

MSS SP-71-1997

Gray Iron Swing Check Valves, Flanged and Threaded Ends

Standard Practice
Developed and Approved by the
Manufacturers Standardization Society of the
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Substantive changes in this 1997 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.

U.S. customary units in this SP are the standard; the metric units are for reference only.

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 A.)

In this Standard Practice all notes, annexes, 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 footnotes appearing in this document are construed as “supplemental” where their information does not modify the text to which they refer.

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

Originally Approved February, 1970

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FOREWORD

The 1997 edition of MSS SP-71, in addition to various editorial changes, includes changes to: provide a more complete metric version for reference use, delete the Class 800 Pressure-Temperature rating, and expand Annex C to include ISO references.

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1. SCOPE

1.1 This standard practice covers gray iron swing check valves with flanged and threaded ends for general purpose service in essentially horizontal lines. The use of swing check valves in steeply inclined or vertical lines requires special consideration.

1.2 These valves are suitable within the sizes and pressure-temperature ratings specified herein for general purpose service.

1.3 This standard practice also includes, directly or by reference, stipulations on chemical and physical properties of materials, and dimensions of end connections in common use.

2. VALVE DESIGNATION, CLASSES AND SIZES

2.1 Valve Types. (a) Valve types covered herein are illustrated in Figures A1 through A4 in Annex A. Swing check valves of the full waterway type when fully opened shall have a flow of not less than the area of a circle having a diameter equal to the nominal pipe size. The clearway type shall allow the disc assembly to swing above the waterway when fully opened.

Type I (Figure A1) — Full waterway, metal to metal seats.

Type II (Figure A2) — Full waterway, composition to metal seats.

Type III (Figure A3) — Clear waterway, metal to metal seats.

Type IV (Figure A4) — Clear waterway, composition to metal seats.

2.2 Trims

- a) Bronze
- b) All-iron
- c) Stainless Steel
- d) Composition or Resilient

(a) Note: The valve sketches herein are for the purpose of illustration and nomenclature only. They are not intended to exclude any design meeting this Standard Practice.

2.3 Classes

125
250

2.4 Nominal Pipe Sizes. Nominal pipe sizes covered herein are:

- a) NPS 2-24 (DN50-600) flanged end.
- b) NPS 2-6 (DN50-150) threaded end.

3. PRESSURE-TEMPERATURE RATINGS

3.1 Pressure-Temperature ratings for the various classes of valves are shown in Table 1. Metric units (bar) are shown in Table B1 in Annex B. The ratings specified are for valves with metal seating surfaces. Pressure-temperature ratings for valves with non-metallic seat materials must be limited to reflect the physical characteristics of these materials at each temperature, and may be lower but in no case higher than values shown in Tables 1 and B1.

3.2 The temperature shown for the corresponding rating shall be the metal temperature of the pressure retaining parts. It shall be assumed that the metal temperature will be the temperature of the contained fluid. Use of a pressure rating at a metal temperature other than that of the contained fluid shall be the responsibility of the user.

4. MATERIALS

4.1 General. This standard practice is intended to cover minimum physical and chemical requirements. Materials of superior properties may be substituted. Users are cautioned against applications with fluids which may react chemically with any materials used in these valves. Consultation with the manufacturer is advised to determine suitability in cases of doubt.

4.1.1 Body and Cover. The body and cover shall be in accordance with ASTM A 126 Class B, "Gray Iron Castings for Valves, Flanges and Pipe Fittings."

TABLE 1. PRESSURE-TEMPERATURE RATINGS, NON-SHOCK-psi

Class	125		250	
Temp. Degrees F.	NPS 2-12	NPS 14-24	NPS 2-12	NPS 14-24
—20 to 150	200	150	500	300
200	190	135	460	280
225	180	130	440	270
250	175	125	415	260
275	170	120	395	250
300	165	110	375	240
325	155	105	355	230
350	150	100	335	220
375	145		315	210
400	140		290	200
425	130		270	
450	125		250	

General Note: See Table B1 for Metric Units.

4.1.2 Seating Material. Metal-to-metal seating surfaces shall be brass or bronze for bronze mounted valves; gray iron or other ferrous material for all-iron valves. Composition or resilient facing material shall be rubber (synthetic or natural), leather or suitable polymer. Other seating materials, either metal or composition, suitable for the intended service may be furnished when agreed between purchaser and manufacturer.

4.1.3 Hinge Pins. Hinge pins shall be wrought brass, or stainless steel for bronze mounted valves; wrought steel or stainless steel for all-iron valves.

