

WaterSense Certification Scheme

1.0 INTRODUCTION

WaterSense is a public-private partnership program sponsored by the U.S. Environmental Protection Agency (EPA) created to protect the future of our nation's water supply by promoting and enhancing the market for water-efficient products and programs. To achieve the mission of the WaterSense program, EPA establishes partnerships with interested stakeholders, such as product manufacturers, retailers, and water utilities. EPA provides and maintains the WaterSense brand and develops national specifications for water-efficient products and programs.

EPA requires all products bearing the WaterSense label to be assessed for conformance to the relevant WaterSense product specification by an accredited third-party product certification body. Accredited product certification bodies will certify that products conform to applicable specifications and authorize the use of the WaterSense label in conjunction with the certified product.

The international criteria for the accreditation of product certification bodies operating product certification programs (tangible products, processes, and services) are detailed in ISO/IEC Guide 65, *General requirements for bodies operating product certification systems*.

This WaterSense certification scheme specifies the minimum requirements that product certification bodies shall observe when operating third-party certifications of product conformance to WaterSense product specifications and authorizing the use of the WaterSense label. It provides guidance on ISO/IEC Guide 65 in order to satisfy the requirements implicit in the certification of products for WaterSense and provides the basis for consistent application of WaterSense certification by product certification bodies.

This document, in respect to the certification and labeling of products for WaterSense, shall be read in conjunction with ISO/IEC Guide 65.

The requirements of this WaterSense certification scheme are applicable to the product certification bodies and do not apply to the manufacturers that are obtaining product certification. The WaterSense requirements applicable to the manufacturers are outlined in the WaterSense manufacturer partnership agreement and the WaterSense program guidelines. Figure A-1 portrays the key elements of this product certification process and the relationships between EPA, the manufacturer, the product certification body, and the accreditation organization.

Certification by a product certification body is not a statement that the product certification body guarantees the efficiency and performance of a WaterSense labeled product. It is also not a guarantee that all of the aspects of a relevant WaterSense product specification are being met or will continue to be met, at all times. The certification and labeling of a product for WaterSense is a statement that the manufacturer's products have been produced in accordance with the relevant WaterSense product specification, and that the validation and verification of

conformance to the WaterSense product specification has been evaluated and determined to meet the necessary requirements. It is also a statement of the manufacturer's commitment to:

- Manufacture water efficient products in accordance with relevant WaterSense product specifications; and
- Comply with requirements of the manufacturer partnership agreement and WaterSense program guidelines.

2.0 TECHNICAL REQUIREMENTS

2.1 Scope

The WaterSense certification scheme applies to the certification of product conformance to the technical requirements of relevant WaterSense product specifications and includes all processes and services used to make a final product.

WaterSense product specifications, this WaterSense certification scheme, and the WaterSense program guidelines outline the purpose and the minimum requirements for certification by a product certification body. WaterSense product specifications are developed by EPA for various products or product categories and detail the required attributes of products that are allowed to bear the WaterSense label. Current WaterSense product specifications are available in Annex A to this WaterSense certification scheme. As additional WaterSense product specifications are developed, or modifications are made to existing WaterSense product specifications, Annex A will be modified to incorporate the new or updated WaterSense product specifications.

2.2 References

The following referenced documents are indispensable for the application of this WaterSense certification scheme. Undated references indicate that the latest edition of the referenced document applies.

WaterSense product specifications developed and maintained by EPA and contained in Annex A.

WaterSense program guidelines developed and maintained by EPA.

Manufacturer partnership agreement between EPA and the manufacturer of certified and WaterSense labeled products.

WaterSense label guidelines developed and maintained by EPA.

ISO/IEC Guide 65, *General requirements for bodies operating product certification systems.*

ISO/IEC 17000:2004, *Conformity assessment – Vocabulary and general principles.*

ISO/IEC 17011:2004, *Conformity assessment – General requirements for accreditation bodies accrediting conformity assessment bodies.*

3.0 THE PRODUCT CERTIFICATION BODY

Product certification bodies must be accredited in accordance with ISO/IEC Guide 65 to operate the WaterSense certification scheme and certify products to the relevant WaterSense product specifications contained in Annex A. The accreditation shall be issued by an accreditation body that:

- Operates in accordance with the requirements of ISO/IEC 17011, *General requirements for accreditation bodies accrediting conformity assessment bodies*;
- Offers accreditation services to ISO/IEC Guide 65; and
- Is an International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA) Signatory or International Accreditation Forum (IAF) Multi-lateral Recognition Agreement (MLA) Signatory.

Product certification bodies can seek accreditation for any or all of the WaterSense product specifications in Annex A. The specific WaterSense product specifications relevant to the products the product certification body certifies must be listed in its Scope of Accreditation.

4.0 PRODUCT CERTIFICATION SCHEME

4.1 Application

Manufacturers seeking WaterSense certification and the WaterSense label for their products must apply directly to a product certification body that is accredited for the relevant WaterSense product specification. The application shall be made on a form supplied by the product certification body and shall contain at a minimum:

- Manufacturer contact information;
- Product brand name, model name, and model number(s); and
- Manufacturer partner's URL.

The application shall relate to the specific product or group of products for which certification is requested by the applicant. Once the application is accepted, the product certification body shall provide the applicant with an estimate of the time required to conduct the initial evaluation, and any further information necessary for the application process.

