WaterSense® Draft Specification for Point-of-Use Reverse Osmosis Systems

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1.0 Scope and Objective

This specification establishes the criteria for point-of-use reverse osmosis (RO) systems to earn a label under the U.S. Environmental Protection Agency's (EPA's) WaterSense program. It applies to point-of-use RO systems, as applicable under the NSF International/American National Standard Institute (ANSI) 58 *Reverse Osmosis Drinking Water Treatment Systems*[1] standard and further defined below. Based on the scope of NSF/ANSI 58 and applicable definitions included in NSF/ANSI 330 *Glossary of drinking water treatment unit terminology* and ASSE 1086 *Performance Requirements for Reverse Osmosis Water Efficiency—Drinking Water*, EPA is defining this product category as follows:

- Reverse osmosis system—A system that incorporates a water treatment process that removes undesirable materials from water by using pressure to force the water molecules through a semipermeable membrane.
- Point-of-use reverse osmosis system—A plumbed-in or faucet-mounted RO system used to treat the drinking and/or cooking water at a single tap or multiple taps, but not used to treat the majority of water used for washing and flushing or other non-consumption purposes at a building or facility. Any batch RO system or device not connected to the plumbing system is considered a point-of-use RO system.

The specification does not apply to:

- Components (e.g., replacement filters, membranes) that do not make up a complete RO system.
- Point-of-entry RO systems.
- RO system add-on devices, accessories, or aftermarket companion products (e.g., permeate pump).

This specification is designed to promote sustainable, efficient water use and a high level of user satisfaction with RO system performance.

2.0 General Requirements

2.1 Except as otherwise indicated in this specification, the RO system shall conform to applicable requirements in NSF/ANSI 58, including the total dissolved solids (TDS) reduction requirement.

2.2 The RO system shall be equipped with a shut-off device.

3.0 Water Efficiency Criteria

3.1 The recovery rating and efficiency rating (as applicable) of the system shall be tested in accordance with the applicable procedures in NSF/ANSI 58 and shall meet the following criteria:

[1] References to this and other standards apply to the most current versions of those standards.

3.1.1 For a system with a storage tank, the recovery rating and efficiency rating shall be a minimum of 30 percent.

3.1.2 For a system without a storage tank, the recovery rating shall be a minimum of 30 percent.

4.0 Performance Criteria

4.1 Membrane Life: The system shall be tested in accordance with the Membrane Life Test for High Efficiency Membrane Systems procedures of ASSE 1086 and shall meet the following criteria:

4.1.1 The percent TDS reduction shall be a minimum of 75 percent each day.

4.1.2 The flow rate shall not decrease by more than 50 percent of the Day 1 reading throughout the test.

4.1.3 The percent recovery, as calculated according to the ASSE 1086 testing procedures, shall be on average a minimum of 30 percent. One tenth of the sample readings may be less than 30 percent but no less than 23 percent. The final percent recovery measurement shall be at a minimum of 30 percent.

4.2 Performance Claims: The manufacturer's performance (chemical reduction and mechanical filtration) claims for the RO system shall be verified according to the applicable criteria and requirements of NSF/ANSI 58.

5.0 Packaging and Documentation Requirements

5.1 The RO system shall conform to applicable instructions and information requirements in NSF/ANSI 58 in addition to the requirements included in this section.

5.2 The system's packaging and point-of-purchase documentation (e.g., specification sheet) shall be marked with the following information and messaging:

5.2.1 For a system with a storage tank: "This system is certified to achieve a XX% efficiency rating in the production of treated water. This means that it will send Y.Y gallons of water down the drain for every gallon of treated water it produces."

Where:

XX% is the system's efficiency rating in two- or three-digit resolution (e.g., 30% or 30.0%) as verified by testing in accordance with NSF/ANSI 58; and

Y.Y is the system's waste-to-product ratio expressed in at least two-digit resolution (e.g., 2.3 gallons) and calculated based on:

$$\text{Waste-to-product ratio} = \text{Y.Y} = \frac{100\%}{verified\ efficiency\ rating} - 1$$

5.2.2 For a system without a storage tank: "This system is certified to achieve a XX% recovery rating in the production of treated water. This means that it will send Y.Y gallons of water down the drain for every gallon of treated water it produces."

