

WaterSense[®] Specification for Flushing Urinals Supporting Statement

I. Introduction

The WaterSense program released its flushing urinal specification on October 8, 2009, to promote and enhance the market for high-efficiency flushing urinals. The intent of this specification is to assist consumers in identifying and differentiating those products that have met EPA's criteria for water efficiency and performance.

This final specification addresses flushing urinals—urinals that use water to convey waste through a trap seal into a gravity drainage system—and their flushing devices. Devices utilizing other techniques such as non-water urinals, composting urinals, and retrofit devices or other aftermarket retrofit systems are not covered by this specification.

II. Current Status of Urinals

There are an estimated 12 million urinals currently in use in the United States, and an additional 300,000 new urinals are sold for installation in new buildings or for replacement of aging fixtures each year.¹ Of the 12 million existing urinals, up to 65 percent (7.8 million) are inefficient units with flush volumes exceeding the current maximum flush volume allowed by federal standards—some by as much as 3.0 gallons per flush. The Energy Policy Act of 1992 established the maximum flush volume for all urinals manufactured in the United States after January 1, 1994, at 1.0 gallons per flush (gpf) (3.9 liters per flush [Lpf]). These requirements are codified in the *Code of Federal Regulations* at 10 *CFR* Part 430 (specifically §430.32[r] Urinals).

Since the federal standards were enacted, manufacturers have developed urinals that use significantly less water than the standard 1.0 gpf fixtures. These high-efficiency fixtures can save at least 0.5 gallons of water per flush compared to standard 1.0 gpf fixtures, resulting in a savings of more than 2,300² gallons per urinal per year. Replacing pre-1994, inefficient urinals with these new high-efficiency fixtures can save even more water.

WaterSense product research has shown that there are at least eight manufacturers offering nearly 40 models of high-efficiency flushing urinals that are expected to meet the requirements of this specification and would be qualified to apply for and use the WaterSense label.

¹ *Plumbing Fixtures Market Overview: Water Savings Potential for Residential and Commercial Toilet and Urinals*. D&R International. September 30, 2005.

² According to data from the U.S. Department of Labor Statistics and Amy Vickers, *Handbook of Water Use and Conservation*, Water Plow Press, 2001, it is estimated that the average urinal is flushed 18 times per day. Savings are based on the assumption that urinals are typically used 260 days per year.

III. WaterSense Specification for Flushing Urinals

Scope

WaterSense has finalized this specification to address criteria for improving and promoting water-efficient, high-performance flushing urinals. It only applies to urinals that use water to convey liquid waste through a trap seal into a gravity drainage system. This includes the ceramic (vitreous china), plastic, or stainless steel urinal fixture and the pressurized (i.e., flushometer valve) or gravity tank-type flushing device.

Non-water urinals, composting urinals, and retrofit devices or other aftermarket retrofit systems are not included within the scope of this specification. Non-water urinals³, though often very similar in appearance to flushing urinals, are different in design, components, how they function (i.e., remove waste), and are subject to significantly different standards. In the United States, two consensus-based American National Standards Institute (ANSI) standards specify the performance requirements for non-water urinals: American Society of Mechanical Engineers (ASME) A112.19.19–*Vitreous China Nonwater Urinals* and ANSI/International Association of Plumbing and Mechanical Officials (IAPMO) Z124.9–*American National Standard for Plastic Urinal Fixtures*. These two standards are designed to ensure a high level of performance for non-water urinals. At this time WaterSense has no basis to propose improvements to these existing standards, thus WaterSense has no means to help purchasers distinguish among these products based on either their efficiency or performance.

It should be noted that non-water urinals, by design, are inherently water-efficient and although the specification does not apply to these products, this specification does not preclude or prevent their use in water efficiency, green building or other conservation programs. In fact, non-water urinals continue to be compatible with and a key component of LEED and other green building programs. WaterSense encourages designers, specifiers, and facility managers to consider all available technologies when making purchasing decisions concerning water using products, including non-water urinals. The specification and WaterSense label are simply one of many tools available to help consumers make informed purchasing decisions. If decision-makers decide to specify and install water-using urinals, then WaterSense encourages them to choose products with the WaterSense label.