For manufacturers with products already listed by a product certification body, subsequent requests for listing of new models for listed products shall be made on separate forms.

4.2 Initial Production Inspection and Product Testing

4.2.1 General

The product certification body shall comply with the requirements of ISO/IEC Guide 65.

Upon confirmation of the acceptance of the application, the product certification body shall make the necessary arrangements with the manufacturer for the initial evaluation in accordance with this WaterSense certification scheme.

The product certification body shall accept responsibility for all actions included in the WaterSense certification scheme, including product sampling and testing, assessment of the production process or quality system (if applicable), and the surveillance of certified products.

4.2.2 Initial Production Inspection

The WaterSense program does not require an initial production inspection (audit of production process and quality management) for products currently certified for sale in the United States. If the product certification body has no prior certification relationship with the manufacturer in the specific product area, the product certification body may conduct an initial production inspection at its own discretion to audit the manufacturer's capability for production and quality management.

4.2.3 Initial Product Testing

4.2.3.1 Selection of Samples

Samples for testing and examination shall be selected in accordance with the requirements specified in the relevant WaterSense product specification and this WaterSense certification scheme.

The product certification body shall select samples of products for testing that are representative of the model to be certified and made using components and subassemblies identical to those used in production. The samples selected shall be made from production tools and assembled using methods established for the production run.

4.2.3.2 Conduct of Initial Testing

The initial testing shall be carried out in accordance with the relevant WaterSense product specification and with this WaterSense certification scheme. All test facilities used by the product certification body shall demonstrate compliance to ISO/IEC 17025, *General requirements for the competence of calibration and testing laboratories*.

The product certification body shall determine the means it will use to conduct the initial testing. Allowable options include:

- In-House Testing: The product certification body performs all product testing in its own facilities.
- Subcontract Testing: The product certification body subcontracts another party to conduct product testing and/or evaluation.
- On-Site Testing (Witness Testing): Qualified staff from the product certification body oversee testing conducted by the manufacturer at its own facility.

4.2.4 Product Evaluation

4.2.4.1 Preparation for Evaluation

Prior to initiating product testing or a production inspection (if applicable), the product certification body shall complete a comprehensive review of quality management

documentation and product literature and schematics to ensure that there is substantiated evidence to show that the product is manufactured in accordance with the relevant WaterSense product specification, and that a proper production system and quality management system are established. The product certification body shall also verify that the manufacturer has in place a signed manufacturer partnership agreement with EPA.

4.2.4.2 Evaluation

The product certification body shall carry out the product evaluation by determining if the evaluation criteria are satisfactorily met and that the results of the initial product testing meet the requirements of this WaterSense certification scheme and the relevant WaterSense product specification. If an initial production inspection is conducted, the product certification body may also evaluate the product based on the results of that inspection.

4.2.4.3 Evaluation Report

The product certification body shall inform the applicant via a full report on the outcome of the initial evaluation (product testing and, if applicable, assessment of production process). If the product certification body is not satisfied that all of the requirements have been fulfilled, it shall inform the manufacturer of the aspects for which they do not comply. If the manufacturer shows that corrective action has been taken to meet the requirements within a time limit specified by the product certification body in the evaluation report, the product certification body shall repeat only the necessary aspects of the initial evaluation. It is up to the discretion of the product certification body to determine whether a repeat of the assessment is necessary for subsequent submittals of the same product.

4.3 Licensing

4.3.1 Licensing Agreement Between Product Certification Body and EPA

The product certification body shall sign a Licensing Agreement with EPA prior to receiving accreditation to certify and label products for WaterSense. This licensing agreement provides the conditions for authorizing the use of the WaterSense label to manufacturers of certified products.

As part of the responsibilities for certifying products and authorizing the use of the WaterSense label, the product certification body shall also provide EPA with ongoing support including:

- Provide EPA data on certified products: Product certification bodies shall maintain a listing of all WaterSense labeled products on their respective Web sites. In addition, EPA will require the product certification bodies to submit an updated list monthly so that EPA's WaterSense Web registry remains current. The data shall be provided to EPA in a format compatible with the WaterSense Web registry database. The data provided to EPA shall include:
 - Manufacturer name and contact information;
 - Brand/model/model number;
 - Certification file number; and
 - Certification date.

- Provide EPA with an annual report: The report shall be made on a form provided by EPA and shall contain information regarding numbers of products tested, certified, failed, or reinstated. In addition, the annual report shall contain a summary of common label misuse or dispute actions. EPA may utilize this information to generally track the certifications of specific products and evaluate the effectiveness and continued applicability of its WaterSense specifications.
- Notify EPA of any WaterSense label suspensions or withdrawals: EPA will rely on the product certification bodies to address product nonconformance, label misuse, and dispute resolution. Accordingly, product certification bodies shall provide EPA with notification of any WaterSense label suspensions or withdrawals, within 30 days of occurrence.
- Allow EPA to accompany accreditation organization on routine assessments: EPA reserves the right, for EPA staff or agents acting on behalf of EPA, to accompany the accreditation organization on any routine or follow-up assessments of the product certification body's accreditation as it relates to the WaterSense Program.

