Summary of Substantive Changes
between the 2009 and 2021 editions of
ASSE 1051 "Individual and Branch Type Air Admittance Valves for Sanitary Drainage Systems"

Presented to the IAPMO Standards Review Committee on December 13, 2021

General: The changes to this standard should not have an impact on currently listed products. The significant changes are:

- Revised the scope to add a pressure range and a note to clarify the minimum air flow rate requirement (see Section 1.2.3, and 1.2.4)
- Revised test specimen requirements to at least 1 type of each model (see Section 2)
- Revised multiple test procedure for clarification (see Sections 3.1, 3.2, and 3.3)

Section 1.2, Scope: Revised the scope to add a pressure range and a note to clarify the minimum air flow rate requirement as follows:

1.2.1 Description

These devices consist of a one-way valve designed to allow air to enter the plumbing drainage system when a pressure less than atmospheric develops. The device closes and seals by gravity under zero (0) differential pressure (static condition) and under positive pressure. These devices prevent sewer gases from entering a building. The device consists of a hooded or shielded body which contains a normally closed movable sealing assembly which seats and seals air flow when closed and allows air to enter when open.

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1.2.3 Rating

These devices ~~shall be rated to~~, at a minimum, pass the air flow rate ~~indicated in~~ according to Table 1 ~~without exceeding a pressure drop greater than~~ at -1.0 inch (-25.4 mm) water column.

Note: This corresponds to half the size of a 2-inch (50.8mm) trap diameter for when a trap potentially evaporates.

1.2.4 Pressure Range

Devices are designed to operate within a range of -1.0 inch (-25.4mm) to 1.57 in (40 mm) of water column.

1.3 Construction

1.3.1 Air Inlet Shields

Air inlets of the device shall be shielded to prevent inlet fouling. Air inlet shields shall extend down the body of the device, over the sealing surface ~~membrane~~, to the lowest portion of the sealing surface, and ~~shall maintain~~ a minimum of 1/16 inch (1.6 mm) clearance between the inner lower edge of the shield and the lowest surface ~~membrane~~ of the air opening of the sealing surface ~~membrane~~.

1.3.4.2 Hubless Connectors

Hubless connectors shall comply with ASTM ~~C-564(3)~~, CSA B602~~(4),~~ or FM ~~168(5)~~ 1680.

1.4 Reference Standards

~~*References to*~~ *Referenced* industry standards shall ~~*mean*~~ *be to* the ~~*latest edition*~~ *revision stated below*.

- *ASME B1.20.1-2013 (R2018), Pipe Threads, General Purpose (Inch)*
- *ASTM A240/A240M-20a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*
- *ASTM C564-20a, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings*
- *ASTM D3965-2016, Standard Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings*
- *ASTM D4396-2015, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Nonpressure Applications*
- *ASTM D1784-2020, Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds*
- *ASTM F1498-2008 (R2020), Standard Specification for Taper Pipe Threads 60° for Thermoplastic Pipe and Fittings*
- *CSA B602-2020, Mechanical Couplings for Drain, Waste, and Vent Pipe and Sewer Pipe*
- *FM Approvals 1680-1989, Couplings Used in Hubless Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Drain Systems Above and Below Ground, Industrial/Commercial and Residential*
- *UL 969-2017, Marking and Labeling Systems*

Section 2.0, Test Specimens: Revised test specimen requirements to at least 1 type of each model as follows:

Section II

2.0 Test Specimens and Test Laboratory

~~*2.1 Samples Submitted*~~

~~*Three (3) devices of each size and model shall be submitted by the manufacturer. Tests shall be performed in the order listed on one (1) device of each size submitted.*~~

~~***2.2 Samples Tested***~~

The ~~testing agency~~ certification body or laboratory shall ~~select~~ test ~~(one)~~1 of each type or model and size of the device for full test. Tests shall be performed in the order listed on 1 device of each size submitted. When a device is designed to accommodate multiple pipe sizes, the device shall be installed on the largest nominal pipe size for which it is designed.

