

## DOCKETED

<b>Docket Number:</b>	17-AAER-10
<b>Project Title:</b>	Irrigation Controllers
<b>TN #:</b>	219125
<b>Document Title:</b>	EPA WaterSense Comments on Irrigation Controllers
<b>Description:</b>	N/A
<b>Filer:</b>	System
<b>Organization:</b>	Stephanie Tanner
<b>Submitter Role:</b>	Public Agency
<b>Submission Date:</b>	6/16/2017 10:40:43 AM
<b>Docketed Date:</b>	6/16/2017

*Comment Received From: Stephanie Tanner*

*Submitted On: 6/16/2017*

*Docket Number: 17-AAER-10*

## **EPA WaterSense Comments on Irrigation Controllers**

*Additional submitted attachment is included below.*



A partnership program of the  
U.S. Environmental Protection Agency

June 16, 2017

California Energy Commission  
Docket Office, MS-4  
1516 Ninth Street  
Sacramento, CA 95814-5512

**RE: Docket #17-AAER-10 – Irrigation Controllers**

Dear California Energy Commission,

The U.S. Environmental Protection Agency's (EPA's) WaterSense® program thanks the California Energy Commission (CEC) for the opportunity to participate in the appliance efficiency pre-rulemaking process. WaterSense is a voluntary partnership program that labels water-efficient products and services and promotes efficient water use throughout the United States. The WaterSense label is intended to easily identify products and services that use 20 percent less water, save energy, and perform as well as or better than standard models on the market. To date, WaterSense has developed specifications for seven plumbing and irrigation product categories, including tank-type toilets, flushometer-valve toilets, urinals, showerheads, lavatory faucets and faucet accessories, pre-rinse spray valves, and weather-based irrigation controllers, and has developed additional specifications for homes and irrigation professional certification programs.

WaterSense's goal in submitting comments to CEC is to provide it with any research EPA has conducted and publicly available data we have collected in our specification development efforts. During the specification development process, WaterSense engages various stakeholders and partners, including water and energy utilities, manufacturers, industry professionals, and the general public. Wherever feasible, WaterSense specifications reference existing, consensus-based national standards as the basis for the water efficiency and performance testing protocols. In cases where a consensus-based standard does not exist or is deficient in meeting WaterSense's criteria for specification adoption, EPA works with standards organizations and industry stakeholders to develop repeatable test methods that provide reproducible results.

Principally, WaterSense encourages harmony between CEC regulations and WaterSense specifications, particularly regarding the referenced efficiency and performance test methods. This will serve to:

1. **Ease the compliance cost and burden on manufacturers.** Manufacturers will be able to have products tested a single time for compliance with the applicable CEC regulation and/or the voluntary WaterSense specification.
2. **Provide utilities and consumers with clear and consistent information.** Product efficiency and performance will be easily comparable across states, regions, and the country.

WaterSense published a specification for weather-based irrigation control technologies (WBICs) in 2011 and is currently developing specifications for two additional irrigation products: soil moisture sensor-based control technologies (SMSs) and spray sprinkler bodies (SSBs). WaterSense is submitting comments to CEC documenting the process used to develop the specifications, identify documents published to date (e.g., Notices of Intent [NOIs] or draft specifications), and demonstrate the preferred adoption of consistent, consensus-based standards, as well as a sound specification development process that includes stakeholder input from industry, water and energy utilities, water efficiency advocates, and the public. WaterSense is also providing links to data gathered to date and is available to discuss the information presented below with CEC if needed. The comments below highlight WaterSense's extensive product research to investigate potential water savings and performance criteria. EPA appreciates CEC's consideration of this information in the appliance efficiency pre-rulemaking process.

### Comments on Weather-Based Irrigation Controllers

WaterSense published a final specification for WBICs, [\*WaterSense Specification for Weather-Based Irrigation Controllers\*](#) in 2011 and to date has certified 400 models. Through 2016, WaterSense estimates nearly 3.4 billion gallons of water have been saved through installation of WaterSense labeled irrigation controllers.

WaterSense began the specification development process for this category in 2006, engaging a wide range of stakeholders, including utilities, irrigation experts, and manufacturers. As part of this effort, WaterSense identified field studies<sup>1</sup> and developed calculations for expected national water savings. These are included in the [\*WaterSense Specification for Weather-Based Irrigation Controllers Supporting Statement\*](#), which should be referenced for CEC's pre-rulemaking efforts.