4.3.2 Licensing Agreement Between Product Certification Body and Manufacturer

When the certification decision has been made, the product certification body shall provide a certification decision to the manufacturer and authorize the use of the WaterSense label in conjunction with that certified product, in accordance with the licensing agreement (between the product certification body and EPA) and this WaterSense certification scheme.

The product certification body shall adhere to the following conditions for issuing the certification and authorizing the use of the WaterSense label:

- Ensure that the manufacturer of a WaterSense labeled product abides by the policies outlined in the WaterSense label guidelines.
- Verify that the manufacturer has in place a signed manufacturer partnership agreement with EPA.

4.4 Appeals to the Product Certification Body

The product certification body shall exercise an appeals procedure in accordance with ISO/IEC Guide 65.

4.5 Confidentiality

The product certification body shall establish confidentiality procedures in accordance with ISO/IEC Guide 65.

4.6 Use of the WaterSense Label

The product certification body shall provide a unique identifier to be displayed in conjunction with the WaterSense label. The identifier shall be the product certification body's registered name or official acronym and shall be formatted and centered directly beneath the WaterSense label. The identifier shall be legible and shall be no wider than the WaterSense label itself. EPA will provide to the product certification body a copy of the label the product certification body shall authorize manufacturers to use in conjunction with WaterSense labeled products.

The product certification body shall provide to the manufacturer of a certified product, the appropriate WaterSense label artwork and shall ensure that the manufacturer applies and uses the WaterSense label in accordance with the WaterSense label guidelines. Use of the WaterSense label by a manufacturer is voluntary.

4.7 Publicity About a WaterSense Labeled Product

The manufacturer of a certified product shall have the right to publish the fact that it has been authorized to apply the WaterSense label on products to which the certification applies. The label may be used in promotional literature published about the product by the manufacturer, its wholesalers, distributors, or retailers, as long as it is in direct correlation to the product. The WaterSense label must not be used to signify WaterSense labeling of every product from the manufacturer, wholesaler, distributor, or retailer, and may never be used to imply direct endorsement of a manufacturer or product by EPA.

The product certification body shall assist EPA in ensuring that the manufacturer adheres to the policies outlined in the WaterSense label guidelines.

4.8 Misuse of the Certification or WaterSense Label

The product certification body shall take appropriate action when a manufacturer of a product it has certified engages in unauthorized, incorrect, or misleading use of the certification or WaterSense label, whether it is discovered by the product certification body or is brought to its attention. Circumstances for unauthorized, incorrect, or misleading use of the certification or WaterSense label are described in the WaterSense program guidelines and the WaterSense label guidelines.

The product certification body shall bring to EPA's attention, any instances of unauthorized use of a WaterSense label by a manufacturer of a product that has not been certified. EPA will engage in appropriate action with the infringing manufacturer.

4.9 Extending a Certification

Manufacturers shall apply to the product certification body to obtain an extension of an existing certification for additional types or models of products, or intended modifications to previously certified models. The product certification body, based on engineering judgment, shall determine if the additional types or models of products are significantly different than the products covered by the existing certification, to the extent that the modifications to the design would impact conformance to the relevant WaterSense specification. Based on this determination, the product certification body shall decide whether to require additional testing to the relevant WaterSense specifications and/or an assessment of the manufacturer's production process or quality system.

4.10 Surveillance

4.10.1 Periodic Production Inspection and Product Testing

The product certification body shall, at a minimum, on an annual basis, audit the production process and quality management of each manufacturer of a certified product(s). The purpose of this audit shall be to:

- Verify that the manufacturer continues to operate production and quality management in a manner that will maintain a product's conformance with relevant WaterSense specifications; and
- Consider and take appropriate action where changes to the manufacturer's operations are made that may impact a product's conformance with relevant WaterSense specifications.

The product certification body shall also, at a minimum, every fifth year, retest each model of each product it has certified, if the manufacturer wishes to maintain certification. Retesting for conformance with the relevant WaterSense specification shall be conducted following the same procedures outlined in Section 4.2.3, Initial Product Testing.

4.10.2 Surveillance of Products on the Market

The product certification body shall conduct an annual post-market product surveillance. The surveillance shall be conducted by an inspector appointed by the product certification body, and shall include randomly selecting and testing one unit of one model of each certified product per manufacturer (e.g., for a manufacturer of A, B, C faucets and X, Y, Z toilets, the product certification body would select one model A faucet and one model Z toilet for testing), either from the manufacturer's warehouse or at the project site or retail outlet where the product is being used/sold. Where purchase of the product is required, the manufacturer shall pay for the product.

Sampled products shall be tested for conformance with the relevant WaterSense specification following the same procedures outlined in Section 4.2.3, Initial Product Testing.

4.11 Suspension of the Use of the WaterSense Label on Products

The product certification body shall determine when the use of the WaterSense label shall be suspended due to product nonconformance, improper use of the WaterSense label, or infringement of the WaterSense certification scheme. Label suspension can occur for a limited period of time as specified by the product certification body. During the period of suspension, the manufacturer is prohibited from using the WaterSense label in conjunction with any product associated with the suspended WaterSense label.

The product certification body shall provide the manufacturer of a suspended WaterSense label the conditions under which the suspension can be removed (e.g., corrective actions that shall be taken). At the end of the suspension period, the product certification body shall investigate whether the indicated conditions for reinstating the WaterSense label have been fulfilled. Upon receiving proof of fulfillment of these conditions, the product certification body shall notify the manufacturer that the suspension has been removed. The product certification body shall notify EPA within 30 days of both WaterSense label suspension and reinstatement.

