



Comments on the November 2016 WaterSense®
Draft Specification for Spray Sprinkler Bodies

June 1, 2017

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Commenter: Robert Reaves
Affiliation: Oklahoma City Utilities
Comment Date: November 17, 2016

Email Text:

Thank you sending me the draft specifications for pressure-regulated spray bodies. Here are a few comments I feel might help to provide more clarity to your document.

1. Title Page: Change the title to “WaterSense Draft Specification for Pressure-Regulated Spray Sprinkler Bodies,” to avoid possible confusion with standard, non-pressure regulated heads. The fact this draft is for pressure-regulated sprays should be in the title.
2. Page 1. Change the title of the document to WaterSense Draft Specifications for Pressure-regulated Sprinkler Bodies.
3. Page 1, third sentence. I would find another word to replace “integral.” The definition of integral is “necessary to make a whole complete; essential or fundamental.” This word does not make sense to me. In this sentence, I think “applicable to sprinkler bodies with in-stem or internal pressure regulation.” Again, the word integral does seem like the right word to use in this situation.
4. Definition of Pressure Regulator. With all irrigation manufacturers, the pressure regulation occurs within the internals or stem of the pop-up or spray body. When I see pressure regulator, it makes think of a pressure reducing valve to regulate pressure on a whole irrigation system.
5. What is an “aftermarket device?” I do not know what you mean. Could you possibly mean an “add-on device”? What is an example of an aftermarket device? Could it be something like a pressure compensating disc in a nozzle?

Page 2, Section 4.2: I believe you have some words in the wrong order. I recommend this section read, “The product and/or its associated packaging documentation shall identify the recommended operating pressure (hereafter referred to as pressure regulation) and the maximum operating pressure. You have “regulation pressure” in this sentence. I think you intended for it to be pressure regulation. As far as the “maximum operating pressure,” I think it important to reveal the maximum dynamic pressure of an irrigation system at which the pressure regulated spray body can maintain the recommended operating pressure (for example, 30 psi, 40 or 45 psi

When this specification is finalized and a product goes through the test, I believe it to be imperative for you to have set ranges for a product to attain the EPA WaterSense certification. I hope these comments have been helpful. Good luck.

Robert E. Reaves, CLIA, CIT
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Commenter: Stuart Eyring
Affiliation: Orbit
Comment Date: November 18, 2016

Email Text:

Kim,

I believe that, as the #1 brand purchased by homeowners, we bring important perspective that should help inform the policy discussion. Unfortunately this specification has the appearance of being data driven, but in fact it ignores important real-world factors. Could you please make sure to engage in this discussion and voice our concerns? They include:

1. The specification is based on data relating to pressure; it ignores two important data sets – a) actual impact on system performance and b) consumer behavior
2. If this is mandated for new systems, homeowners will invariably replace them with widely-available, non-pressure regulating spray bodies from time to time; how does this impact system performance?
3. For existing systems, all spray bodies in a zone must be replaced or we would expect system performance to go down and watering times to go up; this should be studied
4. Marking a spray body cap with PRS or “Pressure Regulating” is meaningless to most homeowners; how will the fact that a zone has pressure regulating spray bodies be clearly communicated to the customer?
5. Pressure regulating heads are expensive and uncommon in retail; what is the standard for retail packaging which will help customers distinguish among pressure regulating and non-pressure regulating spray bodies?
6. The specification, as drafted, will create tremendous confusion in retail channels and among homeowners, and will likely fail to produce true water conservation

At a minimum, please do all that you can to have the specification include an up-front disclaimer, like the following:

Note: Pressure regulating spray bodies can conserve water when ALL sprinklers in a zone incorporate pressure regulating spray bodies. For new systems in which pressure regulating spray bodies are used in the initial system installation, each zone should be marked at the controller as such and a notice affixed to the controller alerting the site manager or homeowner that replacement of any spray body should be with an equivalent pressure regulating spray body. For existing systems composed of non-pressure regulating spray bodies, ALL spray bodies in a zone must be replaced with pressure regulating spray bodies in order to maintain system performance and achieve conservation.

Even that last sentence is a bit of a stretch. Homeowners do curious things to their existing systems to compensate for dry spots (poor uniformity) and plant maturation, including moving/adding heads and changing nozzles, so it is questionable whether

simple replacement with pressure regulating spray bodies will demonstrably improve uniformity. In the real world it is equally likely they will impair it. The Southern Nevada Water Authority can provide data from their rotating nozzle experiment at 200-plus sites which supports this point.

On a positive note: one objective that the specification will certainly achieve – particularly if it is enforced for all new systems – is increase revenue to OEMs and contractors. I suppose that is just good business.

I have raised these serious concerns with Brent Mecham and encourage you to add your voice in support of bringing consumer-focus and further in-field study to the spray head specification.

