API STD*599 94 ■ 0732290 0541347 837 ■

Metal Plug Valves—Flanged and Welding Ends

API STANDARD 599
FOURTH EDITION, NOVEMBER 1994

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005

API STD*599 94 ■ 0732290 0541348 773 ■

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Manufacturing, Distribution, and Marketing Department

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FOREWORD

This standard is a purchase specification that covers requirements for metal plug valves with flanged or butt-welding ends and ductile iron plug valves with flanged ends.

This standard requires the purchaser to specify certain details and features. Although it is recognized that the purchaser may desire to modify, delete, or amplify sections of this standard, it is strongly recommended that such modifications, deletions, and amplifications be made by supplementing this standard, rather than by rewriting or incorporating sections thereof into another complete standard.

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Asbestos is specified or referenced for certain components of the equipment described in some API standards. Asbestos has been of extreme usefulness in minimizing fire hazards associated with petroleum processing. Asbestos has also served as a universal sealing material, compatible with most refining fluid services.

Certain serious adverse health effects are associated with asbestos, among them the serious and often fatal diseases of lung cancer, asbestosis, and mesothelioma (a cancer of the chest and abdominal linings). The degree of exposure to asbestos varies with the product and the work practices involved.

Consult the most recent edition of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, Occupational Safety and Health Standard for Asbestos, Tremolite asbestos, Anthophyllite asbestos, and Actinolite asbestos, 59 *Federal Register* 40964-41162, August 10, 1994; the U.S. Environmental Protection Agency (EPA), National Emission Standard for Asbestos, 40 *Code of Federal Regulations* Sections 61.140 through 61.157; and any pending litigation.

There are currently in use and under development a number of substitute materials to replace asbestos in certain applications. Manufacturers and users are encouraged to develop and use effective substitute materials that can meet the specifications for, and operating requirements of, the equipment to which they would apply.

Information concerning safety and health risks and proper precautions with respect to particular materials and conditions should be obtained from the employer, the manufacturer or supplier of that material, or the Material Safety Data Sheet.

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Tables

NOTES TO PURCHASER

1. If the purchaser needs a plug valve that deviates from this standard, the deviating requirements shall be stated in the purchase order.
2. If no exceptions are to be taken to this standard, the purchase order need only refer to API Standard 599 and specify the following items:
   a. Valve size (see 1.1.1).
   b. Class (see 1.1.2).
   c. Type (lubricated or nonlubricated, see 1.1.3) and pattern [short, regular, venturi, or full bore, (see 1.1.4)].
   d. Flanged ends, including facing, or welding ends, including bore (see 1.1.1 and 2.2.3 through 2.2.5).
   e. Minimum-wall or heavy-wall thickness, for stainless steel valves only (see 2.2.1).
   f. Type of operation required and wrench requirements, if any (see 2.7.1, 2.7.2, and 3.5.1).
   g. Shell (body and cover) material (see 3.1 and 3.2).
   h. Fire test requirements (see 1.1.6).
   i. Plug material (see 3.4).
3. The following additional items are options that may also be specified:
   a. Flanged ends attached by welding (see 2.2.3 and the following Note 4).
   b. Drain and bypass connection (see 2.2.7).
   c. Locking device (see 2.7.5).
   d. Antistatic feature and testing (see 2.8).
   e. Materials for operating mechanisms (see 3.5.1 and 3.5.2).
   f. Stem seal or packing material and/or operating temperature if temperature is outside the range from -20°F through 225°F (-29°C through 107°C) (see 3.7).
   g. Bolting material for temperatures beyond the limits specified in ASME B31.3 or for increased resistance to corrosive environments (see 3.8).
   h. Lubricating sealant (see 4.1). [Specify sealant and/or operating temperature if temperature is outside the range from -20°F through 225°F (-29°C through 107°C).]
   i. Sleeve, seat, lining, or coating material (see 4.2).
   j. Inspection (see 5.1 and the following Note 6).
   k. Coating for ductile iron valves (see 6.1.2).
   l. Export packaging (see 6.5.1 and 6.5.2).
4. If flanges attached by welding are specified, the purchaser shall ensure that adequate quality control of the welds will be provided by the manufacturer. The purchaser may have to specify supplementary requirements for the welds, particularly for severe services, such as special heat treatment or supplementary nondestructive examination of the welds.
5. If a vented body cavity is specified, not only the area within a closed plug, but also the area above and below the plug shall be vented by drilling or by other positive means. If this venting affects the sealing direction of the valve, the body shall be marked with preferred shut-off direction.
6. Refer to API Standard 598 for additional items that may have to be specified, such as the extent of inspection, the inspector's address, and the optional high-pressure closure test.

