MSS-SP110

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STANDARD PRACTICE **SP-110**

1996
Edition

BALL VALVES
THREADED, SOCKET-WELDING, SOLDER JOINT, GROOVED AND FLARED ENDS

Developed and Approved
by the
Manufacturers Standardization Society
of the
Valve and Fittings Industry, Inc.
127 Park Street, N.E.
Vienna, Virginia 22180
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An MSS Standard Practice is intended as a basis for common practice by the manufacturer, the user, and the general public. The existence of an MSS Standard Practice does not in itself preclude the manufacturer, sale, or use of products not conforming to the Standard Practice. Mandatory conformance is established only by reference in a code, specification, sales contract, or public law, as applicable.

Substantive changes in this 1996 edition are "flagged" by parallel bars as shown on the margins of this paragraph. The specific detail of the change may be determined by comparing the material flagged with that in the previous edition.

Non-toleranced dimensions in this Standard Practice are nominal, and, unless otherwise specified, shall be considered "for reference only".

In this Standard Practice all notes, annexes, tables and figures are construed to be essential to the understanding of the message of the standard, and are considered part of the text unless noted as 'supplemental.'

"Other standards documents referred to herein are identified by the date of issue that was applicable to this standard at the date of issue of this standard. See Annex A. This standard shall remain silent on the applicability of those other standards of prior or subsequent dates of issue even though provisions of concern may not have changed. References contained herein which are bibliographic in nature are noted as 'supplemental' in the text."

CONTENTS

BALL VALVES
THREADED, SOCKET-WELDING, SOLDER JOINT, GROOVED AND FLARED ENDS

1. SCOPE

1.1 General

1.1.1 This Standard Practice covers round opening, full, regular and reduced port metal ball valves.

1.1.2 End connections covered herein are threaded, socket-welding, solder joint, grooved and flared end in nominal pipe sizes 1/4 through 4 inch.

1.1.3 These valves are intended for on-off operation and should be used for modulating or throttling service only when recommended by the manufacturer.

1.1.4 This Standard Practice covers ball valves of the following materials:

Carbon Steel
Alloy Steels
Stainless Steels
Grey Cast Iron
Ductile Iron
Malleable Iron
Copper Alloy

1.2 References

1.2.1 Standards and specifications adopted by reference in this standard and names and addresses of the sponsoring organizations are shown in Annex A. 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 Annex A. A product made in conformance with the edition reference applicable during the time of manufacture, and in all other respects 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.

1.3 Description of Valve Types and Parts

1.3.1 Examples of some valve types are shown in Figure 1. When variations of these basic types are used, they shall be named by the manufacturer.

1.3.2 The names of basic valve parts are given in Figure 2.

Note: The valve sketches shown in Figures 1 and 2 are for the purpose of illustration and nomenclature only and do not represent or endorse any manufacturer's product.

2. PRESSURE-TEMPERATURE RATINGS

2.1 Basis of Ratings

The pressure-temperature ratings for assembled valves shall be determined by the material of the body, seats, stem seals, end connections or any other component or type of construction that would be restrictive. Manufacturers should be consulted for exact ratings applicable for a particular material or type. Pressure-temperature ratings of steel valves, shall not exceed those specified in ASME B16.34, where applicable.

2.2 Solder End Ratings

Ratings of solder-end connections shall not exceed the limitations of ANSI B16.18. It shall be the responsibility of the user to select a solder composition that is compatible with the service conditions.

2.3 Cold Working Pressure (CWP)

The cold working pressure rating of the valve shell and components is the maximum allowable non-shock pressure at 100°F. The maximum working pressure at any other temperature shall not exceed this rated pressure.

3. MATERIALS

3.1 Valve Body

3.1.1 Steel. Steels shall be made to ASTM, AISI, or other standards for which mechanical and chemical data are available. The valve pressure boundary parts and bolts shall be made from metals that have the allowable stress established for the temperature range for which the valve is designed. This can be metals that the ASME has established allowable design stress at temperatures the valve will be used at or stress established by testing in accordance with the rules of ASME. Consideration of welding characteristics shall be given to those steels intended for socket weld end valves.

