ASME B16.33-2024

[Revision of ASME 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)

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

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FOREWORD

The B16 Standards Committee was organized in the Spring of 1920 and held its organizational meeting on November 21 of that year. The group operated as a Sectional Committee (later redesignated as a Standards Committee) under the authorization of the American Engineering Standards Committee [subsequently named American Standards Association, United States of America Standards Institute, and now, American National Standards Institute (ANSI)]. Sponsors for the group were The American Society of Mechanical Engineers (ASME), Manufacturers Standardization Society of the Valve and Fittings Industry, and the Heating and Piping Contractors National Association (later the Mechanical Contractors Association of America).

The American Gas Association (AGA) determined that standardization of gas shutoff valves used in distribution services was desirable and needed. The AGA Task Committee on Standards for Valves and Shut-Offs was formed, and development work commenced in 1958. In 1968, it was determined that a more acceptable document would result if approval were gained from ANSI and to facilitate such action, the AGA Committee became Subcommittee No. 13 of the B16 activity.

This Standard offers more performance requirements than has been customary in B16 standards. It is expected that this will permit both manufacturers and users greater latitude in producing and using products made to this Standard.

Work was extremely slow as the group gradually developed the document in the desired format. Its efforts were successful when, on July 18, 1973, final approval was granted by ANSI.

The revision incorporated some major revisions to the format. In addition, the scope of the standard was clarified so that the standard could be applicable to all manually operated metallic gas valves for use in gas piping standards up to 125 psig. The revised standard incorporated testing criteria for valves that could have a specific pressure rating within this pressure range. This revision was made to clarify the fact that the standard is also applicable to valves with service designations other than 60 psig and 125 psig. The revision was approved on February 10, 1981.

The 1990 revision deleted the sampling inspection table on the basis that the scope clearly limited the standard to turning torque valves at the time of manufacture. This edition established U.S. customary units as the standard and metric equivalents were deleted.

In 1982, American National Standards Committee B16 was recognized as an ASME Committee operating under procedures accredited by ANSI.

In 2002, a new materials section was added along with several other revisions. Also incorporated were metric values and a nonmandatory quality system program annex. Use of these valves in higher rated systems is outside the scope of this Standard, and is neither permitted nor prohibited.

The 2012 edition of ASME B16.33 brought an updated scope to allow all manually operated metallic gas valves for use in gas piping standards up to 175 psig. Testing requirements were revised to match this increase in pressure, and references were updated. Following approval by the ASME B16 Standards Committee, ASME B16.33-2012 was approved as an American National Standard by ANSI on August 21, 2012.

In ASME B16.33-2024, the figure and tables have been redesignated. Cross-references have been updated accordingly. Also, the references in Mandatory Appendix I have been updated. Following approval by the ASME B16 Standards Committee, ASME B16.33-2024 was approved by ANSI on January 2, 2024.

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.)

STANDARDS COMMITTEE OFFICERS

STANDARDS COMMITTEE PERSONNEL

SUBCOMMITTEE L — GAS SHUTOFFS AND VALVES

CORRESPONDENCE WITH THE B16 COMMITTEE

General. ASME codes and standards are developed and maintained by committees with the intent to represent the consensus of concerned interests. Users of ASME codes and standards may correspond with the committees to propose revisions or cases, report errata, or request interpretations. Correspondence for this Standard should be sent to the staff secretary noted on the committee's web page, accessible at https://go.asme.org/B16committee.

Revisions and Errata. The committee processes revisions to this Standard on a continuous basis 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 in the next edition of the Standard.

In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive e-mail notifications of posted errata.

This Standard is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number, the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

Cases

(a) The most common applications for cases are

(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Standard

(4) to permit the use of a new material or process

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Standard.

(c) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Standard and the paragraph, figure, or table number

(4) the editions of the Standard to which the proposed case applies

(d) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Approved cases are posted on the committee web page.

Interpretations. Upon request, the committee will issue an interpretation of any requirement of this Standard. An interpretation can be issued only in response to a request submitted through the online Interpretation Submittal Form at https://go.asme.org/InterpretationRequest. Upon submitting the form, the inquirer will receive an automatic e-mail confirming receipt.

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 information submitted, it is the opinion of the committee that the inquirer should seek assistance, the request will be returned with the recommendation that such assistance be obtained. Inquirers can track the status of their requests at https://go.asme.org/Interpretations.

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Interpretations are published in the ASME Interpretations Database at https://go.asme.org/Interpretations as they are issued.

