

Bellows Seals for Globe and Gate Valves

Standard Practice
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This MSS Standard Practice was developed under the consensus of the MSS Technical Committee 114 and the MSS Coordinating Committee. The content of this Standard Practice is the result of the efforts of competent and concerned volunteers to provide an effective, clear, and non-exclusive specification that will benefit the industry as a whole. This 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 manufacture, 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.

Unless otherwise specifically noted in this MSS SP, any standard referred to herein is identified by the date of issue that was applicable to the referenced standard(s) at the date of issue of this MSS SP. (See Annex B.)

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". All appendices appearing in this document are construed as "supplemental". Supplemental information does not include mandatory requirements.

Substantive changes in this 2006 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.

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Bellows Seals for Globe and Gate Valves

1. **SCOPE**⁽¹⁾

1.1 This Standard Practice covers requirements for design, materials, fabrication, installation, qualification, examination, testing, and shipment of metal bellows and/or bellows assemblies to be installed in manual and automated on-off globe and gate valves.

1.2 This Standard Practice is applicable to metal bellows used in conjunction with steel globe and gate valves which otherwise satisfy the requirements of standards such as API600/ISO10434, API602/ISO 15761, ASME B16.34 and API603. Such standards are referred to herein as the “parent” valve specifications.

1.3 This Standard Practice does not apply to non-metallic bellows or bellows made of low melting point materials such as brass, phosphor-bronze, or similar materials.

1.4 Except where specifically noted in the text of this Standard Practice, the requirements here are not intended to supersede or replace those requirements of the parent valve standard. This standard specifies additional requirements for those valves utilizing bellows seals.

1.5 It is the responsibility of the bellows valve manufacturer to ensure compliance with this Standard Practice.

2. **MARKING**

2.1 Valves utilizing bellows seals shall have a corrosion-resistant metal identification plate securely attached, giving the following information:

a) Bellows seal per MSS SP-117

b) Bellows Material: (insert actual bellows material)

Note: If the parent valve elevated pressure-temperature rating is to be derated or service temperature limited due to bellows design limitations, any bellows rated limitations to the parent valve pressure-temperature rating shall be marked as required by the parent valve specification.

3. **DESIGN**

3.1 **General**

3.1.1 The purpose of the bellows seal is to provide a metal barrier between the stem at its point of entry through the pressure boundary and the process fluid within the valve to eliminate stem leakage. The bellows seal is not intended to be a structural member of the valve nor is it considered to be the ultimate pressure containing mechanism of the valve. Thus, the bellows seal is to be designed in conjunction with and not as a substitute for the conventional pressure boundary components normally required. See Figure 1 for an example of a typical valve assembly with bellows seal.

3.1.2 Because a conventional pressure boundary mechanism is available to act as the ultimate pressure containing mechanism, latitude is permitted in the design of bellows seals so long as they satisfy the performance and all other requirements of this Standard Practice.

3.1.3 Except as specifically noted herein, the rules governing the design of all other valve components found in the parent valve specifications apply.

⁽¹⁾ This Standard Practice is not intended for valves developed for and predominantly used in instrument piping systems.

3.2 *Pressure-Temperature Ratings*

3.2.1 The Pressure-Temperature ratings of ASME B16.34 or other parent specification for the pressure class and body material of the valve apply as well to the bellows seal. The bellows shall with-stand the parent valve class full 100⁰F rating. The valve manufacturer may choose to derate the bellows seal to some lower pressure rating at elevated temperatures than the pressure-temperature rating of the parent valve. The manufacturer may also apply an elevated temperature limitation due to the bellows limitations. The valve manufacturer shall provide published rating to end user when a derated pressure-temperature rating applies.