Stuart

Commenter: James Lanier
Affiliation: Lanier Landscapes, Inc.
Comment Date: November 18, 2016

Email Text:

I have been in the sprinkler system repair, improvement, and installation business for 30 yrs. I agree with the concept of pressure regulation, but there are times when we NEED to have NO regulation because the system pressure is already too low for various, uncontrollable reasons.

Please don't make it mandatory to have regulation in the bodies. Educating the people that are handling the systems--whether they are the end-user consumer by way of labelling with quick info/warning label and weblink for more info AND educating the irrigation techs/gardeners/landscapers is the best way to approach this. Awareness is mostly nill right now. We educate the public constantly about these types of issues one household at a time.

I have been IA educated and certified.

Thank you,

James T. (Tom) Lanier, president
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Serving SLO and northern Santa Barbara Counties
Contractor C-27 #1001602

Commenter: Steve Hall
Affiliation: Stahlman-England
Comment Date: November 18, 2016

Email Text:

Believe the sprays should be pressure regulated and applaud your efforts. However, Code Enforcement efforts need to be better to enforce irrigation systems are installed properly. For example, Rain Sensors installed in open areas and inspected for proper operation. Proper Irrigation schedules.

Respectfully,

Steve Hall FWSAP, CLIA, CIC
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LIKE US on www.facebook.com/StahlmanEngland

Commenter: Tim York
Affiliation: City of Aurora, Colorado
Comment Date: November 21, 2016

Email Text:

Good morning. I have some questions regarding your draft specifications:

1. Where is the \$10.09 per 1,000 gallons water cost figure coming from in Equation 5?
2. In Equation 11 are you assuming that a resident purchases and installs the new heads themselves at retail cost? If the assumption is contractor installed, you would need to also include assumed per-head labor, markup and profit costs to derive a more realistic ROI.

Thanks,
Tim

Tim York, RLA, CLIA
Sr. Water Conservation Specialist | City of Aurora
office 303.326.8819

Like us on: Facebook | Follow us on Twitter and YouTube

Commenter: Drake Wauters
Affiliation: Wauters Consulting
Comment Date: November 28, 2016

Email Text:

Dear All,

Changing codes and zoning to require xeriscaping instead of irrigation of plants that do not belong in some climates make vastly more sense.

Best,

Drake A Wauters, AIA, CSI/CDT, SCIP, IES

Principal AEC Consultant

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Please consider your responsibility to the environment before printing this e-mail.

Commenter: Ted Sirkin
Affiliation: Valvette Systems
Comment Date: January 10, 2017

Email Text:

Dear EPA,

Please see my Response attached below. I thank you in advance for reviewing it.

Ted Sirkin
Valvette Systems
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Proud Member of the CLCA

Email Attachment:

January 10 2017

TO: watersense-products@erg.com USEPA
RE: Comments to 'WaterSense Draft Specification for Spray Sprinkler Bodies'

Dear WaterSense,

According to your Supporting Statement, the above-titled draft specification is all about:

"In-ground landscape irrigation sprinklers, which consist of a nozzle and a sprinkler body, are designed to operate within a range of pressures and have a recommended operating pressure under which the nozzle reaches its ideal performance." The Supporting Statement also notes: "The intent of the WaterSense specification is to help purchasers identify products that meet EPA's criteria for water efficiency and performance."

The Statement points out that many sprinklers throughout the country *"are installed at sites where the system pressure is higher than the recommended operating pressure. High operating pressure can result in system inefficiencies, including excessive flow rates, misting, fogging, and uneven coverage (e.g., dry spots or pooling water)"*. The Statement then correctly states, *"Some sprinkler bodies have a built-in pressure-regulating feature that can compensate for high inlet pressure. These products can maintain and provide a constant flow at the nozzle across a range of inlet pressures, reducing excessive flows and water waste that would otherwise occur at high pressures."*

However, other parts of the draft, including the cost estimates provided by Site One Landscape Supply along with some of the product and testing criteria, indicate or purport that the only method to control high pressure in a sprinkler body is the apparatus that all of the major manufacturers use today in their pressure-regulating stems (PRS). The typical PRS unit is basically a spring-loaded device, is costly as noted by Site One, is not recommended for use where inlet pressures exceed 100 psi (by one manufacturer and only 70 psi by another,) and most often after one or two years loses its ability to maintain the 30 or 40 psi for which it was purchased.

But, most importantly, the PRS unit, which creates an obstruction in the water passageway, easily gets clogged up with debris in the field due to its very small opening, which gets even smaller as the inlet pressure increases. Once debris gets caught up in the spring and/or at the plastic end that gets compressed with higher pressures, the water passageway is effectively closed off and the sprinkler is then useless and has to be replaced.

