Metal Plug Valves—Flanged, Threaded, and Welding Ends

API STANDARD 599
SEVENTH EDITION, JANUARY 2013

AMERICAN PETROLEUM INSTITUTE

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Downstream Segment

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Foreword

This standard is a purchase specification that covers requirements for metal plug valves, including flanged, threaded, socket-weld, and butt-weld valves in steel and alloy materials, and flanged valves in ductile iron.

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Contents

Contents

Metal Plug Valves—Flanged, Threaded, and Welding Ends

1 Scope

This standard covers design, materials, face-to-face dimensions, pressure-temperature ratings, and examination, inspection, and test requirements for metallic plug valves as follows.

— Steel, nickel base, and other alloy plug valves with flanged or butt-welding ends and ductile iron plug valves with flanged ends in sizes $15 \leq DN \leq 600$ ($1/2 \leq NPS \leq 24$).

— Threaded or socket-welding ends for sizes $15 \leq DN \leq 50$ ($1/2 \leq NPS \leq 2$). Valve bodies conforming to ASME B16.34 may have one flange and one butt-welding end, or one threaded and one socket-welding end.

— Lubricated and nonlubricated valves that have two-way coaxial ports. Three-way and four-way plug valves do not fall under the scope of this standard.

— Tandem plug valves which have two independent operating plugs in a single body.

This standard includes requirements for valves fitted with internal body, plug, and port linings or applied hard facings on the body, body ports, plug, and plug port. The extent of linings and the facing materials of which they are made are not covered in this standard.

This standard also provides additional requirements for plug valves that are in full conformance to the requirements of ASME B16.34 for Standard Class 150 through 2500. Ductile iron valves, Class 150 and 300, shall follow the additional requirements of ASME B16.42 for pressure-temperature ratings, wall thickness, flange dimensions, and material grade.

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 of valve design are described below.

— Short pattern design found only in Class 150 and 300 where flanged plug valves match the face-to-face dimensions of steel-flanged gate valves in sizes $40 \leq DN \leq 300$ ($1\ 1/2 \leq NPS \leq 12$).

— Regular pattern design with a plug port area that is greater than the venturi pattern.

— Venturi pattern designed for minimum pressure loss consistent with the reduced port area used in this type of valve. Venturi valves have a configuration of body and plug ports that approximate a venturi throat.

— Round-port full-bore pattern design with a circular port through both the plug and the body that is not smaller than that specified in Appendix A of ASME B16.34 for the applicable valve size and pressure class.

It covers valves of the nominal pipe sizes NPS:

— $1/2$, $3/4$, 1, $1\ 1/4$, $1\ 1/2$, 2, $2\ 1/2$, 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24.

Corresponding to nominal pipe sizes DN;

— 15, 20, 25, 32, 40, 50, 65, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600.

Information to be specified by the purchaser is shown in Annex A.

The standard nomenclature for valve parts is shown in Annex B. Figure B.1, Figure B.2, Figure B.3, and Figure B.4 illustrate typical plug valve designs and are not to be construed as precluding other available designs that comply with the requirements of this standard. The only purpose of these figures is to identify part names. The construction of a valve is acceptable only when it complies with this standard in all respects.

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication of this standard, the editions of record are valid. All standards are subject to revisions and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