3.3 *Materials*

3.3.1 Bellows seal material shall be selected so that the maximum temperature is below the creep range.

3.3.2 Acceptable bellows materials are:

- a) Stainless Steel, Types 321, 316L-ASTM A 240 / A 312
- b) Stainless Steel, Types 304 and 304L-ASTM A 240 / A 312
- c) Stainless Steel, Type 347-ASTM A 240 / A 312
- d) Alloy 600-ASTM B 168/B 167
- e) Alloy 625-ASTM B 443
- f) Alloy 718-ASTM B 670
- g) Alloy 400-ASTM B 127/B 165
- h) Alloy C22-ASTM B 575/B 622
- i) Alloy C276-ASTM B 575/B 622

Other materials may be used with the concurrence of the purchaser.

3.3.3 Acceptable materials for the bellows end fittings, including rings, caps or flanges if utilized are:

- a) Stainless Steel, Types 321, 316L-ASTM A 276 / A 479
- b) Stainless Steel, Types 304 and 304L-ASTM A 276 / A 479

- c) Stainless Steel, Type 347-ASTM A 276 / A 479
- d) Alloy 600-ASTM B 564
- e) Alloy 625-ASTM B 446
- f) Alloy 718-ASTM B 637
- g) Alloy 400-ASTM B 164/B 564
- h) Alloy C22-ASTM B 574
- i) Alloy C276-ASTM B 574

Other materials may be used with the concurrence of the purchaser.

3.3.4 The bellows, bellows end fittings and final attachment point such as the stem shall be weld compatible and have no negative effect on the bellow's corrosion resistance.

3.3.5 The bellows material shall be free of weld repair.

3.4 *Bellows Fabrication*

3.4.1 The bellows may be constructed by forming individual convolutions from butt welded tube or drawn tube or by welding a series of formed disks together at both the outside diameter and the inside diameter of the individual disks. Forming may be accomplished either mechanically or hydraulically or any other suitable manufacturing method. The bellows type shall be in accordance with the parent valve specification.

3.4.2 Precautions must be taken in the fabrication of multi-ply bellows to prevent moisture or other contamination between the plies.

3.4.3 Bellows may be welded together in series to accommodate the stroke requirements of the valve. Mechanical connections between bellows are not permitted.

3.4.4 Appropriate design features must be included to prevent squirm (buckling) of the bellows and to prevent localized contact between the bellows convolutions, valve body and stem which could lead to accelerated wear and premature failure.

3.4.5 Material certification of conformance for the bellows and end fittings is required to be furnished by the bellows manufacturer for each shipment if requested by the customer. Material certification should also be required for the end fittings of the bellows when furnished by the manufacturer.

3.5 *Stem/Disk or Moving Connection*

3.5.1 The bellows, or a ring welded to the end of the bellows at the moving end, shall be attached to the disk/stem of moving component by welding. A mechanical connection between the stem/disk or moving component and the bellows is not permitted.

3.5.2 The bellows shall not be subjected to torsional loads associated with operating the valve.

3.6 *Fixed Connection*

3.6.1 The bellow's fixed end shall be welded to the body, the bonnet or to a flange clamped or welded between the body and the bonnet. A mechanical connection to the bellows is not permitted. If welded to the valve body, this weld must be cut in order to perform maintenance of the valve seat.

3.7 *Bellows Compression-Extension*

3.7.1 Appropriate means shall be included in the valve design by the valve manufacturer to prevent compression or extension of the bellows beyond that qualified by the cycle life test.

3.8 *Bellows Cycle Life*

3.8.1 A cycle is defined as fully open to fully closed to fully open. The bellows design shall be qualification tested in accordance with the following table unless otherwise agreed to by the valve manufacturer and end user:

<u>Valve Size</u>	<u>Minimum Cycle Life</u>	
Up to and including Class 800 valves	<u>Gate</u>	<u>Globe</u>
	≤ 2"	2,000
	2-1/2" – 4"	2,000
	> 4"	1,000
Above Class 800 valves	≤ 2"	2,000
	2-1/2" – 4"	1,000
	> 4"	1,000

3.8.2 The suitability of the bellows assembly design shall be demonstrated by means of prototype tests upon representative samples per 4.1.

