IAPMO Notes

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(4) During its development, this Standard was made available for public review, thus providing an opportunity for additional input from stakeholders from industry, academia, regulatory agencies, and the public at large. Upon closing of public review, all comments received were duly considered and resolved by the IAPMO Standards Review Committee.
(5) This Standard was developed in accordance with the principles of consensus, which is defined as substantial agreement; consensus implies much more than a simple majority, but not necessarily unanimity. It is consistent with this definition that a member of the IAPMO Standards Review Committee might not be in full agreement with all sections of this Standard.
(6) Although the intended primary application of this Standard is stated in its scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.
(7) IAPMO Standards are subject to periodic review and suggestions for their improvement will be referred to the IAPMO Standards Review Committee. To submit a proposal for change to this Standard, you may send the following information to the International Association of Plumbing and Mechanical Officials, Attention Standards Department, at standards@IAPMOstandards.org or, alternatively, at 4755 East Philadelphia Street, Ontario, California, 91761, and include “Proposal for change” in the subject line:
(a) standard designation (number);
(b) relevant section, table, or figure number, as applicable;
(c) wording of the proposed change, tracking the changes between the original and the proposed wording; and
(d) rationale for the change.
(8) Requests for interpretation should be clear and unambiguous. To submit a request for interpretation of this Standard, you may send the following information to the International Association of Plumbing and Mechanical Officials, Attention Standards Department, at standards@IAPMOstandards.org or, alternatively, at 4755 East Philadelphia Street, Ontario, California, 91761, and include “Request for interpretation” in the subject line:
(a) the edition of the standard for which the interpretation is being requested;
(b) the definition of the problem, making reference to the specific section and, when appropriate, an illustrative sketch explaining the question;
(c) an explanation of circumstances surrounding the actual field conditions; and
(d) the request for interpretation phrased in such a way that a “yes” or “no” answer will address the issue.
(9) Attention is drawn to the possibility that some of the elements of this Standard may be the subject of patent rights. IAPMO is not to be held responsible for identifying any or all such patent rights. Users of this Standard are expressly advised that determination of the validity of any such patent rights is entirely their responsibility.
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(11) Participation by federal or state agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this Standard.
1 Scope

1.1 General

1.1.1 This Standard covers valves with atmospheric vacuum breakers and specifies requirements for materials, physical characteristics, performance testing, and markings.

1.1.2 Valves covered by this standard are intended for cold water installations requiring an integral anti-siphon device to prevent house water contamination when installed per the manufacturer's instructions. In cold climate areas, backflow assemblies and devices shall be protected from freezing by a method acceptable to the Administrative Authority.

1.2 Alternative Materials
The requirements of this standard are not intended to prevent the use of alternative materials or methods of construction, provided such alternatives meet the intent and requirements of this standard.

1.3 Terminology
In this Standard,
(a) “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy to comply with the Standard;
(b) “should” is used to express a recommendation, but not a requirement;
(c) “may” is used to express an option or something permissible within the scope of the Standard; and
(d) “can” is used to express a possibility or a capability.

Notes accompanying sections of the Standard do not specify requirements or alternative requirements; their purpose is to separate explanatory or informative material from the text. Notes to tables and figures are considered part of the table or figure and can be written as requirements.

1.4 Units of Measurement
SI units are the primary units of record in global commerce. In this Standard, the inch/pound units are shown in parentheses. The values stated in each measurement system are equivalent in application, but each unit system is to be used independently. All references to gallons are to U.S. gallons.

1.5 Amendments
Proposals for amendments to this Standard will be processed in accordance with the standards-writing procedures of IAPMO.
2 Reference Publications

This Standard refers to the following publications and, where such reference is made, it shall be to the current edition of those publications, including all amendments published thereto.

ASME B1.20.1 Pipe Threads, General Purpose (Inch)
ASSE 1001 Performance Requirements for Atmospheric Type Vacuum Breakers
ASTM F1498 Standard Specification for Taper Pipe Threads 60°deg; for Thermoplastic Pipe and Fittings

3 Definitions and Abbreviations

This section is reserved for later use.

4 General Requirements

4.1 Material
Metals approved for use in water distribution systems shall be permitted. Metal alloys shall not exceed 8% lead content.

4.2 Working Pressure
Valves with atmospheric vacuum breakers shall be designed to function at working pressures up to 125 psi (862 kPa) at 23.9°C (75°F) or per manufacturer's specification, whichever is greater.

4.3 Working Temperatures
Valves with atmospheric vacuum breakers shall be designed for use in cold water supply applications with supply temperatures from 4.4°C to 43.3°C (40°F to 110°F), and stagnant (valve closed) temperature extremes to 57.2°C (135°F). Working pressure may be de-rated per manufacturer's specification for elevated working temperatures.

4.4 Installation
Valves with atmospheric vacuum breakers covered by this standard shall be provided with suitable means of connection to a type of supply line in common use.
4.5 **Pipe Threads**  
Where applicable, pipe threads shall conform to ASME B1.20.1. Permissible tolerance on tapered plastic pipe threads shall be flush to 1-1/2 thread tight on a standard pipe thread gage, or per manufacturer’s specification.  
*Note: ASTM F1498 specifies requirements for tapered pipe threads for plastic pipe and fittings.*

4.6 **Slip Fitting**  
Where applicable, solvent cemented joint fitting dimensions shall conform to ASTM D2466, Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40 or ASTM D2467, Socket-Type Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80. A stop shall be provided in each port of the valve to prevent over insertion of supply and outlet lines.