For the last 15 years there has been on the market another technology that is extremely effective at not only controlling high pressure, but overriding it completely. This technology is the ONLY sprinkler product on the commercial rebate list of one of America's largest distributors of water – The Metropolitan Water District of Southern California (MWD), which serves almost 20 million customers. The MWD has given it the name "IN-STEM FLOW REGULATOR". Presently, it is manufactured by a small company located in the Los Angeles area. Other companies are looking to come out with their own In-Stem Flow Regulators (IFR) without violating the patents held by Valvette Systems and Ted Sirkin, the writer of this letter who invented the IFR. Mr. Sirkin is a 58-year veteran of the landscape and irrigation industry and Valvette Systems is the only manufacturer of sprinkler parts owned and operated by a licensed landscape/irrigation contractor. Sirkin is trying to get the MWD to put the In-Stem Flow Regulator into the MWD's *residential* rebate list, as well.

Valvette's IFR, the technology being sold under the trade name 'LittleValve', has numerous advantages over the PRS stems used today by the major manufacturers:

- The LittleValve provides an unobstructed water passageway for flushing.
- With LittleValves and presumably with other IFRs, 5', 8', 10' and 12' nozzles are rarely, if ever needed. The IFR can take the distance range of a 15' nozzle down to 5 or 6 feet. The smaller the nozzle, the more it mists and fogs because the orifices also get smaller. With a LittleValve part, 15-ft nozzles rarely mist and Valvette guarantees that at 14 feet or less, there will be no misting/fogging regardless of the inlet pressure.
- A good IFR such as the one made by Valvette Systems will override all high pressure. The Little Valve technology easily operates at 125 – 150 psi.
- The use of only 15' nozzles allows for the user to dial in the precise desired distance from 15 feet down to 5 – 6 feet eliminating in excess of 95% of overspray, one of the major reasons for water waste. Overspraying is the chief cause of runoff and runoff now in the State of California can subject a property owner to a hefty fine.

- The use of just 15-ft nozzles regardless of distance provides water droplets that are bigger, fatter and heavier, which means larger droplets that provide better watering by penetrating into the ground deeper, diffusing through the soil in a wider pattern and most notably, resist wind drift much better than the smaller-sized nozzles are capable of doing. The panel is encouraged to go to the Valvette Systems website at www.watersavingsprinklers.com or www.littlevalve.com and scroll down the “Menu” button to the bottom wherein is the “Test Data” tab. When that tab is opened, the first test is the Metropolitan Water District trials. The calculations for each of the 5 trials start on page 9 and goes through page 13. The water savings for the four ‘Spray’ trials over the year-long period averaged just over 30%. Pages 5 and 6 are 2 sets of before & after photos that show the big difference in misting and fogging. The 4th tab down from the top of the “Menu” contains several ‘before’ & ‘after’ videos.
- One never uses the little screw atop the nozzle, which every pro knows is a miserable and frustrating exercise when it comes to adjusting distances. Most manufacturers will tell you that you cannot bring the distance down on any nozzle less than 25% of its stated distance. All distance is controlled via the IFR.
- Flat spray nozzles can be brought down to 2’ micro-sprays without misting, fogging and overspray – Rain Bird’s 8-ft Flat and Toro’s Black Flat. Hunter’s SS530 side strip can also be taken down to a micro-spray.
- Valvette’s In-Stem Flow Regulators are not just confined to pop-up sprinklers. They also produce IFRs for shrub adapters, couplings and riser extenders, all parts used for stationary, above-grade sprinklers. Stationary sprinklers make up approximately 15% of the irrigation market especially in the sunbelt states. Every type of spray sprinklers can therefore be equipped to reduce substantially the water waste that takes place from high pressure.
- IFRs also eliminate water waste when irrigation maintenance is taking place in that they provide on/off control at each sprinkler head eliminating trips back and forth from the sprinkler to the control valve or clock. While the sprinklers are running, the person working on them can close down the water at the individual sprinkler and change out the nozzle or flush it because the pop-up stem stays up and does not retract until the RC valve is shut off.
- The words and the concept of “30 psi optimum pressure’ for sprinklers or nozzles goes out the window with IFRs. It becomes totally inapplicable because IFRs provide flow and pressure control individually to each and every sprinkler.
- We know the guidelines for the Draft have excluded parts but it should be pointed out that Valvette does make pop-up replacement stems for all the major manufacturers plus many of the smaller ones, as well, in 4”, 6” and 12” sizes. It is clear that the hoped-for idea behind this Draft is to encourage homeowners and contractors to replace the 100 or so million existing sprinklers in the USA with sprinklers that provide in-stem, in-head or in-body pressure regulation. However, this writer believes that the cost in materials and labor of replacing all those existing sprinklers is simply out of the question, hence I find the cost-effectiveness in the 1st paragraph in page 11 irrelevant, if not misleading.

At the very least, replacing just the pop-up stem at a cost much lower than posted in your Supporting Statement by Site One and being able to inexpensively change out

existing above-grade sprinklers with an In-Stem Flow Regulating part will certainly put into action a lot quicker the EPA's desire to get the idea of pressure regulation across to the populace.

