (40.00) (9)	...	457 (18.00)	457 (18.00)	711 (28.00)	...	500 (20)
...	...	...	508 (20.00)	762 (30.00)	...	550 (22)
1 219 (48.00) (9)	...	508 (20.00)	508 (20.00)	813 (32.00)	...	600 (24)
...	...	559 (22.00)	559 (22.00)	864 (34.00) (12)	...	650 (26)
...	...	610 (24.00)	610 (24.00)	914 (36.00) (12)	...	700 (28)
1 422 (56.00) (9)	...	610 (24.00)	660 (26.00)	914 (36.00) (12)	...	750 (30)
...	...	711 (28.00) (14)	711 (28.00)	965 (38.00) (12)	...	800 (32)

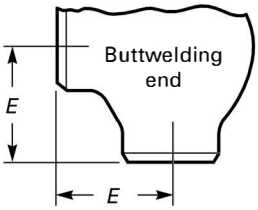
Table 1.3-1
Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions



Class 125 Cast Iron



Class 150 Steel



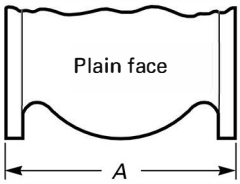
Class 150 Steel

	13	14	15	16	17	18
	Flanged End [1.5 mm (0.06 in.) Raised Face] and Welding End					
	Plug					
Nominal Valve Size, DN (NPS)	Regular Pattern, *A*	Short and Regular Pattern, *B*	Venturi Pattern, *A*	Round Port, Full Bore, *A*	Globe, Lift Check, and Swing Check, *A* and *B* [Note (1)]	Angle and Lift Check, *D* and *E*
8 (1/4)	...	...	...	...	102 (4.00)	51 (2.00)
10 (3/8)	...	...	...	...	102 (4.00)	51 (2.00)
15 (1/2)	...	...	...	...	108 (4.25)	57 (2.25)
20 (3/4)	...	...	...	...	117 (4.62)	64 (2.50)
25 (1)	...	...	...	176 (7.00)	127 (5.00)	70 (2.75)
32 (1 1/4)	...	...	...	...	140 (5.50)	76 (3.00)
40 (1 1/2)	...	...	...	222 (8.75)	165 (6.50)	83 (3.25)
50 (2)	...	267 (10.50)	178 (7.00)	267 (10.50)	203 (8.00)	102 (4.00)
65 (2 1/2)	...	305 (12.00)	...	298 (11.75)	216 (8.50)	108 (4.25)
80 (3)	...	330 (13.00)	203 (8.00)	343 (13.50)	241 (9.50)	121 (4.75)
100 (4)	305 (12.00)	356 (14.00)	229 (9.00)	432 (17.00)	292 (11.50)	146 (5.75)
125 (5)	381 (15.00)	381 (15.00)	...	...	356 (14.00) (3)	178 (7.00)
150 (6)	394 (15.50)	457 (18.00)	394 (15.50)	546 (21.50) (4)	406 (16.00) (3)	203 (8.00)
200 (8)	457 (18.00)	521 (20.50)	457 (18.00)	622 (24.50) (4)	495 (19.50)	248 (9.75)
250 (10)	533 (21.00)	559 (22.00)	533 (21.00)	660 (26.00) (4)	622 (24.50)	311 (12.25)
300 (12)	610 (24.00)	635 (25.00)	610 (24.00)	762 (30.00) (4)	698 (27.50)	349 (13.75)
350 (14)	686 (27.00)	...	686 (27.00)	...	787 (31.00)	394 (15.50)
400 (16)	762 (30.00)	...	762 (30.00)	...	914 (36.00) (8)	457 (18.00)
450 (18)	864 (34.00)	...	864 (34.00)	...	978 (38.50) (10)	...
500 (20)	914 (36.00)	...	914 (36.00)	...	978 (38.50) (10)	...
550 (22)	...	...	...	...	1067 (42.00) (10)	...
600 (24)	1067 (42.00)	...	1067 (42.00)	...	1295 (51.00) (10)	...
650 (26)	...	...	...	...	1295 (51.00) (10)	...
700 (28)	...	...	...	...	1448 (57.00) (10)	...
750 (30)	...	...	...	...	1524 (60.00) (10)	...
800 (32)	...	...	...	...	...	...

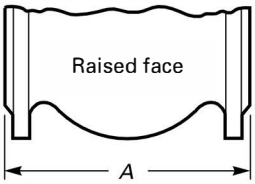
Table 1.3-1
Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions

19	20	21	22	23	
Flanged End [1.5 mm (0.06 in.) Raised Face] and Welding End		Flanged End		Welding End	
	Ball				
Y-Globe and Y-Swing Check, *A* and *B*	Long Pattern, *A*	Short Pattern, *A*	Long Pattern, *B*	Short Pattern, *B*	Nominal Valve Size, DN (NPS)
...	...	...	...	...	8 (1/4)
...	...	...	...	...	10 (3/8)
140 (5.50)	108 (4.25)	108 (4.25)	...	140 (5.50)	15 (1/2)
152 (6.00)	117 (4.62)	117 (4.62)	...	152 (6.00)	20 (3/4)
165 (6.50)	127 (5.00)	127 (5.00)	...	165 (6.50)	25 (1)
184 (7.25)	140 (5.50)	140 (5.50)	...	178 (7.00)	32 (1 1/4)
203 (8.00)	165 (6.50)	165 (6.50)	190 (7.50)	190 (7.50)	40 (1 1/2)
229 (9.00)	178 (7.00)	178 (7.00)	216 (8.50)	216 (8.50)	50 (2)
279 (11.00)	190 (7.50)	190 (7.50)	241 (9.50)	241 (9.50)	65 (2 1/2)
318 (12.50)	203 (8.00)	203 (8.00)	282 (11.12)	282 (11.12)	80 (3)
368 (14.50)	229 (9.00)	229 (9.00)	305 (12.00)	305 (12.00)	100 (4)
...	...	...	...	...	125 (5)
470 (18.50)	394 (15.50)	267 (10.50)	457 (18.00)	403 (15.88)	150 (6)
597 (23.50)	457 (18.00)	292 (11.50)	521 (20.50)	419 (16.50)	200 (8)
673 (26.50)	533 (21.00)	330 (13.00)	559 (22.00)	457 (18.00)	250 (10)
775 (30.50)	610 (24.00)	356 (14.00)	635 (25.00)	502 (19.75)	300 (12)
...	686 (27.00)	381 (15.00)	762 (30.00)	572 (22.50)	350 (14)
...	762 (30.00)	406 (16.00)	838 (33.00)	610 (24.00)	400 (16)
...	864 (34.00)	...	914 (36.00)	660 (26.00)	450 (18)
...	914 (36.00)	...	991 (39.00)	711 (28.00)	500 (20)
...	...	...	1 092 (43.00)	...	550 (22)
...	1 067 (42.00)	...	1 143 (45.00)	813 (32.00)	600 (24)
...	1 143 (45.00) (13)	...	1 245 (49.00)	...	650 (26)
...	1 245 (49.00) (13)	...	1 346 (53.00)	...	700 (28)
...	1 295 (51.00) (13)	...	1 397 (55.00)	...	750 (30)
...	1 372 (54.00) (13)	...	1 524 (60.00)	...	800 (32)

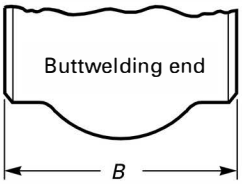
Table 1.3-1
Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)



Class 125 Cast Iron



Class 150 Steel



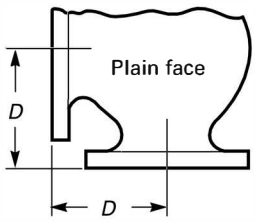
Class 150 Steel

Nominal Valve Size, DN (NPS)	1	2	3	4	5	6
				Regular and Ventrui Pattern, *A*	Round Port, Full Bore, *A*	Globe, Lift Check and Swing Check Type A, AWWA C508, *A* [Note (1)]
850 (34)	...	...	...	...	...	...
900 (36)	...	1 321 (52.00) (6)	1 524 (60.00)	1 600 (63.00) (11)	...	...
1000 (40)	...	...	...	...	...	...
1050 (42)	...	1 575 (62.00) (6)	1 829 (72.00)	...	...	...
1200 (48)	...	...	2 134 (84.00)	...	...	...
1350 (54)	...	...	2 438 (96.00)	...	...	...
1500 (60)	...	...	2 667 (105.00)	...	...	...
1650 (66)	...	...	2 921 (115.00)	...	...	...
1800 (72)	...	...	3 175 (125.00)	...	...	...

