



**WaterSense® Draft Specification for Spray Sprinkler
Nozzles**

Version 1.0

November 2023

WaterSense® Draft Specification for Spray Sprinkler Nozzles

1.0 Scope and Objective

This specification establishes the criteria for landscape irrigation spray sprinkler nozzles to earn a label under the U.S. Environmental Protection Agency's (EPA's) WaterSense program. It applies to spray sprinkler nozzles as applicable under the American Society of Agricultural Biological Engineers (ASABE)/International Code Council (ICC) 802 *Landscape Irrigation Sprinkler and Emitter Standard*¹ and is further defined below. Based on the scope and definitions of ASABE/ICC 802, EPA is defining this product category as follows:

- **Spray sprinkler nozzle:** The discharge opening of a spray sprinkler used to control the volume of discharge, distribution pattern, and droplet size. A nozzle is attached to a spray sprinkler body that does not contain components to drive the rotation of the nozzle during operation and lacks an internal control valve.²

For the purposes of this draft specification, use of the term “nozzle” will refer specifically to spray sprinkler nozzles. Note, however, that this specification does not apply to the following products, based on the definitions in ASABE/ICC 802:

- Nozzles that attach to rotor sprinkler bodies or valve-in-head sprinklers;
- Nozzles that are used exclusively in agricultural irrigation systems; or
- Bubblers, hose-end watering products, and microirrigation emission devices (i.e., those that discharge water in the form of drops or continuous flow rates at less than 30 gallons of water per hour when operated at 30 psi).

2.0 General Requirements

- 2.1 The spray sprinkler nozzle shall meet the following subsections in Section 302 of ASABE/ICC 802, Sprinkler and Bubbler Design Requirements:

- 302.1. Rated temperature
- 302.2. Inlet connections
- 302.3. Filters and strainers
- 302.4. Servicing
- 302.5. Adjustments

3.0 Water Efficiency and Performance Criteria

Nozzles shall be tested in accordance with Section 303.1 of ASABE/ICC 802, Sprinkler and Bubbler Performance Requirements and Test Methods, General, and the relevant sections of ASABE/ICC 802, as specified in Sections 3.2 through 3.4 of this specification.

- 3.1 For a nozzle series, representative nozzle models, as described below, shall be selected for testing. See Appendix B for examples of representative model selection.

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

² This definition includes multi-stream multi-trajectory (MSMT) nozzles as defined in ASABE/ICC 802.

- 3.1.1 For a circular pattern nozzle series rated for a specific fixed distance of throw (i.e., radius) at the recommended operating pressure, the following nozzle models/nozzle settings shall be tested:
 - Minimum arc
 - Maximum arc
- 3.1.2 For a circular pattern nozzle series with an adjustable distance of throw (i.e., radius) at the recommended operating pressure, the following nozzle models/nozzle settings shall be tested:
 - Minimum arc and minimum distance of throw
 - Minimum arc and maximum distance of throw
 - Maximum arc and minimum distance of throw
 - Maximum arc and maximum distance of throw
- 3.1.3 For an asymmetrical or irregular spray pattern (e.g., strip) nozzle series rated for a specific fixed distance of throw at the recommended operating pressure, the following nozzle models/nozzle settings shall be tested:
 - Minimum wetted area
 - Maximum wetted area
- 3.1.4 For an asymmetrical or irregular pattern (e.g., strip) nozzle series with an adjustable distance of throw at the recommended operating pressure, the following nozzle models/nozzle settings shall be tested:
 - Minimum wetted area and minimum distance of throw
 - Minimum wetted area and maximum distance of throw
 - Maximum wetted area and minimum distance of throw
 - Maximum wetted area and maximum distance of throw
- 3.2 Distance of Throw: Nozzles shall be tested in accordance with ASABE/ICC 802 Section 303.5.4 (Distance of throw test method) with the following modifications:
 - 3.2.1 Nozzles shall be tested at the recommended operating pressure, as specified by the manufacturer.
 - 3.2.2 Calculations: An average distance of throw across the five samples for each nozzle/nozzle setting listed in Section 3.1, as applicable, shall be calculated.

- 3.2.3 Criterion: The difference between the manufacturer’s rated distance of throw or distance of throw range, as applicable, and the average distance of throw for each arc or wetted area and distance of throw combination, as calculated in Section 3.2.2, shall not exceed the maximum allowable difference shown in Table 1.

