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

March 2024

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Commenter: Jason M. Anderson
Affiliation: Design 24/26
Comment Date: November 11, 2023

Hello,

I did not have really much for comments on the draft specification. However, I do have one for this *"EPA selected a DULQ threshold of 0.65 to ensure a minimum level of performance for sprinkler nozzles."* And I see the explanation further down in the next 2 paragraphs. In the past, a regular sprinkler head out of the box was assumed to be able to have a threshold of 0.625. Increasing to 0.65, seems to be a minimal threshold increase. Especially since many of the high-performance nozzles on the market today are capable of 0.70 minimum. Why not make the minimum 0.70?

Thanks,

Jason

Design 24/26 closes at noon on Fridays

Jason M. Anderson, RLA, ASLA, ARCSA, ASIC, CLIA, IA
(he/him/his)
Design Two Four / Two Six
a certified Small Business Enterprise (SBE)
14835 161st Court SE
Renton, WA 98059
Cell: (206) 335-7719
ph: (425) 881-2426
www.design2426.com

Commenter: Maribel Campos
Affiliation: ICC Evaluation Services (ICC-ES)
Comment Date: December 12, 2023

Hi Stephanie,

You mentioned during the Nozzle Webinar that manufacturers are going to have included wording as to which part of the sprinkler the WS logo is attached to.

This method works well with showerheads when they are packaged with the valve as the box has sufficient space for this verbiage.

For SSB, the WS logo is label with very small writing and space. At the moment, manuf. for SSB are just adding the logo as is so now they are going to have to go back and redesign their labels or packaging to add this language which a typical end user will not know what it means.

Also, some SSB are sold with a nozzle and some are not so this would mean manufacturers would have to have to separate designs for the WS logo which will be more work at the factory and could lead to confusion.

If the PR-SSB has the label with or without a WS nozzle, it is still good with the spec as these products are tested without a nozzle.

If a nozzle is test with a PR or non-PR sprinkler body, again it is still good as the spec test the nozzle on its own.

If anything may I suggest that this additional language only be applicable to non-PR SSB which are sold with a WS labeled Nozzle. I just don't want to get all the manufacturers upset or confused with all the extra labeling requirements. As the nozzle are new, I can make this point from the beginning.

Please let me know if you have any questions.

Sincerely,

Maribel Campos
Vice President of ES-PMG Standards

ICC Evaluation Service, LLC
Western Regional Office
3060 Saturn Street, Suite 100
Brea, CA 92821
Tel: 562-699-0543 x3578
mcampos@icc-es.org

New Design for the 2024 International Codes! Substantial formatting changes are improving the user experience.

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Commenter: Nathan Bowen, Natasha Rankin
Affiliation: Irrigation Association
Comment Date: December 15, 2023

Email Text:

Stephanie,

Thank you for the very informative webinar earlier this week on the draft spec for spray nozzles, as well as for EPA's engagement with IA members at the Irrigation Show in San Diego. We continue our review and discussions on the proposal. I am sharing with you the attached letter from IA CEO Natasha Rankin, requesting an extension of the comment period on the draft spec to allow sufficient time for the IA, our members and the broader industry to develop meaningful comments on the proposal.

Regards,

Nathan Bowen
Advocacy & Public Affairs Vice President
Irrigation Association
8280 Willow Oaks Corporate Drive, Suite 630 | Fairfax, VA 22031
C: 202-209-9091| nathanbowen@irrigation.org | www.irrigation.org

Submit your CEUs by Dec. 31!
Check out our online options to get your CEUs submitted by the Dec. 31 deadline.

The Irrigation Association will be closed Dec. 22 through Jan. 1. Happy holidays!

Email Attachment:

See page 5.

Irrigation ASSOCIATION®
8280 Willow Oaks Corporate Drive, Suite 630 | Fairfax, VA 22031
Tel: 703.536.7080 | Fax: 703.536.7019
www.irrigation.org

December 14, 2023

U.S. Environmental Protection Agency
WaterSense Program
1200 Pennsylvania Avenue NW
Washington, DC 20004

Re: Comment Period Extension Request for WaterSense Draft Specification for Spray Sprinkler Nozzles

To whom it may concern:

On behalf of the approximately 1,300 member companies of the Irrigation Association, I respectfully request a **90-day extension** of the comment period with respect to the WaterSense Draft Specification for Spray Sprinkler Nozzles.

The Irrigation Association represents experts in all aspects of irrigation, including agriculture, landscape, turfgrass and golf. Irrigation manufacturers, distributors, designers, contractors and other irrigation professionals have proudly partnered with WaterSense since its inception to strengthen the marketplace for efficient water-use technologies and practices.

We appreciate the opportunity to review and comment on this draft on behalf of the entire irrigation industry. To ensure the full breadth of impacts are considered, we respectfully request additional time to gather input and provide feedback on the proposal. Additional time would allow the opportunity for more robust and comprehensive feedback to the program.

Given the fact that a number of major holidays are observed between the Dec. 12 webinar and the comment period deadline, the current schedule makes it difficult ensure the consideration and contributions from a diverse stakeholder group of irrigation experts and companies is included to adequately address the various elements of the proposal. In addition, the IA and our member companies are also currently reviewing and developing responses to two other regulatory matters impactful to the industry that have comment period deadlines close to this deadline. Specifically, comments to the California Department of Water Resources on proposed revisions to the Model Water Efficient Landscape Ordinance are due Jan. 16, 2024, and comments to the California Energy Commission on proposed regulations for irrigation controllers are due Jan. 8, 2024.

Thank you for your consideration of this request. Please contact Nathan Bowen (nathanbowen@irrigation.org), Irrigation Association advocacy and public affairs vice president, for additional information.

Sincerely,

Natasha L. Rankin

Natasha L Rankin, MBA, CAE
Chief Executive Officer

Commenters: John Raffiani
Affiliation: Irrigation Association of NJ
Comment Date: December 29, 2023

Email Attachment:
See page 7.

Template for Public Comment Submission on WaterSense Documents

Commenter Name: John Raffiani

Commenter Affiliation: Irrigation Association of NJ

Date of Comment Submission: December 29, 2023

Topic: Pressure regulation of Spray Sprinkler Nozzles

Comment: By nature these nozzles will clog easily due to the design. Spray body pressure regulation is more than sufficient.

Rationale: The use of chambers and turbulent paths to regulate pressure in a spray nozzle will be a service issue in turf. Like the Toro Precision nozzle it only works well over time when used in other than turf applications.

Suggested Change (or Language): Not for turf use.

Commenters: Andrew Morris, Ron Burke
Affiliation: Alliance for Water Efficiency
Comment Date: February 21, 2024

Email Text:

Dear WaterSense Team,

Please find attached AWE's comments on spray sprinkler nozzles.

Best Regards,

Andrew D. Morris| **Senior Manager of Policy and Programs**
Alliance for Water Efficiency
e: andrew@a4we.org
p: 770-906-1888
w: www.allianceforwaterefficiency.org

Email Attachment:

See pages 9 and 10.

Submitted via email to watersense-products@erg.com

February 21, 2024

WaterSense
U.S. Environmental Protection Agency
Office of Wastewater Management (4204M)
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Re: WaterSense® Draft Specification for Spray Sprinkler Nozzles

Dear WaterSense Staff:

The Alliance for Water Efficiency ("AWE") is a stakeholder-based 501(c)(3) organization with more than 500 member organizations dedicated to the efficient and sustainable use of water. AWE provides a forum for collaboration around policy, information sharing, education, and stakeholder engagement. AWE is providing these comments on the Draft Specification for Spray Sprinkler Nozzles ("Draft Specification"). These comments were developed by AWE's WaterSense-Water Efficient Products Advisory Committee, which is comprised of representatives from AWE member utilities, businesses, and other industry partners; the comments were then approved by a vote of AWE's Board of Directors. AWE also requests that WaterSense evaluate and respond to the comments of AWE's irrigation members, including Hunter Industries. Hunter Industries has additional comments like separating out MSMT nozzles that, due to time constraints, were not considered by the AWE advisory committee and board and, therefore, AWE expresses no opinion.

AWE welcomes this opportunity to comment on the Draft Specification, which has the potential to further improve the water efficiency of landscape irrigation systems. This topic is especially important given that watering landscapes is a consumptive use of water, a key contributor to peak water demands, and a high percentage of many utilities' overall water use.

AWE supports WaterSense finalizing the Draft Specification and labeling spray sprinkler nozzles based on the water savings potential. AWE also encourages WaterSense to explore changes on the following topics to ensure predictable, significant, and cost-effective water savings. Specifically, AWE has the following comments:

Topic #1: Product Marking and Documentation Requirements

Comment: Consumers should be advised that landscape irrigation systems consist of many components that need to be designed and operated in an integrated and coordinated fashion. Irrigation professionals can help ensure proper design and operation.

Rationale: Water savings are dependent both on the characteristics of individual components, like spray sprinkler nozzles, and the overall design and operation of a system as a whole. Changing out one component may not result in water savings or otherwise adequately support plant and vegetation health.

Suggested Change (or Language): AWE recommends that Section 4.3 be modified to read as follows with new language shown in red: Product documentation, including online and print specification sheets and sales brochures, as applicable, shall recommend that (a) the nozzle be used in combination with a compatible WaterSense labeled spray sprinkler body for optimal performance and (b) that both the nozzle replacement and overall design and operation of the system be reviewed by a WaterSense certified landscape professional or other professional qualified under any applicable program administered by state or local governments.

Topic #2: When Sprinkler Body and Nozzle Packaged Together

Comment: WaterSense should consider requiring that if manufacturers choose to package nozzles and bodies together, then both must be WaterSense labeled. AWE is not advocating for a requirement that they must be packaged together, and this comment is intended to address only when a manufacturer chooses to package these products together.

Rationale: Consumers may be more likely to be confused by packaging WaterSense labeled nozzles with non-labeled bodies. WaterSense should consider any data it or other stakeholders have available related to the likelihood and frequency of consumer confusion.

Suggested Change (or Language): Section 4.0 of Annex A could be restated as follows: "WaterSense labeled spray sprinkler nozzles may only be packaged together with spray sprinkler bodies if the bodies are also WaterSense labeled."

