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WaterSense® Specification for Spray Sprinkler Bodies

Version 1.0

September 21, 2017

WaterSense® Specification for Spray Sprinkler Bodies

1.0 Scope and Objective

This specification establishes the criteria for labeling bodies of spray sprinklers[1] under the U.S. Environmental Protection Agency's (EPA's) WaterSense program. This specification is applicable to spray sprinkler bodies with integral pressure regulation. EPA is defining this product category based on the definitions of the applicable components included in the American Society of Agricultural and Biological Engineers and International Code Council's *ASABE/ICC 802-2014 Landscape Irrigation Sprinkler and Emitter Standard:*

- Sprinkler Body—The exterior case or shell of a sprinkler incorporating a means of connection to the piping system designed to convey water to a nozzle or orifice.
- Pressure Regulator—Device that maintains constant operating pressure immediately downstream from the device, given higher upstream pressure.

This specification **does not** apply to the following products, based on the definitions in *ASABE/ICC 802-2014*:

- Nozzle[2]—Discharge opening or orifice of a sprinkler used to control the volume of discharge, distribution pattern, and droplet size.
- Rotor sprinkler body[3]—Body of a sprinkler that applies water in a pattern by means of one or more rotating streams to a defined landscape area.
- Bubbler—Emission device that floods the soil discharging greater than 6.3 gallons per hour (24 liters per hour) when operated at 30 psi (206.8 kPa) and distributing water primarily through capillary action.
- Microirrigation emission device—Emission device intended to discharge water in the form of drops or continuous flow at rates less than 30 gallons per hour (113.5 liters per hour) at the largest area of coverage available for the nozzle series when operated at 30 psi (206.8 kPa), except during flushing. Also known as "low volume irrigation."

This specification **does not** apply to add-on or aftermarket devices nor those products that are not sold with, or integral to, the sprinkler body. This specification also **does not** apply to products for use exclusively within agricultural irrigation systems, hose-end watering products, or valve-in-head devices.

The specification is designed to ensure both efficient water use and a high level of performance.

[1] *ASABE/ICC 802-2014* defines a sprinkler as "an emission device consisting of a sprinkler body with one or more orifices to convert irrigation water pressure to high-velocity water discharge through the air, discharging a minimum of 0.5 gallons per minute (gpm) (1.9 liters per minute) at the largest area of coverage available for the nozzle series when operated at 30 psi (206.8 kPa) or more with a full-circle pattern." A spray sprinkler is defined as "a sprinkler that continuously applies water in a pattern to a defined landscape area."

[2] See Appendix A for information on sprinkler bodies and nozzles that are sold together in the same package.

[3] Note that rotor sprinkler bodies house rotor nozzles. Multistream multitrajectory (msmt) nozzles, as defined in *ASABE/ICC 802-2014*, are "nozzles designed to distribute water in a number of individual streams, of varying trajectories, which rotate across the distribution area." These are not classified as "rotor sprinkler nozzles," but as spray sprinkler nozzles. The sprinkler bodies that house msmt nozzles are included in the scope of this specification.

2.0 Water Efficiency and Performance Criteria

2.1 Test Method—The sprinkler body's ability to provide pressure regulation and maintain consistent flow shall be tested on each of the selected samples in accordance with the methodology included in Appendix B and shall meet the following requirements:

2.1.1 Maximum flow rate at any tested pressure level—The percent difference between the initial calibration flow rate (as described in Appendix B) and the maximum flow rate at any tested pressure level, averaged for the selected samples at the test pressure levels where the maximum flow rate occurred, shall not exceed +/- 12.0 percent.

2.1.2 Average flow rate across all tested pressures—The percent difference between the initial calibration flow rate (as described in Appendix B) and the flow rate at each tested pressure level, averaged across all pressure levels and all selected samples, shall not exceed +/- 10.0 percent.

2.1.3 Minimum outlet pressure—The average outlet pressure at the initial calibration point (as described in Appendix B) of the selected samples shall not be less than two-thirds (67 percent) of the regulation pressure.

3.0 General Sprinkler Body Requirements

3.1 The sprinkler body shall meet all criteria in Section 302 of *ASABE/ICC 802-2014*, Sprinkler and Bubbler Design Requirements.

4.0 Product Marking Requirements

4.1 The sprinkler body and packaging markings shall conform to all applicable sections of Section 304.1 of *ASABE/ICC 802-2014,* Sprinkler and Bubbler Product Marking, General.

4.2 The product and/or its associated packaging or documentation shall identify the regulation pressure and the maximum operating pressure at the inlet.

5.0 Effective Date

This specification is effective on September 21, 2017.

6.0 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 irrigation industry partners and other interested stakeholders.

7.0 Definitions

Definitions within *ASABE/ICC 802-2014 Landscape Irrigation Sprinkler and Emitter Standard* are included by reference.

Regulation Pressure: Outlet pressure the product aims to achieve regardless of higher inlet pressure, as stated by the manufacturer.

Appendix A: Informative Annex for WaterSense Labeling

The following requirements must be met for spray sprinkler bodies to be marked with the WaterSense label.

