ASSE 1002-2020/ ASME A112.1002-2020/ CSA B125.12:20

National Standard of Canada
American National Standard

Anti-siphon fill valves for water closet tanks

Standards Council of Canada
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Preface

This is the second edition of ASSE 1002/ASME A112.1002/CSA B125.12, *Anti-siphon fill valvesfor water closet tanks*. It supersedes the previous edition published in 2015.

This Standard is considered suitable for use with conformity assessment within the stated scope of the Standard.

This Standard was prepared by the ASSE/ASME/CSA Harmonization Task Group on Plumbing Fittings, under the jurisdiction of the ASME A112 Standards Committee on Plumbing Materials and Equipment, the ASSE Product Standards Committee, and the CSA Technical Committee on Plumbing Fittings. The CSA Technical Committee operates under the jurisdiction of the CSA Strategic Steering Committee on Construction and Civil Infrastructure.

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   Staff Engineering Group
   ASSE International
   18927 Hickory Creek Drive, Suite 220
   Mokena, IL 60448-8399

Requests must include:
• Name and contact information of the individual requesting the interpretation;
• Name of organization the individual represents (if any);
• Appropriate references to the standard's clauses that have a bearing on the issue cited in the request;
• A concise explanation of the issue requiring a technical interpretation;
• Any supporting documentation that will assist in understanding or describing the issue;
• Any recommendations the requestor would like to make concerning a possible technical interpretation, along with appropriate justification or comments.
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ASSE 1002-2020/ASME A112.1002-2020/ CSA B125.12:20
Anti-siphon fill valves for water closet tanks

Section I

1 Scope

1.1
This Standard covers anti-siphon fill valves intended to be installed in water closet tanks.

Note: *In this Standard, anti-siphon fill valves are also referred to as "devices".*

1.2
In this Standard, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; and "may" is used to express an option or that which is permissible within the limits of the standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

1.3
SI units are the units of record in Canada. In this Standard the inch/pound units are shown in parentheses.

The values stated in each measurement system are equivalent in application; however, each system is to be used independently. Combining values from the two measurement systems can result in non-conformance with this Standard.

All references to gallons are to U.S. gallons.

Section II

2 Reference publications and definitions

2.1 Reference publications

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

ASME (American Society of Mechanical Engineers)/CSA Group

ASME A112.18.1-2018/CSA B125.1-18
Plumbing supply fittings

ASME A112.19.2-2018/CSA B45.1-18
Ceramic plumbing fixtures

ASME (American Society of Mechanical Engineers)

ASME B1.1-2003 (R2018)
Unified Inch Screw Threads, (UN and UNR Thread Form)

ASSE International

ASSE Plumbing Dictionary, Sixth Edition, 2007

2.2 Definitions

In addition to the definitions in ASME A112.18.1/CSA B125.1 and the *ASSE Plumbing Dictionary*, the following definitions shall apply in this Standard:

Anti-siphon fill valve — a valve that is used to supply water for flush tank refill and, where applicable, trap reseal. The device has an air gap, integral mechanical backflow preventer, or vacuum breaker to prevent the backflow of water from the flush tank into the supply system. The device is operated by a float or similar activation method.

Retrofit device — any replacement fill valve not specifically supplied by the original equipment manufacturer of the water closet tank.

2.3 Abbreviations

The following abbreviation shall apply in this Standard:

CL — critical level

Section III

3 Design and general requirements

3.1 Pressure

Devices shall be designed to function at a supply pressure range of 140 to 860 kPa (20 to 125 psi).

3.2 Temperature

Devices shall be designed to function at a temperature range of 5 to 49 °C (40 to 120 °F).

3.3 Bowl refill tube

3.3.1 Installed position

The bowl refill tube, when supplied, shall be sufficiently rigid to maintain its installed position.

3.3.2 Retrofit devices only

The means of securing the bowl refill tube shall not obstruct a cross-sectional area of the tank overflow tube by more than 20 mm^2 (0.031 in^2).

Note: *When a water closet tank is equipped with an anti-siphon fill valve as original equipment, the required overflow performance is determined in accordance with ASME A112.19.2/CSA B45.1.*

3.4 Backflow prevention

The device shall be equipped with a means to prevent backflow. Air inlet ports shall be protected to reduce the risk of the intake of foreign material into the device.

3.5 Dimensional criteria for fill valve components — End connections

3.5.1

Except when proprietary (i.e., non-standard) shanks or inlets are provided by the manufacturer, the dimensions of standard shanks or inlets designed to mate with standard coupling nuts or locknuts shall be as specified in Figure 1.

3.5.2

Standard shank or inlet thread dimensions shall be 15/16-14 UNS-1A as specified in ASME B1.1.

Standard coupling nut or locknut thread dimensions shall be 15/16-14 UNS-1B as specified in ASME B1.1.

Note: *The recommended standard major and pitch thread diameters are the following:*

a) *Nominal shank thread —*
   i) *major diameter: 23.37 to 23.77 mm (0.9204 to 0.9359 in); and*
   ii) *pitch diameter: 22.39 to 22.50 mm (0.8816 to 0.8895 in).*
b) *Nominal locknut and coupling nut thread —*
   i) *minor diameter: 21.85 to 22.05 mm (0.8602 to 0.8681 in); and*
   ii) *pitch diameter: 22.63 to 22.90 mm (0.8911 to 0.9014 in).*

3.5.3

Proprietary shanks or inlets shall be designed to mate with common supply connections.

3.6 Seating members

Seat disc arrangements shall be replaceable.

3.7 Materials

Coupling nuts and locknuts shall be made from materials that comply with Clause 4.14 of ASME A112.18.1/CSA B125.1.