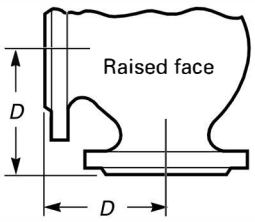
Table 1.3-1
Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)

7	8	9	10	11	12	
Flanged End (Flat Face)		Flanged End [1.5 mm (0.06 in.) Raised Face] and Welding End				
		Gate			Plug	
Globe, Lift Check, and Swing Check Type B, AWWA C508, *A* [Note (1)]	Angle, and Lift Check, *D*	Solid Wedge and Double Disc, *A*	Conduit, *A*	Solid Wedge, Double Disc, and Conduit, *B*	Short Pattern, *A*	Nominal Valve Size, DN (NPS)
...	...	762 (30.00) (14)	762 (30.00)	1 016 (40.00) (12)	1 016 (40.00)	850 (34)
1 600 (63.00) (9)	...	711 (28.00)	813 (32.00)	1 016 (40.00) (12)	...	900 (36)
...	...	813 (32.00)	...	...	...	1000 (40)
1 778 (70.00) (9)	...	...	...	...	...	1050 (42)
1 930 (76.00) (9)	...	...	...	...	...	1200 (48)
...	...	...	...	...	...	1350 (54)
...	...	...	...	...	...	1500 (60)
...	...	...	...	...	...	1650 (66)
...	...	...	...	...	...	1800 (72)

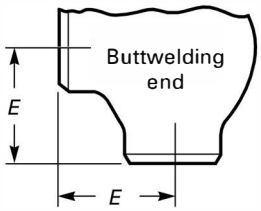
Table 1.3-1
Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)



Class 125 Cast Iron



Class 150 Steel



Class 150 Steel

Nominal Valve Size, DN (NPS)	13	14	15	16	17	18
	Flanged End [1.5 mm (0.06 in.) Raised Face] and Welding End					
	Plug					
	Regular Pattern, *A*	Short and Regular Pattern, *B*	Venturi Pattern, *A*	Round Port, Full Bore, *A*	Globe, Lift Check, and Swing Check, *A* and *B* [Note (1)]	Angle and Lift Check, *D* and *E*
850 (34)	...	...	...	...	...	...
900 (36)	...	...	...	...	1956 (77.00) (10)	
1000 (40)	...	...	...	...	...	...
1050 (42)	...	...	...	...	...	...
1200 (48)	...	...	...	...	...	...
1350 (54)	...	...	...	...	...	...
1500 (60)	...	...	...	...	...	...
1650 (66)	...	...	...	...	...	...
1800 (72)	...	...	...	...	...	...

Table 1.3-1
Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)

19	20	21	22	23	
Flanged End [1.5 mm (0.06 in.) Raised Face] and Welding End		Flanged End		Welding End	
	Ball				
Y-Globe and Y-Swing Check, *A* and *B*	Long Pattern, *A*	Short Pattern, *A*	Long Pattern, *B*	Short Pattern, *B*	Nominal Valve Size, DN (NPS)
...	1 473 (58.00) (13)	...	1 626 (64.00)	...	850 (34)
...	1 524 (60.00) (13)	...	1 727 (68.00)	...	900 (36)
...	...	...	...	...	1000 (40)
...	...	...	...	...	1050 (42)
...	...	...	...	...	1200 (48)
...	...	...	...	...	1350 (54)
...	...	...	...	...	1500 (60)
...	...	...	...	...	1650 (66)
...	...	...	...	...	1800 (72)

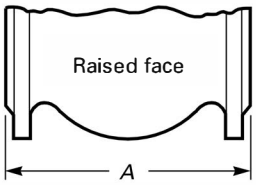
Table 1.3-1
Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)

GENERAL NOTES:
(a) Dimensions are in millimeters (inches).
(b) See Table 3.2-1 for adjustments to tabulated dimensions that may be required for certain flange facings.

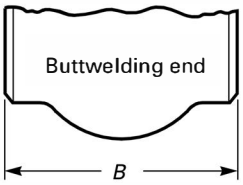
NOTES:
(1) These dimensions are not intended to cover the type of check valve having the seat angle at appoximately 45 deg to the run of the valve, or the "Underwriter Pattern," or other patterns where large clearances are required.
(2) Regular pattern only. The face-to-face dimension of DN 100 (NPS 4) may be 305 (12.00) at the manufacturer's option.
(3) 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 DN 125 (NPS 5) is 330 (13.00) and in DN 150 (NPS 6) is 356 (14.00).
(4) These data for Class 150 round port full bore plug valves are extracted from API 6D.
(5) Solid wedge only.
(6) These data for DN ≥ 350 (NPS ≥ 14) Class 125 cast iron plug valves are extracted from AWWA C517.
(7) Globe and horizontal lift check only.
(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 DN 400 (NPS 16) is 864 (34.00).
(9) These data for DN ≥ 450 (NPS ≥ 18) Class 125 cast iron globe and check valves are extracted from AWWA C508, Type B.
(10) Swing check only.
(11) Venturi pattern only.
(12) Double disc and conduit only.
(13) These data for Class 150 ball valves are extracted from API 6D.
(14) These data for Class 150 gate valves are extracted from API 6D. For DN 750 (NPS 30) and DN 900 (NPS 36) through-conduit valves, use 660 mm (26.00 in.) and 813 mm (32.00 in.), respectively.

TABLE STARTS ON NEXT PAGE

Table 1.3-2
(22) Class 250 Cast Iron Flanged and Class 300 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions



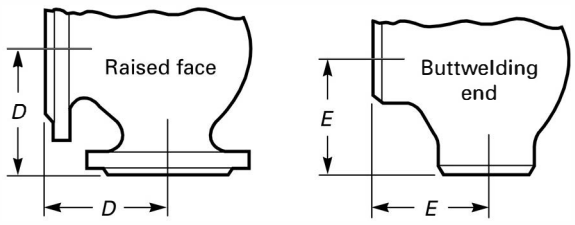
Class 250 Cast Iron and Class 300 Steel



Class 300 Steel

	1	2	3	4	5	6	7	8	9
	Class 250 Cast Iron						Class 300 Steel		
	Flanged End [1.5 mm (0.06 in.) Raised Face]						Flanged and Welding End		
		Plug					Ball		
Nominal Valve Size, DN (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*
15 (½)	...	...	...	...	...	...	140 (5.50)	140 (5.50)	...
20 (¾)	...	...	...	...	...	...	152 (6.00)	152 (6.00)	...
25 (1)	...	...	159 (6.25)	...	...	...	165 (6.50)	165 (6.50)	...
32 (1¼)	...	...	...	...	...	...	178 (7.00)	178 (7.00)	...
40 (1½)	...	...	190 (7.50)	...	...	...	190 (7.50)	190 (7.50)	190 (7.50)
50 (2)	216 (8.50)	184 (7.25)	216 (8.50)	...	267 (10.50)	133 (5.25)	216 (8.50)	216 (8.50)	216 (8.50)
65 (2½)	241 (9.50)	203 (8.00)	241 (9.50)	...	292 (11.50)	146 (5.75)	241 (9.50)	241 (9.50)	241 (9.50)
80 (3)	282 (11.12)	235 (9.25)	282 (11.12)	...	318 (12.50)	159 (6.25)	282 (11.12)	282 (11.12)	282 (11.12)
100 (4)	305 (12.00)	267(10.50)	305 (12.00)	...	356 (14.00)	178 (7.00)	305 (12.00)	305 (12.00)	305 (12.00)
125 (5)	381 (15.00)	...	387 (15.25)	...	400 (15.75)	200 (7.88)	...	...	...
150 (6)	403 (15.88)	378 (14.88)	425 (16.75)	403 (15.88)	444 (17.50)	222 (8.75)	403 (15.88)	403 (15.88)	457 (18.00)
200 (8)	419 (16.50)	...	502 (19.75)	419 (16.50)	533 (21.00)	267 (10.50)	502 (19.75)	419 (16.50)	521 (20.50)
250 (10)	457 (18.00)	568 (22.38)	597 (23.50)	457 (18.00)	622 (24.50)	311 (12.25)	568 (22.38)	457 (18.00)	559 (22.00)
300 (12)	502 (19.75)	648 (25.50)	711 (28.00)	502 (19.75)	711 (28.00)	356 (14.00)	648 (25.50)	502 (19.75)	635 (25.00)
350 (14)	572 (22.50)	...	...	762 (30.00)	...	...	762 (30.00)	572 (22.50)	762 (30.00)
400 (16)	610 (24.00)	...	...	838 (33.00)	...	...	838 (33.00)	610 (24.00)	838 (33.00)
450 (18)	660 (26.00)	...	...	914 (36.00)	...	...	914 (36.00)	660 (26.00)	914 (36.00)
500 (20)	711 (28.00)	...	...	991 (39.00)	...	...	991 (39.00)	711 (28.00)	991 (39.00)
550 (22)	...	...	...	1 118 (44.00)	...	...	1 092 (43.00)	...	1 092 (43.00)
600 (24)	787 (31.00)	...	...	1 143 (45.00)	...	...	1 143 (45.00)	813 (32.00)	1 143 (45.00)
650 (26)	...	...	...	...	...	...	1 245 (49.00)	...	1 245 (49.00)
700 (28)	...	...	...	...	...	...	1 346 (53.00)	...	1 346 (53.00)
750 (30)	...	...	...	...	...	...	1 397 (55.00)	...	1 397 (55.00)
800 (32)	...	...	...	...	...	...	1 524 (60.00)	...	1 524 (60.00)
850 (34)	...	...	...	...	...	...	1 626 (64.00)	...	1 626 (64.00)
900 (36)	...	...	...	...	...	...	1 727 (68.00)	...	1 727 (68.00)

Table 1.3-2
Class 250 Cast Iron Flanged and Class 300 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions



Class 250 Cast Iron and Class 300 Steel

Class 300 Steel

10	11	12	13	14	15	16	17	
Class 300 Steel								
Flanged End [1.5 mm (0.06 in.) Raised Face] and Welding End								
	Plug							
Gate, Solid Wedge, Disc, and Conduit, *A* and *B*	Short and Venturi Pattern, *A*	Short and Venturi Pattern, *B*	Regular Pattern, *A*	Round Port, Full Bore, *A* and *B*	Globe and Lift Check, *A* and *B*	Angle and Lift Check, *D* and *E*	Swing Check, *A* and *B*	Nominal Valve Size, DN (NPS)
140 (5.50) (1)	...	...	...	...	152 (6.00)	76 (3.00)	...	15 (½)
152 (6.00) (1)	...	...	...	...	178 (7.00)	89 (3.50)	...	20 (¾)
165 (6.50) (1)	159 (6.25) (2)	...	...	190 (7.50)	203 (8.00)	102 (4.00)	216 (8.50)	25 (1)
178 (7.00) (1)	...	...	...	...	216 (8.50)	108 (4.25)	229 (9.00)	32 (1¼)
190 (7.50)	190 (7.50) (2)	...	...	241 (9.50)	229 (9.00)	114 (4.50)	241 (9.50)	40 (1½)
216 (8.50)	216 (8.50)	267 (10.50) (2)	...	282 (11.12)	267 (10.50)	133 (5.25)	267 (10.50)	50 (2)
241 (9.50)	241 (9.50)	305 (12.00) (2)	...	330 (13.00)	292 (11.50)	146 (5.75)	292 (11.50)	65 (2½)
282 (11.12)	282 (11.12)	330 (13.00) (2)	...	387 (15.25)	318 (12.50)	159 (6.25)	318 (12.50)	80 (3)
305 (12.00)	305 (12.00)	356 (14.00) (2)	...	457 (18.00)	356 (14.00)	178 (7.00)	356 (14.00)	100 (4)
381 (15.00)	...	...	...	...	400 (15.75)	200 (7.88)	400 (15.75)	125 (5)
403 (15.88)	403 (15.88)	457 (18.00)	403 (15.88)	559 (22.00)	444 (17.50)	222 (8.75)	444 (17.50)	150 (6)
419 (16.50)	419 (16.50)	521 (20.50)	502 (19.75)	686 (27.00)	559 (22.00)	279 (11.00)	533 (21.00)	200 (8)
457 (18.00)	457 (18.00)	559 (22.00)	568 (22.38)	826 (32.50)	622 (24.50)	311 (12.25)	622 (24.50)	250 (10)
502 (19.75)	502 (19.75)	635 (25.00)	711 (28.00)	965 (38.00)	711 (28.00)	356 (14.00)	711 (28.00)	300 (12)
762 (30.00)	762 (30.00) (3)	762 (30.00) (3)	762 (30.00)	...	838 (33.00) (4)	...	838 (33.00)	350 (14)
838 (33.00)	838 (33.00) (3)	838 (33.00) (3)	838 (33.00)	...	864 (34.00) (4)	...	864 (34.00)	400 (16)
914 (36.00)	914 (36.00) (3)	914 (36.00) (3)	914 (36.00)	914 (36.00)	978 (38.50) (4)	...	978 (38.50)	450 (18)
991 (39.00)	991 (39.00) (3)	991 (39.00) (3)	991 (39.00)	...	1 016 (40.00) (4)	...	1 016 (40.00)	500 (20)
1 092 (43.00)	1 092 (43.00) (3)	1 092 (43.00) (3)	1 092 (43.00)	...	1 118 (44.00) (4)	...	1 118 (44.00)	550 (22)
1 143 (45.00)	1 143 (45.00) (3)	1 143 (45.00) (3)	1 143 (45.00)	...	1 346 (53.00) (4)	...	1 346 (53.00)	600 (24)
1 245 (49.00)	1 245 (49.00) (3)	1 245 (49.00) (3)	1 245 (49.00)	...	1 346 (53.00) (4)	...	1 346 (53.00)	650 (26)
1 346 (53.00)	1 346 (53.00) (3)	1 346 (53.00) (3)	1 346 (53.00)	...	1 499 (59.00) (4)	...	1 499 (59.00)	700 (28)
1 397 (55.00)	1 397 (55.00) (3)	1 397 (55.00) (3)	1 397 (55.00)	...	1 594 (62.75) (4)	...	1 594 (62.75)	750 (30)
1 524 (60.00)	1 524 (60.00) (3)	1 524 (60.00) (3)	1 524 (60.00)	...	...	...	...	800 (32)
1 626 (64.00)	1 626 (64.00) (3)	1 626 (64.00) (3)	1 626 (64.00)	...	...	...	...	850 (34)
1 727 (68.00)	1 727 (68.00) (3)	1 727 (68.00) (3)	1 727 (68.00)	...	2 083 (82.00) (4)	...	2 083 (82.00)	900 (36)

Table 1.3-2
Class 250 Cast Iron Flanged and Class 300 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)

GENERAL NOTES:
(a) Dimensions are in millimeters (inches).
(b) See Table 3.2-1 for adjustments to tabulated dimensions that may be required for certain flange facings.

NOTES:
(1) Solid wedge only.
(2) Plug — short pattern only.
(3) Venturi pattern only.
(4) These data for Class 300 check valves are extracted from API 6D.

TABLE STARTS ON NEXT PAGE

Table 1.3-3
(22) **Classes 125 and 250 Cast Iron and Classes 150 to 2500 Steel Wafer Type Valves, Face-to-Face Dimensions**

Nominal Valve Size, DN (NPS)	1	2	3	4	5	6	7
	Steel					Cast Iron [Note (3)]	
	Bonnetless Knife Gate, CWP Rating (150°F Max.) [Note (1)]	Bonnetless Knife Gate Short Pattern, Class 150 [Note (2)]	Bonnetless Knife Gate Long Pattern, Class 150 [Note (2)]	Bonnetless Knife Gate Short Pattern, Class 300 [Note (2)]	Bonnetless Knife Gate Long Pattern, Class 300 [Note (2)]	Swing Check, Single and Dual Plate, Installation Between Standard ASME Flanges	
						Class	
						125	250
50 (2)	48 (1.88)	50.8 (2.00)	69.8 (2.75)	69.8 (2.75)	69.8 (2.75)	54 (2.12)	54 (2.12)
65 (2½)	...	...	...	...	...	60 (2.38)	60 (2.38)
80 (3)	51 (2.00)	50.8 (2.00)	101.6 (4.00)	69.8 (2.75)	101.6 (4.00)	67 (2.62)	67 (2.62)
100 (4)	51 (2.00)	50.8 (2.00)	104.6 (4.12)	69.8 (2.75)	104.6 (4.12)	67 (2.62)	67 (2.62)
125 (5)	57 (2.25)	...	...	...	...	83 (3.25)	83 (3.25)
150 (6)	57 (2.25)	57.2 (2.25)	63.5 (2.50)	80.0 (3.15)	104.6 (4.12)	95 (3.75)	95 (3.75)
200 (8)	70 (2.75)	69.8 (2.75)	73.2 (2.88)	88.9 (3.50)	117.6 (4.63)	127 (5.00)	127 (5.00)
250 (10)	70 (2.75)	69.8 (2.75)	79.2 (3.12)	118.9 (4.68)	136.6 (5.38)	140 (5.50)	140 (5.50)
300 (12)	76 (3.00)	76.2 (3.00)	82.6 (3.25)	127.0 (5.00)	143.0 (5.63)	181 (7.12)	181 (7.12)
350 (14)	76 (3.00)	76.2 (3.00)	91.9 (3.62)	139.7 (5.50)	158.8 (6.25)	184 (7.25)	222 (8.75)
400 (16)	89 (3.50)	88.9 (3.50)	95.2 (3.75)	139.7 (5.50)	168.4 (6.63)	191 (7.50)	232 (9.12)
450 (18)	89 (3.50)	88.9 (3.50)	104.6 (4.12)	158.8 (6.25)	177.8 (7.00)	203 (8.00)	264 (10.38)
500 (20)	114 (4.50)	114.3 (4.50)	114.3 (4.50)	189.0 (7.44)	189.0 (7.44)	213 (8.38)	292 (11.50)
600 (24)	114 (4.50)	114.3 (4.50)	127.0 (5.00)	215.9 (8.50)	215.9 (8.50)	222 (8.75)	318 (12.50)
650 (26)	...	171.4 (6.75)	180.1 (7.09)	215.9 (8.50)	215.9 (8.50)	...	...
700 (28)	...	180.8 (7.12)	180.8 (7.12)	254.0 (10.00)	254.0 (10.00)	...	...
750 (30)	117.0 (4.62)	187.4 (7.38)	209.6 (8.25)	266.7 (10.50)	266.7 (10.50)	305 (12.00)	368 (14.50)
800 (32)	...	206.2 (8.12)	218.9 (8.62)	292.1 (11.50)	292.1 (11.50)	...	...
900 (36)	117.0 (4.62)	225.6 (8.88)	249.9 (9.84)	304.8 (12.00)	304.8 (12.00)	368 (14.50)	483 (19.00)
1050 (42)	...	247.6 (9.75)	304.8 (12.00)	304.8 (12.00)	374.6 (14.75)	432 (17.00)	568 (22.38)
1200 (48)	...	292.1 (11.50)	419.1 (16.50)	304.8 (12.00)	424.4 (16.75)	524 (20.62)	629 (24.75)

GENERAL NOTES:
(a) Dimensions are in millimeters (inches).
(b) The tolerances of para. 5.1 apply to face-to-face dimensions for sizes DN 600 (NPS 24) and smaller. For sizes DN 750 (NPS 30) and larger, the tolerance shall be ±6.0 mm (±0.25 in.).

NOTES:
(1) These data for CWP rated knife gate valves are extracted from MSS SP-81.
(2) These data for Class rated knife gate valves are extracted from MSS SP-135.
(3) These data for cast iron swing check valves are extracted from API 594.
(4) Valves of sizes DN 650 (NPS 26) and larger in Class 150, 300, and 600 shall have body outside diameters and gasket surface dimensions compatible with flange standards specified in the purchase order, e.g., ASME B16.47 Series B or ASME B16.47 Series A (MSS SP-44).
(5) These data for long pattern steel swing check valves in sizes DN 600 (NPS 24) and smaller are extracted from API 6D and API 594. Data for larger sizes are extracted from API 594.
(6) These data for short pattern steel swing check valves are extracted from API 6D.
(7) For API 6D valves, the dimension shall be 250.