Conclusion: AWE supports WaterSense finalizing the Draft Specification and labeling spray sprinkler nozzles and encourages WaterSense to consider comments form AWE and other stakeholders that may help ensure predictable, significant, and cost-effective water savings.

Sincerely,

Ron Burke
President and CEO
Alliance for Water Efficiency

Commenter: Dan Denning
Affiliation: City of Bend, Water Conservation
Comment Date: February 21,2024

Email Text:

To whom it may concern,
We have reviewed the specifications and only have one comment for consideration. Thank you for spearheading this much needed certification.

CITY OF BEND
WATER CONSERVATION

Dan Denning CLIA
Utility Program Manager-Water Conservation
Office: 541-693-2194

Waterwisetips.org

Email Attachment:

See page 12.

Template for Public Comment Submission on WaterSense Documents

Commenter Name: Dan Denning

Commenter Affiliation: City of Bend ,OR- Water Conservation Program manager

Date of Comment Submission: 2/21/24

Topic: Section 3.4.4

Comment: Requirement for "tested" DU_{LQ} should be higher than 65%.

Rationale: Testing conditions are perfect, controlled, hydraulic and environmental operating conditions, which is not representative of how these nozzles will be installed or used in the field. Years of field tests/audits, actual field tested DU will likely be lower. Nozzles that consistently perform higher in controlled conditions would likely perform higher in imperfect conditions in the landscape.

Suggested Change (or Language): "Average DU_{LQ} across five sample for each arc…..shall not be less than 0.75. "

Commenter: Adam Carpenter, G. Tracy Mehan
Affiliation: American Water Works Association
Comment Date: February 21,2024

Email Text:

Dear WaterSense Colleagues,

Please find comments attached from the American Water Works Association on the WaterSense Draft Specification for Spray Sprinkler Nozzles.

Please do not hesitate to reach out should you have any questions or if there's any way that AWWA can be of assistance.

Sincerely,

Adam T. Carpenter *(he/him/his)*
Manager of Energy and Environmental Policy
American Water Works Association
Direct +1 202.326.6126
acarpenter@awwa.org | www.awwa.org
LinkedIn profile
American Water Works Association

Email Attachment:
See pages 14 to 19.

American Water Works Association
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Government Affairs Office
1300 Eye Street NW
Suite 701W
Washington, DC 20005-3314
T 202.628.8303
F 202.628.2846

February 21, 2024

Veronica Blette
Office of WasteWater Management
Environmental Protection Agency
1200 Pennsylvania Ave NW
Washington, DC 20460

RE: Draft WaterSense specification titled "WaterSense Draft Specification for Spray Sprinkler Nozzles" (Version 1.0).

Dear Ms. Blette:

The American Water Works Association (AWWA) appreciates the opportunity to comment on the November 9, 2023 draft WaterSense specification titled "WaterSense Draft Specification For Spray Sprinkler Nozzles" (Version 1.0), and its associated support documents.

AWWA supports the development of this specification

Outdoor water use is an important and often times very significant portion of both residential and non-residential water use. Given inefficient design and use seen in many older irrigation system applications, considerable amounts of non-agricultural irrigation water are wasted due to avoidable evaporation, wind, excess runoff, and application to unintended areas. Inefficient irrigation use adds unnecessary strain to water supplies and is frustrating for customers. Addressing these challenges positively affects water systems, consumers, and the marketplace. Further, reducing the effects of misting and high application rates increases irrigation efficiency and reduces outdoor waste. Recognizing the need to address these important issues, AWWA supports the development of WaterSense specifications that help to make both indoor and outdoor water use more efficient. Further, AWWA recognizes the value of the WaterSense label as a trusted reference point for consumers and water system conservation programs alike and agrees that EPA should proceed with the specification for non-agricultural spray sprinkler nozzles.

Specifically, adoption of this specification:

- Promotes the efficient use of water resources.
- Creates consistency in the marketplace.
- Creates consistency in higher efficiency product quality and performance.

- Reduces potential misting, which increases distribution uniformity.
- Allows embedding a reliable WaterSense standard into irrigation system efficiency programming that includes other WaterSense technologies (Smart Controllers and Spray Sprinkler Bodies).
- Recommends installation on a WaterSense labelled sprinkler body with integral pressure regulation for improved overall efficiency.
- Illustrates and successfully uses adopted irrigation standards (ASABE/ICC Standard 802 Landscape Irrigation Sprinkler and Emitter Standard) on products where no standards previously existed.

Recognizing the above benefits and to support achieving them, there are several steps that need to be taken. Portions of the draft specification and supporting material are not up to the standards that stakeholders expect from WaterSense. These include relatively low water savings on a percentage basis and inaccurate cost calculations. It is essential that calculation of water savings and cost implications are transparent and accurate. Transparency and accuracy allows water systems and property owner / managers to make informed decisions. We request that EPA address the following concerns found in the specification and its supporting documents.

EPA should specifically note the importance of both selecting the correct solution for irrigation needs and integration of all irrigation system components

Although an incremental improvement to water efficiency is valued and important, especially given the opportunity for a low cost "drop in" replacement in existing irrigation systems, it is essential that EPA work to support the use of the most appropriate outdoor irrigation solution in the first place. EPA's analysis assumes that outdoor irrigation systems using spray sprinkler nozzles will be replaced in-kind with more efficient models. Although this is one potential outcome, another is that in some geographic areas considerably less irrigation may be needed than is currently applied, and in other areas there may be opportunities for inherently more efficient options such as xeriscaping and drip irrigation for certain types of landscaping. Although spray sprinkler irrigation is likely to be the best solution in some situations, consumers may be confused by the WaterSense label specifying improved efficiency if it is not the most efficient option for their circumstances. Although the broader framework for irrigation choices does not necessarily change this specification itself, framing irrigation choices appropriately should be discussed as an important part of a holistic set of materials on this issue.

EPA should justify the relatively low water savings on a percentage basis of this specification

WaterSense has a long track record of labeling products that both perform as well as their traditional counterparts and also reduce water use considerably. On the "Statistics and Facts" site for WaterSense[1], there is a note that "WaterSense labels products that are 20 percent more water efficient and perform as well or better than standard models." The provided example is WaterSense labeled irrigation controllers, which reduce water use by up to 30%, nearly all of which would otherwise be wasted due to overwatering. However, in this specification's cover sheet, WaterSense notes that an "[irrigation] system using … 50,500 gallons of water per year … could eventually save approximately 2,400 gallons of water

[1] Environmental Protection Agency. 24 April 2023. WaterSense Statistics and Facts. https://www.epa.gov/watersense/statistics-and-facts

annually." At 4.8% savings, that is less than a quarter of the stated WaterSense standard for labeling. The supporting documents show similar projected savings.

In order to set appropriate expectations by water system conservation programs and consumers, WaterSense should clearly note why it is proposing a specification when the percentage of savings is so much lower than the WaterSense target. Further complicating this discussion is conflicting information about the projected savings, as elsewhere on the cover letter WaterSense notes that "more efficient models … can reduce water use by approximately 10 percent," more than double the savings reported elsewhere.

Although AWWA agrees that there is considerable savings to be had through improvements to irrigation systems, EPA's statement "because spray irrigation is prevalent throughout landscapes in the United States, EPA still sees an opportunity for communities to save significant water by encouraging more efficient nozzles" is not sufficient alone. A similar argument could be used for almost any water consuming product used by a significant number of consumers, and thus justify savings much smaller than the target goal of 20%. EPA should be more specific in noting why sprinkler nozzles are different than other products and thus warrant a lesser amount of savings, or otherwise EPA and WaterSense partners will feel pressured to include other products with savings well below the WaterSense goal in the future. The WaterSense label carries weight only to the extent it consistently and reliably provides considerable water savings to consumers and conservation results to water systems. This is not to say that EPA should not proceed with this specification, but that the justification for the specification should be more thoroughly documented and explained.

Sprinkler spray nozzles are an integral component of the overall irrigation system which also includes two other components that can carry the WaterSense label, irrigation controllers and spray sprinkler bodies, and they differ from other products due to the cumulative and potentially synergistic effect among them. EPA does not currently clearly note this anywhere amongst the draft materials.

AWWA is unable to replicate the WaterSense assumption for "the cost of water for irrigation"

On page A-1 of the draft specification's supporting statement, the "cost-effectiveness calculations" section on assumptions notes "the cost of water for irrigation is $13.11 per thousand gallons" and that statement references "Raftelis Financial Consulting, Inc [and] American Water Works Association, 2021 Water and Wastewater Rate Survey." Although not included in the citation, the link to this survey is https://engage.awwa.org/PersonifyEbusiness/Bookstore/Product-Details/productId/103665535. There is also an updated version of the survey, which is now updated on a six-month basis, at https://www.awwa.org/Publications/Bookstore/Rate-Survey.

AWWA has reviewed this material as well as the results of and data behind the 2021 Water and Wastewater Rate Survey, and we have been unable to replicate the value for "the cost of water for irrigation." The materials provided simply do not provide enough information to validate this option or suggest a different option. In coming to this conclusion, we reviewed:

1. The draft specification supporting statement itself

2. The 2021 Water and Wastewater Rate survey results and data
3. The 2022 WaterSense estimates for average national rates[2]
4. The 2017 article by Stratton et al titled "Keeping Pace with Water and Wastewater Rates"[3]

Although the WaterSense estimates website (item 3 above) points to the 2017 article (item 4 above), which is highly informative, it is not sufficiently detailed to replicate these values, nor does it answer key questions on how WaterSense calculates these average national rates. After attempting the use of several different starting points within this data, we were unable to come up with the same value or a value close enough accounting for inflations from 2021 to 2023. Thus, we are requesting that WaterSense provide more information before proceeding with this standard or any other actions that uses this information. Accurate information and transparency are essential to foster participation from consumers and utility conservation programs.