The intent of this letter, obviously, was to show the panel that there are other proven, perhaps better ways to eliminate the deleterious effects of high pressure in sprinkler systems. We have been doing it for 15 years on systems that have from 90 to 150 psi. Please note that all of our products are in the Site One computer. All of our 4" replacement stems regardless of brand cost the same price; the same goes for our 6" and 12" stems. Our complete pop-up sprinkler, which may qualify for your program carries the name Little Tuffy and it features the LittleValve technology in 4" and 6" pop-ups, the two most common sizes.

Lastly, it should be noted that sometime ago Brent Meacham and Ted Sirkin were in touch with each other and Brent was supplied with some LittleValve products back in its infancy. We have learned a lot since then. Please advise if our IFR can qualify for submission to the program.

Respectfully,
Ted Sirkin

Commenter: Brent Barkley
Affiliation: Rain Bird Corporation
Comment Date: January 30, 2017

Email Text:

Please see the attached document with comments on the WaterSense Draft Specification for Spray Sprinkler Bodies.

Regards,
Brent

Brent Barkley
Regional Sales Manager
N. California and PNW

Rain Bird Corporation
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www.rainbird.com

Email Attachment:

Template for Public Comment Submission on WaterSense Documents

Commenter Name: Brent Barkley

Commenter Affiliation: Rain Bird Corporation

Date of Comment Submission: Jan 30, 2017

Topic: 2.1.1 Flow rate at maximum operating pressure

Comment: The flow rate at the maximum operating pressure is not necessarily the maximum flow rate across the test range. This is demonstrated in tests which show the flow rate at the maximum operating pressure below the average and, in one instance, below the calibration flow rate. Consider if the flow at the maximum operating pressure is the right measure or if limiting the maximum flow across the full range is more desirable.

Rationale: In an extreme case, a pressure regulation device could hold very steady at most points but exceed calibration flow by 25% at a mid-point in the testing. This point would not be subject to the flow rate at max operating pressure criteria (since it is at a mid-range test point) and the average across all test points could still be below the 10% threshold.

Suggested Change (or Language): Maximum Flow rate ~~at the maximum operating pressure~~—The percent difference between the initial calibration flow rate (as described in Appendix B) and the flow rate at any the tested pressure level ~~of 70 psi (or the maximum operating pressure, as specified by the manufacturer, whichever is greater)~~, averaged for the selected samples at that pressure, shall be within +/- 15.0 percent.

Topic: 2.1.3 Minimum outlet pressure

Comment: A minimum outlet pressure of 20 PSI may be appropriate for pressure regulating bodies that are meant to regulate to 30 PSI. However, pressure regulating bodies that regulate at higher pressure (i.e. 45 PSI) are designed to operate with products that are optimized for higher pressures.

Rationale: Pressure regulating bodies that are designed to regulate to a higher outlet pressure (i.e. 45 PSI) commonly operate with a different style of nozzles (MSMT). These nozzles may not operate most efficiently if outlet pressure is allowed to drop to 20 PSI. The minimum outlet pressure allowed should be relative to the designed regulating pressure.

Suggested Change (or Language): Minimum outlet pressure—The average outlet pressure at the initial calibration point (as described in Appendix B) of the selected samples shall not be less than ~~20.0 psi~~ the advertised regulation pressure less 10.0 psi.

Topic: 4.1 Sprinkler body and associated packaging...

Comment: This language could be confusing and be interpreted as requiring all elements to be marked on both the body and packaging. ASABE/ICC does not require this in all cases.

Rationale: This section states “The sprinkler body and associated packaging shall be marked...”

Suggested Change (or Language): The sprinkler body and ~~associated~~ packaging markings shall ~~be marked according to~~ conform to all applicable sections of Section 304.1 of ASABE/ICC 802-2014, Sprinkler and Bubbler Product Marking, General.

Topic: 4.2 The product and/or its associated packaging...

Comment: This section calls out a “recommended operating pressure”. Spray bodies do not typically have a recommended operating pressure. The recommended operating pressure varies for the discharge device / nozzle that is attached.

Rationale: Operating pressure generally refers to the pressure at the “inlet” of the device. A recommended inlet operating pressure should not be specified for a spray body although a maximum inlet operating pressure should be to protect against over pressuring the body. The “recommended operating pressure” should be replaced by a “regulated outlet pressure”.

Suggested Change (or Language): The product and/or its associated packaging or documentation shall identify the ~~recommended operating~~ regulated outlet pressure (hereafter referred to as regulation pressure) and the maximum operating pressure at the inlet.

Commenter: Ed Norum

Affiliation: Center for Irrigation Technology (CIT), California State University
Fresno

Comment Date: January 30, 2017

Email Text:

Stephany/Joanna: In the presentation documents, the following statement appears on page 20: "Flow rate reduction = potential water savings". This is a scientifically indefensible statement. Aerosol evaporation occurs when the drop spectrum from a sprinkler produces aerosol of a size from 0.3 to 100 μm . These particles evaporate before they hit the ground. Further it can be argued that this evaporation cools the plants atmosphere and actually substitutes for water that would be taken in thru the plant roots. In order to reach any quantifying conclusions then on water savings would required the measurement of the drop spectrum. I hope this is helpful. Ed Norum, CIT/CSUF.

