



**Summary of Substantive Changes  
between the 2017 and the 2021 edition of  
ASSE 1001, Performance Requirements for  
Atmospheric Type Vacuum Breakers**

**Presented to the IAPMO Standards Review Committee on January 9, 2023**

**General:** The changes to this standard may have an impact on currently listed products. The significant changes are:

- Test sample selection in Section 2.0
- Clarification to test procedures in Sections 3.1.2, 3.4.2, and 3.5
- Testing clarification as accompanied by new and revised figures.

**Section 1.0, General:**

**1.1 Application**

*This standard applies to atmospheric type vacuum breakers (herein referred to as the "device") that are single pipe-applied, flushometer-applied, or integrally-applied (does not apply to water closet tank ballcocks or similar devices that depend on float-operated valves to control flow). The purpose of these devices is to provide protection of the potable water supply against pollutants or contaminants that enter the system due to backsiphonage through the outlet. Under backsiphonage conditions, a small amount of water is permitted to exit through the air ports.*

*The device shall:*

- 1) *Have its outlet open to atmosphere;*
- 2) *Not be subjected to backpressure; mitigated by one of the following means*
  - a. Be installed with its critical level (CL) not less than 6.0 inches (152.4 mm) above all downstream piping and the flood level rim of the fixture or appliances served;*
  - b. Deck mounted/equipment mounted atmospheric vacuum breakers shall be installed in accordance with the manufacturer's instructions, with its critical level (CL) not less than 1.0 inch (25.4 mm) above the flood level rim of the fixture or appliance served.*
  - c. If the appurtenance serviced has an integral bleed valve the dimension restrictions in a and b above do not apply to the location of the appliance.*
- 3) *Not be subjected to more than twelve (12) hours of continuous water pressure.*  
*~~Be installed with its critical level (CL) not less than 6.0 inches (152.4 mm) above the flood level rim of the fixture or appliances served; or deck mounted/equipment mounted atmospheric vacuum breakers shall be installed in accordance with the manufacturer's instructions, with its critical level (CL) not less than 1.0 inch (25.4 mm) above the flood level rim of the fixture or appliance served.~~*

**1.2.3 Working Pressure**

*Devices shall be designed to operate within a working pressure of 8psi (55 kPa) to ~~a minimum of~~ 125psi (861.9 kPa).*

**1.4 Referenced Standards**

*References to industry standards shall mean to the stated editions of the standards.*

- ASME B1.20.1-2013 [\(R2018\)](#), Pipe Threads, General Purpose, Inch
- ASME B1.20.3-1976 [\(R2018\)](#), Dryseal Pipe Threads, Inch



- ASSE 1037-~~2015~~2020/ASME A112.1037-~~2015~~2020/CSA B125.37-~~15~~20, Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures

## Section 2.0, Test Specimens

### 2.1 Samples Submitted for Test

Sample plan shall be in accordance with the requirements of the certification body.

~~Three (3) devices of each size and model shall be submitted by the manufacturer.~~

### 2.2 Samples Tested

The testing agency shall ~~select~~ test one (1) of each size and model for full test. Tests shall be performed in the order listed on one (1) device.

## Section 3.0, Performance Requirements and Compliance Testing:

### 3.1 Deterioration at Extremes of Manufacturer's Temperature and Pressure Range Test

#### 3.1.1 Purpose

The purpose of this test is to ensure the device continues to function after exposure to manufacturer's extremes of temperature and pressure for pipe-applied and flushometer applied devices.

#### 3.1.2 Procedure

Cold water devices shall be tested at 110°F +0°F, -2.0°F (43.3°C +0°C, -1.1°C) or the manufacturer's maximum rated temperature, whichever is greater; and at 33°F +2.0°F, -0°F (0.56°C +1.1°C, -0°C). Hot water devices shall be tested at 180°F +0°F, -2.0°F (82.2°C +0°C, -1.1°C) or the manufacturer's maximum rated temperature, whichever is greater; and at 33°F +2.0°F, -0°F (0.56°C +1.1°C, -0°C).

Install the device per Figure 1 with a pump capable of circulating water at the flow rates listed in Table 1 through the test setup. For pipe-applied devices, this test shall be performed at the manufacturer's maximum rated pressure for both cold and hot water devices. For flushometer-applied devices, this test shall be performed at 80psi (550kPa).

For cold water devices, water at a temperature of 110°F +0°F, -2.0°F (43.3°C +0°C, -1.1°C) or the manufacturer's maximum rated temperature, whichever is greater, shall be circulated through the device for eight (8) hours per day for a total of ten (10) days (total of eighty (80) hours). For hot water devices, water at a temperature of 180°F +0°F, -2.0°F (82.2°C +0°C, -1.1°C) or the manufacturer's maximum rated temperature, whichever is greater, shall be circulated through the device for eight (8) hours per day for a total of ten (10) days (total of eighty (80) hours). After each eight (8) hour test period, verify that the air inlet valve returns to its fully opened position when the system pressure is reduced to atmosphere.