4.12 Withdrawal of the WaterSense Label from Products

In more severe or repeated instances of product non-conformity, misuse of the WaterSense label, or failure to meet the requirements for reinstatement of a suspended WaterSense label, the product certification body shall withdraw products' certification and the use of the WaterSense label. The product certification body shall inform the manufacturer that the certification and WaterSense label are being withdrawn via a withdrawal notification. If the WaterSense label is withdrawn from a product for any reason, the product certification body shall ensure that the manufacturer and its wholesalers, distributors, and retailers immediately cease to use the mark in conjunction with that product, and the label is to be eliminated from product packaging/promotional materials within six months from the date of withdrawal notification. The product certification body shall immediately notify EPA of any product withdrawals and EPA shall decide whether termination of the partnership agreement or other corrective action is warranted. The WaterSense label may not be used for any reason by, or in conjunction with a product of, a manufacturer with a terminated partnership agreement.

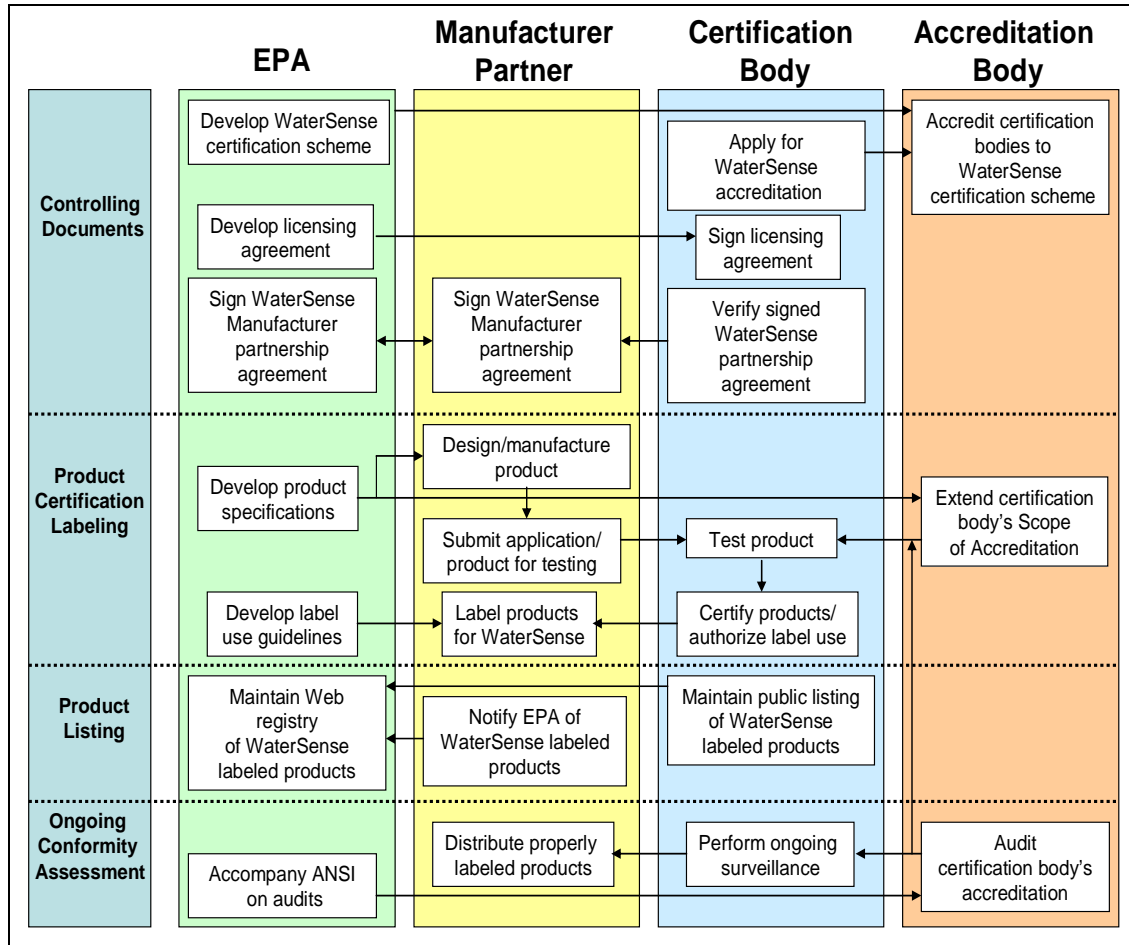
When issues related to product non-conformity or improper use of the WaterSense label come to the attention of EPA, EPA shall notify the product certification body that authorized the use of WaterSense label for the product in question. The product certification body shall then engage in investigation and resolution of the complaint in accordance with ISO Guide 65 and the product certification body's policies and procedures.

4.13 Amendments to these Rules of Procedure

EPA reserves the right to amend these rules of procedure which may include amending the WaterSense certification scheme, the WaterSense program guidelines, or revising any of the WaterSense product specifications contained in Annex A. Major amendments to these procedural documents would only be made following an open public process, including discussion with industry and other interested partners.

Revisions to any of the WaterSense product specifications contained in Annex A can occur due to technological and/or market changes that affect the usefulness of current specifications to consumers, industry, or the environment. Revisions to specifications would require re-certification of products to the new specifications. The transition period will normally be one year.