Commenter: Sean Steffensen
Affiliation: California Energy Commission
Comment Date: February 16, 2017

Email Text:

Hi Stephanie,
Attached is the Energy Commission's comment letter on the Proposed WaterSense Specification for Spray Sprinkler Bodies.

Sincerely,

SEAN STEFFENSEN | MECHANICAL ENGINEER
CALIFORNIA ENERGY COMMISSION | EFFICIENCY DIVISION
1516 9TH ST, SACRAMENTO, CA 95814
(916) 651-2908 OFFICE | FAX (916) 654-4304

Email Attachment:

See pages 20 through 24.

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET
SACRAMENTO, CA 95814-5512
www.energy.ca.gov



February 17, 2017

Ms. Stephanie Tanner
U.S. Environmental Protection Agency
Office of Water
WaterSense Program
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

RE: COMMENTS ON THE U.S. EPA'S WATERSENSE DRAFT SPECIFICATION FOR
SPRAY SPRINKLER BODIES

Dear Ms. Tanner:

The California Energy Commission appreciates the opportunity to provide comments on the U.S. EPA's proposed specification for spray sprinkler bodies. The California Energy Commission is the primary energy policy and planning agency of the State of California. Among its duties, the Energy Commission has a statutory mandate to reduce energy and water consumption in California through minimum efficiency standards for appliances and buildings. We recognize the importance of working closely with the U.S. EPA to lead efficiency efforts that will incentivize energy and water efficient technologies that will reduce the wasteful consumption of energy and water.

The Energy Commission appreciates the U.S. EPA's efforts to establish a new voluntary WaterSense specification for spray sprinkler bodies, especially as the state is emerging from severe drought conditions and continues to focus on ways to conserve its limited water supply. The Energy Commission is pleased that the U.S. EPA's specification proposes to utilize the pressure regulation technology as a means to eliminate water waste in situations where the water supply pressure exceeds the recommended spray sprinkler nozzle operating pressure. The specification has the potential to encourage consumers to choose spray sprinkler bodies that can save what the U.S. EPA estimates to be billions of gallons of water across the country.

The Energy Commission supports the U.S. EPA's proposed modifications to the ANSI/ASABE/ICC 802-2014 Landscape Irrigation Sprinkler and Emitter Standard to improve the repeatability and reliability of the test procedure.

Specifically, the Energy Commission supports U.S. EPA's proposal to modify the test procedure to:

- Incorporate a test configuration diagram as shown in Figure 1 of Appendix B to specify the test setup and eliminate variations that would affect test results.
- Specify minimum accuracy and resolution for the test equipment measurement devices.
- Require the use of a needle valve to ensure performance of the pressure regulation device will be reliably measured.
- Provide rest periods between consecutive pressure levels to eliminate test hysteresis.
- Eliminate test points within the falling limb of the pressure test level curve to reduce test burden.
- Measure water flow as a direct means of validating water savings.
- Establish the percent difference between the water flow at the regulated pressure and the test pressures as the performance metric to measure the effectiveness of pressure regulation.

The test results provided by the U.S. EPA have the hallmarks of a strong test procedure, as they show a clear differentiation in product performance and reduction in flow between those products with pressure regulation and those without pressure regulation. The Energy Commission recommends some modifications to the proposed test procedure to ensure repeatability and suggests areas for further investigation to encourage additional water savings. The Energy Commission provides this information and recommended changes to the specification language in the appendix to this letter.

The Energy Commission urges the U.S. EPA to finalize the WaterSense specification as soon as possible so that consumers will be able to use the WaterSense label to identify water saving spray sprinkler bodies. If you have any questions about these comments, please contact Sean Steffensen at (916) 651-2908, or at Sean.Steffensen@energy.ca.gov.

Sincerely,



Robert B. Weisenmiller
Chair



J. Andrew McAllister
Commissioner

cc: Sean Steffensen, Mechanical Engineer
Enclosures

Appendix 1

Topic 1: Adapter between needle valve and spray sprinkler body

Comment: Please provide a description of the critical characteristics for the adapter between the needle valve and spray sprinkler body. Critical characteristics may include a minimum or maximum length, inner diameter, internal radius, or other characteristics that may introduce variations in the test results if allowed to vary without controls.

Rationale: The adapter may influence the flow during the test. By documenting any critical characteristics, the variation in test results from different test setups can be minimized.

Suggested Change (or Language): The adapter shall be fabricated to the dimensions shown in figure.

Topic 2: Equations used to reduce and evaluate test data

Comment: Please explicitly state the equations used to reduce and evaluate data. As an example, differing definitions for percent difference are widely used.

Definition 1: Percent Difference = $(Q_{\text{max}} - Q_{\text{initial}}) / (1/2(Q_{\text{initial}} + Q_{\text{max}})) \times 100$

Definition 2: Percent Difference = $(Q_{\text{max}} - Q_{\text{initial}}) / (Q_{\text{initial}}) \times 100$

Rationale: Providing an explicit description of equations will reduce ambiguity or misinterpretation of requirements.

