



STANDARD PRACTICE **SP-82**

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Edition

VALVE PRESSURE TESTING METHODS

COMPLIMENTARY
COPY

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by the
Manufacturers Standardization Society
of the
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U.S. customary units in the SP are the standard; the metric units are for reference only.

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FOREWORD

Committees and Task Forces preparing standard practices covering valves are encouraged to designate pressure test methods from the group listed herein.

The metric units given in parentheses were derived utilizing the following conversion factor, and rounded to appropriate accuracy.

Conversion	Factor
inch to millimeter	25.4
psi to bars	0.0689
F to C	$C = \frac{F-32}{1.8}$

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PRODUCTION PRESSURE TESTING METHODS FOR GENERAL PURPOSE VALVES

1. SCOPE

This standard practice defines various types of production pressure tests that may be performed on valves, and covers provisions for identifying the actual type of tests used.

It is not the purpose of this standard practice to cover or replace the valve testing performed by manufacturers on products made to conform to other specifications or standards such as ANSI, API, Underwriters' Laboratories, Factory Mutual, AWWA, Federal and Military Specifications. This document is intended as a guide to aid the manufacturer, the user, and the general public in the identification of testing methods used in the production of valves for which such methods are not otherwise defined in basic valve standards.

2. DEFINITIONS

2.1 Production Pressure Test:

Definition: Pressure tests which include closure member and shell tests performed on production units manufactured for sale.

Purpose: To verify the pressure containing capability of production units.

2.1.1 Shell Test:

Definition: An internal pressure test of the pressure containing envelope.

Purpose: To demonstrate pressure containing capability of the external pressure boundary.

2.1.2 Seat and Closure Member Test:

Definition: An internal pressure test of flow regulating elements (seats, seals and closure member such as gate, disc, ball or plug).

Purpose: To demonstrate static performance within allowable leakage tolerances.

2.2 No Visible Leakage:

2.2.1 Liquid: The term "no visible leakage" applied to a hydrostatic test liquid is defined as a leak rate which will produce no visible weeping or formation of drops at the pressure and for the duration of test.

2.2.2 Gas: The term "no visible leakage" applied to air or gas testing is defined as a leak rate which will produce no visible formation of bubbles in a water immersion test or after the application of leak detection fluid at the pressure and for the duration of test.

2.2.3 For automatic leak detection methods, this definition shall be considered equivalent to a leak rate no greater than $4.1 \times 10^{-5} \text{ in}^3/\text{sec}^{(1)}$ ($6.7 \times 10^{-4} \text{ ml/sec}$) with a pressure differential of 80 to 100 psi (5.5 to 6.9 bar) for application to valves of 8NPS and smaller.

3. GENERAL TESTING PROCEDURES

3.1 Shell Testing: Shell tests are to be performed in such a manner as to insure that all internal pressure containing surfaces are exposed to the test pressure. If test packing or temporary seals are used during testing of valves, production packing and/or seals shall not require testing.

3.2 Seat Testing:

3.2.1 Each main seat shall be tested in a manner which will test the tightness of the seat in the intended direction of sealing or in both directions on double seated valves when flow

(1) This leakage rate is based on the measured leakage of nitrogen gas from a needle valve with a 0.167" O.D. x 0.091" I.D. tube discharge submerged in water to a depth of 1". The tube end was cut square and smooth with no chamfers or burrs and the tube axis was parallel to the surface of the water. Leakage was adjusted to a level equal to 40 bubbles in 10 minutes at 90 psi. The 40 bubbles equaled 1.6 ml or, 1 bubble = 0.04 SCC. Using these data, a leak rate equivalent to 1 bubble every minute is found to be $4.1 \times 10^{-5} \text{ in}^3/\text{sec}$ ($6.7 \times 10^{-4} \text{ ml/sec}$).

flow direction is not indicated. Both seats of double disc gate valves may be tested simultaneously by applying pressure in the bonnet cavity.

3.2.2 In the case of globe valves, the seat shall be tested with pressure applied under the closed disc unless otherwise specified.

3.2.3 The method of seat leakage testing on each seat shall be such that seat leakage cannot escape detection because of gradual pressurization or filling of the cavity between seats in valves with two seats.

