

## WaterSense® Specification Development Update: Spray Sprinkler Nozzles

### I. Introduction

In November 2023, the U.S. Environmental Protection Agency (EPA) published a [WaterSense Draft Specification for Spray Sprinkler Nozzles](#) with proposed water efficiency and performance criteria for spray sprinkler nozzles to earn the WaterSense label. A spray sprinkler nozzle is a component of a spray sprinkler used for irrigation. It is provided in combination with a spray sprinkler body to distribute water to the landscape. EPA separately labels spray sprinkler bodies that provide integral pressure regulation.<sup>1</sup>

Recent water savings studies have indicated that several models of spray sprinkler nozzles can result in reduced water use beyond what is offered by WaterSense labeled spray sprinkler bodies. These studies, as described in Section IV of the [WaterSense Draft Specification for Spray Sprinkler Nozzles Supporting Statement](#), are the basis of EPA's estimate that some models of spray sprinkler nozzles use approximately 10 percent less water than traditional spray sprinkler nozzles. EPA has found many of these nozzles are marketed as "high-efficiency" by manufacturers. Some are multi-stream, multi-trajectory (MSMT) nozzles<sup>2</sup> that emit multiple streams of water at multiple trajectories, and some distribute water in a more traditional fan-shaped pattern.

EPA's research and engagement with program partners have also identified notable interest in a potential WaterSense label for spray sprinkler nozzles, particularly among water utilities. Many water utilities offer rebate programs for spray sprinkler nozzles and request a WaterSense specification to help them more easily identify models that result in water savings.

Since the release of the draft specification, EPA has received public comments on the draft specification and continues to engage with utilities and the irrigation industry. This report serves to update interested parties on the progress made to date.

### II. Overview of Draft Specification for Spray Sprinkler Nozzles

The draft specification proposes criteria for spray sprinkler nozzles to earn the WaterSense label. In summary, the draft specification includes:

- Scope: The specification 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. Spray sprinkler nozzles are further defined in the draft specification as "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."
- General requirements: Nozzles shall meet ASABE/ICC 802, subsections 302.1 through 302.5 in Section 302 Sprinkler and Bubbler Design Requirements.

---

<sup>1</sup> EPA. 2017. *WaterSense Specification for Spray Sprinkler Bodies*, Version 1.0. [www.epa.gov/sites/default/files/2017-09/documents/ws-products-spec-ssb.pdf](http://www.epa.gov/sites/default/files/2017-09/documents/ws-products-spec-ssb.pdf).

<sup>2</sup> Defined in ASABE/ICC 802 as "Nozzles designed to distribute discharge water in a number of individual streams, of varying trajectories, which rotate across the distribution area."

- Water efficiency and performance requirements: Nozzles shall meet the following four criteria:
  - Distance of throw: 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 3.2.3 of the draft specification, shall not exceed the maximum allowable difference shown in Table 1.

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

<b>Rated Distance of Throw (i.e., Radius)</b>	<b>Maximum Allowable Difference</b>
>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

- Application rate: The average application rate across the five samples for each arc or wetted area and distance of throw combination shall be 1.2 inches per hour (in/hr) or less.
- Distribution uniformity (DU<sub>LQ</sub>): The average DU<sub>LQ</sub> across the five samples for each arc or wetted area and distance of throw combination shall not be less than 0.65.
- Matched precipitation: The application rate for each nozzle arc or wetted area and distance of throw combination shall be at least 90 percent of the highest application rate at the recommended operating pressure for the series.
- Packaging and documentation requirements: Nozzle packaging markings shall conform with specific sections of ASABE/ICC 802 Sections 304.1 and 304.2, as listed in the specification. In addition, 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. Lastly, 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.

While EPA selected four water efficiency and performance criteria based on field studies and data from Dr. Michael Dukes of the University of Florida, EPA believes that it is application rate that has the largest influence on water savings, with the remaining three criteria contributing to efficient design and performance. The [WaterSense Draft Specification for Spray Sprinkler Nozzles Supporting Statement](#) includes additional information about the rationale behind each of these proposed criteria.