4.1.4 Hinge. Non-ferrous hinges shall not be used on all-iron valves.

4.1.5 Side Plugs. Side plugs, if used, shall be made of gray iron, malleable iron, ductile iron or steel. However, if used to support the hinge pin in bronze mounted valves, they shall be of brass, bronze, or brass or bronze bushed.

4.1.6 Bolting. Bolts and studs connecting pressure containing parts shall develop physical strength not less than requirements of ASTM A 307.

5. DESIGN

5.1 General. When under the test pressure specified in Section 7, valves shall be designed to prevent permanent distortion of the body, cover or seats.

5.1.1 The closure assembly shall be designed to assume the closed position by gravity under no flow conditions in a horizontal pipeline. Special arrangements of levers and springs or weights may be necessary to assure proper closure in lines which are inclined or vertical.

5.2 End Flanges

a) End flanges shall be integral with the valve body. Dimensions, tolerances and drilling shall be in accordance with ASME/ANSI B16.1, for each respective pressure class. The flanges shall be fully machined on the joint side in accordance with MSS SP-6, "Finishes for Contact Faces of Connecting End Flanges of Ferrous Valves and Fittings."

b) Face-to-face dimensions of flanged end valves shall be as follows:

Class 125 (PN 20), Full Waterway,
Figures A1 and A2
NPS 2-12 (DN 50-300);
ANSI B16.10, Class 125 (PN 20)
NPS 14-24 (DN 350-600)^(a)

Class 125 (PN 20), Clear Waterway,
Figures A3 and A4
NPS 2-24 (DN 50-600)^(a)

Class 250 (PN 50), Full Waterway,
Figure A1
NPS 2-12 (DN 50-300);
ANSI B16.10 Class 250 (PN 50)
NPS 14-18 (DN 350-450)^(a)

^(a) Manufacturers Catalog Dimensions

5.3 Threaded Ends. Threaded end bodies may have hexagon, octagon, or round ends with ribs. Valve ends shall be threaded with taper pipe threads in accordance with ANSI/ASME B1.20.1, "Pipe Threads. General Purpose (inch)."

5.4 Body-Cover Bolting

a) Dimensions of bolts and cap screws shall be in accordance with ANSI B18.2.1; nut dimensions in accordance with ANSI/ASME B18.2.2.

b) Nuts shall be threaded in accordance with ANSI B1.1, Coarse Threaded Series, Class 2B.

c) Bolts, studs or cap screws shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A.

5.5 Seating Surfaces

a) Disc seating surfaces may be integral or may be separate rings securely fastened to the disc.

b) Body seats shall be separate rings, either shoulder or bottom seated, except that all-iron valve seats may be integral with the body casting at the manufacturer's option. Driving lugs may protrude into and reduce port area.

5.6 Bypass and Drain Connections. Unless otherwise specified, bypass and drain connections shall be in accordance with MSS SP-45, "Bypass and Drain Connection Standard."

6. WORKMANSHIP

6.1 Valve Parts. Valve parts shall be designed and manufacturing tolerances set so as to provide interchangeability in the product of any one manufacturer between units of the same size, class, type and design.

6.2 Castings. All castings shall be clean and sound, without defects which will impair their service. No plugging, impregnation, welding or repairing of such defects will be allowed.

7. TESTS

7.1 General. Pressure tests shall be made on all completed valves prior to shipment by the manufacturer.

7.2 Shell Test. Valves shall be subjected to hydrostatic or gas test pressure specified in Table 2. No visible leakage is permitted through the pressure boundary wall or body-cover joint. Tests shall be held for periods specified in Table 3.

Caution: Safety precautions must be taken when gas is used.

7.3 Hydrostatic Seat Test. Valves shall be subjected to a hydrostatic seat test at not less than the maximum service pressure for which the valve is rated. The pressure shall be applied on the downstream side of the valve and the opposite side checked for leakage. The maximum permissible leakage rate shall be 40 millilitres per hour, per inch of nominal valve size. Test pressures shall be held for periods specified in Table 3.

7.4 Gas Seat Test. At the manufacturer's option a gas seat test of not less than 80 psig (5.5 bar) may be used in lieu of Hydrostatic Seat Test (7.3). This gas pressure to be applied as specified for hydrostatic seat test. The maximum permissible leakage rate shall be 4/10 of a standard cubic foot (12 litres) of gas per hour, per inch of diameter of nominal valve size. Test pressures shall be held for periods specified in Table 3.

Caution: Safety precautions must be taken when gas is used.