3.9 *Bellows Welding*

3.9.1 All welding of the bellows and bellows attachment welds must be performed by qualified operators using qualified procedures. All welding qualifications shall be per ASME Boiler and Pressure Vessel Code -Section IX.

3.9.2 Bellows welds and bellows attachment welds, if not attached directly to the valve body or bonnet, are excluded from heat treat requirements of the parent specifications.

4. INSPECTION AND TEST

4.1 *Bellows Design and Qualification Testing*

4.1.1 The bellows assembly shall be cycle life tested either by cycling in an assembled valve without packing, or in a test rig which replicates the actual installation including the clearance, stroke, loading, pressure and wear couples of the parent valve. When required by the parent valve specification, an optional high temperature test shall be performed as designated in API602/ISO15761.

4.1.2 Any variation that constitutes a change in basic design parameters that affect cycle life of the bellows will require requalification by cycle testing (e.g. change in bellow supplier, material specification, number of plies, wall thickness or diameter).

A change in overall length or number of convolutions may not require requalification provided that the percentage of bellows movement in both compression and extension is the same or less than that of originally qualified bellows where:

$$M_c = (L_1 - L_c) \times 100 / L_1$$

$$M_e = (L_e - L_1) \times 100 / L_1$$

Where:

M_c is the percent of movement in compression

L_1 is the live length

L_c is the compressed length

M_e is the percent of movement in extension

L_e is the extended length

4.1.3 After welding bellows to fittings and prior to qualification testing, each bellows assembly shall be Helium leak tested and exhibit no detectable leakage using an instrument with sensitivity of 10^{-6} cc/sec He.

4.1.4 Prior to cycle testing each bellows assembly shall be hydrostatic pressure tested at 1.5 times the 100° F valve design pressure. Each bellows assembly shall be fixed at the length where the valve is in the open position as required at normal valve shell test. The pressure shall be applied on the same side as the valve is designed to operate in service. Water used for testing of stainless steel bellows assemblies shall contain less than 100 ppm chlorides.

4.1.5 The frequency of cycling shall take into consideration excessive heat which may be generated by abnormally fast cycling. In no case shall the frequency of cycling exceed one cycle per second.

4.1.6 Cycling shall be carried out at ambient temperature and at the 100° F rated pressure of the bellows. The pressure shall be applied in a manner to simulate normal valve shell tests.

4.1.7 A minimum of three bellows of each basic design and material selected at random from those produced using the standard production manufacturing processes shall be cycled to achieve the appropriate minimum cycle life requirement of Section 3.8.

4.1.8 After cycling the bellows per Section 3.8.1 each bellows shall be leak tested and exhibit no detectable leakage. Leak testing can be air under water at a minimum of 80 psig or by an instrument with sensitivity of 10^{-6} cc/sec He as permitted by the parent valve specification.

4.1.9 Cycle life testing data shall be documented and available.

4.2 **Production Testing**

4.2.1 Every bellows assembly shall be leak tested by a suitable method equivalent to Helium leak testing with an instrument with sensitivity of 10^{-6} cc/sec He.

5. **SHIPPING INFORMATION**

5.1 **Protection/Marking**

5.1.1 Each bellows assembly must be cleaned and packaged to prevent internal moisture or contamination.

5.1.2 Each bellows assembly shall be individually packaged to prevent damage in handling or in transit.

5.1.3 Each bellows assembly, if practical, shall be marked to insure proper identification of the material. If it is impractical to mark each assembly, each package must be so marked.

6. **ORDERING INFORMATION**

6.1 If the valve manufacturer needs a bellows seal that deviates from this Standard Practice, it is the valve manufacturer's responsibility to clearly define such deviation and to furnish information to permit the bellows manufacturer to complete the order.