In order to address this discrepancy, and especially given that AWWA is listed as the source of this assumption and we are unable to replicate it, we recommend that WaterSense:

- Include a full citation to this data that allows for readers to find the original source (including a URL).
- Note specifically which values within that source are used in WaterSense's calculations to allow for replication.
- Show how those specific data points are used to calculate the resulting assumed cost for irrigation water, including calculations showing each step from the original data to the final estimate. If adjusted for inflation, which inflation index and which months/years are used for that calculation.
- Clarify whether fixed charges are included or excluded in the cost per thousand gallons. Typically, fixed charges should be excluded because the customer will owe them regardless of the amount of water use and thus, they cannot be appropriately considered in savings when reducing water use.
- Confirm that the conversation from "per CCF" (how most information is presented in the study) to "per 1,000 gallons" (how information is shown in the specification and supporting materials) are performed correctly.
- Clearly describe how wastewater charges are used within the calculation, given the complexities of wastewater billing (see the next section).

Assuming that the cost estimates are based upon a series of calculations or a model using the rates study as a starting point, EPA should include the details of those calculations or model while noting the source data, rather than only noting the source data which is how the statement currently reads.

WaterSense should update its cost-benefit assessments for accuracy for outdoor use

[2] Environmental Protection Agency. 2022. Data and Information Used by WaterSense. https://www.epa.gov/watersense/data-and-information-used-watersense#Cost%20of%20Water
[3] Stratton, H, H. Fuchs, Y. Chen, C. Dunham, C. Ni, and A. Williams. 2017 Oct 1. Keeping Pace With Water and WasteWater Rates. https://doi.org/10.5942/jawwa.2017.109.0101.

As noted above, on page A-1 of the draft specification's supporting document, EPA describes that the cost of water for irrigation (and thus the savings when use is reduced) is $13.11 per thousand gallons. Based on information received in an initial inquiry (but not stated in the supporting document), it appears that this amount is based upon savings from both drinking water costs and wastewater costs.

Although this is a reasonable assumption for savings that occur in *indoor* use because most indoor use goes to wastewater treatment and can reasonably be assumed to be billed for wastewater, this is not the case for outdoor use. Thus, the inclusion of the full wastewater average rate *is* appropriate for indoor water uses that will go mostly or entirely into the wastewater system. However, the inclusion of the full wastewater rate *is not* appropriate for outdoor uses.

Although there are some utility rate structures that will bill the volumetric wastewater charge for the entire amount billed for water (including outdoor use), many rate structures do not do so. In those instances, outdoor use can be:

1. Billed separately through a separate irrigation meter or account that does not include the wastewater charge.
2. Billed as a percentage of total use (recognizing that some use does not go to wastewater).
3. Included in one account but with the wastewater charge being reduced by the amount measured by an irrigation sub-meter
4. Inferred and billed only for water based upon the difference in seasonal usage. This is typically done in climates where outdoor irrigation is uncommon in the winter.

The AWWA / Raftelis rates survey provided as the reference for the WaterSense average rate calculation does not currently track how outdoor usage is or is not billed differently than indoor usage in the final calculations.

Page 182 of AWWA's *Principles of Water Rates, Fees and Charges* (M1) recognizes there is considerable variability in how wastewater usage is calculated and billed[4]. Likewise, the Water Environment Federation's *Manual of Practice 27, Financing and Charges for Wastewater Systems*[5], in Chapter 8 discusses at length the different approaches to wastewater billing, which include winter averaging and using a percentage of water consumption. Review of the proposed WaterSense specification and supporting materials implies that the costs of wastewater are applied at the full rate for 100% of outdoor applications. The average wastewater rate in that study is accurate on average / in aggregate only for indoor usage. EPA's current assumption that wastewater rates are applied to outdoor usage 100% of the time is clearly incorrect and needs to be revised for accuracy, as none of the available reference materials point to that as an appropriate default assumption.

Addressing this inaccuracy will likely reduce the average benefit to the customer per 1,000 gallons of outdoor irrigation. This is not to minimize the importance of outdoor irrigation management, which is

[4] Woodcock, C, R. Giardina, and T. Cristiano. 2017.*Manual of Water Supply Practices – M1, Principles of Water Rates, Fees and Charges, Seventh Edition.* American Water Works Association. https://engage.awwa.org/PersonifyEbusiness/Bookstore/Product-Details/productId/61556627.

[5] Water Environment Federation. 2018. *Manual of Practice 27, Financing and Charges for Wastewater Systems, fourth edition. https://www.wef.org/publications/publications/books/Financing-Charges-Wastewater-Systems/*

very significant, but rather to provide more accurate information to help water systems administer their conservation programs and consumers to make informed decisions. Likewise, it is essential that WaterSense address this issue in any other specifications or calculations that include an outdoor component.

Additional clarifications in the materials

The following items also warrant clarification.

- EPA's materials note that spray sprinklers that will likely meet this specification have been in use for some time and are of relatively modest cost, however, EPA does not mention how many such nozzles are likely to already be installed. This may considerably change the overall savings of this specification. For example, page 1 of the supporting statement notes that "90 percent of those systems could be equipped with more efficient nozzles to reduce water use" but it is not clear if this statement is saying that 10% already have efficient nozzles or if 10% of systems are not compatible with more efficient nozzles.
- Given that water costs appear to have been adjusted for inflation to 2023 dollars, it would be appropriate for the costs of both standard and more efficient sprinkler nozzles to be adjusted as well (it is not clear from page A-2 if this adjustment has or has not been made).

Conclusion

Thank you for the opportunity to comment on this proposed specification. If you have any questions regarding this correspondence or if AWWA can be of assistance in some other way, please contact Adam Carpenter at (202) 326-6126 or acarpenter@awwa.org.

Best regards,

FOR THE AMERICAN WATER WORKS ASSOCIATION

G. Tracy Mehan, III, Executive Director of Government Affairs

Who is AWWA?

The American Water Works Association (AWWA) is an international, nonprofit, scientific and educational society dedicated to providing total water solutions assuring the effective management of water. Founded in 1881, the Association is the largest organization of water supply professionals in the world. Our membership includes more than 4,500 utilities that supply roughly 80 percent of the nation's drinking water and treat almost half of the nation's wastewater. Our 50,000-plus total membership represents the full spectrum of the water community: public water and wastewater systems, environmental advocates, scientists, academicians, and others who hold a genuine interest in water, our most important resource. AWWA unites the diverse water community to advance public health, safety, the economy, and the environment.

Commenter: Chris Cueman, Chris Cocoran
Affiliation: New York State Energy Research and Development Authority (NYSERDA)
Comment Date: February 23, 2024

Email Text:

Good afternoon,

Thank you for the opportunity to comment on the proposed specifications for Water Sense. NY State is grateful for the work that went into this effort and for the water and energy savings that we expect it will produce.

Yours,

Chris

Chris Cueman | Senior Project Manager – Codes, Products, & Standards
NYSERDA | 17 Columbia Circle | Albany, NY 12203-6399
P: 518-862-1090 x3212 | F: (518) 862-1091 | E: chris.cueman@nyserda.ny.gov
nyserda.ny.gov

Email Attachment:

See page 21.

Comment Submission on WaterSense Draft Specification for Spray Sprinkler Nozzles

Commenter Name: Chris Corcoran

Commenter Affiliation: New York State Energy Research and Development Authority (NYSERDA)

Date of Comment Submission: March 1, 2024

Topic: General Support

Comment: NYSERDA appreciates the opportunity to submit comments to WaterSense on the Spray Sprinkler Nozzle Draft Specification. NYSERDA's mission is to advance clean energy innovation and investments to combat climate change, improving the health, resiliency, and prosperity of New Yorkers and delivering benefits equitably to all. NYSERDA is strongly supportive of WaterSense developing a new specification for this product category. In June 2023, New York established appliance standards that include Spray Sprinkler Bodies , and referenced the WaterSense specification; NYSERDA looks to the WaterSense program to help establish meaningful opportunities for water savings. A new specification for Spray Sprinkler Nozzles is expected to result in water and associated bill savings for New Yorkers. Please do not hesitate to reach out with any questions. Thank you.

Rationale: N/A

Suggested Change (or Language): N/A

Commenter: Jessica Case
Affiliation: Rain Bird Corporation
Comment Date: February 28,2024

Email Text:

Please see attached response from Rain Bird Corporation regarding the WaterSense Draft Specification for Spray Sprinkler Nozzles.

Thank you,

Jessica Case
Marketing Manager, Landscape Mechanical and Extruded Products
520-434-6232

Rain Bird Corporation
6991 East Southpoint Road
Tucson, Arizona 85756
RainBird.com

Email Attachment:

See pages 23 to 24.

February 28, 2024
US Environmental Protection Agency – WaterSense Program
Via email – watersense-products@erg.com
RE: WaterSense Draft Specification for Spray Sprinkler Nozzles

WaterSense Team,

Thank you for the opportunity to comment on the WaterSense Draft Specification for Spray Sprinkler Nozzles. Since Rain Bird's beginnings in 1933, we have been dedicated to The Intelligent Use of Water™ by developing innovative products and technologies that use water in increasingly efficient ways. We are committed to working with the EPA and WaterSense in our shared goal of providing water-efficient solutions that are easily identifiable and accessible to consumers.

The WaterSense program's success with other Landscape Irrigation product categories, Spray Sprinkler Bodies and Irrigation Controllers for example, is evident by states incorporating irrigation products with WaterSense certification into their appliance efficiency laws. This precedent highlights the importance of developing a specification based on data that is reliable and repeatable across industry manufacturers. We believe the WaterSense specification criteria for spray nozzles will similarly have a significant impact on the irrigation industry and therefore, should be based on a consensus-driven American National Standards Institute (ANSI) standard that defines spray nozzle efficiency.

We oppose the use of nozzle application rate as a key performance criterion, as is proposed in the current draft specification. We do not believe there is sufficient data today to demonstrate that water savings are achieved by restricting a nozzle's application rate. Furthermore, application/precipitation rate is not an element of spray sprinkler nozzle efficiency. Irrigation sprinkler effectiveness depends on multiple factors such as nozzle spacing/layout, soil type, plant type, and watering window restrictions. Applying water more slowly can reduce or delay the start of run-off but does not reduce the amount of water required by plant material, nor does it address over-usage, which is inevitable if distribution uniformity is poor. Lowering application rates of sprinklers is an attempt to reduce run-off, which is really a failure of irrigation scheduling and neither an inherent characteristic of spray sprinkler nozzles nor an element of irrigation efficiency. Run-off is a water management issue that should be addressed

by the proper management of irrigation schedules, aided by WaterSense labeled irrigation controllers.