Where:

XX% is the system's recovery rating in two- or three-digit resolution (e.g., 30% or 30.0%) as verified by testing in accordance with NSF/ANSI 58; and

Y.Y is the system's waste-to-product ratio expressed in at least two-digit resolution (e.g., 2.3 gallons) and calculated based on:

$$\text{Waste-to-product ratio} = \text{Y.Y} = \frac{100\%}{verified\ recovery\ rating} - 1$$

5.2.3 For all systems, include the NSF/ANSI 58 verified contaminant removal rates for the following contaminants:

- Arsenic (pentavalent) at a concentration of 300 parts per billion (ppb)
- Chromium (hexavalent and trivalent)
- Lead
- Nitrate/nitrite
- Perfluorooctanoic acid (PFOA)/perfluorooctane sulfonate (PFOS)

If the system does not have verified reduction claims for any of the above contaminants, the packaging and documentation shall clearly indicate that the product has not been certified to remove these contaminants.

5.2.4 The information required in Sections 5.2.1 through 5.2.3, as applicable, shall be marked on packaging and other point-of-purchase documentation in a manner consistent with the table below.

Water Efficiency and Performance at a Glance		
Water Use		
This system is certified to achieve a XX% [efficiency rating/recovery rating] in the production of treated water. This means that it will send Y.Y gallons of water down the drain for every gallon of treated water it produces.		
Contaminant Removal		
Contaminant	**NSF 58 Minimum Required Reduction**	**Actual Reduction**
Arsenic[1]	96.7%	% Removal/Not Tested
Chromium[2]	66.7%	% Removal/Not Tested
Lead	96.7%	% Removal/Not Tested
Nitrate/nitrite	66.7%	% Removal/Not Tested
PFOA/PFOS[3]	95.3%	% Removal/Not Tested
• All contaminant removal claims listed above are verified through NSF/ANSI 58 testing • Contaminants listed as "Not tested" have not been verified for removal under NSF/ANSI 58 • All contaminants reduced by this system are listed in the performance data sheet • Not all contaminants listed may be present in the water		
[1] Pentavalent, at a concentration of 300 parts per billion (ppb) [2] Hexavalent and trivalent [3] Perfluorooctanoic acid/perfluorooctane sulfonate		

5.3 If a system requires the use of components or companion products (e.g., a permeate pump) to meet the requirements of this specification, all components and/or companion products shall be packaged and sold along with the system.

5.4 The manufacturer shall specify in the system manual and/or maintenance instructions replacement parts for all system components the consumer is expected to replace during the life of the system (e.g., RO membrane, pre-filters, post-filters, shutoff valve, storage tank) along with their recommended replacement frequencies.

5.5 A system shall not be packaged, marked, nor provided with instructions directing the user to an operational setting that would override the system's efficiency, as established by this specification and verified through testing. Any instruction related to the maintenance of the system shall direct the user on how to maintain the system's efficiency.

6.0 Effective Date

This specification's effective date is [TBD].

7.0 Future Specification Revisions

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

8.0 Definitions

Definitions within NSF/ANSI 330 are included by reference.

Point-of-entry RO system: An RO system used to treat the water supply at the entry of a building or facility for drinking and for washing, flushing, or other non-consumption use. A point-of-entry RO system has a minimum initial clean-system flow rate of not less than 15 liters per minute at 103 kilopascals pressure drop and 18 ± 5 °C water temperature (not less than 4.0 gallons per minute at 15 pounds per square inch gauge pressure drop and 65 ± 10 °F water temperature).

Shut-off device: A device that prevents reject water from an RO system when the system is not treating water.

Waste-to-product ratio: A ratio that expresses the number of gallons of water an RO system wastes for every gallon of treated water it produces. Can be expressed as a full ratio (i.e., 2.3:1) or a single value (e.g., 2.3).

Appendix A: Requirements for WaterSense Labeling

The following requirements must be met for products to bear 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 licensed certifying body accredited in accordance with the *WaterSense Product Certification System*.

3.0 WaterSense Label Use

Per the *WaterSense Program Mark Guidelines*, for all products certified to meet this specification, manufacturers must include the WaterSense label on product packaging and in online and printed specification sheets. Manufacturers should also display the WaterSense label in association with any labeled products listed on the organization's website.