6.2 If no exceptions are to be taken to this Standard Practice, the purchase order need only make reference to MSS SP-117 and specify the following items:

- a) Valve size
- b) Pressure class or pressure temperature rating
- c) Materials and traceability
- d) Required travel or stroke
- e) Valve type – Globe or Gate
- f) Packaging requirements
- g) Bellows fabrication method
- h) Inspection by valve manufacturer

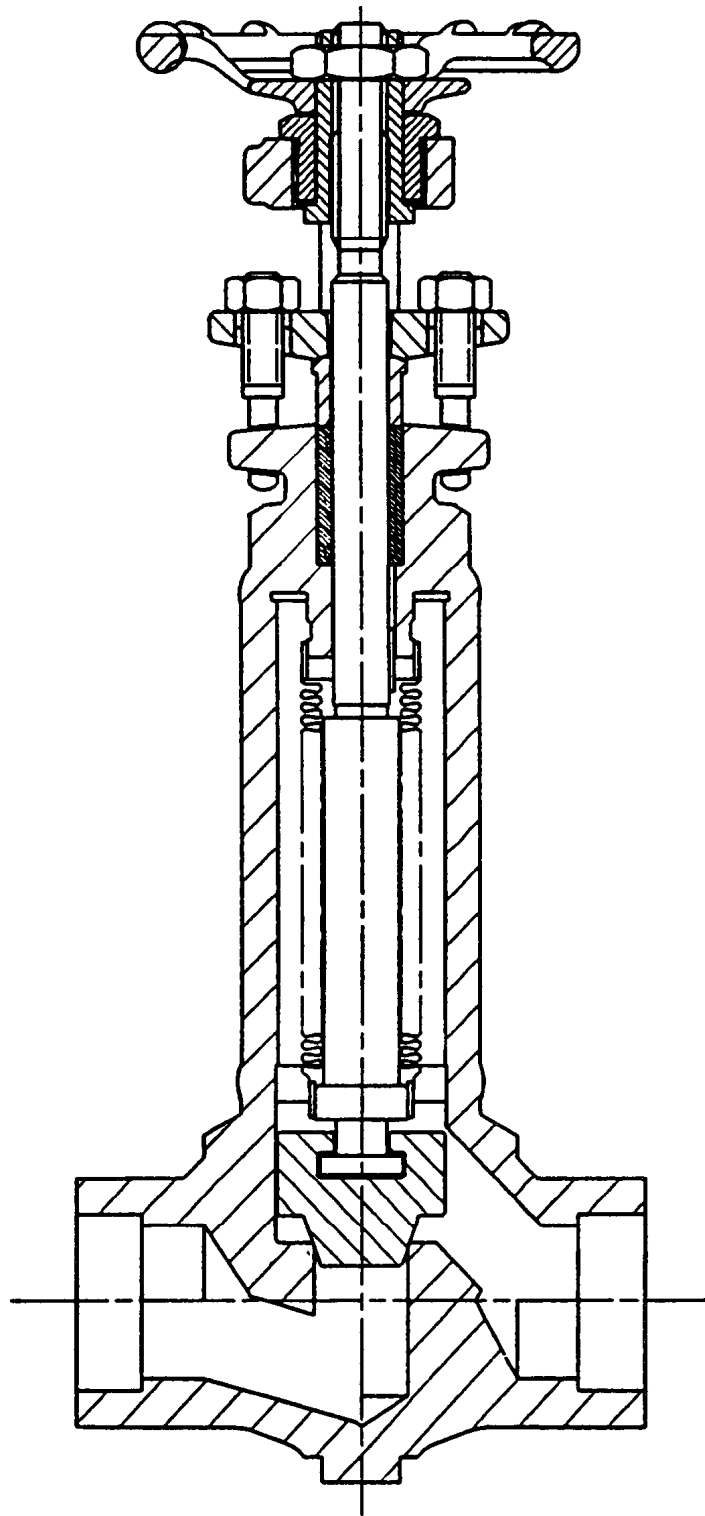


FIGURE 1 - Typical Bellows Stem Seal Arrangement

Note: This figure is for illustrative purposes only and is not intended to imply design requirements.