Almost all spray sprinkler nozzles on the market from multiple manufacturers, even high efficiency nozzles based on California's Model Water Efficiency Landscape Ordinance (MWELO), have published application rates greater than 1.2 inches per hour. Restricting spray nozzles based on application rate severely limits the choices available for proper irrigation design.

For decades, the industry has recognized distribution uniformity as the most appropriate measure of sprinkler efficiency. We urge WaterSense to adopt distribution uniformity, not application rate, as the appropriate measure of spray nozzle efficiency.

We appreciate the opportunity to provide input regarding WaterSense's Draft Specification for Spray Sprinkler Nozzles.

Sincerely,

Jessica Case
Marketing Manager – Landscape Mechanical and Extruded Products

Commenter: Nathan Bowen, Natasha Rankin
Affiliation: Irrigation Association
Comment Date: February 29,2024

Email Text:

We inadvertently submitted the incorrect attachment in the previous email. Please disregard and use this file instead.

Regards,

Nathan Bowen
Advocacy & Public Affairs Vice President
Irrigation Association
8280 Willow Oaks Corporate Drive, Suite 630 | Fairfax, VA 22031
C: 202-209-9091| nathanbowen@irrigation.org | www.irrigation.org

Email Attachment:

See pages 26 to 29.

Irrigation ASSOCIATION®
8280 Willow Oaks Corporate Drive, Suite 630 | Fairfax, VA 22031
Tel: 703.536.7080 | Fax: 703.536.7019
www.irrigation.org

February 29, 2024

U.S. Environmental Protection Agency
WaterSense Program
1200 Pennsylvania Avenue NW
Washington, DC 20004

Re: WaterSense Draft Specification for Spray Sprinkler Nozzles

To whom it may concern:

On behalf of the approximately 1,300 member companies of the Irrigation Association, we appreciate the opportunity to respond to the Agency's *WaterSense Draft Specification for Spray Sprinkler Nozzles*.

The IA represents experts in all aspects of irrigation, including agriculture, landscape, turfgrass and golf, and serves as the unifying voice of the diverse companies and professionals within the industry. As stewards of water resources, irrigation professionals and companies recognize the important role we serve in ensuring water resources are accessible for future generations. Our industry and our members are committed to investing in continuous improvement, technology advancements, innovation, research and new product development and adoption, all while contributing expertise to encourage dialogue and successful solutions that have a lasting impact on the sustainability of our water resources.

We support the goals and objectives of the WaterSense program, and we are committed to working with EPA and the WaterSense program to ensure workable specifications for the industry, communities, utilities and ultimately consumers. As many utilities are already rebating a variety of "high efficiency" nozzle products, we appreciate the Agency's interest in pursuing the development of a specification for spray sprinkler nozzles. We appreciate the dialogue the Agency has engaged in over the course of this process, and we provide the following comments to further that dialogue. These comments were developed with the input of a diverse group of IA members, which includes irrigation manufacturers, distributors, designers, contractors, water agencies, educators and end users.

General comments

1. **Pursue the development of a voluntary, consensus-based American National Standards Institute standard.**

It is critical that any WaterSense specification be developed via a collaborative stakeholder-driven process and be based on sound science, robust data and industry best practices. To that end, we reiterate our recommendation from April 2023 that the most appropriate path forward for these

products is the development of a voluntary, consensus-based American National Standards Institute standard that defines spray nozzles efficiency that could then be used as a basis for a WaterSense specification. This process would forge consensus and help resolve issues IA members have raised in their individual comments on this NOI. During our own review process of the draft specification, it became clear that there are diverse perspectives even within the IA's membership on some elements of this proposal. A standard-setting process would allow for a more robust, inclusive and diverse stakeholder process that would ultimately improve the end result.

To this end, we are prepared to engage with an organization such as the American Society of Agricultural and Biological Engineers to facilitate the development of such a standard. Further, we recognize this recommendation requires a commitment of time and resources on the part of the IA, and we are prepared to bring such a process to a successful conclusion.

2. A voluntary specification will become a legal requirement in many states.

While this would be a voluntary specification, we know that many states will eventually mandate in law that products covered by the specification bear the WaterSense label. Previous experience with spray sprinkler bodies and irrigation controllers indicates this voluntary specification will, in practice, become mandatory regulation in significant portions of the country. This will result in very prescriptive requirements for products that can be used in those states.

We note in particular that this would have significant implications on the retrofit market. A multi-stream, multi-trajectory (MSMT) nozzle or a nozzle with differing precipitation rates cannot simply be "swapped in" to replace an existing spray nozzle due to different pressure and/or run time requirements. This would require significant — and potentially costly — system upgrades just to replace a broken nozzle. Instead, it is more likely retrofits, repairs and upgrades would be delayed, undermining the water conservation goals of a WaterSense specification. A robust, consensus-based ANSI standard would help avoid these future problems.

We also note that the specific sprinkler/nozzle combination that should be used is best determined by the system design professional as they are best equipped to determine the allowable precipitation rate based on available site information which includes: plant material, soils, water pressure, slope, wind, the area to be irrigated and water window time restrictions. A prescriptive approach to nozzle choice limits the designer's ability to provide the nozzle best for the site when all factors are considered.

3. Concerns regarding the lack of data and real-world verification of test methods.

We are concerned the Agency is moving forward with a specification with significant data gaps, particularly with respect to distribution uniformity, as well as the absence of real-world verification of test methods. We encourage the Agency to collaborate with industry, the research community and other stakeholders to close these gaps and ensure any specification is based on robust science. To this end, the

IA is prepared to proactively engage the industry and its stakeholders to facilitate and support measures to bridge these data gaps.

4. The Importance of education, outreach and qualified professionals.

We underscore the important role qualified irrigation and landscape professionals — and educated end users — play in advancing water conservation on landscapes. Unlike many products with WaterSense specifications, spray nozzles are fundamentally different in that they are elements of a complex system designed with the specific climate, plant material, soils, water pressure, slope and the area to be irrigated in mind. A successful landscape depends on proper design, installation and maintenance. Qualified personnel are essential and every level to achieve these water savings.

Comments on specific aspects of the draft specification

Topic: 1.0 – Scope and Objective

Comment: The specification's scope would include both spray nozzles and MSMT nozzles. Including both under the same specification is problematic. Spray sprinkler nozzles and MSMT nozzles are fundamentally different products and defining and establishing test methods for both under the same specification presents significant challenges. An efficient irrigation system considers dozens of variables and is an engineered system. Utilizing the wrong component can negatively affect its performance and potentially negate any water savings or result in waste to try and correct. This is particularly relevant with respect to testing. Currently, per ASABE 802 Table 303.5.4.1, MSMT nozzles are tested via single-leg catchments, rather than the use of a full grid as contemplated in this draft specification.

Suggested Change (or Language): We recommend the Agency clarify the definition so that at a minimum the two products are defined separately and to engage in robust dialogue with stakeholders to determine whether these two product types should be handled under two entirely separate specifications.

Topic: 3.1.1 -- Water Efficiency and Performance Criteria: Arc Settings

Comment: The draft specification calls for testing at both the minimum arc and maximum arc settings. We question the feasibility of testing at these minimum and maximum settings — which in some cases could be 45 degrees and 360 degrees. Is the Agency aware of a DU model that would account for these radii?

Suggested Change (or Language): We recommend testing fixed and partially adjustable arc nozzles at factory settings across the series. We recommend testing fully adjustable arc nozzles at 180 degrees, the most common use case.

Topic: 3.3.4 -- Application Rate: Criterion

Comment: The specification would establish that the average application rate be 1.2 inches per hour or less. Significant aspects of the industry are challenged by this restrictive rate. Additional information is needed regarding the underlying data that is used to support this requirement and how a 1.2 inches per hour or lower precipitation rate was calculated and achieved.

The most efficient design for a given landscape is impacted by any number of factors from soil, weather, geography, plant types, quality of source water, etc., and the most efficient nozzles in a given application are not always those with the lowest precipitation rate. We note that California considered the use of a precipitation rate requirement in the state's 2015 MWELO standard. However, after stakeholder input, the state ultimately adopted the use of DU for nozzle installation (with the exception on slopes, in which cases were limited to 0.75 inches per hour as per MWELO title 23 section 492.7(v)).

Suggested Change (or Language): Because of the broad challenges to stakeholders with the 1.2 inch per hour application rate (especially in the context of the geographic ramifications of such standard) and the lack of robust, defensible data, we recommend the Agency to (1) convene a diverse group of stakeholders around this specific topic to identify an appropriate path forward, and (2) provide additional data to justify the use of this (or other) application rate.

Thank you for your consideration of these comments. We are committed to working with the Agency and impacted stakeholders to advance both the WaterSense program and water conservation across the country. Please contact Nathan Bowen (nathanbowen@irrigation.org), IA advocacy and public affairs vice president, for questions or additional information.

Sincerely,

Natasha L Rankin, MBA, CAE
Chief Executive Officer

Commenter: Amber Clark
Affiliation: Hydro Systems KDI
Comment Date: February 29,2024

Email Text:

Hello, please see attached for comments relating to the proposed specification for Spray Sprinkler Nozzles. Thank you!

Amber Clark
PRINCIPAL
CID, TX LI#0021943, QWEL
amberc@hydrosystemskdi.com
o: 303.980.5327
c: 303.725.7956
hydrosystemskdi.com

13949 W COLFAX AVE, SUITE 260
LAKEWOOD, COLORADO 80401
Website | Facebook | LinkedIn

Email Attachment:

See pages 31 to 34.

To: ***U.S. Environmental Protection Agency WaterSense Program***
1200 Pennsylvania Avenue NW
Washington, DC 20004

From: HydroSystems-KDI, Inc.
Amber Clark
303-980-5327

Date: February 29, 2024

Re: ***WaterSense Draft Specification for Spray Sprinkler Nozzles***

Thank you for the opportunity to comment on the proposed specification.