TABLE 2. MINIMUM HYDROSTATIC OR GAS SHELL TEST PRESSURE

Max. Service Rating 150F (65C)		Test Pressure	
psi	bar	psi	bar
150	10.3	265	18.3
200	13.8	350	24.1
300	20.7	525	36.2
500	34.5	875	60.3

8. MARKING

Marking shall conform to MSS SP-25, "Standard Marking System for Valves, Fittings, Flanges and Unions."

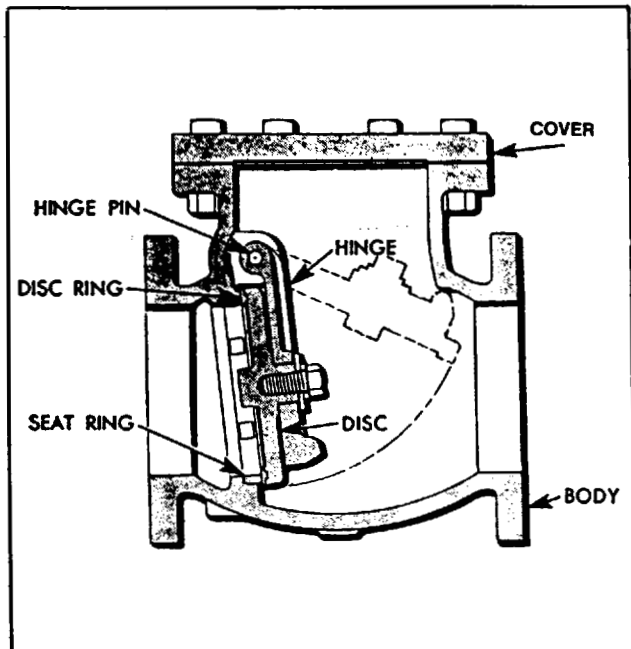
9. PAINTING

The painting of finished valves shall be optional with the manufacturer unless otherwise specified.

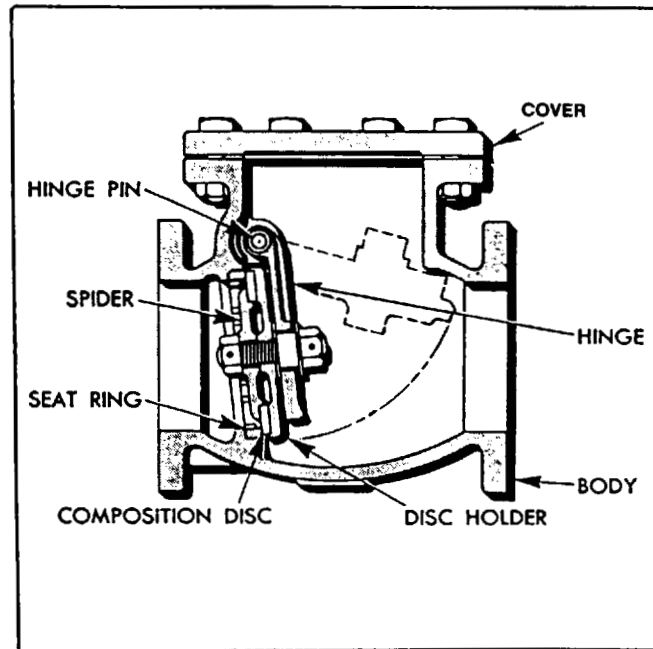
TABLE 3. MINIMUM DURATION OF TESTS

NPS	DN	Shell Test, Seconds	Seat Test Seconds
2-8	50-200	30	30
10-18	250-450	60	60
20-Larger	500-Larger	180	120

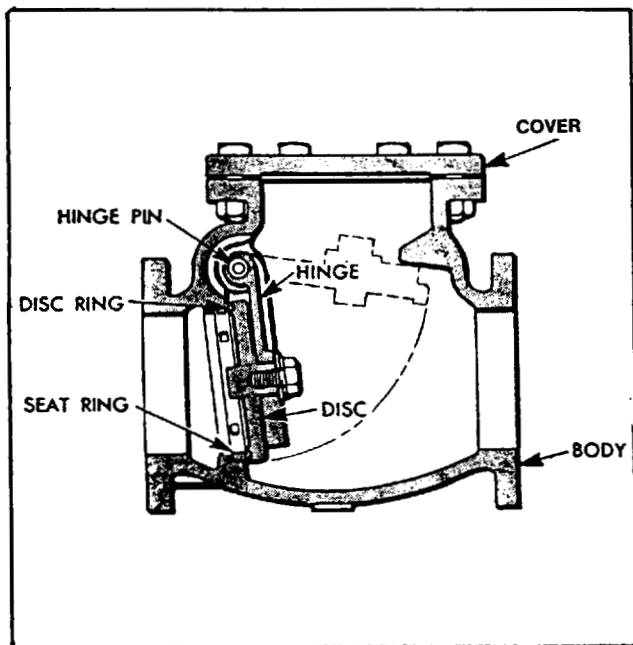
ANNEX A — VALVE TYPES — FIGURES A1 THROUGH A4