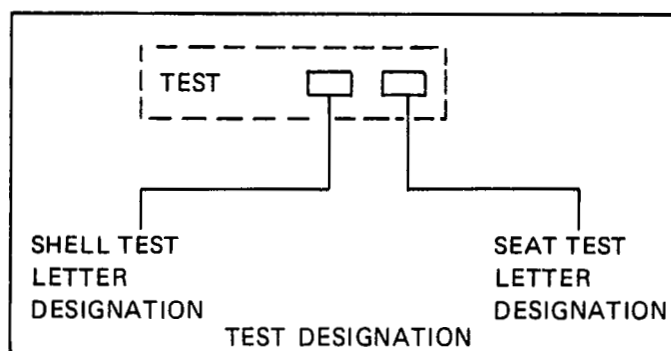


FIGURE 1

4. VALVE PRESSURE TESTING REQUIREMENTS AND TYPES

4.1 Valves tested in accordance with this standard practice may be identified with the appropriate two or more letter test designation signifying the type of test performed as shown in figure 1. This test designation mark may be located on the valve nameplate, on the exterior surface of the valve body, shown on a document included with the valve package, or otherwise shown on manufacturer's documents.

4.2 Shell Pressure Test Types⁽¹⁾

Test Designation	Test Type Definition
B	Each valve assembly shall be given a shell test at a pressure not less than 1.5 times the 100F (38C) rating rounded off to the next higher 25 psi (1 bar) increment. The test shall be made with water which may

(1) Alternate test methods such as volumetric loss testing machines are acceptable provided they are calibrated so that leakage rates are no greater than otherwise allowed based upon visual observation. The same test designations may be used on products tested with automatic testing machines provided the pressure in the product under test is at least equal to the pressure for the designation used and the test medium has a viscosity no greater than the viscosity of the test medium specified for the designation used.

Test Designation

Test Type Definition

B (cont.)	contain a corrosion inhibitor, with kerosene, or with other suitable liquid provided its viscosity is no greater than that of water, at a test temperature not above 125F (52C). The manufacturer at his option may use air or inert gas as the test medium. The test duration shall be as set forth in subsection 5.1. No visible leakage is permitted in the valve pressure boundary except at the stem seal or test connections.
C	Each valve assembly shall be given an air or other gas shell test at the 100F (38C) pressure rating. The test duration shall be as set forth in subsection 5.1. No visible leakage is permitted in the valve pressure boundary except at stem seal or test connections.
D	Each valve assembly shall be given an air or other gas test at a minimum of 80 psi (5.5 bar) for a duration as set forth in subsection 5.1. No visible leakage is permitted in the valve pressure boundary except at stem seal or test connections.
F	Another form of shell pressure testing is employed. Consult manufacturer for details.
G	No shell pressure testing is performed, but other quality assurance provisions are made to insure the valve quality. Consult the manufacturer.

4.3 Seat Pressure Test Types⁽¹⁾Test
Design-
nationTest Type
Definition

- W Each valve shall be given a seat test at a pressure not less than the pressure rating at 100F (38C). The test shall be made with water which may contain a corrosion inhibitor, with kerosene, or with other suitable liquid provided its viscosity is no greater than that of water, at a test temperature not above 125F (52C). The manufacturer at his option may use air or inert gas as the test medium. The test duration shall be as set forth in subsection 5.2. The allowable leakage rate shall be that permitted by the appropriate standard for the individual type of valve or, otherwise, as agreed between the manufacturer and the purchaser. In the absence of established leakage criteria, valves with resilient seats shall show no visible leakage.⁽²⁾
- V Each valve shall be given an air or other gas seat test at a minimum of 80 psi (5.5 bar). The test duration shall be as set forth in subsection 5.2. The allowable leakage rate shall be that permitted by the appropriate standard for the individual type of valve or, otherwise, as

(1) Alternate test methods such as volumetric loss testing machines are acceptable provided they are calibrated so that leakage rates are no greater than otherwise allowed based upon visual observation. The same test designations may be used on products tested with automatic testing machines provided the pressure in the product under test is at least equal to the pressure for the designation used and the test medium has a viscosity no greater than the viscosity of the test medium specified for the designation used.

