ASME A112.18.7-1999

DECK MOUNTED BATH/SHOWER TRANSFER VALVES WITH INTEGRAL BACKFLOW PROTECTION

AN AMERICAN NATIONAL STANDARD

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The American Society of Mechanical Engineers

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A N A M E R I C A N N A T I O N A L S T A N D A R D

DECK MOUNTED BATH/SHOWER TRANSFER VALVES WITH INTEGRAL BACKFLOW PROTECTION

ASME A112.18.7-1999

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This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda or written interpretations of the requirements of this Standard issued to this edition.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

FOREWORD

In late 1988 and 1989 and the early 1990s a trend was appearing with the introduction of hand held showers and other bathing appliances mounted on the deck of bathtubs and other fixtures. The market place was being inundated with new devices, with a fair amount of them coming in from Europe. The need for backflow and back siphonage protection was very evident because of the nature of the accessories being furnished, as they all incorporated a hose or a pull out feature that could become submerged in the vessel they were intended to serve. At the time there were no standards that properly addressed this type of backflow prevention devices that was mounted on the deck of a bathing vessel.

In 1989 and 1990 both ASSE and IAPMO began work on a remedy for this problem. ASSE modified ASSE 1001 to incorporate deck mounted atmospheric type vacuum breakers for mounting on the deck of fixtures. IAPMO developed an IGC (Interim Guide Criteria) in 1989, which covered these devices, but went one step further with incorporating a diverter valve into the backflow prevention device.

In 1991 IAPMO converted the 1990 IGC into a PS standard (PS 45-91) and named it Bathtub Three Way Diverter Valve With Backflow Protection. PS 45-91 along with the ASSE 1001 standard formed the backbone of the technical material and basis for this Standard.

Extensive testing and engineering reviews has gone into the development of the ASSE and IAPMO standards along with the development of this Standard. This Standard combines a series of safety features including a vent to atmosphere and checking members to collectively protect against the possibility of backflow or back siphonage. This Standard is written to give freedom to the manufacturer that desires to develop a design for this type of device.

Suggestions for improvement of this Standard will be welcomed. They should be sent to The American Society of Mechanical Engineers; Attn: Secretary; A112 Main Committee; Three Park Avenue; New York, NY 10016-5990.

This Standard was approved as an American National Standard on April 14, 1999.

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DECK MOUNTED BATH/SHOWER TRANSFER VALVES WITH INTEGRAL BACKFLOW PROTECTION

1 GENERAL

1.1 Scope

This Standard establishes requirements for deck mounted, bath/shower transfer valves with integral backflow protection on the secondary outlets. It covers physical and performance requirements, test methods, and requirements for marking and identification.

The provisions of this Standard are not intended to prevent the use of any alternative material or method of construction, provided any such alternative meets the intent of this Standard.

1.2 Units of Measurement

Values are stated in U.S. Customary units and the International System of Units (SI). The U.S. Customary units shall be considered as the standard.

In this Standard, gallons (U.S. liquid) per minute is abbreviated gpm.

1.3 Referenced Standards

The following documents form a part of this Standard to the extent specified herein.

ANSI/NSF 14-90, Plastics Piping Components and Related Materials

Publisher: National Samitation Foundation (NSF International), 3475 Plymouth Road, Ann Arbor, MI 48105

ASME A112.18.1-2000, Plumbing Fixture Fittings

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990

1.4 Definitions

The terms used in this Standard are defined in ASME

2 PHYSICAL REQUIREMENTS

2.1 Materials

The materials used shall be suitable for use with potable water. Plastic materials coming into contact with potable water shall comply with the applicable sections of NSF 14 exclusive of the sections pertaining to taste and odor.

Solder and fluxes containing lead in excess of 0.2% shall not be used. Metal alloys shall not exceed 8% lead content.

2.2 Coatings

Electrodeposited and organic coatings shall meet the requirements of ASME A112.18.1.

2.3 Pressure and Temperature

The device shall be designed to function at working water pressure up to 125 psi (860 kPa). The device shall be designed to function at supply temperatures from 40°F to 150°F (4°C to 66°C). There shall be no leakage from secondary outlets when the transfer valve is in the primary outlet mode. The leakage rate from the primary outlet mode, when the transfer valve is in the secondary mode, shall not exceed 0.1 gpm (0.38 L/min) at 20 psi (140 kPa) and 60 psi (410 kPa) flowing gauge pressure when new, and 0.3 gpm (1.14 L/min) at the end of the life cycle test.

2.4 Hydrostatic Pressure

The envelope of the device shall withstand a hydrostatic pressure of 250 psi (1720 kPa), for a period of 5 minutes, with pressure applied at the inlet and the outlets plugged. The device shall show no signs of external leakage during the test.