3.1.2 Iron Casting for Threaded End Valves. Cast iron shall conform to ASTM A 126, Class B or C. Malleable iron castings shall conform to ASTM A 47, Grades 32510, 35018 or ASTM A 197. Ductile iron castings shall conform to ASTM A 395 or ASTM A 536, grades 60-40-18 or 65-45-12.

3.1.3 Non-Ferrous Alloys. Non-ferrous materials shall be made to ASTM, CDA, or other standards for which mechanical and chemical data are available.

3.2 Bolting

Prefered bolting materials are as specified in ASME B16.34 Table 1, Group 4. If non-listed materials are used, the valve manufacturer shall be prepared to certify that the products are at least equally suitable for the intended use.

3.3 Other Parts

Parts, for example stems, glands, packing nuts, balls, seats, and seals shall be of materials suitable for the pressure-temperature rating.

Caution for Users: Service conditions other than pressure-temperature may affect suitability of the valve materials. For guidance, see Appendix E of ASME B31.3.

4. DESIGN

4.1 General

The valve design and materials of construction shall be structurally suitable for their stated pressure ratings and temperature limits. Any additional metal thickness above the thickness necessary to contain pressure such as may be needed for assembly stresses, valve closing stresses, shapes other than circular, stress concentrations, and corrosion allowances, shall be determined by the manufacturer.

4.2 Joints

4.2.1 The design of the valve shall be such as to provide against detrimental distortion under hydrostatic test conditions, assembly stresses, closing stresses, pipe reaction stresses, or when rated pressure is applied across a closed valve.

4.2.2 Bolting shall be threaded in accordance with ASME/ANSI B1.1.

4.2.3 Top entry valve bonnet joints shall be designed as follows:

4.2.3.1 Flanged bonnet bolting shall be such that a direct nominal stress resulting from the maximum working pressure acting on an area bounded by the effective outside periphery of the bonnet seal shall not exceed the allowable bolt stress values listed in ASME Boiler & Pressure Vessel Code, Section VIII, Division 1, or Section III, Division 1, Class 2 or Class 3, not to exceed 20,000 psig. For non-listed bolt materials, the allowable bolt stress shall be taken as 25% of the yield strength, not to exceed 20,000 psi.

4.2.3.2 Threaded bonnet or cover joints shall have a thread shear area that satisfies the following:

$$P(Ag/As) \leq .6Sa$$

where:

P = Valve cold working pressure, psi.

Ag = Area bounded by the effective outside periphery of a gasket or O-ring, or other seal effective periphery, except that in the case of a ring-joint, the bounded area is defined by the pitch diameter of the ring, square inches.

As = Total effective thread shear area, square inches.

Sa = Allowable minimum body/bonnet stress, from ASME Boiler Pressure Vessel Code, Section VIII, Division 1, or Section III, Division 1, Class 2 or 3, not to exceed 20,000 psi. For non-listed materials, the allowable stress shall be the lesser of 25% of the minimum tensile strength, or 67% of the minimum yield strength, not to exceed 20,000 psi.

4.2.4 Valves having flanged body joints which split the valve either perpendicular to or at an angle with the piping are subject to piping loads. Bolting in these cases shall be such that a direct tensile stress shall not exceed 7/9 of the allowable stress listed in ASME Pressure Vessel Code, Section VIII, Division 1, or Section III, Division 1, Class 2 or 3, not to exceed 20,000 psig. For non-listed bolting materials, the allowable bolt stress shall be taken as 25% of the yield strength not to exceed 20,000 psi.

4.2.5 Valves of a one-piece end entry type shall be designed so that the body insert is sufficient to withstand the full differential pressure permissible for the valve.

4.2.6 Threaded body joints exposed to piping loads shall satisfy the following thread shear area requirements:

$$P(Ag/As) \leq .47Sa$$

where: P, Ag, As, and Sa are as defined in 4.2.3.2.