Composting urinals are part of a self-contained engineered system with different design and performance requirements, and as such would require unique specification criteria beyond this scope. Composting urinals also are inherently water-efficient as they do not use water.

Retrofit devices are not addressed because the intent of the specification is to recognize and label complete, fully functioning fixtures or fittings, and not individual sub-components.

³ Defined by the applicable ANSI standards as “a plumbing fixture that is designed to receive and convey only liquid waste through a trap seal into the gravity drainage system without the use of water for such function.”

Water-Efficiency Criteria

The water-efficiency component of the specification establishes a maximum average flush volume of 0.5 gpf (1.9 Lpf) when tested in accordance with ASME A112.19.2/Canadian Standards Association (CSA) B45.1, ASME A112.19.3/CSA B45.4, or IAPMO Z124.9, as applicable. This value represents a 50 percent reduction from the current 1.0 gpf standard and is consistent with WaterSense's stated goal of increasing product water efficiency by at least 20 percent.

WaterSense selected the 0.5 gpf average maximum flush volume as its criteria for water efficiency because this value is consistent with the currently accepted industry definition for high-efficiency urinals and therefore is widely accepted by water-efficiency stakeholders and manufacturers. Also, manufacturers have been selling urinals that meet or exceed this standard for several years.

As a change from the draft specification, prior to testing the manufacturer must specify the designed maximum flush volume of the urinal fixture or flushing device (the "rated" flush volume). This rated flush volume must be less than or equal to 0.5 gpf. When the product is tested, its average maximum flush volume must not exceed the manufacturer's rated flush volume. The intent of this requirement is to ensure that WaterSense labeled fixtures and flushing devices that are marketed as performing at a specific flush volume actually perform at that stated flush volume. It also serves to clarify which flush volume manufacturers should include on products and product packaging and provides the consumer with informative and accurate information about the product's water consumption.

Performance Criteria

Currently, all flushing urinals are subject to national performance standards approved by ANSI. Ceramic flushing urinal fixtures are subject to the performance requirements of ASME A112.19.2/CSA B45.1, stainless steel urinal fixtures are subject to the performance requirements of ASME A112.19.3/CSA B45.4, and plastic urinal fixtures must comply with IAPMO Z124.9. Pressurized flushing devices (e.g., flushometer valves) used on the urinals are subject to American Society of Sanitary Engineering (ASSE) #1037—*Pressurized Flushing Devices (Flushometers) for Plumbing Fixtures*, while gravity tank-type flushing devices are subject to the requirements of ASME A112.19.2/CSA B45.1.

For urinal fixtures, the only new significant requirement in this final specification is that they must comply with all applicable sections of ASME A112.19.2/CSA B45.1, A112.19.3/CSA B45.4, or IAPMO Z124.9 at the manufacturer specified flush volume (rated flush volume) rather than at the current federal standard of 1.0 gpf.

For flushing devices, there are several additional requirements in the specification that go beyond the requirements of ASSE #1037 (for pressurized flushing devices) and ASME A112.19.2/CSA B45.1 (for flush tank [gravity-type] flushing devices). In addition to complying with all aspects of the applicable standards, three additional requirements apply to all flushing devices:

- The flushing device's primary actuator must be of a non-hold-open design.

- The flushing device must not be adjustable as to its rated flush volume beyond a specified tolerance of ± 0.1 gpf (0.4 Lpf).
- The flushing device must be designed such that replaceable or maintainable parts are not intended to be interchangeable with parts that would cause the device to exceed its rated flush volume.

The non-hold-open design requirement is designed to eliminate the ability to increase the device's flush volume by holding the actuator open. This requirement has been revised from what was proposed in the draft specification to apply only to the flushing device's primary actuator. This change primarily affects sensor-activated flushing devices that incorporate manual actuators or overrides for emergency or maintenance use. These secondary manual actuators are not intended to be used as the main actuator for these flushing devices, and therefore typically would not meet this requirement. WaterSense recognizes that requiring secondary actuators to comply with this requirement could be cost prohibitive and design restrictive, and would not significantly contribute to water savings.