Committee Meetings. The B16 Standards Committee regularly holds meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the committee. Information on future committee meetings can be found on the committee web page at https://go.asme.org/B16committee.

ASME B16.33-2024
SUMMARY OF CHANGES

Following approval by the ASME B16 Standards Committee and ASME, and after public review, ASME B16.33-2024 was approved by the American National Standards Institute on January 2, 2024.

In ASME B16.33-2024, the figure and tables have been redesignated. Cross-references have been updated accordingly. In addition, this edition includes the following changes identified by a margin note, **(24)**. 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)*
3	4	In paras. 4.1, 4.2, and 4.3, title added to third-level headings *(15-1082)*
4	Table 4.4.4-1	In column heads, the unit of measure for "Load" corrected by errata from "lbf-in. (N·m)" to "lbf (N)" *(18-486)*
6	Mandatory Appendix I	Updated *(14-817)*

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
14-817	Updated references in Mandatory Appendix I.
15-1082	Revised paragraphs in Section 4 to include headers where missing.
18-486	Corrected the units of Load in Table 4.4.4-1 (former Table 3). The correct units of Load are lbf (N).

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MANUALLY OPERATED METALLIC GAS VALVES FOR USE IN GAS PIPING SYSTEMS UP TO 175 psi (Sizes NPS $^1/_2$ Through NPS 2)

1 SCOPE

1.1 General

This Standard covers requirements for manually operated metallic valves sizes NPS $^1/_2$ through NPS 2, for outdoor installation as gas shutoff valves at the end of the gas service line and before the gas regulator and meter where the designated gauge pressure of the gas piping system does not exceed 175 psi (12.1 bar). This Standard applies to valves operated in a temperature environment between −20°F and 150°F (−29°C and 66°C).

1.2 Design

This Standard sets forth the minimum capabilities, characteristics, and properties that a valve at the time of manufacture must possess in order to be considered suitable for use in gas piping systems. Details of design and manufacture (other than those stated in this Standard, including such design and production tests that will produce a valve that will have the required capabilities to meet this Standard) remain the responsibility of the manufacturer.

1.3 Standards and Specifications

Standards and specifications adopted by reference in this Standard are shown in Mandatory Appendix I. It is not considered practical to refer to a specific edition of each of the standards and specifications in the individual references. Instead the specific edition references are included in Mandatory Appendix I. A product made in conformance with a prior edition of reference standards and in all other aspects conforming to this Standard will be considered to be in conformance even though the edition reference may be changed in a subsequent revision of this Standard.

1.4 Quality Systems

Nonmandatory requirements relating to the manufacturer's quality system program are described in Nonmandatory Appendix A.

1.5 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 E29. 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.

1.6 Codes and Regulations

A valve used under the jurisdiction of the Code of Federal Regulation (CFR), such as Title 49, Part 192; the ASME Code for Pressure Piping, such as ASME B31.8; or the National Fuel Gas Code, AGA Z223121/ANSI Z223.1/NFPA 54, is subject to any limitation of that code or regulation.

2 CONSTRUCTION

2.1 General

Each valve at the time of manufacture shall be capable of meeting the requirements set forth in this Standard. The workmanship employed in the manufacture and assembly of each valve shall provide gas tightness, safety, and reliability of performance, and freedom from injurious imperfections and defects.

2.2 Tamperproof Features

Where valves are specified to be tamperproof, they shall be designed and constructed to minimize the possibility of the removal of the core of the valve with other than specialized tools.

2.3 Configuration

2.3.1 Operating Indication. The valve shall be so marked or constructed that the operator can visually determine

(a) when a $^1/_4$ turn valve is in the open or closed position (if flat head, longitudinal axis of the head shall be perpendicular to the longitudinal axis of the valve when valve is in the closed position)

(b) when the valve requires more than $\frac{1}{4}$ turn to operate valve, turning direction to open or close the valve

2.3.2 Valve End. Valve ends shall comply with the following standards where applicable:

(a) ASME B1.20.1
(b) ASME B16.1
(c) ASME B16.5

2.4 Marking

Except as may be modified herein, valves shall be marked as required in MSS SP-25 and shall include

(a) the manufacturer's name or trademark and, where space permits, the designation "B16.33." The B16.33 mark is the manufacturer's acknowledgement that the valve was manufactured in conformance with ASME B16.33.

(b) marking for pressure ratings such as 60G, 125G, etc., which may be shown on the head, stem, or body.