Table 1.3-3
Classes 125 and 250 Cast Iron and Classes 150 to 2500 Steel Wafer Type Valves, Face-to-Face Dimensions

8	9	10	11	12	13	14	15	16	17	18	
Swing Check, Single and Dual Plate, Installation Between Standard ASME Flanges [Note (4)]											
Class Long Pattern [Note (5)]							Class Short Pattern [Note (6)]				Nominal Valve Size, DN (NPS)
150	300	600	900	1500	2500	150	300	600	900	1500	
60 (2.38)	60 (2.38)	60 (2.38)	70 (2.75)	70 (2.75)	70 (2.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	50 (2)
67 (2.62)	67 (2.62)	67 (2.62)	83 (3.25)	83 (3.25)	83 (3.25)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	65 ($2\frac{1}{2}$)
73 (2.88)	73 (2.88)	73 (2.88)	83 (3.25)	83 (3.25)	86 (3.38)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	22 (0.88)	80 (3)
73 (2.88)	73 (2.88)	79 (3.12)	102 (4.00)	102 (4.00)	105 (4.12)	19 (0.75)	19 (0.75)	22 (0.88)	22 (0.88)	32 (1.25)	100 (4)
...	...	...	...	...	...	...	...	...	...	...	125 (5)
98 (3.88)	98 (3.88)	136 (5.38)	159 (6.25)	159 (6.25)	159 (6.25)	19 (0.75)	22 (0.88)	29 (1.12)	35 (1.38)	44 (1.75)	150 (6)
127 (5.00)	127 (5.00)	165 (6.50)	206 (8.12)	206 (8.12)	206 (8.12)	29 (1.12)	29 (1.12)	38 (1.50)	44 (1.75)	57 (2.25)	200 (8)
146 (5.75)	146 (5.75)	213 (8.38)	241 (9.50)	248 (9.75)	254 (10.00) (7)	29 (1.12)	38 (1.50)	57 (2.25)	57 (2.25)	73 (2.88)	250 (10)
181 (7.12)	181 (7.12)	229 (9.00)	292 (11.50)	305 (12.00)	305 (12.00)	38 (1.50)	51 (2.00)	60 (2.38)	...	...	300 (12)
184 (7.25)	222 (8.75)	273 (10.75)	356 (14.00)	356 (14.00)	...	44 (1.75)	51 (2.00)	67 (2.62)	...	...	350 (14)
191 (7.50)	232 (9.12)	305 (12.00)	384 (15.12)	384 (15.12)	...	51 (2.00)	51 (2.00)	73 (2.88)	...	...	400 (16)
203 (8.00)	264 (10.38)	362 (14.25)	451 (17.75)	468 (18.44)	...	60 (2.38)	76 (3.00)	83 (3.25)	...	...	450 (18)
219 (8.62)	292 (11.50)	368 (14.50)	451 (17.75)	533 (21.00)	...	64 (2.50)	83 (3.25)	92 (3.62)	...	...	500 (20)
222 (8.75)	318 (12.50)	438 (17.25)	495 (19.50)	559 (22.00)	...	...	...	...	...	...	600 (24)
...	...	...	...	...	...	...	...	...	...	...	650 (26)
...	...	...	...	...	...	...	...	...	...	...	700 (28)
305 (12.00)	368 (14.50)	505 (19.8)	...	...	...	...	...	...	...	...	750 (30)
...	...	...	...	...	...	...	...	...	...	...	800 (32)
368 (14.50)	483 (19.00)	635 (25.00)	...	...	...	...	...	...	...	...	900 (36)
432 (17.00)	568 (22.37)	701 (27.61)	...	...	...	...	...	...	...	...	1050 (42)
524 (20.62)	629 (24.75)	...	...	...	...	...	...	...	...	...	1200 (48)

Table 1.3-4
Classes 25 and 125 Cast Iron and Classes 150 to 600 Steel Butterfly Valves, Face-to-Face Dimensions

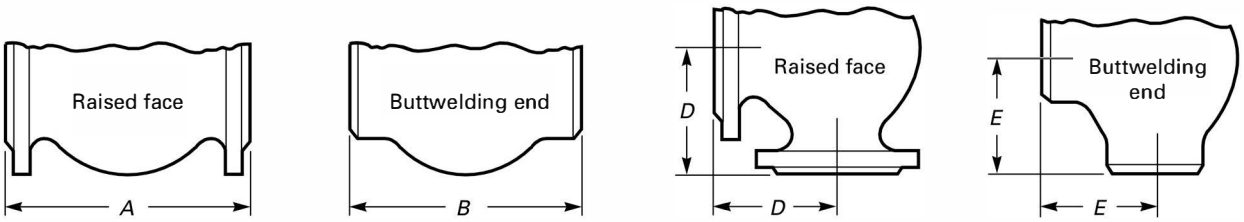
Nominal Valve Size, DN (NPS)	1	2	3	4	5	6	7	8	9
	Class 150 Cast Iron and Steel [Notes (1), (2), and (3)]					Steel Grooved End [Notes (1), (3)]	Steel Offset Seat Lug and Wafer Style [Notes (4), (5)]		
	Flanged End		Lug and Wafer Style [Note (6)]						
	Narrow	Wide	Narrow	Wide	Extra Wide	Class 150	Class 150	Class 300	Class 600
40 (1½)	...	...	33 (1.31)	37 (1.44)	38 (1.50)	86 (3.38)	...	...	...
50 (2)	...	...	43 (1.69)	44 (1.75)	46 (1.81)	81 (3.19)	...	...	...
65 (2½)	...	...	46 (1.81)	49 (1.94)	51 (2.00)	97 (3.81)	...	...	...
80 (3)	127 (5.00)	127 (5.00)	46 (1.81)	49 (1.94)	51 (2.00)	97 (3.81)	48 (1.88)	48 (1.88)	54 (2.12)
100 (4)	127 (5.00)	178 (7.00)	52 (2.06)	56 (2.19)	57 (2.25)	116 (4.56)	54 (2.12)	54 (2.12)	64 (2.50)
125 (5)	127 (5.00)	190 (7.50)	56 (2.19)	64 (2.50)	65 (2.56)	148 (5.81)	...	...	...
150 (6)	127 (5.00)	203 (8.00)	56 (2.19)	70 (2.75)	71 (2.81)	148 (5.81)	57 (2.25)	59 (2.31)	78 (3.06)
200 (8)	152 (6.00)	216 (8.50)	60 (2.38)	71 (2.81)	75 (2.94)	133 (5.25)	64 (2.50)	73 (2.88)	102 (4.00)
250 (10)	203 (8.00)	381 (15.00)	68 (2.69)	76 (3.00)	79 (3.12)	159 (6.25)	71 (2.81)	83 (3.25)	117 (4.62)
300 (12)	203 (8.00)	381 (15.00)	78 (3.06)	83 (3.25)	86 (3.38)	165 (6.50)	81 (3.19)	92 (3.62)	140 (5.50)
350 (14)	203 (8.00)	406 (16.00)	78 (3.06)	92 (3.62)	95 (3.75)	178 (7.00)	92 (3.62)	117 (4.62)	155 (6.12)
400 (16)	203 (8.00)	406 (16.00)	79 (3.12)	102 (4.00)	105 (4.12)	178 (7.00)	102 (4.00)	133 (5.25)	178 (7.00)
450 (18)	203 (8.00)	406 (16.00)	102 (4.00)	114 (4.50)	117 (4.62)	203 (8.00)	114 (4.50)	149 (5.88)	200 (7.88)
500 (20)	203 (8.00)	457 (18.00)	111 (4.38)	127 (5.00)	130 (5.12)	216 (8.50)	127 (5.00)	159 (6.25)	216 (8.50)
600 (24)	203 (8.00)	457 (18.00)	...	154 (6.06)	157 (6.19)	254 (10.00)	154 (6.06)	181 (7.12)	232 (9.13)
750 (30)	305 (12.00)	559 (22.00)	...	165 (6.50)	...	...	...	...	...
900 (36)	305 (12.00)	559 (22.00)	...	200 (7.88)	...	...	...	...	...
1050 (42)	305 (12.00)	610 (24.00)	...	251 (9.88)	...	...	...	...	...
1200 (48)	381 (15.00)	660 (26.00)	...	276 (10.88)	...	...	...	...	...
1350 (54)	381 (15.00)	711 (28.00)	...	...	...	...	...	...	...
1500 (60)	381 (15.00)	762 (30.00)	...	...	...	...	...	...	...
1650 (66)	457 (18.00)	864 (34.00)	...	...	...	...	...	...	...
1800 (72)	457 (18.00)	914 (36.00)	...	...	...	...	...	...	...

GENERAL NOTE: Dimensions are in millimeters (inches).

NOTES:
(1) 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.
(2) These valves are dimensionally compatible with flanges conforming to ASME B16.1 Class 25 or Class 125, ASME B16.5 Class 150, ASME B16.24 Class 150, ASME B16.42 Class 150, or AWWA C207.
(3) For these butterfly valves, a tolerance of ±2.0 mm (±0.06 in.) shall be allowed on face-to-face dimensions of valves of DN 150 (NPS 6) and smaller, and a tolerance of ±3.0 mm (±0.13 in.) on DN 200 (NPS 8) and larger, except that for single flange and flangeless valves of DN 750 (NPS 30) and larger, a tolerance of ±6.0 mm (±0.25 in.) shall be allowed.
(4) For these valves, a tolerance of ±3.0 mm (±0.13 in.) shall be allowed on the face-to-face dimensions for all sizes and pressure classes.
(5) The data for offset seat valves, columns 7 through 9, are extracted from MSS SP-68 and API 609.
(6) 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.