API Standard 598, *Valve Inspection and Testing*

API Standard 607, *Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats*

ASME B1.11 [1], *Unified Inch Screw Threads (UN and UNR Thread Form)*

ASME B1.12, *Class 5 Interference-Fit Thread*

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

ASME B16.5, *Pipe Flanges and Flanged Fittings*

ASME B16.10, *Face-to-Face and End-to-End Dimensions of Valves*

ASME B16.11, *Forged Steel Fittings, Socket-Welding and Threaded*

ASME B16.25, *Buttwelding Ends*

ASME B16.34, *Valves – Flanged, Threaded, and Welding End*

ASME B16.42, *Ductile Iron Pipe Flanges and Flanged Fittings, Class 150 and 300*

ASME B18.2.2, *Square and Hex Nuts*

ASME B18.2.2M, *Square and Hex Nuts Metric*

ASME B18.2.4.6M, *Metric Heavy Hex Nuts*

ASME B31.3, *Process Piping*

ASME B36.10M, *Welded and Seamless Wrought Steel Pipe*

ASME B46.1, *Surface Texture (Surface Roughness, Waviness and Lay)*

ASTM A395 [2], *Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*

ASTM A126, *Gray Iron Castings for Valves, Flanges, and Pipe Fittings*

MSS SP-45 [3], *By-pass and Drain Connections*

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1 ASME International, 3 Park Avenue, New York, New York 10016-5990, www.asme.org.
2 ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.
3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc., 127 Park Street, NE, Vienna, Virginia 22180-4602, www.mss-hq.com.

MSS SP-91, Guidelines for Manual Operation of Valves

MSS SP-25, *Standard Marking System for Valves, Fittings, Flanges, and Unions*

3 Terms and Definitions

For the purposes of this document, the following definitions apply.

3.1
Class
An alphanumeric designation that is used for reference purposes relating to valve pressure-temperature capability, taking into account valve material mechanical properties and valve dimensional characteristics. It comprises “Class” followed by a dimensionless whole number. The number following “Class” does not represent a measurable value and is not used for calculation purposes except where specified in this international standard. The allowable pressure for a valve having a class number depends on the valve material and its application temperature and is to be found in tables of pressure/temperature ratings.

3.2
DN
An alpha numeric designation of size that is common for components used in a piping system, used for reference purposes, comprising the letters “DN” followed by a dimensionless number indirectly related to the physical size of the bore or outside diameter of the end connection as appropriate. The dimensionless number following “DN” does not represent a measurable value and is not used for calculation purposes except where specified.

3.3
NPS
An alpha numeric designation of size that is common for components used in a piping system, used for reference purposes, comprising the letters “NPS” followed by a dimensionless number indirectly related to the physical size of the bore or outside diameter of the end connection as appropriate. The dimensionless number may be used as a valve size identifier without the prefix “NPS.” The dimensionless size identification number does not represent a measurable value and is not used for calculation purposes.

4 Pressure-Temperature Ratings

The pressure-temperature ratings shall be 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 can limit the applications of valves to more restricted pressures and temperatures (see 6.7 and 9.4).

5 Design

5.1 General

Valves manufactured in accordance with this standard shall also meet the requirements of ASME B16.34 for Standard Class, except that in the case of ductile iron valves, Class 150 and 300, the requirements of ASME B16.42 for pressure-temperature ratings, wall thickness, flange dimensions, and ductile iron material shall be substituted.

5.2 Body

5.2.1 The minimum thickness of the body wall shall be in accordance with the following.

— ASME B16.42 minimum wall for fittings shall apply for equivalent size valve bodies of ductile iron.

— Table 1 or Table 2 for lubricated plug valves with valve bodies of ASME B16.34, Group 1 material.

— ASME B16.34 for lubricated plug valves with valve bodies of ASME B16.34, Group 2 and 3 materials.

— ASME B16.34 for nonlubricated plug valves with bodies of ASME B16.34, Group 1, 2, or 3 materials.

Plug valves having a body material listed in Table 1 of ASME B16.34 and provided with minimum wall thickness in accordance with Table 1 or Table 2 may be designated as heavy-wall (API 600 wall) plug valves.

5.2.2 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 unless otherwise agreed to between the manufacturer and the purchaser.

5.2.3 Steel, nickel base, and other alloy plug valve end flanges and bonnet flanges shall be cast or forged integral with the body; except that cast or forged flanges attached by full penetration butt-welding or inertia welding may be used if agreed by the purchaser. When a flange is attached by welding, the welding procedure and the welder or welding operator shall be qualified in accordance with ASME *BPVC*, Section IX. Alignment rings, integral or loose, employed as a welding aid or upset weld curls created by inertia welding shall be completely removed following welding, while care shall be taken that the minimum wall thickness is maintained. Valves having flanges attached by welding shall meet the requirements of Paragraph 2.1.6 of ASME B16.34. Flanges for ductile iron valves shall only be the integral type.