Figure A-1. WaterSense Product Certification Process Flow Diagram



WaterSenseSM Certification Scheme

Annex A - WaterSense Product Specifications

Tank-Type High-Efficiency Toilet Specification

1.0 Scope and Objective

This specification establishes the criteria for a tank-type high-efficiency toilet (HET) under the U.S. Environmental Protection Agency WaterSenseSM program. It is applicable to:

- Single flush, tank-type gravity toilets;
- Dual flush, tank-type gravity toilets;
- Dual flush, tank-type flushometer tank (pressure-assist) toilets;
- Tank-type, flushometer tank (pressure-assist) toilets;
- Tank-type electrohydraulic toilets; and
- Any other technologies that meet these performance specifications.

The specification is designed to ensure both sustainable, efficient water use and a high level of user satisfaction with flushing performance.

2.0 Summary of Criteria

Toilets must meet criteria in three areas:

- Effective flush volume shall not exceed 1.28 gallons¹ (4.8 liters), as specified in Section 3.0;
- Solid waste removal must be 350 grams² or greater, as specified in Section 4.0; and
- The toilet must conform to the adjustability and other supplementary requirements specified in Section 5.0.

3.0 Water Efficiency Criteria

- 3.1 Single Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A112.19.2³.

¹ The effective flush volume has been established as 1.28 gallons, which is a 20 percent reduction from the 1.6 gallons per flush standard that became mandatory pursuant to the 1992 EPA Act.

² A qualified HET must provide superior flushing performance while saving significant volumes of water. Based on data contained in the medical study *Variability of colonic function in healthy subjects*, 1978, J.B. Wyman, K.W. Heaton, A.P. Manning, and A.C.B. Wicks of the University Department of Medicine, Bristol Royal Infirmary, the greatest single 'loading' of the 20 study participants was approximately 450g, and the 99.5 percent confidence level of the men in the study equates to a loading of approximately 350g.

³ References to this and other ASME standards apply to the most current version of that standard.

- 3.2 Dual Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A112.19.2 and ASME A112.19.14.

4.0 Flush Performance Criteria

- 4.1 Toilet model performance is identified as either a Pass or Fail depending upon whether it can successfully and completely clear all test media from the fixture in a single flush in at least four of five attempts. Only toilet models that Pass qualify for the EPA WaterSense label. Flush performance testing shall be conducted in accordance with the test protocol provided in Appendix A.
- 4.2 Test media consists of seven test specimens, 50 ± 4 grams each, consisting of soybean paste forming a 'sausage' approximately 4 ± 0.5 inch (100 ± 13 mm) in length and 1 ± 0.25 inch (25 ± 6 mm) in diameter and four loosely crumbled balls of toilet paper as defined in Appendix A.
- 4.3 The flush performance criteria apply to single flush toilets, and to the full flush option of dual flush toilets. No solid waste removal requirement applies to the reduced flush option on dual flush toilets.

5.0 Supplementary Requirements for Flush Volume Adjustability

- 5.1 *All single flush toilets must conform to ASME A112.19.2 and all dual flush toilets must conform to ASME A112.19.14.*
- 5.2 The criteria in this section apply to tank-type gravity toilets.
- 5.2.1 Must conform to ASME A112.19.5.
- 5.2.2 Fill Valve
The fill valve shall be the pilot valve type only, or, alternatively, the fill valve shall meet the performance requirements of the fill valve test protocol in Appendix B. All fill valves must conform to ANSI/ASSE 1002.
- 5.2.3 Tank Capacity
- 5.2.3.1 Any barrier, bucket, dam, displacement device, or similar fixture used in a toilet tank to affect flush volume shall be tamper-resistant and permanently affixed to the tank. Any device that can be tampered with or removed such that the toilet can be made to flush with greater than the maximum flush volumes specified in Section 5.2.3.2 shall be deemed noncompliant.
- 5.2.3.2 The maximum volume of water that may be discharged by the toilet, when field adjustment of the tank trim is set at its maximum water use setting, shall not exceed the following amounts:
- For single flush fixtures: 1.68 gallons (6.4 liters) per flush⁴

⁴ Value based on a maximum effective flush volume of 1.28 gallons (4.8 liters) per flush, with no more than 0.40 gallon (1.6 liter) increase with tank trim adjusted to maximum water use settings.

- For dual flush fixtures: 1.40 gallons (5.3 liters) per flush⁵ in reduced flush mode and 2.00 gallons (7.6 liters) per flush⁶ in full flush mode.
- The maximum volume of water discharged, using both original equipment tank trim and using after market closure seals, shall be tested according to the protocol in Appendix C.

6.0 Effective Date

This specification is effective on January 24, 2007.

7.0 Future Specification Revisions

EPA reserves the right to revise this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. Revisions to the specification would be made following discussions with industry partners and other interested stakeholders.

8.0 Definitions

Definitions within ASME A112.19.2 and ASME A112.19.14 are included by reference.

- **Electrohydraulic toilet:** A toilet fixture of siphonic or washdown design that uses a motor, pump, and controller to assist flushing action.
- **Pressure-assist toilet:** A flushometer tank toilet as defined in ASME A112.19.2.
- **Rated flush volume:** The stated flush volume of the toilet, as certified.