~~***2.3 Drawings***~~

~~*Assembly drawings, installation drawings and other data which are needed to enable a testing agency to determine compliance with this standard shall accompany devices submitted for examination and performance testing.*~~

~~***2.4 Rejection***~~

~~*Failure of one (1) device shall be cause for rejection of that size or model.*~~

Section III

3.0 Performance Requirements and Compliance Testing

~~*When a device is designed to accommodate multiple pipe sizes, the device shall be installed on the largest nominal pipe size for which it is designed.*~~

3.1 Pressure Test of Complete Device

3.1.1 Purpose

The purpose of this test is to determine if any pressure loss is evident during the pressure test.

3.1.2 Procedure

1. Mount ~~T~~the device ~~shall be mounted~~ in its normal working (upright) position on a pipe having a length equal to ten (10) times its inside diameter ± 2.5%. ~~Installation shall be~~ Install the device in accordance with the manufacturer's required installation instructions.

2. Connect ~~T~~the inlet ~~shall be connected~~ to an air supply capable of creating pressures from a ¼ inch (6.4 mm) water column up to 30.0 inches (762.0 mm) water column.

3. Additionally, a secondary sealed system shall be constructed using the same pipe length and diameter as used for the device under test to compensate for changing environmental conditions.

4. Include the ~~A~~ pressure measuring devices ~~shall be~~ as part of the test apparatus as shown in Figure 1. For the ¼ inch (6.4 mm) and ¾ inch (19.1 mm) water column pressure test, the pressure measuring devices shall have a minimum precision of 0.01 inch (0.3 mm). For the 30 inch (762.0 mm) water column pressure test, the pressure measuring device shall have a minimum precision of 0.5 inch (12.7 mm).

Note: This precision can be achieved using an inclined oil filled manometer

5. ~~The internal air volume of the control shall be equal to the internal air volume of the test device.~~ Maintain ~~T~~the ambient temperature ~~of the testing area shall remain constant~~ within ± 2.0 °F (± 1.1 °C).

Note: Slight variations in local pressure resulting from a door opening or the HVAC system activating may result in variations in the test results.

6. Mount ~~T~~the device ~~shall be mounted~~ in the test fixture at least 2 hours prior to performing the test.

7. Slowly apply pressure equal to ¼ inch (6.4 mm) water column.

8. Close the shut-off valves for 5 minutes, and then slowly increase the pressure to ¾ inch (19.1 mm) water column.

9. Close the shut-off valves; hold for 5 minutes, and then increase the pressure to 30.0 inches (762.0 mm) water column.

10. Close the shut-off valves for 5 minutes.

11. Return the water column to atmospheric pressure.

~~3.1.4~~12. Repeat ~~the test procedures in Section 3.1.2~~ steps 7 through 11 with the device installed at a 15° orientation from the vertical position. ~~The test criteria in section 3.1.3 shall apply for the acceptability of the device to this test variation.~~

3.2 Rated and Opening Pressure Test

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3.2.3 Procedure

1. *The assembly shall have an airflow measuring device to measure the airflow rate in the piping and a pressure measuring device for measuring the pressure change in the piping system.*
2. *The air flow measuring device shall be capable of measuring air flow velocity with a precision of 1 ft/min (304.8 mm/min).*
3. *The pressure measuring device shall have and precision of 0.01 inch (0.3 mm) water column.*
4. *The pressure measuring device shall be located 4.0 inches (101.6 mm) minimum below the device.*
5. *There shall be a straight undisturbed pipe with minimum length of 10 times the pipe diameter ± 2.5 % above the air flow meter and a straight undisturbed pipe with a minimum length of 5 times the pipe diameter ± 5 % below the air flow meter.*
6. *The fan shall be capable of creating a vacuum air flow within the capacity range of the device.*
7. *The end of the pipe shall be temporarily capped to prevent airflow.*
8. *Adjust the amount of vacuum being applied with a variable control to a static vacuum of 0.3 inches (7.6 mm) water column. Turn off the vacuum.*
9. *The ambient temperature of the testing area shall remain constant within ± 5 °F (± 2.84 °C).*
10. *Remove the cap from the fixture and install the AAV to be tested.*
11. *Start the vacuum at 0 inches (0 mm) uniformly increasing the vacuum over 15 ± 2 seconds to 0.3 inches (7.6 mm) water column until the device opens. Record the value of the pressure at the instant the device opens.*
12. *This value shall be designated as the opening pressure.*
13. *Increase the airflow rate until the pressure reaches -1.0 inch ± 0.05 inch (-25.4 mm ± 1.27 mm) water column. Record the air flow rate. This value shall be designated as the determined airflow capacity. The temperature shall be maintained during the test at 73.4 °F ±~~3.6~~ 5 °F (23.0 °C ± ~~2.0~~2.84 °C).*

3.3 Endurance Test

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3.3.2 Procedure – High Temperature

1. ~~Devices shall be placed~~ Place the device in an environment where the temperature is maintained at 150.0 °F ± 5.0 °F (65.6 °C ± 2.84 °C) or claimed maximum operating temperature, whichever is higher for a period of 8 hours.