TABLE STARTS ON NEXT PAGE

Table 1.5-1
(22) **Class 600 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions**



	1	2	3	4	5
	Class 600 Steel				
	Flanged End [6.4 mm (0.25 in.) Raised Face] and Welding End				
	Ball	Gate		Plug	
Nominal Valve Size, DN (NPS)	Long Pattern, *A* and *B*	Solid Wedge, Double Disc, and Conduit, Long Pattern, *A* and *B*	Short Pattern, *B* [Note (1)]	Regular and Venturi Pattern, *A* and *B*	Round Bore, Full Port, *A*
15 (½)	165 (6.50)	165 (6.50) (2)	...	...	...
20 (¾)	190 (7.50)	190 (7.50) (2)	...	...	...
25 (1)	216 (8.50)	216 (8.50)	133 (5.25)	216 (8.50) (3)	254 (10.00)
32 (1¼)	229 (9.00)	229 (9.00)	146 (5.75)	229 (9.00) (3)	...
40 (1½)	241 (9.50)	241 (9.50)	152 (6.00)	241 (9.50)	318 (12.50)
50 (2)	292 (11.50)	292 (11.50)	178 (7.00)	292 (11.50)	330 (13.00)
65 (2½)	330 (13.00)	330 (13.00)	216 (8.50)	330 (13.00)	381 (15.00)
80 (3)	356 (14.00)	356 (14.00)	254 (10.00)	356 (14.00)	444 (17.50)
100 (4)	432 (17.00)	432 (17.00)	305 (12.00)	432 (17.00)	508 (20.00)
125 (5)	...	508 (20.00)	381 (15.00)	...	...
150 (6)	559 (22.00)	559 (22.00)	457 (18.00)	559 (22.00)	660 (26.00)
200 (8)	660 (26.00)	660 (26.00)	584 (23.00)	660 (26.00)	794 (31.25)
250 (10)	787 (31.00)	787 (31.00)	711 (28.00)	787 (31.00)	940 (37.00)
300 (12)	838 (33.00)	838 (33.00)	813 (32.00)	838 (33.00)	1067 (42.00)
350 (14)	889 (35.00)	889 (35.00)	889 (35.00)	889 (35.00)	...
400 (16)	991 (39.00)	991 (39.00)	991 (39.00)	991 (39.00)	...
450 (18)	1092 (43.00)	1092 (43.00)	1092 (43.00)	1092 (43.00) (5)	...
500 (20)	1194 (47.00)	1194 (47.00)	1194 (47.00)	1194 (47.00) (5)	...
550 (22)	1295 (51.00)	1295 (51.00)	...	1295 (51.00) (5)	...
600 (24)	1397 (55.00)	1397 (55.00)	1397 (55.00)	1397 (55.00) (5)	...
650 (26)	1448 (57.00)	1448 (57.00)	...	1448 (57.00) (5)	...
700 (28)	1549 (61.00)	1549 (61.00)	...	...	...
750 (30)	1651 (65.00)	1651 (65.00)	...	1651 (65.00) (5)	...
800 (32)	1778 (70.00)	1778 (70.00) (6)	...	1778 (70.00) (5)	...
850 (34)	1930 (76.00)	1930 (76.00) (6)	...	1930 (76.00) (5)	...
900 (36)	2083 (82.00)	2083 (82.00) (6)	...	2083 (82.00) (5)	...

Table 1.5-1
Class 600 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions

6	7	8	9	10	
Class 600 Steel					
Flanged End [6.4 mm (0.25 in.) Raised Face] and Welding End					
Plug					
Round Bore, Full Port, *B*	Globe, Lift Check, and Swing Check, Long Pattern, *A* and *B*	Globe, Lift Check, and Swing Check, Short Pattern, *B* [Note (1)]	Angle and Lift Check, Long Pattern, *D* and *E*	Angle and Lift Check, Short Pattern, *E* [Note (1)]	Nominal Valve Size, DN (NPS)
...	165 (6.50)	...	83 (3.25)	...	15 (1/2)
...	190 (7.50)	...	95 (3.75)	...	20 (3/4)
...	216 (8.50)	133 (5.25)	108 (4.25)	...	25 (1)
...	229 (9.00)	146 (5.75)	114 (4.50)	...	32 (1 1/4)
...	241 (9.50)	152 (6.00)	121 (4.75)	...	40 (1 1/2)
...	292 (11.50)	178 (7.00)	146 (5.75)	108 (4.25)	50 (2)
...	330 (13.00)	216 (8.50)	165 (6.50)	127 (5.00)	65 (2 1/2)
...	356 (14.00)	254 (10.00)	178 (7.00)	152 (6.00)	80 (3)
559 (22.00)	432 (17.00)	305 (12.00)	216 (8.50)	178 (7.00)	100 (4)
...	508 (20.00)	381 (15.00)	254 (10.00)	216 (8.50)	125 (5)
711 (28.00)	559 (22.00)	457 (18.00)	279 (11.00)	254 (10.00)	150 (6)
845 (33.25)	660 (26.00)	584 (23.00)	330 (13.00)	...	200 (8)
1016 (40.00)	787 (31.00)	711 (28.00)	394 (15.50)	...	250 (10)
1067 (42.00)	838 (33.00)	813 (32.00)	419 (16.50)	...	300 (12)
...	889 (35.00) (4)	...	...	...	350 (14)
...	991 (39.00) (4)	...	...	...	400 (16)
...	1092 (43.00) (4)	...	...	...	450 (18)
...	1194 (47.00) (4)	...	...	...	500 (20)
...	1295 (51.00) (4)	...	...	...	550 (22)
...	1397 (55.00) (4)	...	...	...	600 (24)
...	1448 (57.00) (4)	...	...	...	650 (26)
...	1600 (63.00) (4)	...	...	...	700 (28)
...	1651 (65.00) (4)	...	...	...	750 (30)
...	...	...	...	...	800 (32)
...	...	...	...	...	850 (34)
...	2083 (82.00) (4)	...	...	...	900 (36)

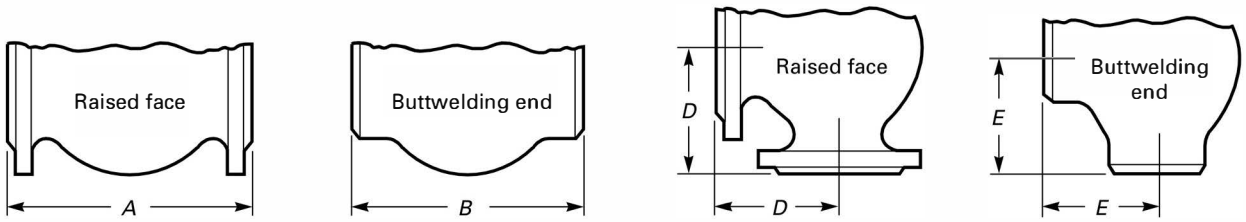
Table 1.5-1
Class 600 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)

GENERAL NOTES:
(a) Dimensions are in millimeters (inches).
(b) See Table 3.2-1 for adjustments to tabulated dimensions that 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) Swing check only.
(5) Venturi pattern only.
(6) Double disc and conduit only.

TABLE STARTS ON NEXT PAGE

Table 1.5-2
(22) **Class 900 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions**



	1	2	3	4
	Class 900 Steel			
	Flanged End [6.4 mm (0.25 in.) Raised Face] and Welding End			
	Gate		Plug	
Nominal Valve Size, DN (NPS)	Solid Wedge, Double Disc, and Conduit, Long Pattern, *A* and *B*	Short Pattern, *B* [Note (1)]	Regular and Venturi Pattern, *A* and *B*	Round Port, Full Bore, *A*
20 (¾) (2)	...	...	...	...
25 (1) (2)	254 (10.00) (3)	140 (5.50)	254 (10.00) (4)	...
32 (1¼) (2)	279 (11.00) (3)	165 (6.50)	279 (11.00) (4)	...
40 (1½) (2)	305 (12.00) (3)	178 (7.00)	305 (12.00) (4)	356 (14.00)
50 (2) (2)	368 (14.50)	216 (8.50)	368 (14.50) (4)	381 (15.00)
65 (2½) (2)	419 (16.50)	254 (10.00)	419 (16.50) (4)	432 (17.00)
80 (3)	381 (15.00)	305 (12.00)	381 (15.00) (4)	470 (18.50)
100 (4)	457 (18.00)	356 (14.00)	457 (18.00) (5)	559 (22.00)
125 (5)	559 (22.00)	432 (17.00)	...	...
150 (6)	610 (24.00)	508 (20.00)	610 (24.00)	737 (29.00)
200 (8)	737 (29.00)	660 (26.00)	737 (29.00)	813 (32.00)
250 (10)	838 (33.00)	787 (31.00)	838 (33.00)	965 (38.00)
300 (12)	965 (38.00)	914 (36.00)	965 (38.00)	1 118 (44.00)
350 (14)	1 029 (40.50)	991 (39.00)	...	...
400 (16)	1 130 (44.50)	1 092 (43.00)	1 130 (44.50) (5)	...
450 (18)	1 219 (48.00)	...	...	...
500 (20)	1 321 (52.00)	...	1 321 (52.00) (5)	...
550 (22)	...	...	...	...
600 (24)	1 549 (61.00)	...	...	...
650 (26)	...	...	...	...
750 (30)	...	...	...	...
900 (36)	...	...	...	...

