

WaterSense® Specification for Showerheads

1.0 Scope and Objective

This specification establishes the criteria for showerheads labeled under the U.S. Environmental Protection Agency's (EPA's) WaterSense® program. It is applicable to showerhead fixture fittings, inclusive of:

- Fixed showerheads that direct water onto a user (excluding body sprays) for bathing purposes; and
- Hand-held showers, a subset of showerheads that are moveable devices for directing water onto a user. Hand-held showers can be installed on a support to function as a fixed showerhead.

When used in this document the term “showerhead” shall also include hand-held showers.

This specification is designed to ensure sustainable, efficient water use and a high level of user satisfaction with showerhead performance.

2.0 General Requirements

- 2.1 The showerhead shall conform to applicable requirements in ASME A112.18.1/CSA B125.1.¹
- 2.2 If the showerhead has more than one mode, all modes must meet the maximum flow rate requirement outlined in Section 3.1.1 and at least one of the modes, as specified by the manufacturer, must meet all of the requirements outlined in this specification.
- 2.3 The showerhead shall not be packaged, marked, or provided with instructions directing the user to an alternative water-use setting that would override the maximum flow rate, as established by this specification. Any instruction related to the maintenance of the product, including changing or cleaning showerhead components, shall direct the user on how to return the product to its intended maximum flow rate.

3.0 Water-Efficiency Criteria

- 3.1 The flow rate of the showerhead shall be tested in accordance with the procedures in ASME A112.18.1/CSA B125.1 and shall meet the following criteria:
 - 3.1.1 The manufacturer shall specify a maximum flow rate value (rated flow) of the showerhead. This specified value must be equal to or less than 2.0 gallons per minute (gpm) (7.6 liters per minute [L/min]).

¹ References to this and other standards apply to the most current version of those standards.

- 3.1.2 The maximum flow rate shall be the highest value obtained through testing at flowing pressures of 20, 45, and 80 ± 1 pounds per square inch (psi) ($140, 310, \text{ and } 550 \pm 7$ kilopascal [kPa]), when evaluated in accordance with 10 CFR 430 Subpart F, Appendix B, Step 6(b). This maximum flow rate shall not exceed the maximum flow rate value specified in Section 3.1.1.
- 3.1.3 The minimum flow rate, determined through testing at a flowing pressure of 20 ± 1 psi (140 ± 7 kPa) and when evaluated in accordance with 10 CFR 430 Subpart F, Appendix B, Step 6(a), shall not be less than 60 percent of the maximum flow rate value specified in Section 3.1.1.
- 3.1.4 The minimum flow rate shall be the lowest value obtained through testing at flowing pressures of 45 and 80 ± 1 psi ($310 \text{ and } 550 \pm 7$ kPa), when evaluated in accordance with 10 CFR 430 Subpart F, Appendix B, Step 6(a). This minimum flow rate shall not be less than 75 percent of the maximum flow rate value specified in Section 3.1.1.

4.0 Spray Force Criteria

- 4.1 The spray force of the showerhead shall be tested in accordance with the procedures outlined in Appendix A and shall meet the following criteria:
 - 4.1.1 The minimum spray force shall not be less than 2.0 ounces (0.56 newtons [N]) at a pressure of 20 ± 1 psi (140 ± 7 kPa) at the inlet when water is flowing.

5.0 Spray Coverage Criteria

- 5.1 The spray coverage of the showerhead shall be tested in accordance with the procedures outlined in Appendix B and shall meet the following criteria:
 - 5.1.1 The total combined maximum volume of water collected in the 2- and 4-inch [in.] (50-, 101-millimeter [mm]) annular rings shall not exceed 75 percent of the total volume of water collected, and;
 - 5.1.2 The total combined minimum volume of water collected in the 2-, 4-, and 6-in. (50-, 101-, 152-mm) annular rings shall not be less than 25 percent of the total volume of water collected.

