Summary of Substantive Changes
between the 2020, 2021 and the 2022 editions of
NSF/ANSI 58 "Reverse Osmosis Drinking Water Treatment Systems"

Presented to the IAPMO Standards Review Committee on May 15, 2023

General: The changes to this standard may have an impact on currently listed products.

The substantive changes are:
- Sample volume of 2L has been removed to allow ease of testing for products holding smaller or larger water volumes.
- Introduction of PFAS reduction claims.

Section 2, Normative references: The following standards were added:
EPA-600/R-05-054, Method 521: Determination of Nitrosamines in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography With Large Volume Injection and Chemical Ionization Tandem Mass Spectrometry (MS/MS), September 2004 Section 4, Materials:

NSF/ANSI/CAN 600, Health Effects and Evaluation Criteria for Chemicals in Drinking Water

Section 4, Materials:
4.1 Materials in contact with drinking water
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***4.1.1.5** POU drinking water treatment units shall conform to the requirements of this section and be evaluated for weighted average lead content in accordance with NSF/ANSI/CAN 372. The weighted average lead content of the contact materials and coated substrates shall be ≤ 0.25%.*

4.4 Materials evaluation
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***4.4.3.2** After flushing and conditioning in accordance with Section 4.4.3.1, systems shall be refilled with exposure water as specified in Section 4.4.2 and maintained for 24 h at an ambient temperature of 23 ± 2 °C (73 ± 3 °F). A ~~2-L~~ water sample shall be collected for analysis by emptying the storage tank completely and then sub-sampling ~~a 2-L volume~~. If the water holding volume of the storage tank is less than 2 L, sufficient samples shall be exposed to provide the required volume of extractant water. The system outlet shall then be closed, and the system shall be maintained for another 24 h at an ambient temperature of 23 ± 2 °C (73 ± 3 °F). A ~~2-L~~ water sample shall again be collected for analysis by emptying the storage tank completely and then sub-sampling ~~a 2-L volume~~. This process shall be repeated to give a total of three 24-h exposures ~~and 2-L samples~~. Systems without storage tanks shall be exposed as membrane elements, except that the recovery shall be dictated by the system. Samples collected shall be composited and analyzed in accordance with Section 4.4.1.*
***4.4.3.3** A ~~minimum sample volume of~~ daily 2-L ~~shall be collected at each sample point~~ collection volume is recommended to ensure there is sufficient volume in the composite sample to conduct the requested analyses. If the water holding volume of the product is greater than 2 L, the entire volume shall be collected in a suitable collection vessel, and a 2-L subsample obtained from this volume. If the water*

holding volume of the product is less than 2 L, sufficient samples shall be exposed to provide ~~the required 2 L~~ at least 1/3 of the volume required for analysis of extractant ~~water drawn from~~ at each sample point. The maximum number of samples exposed shall not exceed 16 with 125 mL of extractant water drawn from each sample. If the components with a water holding volume that is less than 250 mL and is able to be identified as one that will only occur once in the flow path of dispensed treated water (such as diverters, faucets, RO shutoff valves, or specialty components) then a volume of 250 mL shall be drawn from each sample using a maximum number of eight samples.

Section 6, Minimum performance requirements:

6.5 Product water dispensing outlets

Product water dispensing outlets other than drinking fountain outlets, if provided, shall be designed, constructed, and located so that the discharge orifice is directed downward ~~and~~. ~~t~~The lower edge of the outlet shall be at an elevation not less than 51 mm (2 in) above the flood rim of the waste receptacle.

~~6.6~~ 6.5.1 Drinking fountain outlets

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~~6.6.4~~6.5.1.4 The lower edge of the drinking water outlet shall be at least ~~51~~25 mm (~~2~~1 in) above the flood rim of the waste receptacle.

Section 7, Elective performance claims – Test methods:

7.1 Chemical reduction claims

7.1.1 Volatile organic chemical (VOC) reduction claims

Systems with carbon filters downstream of the permeate storage tank shall be tested in accordance with NSF/ANSI 53. VOC reduction for nonintegral carbon filters downstream of the RO membrane shall be tested in accordance with Section 7.1.1.1 or 7.1.1.2. ~~Note -~~Each unique model designation shall claim a capacity no greater than the least reduction capacity that has been verified through testing to NSF/ANSI 42, NSF/ANSI 53, NSF/ANSI 401, or NSF/ANSI 58 section for VOC reduction.

7.1.2 PFAS reduction claims

Claims for reduction of per- and polyfluoroalkyl substances (PFAS) are permitted when tested in accordance with Section 7.1.2 as long as maximum effluent concentrations in Table 7.2 are not exceeded.