3.8 Servicing

The device shall be designed so that replacement of wearing parts can be accomplished

a) without removing the fitting from the supply system;
b) without removing the piping from the body;
c) without disturbing the finished wall; and
d) using standard tools or manufacturer-provided tools.

3.9 Pressure-relief devices

For pressure-relieving devices, pressure relief shall occur at a pressure of at least 1030 kPa (150 psi), and the relief discharge shall be into the fixture.

Section IV

4 Performance requirements and test methods

4.1 General

Tests shall be conducted in the order in which they are listed in this Standard on one test specimen.

4.2 Preconditioning and test conditions

4.2.1 Preconditioning

Before testing, the device shall be conditioned at ambient laboratory conditions for not less than 12 h.

4.2.2 Test conditions

Unless otherwise specified in this Standard, tests shall be conducted at ambient laboratory conditions.

4.3 Test specimen installation

For test purposes, specimens shall be installed in accordance with the manufacturer's instructions.

4.4 Pressure and temperature tests

4.4.1 Pressure and temperature cycling test

4.4.1.1 Purpose

The purpose of the elevated pressure and temperature cycling test is to

a) evaluate the performance of the device at elevated temperatures and pressures; and
b) ensure that the device has a means for securing the refill tube to the overflow tube and that it remains in place during the test.

4.4.1.2 Procedure

The elevated pressure and temperature cycling test shall be conducted as follows:

a) Install the specimen in a tank in accordance with the manufacturer's instructions.
b) The water in the tank may be displaced to accelerate the test, provided the flush volume range given by Clause 4.4.1.2 c) is maintained.

c) Using water at a temperature of 49 ± 3 °C (120 ± 5 °F) and a static pressure of 860 ± 14 kPa (125 ± 2 psi), flush the water closet tank every 5 min ± 15 s for a total of 50 cycles using a flush volume between 3.8 and 7.6 L (1.0 and 2.0 gal).
d) Increase the static pressure to 1035 ± 14 kPa (150 ± 2 psi) and maintain it for 5 min ± 15 s.
e) Check the specimen for leakage, distortion, or other damage that could affect its performance.

4.4.1.3 Performance criteria

There shall be no leakage, distortion, or other damage that affects the performance of the device. The refill tube shall remain in place throughout the test.

4.4.2 Static and dynamic seals, working pressure test

4.4.2.1 Purpose

The purpose of this test is to determine the static and dynamic seal performance of the device at pressures between 140 and 860 kPa (20 and 125 psi).

4.4.2.2 Procedure with the valve closed

With the valve in the closed position, test the specimen according to Clause 4.4.2.4 for 5 min ± 15 s for each condition.

4.4.2.3 Procedure with the outlet(s) blocked

With the valve in the fully open position, block the outlet(s) and test the specimen according to Clause 4.4.2.4 for 5 min ± 15 s for each condition.

Where the outlet is difficult to block, the pressures listed in Clause 4.4.2.4.2 a) and 4.4.2.4.2 b) shall be flowing pressures rather than static pressures.

4.4.2.4 Test temperatures and pressures

4.4.2.4.1

The test for static and dynamic seals shall be conducted in an ambient environment. The specimen shall be brought to equilibrium test temperature by running water through it.

4.4.2.4.2

Test temperatures and pressures shall be as follows:
a) 140 ± 14 kPa and 10 ± 6 °C (20 ± 2 psi and 50 ± 10 °F); and
b) 860 ± 14 kPa and 10 ± 6 °C (125 ± 2 psi and 50 ± 10 °F).

4.4.2.5 Performance criteria

There shall be no leakage.

4.5 Life cycle test

4.5.1 Purpose

The purpose of this test is to demonstrate the long-term operational performance of the device.

4.5.2 Test conditions

The test shall be conducted with water at a

a) temperature of 21 ± 5 °C (70 ± 10 °F);
b) supply pressure of 620 kPa (90 psi) minimum; and
c) flowing pressure of 480 kPa (70 psi) minimum.

4.5.3 Procedure

The life cycle test shall be conducted as follows:

a) Install the fill valve in a tank in accordance with the manufacturer's instructions.
b) The water in the tank may be displaced to accelerate the test.
c) Operate the fill valve for 150,000 cycles by filling the tank for each cycle. Cycle duration shall not exceed 1 min.
d) Increase the static pressure to 860 ± 14 kPa (125 ± 2 psi) for 5 min ± 15 s.
e) Check the fill valve for leakage, distortion, or other damage that could affect its performance.

4.5.4 Performance criteria

There shall be no leakage, distortion, or other damage that affects the fill valve's performance. The refill tube shall remain in place on the fill valve throughout the test.

4.6 Critical level and backflow prevention tests

4.6.1 Purpose

The purpose of this test is to verify the critical level (CL) marking, and ensure that the backflow prevention features function as intended.

4.6.2 Procedure

4.6.2.1 Set-up

4.6.2.1.1 Test water

Manually fill the test tank to the level required with clear or coloured water at 10 ± 6 °C (50 ± 10 °F). When coloured water is used it shall be prepared separately as follows:

a) Add methylene blue dye powder to water in a concentration of approximately 1.5 g/L (0.013 lb/gal) and mix thoroughly.
b) Mix the solution in item a) with water in a ratio of 5 mL/L (0.64 oz/gal).

4.6.2.1.2 Check member fouling

All check members of the specimen shall be fouled using a 0.81 ± 0.10 mm (0.032 ± 0.004 in) diameter fouling wire as follows:

a) On check members that are hinged, the wire shall be placed in the 90° quadrant opposite to the hinge point or point of suspension.
b) On check members that move axially, the wire shall be placed at a single point on the seating area. The fouling wire shall follow the cross-sectional contour of the check member.
c) When devices have other types of moving parts for check members, those parts shall be spaced so as to comply with the intent of this Clause.