Metal Plug Valves—Flanged and Welding Ends

SECTION 1—GENERAL

1.1 Scope

1.1.1 This standard covers metal plug valves with flanged or butt-welding ends and ductile iron plug valves with flanged ends in sizes NPS 1 through NPS 24, which correspond to nominal pipe sizes in ASME B36.10M. Valve bodies conforming to ASME B16.34 may have one flanged end and one butt-welding end.

1.1.2 This standard covers additional requirements for plug valves that are otherwise in full conformance to the requirements of ASME B16.34 for Standard Class 150 through 2500 or ASME B16.42 for Class 150 and 300.

1.1.3 This standard covers both lubricated and nonlubricated valves that have two-way coaxial ports; three-way and four-way plug valves are not discussed in this standard. This standard includes requirements for valves fitted with internal body, plug, or port linings or applied hard facings on the body, body ports, plug, or plug port. The extent of linings and the materials of which they are made are not covered in this standard.

1.1.4 Plug valves covered in this standard belong to one of four general design groups that in many cases have different face-to-face and end-to-end dimensions. Some types of plug valves are not made to all patterns. The four groups are described in 1.1.4.1 through 1.1.4.4.

1.1.4.1 The short-pattern design is found only in Class 150 and 300 where flanged plug valves match the face-to-face dimensions of steel flanged gate valves in NPS 1½ through NPS 12.

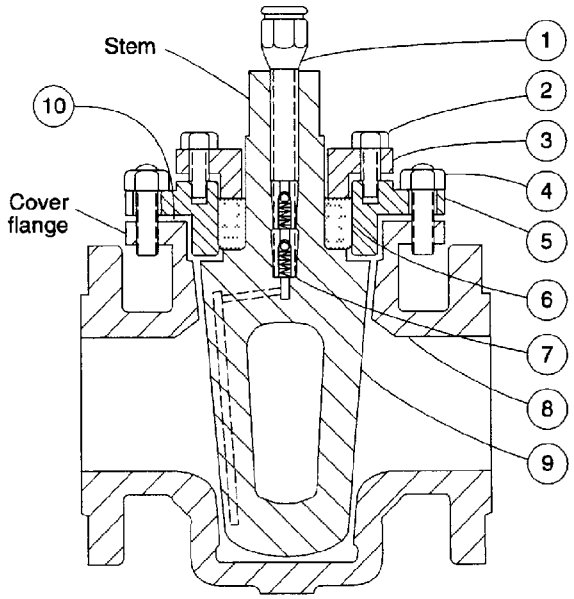
1.1.4.2 The regular pattern design has a plug port area that is greater than the venturi pattern.

1.1.4.3 Valves of the venturi pattern are designed for minimum pressure loss consistent with the reduced port area used in this type of valve. Venturi valves have a conjunction of body and plug ports that approximates a venturi throat.

1.1.4.4 The round-port full-bore pattern has a circular port through both the plug and the body that is not smaller than that specified in Annex A of ASME B16.34 for the inside diameter of a flanged fitting.

1.1.5 The standard nomenclature for valve parts is shown in Figures 1, 2, and 3. Although Figure 1 illustrates a lubricated valve, nonlubricated valves without a sleeve or lining may be similar except for the omission of the lubrication groove and the substitution of a mechanical means for freeing the plug.

1.1.6 When fire tested valves are specified by the purchaser, the requirements of API Standard 607 also apply.



1. Lubricant fitting
2. Gland bolting
3. Gland
4. Cover bolting
5. Cover
6. Stem packing
7. Lubricant check valves
8. Body
9. Plug
10. Cover gasket

Figure 1—Typical Lubricated Plug Valve

1.2 Referenced Publications

Unless otherwise noted, the latest edition or revision of the following standards shall, to the extent specified herein, form a part of this standard. When specific parts (for example, numbered paragraphs or tables) of other documents are referenced in this text, the edition current when this standard was issued shall apply.