2.5 Flow Capacity

The device shall deliver at the primary outlet, the minimum flow rate as specified in Table 3 of ASME A112.18.1.

2.6 Life Cycle Durability

The transfer valve and its backflow prevention mechanism shall be cycled 15,000 cycles. After the life cycle durability test, the transfer valve shall be tested in accordance with paras. 3.5 and 3.6 of the test procedure for back pressure and back siphonage. Failure to meet the minimum performance requirements of this Standard shall result in rejection of the device.

2.7 Back Pressure Backflow Prevention

There shall be no backflow of water into the supply line when the air ports are sealed closed and a back pressure within a range from 6 in. to 59 in. (0.15 m to 1.5 m) water column is applied to each secondary outlet.

2.8 Back Siphonage Backflow Prevention

There shall be no back siphonage of water from the downstream piping into the supply piping when the check valve seat(s) or disk(s) is fouled to a partially open position in accordance with the test method described in para. 3.6. Any rise of water in the sight glass more than $\frac{1}{2}$ in. (13 mm) or if any back siphonage occurs that shall be cause for rejection of the device.

2.9 Critical Level

The transfer valve shall be mounted so that the critical level or the bottom of the device is a minimum 1 in. (25 mm) above the flood level rim of the fixture.

3 PERFORMANCE TESTING

3.1 Pressure and Temperature Test

The transfer valve test sample shall be installed in a test system capable of providing pressures of 125 psi (860 kPa) and water temperatures of 150°F ± 5°F (65°C ± 3°C) at the inlet. The system shall be purged of air and the water pressure elevated to 125 psi (860 kPa) and at a temperature of 150°F ± 5°F (65°C ± 3°C). With the water flowing from the secondary outlet(s), cycle the transfer valve from the primary outlet mode to each of the secondary outlet(s) for 5 minutes. The valve shall not bind, chatter, or have leakage except as allowed in para. 2.3.

3.2 Hydrostatic Test

The transfer valve shall be filled with water and its outlets plugged. The valve shall then be pressurized to 250 psi (1720 kPa) and subjected to this static condition for 5 minutes. Test results shall meet the performance requirements of para. 2.4.

3.3 Flow Capacity Test

With the water supply in a full open position, regulate the flowing pressure to 20 psi (138 kPa) at the inlet of the transfer valve. Measure the flow rate at the primary mode. Minimum flow rate shall be as specified in para. 2.5.

3.4 Life Cycle Durability Test

The transfer valve shall be installed to a life cycle test fixture capable of providing the test parameter listed in para. 6.6.3 of ASME A112.18.1. The test sample shall be installed to the test fixture as it is intended to be installed in the field. The secondary outlets shall be furnished with devices simulating their intended usage. The inlet of the transfer valve shall be connected to a water supply capable of providing hot and cold water in accordance with para. 2.3. There shall be a sliding joint used between the transfer valve handle and the test actuation device. The transfer valve shall be cycled to a minimum of 15,000 actuation. Each actuation from the primary mode through to the secondary modes and back to the primary mode shall be considered one cycle. The transfer valve shall be cycled at the rate of not less then 1000 cycles/hr, alternating cycles between secondary outlet mode positions. Cold and hot water shall be used alternately, supplying cold water followed by hot water at frequencies that are accumulative to the 3/1 exposure ratio, respectively. Test results shall meet the performance requirements of para. 2.6.

3.5 Back Pressure Backflow Test

Install the transfer valve and hose assembly as shown in Fig. 1. Set the transfer valve to a secondary outlet mode. Position the end of the hose at an elevation of 6 in. (150 mm) above the bottom of the device or the critical level of the transfer valve. Place a sheet of white paper under the inlet of the diverter. With the air ports sealed closed, fill the hose with colored water. Allow this assembly to stand for 5 minutes and observe for indications of leakage on the paper. If no leaks are observed, slowly elevate the end of the hose to 59 in. (1500 mm). Add water to the hose if necessary to keep it full. Allow the assembly to stand for 5 minutes and observe for indications of leakage. This