4.3 End Connections

4.3.1 Threaded pipe ends shall have taper pipe threads in accordance with ANSI/ASME B1.20.1.

4.3.2 Socket dimensions of socket welding ends shall be in accordance with ANSI B16.11.

4.3.3 Solder cup dimensions of solder joint ends shall be in accordance with ANSI B16.18.

4.3.4 Grooved ends shall have groove dimensions in accordance with MIL-P-11087.

4.3.5 Flared ends shall be in accordance with ANSI/ASME B16.26.

4.4 Stems

4.4.1 To prevent removal of the stem while the valve is pressurized, the valve shall be designed so that the stem seal retainer assembly (gland) alone does not retain the stem.

4.4.2 In those cases where service conditions require electrical continuity between the stem and body, the purchaser must so specify.

4.5 Stem Packing

4.5.1 The valve shall have provisions for adjustment of a gland or packing nut in order to obtain a seal at the stem packing. The exception is for valves with elastomeric stem seals, where adjustment is not possible.

4.6 Position Indication

4.6.1 The valve shall have a positive means of indication of ball port position. If the handle is the only means of indication (i.e., valve not equipped with position indication), it shall be designed such that the handle cannot be assembled to indicate other than the position of the ball port.

5. DIMENSIONS

5.1 Valve port diameters for full port, regular port, reduced port are defined in Table 1. All components forming the flow stream shall have an inside diameter no smaller than as indicated.

6. MARKING

6.1 Ball valves shall be marked in accordance with MSS SP-25.

6.2 Copper alloy ball valves made with copper alloy components including end pieces or caps, stem, ball (which may be either plated or unplated), and the manufacturer's standard seat material for those valves do not need trim marking per paragraph 7.1.3 of MSS SP-25.

6.3 Copper alloy ball valves manufactured with optional trim components for ball, stem, or seats shall be marked to indicate the optional ball, stem, or seat per MSS SP-25, or as identified by the manufacturer's figure or model number.

7. TESTING

7.1 Shell Test

7.1.1 Each valve, except as noted in 7.1.2 - 7.1.4, shall be given a shell test, at a pressure of 1.5 times the CWP, rounded off to the next higher 25 psi. The test fluid shall be air, gas, water, kerosene, or liquids with a viscosity no greater than that of water. The test fluid temperature shall be below 100°F. The duration of the test shall be as set forth in Table 2.

7.1.2 For valves having CWP no greater than 1000 psig, the manufacturer may, as a substitute for the test specified in 7.1.1 test each valve using gas at a minimum pressure of 80 psig for a duration of not less than that set forth in Table 2. In order to exercise this option, the manufacturer must be able to certify that a production sample of the valve model so tested has been subjected to a hydrostatic shell test of at least 2.5 times CWP with no detrimental distortion as evidenced by a subsequent seat test.

7.1.3 For valves having CWP no greater than 1500 psig, the manufacturer may, as a substitute for the test specified in 7.1.1 test each valve using gas at a minimum pressure of 80 psig for a duration of not less than set forth in Table 2. In order to exercise this option, the manufacturer must sample production lots to ASQC Z1.4, Level II, 0.4 AQL using the test specified in 7.1.1.

7.1.4 For reduced port, end entry valves having one-piece bodies in nominal pipe sizes 2 and smaller that have a CPW no greater than 2000 psig, the manufacturer may, as a substitute for the test specified in 7.1.1 test each valve using gas at a minimum pressure of 80 psig for a duration of not less than set forth in Table 2. In order to exercise this option, the manufacturer must sample production lots to ASQC Z1.4, Level II, 0.4 AQL using the test specified in 7.1.1.

7.1.5 The ball shall be in such a position during the shell test as to assure full pressurization of the valve shell.

7.1.6 When tested with a liquid, the valve exterior shall show no visible leakage. When tested with a gas, the valve shall show no visible leakage when immersed in water or coated with a leak detection solution.

7.1.7 Visually detectable leakage through pressure boundary walls is not acceptable. Leakage through adjustable stem packing during testing shall not be cause for rejection. The stem packing or stem seals shall be capable of retaining pressure at least equal to the rated cold working pressure of the valve without visible leakage.

