



**NSF International Standard
American National Standard
NSF/ANSI 42-2023**

**Drinking Water Treatment
Units - Aesthetic Effects**

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Chair, Joint Committee on Drinking Water Treatment Units
c/o NSF International
789 North Dixboro Road, P.O. Box 130140
Ann Arbor, Michigan 48113-0140 U.S.A.
Phone: (734) 769-8010 Email: info@nsf.org
Web: <www.nsf.org>

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

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Abbreviations

The following tables are provided as a reference for unit abbreviations for common forms of measurement used within NSF documents.

time	second	s
	minute	min
	hour	h
	day	d
	week	wk
	month	mo
	year	yr
length	inch	in
	foot	ft
	yard	yd
	micrometer	μm
	nanometer	nm
	millimeter	mm
	centimeter	cm
	meter	m
	kilometer	km
liquid measure	milliliter	mL
	liter	L
	liters per day	LPD
	liters per minute	LPM
	ounce	oz
	pint	pt
	quart	qt
	gallon	gal
	gallons per minute	GPM
	gallons per day	GPD
weight	microgram	μg
	picogram	pg
	nanogram	ng
	milligram	mg
	centigram	cg
	gram	g
	kilogram	kg
	pound	lb
	ton	t
	metric ton	mt

miscellaneous	atomic mass unit	amu
	valve flow coefficient	Cv
	Daltons	Da
	kilopascals	kPa
	mass-to-charge ratio	m/z
	molecular weight	MW
	pounds per square inch	psi
	pounds per square inch gauge	psig
	weight for weight	w/w

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Foreword²

The purpose of this standard is to establish minimum requirements for materials, design, construction, and performance of drinking water treatment units that are designed to reduce specific aesthetic-related contaminants in public or private water supplies. This standard specifies the minimum product literature and labeling information that a manufacturer must supply to authorized representatives and system owners. Lastly, this standard provides minimum service-related obligations that the manufacturer must extend to system owners.

This edition of the standard contains the following revisions:

Issue 124

This revision adds test protocols for pour through and batch treatment systems with influent reservoirs that hold more volume than the effluent reservoir, or that require multiple drain events to treat a single influent reservoir volume.

Issue 127

This revision adds language in Section [N-4.2](#) to allow the use of a mechanical filter prior to the test unit that does not impact the chemistry requirements of the standard.

Issue 129

This revision standardizes water temperatures for hydrostatic structural integrity testing as well as chemical reduction testing, including POE.

Issue 133

This revision clarifies treatment train options in Section [N-5.1](#).

Issue 134

This revision updates the values in Table [4.3](#) for maximum reporting limits and maximum effluent concentrations for ethylbenzene, toluene, and xylenes.

The Interpretations Annex contains responses to interpretation requests. The responses will be published in each version of the standard until such time that the interpretation response is no longer applicable.

This standard was developed by the NSF Joint Committee on Drinking Water Treatment Units using the consensus process described by the American National Standards Institute.

This standard and the accompanying text are intended for voluntary use by certifying organizations, regulatory agencies, and/or manufacturers as a basis of providing assurances that adequate health protection exists for covered products.

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, U.S.A.

² The information contained in this foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the standard.

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NSF/ANSI Standard for Drinking Water Treatment Units – Drinking Water Treatment Units – Aesthetic Effects

1 General

1.1 Purpose

It is the purpose of this standard to establish minimum requirements for materials, design and construction, and performance of drinking water treatment systems that are designed to reduce specific aesthetic related (nonhealth effects) contaminants in public or private water supplies. This standard also specifies the minimum product literature and labeling information that a manufacturer shall supply to authorized representatives and system owners as well as the minimum service-related obligations that the manufacturer shall extend to system owners.

1.2 Scope

The point-of-use (POU) and point-of-entry (POE) systems addressed by this standard are designed to be used for the reduction of specific substances that may be present in drinking water (public or private) considered to be microbiologically safe and of known quality. Systems covered under this standard are intended to address one or more of the following: reduce substances affecting the aesthetic quality of the water, add chemicals for scale control, or limit microbial growth in the system (bacteriostatic). Substances may be soluble or particulate in nature. It is recognized that a system may be effective in controlling one or more of these substances but is not required to control all. Systems with manufacturer claims that include components or functions covered under other NSF or NSF/ANSI standards or criteria shall conform to the applicable requirements therein. Filter systems covered by this standard are not intended to be used with drinking water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.

NOTE — Systems that are compliant with NSF/ANSI 55 Class A or other standards that cover technologies to treat microbiologically unsafe water (e.g., U.S. EPA *Guide Standard and Protocol for Testing Microbiological Water Purifiers*⁵ or NSF P231) are examples of demonstrating adequate disinfection before or after the system.

1.3 Alternate materials, designs, and construction

While specific materials, designs, and construction may be stipulated in this standard, systems that incorporate alternate materials, designs, and construction may be acceptable when it is verified that such systems meet the applicable requirements stated herein.

1.4 Chemical and mechanical reduction performance claims

1.4.1 All NSF/ANSI 42 performance claims shall be verified and substantiated by test data generated under the requirements of NSF/ANSI 42.

1.5 When performance claims are made for substances not specifically addressed in the scope of this standard or for substances not specifically addressed but falling under the scope of NSF/ANSI 42, such claims shall be identified as not specifically addressed in the standard.

1.6 Minimum requirements

This standard establishes minimum requirements.