6.0 Marking

In addition to the marking requirements in ASME A112.18.1/CSA B125.1, the following markings shall apply:

- 6.1 The product shall be marked with the maximum flow rate value in gpm and L/min as specified by the manufacturer, verified through testing and in compliance with this specification.
- 6.2 The product packaging shall be marked with the maximum flow rate value in gpm and L/min as specified by the manufacturer, verified through testing and in compliance with this specification.
- 6.3 The product packaging shall be marked with the minimum flow rate value in gpm and L/min at 45 psi, calculated in Section 3.1.4 as 75 percent of the manufacturer's specified maximum flow rate value, verified through testing and in compliance with this specification.
- 6.4 Flow rate marking shall be in gpm and L/min in two or three digit resolutions (e.g., 2.0 gpm [7.6 L/min]).

7.0 Effective Date

This specification is effective on February 9, 2010.

8.0 Future Specification Revisions

EPA reserves the right to revise this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. Revisions to the specification would be made following discussions with industry partners and other interested stakeholders.

9.0 Definitions

Definitions within ASME A112.18.1/CSA B125.1 are included by reference

ASME – American Society of Mechanical Engineers

ASME PTC – American Society of Mechanical Engineers Performance Test Codes

ANSI – American National Standards Institute

CFR – Code of Federal Regulations

CSA – Canadian Standards Association

ISA – International Society of Automation

APPENDIX A: Spray Force Procedure

A1 Showerhead Spray Force

The minimum showerhead spray force shall meet the requirements specified in Section 4.1.

A2 Test Procedure

A2.1 Set-Up

The specimen shall:

- (a) Be thoroughly flushed before measuring the spray force.
- (b) Be connected to a smooth-interior pipe or tubing with a length equal to at least 20 times the inside diameter of the pipe or tubing at the inlet(s) of the fitting.
- (c) Be connected to a pipe or tubing of the same nominal size as the fitting connections.
- (d) Have its standard components installed, when tested.
- (e) Have a test setup that utilizes the force balance fixture, as shown in Figure 1, using the method in Section A2.2.

A2.2 Force Balance Method

- (a) The force balance fixture must have a means for measuring the rotation from the point of balance.
- (b) The force balance fixture must be calibrated using the method in Section A2.3, in the same location where it will be used for testing.
- (c) The showerhead must be tested in accordance with Section A2.5.
- (d) The force balance fixture must be dry prior to calibrating per Section A2.3 and testing per A2.5.

A2.3 Force Balance Calibration

- (a) Establish the zero angle position when the target is at $45^{\circ} \pm 1^{\circ}$ to the horizontal and the fixture is at a point of balance.
- (b) Position a calibrated force gage to be in perpendicular contact with the center of the target, as shown in Figure 2.
- (c) Place counterweights on the fixture, such that it balances a force applied at the center and perpendicular to the target, which is equivalent to the minimum force as specified in Section 4.1, ± 0.05 ounces, while maintaining the $0.0 \pm 0.1^{\circ}$ position, as shown in Figure 3.
- (d) Remove the force gage from the force balance fixture.
- (e) The angle position will become a non-zero value, calibrated to the force specified in Section 4.1.1.

