NSF International Standard /
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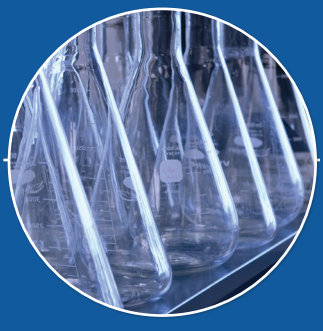
NSF/ANSI 58 - 2017

Reverse Osmosis Drinking Water Treatment Systems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Reverse osmosis drinking water treatment systems

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NSF International Standard/
American National Standard
for Drinking Water Treatment Units –

Reverse osmosis drinking water treatment systems

Standard Developer
NSF International

Designated as an ANSI standard
June 13, 2017
American National Standards Institute

Recommended for adoption by
The NSF Joint Committee on Drinking Water Treatment Units
The NSF Council of Public Health Consultants

Adopted by
The NSF Board of Directors
November 1986

Revised May 1990
Revised November 1992
Revised January 1996
Revised September 1996
Revised September 1996
Revised September 1997
Revised September 1999
Revised May 2000
Revised November 2000
Revised January 2001
Revised January 2002
Addendum June 2002
Addendum October 2002
Revised December 2003
Editorial revision March 2004
Revised March 2004
Revised June 2005
Revised March 2006
Revised October 2007
Revised August 2009
Addendum May 2011
Revised February 2012
Revised December 2012
Revised December 2013
Revised November 2014
Revised October 2015
Revised November 2016
Revised November 2017

Published by

NSF International
P. O. Box 130140, Ann Arbor, Michigan 48113-0140, USA

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Contents

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Foreword[2]

The purpose of this Standard is to establish minimum requirements for materials, design and construction, and performance of point-of-use reverse osmosis drinking water treatment systems. NSF/ANSI 58 also specifies minimum product literature requirements that manufacturers must provide to authorized representatives and owners. Minimum service related obligations for manufacturers to extend to system owners are also specified in this Standard.

Water contact materials in Drinking Water Treatment Units listed under NSF/ANSI 42, 44, 53, 55, 58, and 62 are tested and evaluated under a separate protocol from NSF/ANSI 61 with criteria that were developed specifically for the intended end-use. NSF/ANSI 61 listing should not be additionally required for acceptance of these listed units for water contact application.

This edition of the Standard contains the following revisions:

Issue 74

Sampling procedures for the evaluations of the minimum performance and elective performance claims were revised to ensure consistency among labs.

Issue 78

Normative references were updated.

Issue 79

Evaluation criteria columns from tables 4.1, 4.2, and 4.3 were removed and now reference the evaluation criteria in Annex D, Table D.1 in NSF/ANSI 61.

Suggestions for improvement of this Standard are welcome. This Standard is maintained on a Continuous Maintenance schedule and can be opened for comment at any time. Comments should be sent to Chair, Joint Committee on Drinking Water Treatment Units at standards@nsf.org, or c/o NSF International, Standards Department, P.O. Box 130140, Ann Arbor, Michigan 48113-0140, USA.

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NSF/ANSI Standard
for Drinking Water Treatment Units —

Reverse osmosis drinking water treatment systems

1 General

1.1 Purpose

The purpose of this Standard is to establish minimum requirements for materials, design and construction, and performance of reverse osmosis drinking water treatment systems. This Standard also specifies the minimum product literature that manufacturers shall supply to authorized representatives and owners, as well as the minimum service-related obligations that manufacturers shall extend to system owners.

1.2 Scope

The point-of-use reverse osmosis drinking water treatment systems addressed by this Standard are designed to be used for the reduction of specific substances that may be present in drinking water supplies (public or private) considered to be microbiologically safe and of known quality (except that claims for the reduction of filterable cysts may be permitted). Systems covered by this Standard are intended for reduction of total dissolved solids (TDS) and other contaminants specified herein. Systems with components or functions covered under other NSF or NSF/ANSI Standards or Criteria shall conform to the applicable requirements therein.

1.3 Chemical and mechanical reduction performance claims

1.3.1 All NSF/ANSI 58 performance claims shall be verified and substantiated by test data generated under the requirements of NSF/ANSI 58.