ANNEX A

Definitions

This Annex is an integral part of this Standard Practice and is placed after the main text for convenience. Other definitions may be found in MSS SP-96.

Assemblies	A combination of two or more components, one of which is the bellows and the other a fitting and/or a stem.
Bellows, hydraulically formed	Bellows made by applying hydraulic pressure internally to a tube, generally forming all convolutions simultaneously and collapsed between a series of dies.
Bellows, mechanically formed	Bellows corrugated individually and consecutively on a tube by rotating tools and/or rubber dies.
Bellows, welded	A bellows made by joining alternately the outer and inner edges of a series of flexible disks by welding.
Convolution	A single corrugation formed on the tube. One or more convolutions form a bellows.
Cycle life	The estimated life of a bellows in terms of the number of movements it is capable of providing at a specific pressure differential, temperature and axial stroke.
Live length	The pitch times the number of active convolutions. Also the active length.
Overall length	The total length of the bellows, including end fittings.
Stroke	Compression from free length plus extension from free length.
Squirm	Severe buckling or similar distortion of a bellows, produced by too much pressure inside a relatively long bellows.
Wall thickness	The wall- thickness of the original tube from which the bellows is formed. It is the total wall thickness for multi-ply bellows.

ANNEX B

Referenced Standards and Applicable Dates

This Annex is an integral part of this Standard Practice and is placed after the main text for convenience.

ASME

B16.34 2004 Valves – Flanged, Threaded, and Welding End
ASME Boiler and Pressure Vessel Code
Section IX 2004 Welding and Brazing Qualifications

API

API600/ISO10434 2001 Bolted Bonnet Steel Gate Valves for Petroleum and Natural Gas Industries
API602/ISO15761 2005 Steel Gate, Globe and Check Valves for Sizes DN 100 and Smaller for the
 Petroleum and Natural Gas Industries
API 603 2001 Corrosion Resistant, Bolted Bonnet Gate Valves-Flanged and Butt-Welding Ends

ASTM

Standard Specification for:

A 240/A 240M	2005	Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
A 276	2005	Stainless Steel Bars and Shapes
A 312/A 312M	2005	Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
A 479/A 479M	2005	Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
B 127	2005	Nickel-Copper Alloy (UNS N04400) Plate, Sheet and Strip
B 164	2003	Nickel-Copper Alloy Rod, Bar, and Wire
B 165	2005	Nickel-Copper Alloy (UNS N04400) Seamless Pipe and Tube
B 167	2005a	Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06603, N06690, N06693, N06025, and N06045) and Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617) Seamless Pipe and Tube
B 168	2005	Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06603, N06690, N06693, N06025, and N06045) and Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617) Plate, Sheet, and Strip
B 443	2000	(R 2005) Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) and Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219) Plate, Sheet, and Strip
B 446	2003	Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625), Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219), and Nickel-Chromium-Molybdenum-Tungsten Alloy (UNS N06650) Rod and Bar

ANNEX B
Referenced Standards and Applicable Dates (Continued)

B 564	2004	Nickel Alloy Forgings
B 574	2005	Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Chromium-Molybdenum, Low Carbon Nickel-Molybdenum-Chromium-Tantalum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, and Low-Carbon Nickel-Chromium-Molybdenum-Tungsten Alloy Rod
B 575	2004	Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, Low-Carbon Nickel-Chromium-Molybdenum-Tantalum, Low-Carbon Nickel-Chromium-Molybdenum-Tungsten Alloy Plate, Sheet, and Strip
B 622	2004a	Seamless Nickel and Nickel-Cobalt Alloy Pipe and Tube
B 637	2003	Precipitation-Hardening Nickel Alloy Bars, Forgings, and Forging Stock for High-Temperature Service
B 670	2002	Precipitation-Hardening Nickel Alloy (UNS N07718) Plate, Sheet, and Strip for High-Temperature Service