Within one (1) minute of the conclusion of the final eight (8) hour test period, water maintained at 33°F +2.0°F, -0°F (0.56°C +1.1°C, -0°C) shall be circulated through the device for at least one (1) hour. No further tests are required in this section for flushometer-applied devices.

~~Next~~ For pipe-applied devices, water at ambient temperature shall be allowed to flow freely through the device. Close valve #2 and allow the water pressure in the test assembly to rise to 250.0 psi (1724 kPa) or



two (2) times the manufacturer's maximum rated working pressure, whichever is greater. This pressure shall be maintained for five (5) minutes during which time the device shall be examined for evidence of any leaks or structural deformation.

### 3.4 Air Flow Test

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#### 3.4.2 Procedure

**3.4.2.1** ~~Install~~ For pipe-applied devices, install the device per Figure 2A in the normal operating position with the check or moving member of the device at the water inlet held fully open and the air inlet valve held closed. Connect the outlet of the device by means of a 12.0 inch (305 mm) length of piping of uniform inside diameter to a quick opening valve of the same size or larger, and then by means of a second 12.0 inch (305 mm) length of piping of uniform inside diameter ~~of reamed corresponding sized piping~~ to a vacuum tank. The vacuum tank shall be capable of providing at least a ten (10) seconds air flow (see Figure 3A or 3B). Dissipate the vacuum in the tank from 25 to 5.0 inches of mercury (85 to 17 kPa) through the check valve orifice by operating a quick opening valve [fully open in less than one (1) second]. Record the amount of time needed to dissipate the vacuum.

3.4.2.2 For flushometer-applied devices, install device per figure 2B in the normal vertical position with the water inlet and the air inlet ports located at the top of the device. The check or moving member of the device at the water inlet held fully open and the air inlet ports shall be closed by means of tape or a seal to keep them closed during this portion of the test. Connect the outlet of the device by means of a 12.0 inch (305 mm) length of piping of uniform inside diameter to a quick opening valve of the same size or larger, and then by means of a second 12.0 inch (305 mm) length of reamed corresponding sized piping to a vacuum tank. The vacuum tank shall be capable of providing at least ten (10) seconds air flow (see Figure 3). Dissipate the vacuum in the tank from 25 to 5.0 inches of mercury (85 to 17 kPa) through the check valve orifice by operating a quick opening valve [fully open in less than one (1) second]. Record the amount of time needed to dissipate the vacuum.

**3.4.2.23** ~~For pipe-applied devices, With~~ with the outlet still connected to the vacuum tank and the water inlet check held in a closed position, hold the air inlet valve open and dissipate the vacuum in the tank from 25 to 5.0 inches of mercury (85 to 17 kPa) in the same manner through the air port or ports, timing the operation.

#### 3.4.3 Criteria

For pipe-applied: The time for Section 3.4.2.2 ~~3~~ shall be equal to or less than Section 3.4.2.1 based on the average result of not less than three (3) test runs. Failure to meet this requirement shall result in a rejection of the device.

For flushometer-applied: The time for Section 3.4.2.4 shall be equal to or less than Section 3.4.2.2 based on the average result of not less than three (3) test runs. Failure to meet this requirement shall result in a rejection of the device.

### 3.5 Backsiphonage Test

#### 3.5.2 Procedure

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The device shall be installed ~~in its normal position~~ *in accordance with the manufacturer's instructions*. The check(s) member(s) shall be fouled with the proper size wire in the proper position or by defacement depending on the type of check member(s) and the inlet of the device connected to a vacuum line (see Figure 7A for pipe applied devices and Figure 7B for flushometer applied devices).

Inlet and outlet locations may vary, relative to Figure 7A & and 7B. Vacuum is at the inlet of the device. Dimension H shall be 1-inch for deck mounted and equipment mounted devices, and 6" for all other devices measured from the critical level of the device to the fluid level in the receptacle. The ~~critical level~~ *CL* shall be either the critical level mark, if present, or the bottom of the device. The vertical tube rising from the receptacle shall be transparent, 3/4-inch to 1-inch (19.0mm to 25.4mm) in diameter and having graduations of 1/16-inch (1.6mm). Alternatively, to the graduations, a 6-inch (15.2cm) ruler may be fastened to the tube.

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**Section 5.0, Definitions:** The following definition was added  
*Appurtenance*  
*Equipment used for a particular purpose or task.*

Figures 4, 5 and 6 were revised. A note was added to the figures as follows:

*Note: For any check or moving member that is not represented in Figures 4, 5, or 6, the fouling shall occur at the closest point to the seat or opening of the check.*

Figure 7 was revised and is now labeled Figure 7A

Figure 7B was added.