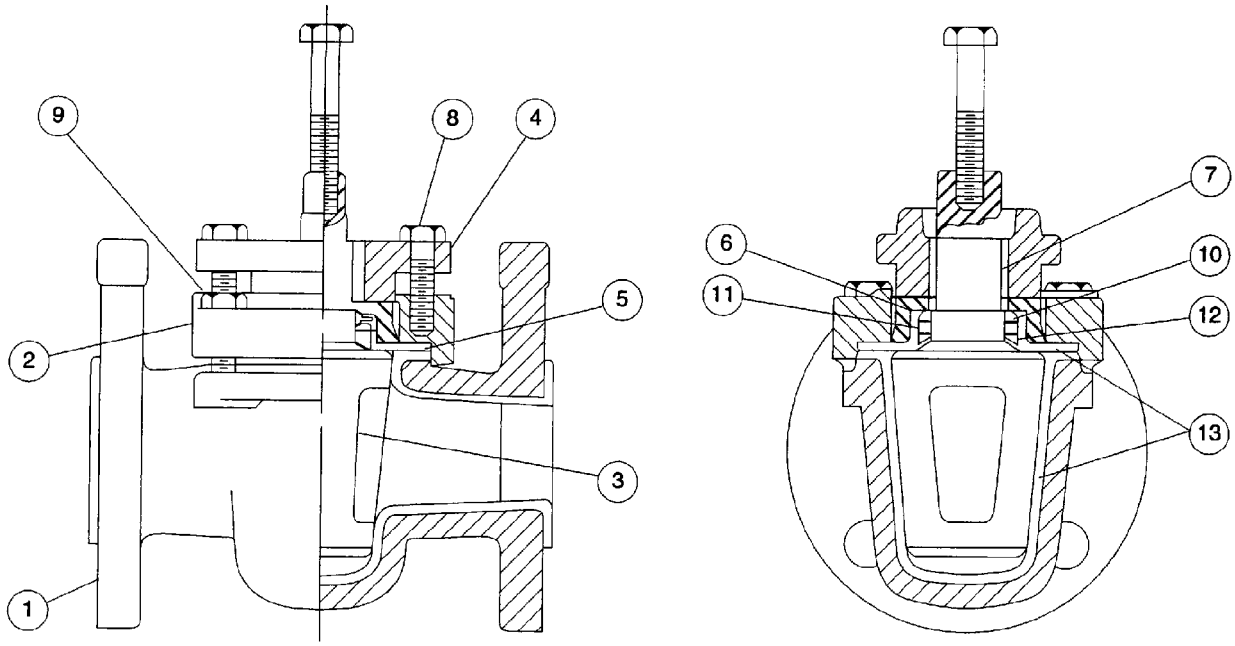
API

Std 598 *Valve Inspection and Testing*
Std 607 *Fire Test for Soft-Seated Quarter-Turn Valves*

ASME[1]

B1.1 *Unified Inch Screw Threads (UN and UNR Thread Form)*

[1]American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017.



1. Body
2. Cover
3. Plug
4. Gland
5. Stem seal
6. Thrust washer
7. Antistatic device
8. Gland bolting
9. Cover bolting
10. Spring washers
11. Support ring
12. Cup seal
13. Lining

Figure 2—Typical Fully Lined Plug Valve

B1.12 *Class 5 Interference-Fit Thread*
B16.5 *Pipe Flanges and Flanged Fittings*
B16.10 *Face-to-Face and End-to-End Dimensions of Ferrous Valves*
B16.25 *Buttwelding Ends*
B16.34 *Valves–Flanged, Threaded and Welding End*
B16.42 *Ductile Iron Pipe Flanges and Flanged Fittings, Class 150 and 300*
B18.2.2 *Square and Hex Nuts*
B31.3 *Chemical Plant and Petroleum Refinery Piping*
B36.10M *Welded and Seamless Wrought Steel Pipe*

ASTM[2]

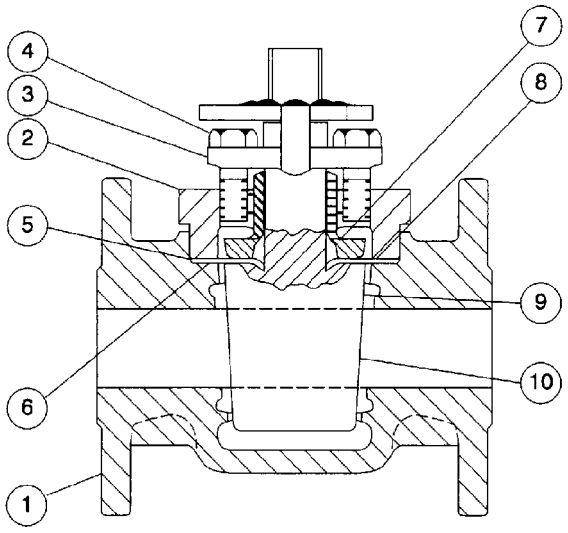
A 126 *Gray Iron Castings for Valves, Flanges, and Pipe Fittings*
A 193 *Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service*
A 194 *Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service*
A 320 *Specification for Alloys—Steel Bolting Materials for Low-Temperature Service.*
A 395 *Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*