Suggested Change (or Language): Add equations for the calculation of percent difference and average flow rate.

Appendix 2

Topic 3: Flow rate testing at 0.5 GPM and 3.5 GPM

Comment: The Energy Commission requests the test procedure also require testing at 0.5 GPM and 3.5 GPM to provide information on the pressure regulating performance at the minimum and maximum flows for spray sprinkler bodies. The Energy Commission does not recommend setting performance standards at these flows but rather making the performance information available for the benefit of consumers.

Rationale: This will provide consumers with more information regarding performance at flows other the 1.5 GPM level and provide rigorous testing of any new products that are brought to market.

Suggested Change (or Language): Repeat performance of test method shown in Appendix B at 0.5 GPM and 3.5 GPM flow rate.

Topic 4: Flow meter and pressure transducer accuracy and resolution

Comment: Please update the required flow meter and pressure transducer accuracy and resolution to ensure readings indicate performance without concerns for measurement uncertainty.

Rationale: Gauge accuracy and resolution need to provide readings that will indicate performance meeting the criteria of the specification. Gauges with high accuracy and resolution should be specified to reduce measurement uncertainty without imposing significant additional test burden.

Suggested Change (or Language): Flow meter with a minimum resolution 0.01 gpm and accuracy of +/-1% plus 0.005 gpm across rated range. Pressure transducer with a minimum resolution a resolution of 0.0035% full scale and accuracy of +/-0.1% full scale range.

Appendix 3

Topic 5: Drain check valve in a future WaterSense specification

Comment: The Energy Commission is studying sprinkler bodies to understand what additional water savings opportunities may be available. The drain check valve, an optional component internal to the spray sprinkler body that prevents system drainage during periods of non-operation will provide additional savings. The Energy Commission requests the U.S. EPA study drain check valves for incorporation into a future specification for spray sprinkler bodies.

Rationale: Drain check valves are another widespread irrigation industry approach to reduce unnecessary water use.

Suggested Change (or Language): Specify a test method and performance level for drain check valve performance.

Topic 6: Expand scope of a future WaterSense specification to include additional sprinkler body types

Comment: The Energy Commission is aware of other sprinkler bodies outside the scope of the proposed WaterSense specification where manufacturers offer pressure regulation such as the impact driven sprinklers. The Energy Commission would support efforts to research test methods and performance levels of these additional sprinkler bodies to expand the scope of a future version of the WaterSense specification.

Rationale: Pressure regulation may benefit other sprinkler types outside the current scope of the specification.

Suggested Change (or Language): Specify a test method and performance level for pressure regulation for sprinkler bodies outside the current scope of the proposed regulation.

Commenter: Brent Mecham
Affiliation: Irrigation Association (IA)
Comment Date: February 16, 2017

Email Text:

Please find the attached comments from Irrigation Association and SWAT

Brent Mecham
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Industry Development Director
Irrigation Association

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Recruit your friends to join IA and receive a referral rebate!

Email Attachment:

[Template for Public Comment Submission on WaterSense Documents](#)

Commenter Name: Brent Mecham

Commenter Affiliation: Irrigation Association and Smart Water Application Technologies

Date of Comment Submission: February 16, 2017

Thank you for the opportunity to offer comments on the testing of pressure regulating sprinkler bodies. The Irrigation Association and SWAT are supportive for other WaterSense labeled irrigation products to be available in the market place. The water saving potential of these products can lead to improved irrigation efficiency when designed, installed and managed correctly. Our comments suggest testing products in a manner similar to how they are used in the field, which is in a vertical position with nozzles and appropriate screens and testing more units from different manufacturing lots or date codes. Additionally, the proposed changes would allow this testing specification to be adapted and expanded to include pressure-regulating rotors that are now available in the market place.

Topic: Product Sampling and Selection

Comment: While the ASABE/ICC 802-2014 Standard only requires five samples selected from a lot of 25 units, we believe that this is insufficient for a labeling program. More samples should be tested that come from at least three different manufacturing lots or date codes.

Rationale: In the manufacturing process, products are made at different times with different molds and machines. Five samples from a lot of 25 could likely all come from the same machine and mold and manufactured on the same date. To require more samples from different manufacturing lots or date codes would provide a better representation of how well the products perform overall. Additionally, since the number of test pressures are significantly less than the current ASABE/ICC standard and the current specification to test four inlet pressure levels, testing additional sprinklers should not be that much more expensive. Additionally, as seen in subsequent comments, testing the sprinklers in groups and using an average flow rate will also shorten the testing time by the lab. Results from each test lot or manufacturing date code could identify potential variation in manufacturing.

Suggested Change (or Language):

1.(a)(five samples selected at random from three different lots of 25 for 15 samples to be tested.)

Topic: Test Procedure, 2. Test conditions

Comment: require as an additional step before testing the products to condition the samples with pressurized water.