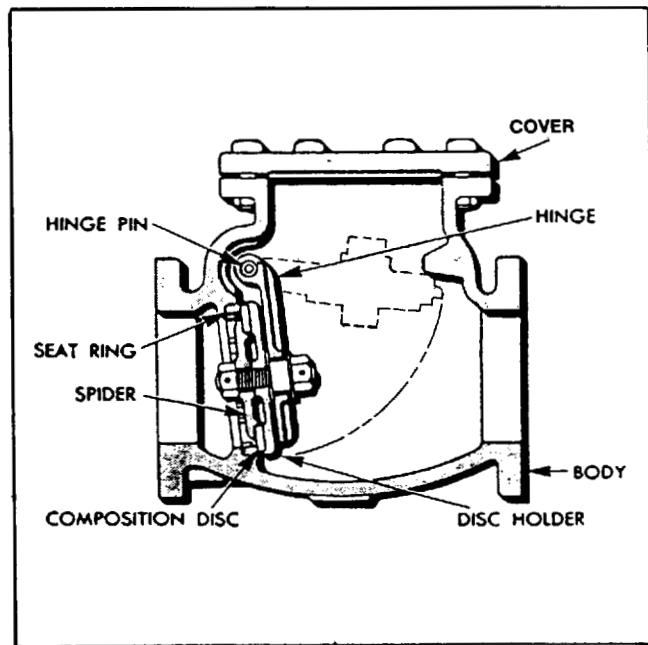
FULL WATERWAY METAL TO METAL SEAT
TYPE I
FIGURE A1



FULL WATERWAY COMPOSITION TO METAL SEAT
TYPE II
FIGURE A2



CLEAR WATERWAY METAL TO METAL SEAT
TYPE III
FIGURE A3



CLEAR WATERWAY COMPOSITION TO METAL SEAT
TYPE IV
FIGURE A4

ANNEX B — METRIC UNITS**TABLE B1. PRESSURE-TEMPERATURE RATINGS, NON-SHOCK-bar**

Temperature Degrees C.	PN 20		PN 50	
	DN 50-300	DN 350-600	DN 50-300	DN 350-600
-29 to 65	13.8	10.3	34.5	20.7
100	12.8	9.2	30.9	19.0
125	11.9	8.5	28.3	17.7
150	11.2	7.7	25.7	16.5
175	10.4	7.0	23.1	15.3
200	9.6		20.5	14.0
205				13.8
225	8.8		17.9	
232	8.6		17.2	

Note: For definitions of DN and PN, see International Standards ISO 6708 and ISO 7268, respectively, or MSS SP-86.

| ANNEX C |

REFERENCED STANDARDS AND APPLICABLE DATES

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

Standard Name and Designation

ASME, ANSI/ASME, ANSI, ASME/ANSI

B1.1-1989	Unified Inch Screw Threads (UN and UNR Thread Form)
B1.20.1-1983 (R1992)	Pipe Threads, General Purpose (Inch)
B16.1-1989	Cast Iron Pipe Flanges and Flanged Fittings (Class 25, 125, 250, and 800)
B16.10-1992	Face-to-Face and End-to-End Dimensions of Valves
B18.2.1-1981 (R1992)	Square and Hex Bolts and Screws, Including Askew Head Bolts, Hex Cap Screws, and Lag Screws
B18.2.2-1987 (R1993)	Square and Hex Nuts

ASTM

Specifications for:

A 126-93	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
A 307-93a	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

MSS

SP-6-1996	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings
SP-25-1993	Standard Marking System for Valves, Fittings, Flanges, and Unions
SP-45-1992	Bypass and Drain Connection Standard

ISO

6708-1980	Pipe Components — Definition of nominal pipe size
7268-1983	Pipe Components — Definition of nominal pressure

Publications of the following organizations appear in the above list:

ANSI	American National Standards Institute, Inc. 11 West 42nd Street, New York, NY 10036
ASME	The American Society of Mechanical Engineers 345 East 47th Street, New York, NY 10017
ASTM	American Society for Testing and Materials 100 Bar Harbor Drive, West Conshohocken, PA 19428-2959
MSS	Manufacturers Society of the Valve and Fittings Industry, Inc. 127 Park Street, N.E, Vienna, VA 22180
ISO	International Organization for Standardization 1, rue de Varembe, Case postale, CH-1211, Geneve 20, Switzerland