MSS[3]

SP-25 *Standard Marking System for Valves, Fittings, Flanges, and Unions*
SP-45 *By-pass and Drain Connection Standard*
SP-91 *Guidelines for Manual Operation of Valves*

[2]American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

[3]Manufacturers Standardization Society of the Valves and Fittings Industry, 127 Park Street, N.E., Vienna, Virginia 22180.



1. Body
2. Cover
3. Adjuster
4. Adjuster bolting
5. Cover gasket or seal
6. Nonmetallic diaphragm
7. Stem seal or packing
8. Metallic diaphragm
9. Sleeve
10. Plug

Figure 3—Typical Sleeve Lined Plug Valve

1.3 Pressure-Temperature Ratings

This standard covers valves that have pressure-temperature ratings in accordance with ASME B16.34 Standard Class, and ASME B16.42 as appropriate for the shell material.This standard also recognizes that seals, sleeves, liners, diaphragms, seats, and sealants may limit the applications of valves to even lower pressures and temperatures (see 3.7).

SECTION 2—DESIGN

2.1 General

Valves manufactured in accordance with this standard shall meet the requirements of ASME B16.34 for Standard Class, ASME B16.42 where appropriate, the requirements of API Standard 607 when fire testing is specified, and any additional requirements as specified in this standard.

2.2 Body

2.2.1 The minimum thickness of the body wall is dependent upon the body material specified and shall be in accordance with the following:

a. ASME B16.42 for valve bodies of ductile iron.
b. Table 1A or 1B for valve bodies of ASME B16.34 group 1 materials.
c. ASME B16.34 for valve bodies of ASME B16.34 group 2 or 3 materials.

Valve bodies of ASME B16.34 group 2 or 3 materials that are provided with minimum wall thickness in accordance with Table 1A or 1B may be designated as heavy wall plug valves.

2.2.2 Face-to-face dimensions for raised-face and ring-joint flanged-end valves and end-to-end dimensions for butt-welding-end valves shall conform to ASME B16.10.

2.2.3 End flanges of steel valves shall be integrally cast or forged with the body; however, flanges may be attached by full-penetration butt welding if this method is specified in the purchase order. End flanges attached by welding shall be cast or forged butt-welding ends. Welds shall conform to ASME B31.3, as shall qualifications for the welding procedure and the welder or welding operator. The finished weld thickness shall not be less than the minimum body-wall thickness (see 2.2.1). No welding or brazing shall be permitted on ductile iron.

2.2.4 The dimensions and finish of steel end flanges shall be as specified in ASME B16.5 for the type of facing specified in the purchase order. Flat-face flanges not covered by a lining material shall be finished as specified in ASME B16.5 for raised-face flanges.

Table 1A—Minimum Body Thickness (Inches): Carbon Steel, Alloy Steel, and Heavy-Wall Stainless Steel[a]

Valve Size (NPS)	Class						
	150	300	400	600	900	1500	2500
1	0.25	0.25	Use	0.31	Use	0.50	0.59
1¼	0.25	0.25	Class 600	0.34	Class 1500	0.56	0.69
1½	0.25	0.31	valves	0.37	valves in	0.59	0.75
2	0.34	0.38	in	0.44	these	0.75	0.88
2½	0.38	0.44	these	0.47	sizes	0.88	1.00
3	0.41	0.47	sizes	0.50	0.75	0.94	1.19
4	0.44	0.50	0.50	0.63	0.84	1.13	1.41
6	0.47	0.63	0.66	0.75	1.03	1.50	1.91
8	0.50	0.69	0.75	1.00	1.25	1.88	2.44
10	0.56	0.75	0.84	1.13	1.44	2.25	2.66
12	0.63	0.81	0.94	1.25	1.66	2.63	3.41
14	0.66	0.88	1.06	1.38	1.81	2.75	—
16	0.69	0.94	1.13	1.50	2.06	3.13	—
18	0.72	1.00	1.19	1.63	2.25	3.50	—
20	0.75	1.06	1.31	1.75	2.50	3.88	—
24	0.81	1.19	1.44	2.00	2.88	4.50	—