MSS

SP-96-2001	Guidelines on Terminology for Valves and Fittings
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Publications of the following organizations appear on the above list:

API	American Petroleum Institute 1220 L St. NW Washington, DC 20005
ASME	ASME International Three Park Avenue New York, NY 10016-5990
ASTM	ASTM International 100 Barr Harbor Dr West Conshohocken, PA 19428-2959
ISO	International Organization for Standardization 1, Rue de Varembe' Case Postale 56 CH-1211 Geneva 20 Switzerland
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Street, NE Vienna, VA 22180-4602

List of MSS Standard Practices (Price List Available Upon Request)

Number	
SP-6-2001	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings
SP-9-2001	(R 05) Spot Facing for Bronze, Iron and Steel Flanges
SP-25-1998	Standard Marking System For Valves, Fittings, Flanges and Unions
SP-42-2004	Class 150 Corrosion Resistant Gate, Globe, Angle and Check Valves with Flanged and Butt Weld Ends
SP-43-1991	(R 01) Wrought Stainless Steel Butt-Welding Fittings
SP-44-1996	(R 01) Steel Pipeline Flanges
SP-45-2003	Bypass and Drain Connections
SP-51-2003	Class 150LW Corrosion Resistant Flanges and Cast Flanged Fittings
SP-53-1999	(R 02) Quality Standard for Steel Castings and Forgings for Valves, Flanges and Fittings and Other Piping Components - Magnetic Particle Examination Method
SP-54-1999	(R 02) Quality Standard for Steel Castings for Valves, Flanges, and Fittings and Other Piping Components - Radiographic Examination Method
SP-55-2001	Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components - Visual Method for Evaluation of Surface Irregularities
SP-58-2002	Pipe Hangers and Supports - Materials, Design and Manufacture
SP-60-2004	Connecting Flange Joint Between Tapping Sleeves and Tapping Valves
SP-61-2003	Pressure Testing of Steel Valves
SP-65-2004	High Pressure Chemical Industry Flanges and Threaded Stubs for Use with Lens Gaskets
SP-67-2002a	Butterfly Valves
SP-68-1997	(R 04) High Pressure Butterfly Valves with Offset Design
SP-69-2003	Pipe Hangers and Supports - Selection and Application (ANSI/MSS Edition)
SP-70-2006	Cast Iron Gate Valves, Flanged and Threaded Ends
SP-71-1997	Gray Iron Swing Check Valves, Flanged and Threaded Ends
SP-72-1999	Ball Valves with Flanged or Butt-welding Ends for General Service
SP-73-2003	Brazing Joints for Cast Copper Alloy Solder Joint Pressure Fittings
SP-75-2004	Specification for High Test Wrought Butt Welding Fittings
SP-77-1995	(R 00) Guidelines for Pipe Support Contractual Relationships
SP-78-1998	Cast Iron Plug Valves, Flanged and Threaded Ends
SP-79-2004	Socket-Welding Reducer Inserts
SP-80-2003	Bronze Gate, Globe, Angle and Check Valves
SP-81-2001	Stainless Steel, Bonnetless, Flanged, Knife Gate Valves
SP-83-2006	Class 3000 Steel Pipe Unions, Socket-Welding and Threaded
SP-85-2002	Gray Iron Globe & Angle Valves, Flanged and Threaded Ends
SP-86-2002	Guidelines for Metric Data in Standards for Valves, Flanges, Fittings and Actuators
SP-88-1993	(R 01) Diaphragm Valves
SP-89-2003	Pipe Hangers and Supports - Fabrication and Installation Practices
SP-90-2000	Guidelines on Terminology for Pipe Hangers and Supports
SP-91-1992	(R 96) Guidelines for Manual Operation of Valves
SP-92-1999	MSS Valve User Guide
