American Society of Sanitary Engineering

Performance Requirements for
Barrier Type Floor Drain Trap Seal Protection Devices
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Instructions for receiving the authorization to display the Seal are available from ASSE's International Office. Organizations wishing to adopt or list any ASSE Standard should print the ASSE Standard number on the cover page first and in equal or larger type to that of the adopting or listing organization.
Foreword

This foreword shall not be considered to be a section of this standard. It is intended to provide background information only.

ASSE standards are developed in the interest of protecting the health of the public.

ASSE recognizes that many floor drains installed within buildings are rarely used. Without periodic use floor drain plumbing-code-required water trap seals will eventually fail due to evaporation. Potentially objectionable and hazardous sewer gases may then escape into the building through the ineffective trap.

The model plumbing codes require that floor drain trap seals that are subject to evaporation are be provided with a method that offsets evaporation. Currently there is one approved method. The method provides a periodic automatic admission of water directly into the floor drain - such as a trap primer.

This new ASSE Standard #1072 introduces an alternative method of protecting floor drain water trap seals - Barrier-Type Floor Drain Trap Seal Devices.

In 2003 a request was submitted to ASSE to develop this standard.

Because this barrier method does not automatically and periodically provide water to replenish the trap seal, it must provide a barrier on the inlet side of the trap seal that will minimize its evaporation caused by the ambient air on the building side of the trap. This barrier must also provide adequate drainage capabilities required for the floor drain’s intended use as determined by its design, size, and installation location.

While developing the performance requirements and tests for these devices, certain adverse conditions were taken into consideration. These are the introduction of fouling substances such as dirt/sand, floor wax, or grease directly into the device. In addition drainage requirements to accommodate infrequent, and unusually sizeable, water flows caused by water line breaks, fixture overflows, or backflow preventer discharges are provided. Tests are included to confirm that devices submitted for approval provide the performance requirements listed above - among others.

Test requirements are also included that evaluate the devices based on size and installation conditions.

These removable devices are designed to be installed in either new, or existing, floor drain that conform s to ANSI/ASME A112.6.3 installations.
This standard represents a composite of knowledge and experience of engineers, manufacturers, public health officials, and others who have an interest in the suitable design and performance of products of this type that are meant to enhance public safety.

This standard’s working group was assembled within the guidelines of the Product Standards Committee of the American Society of Sanitary Engineering. Recognition is made of the time volunteered by the members of this working group.

This standard does not imply ASSE’s endorsement of products that conform to this standard. Compliance with this standard does not guarantee acceptance by any code body. It is recommended that these devices are installed consistent with local codes by qualified professionals.

This standard was promulgated in accordance with procedures accredited by the American National Standards Institute (ANSI).
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Barrier Type Floor Drain Trap Seal Protection Devices

Section I

1.0 General

1.1 Application
This standard establishes physical requirements, performance requirements, and test procedures for barrier type floor drain trap seal protection devices (herein referred to as the “device”). These devices are designed to help protect the floor drain trap seal of floor drains that comply with ANSI/ASME A112.6.3 by minimizing evaporation.

The purpose of this device is to minimize the evaporation of the trap seal for the floor drain. The device will open to allow the flow of drainage and close when there is no flow.

1.2 Scope

1.2.1 Description
The device shall consist of a membrane that allows the flow of drainage to enter the plumbing drainage system. The device shall close when there is no flow.

1.2.2 Size
The device shall be sized according to the outlet size of the floor drain. Sizes shall include 1½ NPS through 6 NPS (40 DN through 150 DN).

1.2.3 Flow Capacity
The device shall permit the flow of drainage as stipulated in Table 1 of this standard.

Table 1
Minimum Flow Rate Through Floor Drains

<table>
<thead>
<tr>
<th>Floor Drain Size</th>
<th>Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GPM</td>
</tr>
<tr>
<td>NPS</td>
<td>DN</td>
</tr>
<tr>
<td>1 ½</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>125</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
</tr>
</tbody>
</table>
Note: The minimum flow rates are based on drainage piping flowing one half full flow with a roughness coefficient \((n)\) of 0.011 and a pitch of 1/4 inch per foot using the Manning Formula.