Rationale: Often the devices are assembled without being water tested in the factory and the pressure regulating devices could have been sitting in boxes for an extended period. By conditioning the samples before testing, the pressure-regulating device will be exercised and operational prior to the testing.

Suggested Change (or Language):**2. Test conditions**

(c) All units shall be conditioned by running water through the sprinklers including an appropriate nozzle and screen at two different operating pressures of 10 psi and 20 psi above rated pressure regulation for two minutes for each pressure setting prior to testing.

Topic: Performance Test

Comment: Use nozzles and screens instead of a needle valve to test performance of the pressure-regulating device to control flow. Also, using two different flow rates

to verify consistent performance of the pressure regulating device adds confidence in the product. Half-circle nozzles represent the vast majority of spray body sprinklers being used in small landscaped areas, but the full-circle nozzle represents the typical maximum flow that the device must be able to regulate for proper flow. Data from the Pressure Regulating Spray Sprinkler Body Final Test Report seems to indicate that there are some differences in performance between high and low flow rates for some products.

Rationale: Test the products as they are used in the field

Suggested Change (or Language):

3. Performance Test

- (a) Select a sufficient number of nozzles as indicated below to be used on a non-pressure regulated sprinkler to establish base flow rate at the declared pressure regulation. The same nozzle shall be used on a sprinkler body with pressure regulation for the various steps of increased inlet pressure as delineated in step (b) to measure flow rate of the pressure-regulating device.

Low-flow nozzles shall have the following characteristics:

- Spray nozzles of a fixed arc shall have a flow rate between 1.00-1.40 gpm at 30 psi operating pressure. (Similar to a 12-foot, 180-degree fixed-arc spray nozzle.)

High-flow nozzles shall have the following characteristics:

- Spray nozzles shall have a flow rate between 3.00-4.00 gpm at preferred operating pressure and have a radius of throw of 15 feet. (Similar to a 15-foot, 360-degree fixed-arc spray nozzle.)

Topic: 3. Performance Test

Comment: The sprinklers should be tested as they are used in the field with the appropriate nozzle, screen and in a vertical position. Instead of using a pressure transducer on the downstream side of the nozzle location, the effectiveness of the internal pressure-regulating device can be determined by measuring flow. Flow could be measured either with a flow sensor or by collecting the water and measuring the total volume for a specific test. If collecting the water, then accurate timing would be necessary to establish a flow rate. Compare flow rates of a sprinkler without pressure regulation but using the exact same nozzle and screen to generate performance curves and comparisons. Testing multiple sprinklers at the same time and determining an average flow could shorten test time and allow for more units to be tested. This would actually be representative of how products are used in the field with multiple sprinklers operating at the same time on a zone.

Rationale: for some of the products to perform correctly, the nozzle and associated screen are an integral part of how the sprinkler works and especially if there is a feature with flow stop or flow restriction if the nozzle were to be missing. Testing in the vertical orientation represents how the product is used in the field and remove the possibility that a horizontal orientation would impede the sprinkler from popping up the stem fully or impeding the stem from retracting completely as would be expected in the vertical position. In the field sprinklers are installed in an almost vertical position. As such, we think the products should be tested in their normal operating field position.

Suggested Change (or Language):

3. Performance Test

(b) Follow test procedure as currently specified testing multiple sprinklers at once

1. Five non-pressure-regulated sprinklers, nozzles and screens shall be tested at the inlet pressure matching the declared pressure regulation of the sprinkler body at the same time and record total flow. Divide the total flow by the number of units to obtain an average flow rate.

2. Using the same nozzles and screens from #1 above, install on five pressure-regulated sprinkler bodies. Test at the various inlet pressures as currently outlined in the test specification. Divide the total flow by the number of units to obtain an average flow rate for each inlet pressure.

Commenter: Edward Osann
Affiliation: Natural Resources Defense Council (NRDC)
Comment Date: February 17, 2017

Email Text:

Thank you for the opportunity to comment on the WaterSense Draft Specification for Sprinkler Spray Bodies. NRDC strongly supports the adoption of a WaterSense specification for these products, and we are encouraged by the progress that has been made up to this point. Our comments will separately address the Cover Letter, Draft Specification, the Test Method, and the Supporting Statement.

Cover Letter

While we don't usually comment on a cover letter, the letter inviting comment on the draft specification for Spray Sprinkler Bodies dated November 17, 2016 contains a significant assertion that does not seem to appear anywhere else in the specification or its supporting material. The second paragraph states that "an estimated one-third of new homes constructed each year include an irrigation system." This bears directly on the potential water savings attributable to the specification, but is without documentation. It would be helpful to provide the documentation for this figure along with an indication of how it may have been used in the savings calculations in the Supporting Statement.