(2) Resilient seats include rubber, polymers, PTFE, and other similar yieldable seating materials. Non-resilient seats include metallic, ceramic, carbon graphite, and other similar hard seating materials.

Test
Design-
nationTest Type
Definition

- V
(cont.) agreed between the manufacturer and the purchaser. In the absence of established leakage criteria, valves with resilient seats shall show no visible leakage.⁽²⁾
- T Each valve shall be given a seat test at 45 to 55 psi (3.1 to 3.8 bar). The test shall be made with water which may contain a corrosion inhibitor, with kerosene, or with other suitable liquid provided its viscosity is no greater than that of water at a test temperature not above 125F (52C). The manufacturer at his option may use air or inert gas as the test medium. The test duration shall be as set forth in subsection 5.2. The allowable leakage rate shall be that permitted by the appropriate standard for the individual type of valve or, otherwise, as agreed between the manufacturer and the purchaser. In the absence of established leakage criteria, valves with resilient seats shall show no visible leakage.⁽²⁾
- S Another form of seat pressure testing is employed. Consult manufacturer for details.
- R No seat pressure testing is performed, but other quality assurance provisions are made to insure the valve quality. Consult the manufacturer.

5. DURATION OF TESTS

5.1 Duration of Shell Test: As required to determine the integrity of the pressure boundary after test pressure has been applied.

5.2 Duration of Seat Test: As required to permit determination that the seat seal satisfies the acceptance criteria.

LIST OF MSS STANDARD PRACTICES**NUMBER**

SP- 6-1990	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-25-1978 (R 1983, 88)	Standard Marking System for Valves, Fittings, Flanges and Unions
SP-42-1990	Class 150 Corrosion Resistant Gate, Globe, Angle and Check Valves with Flanged and Butt Weld Ends
SP-43-1991	Wrought Stainless Steel Butt-Welding Fittings
SP-44-1991	Steel Pipe Line Flanges
SP-45-1992	Bypass and Drain Connections
SP-51-1991	Class 150 LW Corrosion Resistant Cast Flanges and Flanged Fittings
SP-53-1985 (R 1990)	Quality Standard for Steel Castings and Forgings for Valves, Flanges, and Fittings and Other Piping Components — Magnetic Particle Examination Method
SP-54-1985 (R 1990)	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-58-1988	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-65-1990	High Pressure Chemical Industry Flanges and Threaded Stubs for Use with Lens Gaskets
SP-67-1990	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-75-1988	Specifications for High Test Wrought Butt Welding Fittings
SP-77-1984 (R 1990)	Guidelines for Pipe Support Contractual Relationships
SP-78-1987 (R 1992)	Cast Iron Plug Valves, Flanged and Threaded Ends
SP-79-1989	Socket-Welding Reducer Inserts
SP-80-1987	Bronze Gate, Globe, Angle and Check Valves
SP-81-1981 (R 1986, 91)	Stainless Steel, Bonnetless, Flanged Knife Gate Valves
SP-82-1992	Valve Pressure Testing Methods
SP-83-1987	Steel Pipe Unions, Socket-Welding and Threaded
SP-84-1990	Valves — Socket-Welding and Threaded Ends
SP-85-1985	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	Factory-Made Butt-Welding Fittings for Class I Nuclear Piping Applications
SP-88-1983 (R 1988)	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-91-1990	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-94-1983 (R 1987)	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-96-1991	Guidelines on Terminology for Valves and Fittings
SP-97-1987	Forged Carbon Steel Branch Outlet Fittings — Socket Welding, Threaded and Buttwelding Ends
SP-98-1992	Protective Epoxy Coatings for the Interior of Valves and Hydrants
SP-99-1989	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-103-1990	Wrought Copper and Copper Alloy Insert Fittings for Polybutylene Systems
SP-104-1990	Wrought Copper LW Solder Joint Pressure Fittings
SP-105-1990	Instrument Valves for Code Applications
SP-106-1990	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-108-1991	Resilient Seated-Eccentric Cast Iron Plug Valves
SP-109-1991	Welded Fabricated Copper Solder Joint Pressure Fittings
SP-110-1992	Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends

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 as 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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