7.1.8 When volumetric loss testing devices are used the valve manufacturer must be able to demonstrate that leakage sensitivity of the device produces results that are equivalent to those which are acceptable when visual examination methods are employed.

7.2 Seat Test

7.2.1 Following the shell test, each valve shall be given a closure seat test. At the manufacturer's option, this test may be either a hydrostatic closure test at a pressure no less than 110% of the 100°F seat pressure rating or a gas closure test at a minimum pressure of 80 psig. The duration of the test shall be as set forth in Table 3.

7.2.2 The test pressure shall be applied successively on each side of the closed valve. As an alternate method for the 80 psig minimum gas test, the pressure may be applied inside the body cavity with the ball closed and both sides open for inspection. The method of seat leakage testing on each seat shall result in a filled or pressurized cavity between the seats to assure that no seat leakage can escape detection because of gradual and incomplete pressurization or filling of the cavity during the test duration.

7.2.3 Valves marked as one-way valves require a closure test only in the direction of the flow.

7.2.4 There shall be no visible leakage, as defined by MSS SP-82, past the seat for the duration of the test for valves with resilient (polymeric or elastomeric) seats.

7.2.5 The maximum allowable leakage rate on each seat of nonresilient seated, except metal-seated, valves for the duration of the test shall be 2/10 of a standard cubic foot of gas per hour per inch of nominal valve size, or a maximum of 1.22 cubic inches of hydrostatic media per hour per inch of nominal valve size, at the test pressure specified in 7.2.1.

7.2.6 The maximum allowable leakage rate on each seat of metal-seated valves for the duration of the test shall be 4/10 of a standard cubic foot of gas per hour per inch of nominal valve size, or a maximum of 2.44 cubic inches of hydrostatic test media per hour per inch of nominal valve size at the test pressure specified in 7.2.1.

7.2.7 When volumetric loss testing devices are used, the valve manufacturer must demonstrate that leakage sensitivity of the device produces results that are equivalent to or better than those which are acceptable when visual examination methods showing no leakage are employed.

7.3 System Hydrostatic Tests

If valves conforming to this standard practice are subjected to hydrostatic testing of systems with the valve in the closed position at a pressure greater than the CWP rating, such testing shall be the responsibility of the user.

TABLE 1 — PORT SIZES FOR BALL VALVES

Nominal Valve Size	Diameter		
	Full Port[1] Inches	Regular Port[1] Inches	Reduced Port[1] Inches
1/4	.25	not specified	not specified
3/8	.37	not specified	not specified
1/2	.50	.37	.31
3/4	.75	.56	.46
1	1.00	.75	.62
1 1/4	1.25	.93	.77
1 1/2	1.50	1.12	.93
2	2.00	1.50	1.24
2 1/2	2.50	1.87	1.55
3	3.00	2.25	1.86
4	4.00	3.00	2.48

Tolerance: Undersize: .06 inches
Oversize: No limit specified

[1] For pressures in excess of 1500 psig, Annex A of ASME B16.34 may be used for guidance with regard to the minimum inside diameter of full port valves.

TABLE 2 — SHELL TEST DURATION
(VISUAL TEST METHODS)

Valve CWP Rating Maximum	Shell Test Pressure (minimum)		Shell Test Duration:[e] Seconds (minimum)		
	AIR	HYDROSTATIC [a]	AIR	HYDROSTATIC	
			Valve Size	Valve Size	
psig	psig	psig	1/4 - 4	1/4 - 2	2 1/2 - 4
1000	80[b]	1.5 x CWP	5	15	60
1500	80[c]	1.5 x CWP	5	15	60
2000	80[d]	1.5 x CWP	5	15	60

Notes: (a) Round off to next higher 25 psi increment

(b) Refer to section 7.1.2

(c) Refer to section 7.1.3

(d) Refer to section 7.1.4

(e) Time duration is period of inspection after valve is fully prepared and under shell test pressure.