Table 1—Minimum Body Thickness (Millimeters): Materials Except Ductile Iron and Heavy-wall (API 600 Wall) Stainless Steel [a]

Nominal Valve Size (NPS)	Class Designation					
	150	300	600	900	1500	2500
1/2	4.6	4.6	5.3	5.3	5.3	5.3
3/4	4.6	4.6	6.4	10.2	10.2	10.2
1	6.4	6.4	7.9	12.7	12.7	15.0
1 1/4	6.4	6.4	8.6	14.2	14.2	17.5
1 1/2	6.4	7.9	9.4	15.0	15.0	19.1
2	8.6	9.7	11.2	19.1	19.1	22.4
2 1/2	9.7	11.2	11.9	22.4	22.4	25.4
3	10.4	11.9	12.7	19.1	23.9	30.2
4	11.2	12.7	16.0	21.3	28.7	35.8
6	11.9	16.0	19.1	26.2	38.1	48.5
8	12.7	17.5	25.4	31.8	47.8	62.0
10	14.2	19.1	28.7	36.6	57.2	67.6
12	16.0	20.6	31.8	42.2	66.8	86.6
14	16.8	22.4	35.1	46.0	69.9	—
16	17.5	23.9	38.1	52.3	79.5	—
18	18.3	25.4	41.4	57.2	88.9	—
20	19.1	26.9	44.5	63.5	98.6	—
24	20.6	30.2	50.8	73.2	114.3	—

[a] See 5.2.1.

Table 2—Minimum Body Thickness (Inches): Materials Except Ductile Iron and Heavy-wall (API 600 Wall) Stainless Steel [a]

Nominal Valve Size (NPS)	Class Designation					
	150	300	600	900	1500	2500
1/2	0.18	0.18	0.21	0.31	0.31	0.31
3/4	0.18	0.18	0.25	0.40	0.40	0.40
1	0.25	0.25	0.31	0.50	0.50	0.59
1 1/4	0.25	0.25	0.34	0.56	0.56	0.69
1 1/2	0.25	0.31	0.37	0.59	0.59	0.75
2	0.34	0.38	0.44	0.75	0.75	0.88
2 1/2	0.38	0.44	0.47	0.88	0.88	1.00
3	0.41	0.47	0.50	0.75	0.94	1.19
4	0.44	0.50	0.63	0.84	1.13	1.41
6	0.47	0.63	0.75	1.03	1.50	1.91
8	0.50	0.69	1.00	1.25	1.88	2.44
10	0.56	0.75	1.13	1.44	2.25	2.66
12	0.63	0.81	1.25	1.66	2.63	3.41
14	0.66	0.88	1.38	1.81	2.75	—
16	0.69	0.94	1.50	2.06	3.13	—
18	0.72	1.00	1.63	2.25	3.50	—
20	0.75	1.06	1.75	2.50	3.88	—
24	0.81	1.19	2.00	2.88	4.50	—

[a] See 5.2.1.

5.2.4 The dimensions and finish of steel and nickel base end flanges shall be as specified in ASME B16.5 for the type of facing specified in the purchase order.

5.2.5 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.

5.2.6 Socket-welding end preparation shall conform to ASME B16.11. The bottom of the socket shall be square and flat with the thickness in accordance with Table 4 of ASME B16.34.

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

5.2.8 Threaded end valves shall be threaded as specified in ASME B1.20.1. All internal threads shall be chamfered a distance of one half the pitch of the thread at an angle of 40 to 50 degrees with the axis of the thread.

5.2.9 When specified, drain and bypass connections shall conform to ASME B16.34.

5.2.10 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. For lubricated tapered plug valves, the area below the small end of the plug need not be vented if it prevents the sealant injection system from performing its intended

function. If this venting affects the sealing direction of the valve, the body shall be marked with preferred shut-off direction.