Table 1.5-2
Class 900 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions

5	6	7	8	9	
Class 900 Steel					
Flanged End [6.4 mm (0.25 in.) Raised Face] and Welding End					
				Ball	
Globe, Lift Check, and Swing Check, Long Pattern, *A* and *B*	Globe, Lift Check, and Swing Check, Short Pattern, *B* [Note (1)]	Angle and Lift Check, Long Pattern, *D* and *E*	Angle and Lift Check, Short Pattern, *E* [Note (1)]	Long Pattern, *A* and *B*	Nominal Valve Size, DN (NPS)
229 (9.00)	...	114 (4.50)	...	...	20 (¾) (2)
254 (10.00)	...	127 (5.00)	...	254 (10.00)	25 (1) (2)
279 (11.00)	...	140 (5.50)	...	279 (11.00)	32 (1¼) (2)
305 (12.00)	...	152 (6.00)	...	305 (12.00)	40 (1½) (2)
368 (14.50)	...	184 (7.25)	...	368 (14.50)	50 (2) (2)
419 (16.50)	254 (10.00)	210 (8.25)	...	419 (16.50)	65 (2½) (2)
381 (15.00)	305 (12.00)	190 (7.50)	152 (6.00)	381 (15.00)	80 (3)
457 (18.00)	356 (14.00)	229 (9.00)	178 (7.00)	457 (18.00)	100 (4)
559 (22.00)	432 (17.00)	279 (11.00)	216 (8.50)	...	125 (5)
610 (24.00)	508 (20.00)	305 (12.00)	254 (10.00)	610 (24.00)	150 (6)
737 (29.00)	660 (26.00)	368 (14.50)	330 (13.00)	737 (29.00)	200 (8)
838 (33.00)	787 (31.00)	419 (16.50)	394 (15.50)	838 (33.00)	250 (10)
965 (38.00)	914 (36.00)	483 (19.00)	457 (18.00)	965 (38.00)	300 (12)
1 029 (40.50)	991 (39.00)	514 (20.25)	495 (19.50)	1 029 (40.50)	350 (14)
1 130 (44.50) (6)	1 092 (43.00)	660 (26.00)	...	1 130 (44.50)	400 (16)
1 219 (48.00) (6)	...	737 (29.00)	...	1 219 (48.00)	450 (18)
1 321 (52.00) (6)	...	826 (32.50)	...	1 321 (52.00)	500 (20)
...	...	...	...	...	550 (22)
1 549 (61.00) (6)	...	991 (39.00)	...	1 549 (61.00)	600 (24)
...	...	...	...	1 651 (65.00) (7)	650 (26)
...	...	...	...	1 880 (74.00) (7)	750 (30)
...	...	...	...	2 286 (90.00) (7)	900 (36)

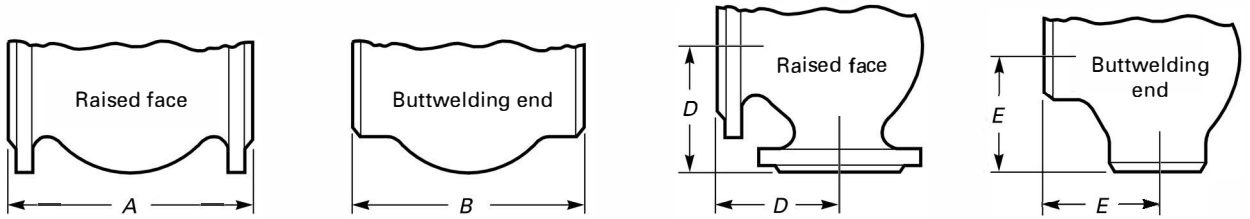
Table 1.5-2
Class 900 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)

GENERAL NOTES:
(a) Dimensions are in millimeters (inches).
(b) See Table 3.2-1 for adjustments to tabulated dimensions that 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, DN 65 (NPS 2½) and smaller, are identical to those of Class 1500 valves. The face-to-face dimensions for all Class 900 valves, DN 65 (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.
(7) These data for Class 900 full and reduced bore ball valves are extracted from API 6D.

Table 1.5-3
Class 1500 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions

(22)



	1	2	3	4	5	6	7	8
	Class 1500 Steel							
	Flanged End [6.4 mm (0.25 in.) Raised Face] and Welding End							
	Gate		Plug					Ball
Nominal Valve Size, DN (NPS)	Solid Wedge, Double Disc, and Conduit, Long Pattern, *A* and *B*	Short Pattern, *B* [Note (1)]	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, *B* [Note (1)]	Angle and Lift Check, Long Pattern, *D* and *E*	Long Pattern, *A* and *B*
15 (½)	...	...	...	...	216 (8.50) (2)	...	108 (4.25)	...
20 (¾)	...	...	...	...	229 (9.00)	...	114 (4.50)	...
25 (1)	254 (10.00) (3)	140 (5.50)	254 (10.00) (4)	...	254 (10.00)	...	127 (5.00)	...
32 (1¼)	279 (11.00) (3)	165 (6.50)	279 (11.00) (4)	...	279 (11.00)	...	140 (5.50)	...
40 (1½)	305 (12.00) (3)	178 (7.00)	305 (12.00) (4)	...	305 (12.00)	...	152 (6.00)	...
50 (2)	368 (14.50)	216 (8.50)	368 (14.50) (4)	391 (15.38)	368 (14.50)	216 (8.50)	184 (7.25)	368 (14.50)
65 (2½)	419 (16.50)	254 (10.00)	419 (16.50) (4)	454 (17.88)	419 (16.50)	254 (10.00)	210 (8.25)	419 (16.50)
80 (3)	470 (18.50)	305 (12.00)	470 (18.50) (4)	524 (20.62)	470 (18.50)	305 (12.00)	235 (9.25)	470 (18.50)
100 (4)	546 (21.50)	406 (16.00)	546 (21.50) (4)	625 (24.62)	546 (21.50)	406 (16.00)	273 (10.75)	546 (21.50)
125 (5)	673 (26.50)	483 (19.00)	...	...	673 (26.50)	483 (19.00)	337 (13.25)	...
150 (6)	705 (27.75)	559 (22.00)	705 (27.75)	787 (31.00)	705 (27.75)	559 (22.00)	353 (13.88)	705 (27.75)
200 (8)	832 (32.75)	711 (28.00)	832 (32.75)	889 (35.00)	832 (32.75)	711 (28.00)	416 (16.38)	832 (32.75)
250 (10)	991 (39.00)	864 (34.00)	991 (39.00)	1 067 (42.00)	991 (39.00)	864 (34.00)	495 (19.50)	991 (39.00)
300 (12)	1 130 (44.50)	991 (39.00)	1 130 (44.50)	1 219 (48.00)	1 130 (44.50)	991 (39.00)	565 (22.25)	1 130 (44.50)
350 (14)	1 257 (49.50)	1 067 (42.00)	...	...	1 257 (49.50)	1 067 (42.00)	629 (24.75)	1 257 (49.50)
400 (16)	1 384 (54.50)	1 194 (47.00)	1 384 (54.50) (5)	...	1 384 (54.50) (6)	1 194 (47.00)	...	1 384 (54.50)
450 (18)	1 537 (60.50)	1 346 (53.00)	...	...	1 537 (60.50) (6)	...	...	1 537 (60.50) (7)
500 (20)	1 664 (65.50)	1 473 (58.00)	...	...	1 664 (65.50) (6)	...	...	1 664 (65.50) (7)

Table 1.5-3
Class 1500 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)

	1	2	3	4	5	6	7	8
	Class 1500 Steel							
	Flanged End [6.4 mm (0.25 in.) Raised Face] and Welding End							
	Gate		Plug					Ball
Nominal Valve Size, DN (NPS)	Solid Wedge, Double Disc, and Conduit, Long Pattern, *A* and *B*	Short Pattern, *B* [Note (1)]	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, *B* [Note (1)]	Angle and Lift Check, Long Pattern, *D* and *E*	Long Pattern, *A* and *B*
550 (22)	...	...	...	...	...	...	...	...
600 (24)	1943 (76.50)	...	...	...	1943 (76.50) (6)	...	...	...
650 (26)	...	...	...	...	...	...	...	1943 (76.50) (7)

GENERAL NOTES:

(a) Dimensions are in millimeters (inches).

(b) See Table 3.2-1 for adjustments to tabulated dimensions that 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) Globe and lift check only.

(3) Solid wedge only.

(4) Regular pattern only.

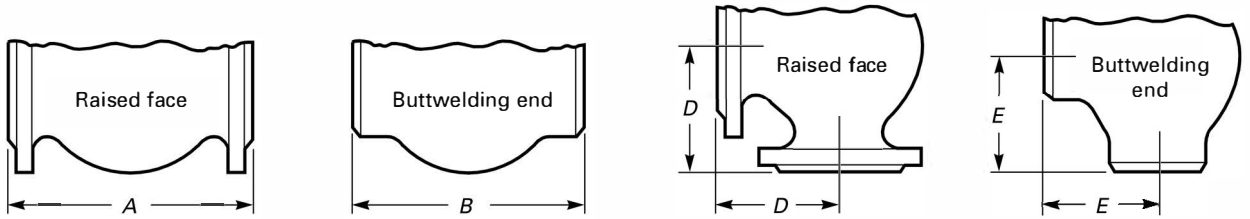
(5) Venturi pattern only.

(6) Swing check only.

(7) These data for Class 1500 full and reduced bore valves are extracted from API 6D.

Table 1.5-4
Class 2500 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions

(22)



	1	2	3	4	5	6	7
	Class 2500 Steel						
	Flanged End [6.4 mm (0.25 in.) Raised Face] and Welding End						
	Gate						Ball
Nominal Valve Size, DN (NPS)	Solid Wedge, Double Disc, and Conduit, Long Pattern, *A* and *B*	Short Pattern, *B* [Note (1)]	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, *B* [Note (1)]	Angle and Lift Check, Long Pattern, *D* and *E*	Long Pattern, *A* and *B*
15 (½)	264 (10.38) (2)	...	...	264 (10.38)	...	132 (5.19)	...
20 (¾)	273 (10.75) (2)	...	...	273 (10.75)	...	137 (5.38)	...
25 (1)	308 (12.12) (2)	186 (7.31)	308 (12.12)	308 (12.12)	...	154 (6.06)	...
32 (1¼)	349 (13.75) (2)	232 (9.12)	...	349 (13.75)	...	175 (6.88)	...
40 (1½)	384 (15.12) (2)	232 (9.12)	384 (15.12)	384 (15.12)	...	192 (7.56)	...
50 (2)	451 (17.75)	279 (11.00)	451 (17.75)	451 (17.75)	279 (11.00)	226 (8.88)	451 (17.75)
65 (2½)	508 (20.00)	330 (13.00)	508 (20.00)	508 (20.00)	330 (13.00)	254 (10.00)	508 (20.00)
80 (3)	578 (22.75)	368 (14.50)	578 (22.75)	578 (22.75)	368 (14.50)	289 (11.38)	578 (22.75)
100 (4)	673 (26.50)	457 (18.00)	673 (26.50)	673 (26.50)	457 (18.00)	337 (13.25)	673 (26.50)
125 (5)	794 (31.25)	533 (21.00)	794 (31.25)	794 (31.25)	533 (21.00)	397 (15.62)	...
150 (6)	914 (36.00)	610 (24.00)	914 (36.00)	914 (36.00)	610 (24.00)	457 (18.00)	914 (36.00)
200 (8)	1 022 (40.25)	762 (30.00)	1 022 (40.25)	1 022 (40.25)	762 (30.00)	511 (20.12)	1 022 (40.25)
250 (10)	1 270 (50.00)	914 (36.00)	1 270 (50.00)	1 270 (50.00)	914 (36.00)	635 (25.00)	1 270 (50.00)
300 (12)	1 422 (56.00)	1 041 (41.00)	1 422 (56.00)	1 422 (56.00)	1 041 (41.00)	711 (28.00)	1 422 (56.00)
350 (14)	...	1 118 (44.00)	...	...	...	...	...
400 (16)	...	1 245 (49.00)	...	...	...	...	...
450 (18)	...	1 397 (55.00)	...	...	...	...	...