TABLE 3 — SEAT TEST DURATION

Nominal Valve Size	Seat Test Duration:[a] Seconds (minimum)	
	Air	Hydrostatic
1/4 - 2	5	15
2 1/2 - 4	5	30

Notes: (a) Time duration is period of inspection after valve is fully prepared and under full seat test pressure.

Figure 1

EXAMPLES OF VALVE TYPES
(DESIGN DETAILS NOT SHOWN)

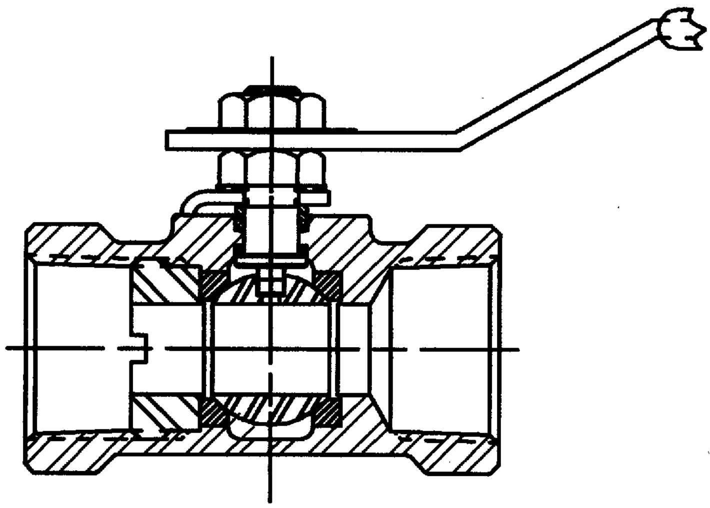

Figure 1A
ONE-PIECE BODY
CONSTRUCTION

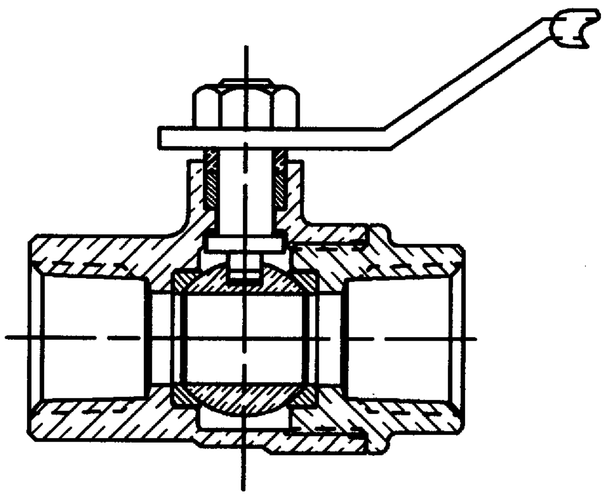

Figure 1B
TWO-PIECE BODY
CONSTRUCTION

These illustrations are not intended to limit design, nor to indicate any preferred design.

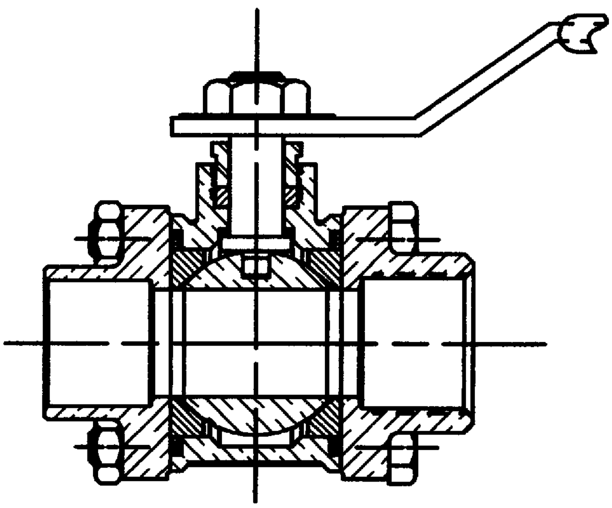

Figure 1C
THREE-PIECE BOLTED
BODY CONSTRUCTION
(SOLDER X THREADED END SHOWN)