1.2.4 Rating
The device shall be rated for the type of floor or floor finish in which the floor drain can be installed. Devices intended for use in floor drains receiving the discharge of grease-laden waste shall be rated for grease-laden waste.

1.3 Construction

1.3.1 Function
The device shall open when there is a maximum of 4 ounces (113.4 g) of water on the inlet to the device, and shall close when there is no flow of wastewater into the device.

1.3.2 Evaporation
The device shall pass the evaporation test described in Section 3.2 of this standard.

1.3.3 Obstruction of Flow
To prevent the collection of waste solids, the opening passageway in the device shall not have any sharp edges or protrusions which will obstruct the flow to the drainage system or result in stoppages. The device shall not obstruct access to the interior of the floor drain trap.

1.3.4 Connections Within Floor Drain
The device shall connect within a floor drain that conforms to ANSI/ASME A112.6.3.

1.4 Reference Documents
Referenced industry standards shall be to the latest edition.
Section II

2.0 Test Specimens

2.1 Samples Submitted

Six (6) devices of each size and model shall be submitted by the manufacturer.

2.2 Samples Tested

The testing agency shall select one (1) of each type or model and size for the testing specified in Sections 3.1 through 3.7. The testing agency shall select an additional one (1) of each type or model and size for the testing specified in Section 3.2. The testing agency shall select another one (1) of each type or model and size for the testing specified in Section 3.8.

Tests shall be performed, in the order listed, on one (1) assembly of each size submitted, with the exception of the Life Cycle Test specified in Section 3.8 and the Physical Test of Membrane Material specified in Section 3.9. The second assembly shall be subjected to the Life Cycle Test specified in Section 3.8. The third assembly shall be subjected to the Physical Test of Membrane Material in Section 3.9.

The device shall have tests performed based on the type of floor in which the floor drain could be installed. The tests are specified in Table 2 for each floor finish. Regardless of floor type, devices rated for installation in floor drains that may receive the discharge of grease-laden waste (AF-GW) shall be tested to all sections of this standard as required by Table 2.

Table 2

<table>
<thead>
<tr>
<th>Application</th>
<th>Designation</th>
<th>Tests Required to be Performed (Based on Section Number)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9</td>
</tr>
<tr>
<td>Any Floor Finish</td>
<td>AF</td>
<td>X    X   X    X   X   X   X   X</td>
</tr>
<tr>
<td>Any Floor, Grease Laden Waste</td>
<td>AF-GW</td>
<td>X    X   X    X   X   X   X   X</td>
</tr>
<tr>
<td>Shower Floor</td>
<td>SF</td>
<td>X    X   X    X   X   X   X</td>
</tr>
<tr>
<td>Concrete Floor</td>
<td>CF</td>
<td>X    X   X    X   X   X   X</td>
</tr>
<tr>
<td>Ceramic Tile Floor</td>
<td>CT</td>
<td>X    X   X    X   X   X   X</td>
</tr>
<tr>
<td>Wood Floor</td>
<td>WF</td>
<td>X    X   X    X   X   X   X</td>
</tr>
</tbody>
</table>

Note: 3.1 - Flow Test; 3.2 - Evaporation Test; 3.3 - Trap Seal Interference Test; 3.4 - Opening Test; 3.5 - Dirt and Debris Test; 3.6 - Floor Wax Test; 3.7 - Grease Test; 3.8 - Life Cycle Test; 3.9 - Physical Test of Membrane Material.

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 assemblies when submitted for examination and performance testing under this standard.
2.4 Rejection

Failure of the one (1) device being tested shall be cause for rejection of that type or model and size.
Section III

3.0 Performance Requirements and Compliance Testing

3.1 Flow Test

3.1.1 Purpose
The purpose of this test is to determine if the device allows the required flow of water through a floor drain.