2. After 8 hours, remove the device, and immediately install the device on the test assembly in accordance with Figure 3.

3. After the device is installed, immediately subject the device to a vacuum ~~of 0 to 2.0 inches (0 to 50.8 mm) water column (in order to~~ sufficient to fully open the device~~)~~ for 250,000 cycles.

4. A cycle shall be defined as 2 ± 1 seconds open and 4 ± 1 seconds closed. During the cycle test, the device shall return to the laboratory-controlled temperature of 73.4 °F ± ~~3.6~~ 5 °F (23.0°C ± ~~2.0~~2.84 °C).

5. Upon completion of this test, the device shall be retested to Section 3.1, Pressure Test of Complete Devices.

~~Note: When installing the device to the test assembly, the installation shall be in accordance with manufacturers' required installation instructions for exposure to subfreezing or elevated temperatures shall be followed.~~

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3.3.4 Procedure – Low Temperature

1. Upon completion of the high temperature test in Section 3.3.2, place the same device in an environment where the temperature is maintained at -40.0 °F ± 5.0 °F (-40.0 °C ± 2.84 °C) or claimed minimum operating temperature, whichever is lower.

2. After 8 hours, remove the device, and install it without delay on a test assembly in accordance with Figure 3.

3. After the device is installed, immediately subject the device to a vacuum ~~of 0 to 2.0 inches (0 to 50.8 mm) water column (in order to~~ sufficient to fully open the device~~)~~ for 250,000 cycles. During the cycle test, the device shall be returned to the laboratory-controlled temperature of 73.4 °F ± ~~3.6~~ 5 °F (23.0°C ± ~~2.0~~2.84 °C).

4. Upon completion of this test, the device shall be tested as prescribed in Section 3.1, Pressure Test of Complete Devices.

Note: When installing the device to the test assembly in the above section, the ~~installation shall be in accordance with~~ manufacturer's ~~required~~ installation instructions for exposure to subfreezing or elevated temperatures shall be followed.

Section IV

4.1 Materials

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4.1.2 Internal Metallic Parts

~~Internal parts of metallic construction shall be of a material having a corrosion resistance at least equal to stainless steel series 300 or greater.~~

Ferrous materials shall be, at a minimum, 300-series stainless steel complying with the requirements of ASTM A240/A240M.

4.2 Instructions for Marking and Installation

4.2.1 Marking of Devices

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The markings shall be cast, etched, stamped, or engraved on the body of the device or on a corrosion resisting plate securely attached to the device. Labels shall comply with UL 969 for permanence.

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4.2.3 Installation Instructions

Installation instructions shall be on the packaging, freely available online, or packaged with the device. The instructions shall contain:

a) Installation limitations, including instructions for the device when exposed to subfreezing and elevated temperatures.

b) A statement regarding the proper method of venting where pumps or pressurized flushing devices are used, or where multiple floors are encountered.

c) ~~A statement regarding the device is not a substitute for ALL conventional venting situations~~. A statement that the device shall be installed in an accessible location, which shall permit the free (unobstructed) movement of air into the device.

~~4.2.4 Installation Requirements~~

d) A statement that the device shall be installed in a vertical and upright orientation with the deviation not to exceed fifteen (15) degrees from vertical plumb.

e) A statement that a minimum of one stack vent or vent stack shall extend outdoors to the open air to serve as the positive pressure relief for the drainage system.

f) A statement that an air admittance valve is not designed to relieve positive pressure.

g) A statement that installations shall comply with ~~manufacturer's installation instructions and~~ local code requirements.

~~d~~h) Sizing of the device.

Table 1, was revised for clarification

Figure 1 was revised for clarification

Figure 2 was revised for clarification