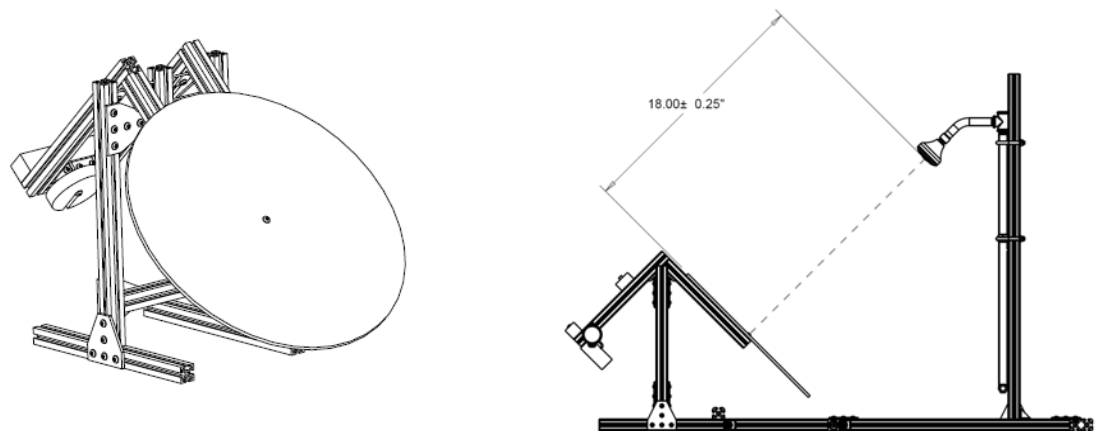
A2.4 Other Test Conditions

- (a) Install the device as indicated in Figure 1.
- (b) The upstream pressure tap shall have the pressure gage located 8 ± 2 in. (203 ± 51 mm) before the inlet of the specimen.
- (c) Pressure tap size and configuration shall conform to ASME PTC 19.2 or ANSI/ISA-75.02.
- (d) If a fluid meter is used to measure flow rate, the installation shall be in accordance with ASME PTC 19.5.
- (e) The water temperature shall be 100 ± 10 °F (38 ± 6 °C) maintained for at least one minute.
- (f) The water pressure shall be 20 ± 1 psi (140 ± 7 kPa) at the inlet when water is flowing.

A2.5 Test Procedure

- (a) Mount the showerhead so the force target surface and showerhead faceplate are parallel, and the center of the force target and the center of the showerhead faceplate are aligned and 18 ± 0.25 in. (457 mm \pm 6 mm) apart, measured prior to the water flowing.
- (b) Initiate the flow of water.
- (c) Once the water flow has been initiated, the showerhead is to be adjusted only using its standard components, such that the center of the spray pattern aligns with the center of the force target.
- (d) If the center of the spray pattern cannot hit the center of the force target, the showerhead does not meet the criteria for spray force as defined in this specification.
- (e) Maintain water flow for at least one minute.
- (f) The showerhead spray force meets the minimum force specified in Section 4.1 when the fixture rotates within 0.1° of zero or past it.
- (g) Record if pass or fail.

Figure 1. Force Balance Test Apparatus²



² Detailed drawings of the force balance test apparatus are available on the WaterSense Web site, www.epa.gov/watersense/pp/showerheads.htm.

Figure 2. Force Balance Calibration Setup

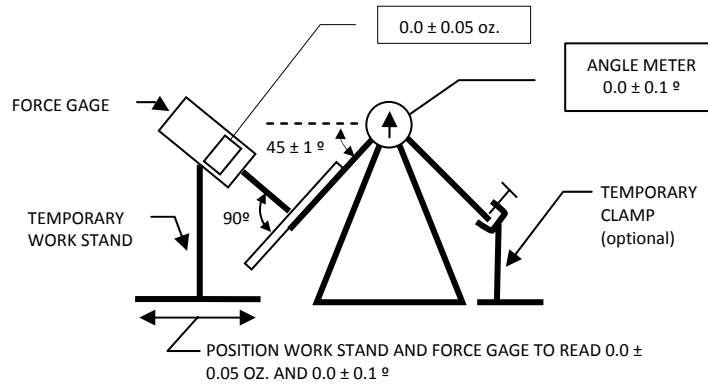
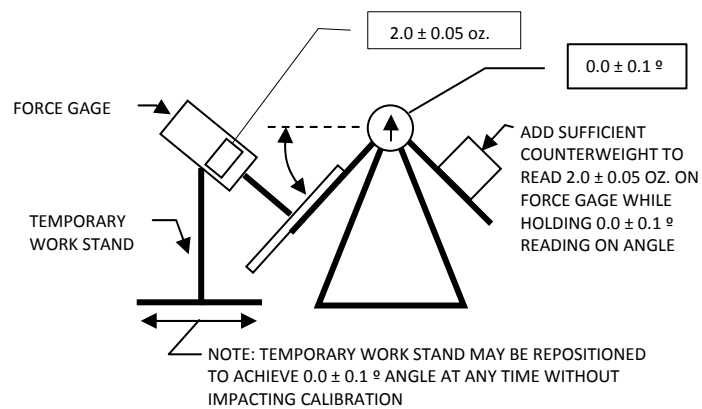


Figure 3. Force Balance Calibration Procedure



APPENDIX B: Spray Coverage Procedure

B1 Showerhead Spray Coverage

The showerhead spray coverage shall meet the requirements specified in Section 5.1.