(c) the designation "T" for tamperproof construction where tamperproof features are not easily identifiable without disassembling the valve. This designation may be shown on the head or stem.

2.5 Lubrication (Sealant)

Valves that require pressure lubrication (by the injection of lubricant through fittings to the sealing surface of the valve) shall be capable of being lubricated while subjected to the pressure rating. Compliance with this provision can be met if lubrication can be accomplished with the valve in both the fully opened and fully closed positions. The design must be such as to minimize entry of lubricant into the gasway when lubricated in accordance with the manufacturer's instructions.

3 MATERIALS

3.1 Metallic Materials for Valve Parts

Metallic materials known to be acceptable for compliance with this Standard are listed in Table 3.1-1. Other metallic materials may be used when the product incorporating them meets the requirements of this Standard.

Table 3.1-1
Materials for Metallic Valve Parts

Material	ASTM Specifications	
Cast iron	ASTM A126	Class B
	ASTM A48	Class 30
Malleable iron	ASTM A47	...
	ASTM A197	...
Ductile iron	ASTM A395	...
	ASTM A536	Grade 60-40-18 or Grade 65-45-12
Steel	ASTM A108	...
	ASTM A505	...
	ASTM A589	...
Cast bronze	ASTM B62	...
Cast brass	ASTM B584	Alloy UNS C83600
		Alloy UNS C84400
Forged brass	ASTM B283	Alloy UNS C37700
Rod brass	ASTM B16	Alloy UNS C36000
Sintered brass	ASTM B282	...
	MPIF Std 35	Code CZP 3002 or CZP 2002

3.2 Lubricants, Sealants, and Seating Materials

3.2.1 Lubricants and Sealants. Lubricants and/or sealants shall be resistant to the action of fuel gases such as natural, manufactured, and LP gases. The valve manufacturer is responsible for the selection of lubricants and sealants, and for the determination of their suitability for the service conditions specified in the scope of this Standard.

3.2.2 Seating and Stem Seal Materials. The valve manufacturer is responsible for selection of seating and stem seal materials and for determination of their suitability for the service conditions specified in the scope of this Standard.

3.2.3 Elastomer Components.

3.2.3.1 Air Aging Tests. Elastomer parts that are exposed to fuel gas shall be made from materials that, following 70-hr air aging in accordance with ASTM D573 at 212°F (100°C), meet elongation, tensile, and hardness property requirements as follows:

(a) Tensile tests shall be conducted on six dumbbells in accordance with ASTM D412. Three dumbbells shall be air aged 70 hr in accordance with ASTM D573 at 212°F (100°C). The dumbbells shall have a thickness of 0.080 in. ± 0.008 in. (2.0 mm ± 0.2 mm). The average of the three individual tests for the aged dumbbells shall exceed 60% retention of ultimate elongation and 60% retention of tensile strength at break. The average of the three individual tests for the non-aged dumbbells shall be the basis for percent retention calculation.

(b) Hardness tests shall be conducted using specimens in accordance with ASTM D395, Type 2. Three specimens shall be air aged 70 hr in accordance with ASTM D573 at 212°F (100°C). The average of the three individual tests for the aged specimens shall not show a hardness change of more than ±10 Shore hardness points relative to the average hardness of the non-aged specimens.

3.2.3.2 Swell Tests. Elastomer parts that are exposed to fuel gas shall be made from materials that, after 70-hr exposure in n-hexane at 74°F (23°C), in accordance with ASTM D471, meet the volume change, elongation, and tensile property requirements as follows:

(a) Volume change tests shall be conducted using six specimens in accordance with ASTM D471, Section 8. Three specimens shall be exposed for 70 hr at 74°F (23°C) in n-hexane in accordance with ASTM D471.

The average of the three individual n-hexane tests shall not show an increase in volume of more than 25% nor a decrease in volume of more than 1%. The average of the three tests for the nonaged specimen shall be the basis for the percent retention change calculation.

(b) Tensile tests shall be conducted on six dumbbells in accordance with ASTM D412. Three of the tensile tests shall be conducted on dumbbells exposed in n-hexane at 74°F (23°C) for 70 hr in accordance with ASTM D471. The dumbbells shall have a thickness of 0.080 in. + 0.008 in. (2.0 mm ± 0.2 mm). The average of the three individual n-hexane tests shall exceed 60% retention of ultimate elongation and 60% retention of tensile strength at break. The average of the three tests for the non-aged specimen shall be the basis for the percent volume change calculation.