SP-93-1999	(R 04) Quality Standard for Steel Castings and Forgings for Valves, Flanges, and Fittings and Other Piping Components - Liquid Penetrant Examination Method
SP-94-1999	(R 04) Quality Std for Ferritic and Martensitic Steel Castings for Valves, Flanges, and Fittings and Other Piping Components - Ultrasonic Examination Method
SP-95-2000	Swage(d) Nipples and Bull Plugs
SP-96-2001	(R 05) Guidelines on Terminology for Valves and Fittings
SP-97-2001	Integrally Reinforced Forged Branch Outlet Fittings - Socket Welding, Threaded and Buttwelding Ends
SP-98-2001	Protective Coatings for the Interior of Valves, Hydrants, and Fittings
SP-99-1994	(R 05) Instrument Valves
SP-100-2002	Qualification Requirements for Elastomer Diaphragms for Nuclear Service Diaphragm Type Valves
SP-101-1989	(R 01) Part-Turn Valve Actuator Attachment - Flange and Driving Component Dimensions and Performance Characteristics
SP-102-1989	(R 01) Multi-Turn Valve Actuator Attachment - Flange and Driving Component Dimensions and Performance Characteristics
SP-104-2003	Wrought Copper Solder Joint Pressure Fittings
SP-105-1996	(R 05) Instrument Valves for Code Applications
SP-106-2003	Cast Copper Alloy Flanges and Flanged Fittings, Class 125, 150 and 300
SP-108-2002	Resilient-Seated Cast-Iron Eccentric Plug Valves
SP-109-1997	(R 06) Welded Fabricated Copper Solder Joint Pressure Fittings
SP-110-1996	Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
SP-111-2001	Gray-Iron and Ductile-Iron Tapping Sleeves
SP-112-1999	(R 04) 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 at \$77.00 each. Same quantity discounts apply on total order.
SP-113-2001	Connecting Joint between Tapping Machines and Tapping Valves
SP-114-2001	Corrosion Resistant Pipe Fittings Threaded and Socket Welding, Class 150 and 1000
SP-115-1999	Excess Flow Valves 1 1/4 NPS and Smaller, for Fuel Gas Service
SP-116-2003	Service Line Valves and Fittings for Drinking Water Systems
SP-117-2006	Bellows Seals for Globe and Gate Valves
SP-118-2002	Compact Steel Globe & Check Valves - Flanged, Flangeless, Threaded & Welding Ends (Chemical & Petroleum Refinery Service)
SP-119-2003	Factory Made Belled End Socket Welding Fittings
SP-120-2002	Flexible Graphite Packing System for Rising Stem Steel Valves (Design Requirements)
SP-121-1997	(R 02) Qualification Testing Methods for Stem Packing for Rising Stem Steel Valves
SP-122-2005	Plastic Industrial Ball Valves
SP-123-1998	(R 06) Non-Ferrous Threaded and Solder-Joint Unions for Use With Copper Water Tube
SP-124-2001	Fabricated Tapping Sleeves
SP-125-2000	Gray Iron and Ductile Iron In-Line, Spring-Loaded, Center-Guided Check Valves
SP-126-2000	Steel In-Line Spring-Assisted Center Guided Check Valves
SP-127-2001	Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, Application
SP-129-2003	Copper-Nickel Socket-Welding Fittings and Unions
SP-130-2003	Bellows Seals for Instrument Valves
SP-131-2004	Metallic Manually Operated Gas Distribution Valves
SP-132-2004	Compression Packing Systems for Instrument Valves
SP-133-2005	Excess Flow Valves for Low Pressure Fuel Gas Appliances
SP-135-2006	High Pressure Steel Knife Gate Valves
(R-YEAR)	Indicates year standard reaffirmed without substantive changes

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.

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