

WaterSense Performance Overview: *Commercial Pre-Rinse Spray Valves*

Equal or superior product performance is a pillar of the WaterSense label. Ensuring performance is vital for maintaining program integrity and consumer confidence in WaterSense labeled products. As part of specification development, the U.S. Environmental Protection Agency (EPA) also evaluates whether high-efficiency products will have other environmental or economic impacts. This includes whether there will be unintended or negative impacts to overall system performance, which may affect user satisfaction and health and safety. This Performance Overview details EPA's process for developing performance test methods and criteria for commercial pre-rinse spray valves (PRSVs). In general, as part of the [specification development process](#), EPA involves many WaterSense stakeholders, including manufacturers, certifying bodies and testing laboratories, standard development organizations, trade organizations, water and energy utilities, and other water efficiency experts and advocates. Each of these stakeholders offers a unique perspective and has dedicated technical expertise and other resources that have contributed to the development of performance criteria used to ensure WaterSense labeled products perform as well or better than standard products on the market.



EPA released the [WaterSense Specification for Commercial Pre-Rinse Spray Valves](#) and associated supporting statement on September 19, 2013.¹ EPA subsequently sunset the WaterSense specification as of January 1, 2019.

Summary of Performance Requirements

Table 1 summarizes the performance requirements that commercial PRSVs were previously required to meet to earn the WaterSense label. Table 1 also describes the purpose of each performance requirement, the applicable standard the WaterSense specification references, and any specific requirements or deviations from the referenced standard.

¹ More information on EPA's rationale for establishing its efficiency and performance criteria for PRSVs can be found in the supporting statement, response to comments, and other background documents found at www.epa.gov/watersense/product-background-materials.

Table 1. Summary of Performance Criteria Previously Included in the *WaterSense Specification for Commercial Pre-Rinse Spray Valves* (at time of specification sunset)

Performance Requirement	Purpose	Referenced Standard (if applicable)	Applies to Conventional Models	Applied to WaterSense Labeled Models
Life cycle test	Tests whether PRSVs continue to function as intended after 250,000 cycles.	ASME A112.18.1/ CSA B125.1 <i>Plumbing supply fittings</i>	✓*	✓
Spray force	Ensures PRSV spray force is sufficient to provide user satisfaction.	ASTM F2324 <i>Standard Test Method for Pre-Rinse Spray Valves</i> The minimum spray force shall not be less than 4.0 ounces-force.		✓

* The life cycle testing requirement within ASME A112.18.1/CSA B125.1 *Plumbing supply fittings* was updated to require life cycle testing following 250,000 cycles (up from 150,000 cycles) after the requirement was initially included in the *WaterSense Specification for Commercial Pre-Rinse Spray Valves*. All PRSVs sold in the United States or Canada are now required to pass this performance test.

Development of Performance Requirements

EPA announced its intent to label PRSVs on July 10, 2009. At the time, ASTM F2324-03 *Standard Test Method for Pre-Rinse Spray Valves* was the established test method for evaluating PRSV efficiency and performance. Within the ASTM standard, product performance was determined by measuring “cleanability,” or the time it would take for the PRSV to rinse tomato paste from a plate. Though ASTM F2324 provided a measure for performance, some of WaterSense’s utility partners and other stakeholders expressed concern that high-efficiency PRSVs needed to be used longer in the field (thus negating expected water savings), and that users were not satisfied with their performance.

As a result of these concerns, EPA initiated a [field study](#) in 2010 to assess and compare water and energy savings, use time, and performance of different models of standard and high-efficiency PRSVs. The field study was conducted at 10 commercial kitchen facilities in Washington, DC, and Boston, Massachusetts. Critical to this study, EPA also evaluated user satisfaction with each model of PRSV tested and used this information to assess how certain performance metrics correlated to user satisfaction. Among other conclusions related to PRSV water and energy savings, EPA found that the ASTM F2324 cleanability test did not necessarily correlate to user satisfaction or actual use time in the field. Users instead suggested pressure (i.e., spray force) played a substantial role in product performance and satisfaction.²

WaterSense collaborated through an American Society of Mechanical Engineers (ASME)/Canadian Standards Association (CSA) Joint Harmonization Task Group project team, made up of representatives from the plumbing industry, manufacturers, testing laboratories, water utilities, members of the ASTM F2324 standard committee, and other water efficiency

² EPA, 2011. *Pre-Rinse Spray Valves Field Study Report*. March 31, 2011. www.epa.gov/sites/production/files/2017-02/documents/ws-background-prsv-field-study-report.pdf.

advocates, to develop specification criteria and test methods related to PRSVs. WaterSense presented the results of its field study to the ASME/CSA project team. The project team agreed that a new measure of performance was needed, given the fact that the ASTM F2324 cleanability test did not adequately differentiate PRSV performance and there was dissatisfaction with the perceived pressure of some lower-flowing PRSVs.

Initially borrowing from the concepts for measuring force specified by the *WaterSense Specification for Showerheads*, the test protocol underwent several iterations of round-robin testing in various independent laboratories to refine the protocol. To determine spray force's efficacy as a performance metric, laboratory force test data for the 14 PRSV models monitored in EPA's field study were compared against the user satisfaction survey data. Ultimately, spray force was found to correlate better to user satisfaction than cleanability. As a result, ASTM revised its ASTM F2324 test method to include the new spray force method and remove the cleanability method. The WaterSense specification subsequently referenced the revised ASTM F2324 spray force test method. The spray force component of the WaterSense specification requires a PRSV's spray force to be at least 4.0 ounces-force at an inlet pressure of 60 psi when the water is flowing, which aligned with the threshold above which users reported satisfaction. The testing procedure, described in the 2013 version of ASTM F2324, is a direct measure of the force of the PRSV through the use of a force gauge. The PRSV is aimed directly at the force gauge, and the spray force measurement is recorded.

As an ancillary observation during the field study, several of the installed models leaked or otherwise malfunctioned during the three-week testing period, causing WaterSense to question the long-term durability and ultimate water and energy savings potential of the products once installed in the field. To address this issue, the project team recommended strengthening the life cycle testing requirements previously specified by ASME A112.18.1/CSA B125.1 to better ensure product duration and the longevity of water and energy savings. WaterSense increased the life cycle testing requirements to 250,000 cycles, which represents a 67 percent increase over the previous life cycle testing for standard PRSVs and puts the requirements in line with other manually operated fittings. The ASME A112.18.1/CSA B125.1 standard has since been updated to align with the WaterSense life cycle testing criteria.

Following the release of the *WaterSense Specification for Commercial Pre-Rinse Spray Valves*, the U.S. Department of Energy (DOE) revised the federal energy conservation standards for commercial pre-rinse spray valves, codified in 10 CFR 431 Subpart O. The new regulations, effective January 28, 2019, classify PRSVs into three product categories, differentiated by spray force, each with its own maximum allowable flow rate. The regulation requires the flow rate and spray force to be determined in accordance with the ASTM F2324 standard, which WaterSense, in coordination with its stakeholders, had successfully updated to reflect user satisfaction and performance. As a result of the new DOE regulation and having successfully transformed the marketplace for high-efficiency and high-performing PRSVs, EPA sunset the *WaterSense Specification for Commercial Pre-Rinse Spray Valves* on January 1, 2019.³

³ More information on EPA's rationale for sunsetting the WaterSense specification can be found in the *WaterSense Notice of Sunset of the Specification for Commercial Pre-Rinse Spray Valves*, found at www.epa.gov/watersense/pre-rinse-spray-valves.