The non-adjustability requirement ensures that the product's water consumption in the field can be maintained. This requirement also has been revised from the draft specification to include a specific tolerance allowance. This change reflects the frequent need for field adjusting of flushing devices to account for site-specific differences in water pressures, inherent fluctuations or variances in flushing performance of individual flushing devices, and fine-tuning different flushing device and fixture combinations to achieve maximum performance. Pressurized flushing devices are allowed to have a flush volume adjustment as long as it does not allow the rated flush volume to vary by more than ± 0.1 gpf from the device's manufacturer specified flush volume (rated flush volume). For gravity tank-type flushing devices, the maximum volume of water discharged by the tank when the tank trim is adjusted to its maximum water use setting cannot vary by more than ± 0.1 gpf from the device's rated flush volume. These changes simply acknowledge the inherent variability of all flushing devices when installed in the field.

WaterSense is maintaining the requirement that the flushing devices be designed such that replaceable or maintainable parts are not interchangeable with parts that would cause the device to exceed its rated flush volume. This requirement, to the extent it can be controlled through this specification, is designed to help prevent the intentional or unintentional change from the product's rated flush volume to a higher flush volume, which could not only reduce water savings, but impact the product's performance (e.g., the urinal may flood) as the flushing device and urinal fixture are no longer matched to perform with the same flush volume. For example, a flushing device rated at 0.5 gpf that accepted existing replacement 1.0-gpf pistons or diaphragms would not be a product that meets WaterSense's intentions for this requirement. It is important to note that WaterSense has, however, made a change to this requirement from the draft specification. Under the final specification the manufacturer must attest to the applicable certifying body that its products comply with this specific requirement rather than relying on the licensed certifying body to verify that the product meets this requirement. Manufacturer attestation shifts responsibility for ensuring compliance with this design intent to the manufacturer.

Many pressurized flushing devices on the market today already incorporate features that meet the new requirements, and therefore should not encounter technical difficulties in complying with the final specification. While the non-interchangeable parts requirement might create a new

burden for some manufacturers, WaterSense has determined that all three of these requirements are essential for preserving the long-term efficiency and performance of WaterSense labeled flushing urinals.

Product Marking

In response to several public comments, discussions with stakeholders concerning the marking of other WaterSense labeled products, and changes made to Section 3.0 of the specification, WaterSense has revised the product marking requirements found in Section 6.0 to require the manufacturer to mark the product and product packaging with the rated flush volume. This is as opposed to marking the product and/or the product packaging in accordance with 16 CFR 305.11(f). This change provides several benefits. First, it clears up any confusion regarding which flush volume value to use (i.e., the actual or maximum water consumption, as both are allowed and vaguely defined in the CFR). Second, it helps purchasers easily identify flushing devices and urinal fixtures that have the same rated flush volume and that can be used together as a system to meet the requirements of the specification. Lastly, clear marking, in conjunction with the non-interchangeable parts requirements of this specification, could help eliminate the installation or retrofitting of inappropriate replacement parts that could adversely affect performance and long-term water savings.

Potential Water Savings

WaterSense labeled flushing urinals that use a half-gallon of water or less per flush have the potential to save significant amounts of water both individually and at the national level. Assuming that the average urinal is flushed approximately 18 times per day and is in use 260 days per year, replacing a single inefficient 1.5 gpf urinal with a WaterSense labeled 0.5 gpf model could save more than 4,600 gallons of water per year (see Equation 1).

$$\text{Equation 1. Annual Individual Water Savings From Replacing 1.5 gpf Urinals} \\ (18 \text{ flushes/day}) \times (1.0 \text{ gallons saved/flush}) \times (260 \text{ days/year}) = 4,680 \text{ gallons/year}$$

Nationwide, if all 7.8 million pre-1994, inefficient urinals were replaced with WaterSense labeled models, more than 36 billion gallons could be saved per year (see Equation 2). It is important to note that many of the existing inefficient urinals have flush volumes significantly higher than 1.5 gpf. Since the exact breakdown of all existing urinals is unknown, WaterSense is assuming a 1.5 gpf flush volume as a conservative estimate. Because of this, the actual water savings potential could be much higher.