Draft Specification

2.0 Water Efficiency and Performance Criteria

Based on the University of Florida test data used by WaterSense to set the performance metric, the allowable flow difference (+/- 15%) at the maximum test pressure appears overly generous, apparently influenced by one brand (out of 7 tested) that significantly underperformed on this metric. The data would seem to support a stronger standard (+/- 12% difference rather than +/- 15% difference), or perhaps a two-stage requirement, where the proposal is Stage 1 and a more stringent level takes effect as Stage 2 a year or two later.

Additionally, the proposal sets the maximum of +/- 15% tolerance on variation between the flow rate at the recommended inlet water pressure (such as 30 psi) compared to the highest tested inlet pressure (typically 70 psi). However, data from the University of Florida tests indicates that the maximum flow rate can occur at pressures below the maximum test pressure. See for example, Figure 9A for test runs at 1.5 gpm and Figures 6A and 10A for test runs at 3.5 gpm. Looking at the data tables behind the figures, here is a table of the test runs for Brand A Test Sample 2, which illustrates this phenomenon as well:

Brand A Pressure Regulation Test sample #2 [pressure regulated at 30psi]

Inlet Pressure (psi)	Inlet Pressure (psi)	Outlet Pressure (psi)	Flow Rate (gpm)
	Avg	Avg	Avg
	Nominal flow rate of 1.5 gpm		
30	30.2	26.9	1.53
40	40.1	35.8	1.67
60	59.8	33.5	1.60
70	69.6	32.0	1.59
60	59.4	31.0	1.60
40	40.2	29.2	1.56
	Nominal flow rate of 3.5 gpm		
30	30.3	19.8	3.44
40	40.4	26.3	3.96
60	60.3	28.7	4.10
70	70.7	27.5	4.01
60	60.1	27.9	4.07
40	40.5	26.5	3.94

WaterSense should consider applying the maximum flow rate limit to the flow measured at any inlet pressure because the maximum flow rate can occur below the maximum operating pressure. This change would not require any change in the test set-up or run time.

Test Method

Product Sampling and Selection. The specification should require that product samples be taken from multiple manufacturing lots as recommended by the Irrigation Association due to the potential for variation among lots.

Test Conditions. The specification should require conditioning of samples before they are tested as recommended by the Irrigation Association. Products may perform differently after a brief period of initial use compared to when they are initially drawn from inventory.

Test Equipment and Setup. The specification is silent on the calibration of test instruments. Since testing with equipment that is not calibrated will not necessarily produce the same results as equipment that is calibrated, this should be addressed with as much specificity as practical. Perhaps ISO standards are available that can be incorporated by reference.

Additionally, the diagram of the test setup includes a needle valve and two pressure gauges that are not listed and described in the Equipment List.

Supporting Statement

Operating Pressures. The supporting statement (at pp. 2-4) draws upon two datasets of irrigation site evaluations to conclude that 63% of systems receive water at more than 30 psi, leaving 37% that get water at 30 psi or less. This latter cohort would obviously not contribute any water savings at all to the total. The Supporting Statement recognizes that the datasets of utility water pressure used in the savings analysis may not be representative. We agree. Water pressure is commonly above the levels suggested by this data. As an additional source for consideration, WaterSense should consider the pool of available validated water audit data compiled into a single dataset of 246 utilities by George Kunkel. This data was compiled to form a basis of comparison with water systems in Pennsylvania that prepared standardized water audits and was published in a recent report.^[1] Kunkel found the following values for average system pressure in this large dataset: median, 70 psi; 90th percentile, 105.75 psi; maximum, 170 psi. Notably, the lowest average system pressure reported by any utility in the dataset was 42 psi.

Appendix A: Potential Water Savings Calculations

Calculations and Key Assumptions contains several assumptions that serve to understate the potential savings resulting from adoption of the specification. These include –

- 13.5 million households with in-ground irrigation systems is attributed to the 2005 RECS survey. It is not clear (and should be clarified) whether 13.5 million was the actual RECs count in 2005, or whether some lower number was recorded in 2005 and that total increased by new landscapes installed since then, which the Cover Letter asserts to consist of 1/3 of all new homes each year. Is 13.5 million the number of systems in 2005 or the number of systems in 2016? Either way, if it is based on RECS, it does not include any commercial landscape irrigation, which would add to the savings.
- The average residential outdoor use of 50,500 gallons per year is attributed to REUWS 2. However, this figure is for all households, not just those with automatic irrigation systems. Residences with in-ground systems are likely to cluster in the highest quartile of water use, not the middle.
- The analysis assumes that an average landscape has 50% irrigated turf. This seems like a reasonable method to determine the fraction of all landscaped area with turf, including homes with no turf, but not for determining the fraction of turf at a home with in-ground irrigation systems.

We urge that the savings analysis be revisited with more plausible assumptions about the market for spray sprinkler bodies.

Thank you for your consideration of these views.

^[1] Kunkel Water Efficiency Consulting, *Report on the Evaluation of Water Audit Data for Pennsylvania Water Utilities*, February 2017, pp. 20-22. <
<https://www.nrdc.org/sites/default/files/pa-utilities-water-audit-data-evaluation-20170215.pdf>>



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