Table 1. Maximum Allowable Difference Between Tested and Rated Distance of Throw

Rated Distance of Throw (i.e., Radius)	Maximum Allowable Difference
>1.0 foot and ≤10.0 feet	1.0 foot
>10.0 feet and ≤20.0 feet	2.0 feet
>20.0 feet and ≤39.0 feet	2.5 feet
>39.0 feet	5.0 feet

- 3.3 Application Rate:³ A nozzle’s application rate shall be calculated in accordance with ASABE/ICC 802 Section 303.6.1 (Application rate calculation method) with the following modifications:
- 3.3.1 Application rate shall be calculated using the average flow rate determined according to ASABE/ICC 802 Section 303.5.3 (Flow rate test method),⁴ at the recommended operating pressure, as specified by the manufacturer.
 - 3.3.2 Within a nozzle series, the application rate shall be calculated for the nozzles and nozzle settings listed in Sections 3.1, as applicable.
 - 3.3.3 Calculations: The average application rate across the five samples shall be calculated for each arc or wetted area and distance of throw combination, as applicable under Section 3.1.
 - 3.3.4 Criterion: The average application rate across the five samples for each arc or wetted area and distance of throw combination, as applicable under Section 3.1, shall be 1.2 inches per hour or less.
- 3.4 Uniformity: Distribution uniformity of the lowest quarter (DU_{LQ}) shall be calculated in accordance with ASABE/ICC 802 Section 303.6.2 (Uniformity modeling method) with the following modifications:
- 3.4.1 A DU_{LQ} shall be calculated at the recommended operating pressure, as specified by the manufacturer, and with rectangular/square spacing.
 - 3.4.2 Within a nozzle series, the DU_{LQ} shall be calculated for the nozzle models and settings listed in Section 3.1, as applicable.

³ Also known as “precipitation rate.”

⁴ ASABE/ICC 802 specifies that flow rate shall be tested at the minimum, recommended, and maximum operating pressures. Because EPA is only requiring application rate calculations at recommended operating pressure, the flow rate test shall only be conducted at that pressure level.

- 3.4.3 Calculations: An average DU_{LQ} shall be calculated for each arc or wetted area and distance of throw combination, as applicable under Section 3.1.
 - 3.4.4 Criterion: The average DU_{LQ} across the five samples for each arc or wetted area and distance of throw combination, as applicable under Section 3.1, shall not be less than 0.65.
- 3.5 Matched Precipitation: Nozzle models/settings tested within a series shall have matched precipitation. The application rate for each nozzle arc or wetted area and distance of throw combination, as designated in accordance with Section 3.1(as applicable) and calculated in accordance with Section 3.3.3 of this specification, shall be at least 90 percent of the highest application rate at the recommended operating pressure for the series.

4.0 Product Marking and Documentation Requirements

- 4.1 The sprinkler nozzle and packaging markings shall conform to the following requirements of ASABE/ICC 802 Sections 304.1 and 304.2:
- 304.1.1. Units
 - 304.1.2. Location
 - 304.1.3. Manufacturer name
 - 304.1.4. Connectors
 - 304.1.5. Nozzle series marking
 - 304.1.6. Instructions
 - 304.2. Marking of sprays and rotors requirements 2, 3, 4, 5, and 7
- 4.2 A nozzle shall not be packaged, marked, nor provided with instructions directing the user to an operational setting that would override the nozzle's intended operating characteristics, as established by this specification and verified through testing. Any instruction related to the maintenance of the nozzle shall direct the user on how to maintain the nozzle's intended operating characteristics.
- 4.3 Product documentation, including online and print specification sheets and sales brochures, as applicable, shall recommend that the nozzle be used in combination with a WaterSense labeled spray sprinkler body for optimal performance.

5.0 Effective Date

This specification's effective date is [TBD].

6.0 Future Specification Revisions

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

7.0 Definitions

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

Matched precipitation rate: When sprinkler nozzles are designed to apply water at the same application rate across all arcs or wetted areas.

Nozzle series: A group of nozzles, as indicated by the product manufacturer, with similar operating characteristics (e.g., optimal pressure, distance of throw [or range of distances of throw, if adjustable]) but that may vary in spray pattern. For example, a nozzle series may include nozzles that have arcs of 90°, 180°, 270°, and 360° with a distance of throw of 8 feet.

Appendix A: Informational Annex for WaterSense Labeling

1.0 WaterSense Partnership

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

2.0 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*.

3.0 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.

4.0 Sprinkler Body and Nozzle Packaged Together

In cases where a certified sprinkler nozzle is packaged for sale with a spray sprinkler body or other components, the packaging must bear the WaterSense label. If packaging contains both labeled and non-labeled products, the packaging must clearly indicate which components within the package have earned the WaterSense label and display their associated model number(s).