5.3 Cover

Covers shall have nut bearing surfaces for bolting that are parallel to the cover face within 1 degree. Spot-facing or back-facing for standard hex head and internal hex head cap screws shall accommodate the dimensions of these fastener types.

5.4 Stem and Plug

5.4.1 Stem retention and stem strength shall meet the requirements of Paragraph 6.5.1 of ASME B16.34. The design shall not rely on actuation components (e.g. gear operators, actuators, levers, etc.) to prevent ejection.

5.4.2 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 outside the pressure boundary by more than 10 %. This shall be verified by destructive testing or calculation methods that have been verified by destructive testing on items of the same geometric configuration.

5.4.3 The stem and connection between stem and plug shall be designed to resist permanent deformation or failure of any part when a force applied to handle or gear operator produces a torque equal to the greater of 20 N-m (15 ft-lb) or two times the manufacturer's maximum published torque at maximum differential pressure at 21 °C (70 °F) on dry air service. This shall be verified by destructive testing or calculation methods that have been verified by destructive testing on items of the same geometric configuration.

5.4.4 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 Ra of 16 μin. (0.40 μm) in accordance with ASME B46.1. Lubricated plug valves shall have a surface finish between the seat and plug that will insure maximum retention of lubricant as determined by the manufacturer.

5.4.5 Stem surface area in contact with the stem seal or packing shall be no rougher than Ra of 32 μin. (0.80 μm) in accordance with ASME B46.1.

5.5 Glands

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

5.6 Bolting

5.6.1 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 or ASME B18.2.4.6M.

5.6.2 Bolting 1 in. (25 mm) or smaller shall have coarse (UNC) threads or the most nearly corresponding metric thread. Bolting larger than 1 in. (25 mm) shall be of the 8-thread series (8 UN) or the most nearly corresponding metric thread. Bolt threads shall be Class 2A, and nut threads shall be Class 2B in accordance with ASME B1.1. 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. When metric bolting is used, metric bolt threads shall be tolerance Class 6g and nuts tolerance Class 6H in accordance with ASME B1.13M.

5.6.3 Gland bolting shall pass through holes in the gland. Open slots shall not be used in the cover flange, cover, adjuster, or gland.

5.6.4 Packing gland bolts shall be designed so that the bolt stress shall not exceed one third ($^1/_3$) of the minimum tensile stress of the bolt due to average packing compressive stress required to retain the maximum cold working pressure of the valve (CWP rating).

5.7 Operation

5.7.1 Plug valves shall be designed for operation by applying a wrench (sometimes called a lever), handle, 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. The length of the wrench (or lever), handle, 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 short-term force, a combined multiplier of 0.4 at the manufacturer's maximum operating torque as defined in 5.4.3. The input force shall not exceed 360 N (80 lbf).

5.7.2 A wrench (or lever) 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 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.

5.7.3 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.

5.7.4 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 separate shafts. On power-operated valves, the gear assembly shall be suitably guarded.

5.7.5 When specified in the purchase order, valves shall be furnished with a lockable device, not of the type that latch automatically, 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 an 8 mm ($^5/_{16}$ in.) diameter shank, not more than 100 mm (4 in.) long, can be inserted directly through appropriate holes and locked.

5.7.6 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. Stem wrench flats in line with the plug port are also a suitable integral position indicator.

5.7.7 The handle shall be mounted parallel to the flow passage through the plug if the valve is supplied with a lever-type handle. The handle design shall not permit incorrect assembly.

5.7.8 Valves supplied with the capability of mounting actuators or gear operators shall be capable of doing so without removal of any pressure containing parts (e.g. body bolts, bonnet bolts, flange bolts, packing glad bolts, packing retaining stem nut, etc,).

5.8 Electrical Continuity

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.

6 Materials

6.1 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.

6.2 Shell

6.2.1 The shell, which comprises the body and the cover, shall be of a material listed in ASME B16.34 or ductile iron listed in ASME B16.42.