B2 Test Procedure

B2.1 Set-Up

The specimen shall:

- (a) Be thoroughly flushed before measuring the spray coverage.
- (b) Be connected to a smooth-interior pipe or tubing with a length equal to at least 20 times the inside diameter of the pipe or tubing at the inlet(s) of the fitting.
- (c) Be connected to a pipe or tubing of the same nominal size as the fitting connections.
- (d) Have its standard components installed, when tested for compliance with the minimum and maximum spray coverage specified in Section 5.1.
- (e) Use the annular ring test setup shown in Figures 4 and 5.

B2.2 Other Test Conditions

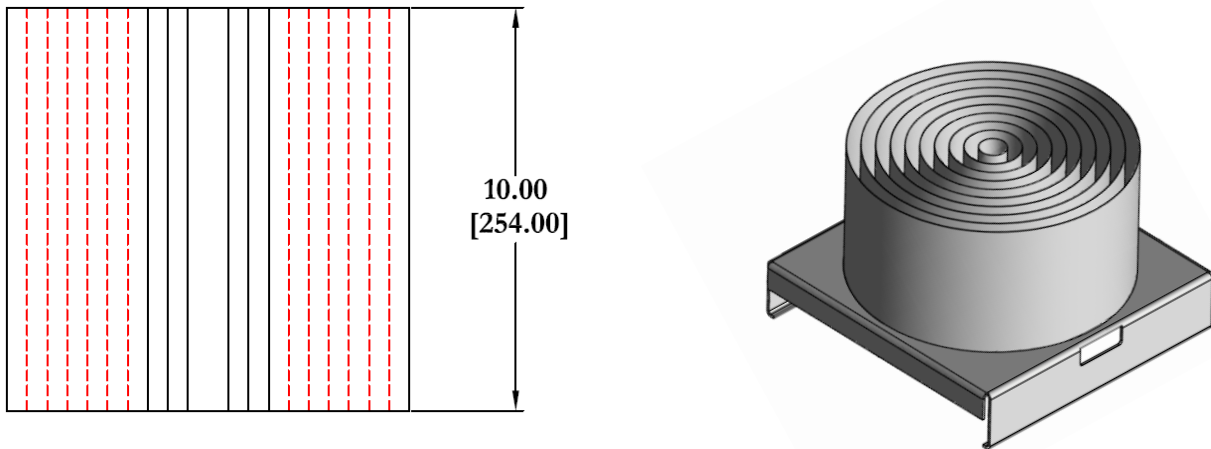
- (a) Install the device in accordance with Figure 5.
- (b) The upstream pressure tap shall have the pressure gage located 8 ± 2 in. (203 ± 51 mm) before the inlet of the specimen.
- (c) Pressure tap size and configuration shall conform to ASME PTC 19.2 or ANSI/ISA-75.02.
- (d) If a fluid meter is used to measure flow rate, the installation shall be in accordance with ASME PTC 19.5.
- (e) If the volume/time method is used for the flow rate measurement, the container shall be of sufficient size to hold the collected water for a minimum of one minute.
- (f) The water temperature shall be 100 ± 10 °F (38 ± 6 °C) maintained for at least one minute.
- (g) The water pressure shall be 45 ± 1 psi (310 ± 7 kPa) at the inlet when water is flowing.