3.2.3.3 Compression Set Tests. Elastomer parts that may be exposed to fuel gas shall be made from materials having a compression set of no more than 25% after 22 hr at 212°F (100°C), in accordance with ASTM D395, Method B, using standard test specimen in accordance with ASTM D395.

3.2.4 Polytetrafluoroethylene (PTFE) Components. PTFE materials shall comply with ASTM D4894 or ASTM D4895.

(24) 4 DESIGN QUALIFICATION

4.1 General

4.1.1 Valve Selection. Each basic valve design shall be qualified and demonstrated as suitable for the service by testing randomly selected production valves of each size, type, and pressure shell material according to the design qualification tests required by this section.

4.1.2 Temperature. All tests, unless otherwise specified, shall be conducted at a temperature of 74°F ± 15°F (23°C ± 8°C).

4.1.3 Condition. Before each test is conducted, the valve shall be in the condition in which it would be placed in service.

4.2 Gas Tightness

4.2.1 Acceptance. The valve shall provide a shutoff when in the closed position and shall not leak to the atmosphere in the open or closed position when subjected progressively to internal air pressure of first 4 psi ± 2 psi (0.3 bar ± 0.1 bar) and then to at least 1.5 times the pressure rating of the valve.

4.2.2 Method of Test for Gas Tightness. With the valve in the open position and the outlet plugged, the test pressure shall be applied to the inlet of the valve. The valve shall be immersed in a bath containing water at a temperature of 74°F ± 15°F (23°C ± 8°C) for a period of 15 sec. Leakage, as evidenced by flow (breaking away) of bubbles, shall be cause for rejection. The valve shall then be turned to the closed position, outlet opened, and the test repeated.

4.2.3 Leak Detection. Other means of leak detection may be used, provided they can be shown to be equivalent in leak detection sensitivity.

4.3 Temperature Resistance

4.3.1 Temperature Limits. A valve should be operable at temperatures ranging from −20°F to 150°F (−29°C to 66°C) without affecting the capability of the valve to control the flow of gas.

4.3.2 Low Temperature. The valve shall be maintained at a temperature of −20°F (−29°C) for a period long enough to allow all parts to come to equilibrium temperature. With the valve subjected to an internal air pressure at least equal to the pressure rating, and with the outlet end of the valve arranged to vent to atmosphere, it shall be determined that it can be opened and closed.

4.3.3 High Temperature. The valve shall then be maintained at a temperature of 150°F (66°C) for a period long enough to allow all parts to come to equilibrium temperature. With the valve subjected to an internal air pressure at least equal to the pressure rating, it shall be determined that it can be opened and closed.

4.3.4 Ambient Temperature. The valve shall then be allowed to return to a temperature of 74°F ± 15°F (23°C ± 8°C) and satisfactorily pass the test outlined in para. 4.2.

4.4 Structural Provision

4.4.1 General. Each test in which damage to the valve could result (i.e., those described in paras. 4.3 and 4.4.2 through 4.4.5) shall be conducted on new unused samples of the valve.

4.4.2 Strength. A valve in the open position with the outlet plugged shall withstand an internal hydrostatic pressure of 600 psi (41 bar) for a period of 10 min without permanent deformation that would, after release of the pressure, prevent operation of the valve from the fully open position to the fully closed position.

4.4.3 Twist. The valve body, when tested in both the open and closed position, shall withstand the torque specified in Table 4.4.3-1 applied directly to the ends of the valve, without permanent deformation that would, after release of the torque, prevent operation of the valve from the fully open position to the fully closed position. After this test, the valve must comply with the provisions of para. 4.2.

4.4.4 Bending. A valve in both the open and closed positions shall withstand the bending moment specified in Table 4.4.4-1 when applied as indicated in

Table 4.4.3-1
Torque Values

Nominal Valve Size [Note (1)]	Torque, lbf-in. (N·m)
$\frac{1}{2}$	800 (90)
$\frac{3}{4}$	1,000 (113)
1	1,200 (136)
$1\frac{1}{4}$	1,450 (164)
$1\frac{1}{2}$	1,550 (175)
2	1,650 (186)

NOTE: (1) For valves having a different size inlet and outlet, the smaller size shall determine the torque value.

Figure 4.4.4-1. After the bending stress is relieved, there shall be no permanent deformation that would prevent operation of the valve from the fully open position to the fully closed position. After this test, the valve must comply with the provisions of para. 4.2.