⁵ Value based on the reduced flush requirement in ASME A112.19.14-2001.

⁶ Value based on the requirement in the Los Angeles Department of Water and Power Supplementary Purchase Specification, adopted in 2000 and as amended in 2005.

Appendix A: HET Fixture Performance Testing Protocol⁷

1.0 Scope of Testing

- 1.1 Toilet model performance is identified as either a **Pass** or a **Fail** depending upon whether the test fixture can successfully and completely clear all media (350 grams) from the fixture in a single flush in at least four of five attempts.
- 1.2 Tests where toilet sample clogs, plugs, or fails to restore a minimum of a 2 inch (50 mm) trap seal following each flushing test will be deemed a failed test.
- 1.3 Test media is comprised of the following:
 - 1.3.1 Seven test specimens at 50 ± 4 grams per test specimen (“test specimen”) consisting of soybean paste forming a “sausage” approximately 4 ± 0.5 inch (100 ± 13 mm) in length and 1 ± 0.25 inch (25 ± 6 mm) in diameter. The total mass of test media used for each test shall be 350 ± 10 grams.
 - 1.3.2 Four loosely crumpled balls of toilet paper (“paper”).

2.0 Testing Protocol

- 2.1 Fixture Model Selection
The product sample tested to these requirements shall be selected according to the procedure provided in Section A4 of ASME A112.19.2, Nonmandatory Appendix A, Demonstrating Compliance to ASME A112.19.2.
- 2.2 Set-Up
 - 2.2.1 Samples shall be assembled according to manufacturer’s written instructions as contained within the product packaging, and placed on test rig, ensuring tank and bowl are level.
 - 2.2.2 Tank water level shall be adjusted to the level specified by manufacturer in the manufacturer’s instructions (e.g., set to waterline) where applicable.
 - 2.2.3 Static water supply pressure shall be set to 50 ± 3 PSIG.
 - 2.2.4 Inlet water temperature shall be 65 to 80°F (18 to 27 °C).
 - 2.2.5 Flush sample a minimum of three times prior to commencement of testing.
 - 2.2.6 Re-adjust tank water level to proper level if required.
- 2.3 Flush Volume Measurement
 - 2.3.1 Measure and record flush volume of sample (sample set-up as outlined in Section 2.2). Repeat the test two additional times and record the results and the average of the three test replicates. A receiving vessel may be used, either calibrated in increments not exceeding 0.025 gallon (0.1 L) or placed on a load cell with a readout in increments not exceeding 0.025

⁷ Testing protocol based on Maximum Performance (MaP) Testing Protocol, Version 3, January 2006, by Bill Gauley, Veritec Consulting, Inc., and John Koeller, Koeller and Company.

- gallon (0.1 L). Other methods capable of measuring volumes to within in 0.025 gallon (0.1 L) shall be acceptable.
- 2.3.2 Samples with average flush volumes in excess of 0.10 gallon (0.4 L) greater than their rated flush volume shall be deemed to fail testing requirements due to excessive flush volume⁸.
 - 2.3.3 Samples with average flush volumes less than 0.10 gallon (0.4 L) greater than their rated flush volume shall be adjusted, if possible, to their rated flush volume prior to performance testing.
 - 2.3.4 Samples with average flush volumes less than their rated flush volume shall be tested at measured volume and this volume shall be recorded on test report.
- 2.4 Waste Extraction Test
- 2.4.1 Test specimens shall be formed such that they are roughly cylindrical in shape and uniform in diameter.
 - 2.4.2 A test specimen drop guide shall be placed across the top of the bowl, with the centerline of a 2 inch (50 mm) diameter opening 6 inches (15 cm) in front of the center of the seat post holes, equidistance from each hole. Drop guide may be made of plastic or other rigid material, to be no more than 0.5 inch (12 mm) thick, and be of sufficient length to span top of toilet bowl.
 - 2.4.3 Seven (7) test specimens (350g) shall be freely dropped in a vertical orientation through opening in drop guide into bowl.
 - 2.4.4 Immediately remove drop guide and freely and randomly drop four balls of crumpled toilet paper over center of bowl sump.
 - 2.4.5 Wait 10 ± 1 seconds.
 - 2.4.6 Flush sample.
 - 2.4.7 Record test as **Pass** or **Fail** (test is a **Fail** if any waste remains in the bowl or trap, or if minimum 2 inch (50 mm) trap seal has not been restored).
 - 2.4.8 Flush sample to clean bowl and trapway and fully restore trap seal.
 - 2.4.9 Repeat testing until toilet sample either (i) achieves four **Pass** grades or (ii) achieves two **Fail** grades.
 - 2.4.10 Models must **Pass** at least four of five attempts to qualify for the EPA WaterSense Program.

3.0 Test Media Specifications

- 3.1 Soybean Paste Nominal Specifications:
35.5 percent water, 33.8 percent soybean, 18.5 percent rice, and 12.2 percent salt, and having a density of 1.15 ± 0.10 g/mL (i.e., density greater than that of water).
- 3.2 Test Specimens:
Each test specimen shall have a mass of 50 ± 4 grams.

⁸ For example, fixtures rated at 1.28 gallons per flush (the HET maximum) but flushing at greater than 1.38 gallons (5.2 L) when adjusted to water line shall be deemed to have “failed” the requirements of this specification.