Table 1.5-4
Class 2500 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions (Cont'd)

GENERAL NOTES:
(a) Dimensions are in millimeters (inches).
(b) See Table 3.2-1 for adjustments to tabulated dimensions that may be required for certain flanged 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 3.2-1
Determination of Face-to-Face and End-to-End Dimensions of Flanged Valves Having Various Flange Facings (22)

Material	Class	Flat Face	Face-to-Face [Notes (1), (2)]				Ring Type Joint	End-to-End [Notes (1), (2)]	
			1.5 mm (0.06 in.) Raised Face	6.4 mm (0.25 in.) Raised Face	Large or Small			Large or Small	
					Male Face	Tongue Face		Female Face	Groove Face
Cast iron	125	(3)	...	...	...	...	...	...	...
	250	...	(3)	...	...	...	...	...	...
Steel	150	(4)	(3)	...	+13 (+0.50)	+13 (+0.50)	(5)	+10 (+0.38)	+10 (+0.38)
	300	(4)	(3)	...	+13 (+0.50)	+13 (+0.50)	(5)	+10 (+0.38)	+10 (+0.38)
	600 to 2500	...	...	(3)	(6)	(6)	(5)	−3 (−0.12)	−3 (−0.12)

GENERAL NOTE: Dimensions are in millimeters (inches).

NOTES:

(1) 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 1.3-1 through 1.5-4 by the amount shown.

(2) For center-to-face or center-to-end dimensions of angle type valves, use one-half the numerical adjustment shown herein.

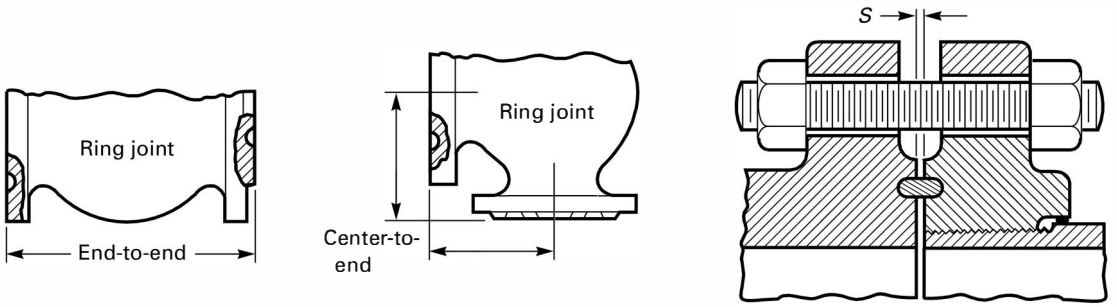
(3) These face-to-face dimensions are listed in Tables 1.3-1 through 1.5-4. (See table of desired Class Number.)

(4) For Class 150 and for Class 300 steel valves having flat faces, either the full thickness of the flange or the thickness with the 1.5 mm (0.06 in.) raised face removed may be supplied unless otherwise specified. For full thickness of flange, the face-to-face dimensions listed for 1.5 mm (0.06 in.) raised face apply. Users are reminded that removing the 1.5 mm (0.06 in.) raised faces will make the face-to-face dimensions nonstandard.

(5) The *X* dimensions given in added to the appropriate raised face flange face-to-face dimensions of Tables 1.3-1 through 1.5-4 establish the end-to-end dimensions of steel valves having flanges with ring joint facings.

(6) These face-to-face dimensions are those listed for 6.4 mm (0.25 in.) raised face in Tables 1.5-1 through 1.5-4.

Table 3.3-1
Classes 150 to 2500 Steel Valves Having End Flanges With Ring Joint Facings, End-to-End Dimensions



Nominal Valve Size, DN (NPS)	1	2	3	4	5	6	7	8	9	10	11	12
	Class 150		Class 300		Class 600		Class 900		Class 1500		Class 2500	
	X	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*
15 (½)	...	...	11 (0.44)	3 (0.12)	−2 (−0.06) (1)	3 (0.12)	0	4 (0.16)	0	4 (0.16)	0	4 (0.16)
20 (¾)	...	...	13 (0.50)	4 (0.16)	0	4 (0.16)	0	4 (0.16)	0	4 (0.16)	0	4 (0.16)
25 (1)	13 (0.50)	4 (0.16)	13 (0.50)	4 (0.16)	0	4 (0.16)	0	4 (0.16)	0	4 (0.16)	0	4 (0.16)
32 (1¼)	13 (0.50)	4 (0.16)	13 (0.50)	4 (0.16)	0	4 (0.16)	0	4 (0.16)	0	4 (0.16)	3 (0.12)	3 (0.12)
40 (1½)	13 (0.50)	4 (0.16)	13 (0.50)	4 (0.16)	0	4 (0.16)	0	4 (0.16)	0	4 (0.16)	3 (0.12)	3 (0.12)
50 (2)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)
65 (2½)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)	6 (0.25)	3 (0.12)
80 (3)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	4 (0.16)	3 (0.12)	3 (0.12)	6 (0.25)	3 (0.12)
100 (4)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	4 (0.16)	3 (0.12)	3 (0.12)	10 (0.38)	4 (0.16)
125 (5)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	4 (0.16)	3 (0.12)	3 (0.12)	13 (0.50)	4 (0.16)
150 (6)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	4 (0.16)	6 (0.25)	3 (0.12)	13 (0.50)	4 (0.16)
200 (8)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	4 (0.16)	10 (0.38)	4 (0.16)	16 (0.62)	5 (0.19)
250 (10)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	4 (0.16)	10 (0.38)	4 (0.16)	22 (0.88)	6 (0.25)
300 (12)	13 (0.50)	4 (0.16)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	3 (0.12)	4 (0.16)	16 (0.62)	5 (0.19)	22 (0.88)	8 (0.31)
350 (14)	13 (0.50)	3 (0.12)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	10 (0.38)	4 (0.16)	19 (0.75)	6 (0.22)	...	...
400 (16)	13 (0.50)	3 (0.12)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	10 (0.38)	4 (0.16)	22 (0.88)	8 (0.31)	...	...
450 (18)	13 (0.50)	3 (0.12)	16 (0.62)	6 (0.22)	3 (0.12)	5 (0.19)	13 (0.50)	5 (0.19)	22 (0.88)	8 (0.31)	...	...
500 (20)	13 (0.50)	3 (0.12)	19 (0.75)	6 (0.22)	6 (0.25)	5 (0.19)	13 (0.50)	5 (0.19)	22 (0.88)	10 (0.38)	...	...
550 (22)	13 (0.50) (2)	(3)	22 (0.88) (2)	6 (0.25)	10 (0.38) (2)	6 (0.22)	...	...	...	...	...	...
600 (24)	13 (0.50)	3 (0.12)	22 (0.88)	6 (0.25)	10 (0.38)	6 (0.22)	19 (0.75)	6 (0.22)	28 (1.12)	11 (0.44)	...	...

Table 3.3-1
Classes 150 to 2500 Steel Valves Having End Flanges With Ring Joint Facings, End-to-End Dimensions (Cont'd)

Nominal Valve Size, DN (NPS)	1	2	3	4	5	6	7	8	9	10	11	12
	Class 150		Class 300		Class 600		Class 900		Class 1500		Class 2500	
	X	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*
650 (26)	...	...	25 (1.00) (2)	6 (0.25)	13 (0.50) (2)	6 (0.22)	21 (0.87)	(3)	...	...	...	...
700 (28)	...	...	25 (1.00) (2)	6 (0.25)	13 (0.50) (2)	6 (0.22)	21 (0.87)	(3)	...	...	...	...
750 (30)	...	...	25 (1.00) (2)	6 (0.25)	13 (0.50) (2)	6 (0.22)	21 (0.87)	(3)	...	...	...	...
800 (32)	...	...	28 (1.12) (2)	(3)	16 (0.62) (2)	(3)	21 (0.87)	(3)	...	...	...	...
850 (34)	...	...	28 (1.12) (2)	(3)	16 (0.62) (2)	(3)	27 (1.12)	(3)	...	...	...	...
900 (36)	...	...	28 (1.12) (2)	(3)	16 (0.62) (2)	(3)	27 (1.12)	(3)	...	...	...	...

GENERAL NOTES:

(a) Dimensions are in millimeters (inches).

(b) Flanges conform to those of ASME B16.5 for the corresponding size and pressure class, except in DN 550 (NPS 22), DN 650 (NPS 26), and larger sizes. See Note (2).