Figure 2

TYPICAL NOMENCLATURE FOR BALL VALVE PARTS

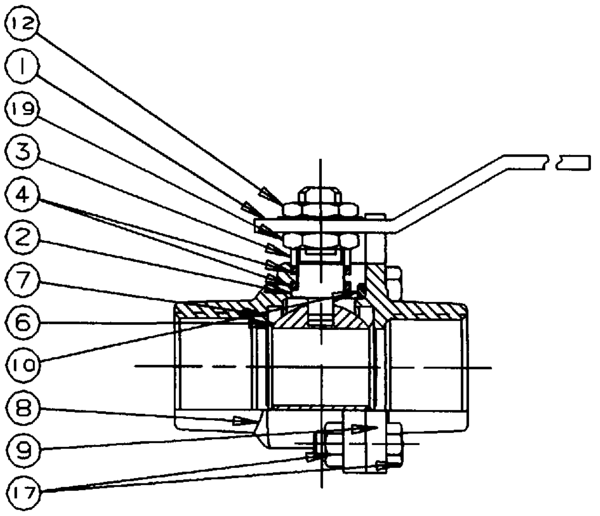

Figure 2A

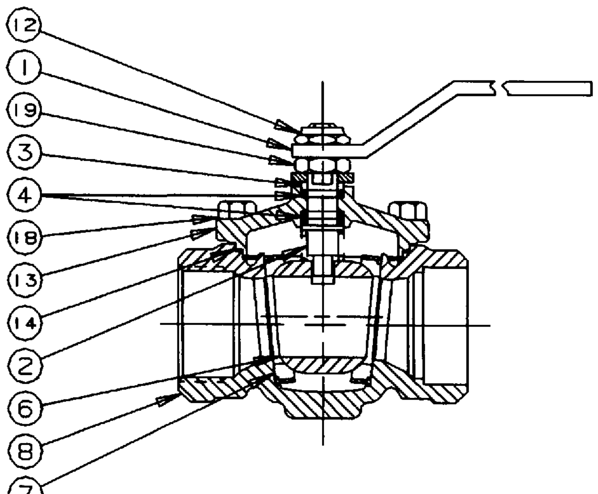

Figure 2B

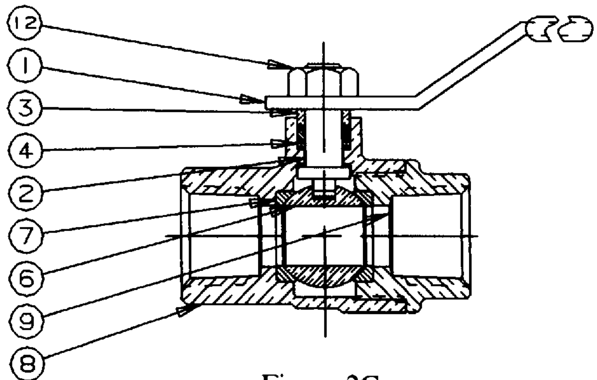

Figure 2C

PART NAME

1. Handle
2. Stem
3. Gland
4. Stem Seal
* 5. Thrust Washer
6. Ball
7. Seat
8. Body
9. End Cap
10. Body Seal
* 11. Body Insert
12. Handle Nut
13. Bonnet
14. Bonnet Seal
* 15. Trunnion
* 16. Trunnion Bushing
17. Body Bolting
18. Bonnet Bolting
19. Packing Nut

* Not illustrated

These illustrations are not intended to limit design, nor to indicate any preferred design.

ANNEX A
LIST OF REFERENCED STANDARDS

The following is a list of standards and specifications for use under this standard.