Appendix B: Testing and Certification for Nozzle Series

1.0 Representative Nozzle Selection and Testing

When evaluating a nozzle series for conformance to this specification, representative nozzle models from the series shall be selected for testing, as described in Section 3.1. EPA offers the following examples to demonstrate which representative models shall be selected for testing, noted using a checkmark (✓) along with additional guidance, as applicable.

Examples Corresponding to Section 3.1.1 of the Specification: Circular Pattern Nozzle Series With a Fixed Distance of Throw

Example 1A: Fixed Arc Nozzles

A circular pattern nozzle series has four nozzle models with spray arcs of 90°, 180°, 270°, and 360°. The rated distance of throw for the series is 10 feet.

Rated Distance of Throw	Nozzle Arc			
	90° Model	180° Model	270° Model	360° Model
10'	✓			✓

Example 1B: Mixed Fixed and Adjustable Arc Nozzles

A circular pattern nozzle series has two nozzle models. One model is adjustable between 90° and 270° and one model has with a fixed spray arc of 360°. The rated distance of throw for the series is 10 feet.

Rated Distance of Throw	Nozzle Arc	
	90° to 270° Model	360° Model
10'	✓ at 90° arc setting	✓

Example 1C: Fully Adjustable Arc Nozzle

A circular pattern nozzle series has one nozzle model with a fully adjustable arc between 90° and 360°. The rated distance of throw for the series is 10 feet.

Rated Distance of Throw	Nozzle Arc
	90° to 360° Model
10'	✓ at both 90° and 360° arc settings

Examples Corresponding to Section 3.1.2 of the Specification: Circular Pattern Nozzle Series With an Adjustable Distance of Throw

Example 2A: Fixed Arc Nozzles

A circular pattern nozzle series has four nozzle models with spray arcs of 90°, 180°, 270°, and 360°. The distance of throw can be adjusted between 10 feet and 15 feet.

Rated Distance of Throw	Nozzle Arc			
	90° Model	180° Model	270° Model	360° Model
10'	✓			✓
15'	✓			✓

Example 2B: Mixed Fixed and Adjustable Arc Nozzles

A circular pattern nozzle series has two nozzle models. One model is adjustable between 90° and 270°, and one model has with a fixed spray arc of 360°. The distance of throw can be adjusted between 10 feet and 15 feet.

Rated Distance of Throw	Nozzle Arc	
	90° to 270° Model	360° Model
10'	✓ at 90° arc setting	✓
15'	✓ at 90° arc setting	✓

Example 2C: Fully Adjustable Arc Nozzle

A circular pattern nozzle series has one nozzle model with a fully adjustable arc between 90° and 360°. The distance of throw can be adjusted between 10 feet and 15 feet.

Rated Distance of Throw	Nozzle Arc
	90° to 360° Model
10'	✓ at both 90° and 360° arc settings
15'	✓ at both 90° and 360° arc settings

Example Corresponding to Section 3.1.3 of the Specification: Asymmetrical or Irregular Spray Pattern Nozzle Series With a Fixed Distance of Throw

Example 3: Strip Nozzles

A strip pattern nozzle series has three nozzle models with spray pattern areas of left strip, side strip, and right strip. The spray pattern of the left and right strip models covers 5 feet in width by 15 feet in length. The side strip covers 5 feet in width and 30 feet in length.

Rated Distance of Throw	Spray Pattern		
	Left Strip Model	Side Strip Model	Right Strip Model
5' x 15' (left/right)	✓*	✓	
5' x 30' (side)			

* The left or the right strip could be selected, at the discretion of the testing laboratory.

Example Corresponding to Section 3.1.4 of the Specification: Asymmetrical or Irregular Spray Pattern Nozzle Series With an Adjustable Distance of Throw

Example 4: Strip Nozzles

A strip pattern nozzle series has three nozzle models with spray pattern areas of left strip, side strip, and right strip. The spray pattern of the left and right strip models covers 5 feet in width and can be adjusted between 10 feet and 20 feet in length. The side strip covers 5 feet in width and can be adjusted between 20 feet and 40 feet in length.

Rated Distance of Throw	Spray Pattern		
	Left Strip Model	Side Strip Model	Right Strip Model
5' x 10' (left/right) 5' x 20' (side)	✓*	✓	
5' x 20' (left/right) 5' x 40' (side)	✓*	✓	

* The left or the right strip could be selected, at the discretion of the testing laboratory.

2.0 Certification and Label Use

Following testing and verification that the representative models of a nozzle series meet the criteria of the specification, all nozzle models within a nozzle series can be certified. Upon certification, packaging for individual nozzle models and online and printed product documentation shall include the WaterSense label. Marketing materials, brochures, point-of-purchase displays, web pages, and other materials associated with a certified nozzle series may also display the WaterSense label.