1.0 Sprinkler Body and Nozzle Packaged Together

In cases where a certified sprinkler body is packaged for sale with a nozzle or other components, the packaging must bear the WaterSense label. The packaging must clearly indicate which components within the package have been certified to bear the label and display their associated model number(s).

2.0 WaterSense Partnership

The product's manufacturer must have a signed partnership agreement in place with EPA.

3.0 Conformity Assessment

Conformance to this specification must be certified by a licensed certifying body accredited for this specification in accordance with the *WaterSense Product Certification System*.

4.0 WaterSense Label Use

Per the *WaterSense Program Mark Guidelines*, manufacturers must include the WaterSense label on product packaging and in online and printed specification sheets. Manufacturers should display the WaterSense label in association with any labeled product on the organization's website.

Appendix B: Spray Sprinkler Body Performance Test Method[4]

Test Procedure

1. Product Sampling and Selection
   (a) Products shall be sampled and selected for testing in accordance with Section 303.1.1 of *ASABE/ICC 802-2014* (i.e., a minimum of five samples, selected at random from a lot of at least 25 units).
   (b) Each selected test sample shall be tested in accordance with the methodology outlined in this Appendix.

2. Test conditions
   (a) All tests shall be conducted at an ambient air temperature between 40°F and 120°F (3°C and 49°C) and the water supply temperature shall not exceed 78°F (25.5°C). The water supply shall be filtered in accordance with the specifications of the manufacturer.
   (b) Test samples shall be stored at ambient laboratory conditions for a minimum of 12 hours prior to testing. Test samples shall be flushed prior to testing.

3. Performance Test
   (a) Initial Calibration—The test sample shall be initially calibrated so that the flow is 1.5 +/- 0.1 gpm at the regulation pressure (as specified by the manufacturer), measured at the test sample inlet. The flow rate shall be controlled by a needle valve. Once the flow rate is established at the regulation pressure, there shall be no further adjustment of the needle valve for that test sample.
   (b) The test sample shall be tested at four inlet pressure levels: 1) regulation pressure [the initial calibration point described in 3(a)]; 2) 10.0 psi above the regulation pressure; 3) 60.0 psi; and 4) 70.0 psi [or the maximum operating pressure, as specified by the manufacturer, whichever is greater].
      i. Inlet pressure shall be measured at the inlet to the sprinkler body as shown in Figure 1.
      ii. For all inlet pressure level test points, the inlet pressure shall be adjusted to within 1.0 psi of the specified test point (e.g., 40.0 psi, 60.0 psi, etc.) and stabilized. Stabilization is considered achieved when three consecutive pressure readings are within +/- 1.0 psi of the specified test point.
      iii. After testing the sample at each pressure level test point, the inlet pressure shall be reduced to 0.0 psi for at least 2 minutes prior to testing at the next pressure level test point.
   (c) The outlet pressure of the test sample shall be measured and recorded only at the initial calibration point described in 3(a). Outlet pressure shall be measured downstream of the integral pressure regulation device as close as practical to the needle valve as shown in Figure 1. Outlet pressure shall be logged at no greater than 30-second intervals and the data collection duration shall be a minimum of 3 minutes, not to exceed 5 minutes.

[4] This test procedure is based on A*SABE/ICC 802-2014 Landscape Irrigation Sprinkler and Emitter Standard* with modifications and clarifications. WaterSense is working with ASABE/ICC to incorporate these modifications and clarifications into the standard.

(d) The inlet pressure shall be measured and recorded at each of the four pressure level test points, as described in 3(b). Inlet pressures shall be logged at no greater than 30-second intervals and the data collection duration at each test pressure shall be a minimum of 3 minutes, not to exceed 5 minutes.

(e) Flow rate shall also be measured and recorded at each of the four pressure level test points. Flow rate shall be measured at no more than 30 second intervals and the test duration shall be a minimum of 3 minutes, not to exceed 5 minutes.

(f) Data Recording and Rounding—For each pressure level test point, the average, minimum, maximum, and standard deviation shall be recorded for the inlet pressure, outlet pressure (only at initial calibration), and flow rate. The average values of the test samples shall be used in the calculations to determine the percent differences, as specified in Section 2.1 of the specification. For all calculations, all digits shall be carried through to the final step, where they shall be rounded to the nearest 0.1 psi and 0.05 gpm for comparison to the criteria established in Section 2.1.