3.1.2 Procedure
For testing sizes 1-1/2 NPS through 3 NPS (40 DN through 80 DN), install a floor drain that conforms to ANSI/ASME A112.6.3 in an assembly measuring 24.0 inches (609.6 mm) by 24.0 inches (609.6 mm) by 1.0 inch (25.4 mm) deep with the floor sloped to the floor drain as shown in Figure 1. For testing sizes 4 NPS through 6 NPS (100 DN through 150 DN), install a floor drain that conforms to ANSI/ASME A112.6.3 in an assembly measuring 48.0 inches (1219.2 mm) by 48.0 inches (1219.2 mm) by 1.0 inch (25.4 mm) deep with the floor sloped to the floor drain as shown in Figure 1. Install the device in the floor drain in accordance with the manufacturer’s instructions.
Figure 1

Turn on the water and adjust the flow rate for the given floor drain size to the flow rate in Table 1. Continue running the water for a period of ten (10) minutes.

NOTE: Laboratories shall have the option to increase the size of the base opening for water flow on the test assembly for floor drains 4NPS (100 DN) and larger in diameter. If the water overflows the sides of the test assembly without the device for the larger floor drain sizes, the walls of the test assembly shall be raised to prevent the overflow of water. Once the overflow rate has been established, the sides shall be increased 1.0 inch (25.4 mm) in height for tests with the installation of the device.

Turn on the water and adjust the flow rate for the given floor drain size to the flow rate in Table 1. Continue running the water for a period of ten (10) minutes.
3.1.3 **Criterion**
Any water overflowing the open side of the pan shall result in rejection of the device.

## 3.2 Evaporation Test

### 3.2.1 Purpose
The purpose of this test is to determine if the device will reduce evaporation from the trap seal of the floor drain.

### 3.2.2 Procedure
The test equipment for this test shall include three vessels identified as cylinders A, B, and C in Figure 2. The vessels shall be the nominal pipe diameter of the device being tested, and have a minimum height of 4.0 inches (101.6 mm) and a maximum height of 12.0 inches (304.8 mm). Attach the device to the top of vessels B and C, sealing the connection between the device and the vessel. Insert a 1/8 inch (3.2 mm) diameter wire through the opening of the device in cylinder B. Fill the three vessels with 2.0 inches (50.8 mm) of water. For the vessels with the device, manually open the device to fill the vessel with water so that there is no water on the membrane of the device. Weigh each vessel independently with a scale having an accuracy of 0.01 pounds (4.5 g) to establish the initial weight. Record the initial weight of each vessel.

**Figure 2**

Note: The wire should be configured to allow the membrane to close around the wire. This may require the wire to be bent into place.

Place the vessels in a controlled environment that is maintained at 100.0 °F ± 5.0 °F (37.8 °C ± 2.8 °C) with 20 percent (±10 percent) relative humidity.

Continue the test for 96 hours ± 1 hour, record the weight of each vessel at the end of the test. Establish the total weight loss of the contents of each vessel by subtracting the weight of each vessel just before placement into the controlled environment for this test from the final weight of the vessel.”
3.2.3 Criterion
A weight loss in cylinder B greater than 10 percent of the weight loss in cylinder A shall result in rejection of the device. A weight loss in Cylinder C greater than 0.01 pounds (4.5 g) shall result in rejection of the device.

3.3 Trap Seal Interference Test

3.3.1 Purpose
The purpose of this test is to determine if the device extends into the trap seal of a floor drain.

3.3.2 Procedure
Install the device in a floor drain with an integral trap conforming to ANSI/ASME A112.6.3 in accordance with the device manufacturer’s installation instructions. Fill the floor drain trap. With the device fully open, no portion of the device shall extend into the water seal of the floor drain trap.

3.3.3 Criterion
Any protrusion of the device into the floor drain trap seal shall result in rejection of the device.

3.4 Opening Test

3.4.1 Purpose
This purpose of this test is to determine that the device will open when there is a minimal amount of water on the membrane of the device.