### III. Public Comment Feedback

EPA received public comments on the draft specification from more than a dozen interested parties.<sup>3</sup> Common topics addressed by commenters included:

- Utility partners support a WaterSense label for this product category. Many utilities are offering rebates for water-efficient spray sprinkler nozzles, but there is a lack of national consistency in rebate criteria. The Alliance for Water Efficiency and the American Water Works Association, representing their members, many of whom are utilities, both support WaterSense in moving forward with a specification with minor modifications.
- State agencies in New York and California, as well as nonprofits such as the Natural Resources Defense Council, the Appliance Standards Awareness Project, and the Pacific Institute, support specification development for this product category.
- There is little consensus among manufacturers about whether the performance criteria and thresholds proposed by EPA adequately represent what makes certain nozzles more efficient. Some manufacturers would like EPA to develop separate specifications for MSMT nozzles and fan-type spray nozzles. Some manufacturers suggest that application rate is not an appropriate measure of efficiency and propose using only distribution uniformity for WaterSense performance criteria.
- The Irrigation Association and some manufacturers expressed their preference for first developing a voluntary consensus standard for this product category to determine the appropriate performance attributes and thresholds, as well as test methods, to differentiate higher-efficiency spray sprinkler nozzles. IA offered to facilitate this process by engaging a standards development organization, as well as providing time and resources to bring the process to a successful conclusion.
- Practitioners expressed concern that if a WaterSense specification for this product category is used in state regulations, it will limit their design flexibility.
- Manufacturers expressed concern in their capability to test products according to the test methods included in the draft specification and noted that external test laboratory options are limited at this time.

### IV. Path Forward

In response to public comments received on the draft specification, EPA examined all recommended proposals, followed up with commenters, and developed several options for how to proceed. The options are presented in Section IV.A below. EPA understands the concerns expressed by industry and is planning to pause WaterSense specification development efforts to allow time for an industry-led standard development process to proceed in coordination with EPA and other interested parties, with the goal of determining whether other performance attributes exist to adequately differentiate higher-efficiency spray sprinkler nozzles.

EPA is allowing industry time to determine whether alternative performance measures to application rate and the other water efficiency and performance criteria included in the draft specification exist and will result in water savings associated with spray sprinkler nozzles. Working with IA and nozzle manufacturer partners, EPA will determine a reasonable amount of time for industry to develop or update a consensus-based product standard for spray sprinkler

---

<sup>3</sup> A compilation of public comments received on the *WaterSense Draft Specification for Spray Sprinkler Nozzles* can be reviewed at <https://www.epa.gov/system/files/documents/2024-05/ws-products-outdoor-nozzle-comment-compilation.pdf>.

nozzles that includes test methods that are repeatable, transferable, and feasible to conduct cost-effectively within a laboratory setting. The standard development should be supported with performance data to help differentiate product models and determine appropriate thresholds that result in water savings.

If, after a reasonable amount of time, industry is not able to identify attributes or a consensus standard to evaluate spray sprinkler nozzle efficiency, EPA intends to move forward with the attributes and test methods proposed in the draft specification, taking into consideration minor modifications suggested in public comments to facilitate more cost-effective laboratory testing.

In the interim, WaterSense utility partners should consider utilizing EPA's draft criteria for application rate (i.e., 1.2 in/hr or less) when determining qualified spray sprinkler nozzles within rebate programs. As discussed in the *WaterSense Draft Specification for Spray Sprinkler Nozzles Supporting Statement*, this threshold was established based on field and laboratory studies on high-efficiency nozzles that resulted in water savings and aligns with the attributes used by manufacturers to identify their high-efficiency nozzles.

### A. Alternative Options Considered

As noted above, and based on public comments received, EPA considered the following options before deciding to pause its specification efforts to support the development of an industry standard:

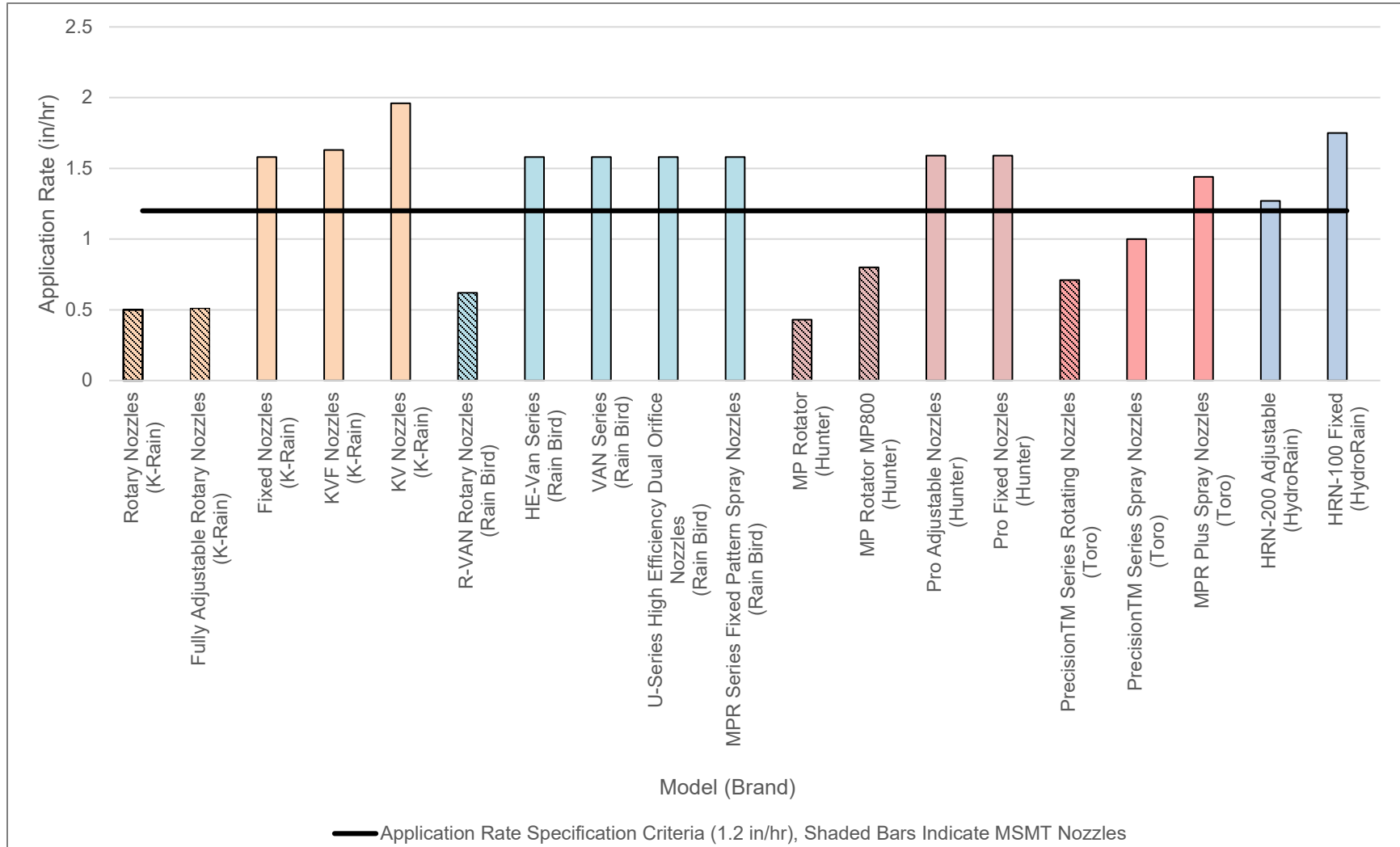
1. **Proceed with current criteria:** EPA considered publishing a final specification with performance criteria that are similar to those included in the draft specification, but with minor revisions to address comments received on other requirements, such as sampling and marking and packaging. EPA chose not to move forward with its specification at this time because there is neither consensus among manufacturers, nor agreement with WaterSense, on the performance criteria that contribute to water savings.
2. **Revise the scope:** EPA considered developing a separate specification for just MSMT nozzles, but decided not to proceed with this option because it could limit the potential for market transformation, since the product category would only identify high performing MSMT nozzles, not the most efficient of the entire spray sprinkler nozzle product category. In addition, this path could stifle innovation and would exclude a nozzle series currently on the market that has demonstrated water savings in field studies. EPA also chose not to develop a specification for just fan-type nozzles because there is not a body of literature demonstrating water savings from multiple models of these types of nozzles.
3. **Revise the performance criteria:** EPA considered revising the performance criteria in the following two ways:
  - a. EPA considered removing the application rate criterion and revising the distribution uniformity criterion from a minimum performance level to a threshold at which water savings are realized. Unfortunately, EPA has not received data correlating distribution uniformity with residential or commercial water savings.
  - b. EPA also considered increasing the application rate criterion from 1.2 in/hr to a higher level (e.g., 2.0 in/hr) to include a wider range of nozzles on the market. As demonstrated in Figure 1 in Appendix A, raising the threshold much higher than 1.2 in/hr would result in including most spray sprinkler nozzles on the market, eliminating the differentiation of certain nozzle models tested in field studies that demonstrated significant water savings. In addition, EPA is not aware of studies that suggest these other nozzle series contribute to water savings.

## **V. Conclusion**

EPA appreciates the continued interest in a WaterSense specification for spray sprinkler nozzles and will keep interested parties informed of both the standard development and the specification development process. If you have any questions or feedback regarding spray sprinkler nozzles specification development, please email [watersense-products@erg.com](mailto:watersense-products@erg.com).

## Appendix A

Figure 1. Application Rate for 15-Foot Half Circle Spray Sprinkler Nozzles at Recommended Operating Pressure (in/hr)



Note: Application rates are based on manufacturer-provided literature located on their websites.