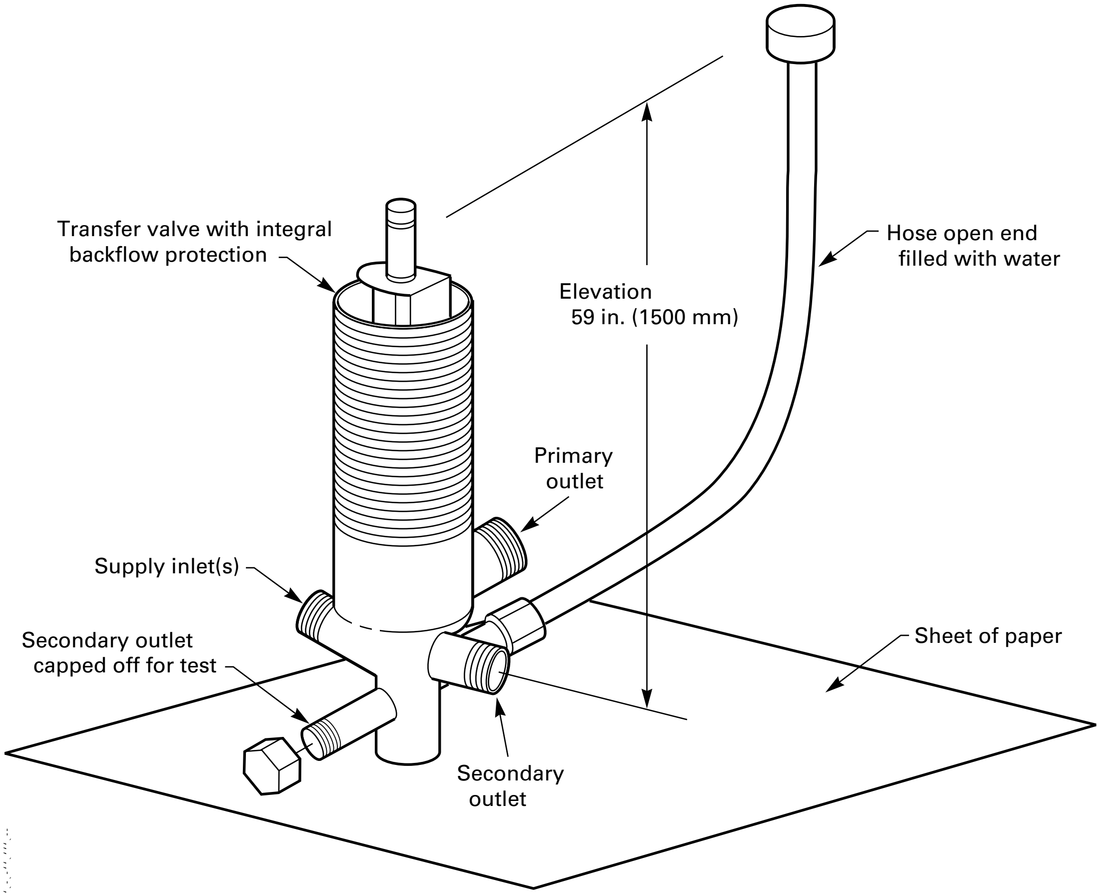

FIG. 1 BACK PRESSURE BACKFLOW TEST SET-UP

test shall be repeated until all secondary outlets have been tested. Test results shall meet the performance requirements of para. 2.7.

3.6 Back Siphonage Backflow Test

All check valves contained within the transfer valve shall be fouled with a 0.032 in. (0.8 mm) diameter wire. The wire shall be placed between the check valves and the seat as shown in Fig. 2. For any other configuration, the wire shall be placed in a position analogous to those shown. The device shall be installed to the test fixture as shown in Fig. 3. All unused secondary outlets shall be blocked. The test fixture shall have the capability of producing a vacuum up to 25 in. (635 mm) of mercury. A transparent sight glass $\frac{1}{2}$ in. (13 mm) inside diameter shall be connected to the outlet of the transfer valve with its lower end immersed in a reservoir of colored water positioned below the transfer valve. Apply the following vacuum

(a) Apply and hold a vacuum of 25 in. (635 mm) of mercury for 5 minutes and then vent the vacuum on the supply side of the assembly to return to atmospheric.

(b) Raise the vacuum slowly from 0 in. to 25 in. (0 mm to 635 mm) of mercury, and then slowly reduce it to 0 in. (0 mm) of mercury.

(c) Create a surge effect by opening and closing valve #2 at least five times. The applied vacuum load shall vary from 0 in. to 25 in. (0 mm to 635 mm) of mercury during the test.

Observations shall be made for water rise within the sight tube and recorded for each test. Test results shall meet the performance requirements in para. 2.8.

3.7 Determination of Critical Level

3.7.1 With the device installed in accordance with Fig. 4 and the check valve(s), if any, fouled, submerge the device for at least 5 minutes so that all of its openings and exterior and interior surfaces are thoroughly wetted.