During the specification development process, WaterSense adopted the Irrigation Association's Smart Water Application Technology's (SWAT) test protocol for climatologically based controllers included in Appendix C of the specification. WaterSense adopted this test method

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<sup>1</sup>It is likely that additional studies have been published since 2011 that are not included in this document and should be identified by CEC to the extent possible.

because there was not a consensus-based standard available in the marketplace at the time, and EPA determined that the theory behind the test method adequately tested the products for performance. At the time of adoption, the test had only been conducted at one laboratory and industry, and utilities expressed several concerns with the test method. WaterSense conducted two rounds of research (see the [\*Examination of SWAT Protocol Utilizing a Performance Analysis of Weather-Based Irrigation Controllers \[2009\]\*](#) and [\*Examination of SWAT Protocol Utilizing a Performance Analysis of Weather-Based Irrigation Controllers: Update With Extended Data \[2011\]\*](#)) to examine these concerns and confirm the protocol was repeatable at any laboratory. Based on this research and two rounds of public comment, WaterSense made several modifications to the SWAT protocol for inclusion as the test method in the specification.

In addition to performance criteria, utility stakeholders strongly encouraged EPA to include supplemental features for labeled controllers that ensure a high-performing product. These are included in Section 4 of [the specification](#). WaterSense developed these features based on a series of stakeholder meetings and the public comment process (<https://www.epa.gov/watersense/product-background-materials>) and is available to discuss these features and their development with CEC. In the specification, WaterSense also differentiated between controllers that are standalone (e.g., the controller and the weather-based capabilities are one device or sold together) or added to an existing controller (e.g., add-on or plug-in device). WaterSense has developed a testing and packaging scheme to address these products and is available to discuss these decisions with CEC as well.

After the test method research, two draft specifications, and associated public comment periods (provided at <https://www.epa.gov/watersense/product-background-materials>), WaterSense published a [final specification](#) in 2011.

In 2012, the American Society for Agricultural and Biological Engineers (ASABE) began the standard development process for [\*S627 Environmentally Responsive Landscape Irrigation Control Systems\*](#), incorporating the SWAT test protocol for climatologically based controllers. This standard development committee revised the SWAT protocol to incorporate several of the modifications WaterSense included in the *WaterSense Specification for Weather-Based Irrigation Controllers*, as well as several additional revisions, and published a draft standard for comment in 2016. WaterSense submitted official comments in April 2016 (see Appendix A). In these comments, WaterSense recommended the committee conduct round robin testing with multiple laboratories to ensure the new test method is repeatable and examine how current products on the market score, prior to moving forward with finalizing the standard. To date, EPA is not aware of any further movement on this standard.

## Comments on Soil Moisture-Based Control Technologies

WaterSense has also been working diligently to develop a companion specification for soil-moisture-based control technologies. Soil moisture- and weather-based control technologies accomplish the same goal (i.e., appropriate irrigation scheduling) using different technologies. WaterSense began examining this product category in 2006 as well, and similarly, there was not a consensus-based standard available. However, there was a [SWAT protocol available](#), which WaterSense examined. At that time, the method was still in development and few products had been tested to it. Manufacturers of by-pass type products decided to separate from that development process and instead produce a test protocol that applied to their products, so as to accelerate the test method development process. This group formed the basis of the ASABE committee, formalized in 2012 and tasked with developing a standard for bypass type soil moisture-based control technologies, [X633 Testing Soil Moisture Sensors for Landscape Irrigation](#).

In 2013, WaterSense published an [NOI for SMSs](#) indicating a draft specification would adopt a test method developed by this consensus-based committee. Since this time, the ASABE S633 committee has conducted beta testing on these products to ensure the test method developed is repeatable. Results from this testing are expected in 2017. Once a test method is finalized and a body of performance data testing a range of products on the market is available, WaterSense plans to move forward with developing a draft specification for this product category, tentatively scheduled for late 2017 or early 2018.

Regarding soil moisture-based control technologies' water savings data, WaterSense included published field studies known to date in its [NOI](#). Since then, additional studies have likely been published, and WaterSense will examine these studies when developing the supporting statement that accompanies a draft specification. WaterSense is available to discuss progress to date and preliminary findings from testing with CEC if needed.