6.2.2 A metallographic examination shall not be substituted for the tensile test required by ASTM A395.

6.3 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 Table C1 of ASME B16.5, or the seal or gasket may be made of a hydrocarbon-resistant plastic or elastomer.

6.4 Stem and Plug

6.4.1 Plugs shall be made of one of the materials specified in ASME B16.34 or ductile iron specified in ASME B16.42. Other materials may be used if they are specified in the purchase order. The corrosion resistance of the plug shall be at least equal to that of the body. 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. When ductile iron plugs are hard surfaced, hard surfacing shall not be applied by welding or brazing.

6.4.2 Stem material, when not integral with plug, shall have a corrosion resistance at least equal to the body and meet the strength requirements of 5.4.2.

6.5 Operating Mechanisms

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. All handwheels shall be free from burrs and sharp edges. Wrenches and handles shall be made of steel, ductile iron, malleable iron, bronze, or other ductile metals. Chains shall be made of steel.

6.6 Glands

Glands or gland followers 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 343 °C (650 °F).

6.7 Stem Seal or Packing

A hydrocarbon-resistant stem seal or packing that is suitable to meet the maximum rated design temperature of the valve shall be furnished unless otherwise specified on the purchase order.

6.8 Bolting

6.8.1 Cover bolting material shall conform to ASME B16.34, Group 4 materials except that ASTM A307, Grade B carbon steel bolting shall not be used.

6.8.2 Gland and adjuster bolting material shall conform to ASME B16.34, Group 4 materials.

6.8.3 Valve bolting material is subject to the temperature limitations specified in ASME B31.3.

6.9 Identification Plate

6.9.1 The identification plate material shall be 18Cr-8Ni stainless steel or nickel alloy.

6.9.2 The identification plate shall be attached to the valve shell by welding, except for ductile iron, or by pins made of a material similar to that of the nameplate.

6.10 Repair of Defects

6.10.1 When examination, inspection, or testing reveals defects in the body of a steel or alloy valve, the defect may be repaired as permitted by the applicable ASTM material specification listed in Table 1 of ASME B16.34.

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

7 Sealing System

7.1 Lubricated Plug Valves

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

7.1.2 Grooves shall be provided in the body and 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 sealing the ports and facilitating operation.

7.1.3 The design of the sealant (lubricant) fitting shall be a lubricant screw, a sealant (lubricant) fitting, or a combination (lubricant) fitting and screw. The sealant fitting, including the screw, shall be made of steel.

7.1.4 For valves that are supplied with a lubricant screw or a combination sealant fitting and lubricant screw, steel check valves with a minimum of two independent check elements are required. For valves supplied with a sealant fitting, steel check valves with a one check element can be used, provided the lubricant fitting has a separate checking element. 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.

7.1.5 Unless otherwise specified in the purchase order, lubricated plug valves shall be furnished with hydrocarbon-resistant lubricating sealant that is suitable to meet the maximum rated design temperature of the valve. This sealant shall have both proper plasticity for tight sealing and lubricity for ease of operation.

7.2 Nonlubricated Plug Valves

Nonlubricated plug valves may use metal seats or hydrocarbon-resistant plastic or elastomer sleeves, seats, or complete or partial linings or coatings as sealing elements. 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.

8 Inspection, Examination, and Testing

8.1 Inspection and Examination

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

8.2 Testing

8.2.1 Each valve shall be pressure tested in accordance with API 598. Valves shall be tested at the factory in the fully assembled condition, including auxiliary components, fitting, and gland packing, and before coating or painting. During the pressure test, the valve body shall be free of external constraints applied in the direction of the pipe axis. Valves having surface conversion treatment may be tested with the treatment applied.

8.2.2 When fire-tested valves are specified by the purchaser, the requirements of API 607 shall apply unless otherwise agreed by the purchaser. When external fire testing is specified, the requirements of API 607 for seat leakage are not applicable.

9 Marking

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

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

9.3 Valve identification plate marking shall include the pressure rating at 38 °C (100 °F) and manufacturer's figure number.