[a]See 2.2.1

Table 1B—Minimum Body Thickness (Millimeters): Carbon Steel, Alloy Steel, and Heavy-Wall Stainless Steel[a]

Valve Size (NPS)	Class						
	150	300	400	600	900	1500	2500
1	6.4	6.4	Use	7.9	Use	12.7	15.1
1¼	6.4	6.4	Class 600	8.6	Class 1500	14.2	17.5
1½	6.4	7.9	valves	9.3	valves in	15.0	19.1
2	8.7	9.5	in	11.1	these	19.1	22.2
2½	9.5	11.1	these	11.9	sizes	22.2	25.4
3	10.3	11.9	sizes	12.7	19.1	23.8	30.2
4	11.1	12.7	12.7	15.9	21.4	28.6	35.7
6	11.9	15.9	16.7	19.1	26.2	38.1	48.4
8	12.7	17.5	19.1	25.4	31.8	47.6	61.9
10	14.3	19.1	21.4	28.6	36.5	57.2	67.5
12	15.9	20.6	23.8	31.8	42.1	66.7	86.5
14	16.7	22.2	27.0	34.9	46.0	69.9	—
16	17.5	23.8	28.6	38.1	52.4	79.4	—
18	18.2	25.4	30.2	41.3	57.2	88.9	—
20	19.1	27.0	33.3	44.5	63.5	98.4	—
24	20.6	30.1	36.5	50.8	73.0	114.3	—

[a]See 2.2.1

2.2.5 The dimensions and finish of ductile iron end flanges shall be as specified in ASME B16.42 for the type of facing specified in the purchase order.

2.2.6 Steel butt-welding ends shall conform to ASME B16.25 for the bore specified, for use without backing rings.

2.2.7 When specified, drain and bypass connections shall conform to ASME B16.34 and MSS SP-45, as applicable.

2.3 Cover

Covers shall have bearing surfaces for bolting that are parallel to the cover face within 1 degree. When spot facing or back facing of flanges is required, it shall be in accordance with the requirements of ASME B16.5 for end flanges.

2.4 Plug Stem

The stem may be either integral with or separate from the plug. The stem or stem-to-plug connection and all parts of the stem within the pressure boundary shall, under torsional load, exceed the strength of the stem that lies beyond the stem seal.

2.5 Glands

Adjustable glands may be a threaded type, a bolted one-piece type, or a bolted two-piece, self-aligning type.

2.6 Bolting

2.6.1 Covers shall be bolted with studs, stud bolts, or cap screws. Studs and stud bolts shall be equipped with heavy, semifinished hexagon nuts that conform to ASME B18.2.2.

Bolting shall be threaded in accordance with ASME B1.1. Bolting 1 inch or smaller shall have coarse (UNC) threads; bolting larger than 1 inch shall be of the 8-thread series (8 UN). Bolt threads shall be Class 2A, and nut threads shall be Class 2B. When wrench-fit studs are furnished, the wrench-fit end of these studs and the threaded hole shall have threads in accordance with a Class 5 interference fit, as specified in ASME B1.12.

2.6.2 Gland bolting shall pass through holes in the gland. The use of open slots is not permitted in the cover flange, cover, adjuster, or gland.

2.7 Operation

2.7.1 Plug valves shall be designed for operation by applying a wrench (sometimes called a lever) or a handwheel to the stem either directly, or indirectly through the use of a gear mechanism or another mechanical device. The purchaser shall specify the type of operation required. Tables 2A and 2B show the standard method of operation for each valve class, pattern, and size. For a valve of any class or pattern, the method of operation is shown as optional for only one size; however, if specified in the purchase order, wrench operation may be furnished on larger valves, and gear mechanisms may be furnished on smaller valves. The length of the wrench or the gear ratio of the gear mechanism shall be designed such that the input force required to operate the valve does not exceed the operator input force capability values given in MSS SP-91 using a position multiplier of 0.5.