ASME, ANSI/ASME, ANSI, ASME/ANSI Standards

B1.1-1989	Unified Inch Screw Threads
B1.20.1-1983 (R 92)	Pipe Threads, General Purpose (Inch)
B16.11-1991	Forged Steel Fittings, Socket Welding & Threaded
B16.18-1984	Cast Copper Alloy Solder-Joint Pressure Fittings
B16.26-1988	Cast Copper Alloy Fittings For Flared Copper Tubes
B16.34-1988	Valves - Flanged, Threaded and Welding End
B18.2.1-1981 (R 94)	Square and Hex Bolts and Screws (Inch Series)
B18.2.2-1987 (R 93)	Square and Hex Nuts (Inch Series)
B18.3-1986	Socket Cap, Shoulder and Set Screws (Inch Series)
B31.3-1993	Chemical Plant and Petroleum Refinery Piping
ASME-1992	Boiler and Pressure Vessel Code, Section III, Division 1
ASME-1992	Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels, Division 1

ASQC Standards

Z1.4-1983	Sampling Procedures and Tables for Inspection by Attributes

ASTM Standards

A 47-90	Specification for Ferritic Malleable Iron Castings
A 126-93	Specification for Grey Iron Castings for Valves, Flanges, and Pipe Fittings
A 197-87 (1992)	Specification for Cupola Malleable Iron
A 395-88 (1993)	Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
A 536-84 (1993)	Specification for Ductile Iron Castings

Military Specifications

MIL-P-11087-1985	Pipe, Steel: Grooved, Threaded, or Plain End

MSS Standard Practices

SP-25-1993	Standard Marking System for Valves, Fittings, Flanges, and Unions
SP-82-1992	Valve Pressure Testing Methods
SP-96-1996	Guidelines on Terminology for Valves and Fittings

Standards and specifications of the following organizations appear in the above list.

ASME	American Society of Mechanical Engineers 345 East 47th Street, New York, NY 10017
ANSI	American National Standards Institute, Inc. 11 West 42nd Street, New York, NY 10036
ASQC	The American Society for Quality Control, Inc. 230 West Wells, Milwaukee, WI 53203
ASTM	The American Society for Testing and Materials 100 Barr Harbor Drive, Conshohocken, PA 19428
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Street, N.E., Vienna, VA 22180

