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

ASME B16.10-2000

(Revision of ASME B16.10-1992)

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This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda issued to this edition. The next edition of this Standard is scheduled for publication in 2005.

ASME will issue written replies to inquiries concerning interpretation of technical aspects of this Standard.

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

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 Instrument Society of America, 67 Alexandria Drive, Research Triangle Park, NC 27709.

In this 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.

Requests for interpretations or suggestions for revisions should be sent to the Secretary, B16 Committee, The American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016.

Following approval by the B16 Main Committee and the ASME Supervisory Board, this Standard was approved as an American National Standard by ANSI on June 7, 2000.

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, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B16 Main Committee
The American Society of Mechanical Engineers
Three Park Avenue
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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.

Interpretations. Upon request, the B16 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 Main Committee.

The request for 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.
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. The inquirer may also include any plans or drawings, which are necessary to explain the question; however, they should not contain proprietary names or information.

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

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 Main Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B16 Main Committee.

CONTENTS

Foreword iii
Standards Committee Roster v
Correspondence With the B16 Committee vi

1 Scope 1

2 Definitions 2

3 Facings of Flanged Valves 3

4 Variations of Length Within a Class of Valves 5

5 Tolerances 5

Figures

1 Flange Facings and Their Relationships 4
2 Welding Ends 5

Tables

Metric Unit Tables

Tables 1 to 10 are formatted using millimeter units.
See para. 1.2 for applicability.

1 Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 6
2 Class 250 Cast Iron Flanged and Class 300 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 9
3 Class 600 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 12
4 Class 900 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 14
5 Class 1500 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 15
6 Class 2500 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 17
7 Classes 125 and 250 Cast Iron and Classes 150 to 2500 Steel Wafer Type Valves, Face-to-Face Dimensions 18
8 Classes 25 and 125 Cast Iron and Classes 150 to 600 Steel Butterfly Valves, Face-to-Face Dimensions 19
9 Determination of Face-to-Face and End-to-End Dimensions of Flanged Valves Having Various Flange Facings 20
10 Classes 150 to 2500 Steel Valves Having End Flanges With Ring Joint Facings, End-to-End Dimensions 21

U.S. Customary Unit Tables

Tables A1 to A10 are formatted using inch units.
See para. 1.2 for applicability.

A1 Class 125 Cast Iron Flanged and Class 150 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 23
A2 Class 250 Cast Iron Flanged and Class 300 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 26
A3 Class 600 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 29
A4 Class 900 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 31
A5 Class 1500 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 32
A6 Class 2500 Steel Flanged and Buttwelding End Valves, Face-to-Face and End-to-End Dimensions 34
A7 Classes 125 and 250 Cast Iron and Classes 150 to 2500 Steel Wafer Type Valves, Face-to-Face Dimensions 35
A8 Classes 25 and 125 Cast Iron and Classes 150 to 600 Steel Butterfly Valves, Face-to-Face Dimensions 36
A9 Determination of Face-to-Face and End-to-End Dimensions of Flanged Valves Having Various Flange Facings 37
A10 Classes 150 to 2500 Steel Valves Having End Flanges With Ring Joint Facings, End-to-End Dimensions 38

Mandatory Annex

I References 41

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 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.

In Tables 1 to 6 (Tables A1 to A6), *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 values stated in either millimeter units (Tables 1 to 10) or inch units[1] (Tables A1 to A10) are to be regarded separately as standard. Within the text, the inch units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

[1] Linear inch 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 = $^3/_8$	

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 as follows.

1.3.1 Gate, Plug, and Check Valves

(a) Class[2] 125 — Tables 1 and A1
(b) Class 250 — Tables 2 and A2

1.3.2 Globe and Angle Valves

(a) Class 125 — Tables 1 and A1
(b) Class 250 — Tables 2 and A2

1.3.3 Wafer Swing Check Valves

(a) Class 125 — Tables 7 and A7
(b) Class 250 — Tables 7 and A7

1.3.4 Butterfly Valves

(a) Class 25 — Tables 8 and A8
(b) Class 125 — Tables 8 and A8

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 — Tables 1 and A1
(b) Class 300 — Tables 2 and A2

1.5 Steel and Alloy Valves

This category includes carbon, alloy, and 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,

[2] For explanation of *Class* and relationship to PN, see para. 2.2.

ASME B16.47, Series A, or MSS SP-44. [For flanged end butterfly valves, refer to Note (3) of Table 8 (A8) for flange information.] For flangeless or wafer valves intended for assembly between flanges, refer to Tables 7 and 8 (A7 and A8) 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 as follows.

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

(a) Class 150 — Tables 1 and A1
(b) Class 300 — Tables 2 and A2
(c) Class 600 — Tables 3 and A3
(d) Class 900 — Tables 4 and A4
(e) Class 1500 — Tables 5 and A5
(f) Class 2500 — Tables 6 and A6

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

Class 150 — Tables 1 and A1

1.5.3 Wafer Knife Gate Valves

Class 150 — Tables 7 and A7

1.5.4 Wafer Swing Check Valves

Class 150 to 2500 — Tables 7 and A7

1.5.5 Butterfly Valves

(a) Class 150 — Tables 8 and A8
(b) Class 300 — Tables 8 and A8
(c) Class 600 — Tables 8 and A8

1.6 Convention

For the purpose of determining conformance with this Standard, the convention for fixing significant digits where limits, maximum or minimum values, are specified shall be ''rounding off'' as defined in ASTM Practice E29. This requires that an observed or calculated value shall be rounded off to the nearest unit in the last right-hand digit used for expressing the limit. Decimal values and tolerance do not imply a particular method of measurement.

2 DEFINITIONS

2.1 Valve Size Designation

2.1.1 (DN) (Nominal Diameter). 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 through 10). The valve size is not necessarily the same as the inside diameter or port diameter.

2.1.2 NPS (Nominal Pipe Size). The size of a valve is designated by the nominal size of its end connections. This is denoted by NPS, a dimensionless number indirectly related to the physical size of the connecting pipe (See Tables A1 through A10). The valve size is not necessarily the same as the inside diameter or port diameter.

2.1.3 Reduced port, gate, and ball valves conforming to API 6D are designated for size by two numbers, the first being the NPS (DN) on the valve ends, the second being the NPS (DN) of the port (seats, moving parts, etc.); e.g., NPS 6 × 4 (DN 150 × 100) designates a valve of end size NPS 6 (DN 150) with a port to match NPS 4 (DN 100). 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 (DN 150 × 100) valve shall have the face-to-face or end-to-end dimensions of a NPS 6 (DN 150) valve.

2.1.4 Reduced port, pressure seal bonnet, gate, globe, and check valves are designated for size by three numbers, the first and last being the NPS (DN) of the valve ends, the second being the NPS (DN) of the port; e.g., NPS 6 × 4 × 6 (DN 150 × 100 × 150) designates a valve having ends matching NPS 6 (DN 150) with a port to match NPS 4 (DN 100). Likewise, NPS 6 × 4 × 4 (DN 150 × 100 × 100) would designate a valve having one end matching NPS 6 (DN 150), the other matching NPS 4 (DN 100), and the port matching NPS 4 (DN 100). 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 (DN 150 × 100 × 150) or a NPS 6 × 4 × 4 (DN 150 × 100 × 100) valve shall have the face-to-face or end-to-end dimensions of a NPS 4 (DN 100) valve.

2.2 Pressure Rating Designations

Valve class designations and related PN values are given below:

(a) Cast iron

Class	PN
25	. . .
125	20
250	50