4.7 **Seals**  
O-ring seals, gaskets and diaphragm seals shall be of such design and quality to ensure leak-proof joints.

4.8 **Replacement Parts**  
Valves with atmospheric vacuum breakers shall be designed such that, after installation, replacement of all wearing parts may be accomplished without disconnecting the valve from the supply and outlet lines unless specified otherwise by the manufacturer.

5 **Testing Requirements**

5.1 **Test Specimen and Documentation**

5.1.1 **Test Specimen**  
Three test specimens shall be selected at random from standard production. Testing shall be applied to the test specimens in the sequence noted as follows:  
(a) Sample One:  
   (i) Section 5.2, Backflow Prevention Test;  
   (ii) Section 5.3, Water Flow Pressure Loss Test; and,  
   (iii) Section 5.4, Valve Seal Test.  
(b) Sample Two:  
   (i) Section 5.5, Rated Maximum Water Working Temperature Test; and,  
   (ii) Section 5.6, Stagnate Temperature Extreme.  
(c) Sample Three:  
   (i) Section 5.7, Life Cycle Test.

5.1.2 **Documentation Requirements**  
Engineering drawings, specification labeling, and installation instructions shall be provided with test samples.

5.2 **Backflow Prevention Test**

5.2.1 **Test Procedure**  
The backflow prevention test shall be tested in accordance with Section III, Performance Requirements and Compliance Testing of ASSE 1001
5.2.2 **Performance Requirements**
Valves with atmospheric vacuum breakers covered by this Standard shall comply with the performance requirements of Section III, Performance Requirements and Compliance Testing of ASSE 1001 except for the performance requirements in Section 3.2, Allowable Pressure Loss at Rated Flow Test of ASSE 1001.

5.3 **Water Flow Pressure Loss Test**

5.3.1 **Test Procedure**
The water flow pressure loss test shall be conducted in accordance with Section 3.2.2, Procedure of ASSE 1001.

5.3.2 **Performance Requirements**
The valve shall meet the pressure loss performance requirements as specified by the manufacturer.

5.4 **Valve Seat Test**

5.4.1 **Test Procedure**
The valve seat test for valves with atmospheric vacuum breakers shall be conducted as follows:
(a) The valve shall be subjected to two times) the maximum rated working pressure for a minimum of 10 min.
(b) The pressure shall be applied at the inlet with the valve closed.
(c) The unit may be of the pressure relieving type, provided that the relief occurs above 1034 kPa (150 psi).
(d) After testing, the valve shall be disassembled and inspected for internal and external component damage.

5.4.2 **Performance Requirements**
There shall be no leakage while applying pressure with the inlet valve closed, and after reassembly, valve shall function properly throughout its rated pressure.

5.5 **Rated Maximum Water Working Temperature Test**

5.5.1 **Test Apparatus**
The valve shall be able to withstand a minimum of 100 h of operation at 43.3°C (110°F) without damage or impairment of operation. Test shall be performed in a monitored test fixture which will provide supply water at the rated temperature and 621 kPa (90 psi) or the pressure noted in the manufacturer’s specification for this temperature, whichever is less.
5.5.2 **Test Procedure**

The rated maximum water working temperature test for Valves with Atmospheric Vacuum Breakers shall be conducted as follows:

(a) Assemble the test specimen in accordance with Section 5.5.1 and the manufacturer’s instructions;
(b) The valve shall be cycled through 24 on-off cycles per 24 h period. Minimum on time or off time per on-off-on cycle shall be 10 min.
(c) After testing, the valve shall be disassembled and inspected for internal and external component damage.

5.5.3 **Performance Requirements**

Any leakage during the test shall be cause for failure. After testing, the valve shall be disassembled and inspected for internal and external component damage. After reassembly, valve must function properly throughout its rated pressure operating range.

5.6 **Stagnant Temperature Extreme**

5.6.1 **Test Procedure**

The Stagnant temperature extreme test for Valves with Atmospheric Vacuum Breakers shall be conducted as follows:

(a) The valve shall be installed in a temperature-controlled chamber set to 57.2°C (135°F).
(b) The valve shall be pressurized for 1 h with water at 552 kPa (80 psi) or per manufacturer's specification for this temperature, whichever is less.

5.6.2 **Performance Requirements**

Any leakage during the test shall be cause for failure. After testing, the valve shall be disassembled and inspected for internal and external component damage which may impair valve operation.

5.7 **Life Cycle Test**

5.7.1 **Test Procedure**

The life cycle test for valves with atmospheric vacuum breakers shall be conducted as follows:

(a) The valve shall be cycled for three times the published life cycles listed in the manufacturer's product literature or 10,000 cycles, whichever is greater.
(b) The valve shall be mounted on a fixture that supplies water within a range of 4.4°C – 21.1°C (40°F – 70°F) water temperature and at 552 kPa (80 psi) water pressure.
(c) The valve shall be actuated, by normal operation means, from full off, to full on, to full off, at a rate of 30 cycles per hour or as stipulated by the manufacturer, whichever is greater.
(d) A downstream flow restrictor must be used to limit the flow to the maximum specified by the manufacturer.

5.7.2 **Performance Requirements**

After completion of the specified test cycles, the valve shall function without leaking. After testing, the valve shall be disassembled and inspected for internal and external component damage which may impair valve operation.
6 Markings and Accompanying Literature

6.1 Valves with atmospheric vacuum breakers complying with this Standard shall be marked with the:
(a) Manufacturer's name or trademark;
(b) Model number;
(c) Maximum rated working pressure;
(d) Maximum water temperature;
(e) Nominal valve size; and
(f) Direction of water flow.