## Additional Data

Although a final report is not available at this time, CEC may be interested in tracking a Water Research Foundation effort aimed at examining outdoor water use savings (<http://www.waterrf.org/Pages/Projects.aspx?PID=4633>), as it may include field studies that examine the water savings of irrigation technologies, as well as other outdoor water efficiency techniques. As WaterSense moves forward in specification development for these products, we will keep CEC apprised of developments related to any additional research conducted.



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In closing, EPA encourages CEC to seek out the adoption of consensus-based test methods for both types of irrigation controllers, if available at the time of the rule development. As mentioned above, WaterSense seeks to harmonize the use of test methods and plans to consider the test methods included in both the final versions of ASABE S627 and S633, when available.

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As demonstrated above, EPA has extensive experience with these product categories and has conducted research on or participated in research efforts related to the performance of both products. We are eager to share our historical knowledge and provide publicly available data to CEC to assist you in your rule-making process. Please contact Stephanie Tanner ([tanner.stephanie@epa.gov](mailto:tanner.stephanie@epa.gov); 202-564-2660) or the WaterSense Helpline ([watersense@epa.gov](mailto:watersense@epa.gov)) to discuss any of the information or data discussed in this comment submission. Thank you again for the opportunity to comment, and we look forward to discussions moving forward.

Sincerely,

EPA WaterSense  
(866) WTR-SENS (987-7367)  
[www.epa.gov/watersense](http://www.epa.gov/watersense)

**Appendix A**  
**WaterSense Comments on ASABE S627**  
**Submitted in April 2016**



## Template for comments and committee observations

Date: due 4/2/2016

Document: **X627 draft**

Project: X627

Name	Line # (opt.)	Clause/ Subclause	Paragraph/ Figure/ Table/	Type of comment*	Comments	Proposed change	Observations of the committee  (not for commenter use)
Joanna Kind		Full Standard		General	<p>The S627 standard is an update of the eighth draft of the Smart Water Application Technologies™ (SWAT) test protocol for climatologically based controllers, the methodology referenced in the WaterSense Specification for Weather-Base Irrigation Controllers (with modifications). WaterSense would like to consider adopting the S627 standard in future versions of the specification, but is concerned with the readiness of the standard for finalization. The standard updates many of the calculations used in the SWAT protocol and includes many other major changes as mentioned below (e.g., weather requirements, hourly moisture balance, order of operations, and values in the virtual landscape). WaterSense would prefer to have a spreadsheet or other standardized method for the calculations provided along with the standard, so that laboratories performing the test would have a template for data entry, calculations, and results. It is not apparent that such a method exists at this time. In addition, development of a spreadsheet would provide an opportunity for the committee to ensure all of the calculations in the standard work together to accurately test the product as intended. WaterSense is also concerned that there hasn't been any testing of products currently on the market using the revised methodology in the standard to ensure the test is valid and can produce consistent and repeatable results when implemented by a laboratory. WaterSense is concerned that the committee has not examined how the major changes from the current SWAT protocol and WaterSense specification will impact product scores and would feel more</p>	<p>WaterSense proposes that the committee delay in finalizing the standard until the following actions are taken:</p> <ol style="list-style-type: none"> <li>1. Develop a spreadsheet or other methodology similar to that which is used for WaterSense certification of weather-based irrigation controllers. This will ensure the calculations and major changes from the SWAT protocol accurately test the products as intended. As part of the spreadsheet development, WaterSense suggests running sample controller and weather data through the spreadsheet to ensure the methodology, calculations, and results are sound.</li> <li>2. Document the test is repeatable. Once a spreadsheet is built, provide the standard and spreadsheet to one or more independent laboratories, along with at least three products for testing using the new methodology. This will ensure the language included in the standard is clear and the test lends repeatable results. This will also provide feedback on how the standard will impact scores of those products that have already undergone WaterSense certification and/or SWAT testing.</li> </ol>	