LIST OF MSS STANDARD PRACTICES

NUMBER	
SP- 6-1996	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings
SP- 9-1992	Spot Facing for Bronze, Iron and Steel Flanges
SP-25-1993	Standard Marking System for Valves, Fittings, Flanges and Unions
SP-42-1990 (R 1995)	Class 150 Corrosion Resistant Gate, Globe, Angle and Check Valves with Flanged and Butt Weld Ends
SP-43-1991 (R 1996)	Wrought Stainless Steel Butt-Welding Fittings
SP-44-1996	Steel Pipeline Flanges
SP-45-1992	Bypass and Drain Connections
SP-51-1991 (R 1995)	Class 150 LW Corrosion Resistant Cast Flanges and Flanged Fittings
SP-53-1995	Quality Standard for Steel Castings and Forgings for Valves, Flanges, and Fittings and Other Piping Components — Magnetic Particle Examination Method
SP-54-1995	Quality Standard for Steel Castings for Valves, Flanges, and Fittings and Other Piping Components — Radiographic Examination Method
SP-55-1985 (R 1990)	Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components — Visual Method
SP-58-1993	Pipe Hangers and Supports — Materials, Design and Manufacture
SP-60-1991	Connecting Flange Joint Between Tapping Sleeves and Tapping Valves
SP-61-1992	Pressure Testing of Steel Valves
SP-65-1994	High Pressure Chemical Industry Flanges and Threaded Stubs for Use with Lens Gaskets
SP-67-1995	Butterfly Valves
SP-68-1988	High Pressure-Offset Seat Butterfly Valves
SP-69-1991	Pipe Hangers and Supports — Selection and Application
SP-70-1990	Cast Iron Gate Valves, Flanged and Threaded Ends
SP-71-1990	Cast Iron Swing Check Valves, Flanged and Threaded Ends
SP-72-1992	Ball Valves with Flanged or Butt-Welding Ends for General Service
SP-73-1991	Brazing Joints for Wrought and Cast Copper Alloy Solder Joint Pressure Fittings
SP-75-1993	Specifications for High Test Wrought Butt Welding Fittings
SP-77-1995	Guidelines for Pipe Support Contractual Relationships
SP-78-1987 (R 1992)	Cast Iron Plug Valves, Flanged and Threaded Ends
SP-79-1992	Socket-Welding Reducer Inserts
SP-80-1987	Bronze Gate, Globe, Angle and Check Valves
SP-81-1995	Stainless Steel, Bonnetless, Flanged Knife Gate Valves
SP-82-1992	Valve Pressure Testing Methods
SP-83-1995	Class 3000 Steel Pipe Unions, Socket-Welding and Threaded
SP-85-1994	Cast Iron Globe & Angle Valves, Flanged and Threaded Ends
SP-86-1987 (R 1992)	Guidelines for Metric Data in Standards for Valves, Flanges, Fittings and Actuators
SP-87-1991 (R 1996)	Factory-Made Butt-Welding Fittings for Class I Nuclear Piping Applications
SP-88-1993	Diaphragm Type Valves
SP-89-1991	Pipe Hangers and Supports — Fabrication and Installation Practices
SP-90-1986 (R 1991)	Guidelines on Terminology for Pipe Hangers and Supports
SP-91-1992 (R 1996)	Guidelines for Manual Operation of Valves
SP-92-1987 (R 1992)	MSS Valve User Guide
SP-93-1987 (R 1992)	Quality Standard for Steel Castings and Forgings for Valves, Flanges, and Fittings and Other Piping Components — Liquid Penetrant Examination Method
SP-94-1992	Quality Standard for Ferritic and Martensitic Steel Castings for Valves, Flanges, and Fittings and Other Piping Components — Ultrasonic Examination Method
SP-95-1986 (R 1991)	Swage(d) Nipples and Bull Plugs
SP-96-1996	Guidelines on Terminology for Valves and Fittings
SP-97-1995	Integrally Reinforced Forged Branch Outlet Fittings — Socket Welding, Threaded and Buttwelding Ends
SP-98-1996	Protective Coatings for the Interior of Valves, Hydrants, and Fittings
SP-99-1994	Instrument Valves
SP-100-1988	Qualification Requirements for Elastomer Diaphragms for Nuclear Service Diaphragm Type Valves
SP-101-1989	Part-Turn Valve Actuator Attachment — Flange and Driving Component Dimensions and Performance Characteristics
SP-102-1989	Multi-Turn Valve Actuator Attachment — Flange and Driving Component Dimensions and Performance Characteristics
SP-103-1995	Wrought Copper and Copper Alloy Insert Fittings for Polybutylene Systems
SP-104-1995	Wrought Copper Solder Joint Pressure Fittings
SP-105-1996	Instrument Valves for Code Applications
SP-106-1990 (R 1996)	Cast Copper Alloy Flanges and Flanged Fittings, Class 125, 150 and 300
SP-107-1991	Transition Union Fittings for Joining Metal and Plastic Products
SP-108-1996	Resilient-Seated Cast Iron-Eccentric Plug Valves
SP-109-1991	Welded Fabricated Copper Solder Joint Pressure Fittings
SP-110-1996	Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
SP-111-1996	Gray-Iron and Ductile-Iron Tapping Sleeves
SP-112-1993	Quality Standard for Evaluation of Cast Surface Finishes — Visual and Tactile Method. This SP must be sold with a 10-surface, three-dimensional Cast Surface Comparator, which is a necessary part of the Standard. Additional comparators may be sold separately.
SP-113-1994	Connecting Joint between Tapping Machines and Tapping Valves
SP-114-1995	Corrosion Resistant Pipe Fittings, Threaded and Socket Welding, Class 150 and 1000
SP-115-1995	Excess Flow Valves for Natural Gas Service
SP-116-1996	Service Line Valves and Fittings for Drinking Water Systems
SP-117-1996	Bellows Seals for Globe and Gate Valves

R-Year — Indicates year standard reaffirmed without substantive change.

Prices available upon request.

A large number of former MSS Practices have been approved by the ANSI or ANSI Standards, published by others. In order to maintain a single source of authoritative information, the MSS withdraws its Standard Practices in such cases.

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC.
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