As an Irrigation Designer, I strive to create water efficient landscape irrigation systems, teaming with Landscape Designers and Architects. My background is in Engineering and Horticulture, and I am passionate about doing the best we can creating environments in our built world.

Programs such as yours give me resources to encourage design that uses water in sustainable ways, in an industry that is very driven by cost. I appreciate your considerations of my comments regarding the challenges the specific writing of this draft specification can pose for designers such as myself. I believe there is a path to certify nozzles and encourage development of new products, with some adjustment to the draft.

Sincerely,

Amber Clark
Principal

Template for Public Comment Submission on WaterSense Documents – Spray Sprinkler Nozzles

Commenter Name: Amber Clark

Commenter Affiliation: HydroSystems-KDI, Principal, Irrigation Association Certified Irrigation Designer, Qualified Water Efficient Landscaper (QWEL) Certified, TX Licensed Irrigator #0021943

Date of Comment Submission: 2/29/2024

Topic: General Comments

Comment: A voluntary specification will become a legal requirement in many states.

Rationale: As we have seen in the past, WaterSense is seen as an authority on water conscious products, and provide an easy path to legislation regarding ways to save water. We have seen many legislative bodies and "green" certification entities require or write into law the use of WaterSense labeled product. In many situations, previously labeled products did not drastically limit or change the irrigation systems' capabilities to operate. We believe this specification would do so. Current products cover a multitude of site-specific needs and the proposed specification has the possibility of limiting the ability to irrigate in a method that takes site specific needs into account. These products are not all equal on their foundation, and may end up being used in a method that will increase water waste or landscape death.

Should the approved products lead to legislation, in particular the retrofit market will be drastically impacted. A single nozzle would not be able to be replaced when in need of repair with an equal nozzle. This could have consequences that lead to water waste, such as: failure to repair, replacement with a nozzle that changes the Distribution Uniformity (DU), a nozzle that requires a wholly different pressure, or a nozzle that does not fit the limits of the area. It may also lead to a "if you touch it, you must upgrade" scenario. Where funds are not available, repairs, upgrades or retrofits may be delayed or avoided altogether.

A prescriptive law or specification will limit a professional designer in the design process to an outcome that may not be the most efficient in terms of water use or plant health. We prefer labeling that notes nozzle's ability to meet their stated water use and performance stated in manufacturer literature, and a larger emphasis on utilizing WaterSense (or equivalent) certified Designers, Installers, and Maintenance Personnel.

Suggested Change (or Language):

Topic: 1.0 – Scope and Objective

Comment: The specification's scope would include both spray nozzles and multi-stream, multi-trajectory (MSMT) nozzles. These are fundamentally different products and defining them in the same specification presents real issues.

Rationale: Traditional spray nozzles and MSMT nozzles have very different needs in terms of hydraulics and uses.

Pressure needs – The manufacturer's recommended pressures for each type of nozzle are different, ranging from 30psi (traditional spray, or 40psi to 45psi (MSMT). When calculating hydraulics, many systems cannot provide the pressures needed for MSMT nozzles. Where legislation adopts this specification and limits selection, this may force the need for booster pumps. While WaterSense is concerned with water, this increases Electrical demands for the system and its associated impact on our world. Additionally, not all providers allow for the use of booster pumps on irrigation systems.

In the retrofit market, this may be especially cumbersome. Not only may nozzles need to be replaced, but regulated spray bodies to match as well. Should pressures for MSMT nozzles not be available, booster pumps and additional power sources may be needed. A single nozzle update may result in changes that price in the five-figure range.

Operational needs – MSMT nozzles apply water at a much slower rate than other spray nozzles. While that may reduce some losses – primarily through run-off due to improper matching to soil types, the plant still requires a given amount of water for proper health and growth. In practice, this means it takes more hours in a week to apply the water needed for the plant. Municipalities and water purveyors have instituted "water windows" for irrigation for a number of reasons, including ability to manage their peak demand. We have seen this result in the need for larger tap sizes and larger control systems. This may discourage selecting WaterSense certified product if budgets or municipalities do not allow for this increase in size. It may also push irrigation into daytime hours, which is not ideal for plants or use of park spaces.

Suggested Change (or Language): At minimum, we recommend the Agency clarify the definition so at minimum the two products are defined separately, and ideally separate these two product types into two entirely separate specifications.

Topic: 3.1.1 – Application Rates: Criterion

Comment: The specification would establish that the average application rate be 1.2 inches per hour or less. More information is needed regarding the underlying data that is used to support this requirement and how a 1.2 inches per hour or lower precipitation rate was calculated/achieved.

Rationale: Proper design and product selection should include extensive evaluation of site-specific variables. A designer should evaluate site types, weather patterns (including wind), slopes, geography, plant types and growth patterns, purveyor requirements for water windows and application times, and water source and quality.

In practice, this means it takes more hours in a week to apply the water needed for the plant. Municipalities and water purveyors have instituted "water windows" for irrigation for a number of reasons, including ability to manage their peak demand. We have seen this result in the need for larger tap sizes and larger control systems. This may discourage selecting WaterSense certified product if budgets or municipalities

do not allow for this increase in size. It may also push irrigation into daytime hours, which is not ideal for plants or use of park spaces, or result in fines due to exceeding water windows enforced by purveyors or Municipalities.

Selection of the proper emission device to property irrigate the selected plant material should depend on all of these factors, and a very low precipitation rate does not always result in the most efficient use of water or ability to minimize plant health. Clogging of orifices are particularly challenging at this rate of application. Feasibility of using alternative sources of water, such as reclaimed, raw water pumping systems or reuse systems rather than drinking water, will be negatively impacted by any legislation or mandating this limit.

A prescriptive law or specification will limit a professional designer in the design process to an outcome that may not be the most efficient in terms of water use or plant health. We prefer labeling that notes nozzle's ability to meet the performance stated in manufacturer literature, and a larger emphasis on utilizing WaterSense (or equivalent) certified Designers, Installers, and Maintenance Personnel.

Suggested Change (or Language): We recommend the Agency reconsider including this specific limitation until there is greater consensus on this being an appropriate limitation.

Commenter: Kelsey Jacquard
Affiliation: Hunter Industries
Comment Date: February 29, 2024

Email Text:

Hello,

Please see our response from Hunter Industries regarding the proposed EPA WaterSense Specification for Nozzles.

We appreciate the opportunity to respond, and we welcome more discussion around the topic of characterizing nozzle performance.

Thank you!

KELSEY JACQUARD, *CID, CLIA*
Category Manager – Mechanical Irrigation Products

1 760-744-5240 **Main**
1 760-591-7099 **Direct**
Kelsey.Jacquard@hunterindustries.com

Hunter® | Built on Innovation®

1940 Diamond Street
San Marcos, CA 92078
USA
www.hunterindustries.com

Email Attachment:

See pages 36 to 41.

Template for Public Comment Submission on WaterSense Documents

Commenter Name: Kelsey Jacquard

Commenter Affiliation: Hunter Industries

Date of Comment Submission: 02/29/24

Thank you for the opportunity to comment on the draft specification for nozzles. We welcome more discussion directly with WaterSense around the characterization of nozzle performance to further explain our position and answer any questions.

General Comments:

EPA WaterSense Specification for Spray Sprinkler Bodies test method was clear and verified during the standard development whereas the proposed nozzle criteria and test methods are unclear and unproven.
The proposed acceptance criteria and test methods for nozzles lack clarity and have not been proven. During the spray body standard development, the acceptance criteria and test methods were tested and verified to be realistic and repeatable. Has that same effort gone into this proposed standard?

Limiting nozzles based on precipitation rate limits the efficiency of the landscape.
Less water flow through a nozzle does not equate to more efficient irrigation for the landscape. Implementing a precipitation rate requirement eliminates several nozzles designed for specific spaces and eliminates the choices available to professional designers and installers for the landscape. Requiring low precipitation through a fan spray nozzle will also lead to more misting in real-world applications where even a slight breeze will distort the pattern. Using the manufacturer's recommended pressure for the nozzle and allowing for the selection of the best nozzle for the landscape will allow for more effective irrigation, increased overall irrigation efficiency, and healthier plant materials long term.

EPA intends to influence a market that has already been transformed.
During a public comment session hosted by EPA WaterSense on December 12th, 2023, it was shared that proposals from EPA WaterSense intend to 'transform' and influence markets to innovate and release products with certified water savings. In this case, the transformation has already occurred. MSMT nozzles were innovated to deliver greater efficiency over spray nozzles as identified by landscape professionals, water managers, and manufacturers. Domestic irrigation markets understand that MSMT nozzles deliver greater water efficiency than spray nozzles through lower precipitation rates as well as improved uniformity, reduced misting, and wind resistance using rotating streams. The proposed EPA nozzle certification negates the benefits of this transformation by creating an apples-to-apples comparison between spray nozzles and MSMT nozzles, confusing the market and undermining actual water savings practices conducted by the industry.

Price Comparison and Actual Water Savings
By including both spray nozzles and MSMT nozzles under the same certification, we create a comparison that will lead to less water savings. The price of a spray nozzle is about 5x less than an MSMT nozzle. If both products fall under the same certification, it will be

assumed that both nozzles perform to the same level, so consumers will instinctually lean toward purchasing the lower-priced product. MSMT nozzles have additional water-saving benefits to fan spray nozzles beyond low precipitation rates, including improved wind resistance and larger droplets from the rotating streams, and higher uniformity from the multiple stream trajectories. If equally certified, the consumer preference will be the lower-priced nozzle which leads to less real water savings in the field.

Nozzle certification will create confusion in the market.
WaterSense Certification of some nozzles while excluding other nozzles by their "micro irrigation" performance will create confusion in the marketplace. Some nozzles may qualify as micro irrigation emission devices, excluding them from the certification standard; however, we have seen exemptions lead to complete exclusion from projects due to a lack of understanding. Even with a well-defined spray sprinkler body specification, projects in some markets excluded MSMT nozzles because they were not "sprays" that were installed on EPA WaterSense Certified spray sprinkler bodies.

Topic: Definition of spray sprinkler nozzle

Comment: Define MSMT nozzles separate from spray sprinkler nozzles.