2.7.2 A wrench shall be furnished as a separate item and shall be supplied only when specified in the purchase order. A wrench may be of an integral design or may consist of a head that fits onto the stem and is provided with a socket or another suitable means of accommodating an extended

Table 2A—Lubricated Plug Valve Stem Operation

		Size (NPS)	
Class	Pattern	Direct Operation	Gear Operation
150	Short and venturi	1 through 8	8 through 24
	Regular	1 through 6	6 through 24
	Round port	1 through 4	4 through 24
300	Short and venturi	1 through 8	8 through 24
	Regular	1 through 6	6 through 24
	Round port	1 through 4	4 through 24
400	Venturi	4 through 6	6 through 24
	Regular	4	4 through 24
	Round port	4	4 through 24
600	Venturi and regular	1 through 4	4 through 12
	Round port	1 through 3	3 through 12
900	Venturi and regular	3	3 through 12
	Round port	—	3 through 12
1500	Venturi and regular	1 through 3	3 through 12
	Round port	1 through 2	2 through 12
2500	Venturi and regular	1 through 3	3 through 12

Table 2B—Sleeve Lined and Fully Lined Plug Valve Stem Operation

		Size (NPS)	
Class	Pattern	Direct Operation	Gear Operation
150	Short and venturi	1 through 4	4 through 12
300	Short and venturi	1 through 4	4 through 12

handle. The head shall be designed so that the handle can be permanently attached. The head shall be secured to the stem or operating mechanism with a set screw of ample size, or by another positive means.

2.7.3 A spoked handwheel shall be furnished with each gear-operated valve; webbed or disked handwheels shall not be used. Spokes that extend beyond the wheel rim (tiller type) are permissible.

2.7.4 Gear mechanisms may be operated manually or by means of an electric motor or another similar power device. Keys or pins shall be used to secure gears or pinions to shafts. On power-operated valves, the gear assembly shall be suitably guarded.

2.7.5 When specified in the purchase order, valves shall be furnished with a lockable device that accepts a purchaser-supplied lock that enables the valve to be locked in the open and closed positions. The lockable device shall be designed such that a lock with a 5/16 inch (8mm) diameter shank, not more than 4 inches (100 mm) long, can be inserted directly through appropriate holes and locked. Provisions for a lockable device are permitted even when it is not specified in the purchase order.

2.7.6 Valves shall be provided with a suitable stop for the plug assembly in both the open and the closed position. The open or closed position of the plug in the body shall be shown by an indicator. Cast or integrally forged indicators shall be raised rather than recessed.

If the position indicators are not integral with the plug, they shall be designed to prevent the plug and indicators from being assembled in any way other than with the indicator in its proper position with respect to the plug port.

2.7.7 Valves shall be supplied with the capability of mounting actuators or gear mechanisms without removing any pressure-containing components (e.g. body bolts, bonnet bolts, flange bolts, packing gland bolts, packing retaining stem nut, etc.).

2.8 Electrical Continuity

When specified in the purchase order, valves shall incorporate an antistatic feature that ensures electrical continuity between the plug and the body. The valve shall have electrical continuity across the discharge path, with a resistance of not more than 10 ohms from a power source of not more than 12 volts DC. This continuity shall be verified by testing a new, dry valve that has been (a) pressure tested and (b) cycled at least five times.

2.9 Marking

2.9.1 Valves other than ductile iron valves shall be marked in accordance with ASME B16.34.

2.9.2 Ductile iron valves shall be marked in accordance with MSS SP-25.

2.9.3 Valve nameplate marking shall include the pressure rating at 100°F (38°C).

2.9.4 Valve nameplate marking shall include the maximum temperature limit and its corresponding limiting pressure for any seal, sleeve, liner, diaphragm, seat, or sealant that causes the valve to be limited to a pressure-temperature rating that is lower than that listed in applicable ASME B16.34 or ASME B16.42.

SECTION 3—MATERIALS

3.1 General

When service or environmental conditions, such as low temperatures or a corrosive environment, make special considerations necessary in choosing valve materials, the purchaser shall indicate this on the purchase order, and the materials shall be as agreed upon by the purchaser and the manufacturer.

3.2 Shell

3.2.1 The shell, which comprises the body and the cover, shall be of a material listed in ASME B16.34 or ductile iron to ASTM A 395. For ASME B16.34 listed materials, the body and the cover do not have to be to identical material specifications, however, the body and the cover shall be of materials of the same materials group.

3.2.2 A metallographic examination may not be substituted for the tensile test required by ASTM A 395.

3.3 Body-to-Cover Seals, Diaphragms, or Gaskets

When body-to-cover seals or metallic or nonmetallic diaphragms or gaskets are used, they shall be suitable for the service conditions and the valve's pressure-temperature ratings. Where necessary, compression of the seals, diaphragms, or gaskets shall be controlled by a compression ring or by the body-to-cover design. The corrosion resistance of any metal in contact with the service fluid shall at least equal that of the body. The seal or gasket may be made of a material listed in Annex E, Figure E1, of ASME B16.5, or the seal or gasket may be made of a hydrocarbon-resistant plastic or elastomer.