- 3.3 Toilet Paper Specifications:
Each ball of paper is comprised of six sheets of single-ply toilet paper conforming to ASME A112.19.14, section 3.2.5.1.2.

Appendix B: HET Fill Valve Integrity Test Protocol⁹

1.0 Scope of Testing

This requirement shall apply to all fill valves that are not otherwise classified as pilot valves. Samples must conform to both Sections 2.0 and 3.0 of this appendix.

2.0 Consistent Water Level

- 2.1 Purpose of Test: To determine whether or not the fill valve shuts off at a consistent water level in a toilet tank independent of any change in inlet water supply pressure.
- 2.2 Test Procedure
 - 2.2.1 Install the fill valve in the toilet tank provided, install the tank on a leveled test stand, and adjust the water level per the manufacturer's recommendation at an inlet water pressure of 20 ± 2 PSIG or at the manufacturer's recommended minimum pressure as noted in the product literature and product packaging.
 - 2.2.2 Flush the tank to verify and mark water level after completed refill.
 - 2.2.3 Increase the inlet water pressure to 60 ± 2 PSIG.
 - 2.2.4 Flush the tank.
 - 2.2.5 Measure any difference in water level after completed refill.
 - 2.2.6 Repeat steps 2.2.3 to 2.2.5 utilizing 80 ± 2 PSIG inlet water pressure.
- 2.3 Performance Requirement: The fill valve shall shut off at the same water level ± 0.5 inch (± 12 mm) for all three inlet water pressures. In addition, water shall not enter the overflow tube or flow out of the tank at any of the three tested inlet pressures.

3.0 Shutoff Integrity with Increased Water Pressure

- 3.1 Purpose of Test: To determine whether or not the fill valve shuts off at a consistent water level in a toilet tank independent of changes in inlet water supply pressure.
- 3.2 Test Procedure
 - 3.2.1 Install the fill valve in a toilet tank and adjust the water level per the manufacturer's recommendation at an inlet water pressure of 20 ± 2 PSIG or at the manufacturer's recommended minimum pressure as noted in the product literature and product packaging.
 - 3.2.2 Flush the tank to verify and mark water level after completed refill.
 - 3.2.3 Increase the inlet pressure to the fill valve from 20 (or recommended minimum pressure) to 60 PSIG, then to 80 PSIG at a rate of less than 10 PSIG per second.

⁹ Testing protocol based on Appendix B to Los Angeles Department of Water and Power Supplementary Purchase Specification, November 16, 2005 version.

- 3.3 Performance Requirement: The water level shall remain at the initial mark ± 0.5 inch (± 12 mm). In addition, water shall not enter the overflow tube or flow out of the tank.

Appendix C: Tank Trim Adjustability Testing Protocol¹⁰

1.0 Scope of Testing

All tank-type gravity toilet fixtures must conform to the requirements of Section 2.0 of this appendix, which address the adjustability of original equipment tank trim and the resulting flush volume of the toilet fixture. All tank-type gravity toilet fixtures with flush seals must conform to the requirements in Section 3.0 of this appendix, which address the flush volume resulting from the replacement of original equipment seals with seals available in the after market.

2.0 Tank-Type Gravity Toilets With Original Equipment

2.1 Purpose of Test

The objective of this tank trim adjustability test is to determine the upper limit to the volume of water that may be discharged by the field adjustment of tank trim components. The maximum volume of water that may be discharged by the toilet, when field adjustment of original equipment tank trim is set at its maximum water-use setting, shall not exceed the following amounts:

For single flush fixtures – 1.68 gallons (6.4 liters) per flush

For dual flush fixtures:

Reduced flush (“short flush”) mode – 1.40 gallons (5.3 liters) per flush

Full flush mode – 2.00 gallons (7.6 liters) per flush

The following test procedure shall be used to verify that the toilet sample meets these requirements.

2.2 Test Procedure

Test shall be conducted per section 8.4 of ASME A112.19.2 with the following modifications:

2.2.1 The toilet shall be installed on a leveled test stand and all adjustable tank trim components (any field adjustment features in the tank that might increase the toilet flush volume) shall be adjusted to the maximum water use setting, while taking care not to damage or alter the parts.

2.2.2 The water level in the tank shall be set to 0.25 ± 0.06 inch (6 ± 2 mm) below the top of the overflow tube. Where the tank utilizes an internal containment vessel and does not possess an overflow tube, the vessel shall be filled to a level 0.25 ± 0.06 inch (6 ± 2 mm) below the top rim of the vessel or to the manufacturer’s designated water line, whichever is higher.

2.2.3 The static pressure of the water supply shall be adjusted to 80 ± 2 PSIG.

2.2.4 The toilet shall be flushed maintaining the activator in the flushing position for a period of one (1) second, the water being drained into a container.

2.2.5 After the flush cycle is complete, the total flush volume shall be observed and recorded.

2.2.6 This procedure shall be repeated until five (5) sets of data are obtained.

¹⁰ Testing protocol based on Los Angeles Department of Water and Power Supplementary Purchase Specification, 16 November 2005 version, modified to reflect the deletion of certain trim durability and marking requirements incorporated into ASME A112 19.5.