3.4.2 Procedure
Install the device in a floor drain conforming to ANSI/ASME A112.6.3 in accordance with the device manufacturer’s installation instructions. Position a water dropper 1.0 inch (25.4 mm) above the center of the device. Add water to the membrane, one (1) drop at a time. Record the quantity of water required to open the device and allow the passage of water.

3.4.3 Criterion
Failure of the device to open with 4.0 ounces (113.4 g) or less of water shall result in rejection of the device.

3.5 Dirt and Debris Test

3.5.1 Purpose
The purpose of this test is to determine the ability of the device to seal after sand passes through the device.

3.5.2 Procedure
Install a floor drain that conforms to ANSI/ASME A112.6.3 in an assembly as shown in Figure 1. Install the device in the floor drain in accordance with the device manufacturer’s instructions. Remove the top grate of the floor drain. Pour 1.0 ounce (28.4 g) of sand in the center of the device. The sand shall pass through a Number 50 sieve (300 Fm) but not pass through a Number 120 sieve (125 Fm) as designated by ASTM E11. Reinstall the grate on the floor drain. Pour 5.0 gallons (18.9 l) of water in the center of the floor drain at a rate of 1.0 GPM (3.8 L/m) with the grate in place. Subject the device to the evaporation test specified in Section 3.2.

3.5.3 Criterion
Failure to pass the evaporation test specified in Section 3.2 shall result in rejection of the device.
3.6 Floor Wax Test

3.6.1 Purpose
The purpose of this test is to determine if the device will open after being exposed to common liquid floor waxes.

3.6.2 Procedure
Install a floor drain that conforms to ANSI/ASME A112.6.3 in an assembly as shown in Figure 1. Install the device in the floor drain in accordance with the device manufacturer’s instructions.

Remove the top grate of the floor drain. Pour 1 cup (236.8 ml) of Johnson Diversey Signature™ floor wax into the center of the device. Reinstall the top grate on the floor drain. Maintain the test assembly undisturbed at ambient room temperature until the wax is dry.

Flow cold water at a rate of 1.0 GPM (3.8 L/m) into the floor drain and observe the opening of the device. Once the device opens, discontinue flowing water into the floor drain. If water overflows the top grate of the floor drain, discontinue flowing water into the floor drain.

3.6.3 Criterion
Failure to open before the water overflows the floor drain top grate shall result in rejection of the device.

3.7 Grease Test

3.7.1 Purpose
The purpose of this test is to determine if the device will open after receiving the discharge of grease-laden waste.

3.7.2 Procedure
Install a floor drain that conforms to ANSI/ASME A112.6.3 in an assembly as shown in Figure 1. Install the device in the floor drain in accordance with the device manufacturer’s instructions.

Prepare a test media consisting of a ratio of 5.0 gallons (18.9 liters) of water with a pH of 6.0 to 8.0 and 1.0 pound (454 g) of lard having a specific gravity of 0.875 ± 0.005. The media shall be at a temperature of 155.0 °F ± 5.0 °F (68.3 °C ± 3.1 °C).

With the floor drain cover grate in place, pour the 5.0 gallons (18.9 liters) of the media in the center of the grate. Maintain the test assembly undisturbed at ambient room temperature for a period of four (4) hours.

Flow cold water at a rate of 1.0 GPM (3.8 L/m) into the floor drain and observe the opening of the device. Once the device opens, discontinue flowing water into the floor drain. If water overflows the top grate of the floor drain, discontinue pouring water into the floor drain.

3.7.3 Criterion
Failure to open before the water overflows the floor drain top grate shall result in rejection of the device.