9.4 Valve identification plate marking shall include the maximum temperature limit and its corresponding limiting pressure for any seal, sleeve, liner, diaphragm, or seat 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.

9.5 API 599 may also be added to identification plate for valves complying with this standard.

10 Shipment

10.1 Coatings

10.1.1 Unless otherwise specified in the purchase order, the external surfaces of valve bodies and covers, except nonferrous and austenitic stainless steel, shall be painted.

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

10.1.3 All coatings and paints shall not contain lead. [4]

[4] Lead-free is defined by the Consumer Product Safety Act, CPSA 15 USC 2057-8, 1978, as less than 0.06 % (600 ppm by dry weight).

10.2 Openings

10.2.1 End flanges or welding ends shall be covered to protect the gasket surfaces or welding ends and the valve internals during shipment and storage, except on small, individually packaged valves where the packaging provides such protection. 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.

10.2.2 Tapped connections shall be fitted with fully tightened threaded solid metal plugs that have corrosion resistance at least equal to that of the shell. Cast iron plugs shall not be used. However, ductile iron plugs may be used in ductile iron valves.

10.3 Plug Position

Valves shall be shipped with the valve plug or plugs in the open position.

10.4 Packing

If adjustable stem packing is used, valves shall be shipped with the stem packing installed. The remaining packing adjustment, with the gland tight, shall be greater than one packing width.

10.5 Packaging

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

10.5.2 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.

11 Recommended Spare Parts

When specified on the purchase order, the vendor shall submit a recommended list of spare parts. The list shall include cross-sectional or assembly type drawings for identification with part numbers.

Annex A
(informative)

Information to Be Specified by the Purchaser

A.1 If the purchaser needs a plug valve that deviates from this standard, the deviating requirements shall be stated in the purchase order.

A.2 If no exceptions are to be taken to this standard, the purchase order need only refer to API 599 and specify the items included in A.2.1. Optional items included in A.2.2 may also be specified.

A.2.1 Items required on the purchase order are as follows.

a) Valve size (see Section 1).

b) Class (see Section 1).

c) Type (lubricated or nonlubricated) and pattern (short, regular, venturi, or full bore) or tandem plug (see Section 1).

d) End connections: (1) flanged, including facing type (raised, ring joint, or flat); (2) welding end, including bore dimensions; (3) threaded; (4) socket weld or sw/threaded; (5) flanged/welding ends (see Section 1 and 5.2.3 through 5.2.8).

e) Standard or heavy-wall thickness, for stainless steel and nickel base valves only (see 5.2.1).

f) Type of operator required (wrench, handle, handwheel, or gear) and whether supply of operator is included in the purchase order (see 5.7 and 6.5).

g) Shell (body and cover) material (see 6.1 and 6.2).

h) Fire test requirements (see 8.2.2).

i) Plug material (see 6.4).

A.2.2 Optional items are as follows.

a) Flanged ends attached by welding (see 5.2.3).

b) Drain and bypass connection (see 5.2.9).

c) Locking device (see 5.7.5).

d) Antistatic feature and testing (see 5.8).

e) Materials for operating mechanisms (see 6.5).

f) Stem seal or packing material (see 6.7).

g) Bolting material for temperatures beyond the limits specified in ASME B31.3 or for increased resistance to corrosive environments (see 6.8).

h) Lubricating sealant (see 7.1.5). (Specify sealant and/or operating temperature if temperature is outside the rated design of the valve.)

i) Inspection (see 8.1).

j) Coating for ductile iron valves (see 10.1.2).