(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 1.3-1 through 1.5-4. 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:

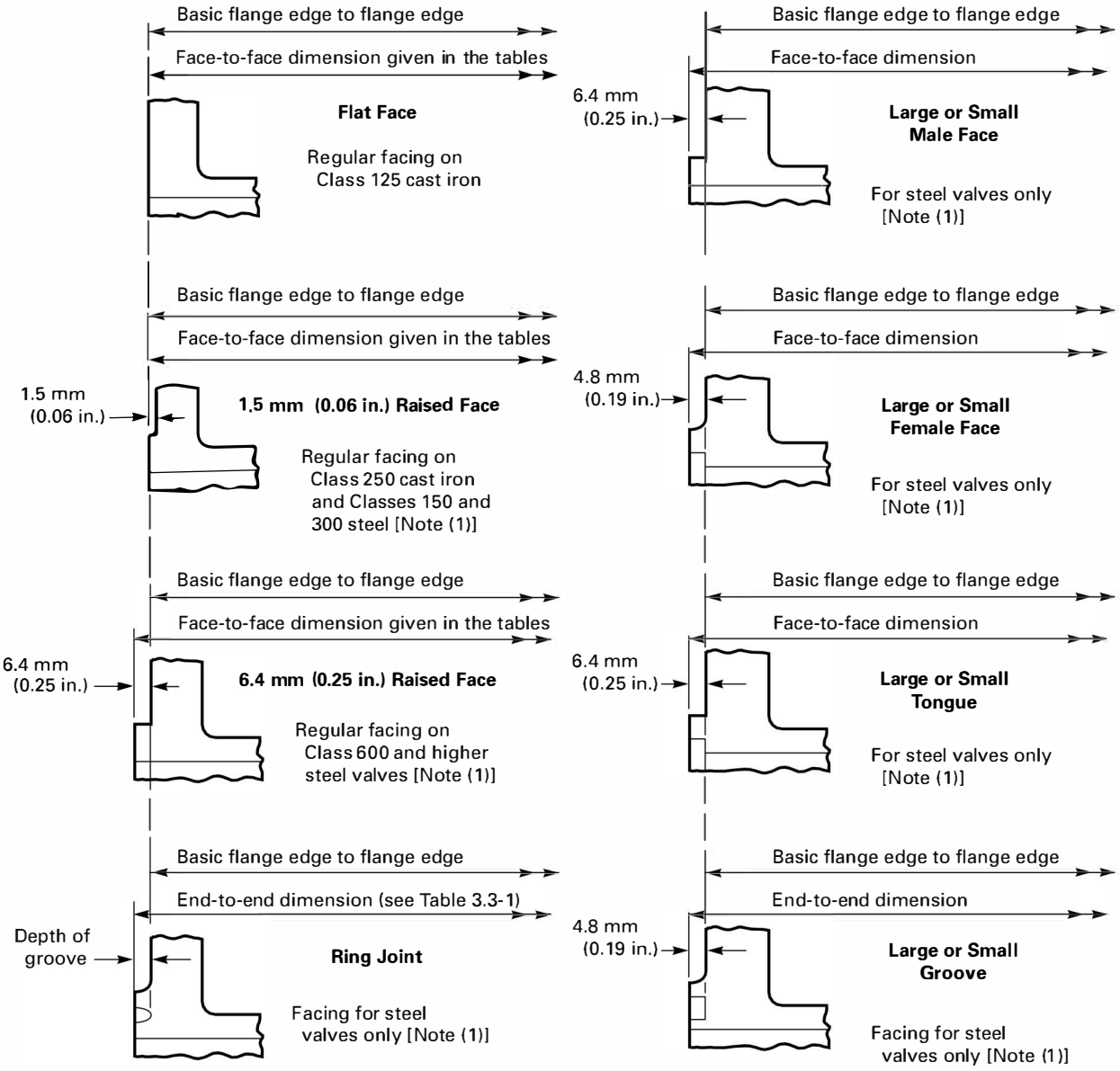
(1) This dimension has a minus value because the height of the applicable ring joint face is 1 mm (0.22 in.) less than the height of the raised face is 0.25 in..

(2) Flanges for DN 550 (NPS 22), DN 650 (NPS 26), and larger sizes conform to those of MSS SP-44 and ASME B16.47, Series A for the corresponding size and pressure class.

(3) *S* dimension is not determined.

(22)

Figure 2.3.1-1
Flange Facings and Their Relationships

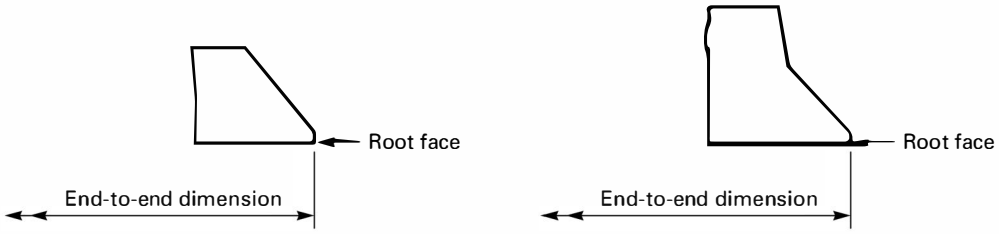


(a) Regular Standard Facings [Note (2)]

(b) Other Standard Facings [Note (3)]

NOTES:
(1) Steel includes nonferrous materials in ASME B16.34.
(2) Regular flange facings for valves are shown above. Valves normally carried in stock are so faced.
(3) Valves are supplied with the facings shown above when specified. See Table 3.2-1 to determine face-to-face dimensions of valves with these facings.

Figure 2.4-1
Welding Ends



(a) Plain Bevel **(b) Compound Bevel**

GENERAL NOTE: Typical bevels are shown for illustration only.

NONMANDATORY APPENDIX A
REFERENCES

The following is a list of publications referenced in this Standard.

API 6D, Twenty-Fourth Edition, Specification for Pipeline Valves
API 594, Eighth Edition, Check Valves: Flanged, Lug, Wafer, and Butt-Welding
API 609, Seventh Edition, Butterfly Valves: Double-Flanged, Lug- and Wafer-Type
Publisher: American Petroleum Institute (API), 200 Massachusetts Avenue NW, Suite 1100, Washington, DC 20001-5571 (www.api.org)

ASME B16.1, Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
ASME B16.5, Pipe Flanges and Flanged Fittings
ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500, and 2500
ASME B16.34, Valves — Flanged, Threaded, and Welding End
ASME B16.42, Ductile Iron Pipe Flanges and Flanged Fittings, Class 150 and 300
ASME B16.47, Large Diameter Steel Flanges NPS 26 through NPS 60
Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASTM A29, Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 (www.astm.org)

AWWA C207-13, Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In. (100 mm Through 3600 mm)
AWWA C508-09, Swing-Check Valves for Waterworks Service, 2-In. Through 24-In. (50-mm Through 600-mm) NPS
AWWA C517-09, Resilient-Seated Cast-Iron Eccentric Plug Valves
Publisher: American Water Works Association (AWWA), 6666 West Quincy Avenue, Denver, CO 80235 (www.awwa.org)

MSS SP-44-2010, Steel Pipe Line Flanges
MSS SP-67-2011, Butterfly Valves
MSS SP-68-2011, High Pressure Butterfly Valves with Offset Design
MSS SP-81-2013, Stainless Steel Bonnetless, Flanged Knife Gate Valves
MSS SP-135-2006, High Pressure Steel Knife Gate Valves
Publisher: Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS), 127 Park Street, NE, Vienna, VA 22180 (www.msshq.org)

B16 AMERICAN NATIONAL STANDARDS FOR PIPING, PIPE FLANGES, FITTINGS, AND VALVES

B16.1-2020	Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
B16.3-2021	Malleable Iron Threaded Fittings: Classes 150 and 300
B16.4-2021	Gray Iron Threaded Fittings: Classes 125 and 250
B16.5-2020	Pipe Flanges and Flanged Fittings: NPS ½ Through NPS 24 Metric/Inch Standard
B16.9-2018	Factory-Made Wrought Buttwelding Fittings
B16.10-2022	Face-to-Face and End-to-End Dimensions of Valves
B16.11-2016	Forged Fittings, Socket-Welding and Threaded
B16.12-2019	Cast Iron Threaded Drainage Fittings
B16.14-2018	Ferrous Pipe Plugs, Bushings, and Locknuts With Pipe Threads
B16.15-2018	Cast Copper Alloy Threaded Fittings
B16.18-2021	Cast Copper Alloy Solder Joint Pressure Fittings
B16.20-2017	Metallic Gaskets for Pipe Flanges
B16.21-2021	Nonmetallic Flat Gaskets for Pipe Flanges
B16.22-2021	Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
B16.23-2021	Cast Copper Alloy Solder Joint Drainage Fittings: DWV
B16.24-2021	Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500, and 2500
B16.25-2017	Buttwelding Ends
B16.26-2018	Cast Copper Alloy Fittings for Flared Copper Tubes
B16.29-2017	Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings — DWV
B16.33-2012 (R2017)	Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 175 psi (Sizes NPS ½ Through NPS 2)
B16.34-2020	Valves — Flanged, Threaded, and Welding End
B16.36-2020	Orifice Flanges
B16.38-2012 (R2017)	Large Metallic Valves for Gas Distribution: Manually Operated, NPS 2½ (DN 65) to NPS 12 (DN 300), 125 psig (8.6 bar) Maximum
B16.39-2019	Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300
B16.40-2019	Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems
B16.42-2021	Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300
B16.44-2012 (R2017)	Manually Operated Metallic Gas Valves for Use in Aboveground Piping Systems Up to 5 psi
B16.47-2020	Large Diameter Steel Flanges: NPS 26 Through NPS 60 Metric/Inch Standard
B16.48-2020	Line Blanks
B16.49-2017	Factory-Made, Wrought Steel, Buttwelding Induction Bends for Transportation and Distribution Systems
B16.50-2021	Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings
B16.51-2021	Copper and Copper Alloy Press-Connect Pressure Fittings
B16.52-2018	Forged Nonferrous Fittings, Socket-Welding and Threaded (Titanium, Titanium Alloys, Aluminum, and Aluminum Alloys)

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