3.8 Life Cycle Test

3.8.1 Purpose
The purpose of this test is to evaluate the performance of the device after cycling 2500 times.
3.8.2 Procedure
Install the device in a floor drain conforming to ANSI/ASME A112.6.3 in accordance with the device manufacturer’s installation instructions. Subject the device to 1250 cycles of hot water. A cycle shall constitute running water at a rate of 1.0 GPM (3.8 L/m) and a temperature of 140.0 °F ± 5.0 °F (60.0 °C ± 2.8 °C) for a period of ten (10) seconds, then turn the water off for a period of fifty (50) seconds. At the completion of the hot water cycle test, subject the device to 1250 cycles of water at room temperature. A cycle shall constitute running water at a temperature of 70.0 °F ± 5.0 °F (21.1 °C ± 2.8 °C) for a period of ten (10) seconds, then turn the water off for a period of fifty (50) seconds.

3.8.3 Retest
Three days (72 hours) after the completion of the cycle testing, subject the device to the evaporation test specified in Section 3.2 of this standard.

3.8.4 Criterion
Failure to pass the test in Section 3.2 shall result in rejection of the device.

3.9 Physical Test of Membrane Material

3.9.1 Purpose
The purpose of this test is to determine the suitability of the membrane material when exposed to the environment of a sanitary drainage system.

3.9.2 Procedure
The membrane material of the device shall be subjected to the tests listed in Table 3.

Table 3
Physical Tests of Membrane Material

<table>
<thead>
<tr>
<th>Property</th>
<th>Conditions</th>
<th>ASTM Method</th>
<th>Test Performance Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone Resistance</td>
<td>72 hours at 104.0 °F (40.0 °C) and 25 pphm ozone</td>
<td>D 1149</td>
<td>No visible cracks</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>48 hours at 158.0 °F (70.0 °C)</td>
<td>D 471</td>
<td>Maximum weight gain of 20%</td>
</tr>
<tr>
<td>Chemical Reagents</td>
<td>Complete immersion for 72 hours</td>
<td>D 543</td>
<td>Gain in weight no greater than 10%. No weight loss.</td>
</tr>
<tr>
<td>Weather-o-meter</td>
<td>One (1) cycle 4 hours UV* at 140.0 °F (60.0 °C) 4 hours Condensation at 122.0 °F (50.0 °C) 500 hours</td>
<td>G 53</td>
<td>Maximum 50% loss in tensile strength and ultimate elongation</td>
</tr>
<tr>
<td>Split Tear</td>
<td>Die C Sample</td>
<td>D 624</td>
<td>Minimum 0.25 kn/m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minimum 0.17 kn/m (Silicone rubber) Low Temperature</td>
</tr>
<tr>
<td>Non-brittle Brittle-ness</td>
<td>3 minutes</td>
<td>D 2137 Method A</td>
<td>Non-brittle at -40.0 °F (-40.0 °C)</td>
</tr>
</tbody>
</table>

3.9.3 Criteria
Failure to pass the tests in Table 3 shall result in a rejection of the device.
Section IV

4.0 Detailed Requirements

4.1 Materials

Materials used in devices shall conform to the requirements of this standard.

4.1.1 Dissimilar Metals

Where dissimilar metals are used in the construction of devices, materials that are close to each other in the electromotive series shall be used to reduce the corrosion potential.

4.1.2 Internal Metallic Parts

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

4.1.3 Non-Metallic Parts

Nonmetallic parts shall be designed for the rated operating temperature of the device without change in physical characteristics that would prevent full compliance with all requirements of this standard.

4.2 Instructions for Marking and Installation

4.2.1 Marking of Devices

Each device shall have the following information marked on it by a permanent method where it will be visible:

A) Name of manufacturer or trademark.
B) Application designation (per Table 2).

4.2.2 Packaging

Each device shall have the following information marked on the packaging:

A) Name of manufacturer or trademark.
B) Model number or description of the device.
C) Rating for type of floor.
D) Rated for grease-laden waste, if applicable.
E) Floor drain size.

4.3 Installation Instructions

4.3.1 Instructions for installation of the device shall be on the packaging or packaged with the device.
Definitions are located in the *Plumbing Dictionary*, Sixth Edition, published by ASSE.