4.4.5 Tensile Strength. Schedule 80 or heavier steel pipe shall be connected to the valve for the purpose of transmitting the tensile load. A valve in both the open and closed positions shall withstand the tensile load specified in Table 4.4.5-1, when applied gradually to valve ends, without permanent deformation that would, after release of the tensile load, prevent operation of the valve from the fully open position to the fully closed position. After this test, the valve must comply with the provisions of para. 4.2.

(24) **Table 4.4.4-1**
Bending Moment Values

Nominal Valve Size [Note (1)]	Test	
	Bending, lbf-in. (N·m)	Load, lbf (N)
$\frac{1}{2}$	1,800 (203)	600 (2 670)
$\frac{3}{4}$	3,200 (362)	1,060 (4 720)
1	6,000 (678)	2,000 (8 900)
$1\frac{1}{4}$	10,600 (1 200)	3,530 (15 700)
$1\frac{1}{2}$	14,500 (1 640)	4,830 (21 500)
2	25,200 (2 850)	8,400 (37 400)

NOTE: (1) For valves having a different size inlet and outlet, the smaller size shall determine the bending moment and load values.

4.4.6 Turning Torque. The torque required to operate the valve after breaking loose from its open or closed position shall not exceed the amounts specified in Table 4.4.6-1. At the end of this test, the valve shall be capable of complying with the provisions of para. 4.2.

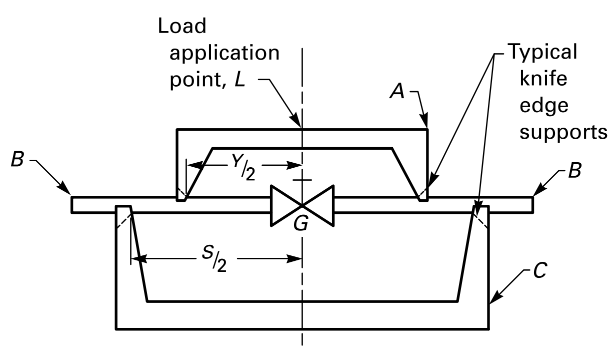
4.5 Flow Capacity

The valves, when in the full open position, shall meet the minimum gas flow as specified in Table 4.5-1. A valve of each size and type shall be tested to verify that the pressure loss is not greater than that specified in Table 4.5-1. The test shall be conducted using a technically recognized procedure such as that contained in ANSI/ISA SP-75.02.01. The test fluid and type of test facility and instrumentation are at the discretion of the manufacturer and shall be fully described in their test records.

5 PRODUCTION TESTING

Each valve shall be tested at the time of manufacture at a pressure of at least 1.5 times the pressure rating marked on the valve, according to the method of test for gas tightness in para. 4.2.

Figure 4.4.4-1
Test Assembly



Legend:
- A = load application yoke
- B = solid steel bars machined to the nominal iron pipe size diameter of the valve ends and firmly connected to the valve ends as a test assembly. [When a threaded end valve is used, the bars shall be threaded with American Standard taper pipe threads (NPT) as described in ASME B1.20.1, coated with thread lubricant, and tightened to 50% of the values specified in Table 4.4.3-1.]
- C = resistance yoke
- G = gas valve
- L = load
- S = 24 in. (610 mm) span between points for load resistance
- Y = 12 in. (305 mm) span between points of load application

GENERAL NOTE: The bending moment, M_b, is determined using the equation $M_b = [L(S - y)]/4$.

Table 4.4.5-1
Tensile Load Values

Nominal Valve Size [Note (1)]	Load, *L*, lbf-in. (N·m)
$\frac{1}{2}$	4,000 (18 000)
$\frac{3}{4}$	6,000 (27 000)
1	8,000 (36 000)
$1\frac{1}{4}$	8,000 (36 000)
$1\frac{1}{2}$	8,000 (36 000)
2	10,000 (44 000)

NOTE: (1) For valves having a different size inlet and outlet, the smaller size shall determine the tensile load values.

Table 4.4.6-1
Maximum Turning Torque Values

Nominal Valve Size [Note (1)]	Maximum Turning Torque, lbf-in. (N·m) [Note (2)]
$\frac{1}{2}$	200 (23)
$\frac{3}{4}$	240 (27)
1	320 (36)
$1\frac{1}{4}$	500 (56)
$1\frac{1}{2}$	700 (79)
2	1,200 (136)

NOTES:
(1) For valves having a different size inlet and outlet, the smaller size shall determine the maximum turning torque values.
(2) Measured at a temperature of 74°F ± 15°F (23°C ± 8°C).