Rationale: MSMT nozzles are established in the industry as a separate style nozzle from spray nozzles with different performance characteristics. MSMT nozzles use multiple rotating streams to target water distribution and to put water down slowly, more like a rotor. These multiple rotating streams allow for larger water droplets to better reach their target, better wind resistance, and improved uniformity. Spray nozzles are understood in the industry to apply water over a defined area in a fan shape without rotation where a higher application of water is needed to reduce misting.

ASABE 802-2020 defines a rotor as "a sprinkler that applies water in a pattern by means of one or more rotating streams to a defined landscape area." The test method for rotors is different from sprays based on one or more rotating streams.
ASABE 802-2020 defines a spray as "a sprinkler that continuously applies water in a pattern to a defined landscape area."
ISO 8026 section 3.6 defines an irrigation sprayer as a "device that discharges water in the form of fine jets or in a fan shape without rotational movement of its parts."

MSMT nozzles and spray nozzles are built very differently and priced differently to the consumer. MSMT nozzles can be made of up to 20 components while a spray nozzle is made up of 3-4 components. The cost to the manufacturer to produce and ultimately to the consumer to install is about 5 times more expensive than a spray nozzle.

The definition has implications for the test method used in this specification.
Based on ASABE's definition of a rotor and a spray, MSMT nozzle testing has been performed using single-leg catchments per ASABE 802 Table 303.5.4.1. Changing the definition and requiring a full grid with 1ft spacing of catchments for nozzles that throw up to 35ft will require a significant and impractical increase in time, labor, and money required to test the MSMT nozzles that could be unachievable for manufacturers. A 20ft grid has 714 catchments, and a 35ft grid would require over 1900 catchments to manually read for a single test in a single configuration.

We ask for clarification on the definition and the test standard regarding MSMT nozzles.

Suggested Change (or Language):
Define a spray nozzle as a “nozzle that discharges water in the form of fine jets or in a fan shape without rotational movement of its parts.”
Define MSMT nozzle as a “nozzle that discharges water in multiple rotating streams.”
Clarify the test method to allow for single-leg catchment testing of rotating stream nozzles per ASABE.

Topic: Spray Sprinkler Nozzle Definition

Comment: The definition is confusing, and it is not clear which component is being referenced.

“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.”

Rationale: Confusing definition. Which product does not contain components to drive rotation? The nozzle or the body?

Suggested Change (or Language): Clarify spray sprinkler nozzle definition based on existing ASABE and ISO 8026 definitions. Separate MSMT from spray nozzle category.

Topic: Water Efficiency and Performance Criteria: Distance of Throw

Comment: The proposed ‘extremes’ distance of throw testing is in contradiction with the 3.1.2 testing proposal verbiage.

Rationale: Manufacturers publish a specific operating distance of throw performance at a recommended pressure, not a range of distances at that pressure.

Also looking for clarification on using the spray nozzle radius adjustment screw. The radius adjustment screw chokes flow and radius, but it is not so precise to maintain matched precipitation to the level described in this specification. The best practice for spray nozzles that throw too far for a space is to use the next nozzle size down at the fully open factory radius setting.

Suggested Change (or Language): Remove the minimum and maximum distance of the throw test and only test a manufacturer’s published distance of throw at factory settings at the manufacturer's recommended operating pressure.

Topic: Water Efficiency and Performance Criteria: Arc Settings

Comment: The nozzle settings defined for testing are set to the minimum and maximum extremes of the product settings. Has this been tested for feasibility to comply with the standard criteria?

Some nozzles have a minimum published performance of 45 degrees. Is there a DU model that accounts for these odd radii?

Rationale: Products are designed for optimal performance at their fixed arc settings and at the most common use case, which is a 180-degree arc setting with a fully open radius.

Suggested Change (or Language): For fixed arc nozzles and partially adjustable arc nozzles, we suggest testing each nozzle at factory arc settings across the nozzle series. For fully adjustable arc nozzles, we suggest testing each nozzle at the most common use case of 180 deg.

Topic: Asymmetrical or Irregular Spray Pattern Testing

Comment: Eliminate extremes of product settings for testing.

Rationale: Products are designed for optimal performance at their most common use case, which for asymmetrical nozzles is factory settings.

Suggested Change (or Language): Test the nozzles at factory settings at recommended pressure.

Topic: Distance of Throw Testing

Comment: The distance of throw is used to calculate the application rate and to generate the DU. This ties back to the question of the test method. For MSMT nozzles, per ASABE ICC 802, can they be tested using the single-leg test method like rotors?

Rationale: ASABE ICC 303.5.4.2 distance of throw references ASAE S398.1 which measures the radius at the midpoint of the pattern. If the chosen radius for calculations is from a midpoint in the pattern, then using single-leg test data would have the same result.

Suggested Change (or Language): Clarify the definition of MSMT v spray nozzle and define the test method for the distance of throw. Suggest single-leg testing for rotating stream nozzles as defined by ASABE.

Topic: Maximum Allowable Difference Between Tested and Rated Distance of Throw

Comment: Round up the ½ ft difference as the radius is not measured by the ½ ft.
No product exists in this category today with a range over 35 ft.
Suggest maintaining a similar tolerance percentage across the radius ranges.

Rationale: Need to prove the tolerance range through testing.

Suggested Change (or Language): Change the allowable distance table for every 10ft and widen the tolerance.
20-29 ft = 3 ft
30-39 ft = 4 ft

Topic: Application Rate as a Criterion

Comment: Eliminate precipitation rate of 1.2 in/hr as a criterion for an EPA WaterSense Certified nozzle.

Rationale: The best nozzle for the landscape is not always the nozzle with the lowest precipitation rate. The best application rate for the landscape depends on multiple factors. Soil type, plant type, weather, water window restrictions, and available nozzle sizes among other factors determine the best application rate for the landscape.

Sandy soils in hot climates prefer higher application rates from the nozzle while clay soils require low precipitation rate nozzles to prevent runoff.
Hot, dry climates can prefer higher precipitation rates to better saturate the soil to better fight evaporation whereas low precipitation rate nozzles would require longer runtimes to properly irrigate the landscape.

Local water districts oftentimes prescribe irrigation water-windows or limit the cycle time for each irrigation zone, sometimes to 10 minutes for example. Lower precipitation rate nozzles directly lead to longer run times to adequately sustain green infrastructure which often exceeds locally prescribed water-window regulations. In this case, conflicts between adopted federal programs and local regulations may lead to landscape material losses, increased waste, and decreased carbon sequestration ability due to lack of adequate irrigation. Longer runtimes are needed for low precipitation rate nozzles.

Short radius nozzles are limited in their precipitation rate offering, so a standard would limit the available irrigation options for certain spaces even if they are the best option for the job.

Low precipitation rates can help prevent runoff, but irrigation efficiency comes from how effective the applied water is to the landscape. Proper runtimes can also prevent runoff.

CA researched the idea of using a precipitation rate requirement for the 2014 MWELO standard, and after research and stakeholder input, decided upon using DU as the requirement for nozzle installation, except on slopes which was limited to 1.0 in/hr.

More research is needed before establishing a precipitation/application rate as a requirement.

Suggested Change (or Language): Eliminate the precipitation rate criterion until more research has been completed.

Topic: DU Test Method

Comment: The standards do not describe how to model the DU. The test method also needs clarification based on whether MSMT nozzles can use single-leg test data per the ASABE standard Table 303.5.4.1 under “rotating streams.”

Rationale: The industry needs a proven, repeatable method to model DU.

Suggested Change (or Language): Either provide an acceptable modeling method based on proven repeatability or allow accredited test facilities to use their own method.

Topic: Matched precipitation criterion

Comment: Eliminate the criterion. Otherwise, open tolerances for more realistic performance.

Rationale: Most nozzles are already matched precipitation within their nozzle families, but they are not always matched across families or manufacturers. A WaterSense label for matched precipitation will be confusing and lead consumers to believe that all certified nozzles can be mixed in a landscape irrigation zone. More research is needed before establishing a matched precipitation rate as a requirement.

The described test methods also test the nozzles at the extreme upper and lower settings, creating variability in the performance. It would be interesting to test various products to check the viability of the test method and the acceptance limit of 90%.

Suggested Change (or Language): Eliminate the criterion. Otherwise, verify the test method and open the tolerances so they are achievable and repeatable.

Topic: Micro irrigation definition

Comment: Exempting micro irrigation emission devices allows many low-volume spray and MSMT nozzles to be exempt from this specification. Is that intentional? And will it be confusing that some nozzles are EPA WaterSense Certified while others are exempt, especially within the same family of nozzles?

As EPA WaterSense Certification becomes a requirement in various states and regions, knowing which nozzle products need certification or are exempt will be confusing.

Rationale: Several MP Rotator models flow less than the defined micro irrigation device of 30 GPH at 30 PSI. Other nozzle products on the market qualify as micro irrigation as well and would therefore be exempt from this standard. How would the market know which category of nozzles would be exempt and which category would require WaterSense certification?

Suggested Change (or Language): Clarify that micro irrigation emission devices discharge water at flow rates less than 30 GPH at 30 PSI <u>across the product series</u>. This matches the ASABE definition. Nonetheless, a WaterSense label for nozzles with these necessary nozzle exceptions will create confusion in the market.

Commenter: Spencer Bernard
Affiliation: Northern Water
Comment Date: February 29,2024

Email Text:

Hello,

Please see the attached document regarding comments for the EPA nozzle specification.

Thank you,

Northern Water

Spencer Bernard, CID, CLIA
Water Efficiency Specialist | Northern Water
Direct: (970) 622-2345 | Cell: (970) 617-8011

220 Water Ave | Berthoud, CO 80513 | (800) 369-RAIN (7246)
www.northernwater.org | Facebook | X | Instagram | LinkedIn

Email Attachment:

See page 43.

Template for Public Comment Submission on WaterSense Documents

Commenter Name: Spencer Bernard

Commenter Affiliation: Northern Water

Date of Comment Submission: 2/29/2024

Topic: Section 4.3

Comment: 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.