- 2.2.7 The static pressure of the water supply shall be adjusted to 20 ± 2 PSIG or at the manufacturer's recommended minimum pressure as noted in the product literature and product packaging, and test procedure steps 2.2.4 to 2.2.6 shall be repeated.
- 2.2.8 For dual-flush toilet fixtures, this test shall be conducted at both full flush and reduced flush modes.
- 2.3 Report: The five (5) individual flush volumes and the average of the five (5) runs shall be reported for each of the two static water supply pressures specified.
- 2.4 Performance Requirement: The average total flush volume for five (5) test runs for each of the two static water supply pressures shall not exceed the following:
For single-flush fixtures – 1.68 gallons (6.4 liters) per flush
For dual-flush fixtures:
Reduced flush (“short flush”) mode – 1.40 gallons (5.3 liters) per flush
Full flush mode – 2.00 gallons (7.6 liters) per flush
The volume of water may be determined visually using a graduated container or by weight calculated as a unit to volume unit.

3.0 Tank-Type Gravity Toilets With After-Market Closure Seals

- 3.1 Purpose of Test
The objective of this tank trim adjustability and after-market seal test is to determine the upper limit to the volume of water that may be discharged when an off-the-shelf replacement flush valve seal/flapper is installed on the toilet. The maximum volume of water that may be discharged by the toilet, when the original equipment flush valve seal (flapper or other sealing device) is replaced with a standard (buoyant) seal available in home improvement centers and hardware stores, and the field adjustment of tank trim is set at its maximum water-use setting, shall not exceed the following amounts:
For single flush fixtures – 1.68 gallons (6.4 liters) per flush
For dual flush fixtures:
Reduced flush (“short flush”) mode – 1.40 (5.3 liters) gallons per flush
Full flush mode – 2.00 gallons (7.6 liters) per flush
The following test procedure shall be used to verify that the toilet sample meets these requirements.
- 3.2 Test Procedure
Test shall be conducted per section 8.4 of ASME A112.19.2 with the following modification:
- 3.2.1 The toilet shall be installed on a leveled test stand and all adjustable tank trim components (any field adjustment features in the tank that might increase the toilet flush volume) shall be adjusted for maximum water use, while taking care not to damage or alter the parts.
- 3.2.2 Remove the original equipment flush valve seal and replace it with a standard (buoyant) non-adjustable after-market seal/flapper for that toilet

- where possible. In the case of a standard configuration 2-inch flush valve, a Fluidmaster Bullseye Super flapper (part no. 501) or a Coast Foundry Ultra Blue flapper shall be used. For non-standard flush valves, including 3-inch flush valves, one or more replacement seals available at hardware, plumbing supply, and building supply stores or from the manufacturer or other recognized source shall be used¹¹.
- 3.2.3 The water level in the tank shall be set to 0.25 ± 0.06 inch (6 ± 2 mm) below the top of the overflow tube. Where the tank utilizes an internal containment vessel and does not possess an overflow tube, the vessel shall be filled to a level 0.25 ± 0.06 inch (6 ± 2 mm) below the top rim of the vessel or to the manufacturer's designated water line, whichever is higher.
 - 3.2.4 The static pressure of the water supply shall be adjusted to 80 ± 2 PSIG.
 - 3.2.5 The toilet shall be flushed maintaining the activator in the flushing position for a period of one (1) second maximum, the water being drained into a container.
 - 3.2.6 After the flush cycle is complete, the total flush volume shall be observed and recorded.
 - 3.2.7 This procedure shall be repeated until five (5) sets of data are obtained.
 - 3.2.8 The static pressure of the water supply shall be adjusted to 20 ± 2 PSIG or at the manufacturer's recommended minimum pressure as noted in the product literature and product packaging, and test procedure steps 3.2.5 to 3.2.7. shall be repeated.
 - 3.2.9 For dual-flush toilet fixtures, this test shall be conducted at both flush modes (full flush and reduced flush).
- 3.3 Report: The five (5) individual flush volumes and the average of the five (5) runs shall be reported for each of the two static water supply pressures specified.
- 3.4 Performance Requirement: The average total flush volume for five (5) test runs for each of the two static water supply pressures shall not exceed the following:
For single-flush fixtures – 1.68 gallons (6.4 liters) per flush
For dual-flush fixtures:
 Reduced flush (“short flush”) mode – 1.40 gallons (5.3 liters) per flush
 Full flush mode – 2.00 gallons (7.6 liters) per flush
The volume of water may be determined visually using a graduated container or by weight calculated as a unit to volume unit.

¹¹ Where neither the Fluidmaster Bullseye Super flapper nor the Coast Foundry Ultra Blue flapper fit the flush valve, where a 3-inch flush valve is employed, or in the case of a toilet fixture with a non-standard flush valve seal, the testing laboratory shall have discretion as to which after-market flapper or seal shall be used in the test.

Appendix D: Informative Annex for WaterSense Labeling

The following requirements must be met for products to be marked with the WaterSense label.

1.0 WaterSense Partnership

The manufacturer of the product must have a signed partnership agreement in place with EPA.

2.0 Conformity Assessment

Conformance to this specification must be certified by a body either accredited by ANSI in accordance with the WaterSense certification scheme, or otherwise approved for that purpose by EPA.

3.0 Prior Testing

Products previously tested under the predecessor UNAR specification¹² must still be certified under this specification.

¹² Uniform North American Requirements (UNAR) for toilet fixtures, a supplementary specification developed in 2005 for water utilities.