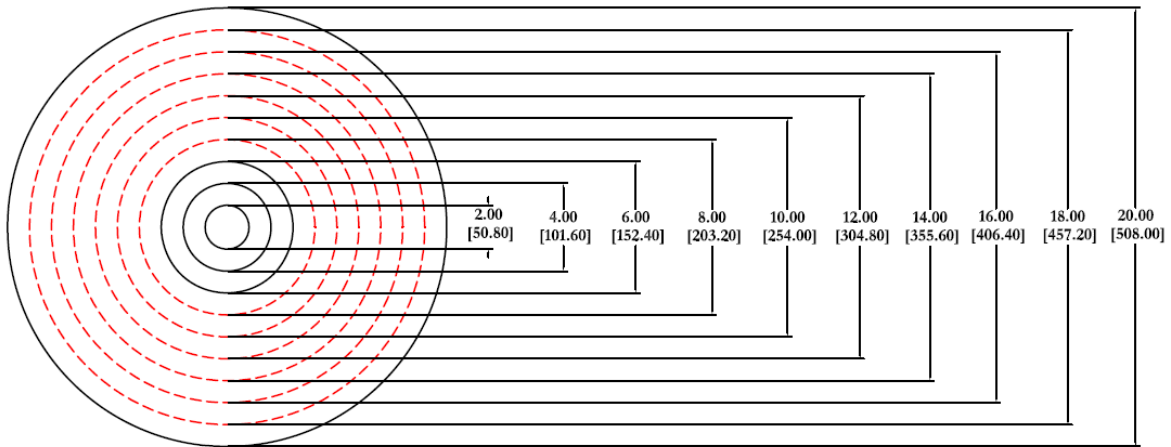
B2.3 Test Procedure

- (a) Mount the showerhead so the faceplate is horizontal and parallel with the top surface of the annular rings.
- (b) Position the annular rings underneath the showerhead so the center line of the faceplate and the center ring are in vertical alignment and the top of the annular gage is 18 ± 0.25 in. (457 ± 6 mm) from the faceplate (see Figure 5).

- (c) Initiate the flow of water, where the specified water pressure is stabilized within ± 1 psi (7 kPa) within two seconds.
Note: Before initiating the flow of water, if the water pressure cannot be stabilized within two seconds, a cover may be placed over the annular rings and then removed once the pressure has stabilized.
- (d) Allow the water to flow through the showerhead and into the annular rings for a minimum of one minute.
- (e) Record the measured flow rate and the time the water flowed through the showerhead and into the annular rings to the nearest second on a stopwatch.
- (f) Calculate the total volume collected from the measured flow rate and time.
- (g) Collect, measure, and record the volume of water in each annular ring.
- (h) Determine the total volume collected in all rings.
- (i) Calculate and record the percentage of the total recorded volume collected in each ring.
- (j) If the total volume collected varies by more than ± 5 percent of the total volume calculated from the recorded flow rate and time, correct and repeat this procedure and record the results.
- (k) Evaluate and verify that the spray coverage meets the minimum and maximum values specified in Section 5.1.