Rationale: In order to label these nozzles, they must be used in tandem with pressure regulated spray bodies. As soon as a "high efficiency" nozzle is installed on an unregulated spray body, it will have a much smaller likelihood to meet the DU requirements that are required for labeling initially. It is recommended that the EPA explore options to provide a conditional label for the nozzles, only if they are to be used with a pressure regulated spray bodies. For example, many MSMT nozzles on the market currently require an operating pressure of 45psi at the head. This pressure is not always achievable at the residential level around the country.

Suggested Change (or Language): Product documentation, including online and print specification sheets and sales brochures, as applicable, shall notate that the nozzle must be used in combination with a WaterSense labeled spray sprinkler body for optimal performance.

Topic: Section 3.4.4

Comment: Criterion: The average DULQ 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.

Rationale: If these DU tests are occurring at the manufacturer, then this value must be higher. The reason being tests within manufacturer facilities are not subject to the same conditions than that of a field audit. There is no wind, the pressure does not fluctuate, and the equipment is brand new installed to spec. I have often audited MSMT nozzles that outperform that of a .65 DU in the field. According to the IA's chart regarding anticipated distribution uniformities, .65 would be considered the upper boundary of a historical value, which means that the system needs to be improved. .65 is a very low bar for manufacturers to meet.

Suggested Change (or Language): I would suggest an updated DU requirement at .75, as this puts the nozzles into the achievable category. If this is going to be where the standard is set, set the standard high.

Commenter: Ed Osann, Kanchan Swaroop, Heather Cooley
Affiliation: Natural Resources Defense Council
Comment Date: March 1, 2024

Email Text:

Please accept these comments for the record regarding the Draft Specification for Spray Sprinkler Nozzles filed on behalf of the Appliance Standards Awareness Project, the Natural Resources Defense Council, and Pacific Institute.

Ed Osann
NRDC

Email Attachment:

See pages 45 to 47.

Appliance Standards Awareness Project
Natural Resources Defense Council
Pacific Institute

March 1, 2024

Submitted via email to <watersense-products@erg.com>

Re: WaterSense Draft Specification for Spray Sprinkler Nozzles, Version 1.0

Please accept these comments for the record regarding the above-captioned Draft Specification for Spray Sprinkler Nozzles filed on behalf of the Appliance Standards Awareness Project (ASAP), the Natural Resources Defense Council (NRDC), and Pacific Institute (PI). We appreciate this opportunity to comment.

NRDC, ASAP, and PI welcome the proposed specification and are in strong support of improved water efficiency in landscape products. The irrigation of urban ornamental landscapes constitutes a large share of the demand on public water suppliers and is a major contributor to peak season demand that drives capital and operating costs higher for water suppliers and ultimately drives rates higher for customers. Furthermore, a warming climate will increase the evapotranspiration of living plants, in effect making our landscapes even thirstier in the future. In this context, it is imperative that public policies encourage more water-efficient landscape designs and equipment wherever cost-effective.

What follows are comments on individual provisions of the proposed specification.

Scope and Objective

Strip nozzles should be out of scope. Nozzles configured for narrow strips should not carry a WaterSense label. The WaterSense Program's educational purposes to advance public understanding of water efficiency will be compromised by awarding labels to products that can only be used to maintain water use practices that are prone to waste. The inherent likelihood of water waste from overhead sprinkling of narrow strips has long been recognized in the trade. Spray sprinklers serving narrow strips are prone to misalignment from mowing and foot traffic, and the narrow format makes overspray and runoff likely even in modestly windy conditions. IAPMO's model code for water efficiency, the Water Efficiency Standard for the Built Environment (WEStand), specifically bars sprinkler irrigation on narrow or irregularly shaped areas less than 4 feet in any direction across opposing boundaries (See Sec. 415.11.) Similarly, the International Green Construction Code, which has been adopted by many jurisdictions, prohibits sprinkler irrigation on landscape areas having any dimension less than 4 feet (See Sec. 601.3.1.2.1(c)(3).) California's statewide water efficient landscape regulations require that areas less than 10 feet in width in any direction must be irrigated with subsurface irrigation

or other means that produces no runoff or overspray – which even a high efficiency spray sprinkler nozzle cannot ensure (See CCR Title 23, Sec. 492.7(a)(1)(T).) In light of the requirements of current codes and standards, it would be incongruous for WaterSense to award its mark to products that are proscribed in the interest of preventing the waste of water.

Water Efficiency and Performance Criteria

Performance metrics for droplet size should be investigated for possible inclusion in the specification. As noted in the Spray Sprinkler Nozzles Supporting Statement, the primary performance measure that affects water consumption is the application rate. Sprinklers that apply water at a lower rate use less water overall. Other performance metrics in the specification (distance of throw, distribution uniformity) are important, but primarily serve to maintain landscape quality, and thus customer satisfaction. However, droplet size may have a direct bearing on misting and overspray, and thus may materially affect water consumption and water waste. As noted in the product definition in the draft specification, controlling droplet size is one of the core functions of a spray sprinkler nozzle. The failure to incorporate performance metrics for droplet size is a concern, and forgoing inclusion at this time would seem to lock out any prospect of its incorporation into the specification for at least six years, as per the WaterSense authorizing statute.[1] Thus, EPA should identify the data and research needed to support a metric for droplet size, and evaluate whether it is practical to obtain the needed information within the next 12 to 24 months. If so, it may be advisable to defer the final publication of Version 1.0 until then so that a droplet size metric could be incorporated into the specification to achieve additional water savings.

Testing nozzles only at the manufacturer's recommended pressure is too limiting. While the ASABE flow rate test method requires testing at no fewer than three pressure test points, including the minimum, recommended, and maximum operating pressures, the proposed specification would require testing only at the manufacturer's recommended operating pressure. Since the water-saving effectiveness of the specification is based on the application rate, which is highly subject to water pressure, measuring performance across a range of pressures is crucial for determining the effectiveness of the specification. The Supporting Statement indicates that the reduced testing is being proposed "to reduce the number of tests and to represent how these products should operate in the field." (Supporting Statement, p. 7.) Although WaterSense-labeled spray sprinkler bodies with integral pressure regulation are gaining share in the market, it is unrealistic to expect that WaterSense-labeled spray sprinkler nozzles would *only* be installed in the field where effective pressure regulation is achieved. Thus, test data encompassing all ASABE flow rate test points should be evaluated to fully inform the achievement of the performance criteria of this specification.

[1] 42 USC § 6294b(b)(4).

Product Marking and Documentation Requirements

Marking of nozzles' application rate should be prominent and clear. The proposed marking and labeling requirements call for disclosure of flow rates and application rates (both undefined terms in ASABE and in the draft spec), which could easily be confused. Adding to the potential for confusion is the ASABE requirement (incorporated by reference in Sec. 4.1) to disclose both rates at their minimum, recommended, and maximum operating pressure, even though WaterSense-labeled nozzles would only be evaluated at the recommended pressure. The application rate at the recommended operating pressure is key information which must be clear to consumers and not buried in a jumble of other product information.

The importance of using a nozzle in combination with a WaterSense spray sprinkle body with pressure regulation should be clarified in documentation and labeling. Paragraph 4.3 of the Draft Specification directs that packaging and promotional materials shall recommend this combination "for optimal performance." However, as noted above, effective pressure regulation may be necessary for achieving *any* savings, not just optimal performance, and this wording should be revised accordingly.

WaterSense-labeled nozzles must not be packaged with non-WaterSense spray sprinkler bodies. Section 4.0 of Appendix A suggests that WaterSense-labeled nozzles could be sold with non-WaterSense labeled spray sprinkler bodies, which could directly undermine the anticipated benefit of the water-efficient nozzles. This type of combined packaging must not be allowed under the specification.

Thank you for your attention to these views.

Edward R. Osann
Senior Policy Analyst
Natural Resources Defense Council
eosann@nrdc.org

Kanchan Swaroop
Senior Technical Advocacy Associate
Appliance Standards Awareness Project
kswaroop@standardsasap.org

Heather Cooley
Director of Research
Pacific Institute
hcooley@pacinst.org

Commenter: Shareef Khoga
Affiliation: Energy Solutions, California Investor-Owned Utility
Comment Date: March 1,2024

Email Text:

Hello,

Please see attached for the California Investor-Owned Utility comments on EPA's Water Sense Draft Specification for Spray Sprinkler Nozzles. We look forward to continued collaboration and please let us know if you have any questions about our comments.

We would greatly appreciate if you could confirm receipt of this email.

Shareef Khoga
Senior Project Manager
Energy Solutions
510.482.4420 x667
energy-solution.com

Email Attachment:

See pages 49 to 51.

Commenter Name: California Investor-Owned Utility Codes and Standards Enhancement Team

Commenter Affiliation: California Investor-Owned Utilities (CA IOUs) – Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE)

Date of Comment Submission: March 1, 2024

Topic: WaterSense® Draft Specification for Spray Sprinkler Nozzles Supporting Statement and WaterSense® Draft Specification for Spray Sprinkler Nozzles

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Topic: Water savings estimates when used with pressure-regulating spray sprinkler bodies

Comment: We recommend that WaterSense publish separate water savings estimates for nozzles used with and without pressure-regulating spray sprinkler bodies.

Rationale: As noted in the WaterSense Draft Specification for Spray Sprinkler Nozzles Supporting Statement (Supporting Statement), EPA released the WaterSense Specification for Spray Sprinkler Bodies in 2017. Since then, states and jurisdictions, including California, have implemented standards requiring spray sprinkler bodies to contain integral pressure regulation. This feature improves spray sprinkler operation and conserves water compared to non-pressure-regulating sprinkler operation in landscapes with high water pressures. The Supporting Statement estimates that "more efficient spray sprinkler nozzles use approximately 10 percent less water than standard sprinkler nozzles."[1] However, this estimate does not adequately reflect the range of potential water savings, which could vary depending on whether the nozzles are used with pressure-regulating spray sprinkler bodies or standard spray sprinkler bodies. We recommend that WaterSense publish separate water savings estimates for nozzles used with pressure-regulating bodies at the recommended operating pressure and without pressure-regulating bodies at minimum and maximum operating pressures. This information would help jurisdictions understand the value of adopting WaterSense requirements for their regions. In regions with existing requirements for pressure regulation in spray sprinkler bodies like California, the incremental water savings gained from high-efficiency nozzles may be lower than for regions without such regulations. More complete water savings estimates would better highlight the value of the WaterSense specification for regions with high water pressure and a high prevalence of sprinkler systems without pressure regulation.