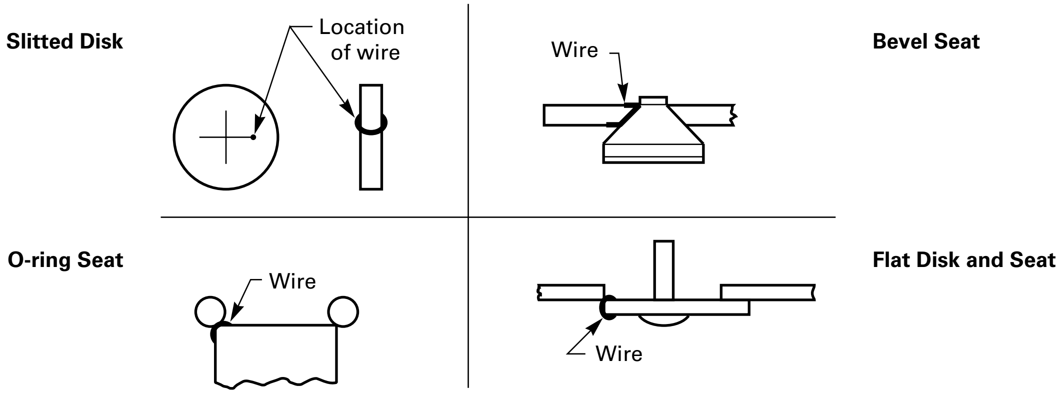

FIG. 2 FOULING THE CHECK MEMBERS

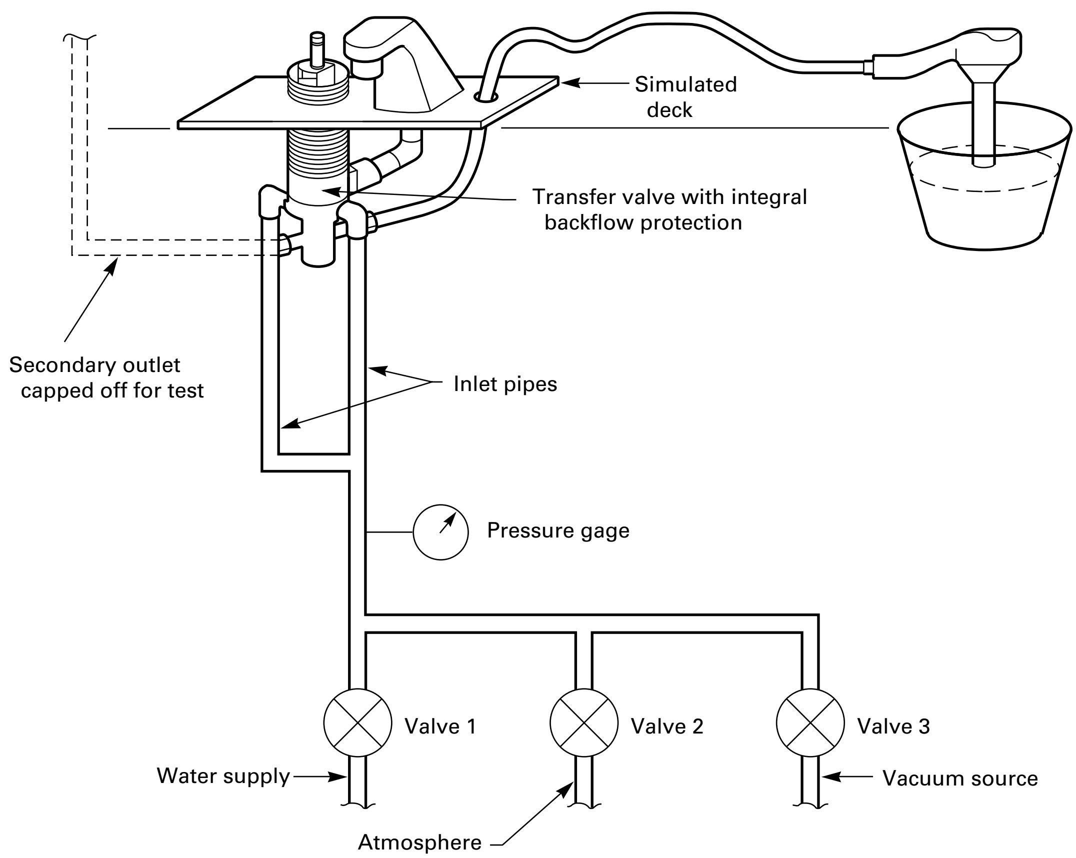

FIG. 3 BACK SIPHONAGE BACKFLOW TEST SET-UP

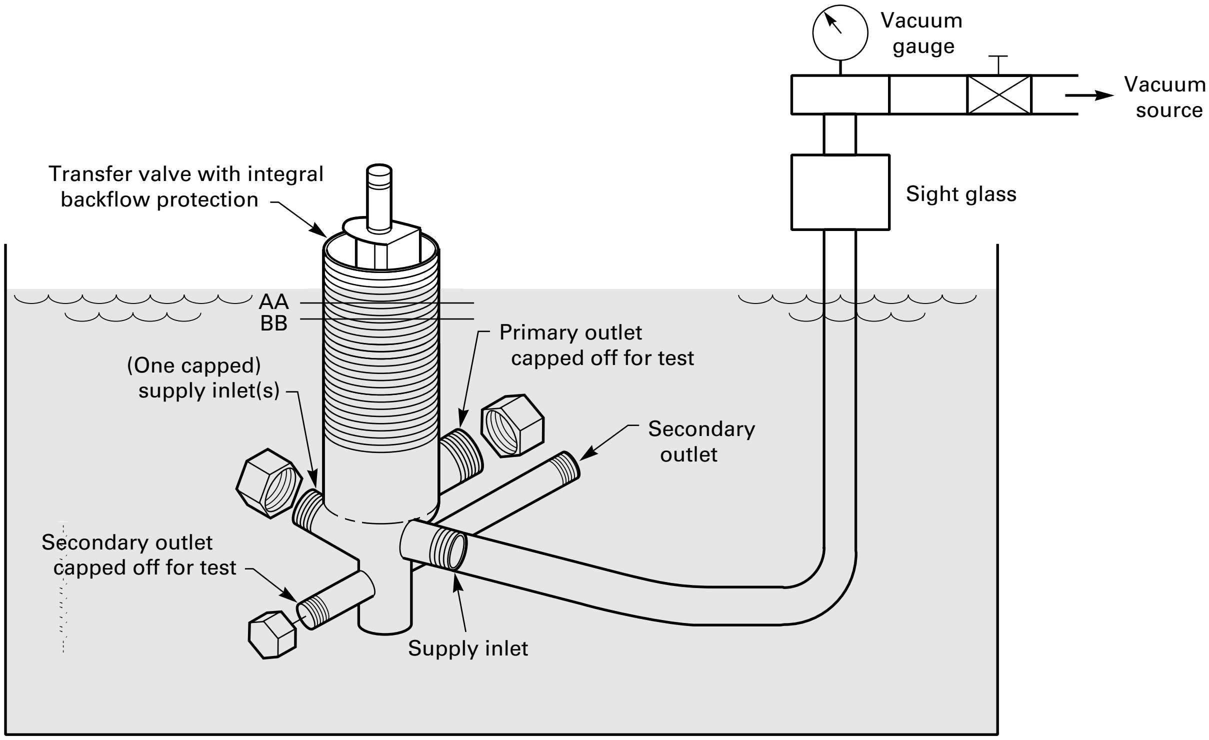

FIG. 4 CRITICAL LEVEL TEST SET-UP

3.7.2 With the water level in the tank lowered to 0.12 in. (3 mm) below the air port(s), a vacuum of 25 in. (85 kPa) of mercury shall be applied while the water level in the tank is slowly lowered. The elevation at which back siphonage ceases (BB) shall be marked. A vacuum of 25 in. (85 kPa) of mercury shall then be applied as the water level in the tank is gradually raised. The elevation at which back siphonage begins (AA) shall be marked. The lower of the two elevations shall be considered the critical level.

3.7.3 The device shall be installed in the test tank with the critical level as determined above located 1 in. (25 mm) above the the water surface. Surge vacuum loading shall then be applied by opening and closing a quick-opening valve at least five times, varying the vacuum load from 0 in. to 25 in. (0 kPa to 85 kPa) of mercury to verify the location of the critical level.

4 MARKING AND IDENTIFICATION

4.1 Transfer Valve

(a) The transfer valve shall be permanently and legibly marked with the following:

(1) manufacturer's name or trademark;

(2) model number.

(b) The transfer valve shall be marked ''A112.18.7'' to demonstrate compliance with this Standard. The marking shall be by means of either a permanent mark on the product, a label on the product, or a tag attached to the product.

4.2 Packaging

The package or any label attached to the package shall be marked with the manufacturer's name, model number, and ''A112.18.7''.

ASME STANDARDS RELATED TO PLUMBING

Air Gaps in Plumbing Systems	A112.1.2-1991(R1998)
Performance Standard and Installation Procedures for Stainless Steel Drainage Systems for Sanitary, Storm, and Chemical Applications, Above and Below Ground	A112.3.1-1993
Water Heater Relief Valve Drain Tubes	A112.4.1-1993(R1998)
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