There are two ways to make reduction claims for PFAS.

The first method is to make a mixture of seven PFAS compounds with the influent concentration of 2,160 ppt, made up of PFOA (500 ppt), PFOS (1,000 ppt), PFHxS (300 ppt), PFNA (50 ppt), PFHpA (40 ppt), PFBS (260 ppt), and PFDA (10 ppt), and to reduce these by 99% to the effluent concentration of 20 ppt.

The second option is to reduce individual PFAS compounds from their respective influent concentrations to their individual health advisory effluent concentrations (as shown in Table 7.2). Two PFAS compounds, PFBS (perfluorobutanesulfonic acid) and PFDA (perfluorodecanoic acid), are excluded from the individual contaminant reductions because their occurrence level is less than their health advisory level. Therefore, they do not appear in Tables 7.2 or 8.1.

7.1.4 N-nitrosodimethylamine (NDMA) reduction testing

7.1.4.1 NDMA reduction claim

Claims for NDMA reduction may be made when tested in accordance with Section 7.1.4.1, so long as maximum effluent concentrations denoted in Table 7.4 are not exceeded.

7.1.4.2 Apparatus

A test apparatus capable of providing specified flow rates and pressures shall be used. An example of an appropriate test apparatus appears in Figure 2.

7.1.4.3 Analytical methods

All analysis shall be conducted in accordance with the applicable methods referred to in Table 7.4.
It is highly recommended that validation of US EPA Method 521 be undertaken prior to the actual testing, with the following precautions (an alternate validated method of equivalent sensitivity to US EPA Method 521 is permissible):
a) Use RO/UV water for preparing the challenge water for verification of the stability of the NDMA concentration. UV treatment of the RO water needs to be optimized to eliminate all NDMA background. Alternatively, any challenge water that has no NDMA background is acceptable.
b) In a 10-L tank, use 9 L of the above treated RO/UV water, add the chemicals in the modified (TOC > 1 ppm and TDS- 350 ± 50 mg/L) chemical test water given in Section 7.1.2.4.2.
c) For pH adjustment use HCl, NaOH, and a small amount of Na2CO3 for stability. For TDS adjustment use NaCl and for TOC use tannic acid.
d) Add 40 ng/L NDMA to the RO/UV water. Test to see if this concentration can be maintained within ± 10% during a 24-h period, taking samples at 2, 4, 8, 12, 18, and 24 hours.
e) Make a 20× dilution of the sample at 2 and 24 hours and analyze to show that NDMA at 2 ng/L concentration can be detected in the presence of chemicals present in the test water.

7.1.4.4 Test water

A RO/UV treated water without any NDMA background described above shall be maintained throughout the test for NDMA reduction claim:

7.1.4.5 Challenge water

Using the test water described in Section 7.1.4.4, a solution of NDMA at a concentration of 40 ± 10% ng/L should be used as a challenge water.

7.1.4.6 Method

Two systems shall be conditioned in accordance with the manufacturer's instructions using the test contaminant specified in Table 7.4 and the appropriate test water specified in Section 7.1.4.4. The systems shall be tested using the appropriate influent challenge water at an initial dynamic pressure of 350 ± 18 kPa (50 ± 3 psig). The pressure shall not be readjusted, although the system may experience some change in dynamic pressure. Premembrane and postmembrane filters shall be removed prior to testing.

7.1.4.7 Sampling

7.1.4.7.1 Systems with storage tank and automatic shutoff

Product water samples shall be collected from the first water out of the system in the amount of 250 mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, the storage tank shall be emptied after each collection at 4 h and 12 h. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 h and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.1.4.7.2 Countertop systems with storage tanks or reservoirs

Product water samples shall be collected from the first water out of the system in the amount of 250 mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1, the storage tank shall be emptied after each collection at 4 h and 8

h. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 h and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.1.4.7.3 Systems without storage tanks

Product water samples shall be collected from the first water out of the system in the amount of 250 mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, samples shall be collected at 4 h and 8 h. On Days 2 to 4 of testing, samples shall be collected at the beginning of the day and after an elapsed time of 6 h and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a test contaminant sample shall be collected and analyzed. A final sample shall be collected and analyzed on Day 7 for the first 4-h period.

7.1.4.7.4 Systems with no shutoff provisions

Product water samples shall be collected from the first water out of the system in the amount of 250 mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for test contaminants. On Day 1 of testing, samples will be collected in 4 h intervals including 4 h, 8 h, 12 h, and 16 h. The storage tank shall be emptied after each collection and the product water volume shall be recorded in liters (gallons). On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 h and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

Table 4.2 was expanded.

Table 8.1 was expanded.