Suggested Change (or Language): In Supporting Statement Section IV under Potential Water Savings, separately document average water savings for the following products:

- Nozzles used with pressure-regulating spray sprinkler bodies at the recommended operating pressure
- Nozzles used with non-pressure-regulating spray sprinkler bodies in low-pressure landscapes, e.g., <30 pounds per square inch (psi) inlet water pressure
- Nozzles used with non-pressure-regulating spray sprinkler bodies in high-pressure landscapes, e.g., >50 psi inlet water pressure

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[1] Supporting Statement, pg 10.

Topic: Use of high-efficiency nozzles with pressure-regulating spray sprinkler bodies

Comment: We recommend that WaterSense require WaterSense-labeled spray sprinkler nozzles to be paired with pressure-regulating spray sprinkler bodies to achieve the WaterSense label. The products could be packaged together as “WaterSense Spray Ssprinklers”.

Rationale: The WaterSense Draft Specification for Spray Sprinkler Nozzles (Draft Specification) recommends pairing WaterSense spray sprinkler nozzles with WaterSense-labeled spray sprinkler bodies with integral pressure regulation; however, we suggest making this pairing a requirement. In irrigation systems, pressure is the most significant variable. Adhering to the manufacturer’s recommended pressure tolerances results in more efficient sprinkler operation. A requirement to test and package WaterSense-labeled spray sprinkler nozzles with pressure-regulating sprinkler bodies would ensure that the nozzles are tested and ultimately used at appropriate water pressures. Pairing high-efficiency nozzles with pressure-regulating spray bodies would ensure that these nozzles are appropriately matched to spray bodies that will provide the best performance in new installations. Without proper guidance, users might opt for WaterSense high-efficiency nozzles in retrofit situations where they may not be the best fit. For instance, a multi-stream multi-trajectory nozzle, designed for use at an inlet water pressure of 40 or 45 psi, could be fitted onto a pre-existing spray sprinkler body with a 30-psi pressure regulator. These mismatched installations could lead to customer confusion and subpar user experiences.

Suggested Change (or Language): Add an additional requirement in Section 2.0 of the Draft Specification stating that spray sprinkler nozzles must be tested and packaged with WaterSense-certified spray sprinkler bodies.

Topic: Product testing pressures

Comment: If WaterSense nozzles are not required to be sold packaged with pressure-regulating spray sprinkler bodies, we recommend evaluating nozzle performance at minimum, recommended, and maximum operating pressures to demonstrate their full range of performance.

Rationale: If nozzles can bear the WaterSense label without being packaged with a WaterSense spray sprinkler body, users who choose these nozzles are likely to install them on sprinkler bodies with a range of water pressures. In this case, we recommend that the WaterSense specification require product testing at the minimum, recommended, and maximum operating pressures in alignment with ASABE/ICC 802. The inlet water pressure will affect the sprinkler’s operation and could significantly impact the results of the specification’s required testing. Products that can operate consistently across various pressures likely to be seen in field installations should be prioritized for WaterSense labeling. Testing only at the recommended pressure leaves an incomplete picture of how these high-efficiency nozzles would operate in real-world conditions.

Suggested Change (or Language): In Section 3.0 of the Draft Specification, change “recommended operating pressure” to “the manufacturer-specified minimum, recommended, and maximum operating pressures.”

Topic: Expand testing to better reflect landscape design principles

Comment: We recommend changing test requirements to align better with typical landscape design.

Rationale: For circular pattern nozzle series, the Draft Specification only requires testing the minimum and maximum arc of the series, which would equate to testing 90° and 360° nozzle arcs for many products. Requiring only two test points excludes 180° arc nozzles from the testing process, even though these nozzles are commonly used in the design of square or rectangular landscapes, particularly along the border. We recommend revising the specification to require 180° arc nozzles to be tested along with minimum and full circle nozzles for circular pattern nozzle series, in alignment with ASABE/ICC 802.

To reduce testing burden while accommodating additional testing at a range of pressures and testing for the half-arc nozzle, the specification could reduce the testing requirement for adjustable arc nozzles to just the manufacturer-recommended distance of throw for the nozzle rather than the user-adjusted minimum and maximum distance of throw. Testing at a range of inlet pressures would accomplish the goal of testing nozzle operation at different watering radii. Although these nozzles are adjustable, it is best practice to use them at the manufacturer's recommended radius, and manual radius adjustment during testing could be prone to error.

Suggested Change (or Language): In Section 3.0 of the Draft Specification, change the testing requirements for circular pattern nozzle series from the minimum and maximum arc to 90°, 180°, and 360° nozzle arcs. Change the testing requirement for the circular pattern nozzle series with an adjustable distance of throw to require testing at the manufacturer's specified recommended distance of throw rather than the minimum and maximum distance of throw.

Commenter: Orion Goe
Affiliation: The Toro Company
Comment Date: March 1, 2024

Email Text:

Good afternoon,

With thanks for the opportunity to comment on the Draft Sprinkler Nozzle Specification, please find the attached comments for The Toro Company.

Please feel free to reach out to me at the below contact details for any questions.

With thanks,
Orion Goe

Orion Goe
Sr. Channel Marketing Manager | ResCom Irrigation & Lighting
The Toro Company
(951) 215-9913 | orion.goe@toro.com

Email Attachment:

See pages 53 to 54.

March 1, 2024

RE: Comments from The Toro Company regarding the EPA WaterSense® Draft Specification for Spray Sprinkler Nozzles

Commenter Name: Orion Goe

Commenter Affiliation: The Toro Company (Irrigation & Lighting Div.; Riverside, CA)

Date of Comment Submission: March 1, 2024

Topic: Section 3.0 Water Efficiency and Performance Criteria; Subpart 3.1.1

Comment: The specification currently calls for the testing of all nozzles arcs within a series, which we view as being beyond what is required for establishing a series of products is well suited to meet the specification requirements. Based on Toro's sales, over eighty-five percent (85%) of fixed spray nozzles installed in real-world applications are of the Quarter (90° Arc), Half (180° Arc), and Full (360° Arc) configuration. Based on this fact, we believe the testing of these configurations serves as a reasonable and acceptable proxy for the balance of nozzles included within the series of nozzles rated at the same fixed distance of throw.

Rationale: The usage of Quarter, Half, and Full arc nozzles vastly outweigh the usage of other arcs within a nozzle series and the testing these arcs should suffice to qualify an entire series.

Suggested Change (or Language):

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:

- *90° Arc (Quarter)*
- *180° Arc (Half)*
- *360° Arc (Full*

~~*• Minimum arc*~~
~~*• Maximum arc*~~

Topic: Part 3.3 Application Rate; subpart 3.3.4

Comment: The Irrigation Association details Precipitation Rate [PR] (aka Application Rate) as, "…the rate at which irrigation water is applied per unit of time…Precipitation rate is a critical factor in design, because sprinkler systems can easily apply water at rates greater than the soil's intake rate" (Source: APPENDIX A (irrigation.org)). In absence of a defined application rate, this specification runs the risk of allowing nozzles with application rates that far exceed what is feasible when compared to soil infiltration rates (irrespective of variables such as, soil type, slope, exposure, etc.).

At current state, there are commercially available spray nozzles with published application rates in excess of 3 inches per hour, which far exceeds the soil infiltration rate of most any soil type or landscape. When water is delivered to a landscape in excess of its ability to absorb that water, runoff

and water waste is an inevitable result. This speaks to the importance of using the combination of Application Rate and Distribution Uniformity in defining efficient nozzle performance. Toro supports the premise of a nozzle's application rate being no more than 1.2 inches per hour, as it more closely resembles turf's water requirement and a representative soil infiltration rate.

Rationale: Application Rate, in combination with Distribution Uniformity (DU), is a key element of irrigation effectiveness and emission device (nozzle) performance, and needs to be quantified and in line with reasonable soil infiltration rate.

Suggested Change (or Language): No proposed changes, Toro is in support of the language in Part 3.3 as written.

Topic: Part 3.4 Uniformity; Subparts 3.4.1 and 3.4.4

Comment: Toro supports the premise that the combination of defined Distribution Uniformity and Application Rate make for a model of nozzle efficiency that presents a consistent and sustainable approach to product design, irrigation efficiency, and water savings. Further, Toro supports the rectangular/square spacing configuration specified in subpart 3.4.1, as it most accurately represents nozzle layout and design in real-world application.

Distribution Uniformity (DU) is defined as a measure of how evenly water is applied across an intended area during irrigation. The more effective (i.e., higher) a DU ratio is, the more effective the nozzle is at delivering water to the intended area, which in turn may convey to the need for shorter run times and water savings (more water getting to where it's meant to be in a shorter window of time). It has been studied and shown that DU can be materially different across a series of nozzles at different nozzle distances; an example of such a study is *The Effect of Spray Sprinkler Spacing on Distribution Uniformity* (Colasurdo, Nina; Kumar, Ramesh; Vis, Eudell. (2011) "The Effect of Spray Sprinkler Spacing on Distribution Uniformity". The Effect of Spray Sprinkler Spacing on Distribution Uniformity (irrigation.org)).

As such, Toro supports the quantifying of an average DU_{LQ} for the sample of test nozzles, but feels more research be conducted to establish a minimum DU_{LQ} that represents a level of efficiency and 'coverage' that will lead to water savings while maintaining turf health.

Rationale: Distribution Uniformity (DU) in combination with Application Rate is a key measure of irrigation effectiveness and emission device (nozzle) performance, and needs to be quantified in order to make for a consistent and sustainable approach to product design, irrigation efficiency, and water savings

Suggested Change (or Language): The current Distribution Uniformity ratio of 0.65 may not be repeatedly achievable in testing or field applications given inherent variability found in manufacturing. Toro believes a minimum Distribution Uniformity of 0.50 represents a coverage ratio that would lead to water savings while preserving turf health, but would like to see more research and supporting data specific to DU in pursuit of a minimum threshold within the specification.