1.3.2 When performance claims are made for substances not specifically addressed in the scope of this Standard or for those substances not specifically addressed but falling under the scope of NSF/ANSI 58, claims not specifically addressed in the Standard shall be so identified.

1.4 Treatment train

A system that contains multiple, sequential treatment technologies for a performance claim under this Standard shall meet the applicable requirements as described in Annex E.

2 Normative references

The following documents contain provisions that constitute requirements of this Standard. At the time of publication, the indicated editions were valid. All standards are subject to revision, and parties are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. The most recent published edition of the document shall be used for undated references.

21 CFR §. Parts 170-199. Food and Drugs[3]

APHA, *Standard Methods for the Examination of Water and Wastewater*, twentieth edition[4]

NSF/ANSI 53. *Drinking water treatment units – Health effects*

NSF/ANSI 61. *Drinking water system components – Health effects*

Ontario Ministry of the Environment 1977. *An Interim Method for Determination of Asbestos Fibre Concentration in Water by Transmission Electron Microscopy*[5]

SAE J726 *Air Cleaner Test Code*, June 1993[6]

USEPA-600/4-84-053. *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater*, June 1984[7]

USEPA–600/4B79/020. *Methods for the Chemical Analysis of Water and Wastes*, March 1983[7]

USEPA–600/RB93/100. *Methods for the Determination of Inorganic Substances in Environmental Samples*, August 1993[7]

USEPA–600/R–94/111. *Methods for the Determination of Metals in Environmental Samples*, Supplement 1, May 1994[7]

USEPA–600/4–90/020. *Methods for the Determination of Organic Compounds in Drinking Water*, Supplement 1, July 1990[7]

USEPA *National Primary Drinking Water Regulations*, 40 CFR Part 141[8]

USEPA *National Secondary Drinking Water Regulations*, 40 CFR Part 143[8]

3 Definitions

Terms used in this Standard that have a specific technical meaning are defined in NSF/ANSI 330.

4 Materials

4.1 Materials in contact with drinking water

4.1.1 Acceptance criteria

4.1.1.1 Materials in contact with drinking water shall not impart levels of target compounds or Tentatively Identified Compounds (TICs) that exceed the Total Allowable Concentration (TAC), Maximum Contaminant Levels (MCL), or Maximum Acceptable Concentration (MAC) criteria specified in NSF/ANSI 61 Annex D,

[3] USFDA –CFR Code of Federal Regulations Title 21 <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/cfrsearch.cfm>.

[4] American Public Health Association (APHA), 1015 Fifteenth Street, NW, Washington, DC 20005 <www.apha.org>.

[5] Ontario Ministry of the Environment, Toronto, Canada M4V 1P5 <www.ene.gov.on.ca>.

[6] Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, PA 15096 <www.sae.org>.

[7] U. S. Environmental Protection Agency (USEPA), Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268 <www.epa.gov>.

[8] Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402 <www.gpo.gov>.

Table D.1. Any extractable contaminants not listed in the referenced tables shall be reviewed and shall not exceed criteria developed in accordance with NSF/ANSI 61 Annex A.

4.1.1.2 TIC identification and quantitation shall be conducted in accordance with section 4.5.1.2. Additional TIC identification and quantitation should be verified using a standard of the compound in question or an alternate approved analytical method. Additional TIC identification and quantitation is recommended when the contaminant is a health risk or when the "Probability Based Matching" process in section 4.5.1.2 is inconclusive. When possible, the product manufacturer should assist and support the testing laboratory in the identification of a standard for the compound and an appropriate analytical method, if applicable, so that confirmatory identification and quantification can be performed. If a standard and an adequate alternative analytical method are not available to verify the identification and quantitation of the compound, the TIC shall be evaluated according to section 4.5.1.2.

NOTE — Manufacturers may not be privy to formulation information, so they may not be able to assist a testing laboratory to identify a standard for the compound that extracted. Refer to Section 4.5.1.2 when the manufacturer does not have material formulation information.

4.1.1.3 Unknown contaminants detected by GC/MS analysis for which identification is unable to be made after performing the steps in 4.5.1 shall be reported in accordance to 4.1.2.2.