Figure 4. Annular Ring Specifications

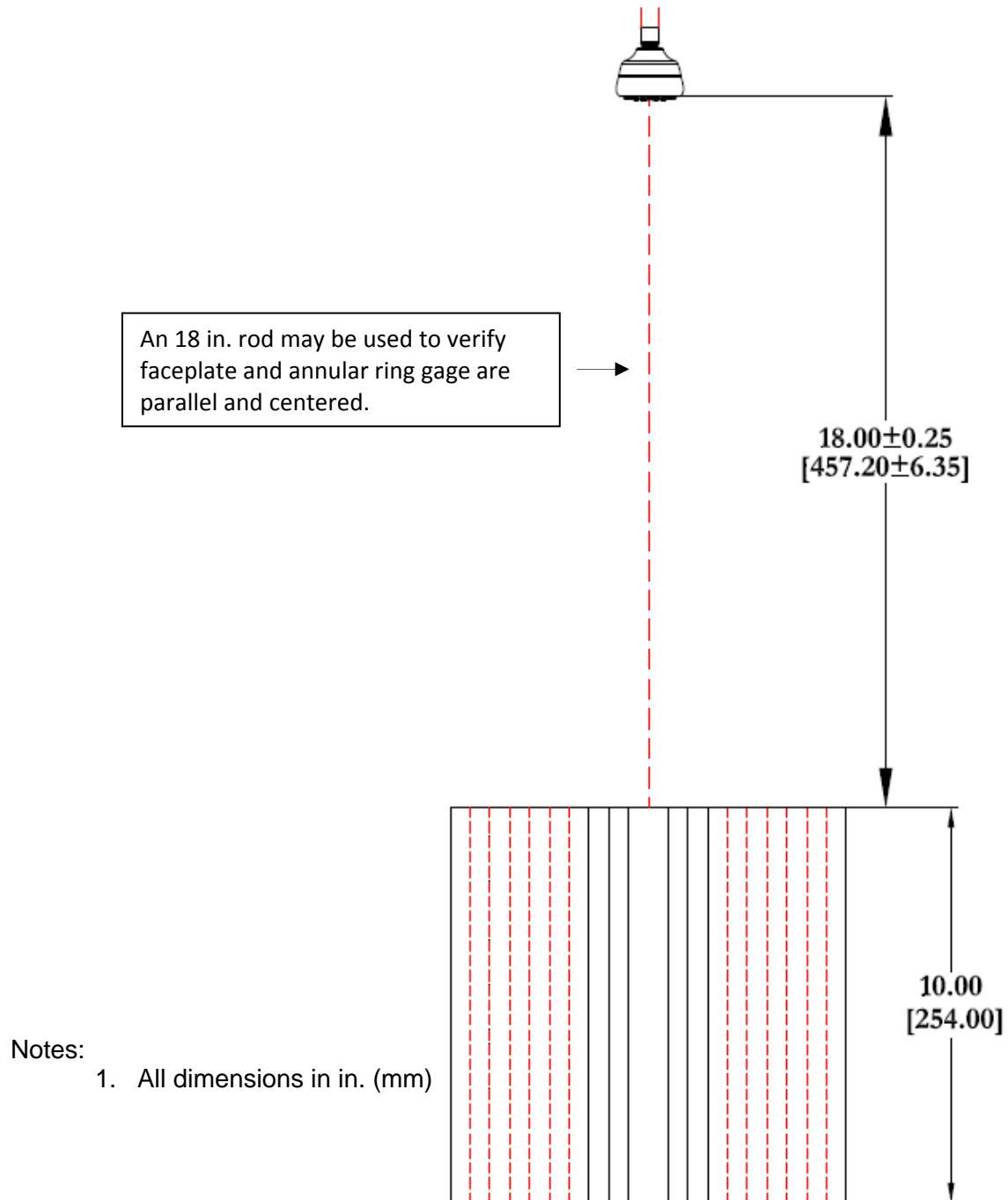




Notes:

1. All dimensions in in. (mm)
2. Tolerance: ± 0.06 in. (1.6 mm)
3. Suggested Material: (0.03 in. [0.75 mm]) 304 Stainless Steel
4. 8 in. – 18 in. Rings Optional (Shown as red dotted lines)

Figure 5. Annular Ring Test Setup



Notes:
1. All dimensions in in. (mm)

Appendix C: Requirements for WaterSense Labeling

The following requirements must be met for products to bear the WaterSense label.

1.0 Scope Clarification – Combination Showerheads

In cases where more than one showerhead or hand-held shower is provided in combination with others in a single device intended to be connected to a single shower outlet, the product and/or its packaging may be marked with the WaterSense label only if each showerhead (or hand-held shower) meets all of the requirements of this specification and the entire device meets the maximum flow rate requirement of this specification in all possible operating modes.

2.0 WaterSense Partnership

The manufacturer³ of the product must have a signed partnership agreement in place with EPA.

3.0 Conformity Assessment

Conformance to this specification must be certified by an EPA licensed certifying body accredited in accordance with the WaterSense product certification system.

³ Manufacturer, as defined in the WaterSense Program Guidelines, means: “Any organization that produces a product for market that might be eligible to meet WaterSense criteria for efficiency and performance. Manufacturers may also produce ‘private label’ products that are sold under the brand name of a separate organization, which is treated as a separate partner/application from the original product manufacturer.”