**Template for comments and committee observations**

Date: due 4/2/2016

 Document: **X627 draft**

Project: X627

Name	Line # (opt.)	Clause/ Subclause	Paragraph/ Figure/ Table/	Type of comment*	Comments	Proposed change	Observations of the committee  (not for commenter use)
					comfortable with the changes after analyzing test data produced by the methodology included in the standard.		
Joanna Kind		4.2		Technical	The standard requires an hourly moisture balance calculation, as opposed to the daily calculation currently utilized in the SWAT protocol and WaterSense Specification for Weather-Base Irrigation Controllers. There is no evidence provided for why this change is being made. WaterSense acknowledges an hourly moisture balance is a more accurate representation of real world conditions, but has some concerns. First, since no testing has been done by the committee, it is not clear what impact this additional level of complexity would have on the cost or time to certify products. Hourly testing would make a spreadsheet or other calculation method much more complex. Second, given that most controllers on the market make daily calculations of moisture balance, it is not clear how this change improves the testing of products available in the market.	Either provide support for why this change is being made, or calculate the moisture balance on a daily basis as done in the SWAT protocol and WaterSense Specification for Weather-Base Irrigation Controllers.	
Joanna Kind		4.5		Technical	The current methodology in the WaterSense Specification for Weather-Base Irrigation Controllers requires that irrigation is counted first in the moisture balance and then rainfall second (note that the moisture balance is calculated daily). The S627 methodology provides a different order of operations consistent with current SWAT protocol so that rainfall is counted first and then irrigation second. WaterSense counts irrigation first with the logic that irrigation will likely occur early in the day based on ET and rainfall data from the previous day. This	If the committee moves forward with the hourly moisture balance (rather than daily as suggested in the previous comment), then WaterSense supports rainfall being counted first and irrigation second in the order of operations. However, if a daily moisture balance is adopted, then WaterSense suggests adopting an order of operations with irrigation counted first and rainfall second to avoid controllers being unnecessarily penalized due to a lack of predictive capabilities.	

## Template for comments and committee observations

Date: due 4/2/2016

Document: **X627 draft**

Project: X627

Name	Line # (opt.)	Clause/ Subclause	Paragraph/ Figure/ Table/	Type of comment*	Comments	Proposed change	Observations of the committee  (not for commenter use)
					results in the controller not being penalized if it irrigates in the morning and then it rains in the afternoon. By counting rainfall first, the S627 approach presumes a predictive capability of the controller to forecast rainfall information into the future based on past weather conditions (e.g., if a controller waters in the morning and then it rains in the afternoon, the controller may be penalized). However if the S627 standard moves to an hourly moisture balance calculation as discussed in the previous comment, this situation is essentially eliminated except when the controller waters and it rains within the same hour. In that scenario, WaterSense agrees the controller should be penalized.		
Joanna Kind		4.6		Technical	WaterSense is in support of increasing the weather requirements to 2 inches of rain (with at least four events of .1") and 5" inches of ET. However, this will reduce the number of areas in the country where these products can be tested due to regional weather. Additionally, the criteria regarding test length is vague and should be clarified. WaterSense has structured the language in its specification so that the test period is the same length for all products, "...the test period shall be 30 consecutive days. However, the test may run past the initial 30 days until a 30-day period occurs where all conditions in Section 3.1 are met. The first valid 30-day test period shall be used to calculate irrigation adequacy and irrigation excess. If the thresholds included in Section 3.2 are not met, the test shall be restarted." WaterSense recommends that the standard	No change regarding weather requirements. Regarding test length, WaterSense suggests adopting language similar to that in the WaterSense Specification for Weather-Base Irrigation Controllers (see adjacent text) to ensure all products undergo tests identical in length. Because the weather requirements are significantly increased in the draft standard, WaterSense suggests the committee determine an appropriate test length and include it in the revised language (e.g., 45 days instead of the 30 suggested in the WaterSense specification language).	

## Template for comments and committee observations

Date: due 4/2/2016	Document: <b>X627 draft</b>	Project:X627
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Name	Line # (opt.)	Clause/ Subclause	Paragraph/ Figure/ Table/	Type of comment*	Comments	Proposed change	Observations of the committee  (not for commenter use)
					also require the same test length for all products.		
Joanna Kind		4.3	Table 1	Technical	Many of the values in this table were updated with no documentation and/or citations for the new values used, specifically the root zone depths and a move from monthly turf factors to an annual value.	Provide citations or technical support for the changes made to Table 1.	
Joanna Kind		4.1		Technical	The language regarding product sampling is vague with respect to where the product is coming from or how a product is selected by a laboratory for testing.	Change the language similar to the product sampling requirement in the WaterSense Specification for Weather-Base Irrigation Controllers, "One product shall be selected at random from the entire inventory of the manufacturer's packed production."	