4.1.1.4 Whole-system or component assembly extraction testing may be waived if components, when separately tested, meet the requirements of this Standard and are assembled in a manner that does not introduce any new components or materials, increase the surface area-to-volume ratio of previously evaluated components, or present potential concern based on cumulative factors. The reported extractable concentrations for components shall be arithmetically added to ensure that the whole-system or component assembly meets the allowable levels in accordance with tables 4.1, 4.2, and 4.3 and Annex A, D, and E of NSF/ANSI 61.

4.1.2 Data reporting

4.1.2.1 All contaminants identified and detected at or above the reporting limit shall be reported with the identification of the contaminant, the concentration, and whether it exceeds the acceptance criteria as required in section 4.1.1. Contaminants detected below the reporting limit shall be reported to the manufacturer as less than the reporting limit's value.

Example: If the lab's reporting limit is 1.0 mg/L for analyte "X" and the concentration was detected at 0.5 mg/L, the lab shall report less than 1.0 mg/L or <1.0 mg/L.

4.1.2.2 If the extractable contaminant cannot be identified following the procedures in 4.5.1 the laboratory shall supply the manufacturer with the approximate molecular weight along with any additional information about the compound.

4.2 Membrane preservatives

After system installation and flushing in accordance with the manufacturer's instructions, membrane preservatives shall not be present in the product water at a level of toxicological significance when the system is evaluated and tested in accordance with 4.4.3.

4.3 Temperature resistance

4.3.1 Materials shall be tested in accordance with 4.4.3 to verify suitable temperature resistance.

4.3.2 Components of systems designed for exclusive application on cold water lines shall be constructed of materials suitable for a maximum operating temperature of 38 °C (100 °F).

4.4 Materials evaluation

Complete formulation information on any material not certified as specifically compliant with the sections of the U. S. Code of Federal Regulations, Title 21, listed in table 4.1, shall be reviewed to determine whether the material presents a health effects concern in contact with drinking water and to assess the material's potential for contributing contaminants to the drinking water. As a minimum level of information for those materials requiring submission of formulation information, the complete chemical identity and proportion by weight (in some cases approximate weights or proportions may suffice) and ingredient sources of supply shall be provided.

The following additional information is required when available:

— a list of the known or suspected impurities within the product or material and the maximum percent or parts by weight of each impurity;

— the water solubility, hydrolysis products, and extraction rates of chemicals within the product or material; and

— a list of toxicological studies relevant to the chemicals and impurities present in the product, component, or material.

4.4.1 Analytical methods

All analyses shall be conducted in accordance with the applicable method(s) referred to in 2.

4.4.1.1 The laboratory shall validate the analytical method to the reporting limit (RL) concentration following the procedures established in the referenced method. The laboratory shall evaluate its method detection limit (MDL) in reference to the RL. In all cases, the RL shall be equal or greater than the MDL. When preparing its calibration standards, the lowest calibration point shall be at or less than the RL.

4.4.1.2 For extracted techniques (e.g., USEPA Method 625), regarding the concentration of the lowest calibration point, the laboratory shall apply the concentration factor due to sample preparation. For example, a sample one liter extracted, and the extract concentrated to 1.0 milliliter, for a factor of 1000, if the RL is set to 0.2 ug/L, then the lowest calibration point would be at or less than 0.2 mg/L.

NOTE — See Annex C for additional information on GC/MS and other alternative methods.

4.4.2 Exposure water

4.4.2.1 Systems and components shall be exposed to locally available tap water that has been adjusted to contain 50 ± 5 mg/L total dissolved solids and to have a pH of 6.75 ± 0.25. Exposure water used to evaluate systems or components shall be 23 ± 2 °C (73 ± 3 °F). Any existing concentrations of extraction testing parameters listed in tables 4.1, 4.2, and 4.3 found to be present in the exposure water shall be subtracted from the values obtained in the analysis of the extractant water.

4.4.2.2 Components designed to be installed downstream from the membrane shall be exposed to a 1:20 dilution of the exposure water listed in 4.4.2.1. Deionized water shall be used as the diluent.

4.4.3 Exposure

4.4.3.1 The system or component/s of a system shall be installed, flushed, and conditioned in accordance with the manufacturer's instructions. If instructions are not provided, systems shall be operated with the outlet closed until the storage tank is full, or component/s shall be flushed with one unit volume using the exposure water (see 4.4.2) at an initial inlet static pressure of 340 kPa (50 psig).