Table 4.5-1
Minimum Gas Flows

Nominal Valve Size [Note (1)]	Minimum Gas Flow at Reference Conditions, ft^3/hr (m^3/h) [Note (2)]
$\frac{1}{2}$	190 (5.4)
$\frac{3}{4}$	290 (8.2)
1	600 (17.0)
$1\frac{1}{4}$	1,200 (34.0)
$1\frac{1}{2}$	1,500 (42.5)
2	2,400 (68.0)

NOTES:
(1) For valves having a different size inlet and outlet, the smaller size shall determine the minimum gas flow.
(2) Minimum gas flow in standard cubic feet per hour (cubic meters per hour) with the valve in the fully open position at an inlet pressure of 0.5 psi (0.035 bar), 70°F (21°C), 0.64 specific gravity, and 0.3 in. (7.6 mm) water column net valve pressure drop, assuming the valve is on Schedule 40 pipe.

(24)

MANDATORY APPENDIX I REFERENCES

The following is a list of publications referenced in this Standard. Materials manufactured to other editions of the referenced ASTM specifications may be used to manufacture valves meeting the requirements of this Standard as long as the valve manufacturer verifies that the material meets the requirements of the referenced edition of the ASTM specification. Unless otherwise specified, the latest edition of ASME publications shall apply.

AGA Z223121/ANSI Z223.1/NFPA 54 (2024). National Fuel Gas Code. American Gas Association.

ANSI/ISA S75.02-01-2008 (IEC 60534-2-3 Mod). Control Valve Capacity Test Procedures. International Society of Automation.

ASME B1.20.1. Pipe Threads, General Purpose, Inch. The American Society of Mechanical Engineers.

ASME B16.1. Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250. The American Society of Mechanical Engineers.

ASME B16.5. Pipe Flanges and Flanged Fittings: NPS $\frac{1}{2}$ Through NPS 24 Metric/Inch Standard. The American Society of Mechanical Engineers.

ASME B31.8. Gas Transmission and Distribution Piping Systems. The American Society of Mechanical Engineers.

ASTM A47/A47M-99 (2018). Standard Specification for Ferritic Malleable Iron Castings. ASTM International.

ASTM A48/A48M-03 (2021). Standard Specification for Gray Iron Castings. ASTM International.

ASTM A108-18. Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished. ASTM International.

ASTM A126-04 (2019). Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings. ASTM International.

ASTM A197/A197M-00 (2019). Standard Specification for Cupola Malleable Iron. ASTM International.

ASTM A395/A395M-99 (2018). Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures. ASTM International.

ASTM A505-16 (2021). Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements for. ASTM International.

ASTM A536-84 (2019). Standard Specification for Ductile Iron Castings. ASTM International.

ASTM A589-06 (2018). Standard Specification for Seamless and Welded Carbon Steel Water-Well Pipe. ASTM International.

ASTM B16/B16M-19. Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines. ASTM International.

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[1] This publication may be obtained from American National Standards Institute (ANSI): www.ansi.org.

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NONMANDATORY APPENDIX A
QUALITY SYSTEM PROGRAM

The products manufactured in accordance with this Standard shall be produced under a quality system program following the principles of an appropriate standard from the ISO 9000 series.[1] A determination of the need for registration or certification, or both, of the product manufacturer's quality system program by an independent organization shall be the responsibility of the manufacturer. The detailed documentation demonstrating program compliance shall be available to the purchaser at the manufacturer's facility. A written summary description of the program used by the product manufacturer shall be available to the purchaser upon request. The product manufacturer is defined as the entity whose name or trademark appears on the product in accordance with the marking or identification requirements of this Standard.

[1] The series is also available from the American National Standards Institute (ANSI) and the American Society for Quality (ASQ) as American National Standards that are identified by the prefix "Q," replacing the prefix "ISO." The applicable standards from the series are listed in Mandatory Appendix I.

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 $\frac{1}{2}$ 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
B16.11-2021	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
B16.20-2023	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
B16.25-2022	Buttwelding Ends
B16.26-2018	Cast Copper Alloy Fittings for Flared Copper Tubes
B16.29-2022	Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings — DWV
B16.33-2024	Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 175 psi (Sizes NPS $\frac{1}{2}$ Through NPS 2)
B16.34-2020	Valves — Flanged, Threaded, and Welding End
B16.36-2020	Orifice Flanges
B16.38-2023	Large Metallic Valves for Gas Distribution: Manually Operated, NPS $2\frac{1}{2}$ (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
B16.44-2023	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
B16.49-2023	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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