$$\text{Equation 2. Annual National Water Savings From Replacing 1.5 gpf Urinals} \\ (7.8 \text{ million inefficient urinals}) \times (4,680 \text{ gallons/year/urinal}) = 36.5 \text{ billion gallons/year}$$

Cost-Effectiveness

Urinals are relatively expensive when compared to other restroom plumbing fixtures, with the fixture cost averaging about \$350 and flushometer valve cost averaging about \$200 (based upon WaterSense product research). Fortunately, there seems to be very little price difference between high-efficiency fixtures and flushing devices and their standard counterparts. In fact, some of the fixtures are sold as 0.5/1.0 gpf fixtures, capable of being used at either flush

volume. Similarly, some models of the flushometer valves are available in 0.5 gpf or 1.0 gpf versions at the same price. Because there is no cost difference between the standard and high-efficiency models, installing high-efficiency urinals in new construction or as part of the normal replacement process is cost-effective with immediate payback and realized water cost savings.

Replacing an older, inefficient urinal with a flush volume of 1.5 gpf with a 0.5 gpf WaterSense labeled urinal will save more than \$850 over the useful life of the urinal (see Equation 3)—\$300 more than the initial cost of the fixture and flushometer valve (assuming the useful life for fixtures and flushometer valves is 30 years and the total of water and wastewater cost is \$6.06/1,000⁴ gallons).

$$\text{Equation 3. Estimated Lifetime Water Cost Savings From Replacing a 1.5 gpf Urinal} \\ (4,680 \text{ gallons/year}) \times \$6.06/1,000 \text{ gallons}) \times (30 \text{ years useful life}) = \$850.82$$

Without rebates or some other economic incentive, replacing properly functioning 1.0 gpf urinals with 0.5 gpf WaterSense labeled urinal might not make sense from a purely economic standpoint. It can, however, when done communitywide, significantly contribute to reducing water demand and delaying the need to develop new water supply and treatment capacity and infrastructure.

IV. Certification and Labeling

Independent Labeling of Urinal Fixtures and Flushing Devices

WaterSense has established an independent third-party product certification process, described on the WaterSense Web site at www.epa.gov/watersense/specs/certification.htm. Under this process, products are certified to conform to applicable WaterSense specifications by accredited third-party licensed certifying bodies. Manufacturers are then authorized to use the WaterSense label in conjunction with certified products.

With flushing urinals, it is not uncommon for a company to manufacture only the ceramic, stainless steel, or plastic urinal fixture and to require the use of another company's flushing device. The urinal fixtures' specification sheets for these products often indicate which make and model valves are best suited for use with the urinal. Correspondingly, there are some manufacturers that only make flushometer valves that can be used with other manufacturers' urinal fixtures.

WaterSense is retaining its proposed approach of allowing each urinal fixture and flushing device to be certified and labeled as either a complete system or independently as a urinal fixture or flushing device. For products certified and labeled separately, WaterSense will require manufacturers to clearly indicate on product documentation that the fixture or flushing device should be used with a WaterSense labeled counterpart with the same rated flush volume to ensure that the entire system meets the requirements of this specification for water efficiency and performance. This approach is the common industry practice and ensures that WaterSense is not significantly increasing the burden associated with the certification of high-efficiency

⁴ Raftelis Financial Consulting. *Water and Wastewater Rate Survey*. American Water Works Association. 2006.

flushing urinals. It also enables purchasers to easily identify and match labeled components with the same flush volumes.

Product Sampling for Certification

WaterSense has added new requirements specifying how certifying bodies are to select and sample products for certification. Sampling was not previously addressed in the draft specification, either directly or by reference. The requirements specify that the manufacturer must provide, at a minimum, three samples of the model to be tested. Of those, the certifying body must choose at least one at random for testing to the requirements of the specification. This sampling regime is modeled after the recommended sampling scheme for initial certification as specified in Section A4 of the Nonmandatory Appendix A Demonstrating Compliance to ASME A112.19.2 and is consistent with sampling requirements specified in the WaterSense high-efficiency tank-type toilet specification.