Test Equipment and Setup

1. Equipment
    a. Two pressure transducers capable of measuring pressure from 0 to at least 145 psi with at least 0.1 psi resolution. Accuracy (including linearity, hysteresis, and repeatability) shall be within 0.3% full scale output.
    b. Two pressure gauges that are 0-160 psi liquid filled with a ¼" MNPT bottom connection.
    c. Flow meter capable of resolving at least 0.05 gpm (0.189 lpm) within a range of at least 1.5 to 15 gpm and accuracy of 100 percent +/- 1.5 percent for the range of flow measured.
    d. Data logger capable of recording the pressure transducer and flow meter outputs.
    e. Piping to allow necessary straight pipe runs for the flow measurement and necessary pressure taps.
    f. Needle valve — ¼" NPT steel metering valve, ¼" FNPT, with a maximum flow range of 5 gpm, and maximum pressure of 5000 psi.
    g. An adapter will need to be fabricated to connect the needle valve to the sprinkler stem. The adapter will connect the sprinkler stem threads to an NPT fitting suitable for attachment to the needle valve. The adapter shall be no less than 0.6-inch inner diameter and connections shall minimize flow disturbance. The manufacturer shall supply for testing a connection to their product's stem that allows connection to standard piping.
    h. Test samples shall be supplied by straight, smooth piping that is free of fittings, except compliant pressure taps, for a minimum length of 20 times the inlet diameter of the sprinkler body test sample. Supply piping shall be ½" nominal diameter schedule 40 polyvinyl chloride (PVC). All pressure taps shall comply with ASME Performance Test Code (PTC) 19.2.
    The flow meter shall be conditioned in accordance with manufacturer instructions and shall be installed in accordance with ASME PTC 19.5.

2. Diagram of Sample Test Setup

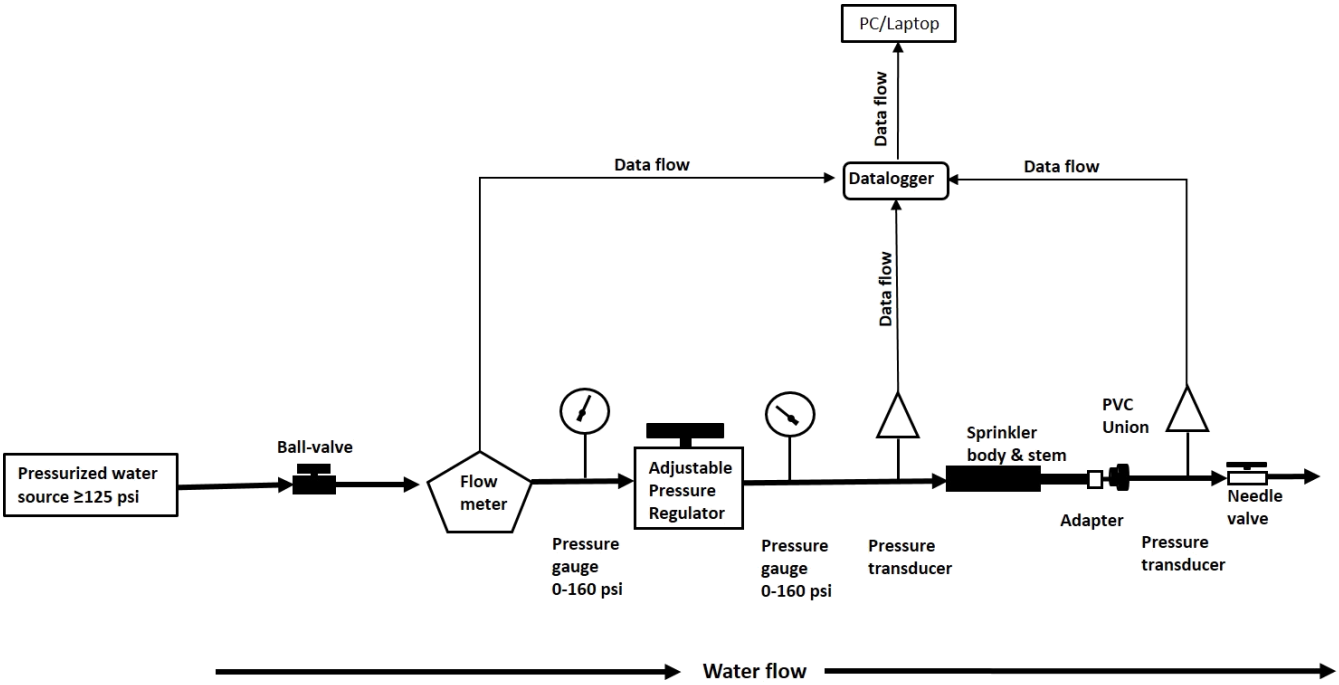

Figure 1. Equipment Setup for Pressure Regulation Test

Data Analysis

1. Measurements—During the performance test for each sample, for each inlet pressure level test point, record the duration time at that pressure (e.g., 3 minutes and 30 seconds), number of observations, and the average, maximum, minimum, and standard deviation of inlet pressure and flow rate. The outlet pressure shall only be recorded at initial calibration point, described in Section 3(a) above. Pressure shall be reported to the nearest 0.1 psi and flow rate to the nearest 0.05 gpm for the final calculated values that are compared to the criteria.

2. Calculations—The following equation shall be used to calculate the percent difference as specified in Sections 2.1.1 and 2.1.2 of this specification.

   Percent difference = 100*(Qmax-Qinitial)/Qinitial

   Where: Qmax = measured flow rate at any tested pressure level
   Qinitial = measured flow rate at the initial calibration point

3. Analysis—EPA has made a spreadsheet available to licensed certifying bodies as a template for recording and analyzing the data.