3.4 Plugs

Plugs shall be made of one of the materials specified in ASME B16.34 or ductile iron to ASTM A 395. The plug

surfaces shall have bearing properties that will resist galling. Steel plugs may be hard surfaced to provide the desired resistance to abrasion and galling. Other materials may be used if they are specified in the purchase order. On ductile iron plugs, hard surfacing shall not be applied by welding or brazing. The corrosion resistance of the plug shall be at least equal to that of the body. If the surfaces of plugs that rotate against elastomeric or plastic sleeves, liners, seals, gaskets, or seats are not coated with an elastomer or plastic, these surfaces of plugs shall have a surface finish no rougher than 16 microinches arithmetic average roughness height.

3.5 Operating Mechanisms

3.5.1 Handwheels and chainwheels shall be made of carbon steel, ductile iron, or malleable iron. Unless otherwise specified in the purchase order, handwheels and chainwheels shall be cast or forged, or they may be fabricated from other carbon steel product forms, provided that the fabricated wheels are as strong and as tough as those made by casting or forging. All handwheels shall be free from burrs and sharp edges. Wrenches shall be made of steel, ductile iron, malleable iron, bronze, or other ductile metals. Chains shall be made of steel.

3.5.2 Unless otherwise specified by the purchaser, gears for stem operation may be made of steel, bronze, ductile iron, malleable iron, or cast iron that conforms to ASTM A 126, Grade B, or is of a higher tensile strength. Worm gears shall be made of steel, ductile iron, or malleable iron.

3.6 Glands

Glands shall be made of cast, forged, or rolled steel or of ductile iron. Ductile iron shall not be used for fluid services with operating temperatures above 650°F (343°C).

3.7 Stem Seal or Packing

Unless otherwise specified in the purchase order, a hydrocarbon-resistant stem seal or packing that has a minimum temperature range from -20°F through 225°F (-29°C through 107°C) shall be furnished.

3.8 Bolting

3.8.1 Cover bolting material shall conform to Table 3 and ASME B16.34.

3.8.2 Gland and adjuster bolting material shall conform to ASME B16.34

3.8.3 All valve bolting material is subject to the temperature limitations specified in ASME B31.3.

Table 3—Cover Bolting

		Standard Cover Bolting[a]	
Material Group Number	Nominal Steel Designation	Bolt and Stud Grades per ASTM A 193	Nut Grades per ASTM A 194
1.1	Carbon	B7	2H
		B8M-CL2[b, c, d, e]	8M[b]
1.2	2½Ni	B8M-CL2[b, c, d, e]	8M[b]
	3½Ni	B8M-CL2[b, c, d, e]	8M[b]
1.3	Carbon	B8M-CL2[b, c, d, e]	8M[b]
1.9	1¼Cr-½Mo	B16	4[f]
1.10	2¼Cr-1Mo	B16	4[f]
1.13	5Cr-½Mo	B16	4[f]
1.14	9Cr-1Mo	B16	4[f]
2.1	18Cr-8Ni	B8M-CL2[c, d]	8M
2.2	16Cr-12Ni-2Mo 18Cr-9Ni-2Mo	B8M-CL2[c, d]	8M
2.3	18Cr-8Ni 16Cr-12Ni-2Mo	B8M-CL2[c, d]	8M
2.5	18Cr-10Ni-Cb	B8M-CL2[c, d]	8M

Source: This table is extracted from ASME B16.34, Table 1, except for standard bolting columns and Notes a, b, c, d, e, and f.

[a]Temperature limitations on bolting are as follows: Grade B7, 1000°F; Grade L7, 1000°F; Grade B16, 1100°F; Grade B8-CL1, 1500°F; Grade B8M-CL1, 1500°F; Grade B8-CL2, 1000°F; and Grade B8M-CL2, 1000°F.

[b]ASTM A 320, Grade L7, bolts and ASTM A 194, Grade 4, nuts are also acceptable.

[c]ASTM A 193, Grade B8-CL1 and Grade B8M-CL1, bolting may be substituted.

[d]ASTM A 193, Grade B8-CL2, bolts are also acceptable.

[e]B8M bolts are to be furnished only for service below -20°F (-29°C) when used with 1.1, 1.2, and 1.3 materials.

[f]ASTM A 194, Grade 8M and Grade 7, nuts are also acceptable.