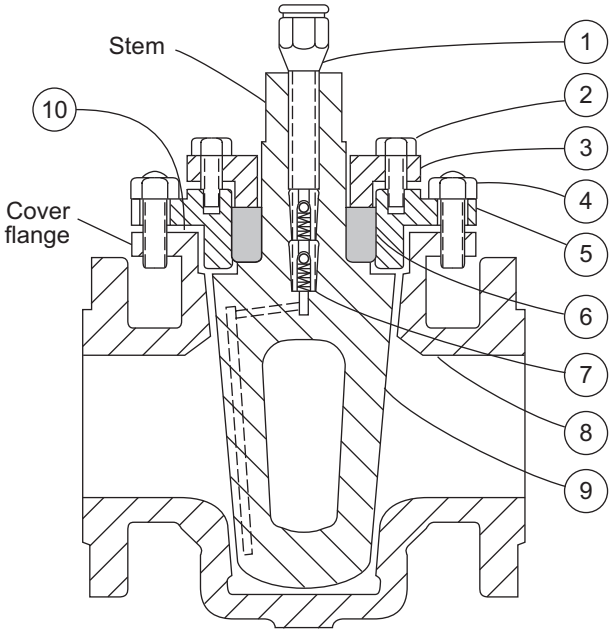
k) Export packaging (see 10.5).

l) Vented body cavity (see 5.2.10).

m) Spare parts (see Section 11).

Annex B
(informative)

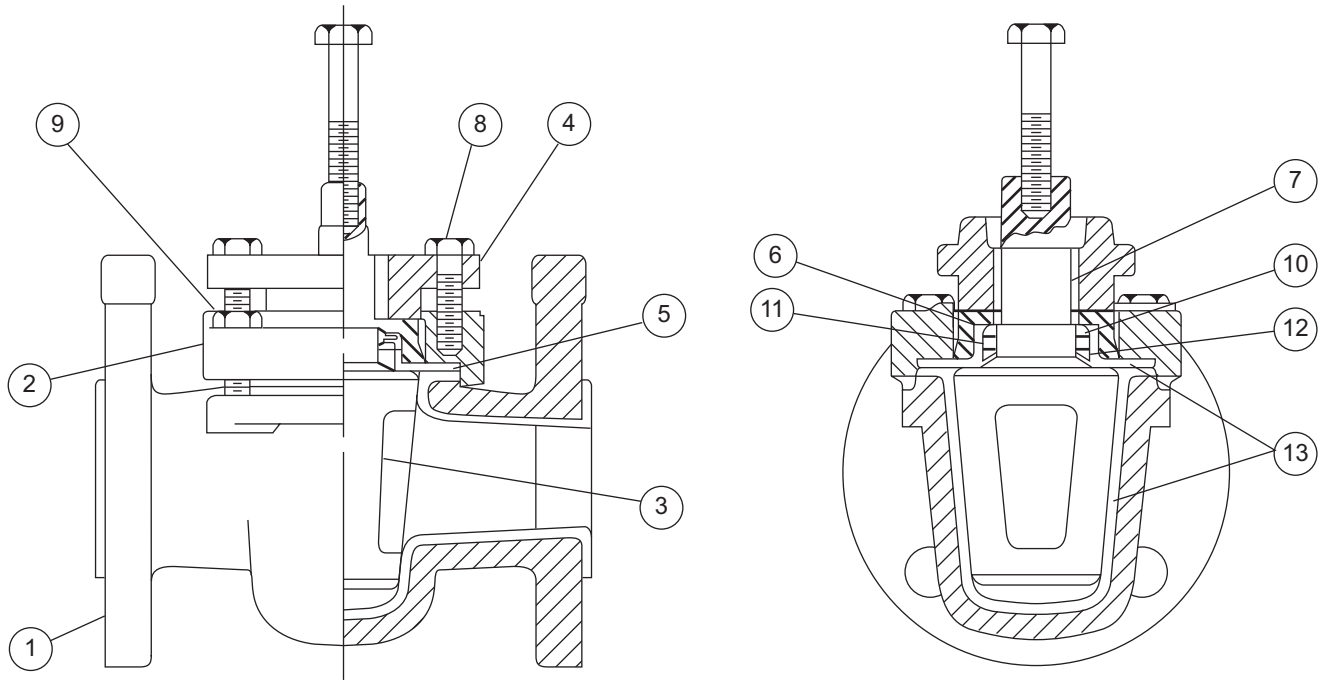
Standard Nomenclature for Valve Parts



Key

1	lubricant fitting	6	stem packing
2	gland bolting	7	lubricant check valves
3	gland	8	body
4	cover bolting	9	plug
5	cover	10	cover gasket