3.9 Nameplates

The nameplate shall be made of 18Cr-8Ni steel or nickel alloy. The nameplate shall be attached to the valve shell by welding, or by pins made of a material similar to that of the nameplate.

SECTION 4—SEALING SYSTEM

4.1 Lubricated Plug Valves

4.1.1 Lubricated plug valves shall be furnished with an internal lubricating system that is capable of delivering lubricant to the body/plug contact surfaces in the seating and seal areas.

4.1.2 Grooves shall be provided in the body/plug surfaces. The grooves shall be arranged so that lubricant under pressure will be transmitted to all parts of the system when the valve is fully open or closed, thereby scaling the ports and facilitating operation.

4.1.3 The lubricant fitting, including the screw, shall be made of steel.

4.1.4 Steel check valves with a minimum of two independent check elements are required on all lubricated plug valves to prevent escape of sealant. The material for the check valves, including the check elements and the housing, shall be at least as corrosion resistant as the metal of the valve body.

4.1.5 Unless otherwise specified in the purchase order, lubricated plug valves shall be furnished with hydrocarbon-resistant lubricating sealant that has a temperature range from -20°F through 225°F (-29°C through 107°C). This sealant shall have both proper plasticity for tight sealing and lubricity for ease of operation.

4.2 Nonlubricated Plug Valves

Nonlubricated plug valves may use as sealing elements metal seats or hydrocarbon-resistant plastic or elastomer sleeves, seats, or complete or partial linings or coatings. Sleeves shall be mechanically restrained to prevent displacement or dislodging while valves are in service. Linings or coatings of the plug shall be bonded or mechanically locked. Linings or coatings of the shell shall also be bonded or mechanically locked unless the strength and rigidity of the lining or coating are sufficient to prevent displacement or dislodging while valves are in service. In sleeved, lined, and soft-seated plug valves, a means shall be provided to adjust, either manually or automatically, the position of the plug as wear occurs. The material for sealing elements may be specified by the purchaser.

SECTION 5—INSPECTION AND TESTING

5.1 Inspection

If inspection by the purchaser is specified in the purchase order and a detailed procedure is not included, inspection shall be in accordance with API Standard 598. If inspection is not specified in the purchase order, the valves shall be capable of meeting the inspection requirements described in API Standard 598. Examination by the manufacturer shall be as specified in API Standard 598.

5.2 Pressure Tests

Each valve shall be pressure tested in accordance with API Standard 598.

5.3 Repair of Defects

Defects in the shell of steel valves that are revealed by inspection or testing may be repaired as permitted by the most applicable ASTM material specification.

No repair, including plugging or impregnation, of defects found in ductile iron castings is permitted. Welding or brazing of ductile iron is not permitted.

SECTION 6—SHIPMENT

6.1 Coatings

6.1.1 Unmachined exterior surfaces of finished steel valves, except austenitic stainless steel valves, shall be painted or treated by another equally effective method, such as phospating, to protect surfaces from corrosion caused by atmospheric exposure.

6.1.2 Unless otherwise specified in the purchase order, unmachined surfaces of ductile iron bodies and covers shall be coated with green paint.

6.1.3 Machined surfaces of flange faces and welding ends shall be coated with an easily removable rust preventive.

6.2 Openings

6.2.1 Except on small, individually packaged valves, end flanges or welding ends shall be blanked to protect the gasket surfaces or welding ends and the valve internals during shipment and storage. The protective covers shall be made of wood, wood fiber, plastic, or metal and shall be securely attached to the valve ends by bolts, steel straps, steel clips, or suitable friction-locking devices. The cover shall be designed so that the valve cannot be installed without complete removal of the cover.

6.2.2 Tapped connections shall be fitted with fully tightened threaded solid metal plugs that have corrosion resistance at least equal to that of the shell.

6.3 Plug Position

Valves shall be shipped with the plugs in the open position.

6.4 Packing

If stem packing is used, valves shall be shipped with the stem packing installed. After a valve has been successfully pressure tested and accepted, at least 75 percent of the gland adjustment travel shall remain for use in service.

6.5 Packaging

6.5.1 Unless export packaging is specified in the purchase order, valves may be shipped loose, palletized, or packed in cartons, boxes, or crates.

6.5.2 If export packaging is specified in the purchase order, valves shall be shipped individually or collectively in wooden boxes or crates in a manner that will prevent their shifting within the package.

1-01400—11/94—5C (3E)

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Order No. 822-59904