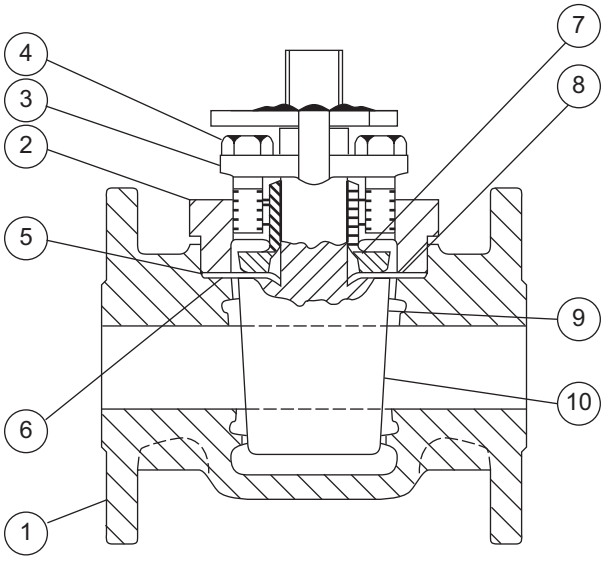
Figure B.1—Parts Identification for Lubricated Plug Valve



Key

1	body	8	gland bolting
2	cover	9	cover bolting
3	plug	10	spring washers
4	gland	11	support ring
5	stem seal	12	cup seal
6	thrust washer	13	lining
7	antistatic device		

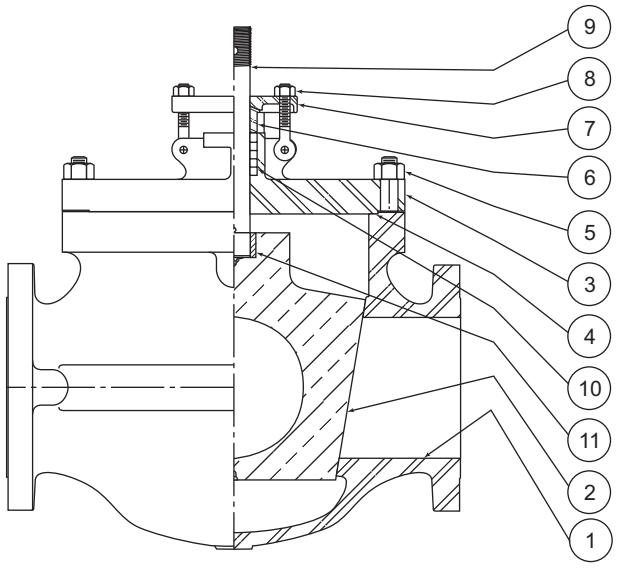
Figure B.2—Parts Identification for Fully-lined Plug Valve



Key

1	body	6	nonmetallic diaphragm
2	cover	7	stem seal or packing
3	adjuster	8	metallic diaphragm
4	adjuster bolting	9	sleeve
5	cover gasket or seal	10	plug

Figure B.3—Parts Identification for Sleeve-lined Plug Valve



Key

1	body	7	packing gland flange
2	plug	8	packing gland bolting
3	bonnet	9	stem
4	gasket, bonnet	10	packing
5	bonnet bolting	11	stem connection
6	packing gland		

Figure B.4—Parts Identification for Nonlubricated Plug Valve

Bibliography

[1] API, *Procedures for Standards Development*

[2] ISO/IEC Directives, Part 2 [5], *Rules for the structure and drafting of International Standards*

[3] ISO/IEC Guide 51, *Safety aspects—Guidelines for their inclusion in standards*

[5] International Organization for Standardization, 1, ch. de la Voie-Creuse, Case postale 56, CH-1211 Geneva 20, Switzerland, www.iso.org.

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