A system as defined in this standard shall meet the applicable requirements of Sections 4, 5, 6, and 8, and at least one performance claim as described in Section 7.

A component as defined in this standard shall meet the requirements of Sections 4 and 8. If the component is pressure bearing, it shall also meet the applicable requirements of Section 5.

A commercial modular system as defined in this standard shall meet the applicable requirements of Sections 4, 5, 6, and 8, and at least one performance claim as described in Section 7. Manifolds of commercial modular systems shall meet the requirements of Sections 4, 5 (if pressure bearing), and 8, and shall be evaluated as stand-alone components. Manifolds shall have a minimum internal diameter such that the water velocity in the manifold will not exceed 3 m/s (10 ft/s) (which can be calculated based upon the system flow rate and the manifold internal diameter). Individual modular elements evaluated as a manifold and modular element combination shall meet the applicable requirements of Sections 4, 5, 6, and 8, and at least one performance claim as described in Section 7.

1.7 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 N-5.

2 Normative references

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

21 C.F.R., *Food and Drugs*, Subchapter B, *Food for Human Consumption*, Parts 170-199³

40 C.F.R. Part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants*³

40 C.F.R. Part 141, *National Primary Drinking Water Regulations*³

40 C.F.R. Part 143, *Other Safe Drinking Water Act Regulations*, Subpart A, *National Secondary Drinking Water Regulations*³

APHA/AWWA/WEF, *Standard Methods for the Examination of Water and Wastewater* (hereinafter referred to as *Standard Methods*)⁴

EPA-600/4-79-020, *Methods for the Chemical Analysis of Water and Wastes*, March 1983⁵

EPA-600/4-82-057, *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater*, May 2002⁵

³ National Archives and Records Administration, Office of the Federal Register. 7 G Street NW, Suite A-734, Washington, DC 20401. <www.ecfr.gov>

⁴ American Public Health Association, American Water Works Association, and Water Environment Federation. <www.standardmethods.org>

⁵ U.S. Environmental Protection Agency. 1200 Pennsylvania Avenue NW, Washington, DC 20004. <www.epa.gov>

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 2004⁵

EPA-600/R-94/111, *Methods for the Determination of Metals in Environmental Samples, Supplement 1*, May 1994⁵

EPA-600/4-90/020, *Methods for the Determination of Organic Compounds in Drinking Water, Supplement 1*, July 1990⁵

ISO 12103-1:1997, *Road Vehicles – Test dust for filter evaluation – Part 1: Arizona test dust*⁶

NIST Standard Reference Database 1A (NIST/EPA/NIH Mass Spectral Library with Search Program), NIST20/NIST v20)⁷

NSF/ANSI 51, *Food Equipment Materials*

NSF/ANSI 53, *Drinking Water Treatment Units – Health Effects*

NSF/ANSI/CAN 61, *Drinking Water System Components – Health Effects*

NSF/ANSI/CAN 372, *Drinking Water System Components – Lead Content*

NSF/ANSI/CAN 60, *Drinking Water Treatment Chemicals – Health Effects*

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

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 POE drinking water treatment units shall conform to the protocol in NSF/ANSI/CAN 61.

4.1.2 POU drinking water treatment units shall conform to the protocol in 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 $\leq 0.25\%$.

4.1.3 Acceptance criteria

4.1.3.1 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/CAN 600, Table 4.1: *Drinking water criteria*. Any extractable contaminants not listed in the referenced tables shall be reviewed and shall not exceed criteria developed in accordance with NSF/ANSI/CAN 600, Section 3: *Toxicology review and evaluation procedures*.

⁶ International Organization for Standardization. Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland. <www.iso.org>

⁷ National Institute of Standards and Technology. 100 Bureau Drive, Gaithersburg, MD 20899. <www.nist.gov>

4.1.3.2 TIC identification and quantitation shall be conducted in accordance with Section [4.3.1.2](#). 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 [4.3.1.2](#) 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 [4.3.1.2](#).

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 [4.3.1.2](#) when the manufacturer does not have material formulation information.

4.1.3.3 Unknown contaminants detected by GC/MS analysis for which identification is unable to be made after performing the steps in Section [4.3.1](#) shall be reported in accordance with Section [4.1.4.2](#).

4.1.3.4 The concentration of active agents or additives used in the drinking water treatment process shall be evaluated in the product water as specified in Section [6.9](#). The concentration of active agents or additives used in the drinking water treatment process shall not be evaluated during extraction testing.

4.1.3.5 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](#), [4.3](#), NSF/ANSI/CAN 61, and NSF/ANSI/CAN 600.

4.1.4 Data reporting

4.1.4.1 All contaminants identified and detected at or above the reporting limit (RL) shall be reported with the identification of the contaminant, the concentration, and whether it exceeds the acceptance criteria as required in Section [4.1.3](#). Contaminants detected at or below the RL shall be reported to the manufacturer as less than the RL's value.

Example: If the lab's RL 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.

4.1.4.2 If the extractable contaminant cannot be identified following the procedures in Section [4.3.1](#), the laboratory shall supply the manufacturer with the approximate molecular weight along with any additional information about the compound.

4.2 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 [4.4](#)) 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.

4.2.1 Analytical methods

All analyses shall be conducted in accordance with the applicable method(s) referenced in Section [2](#).

4.2.1.1 The laboratory shall validate the analytical method to the 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 greater than or equal to the MDL. When preparing its calibration standards, the lowest calibration point shall be at or less than the RL.

4.2.1.2 For extracted techniques (e.g., U.S. EPA Method 625),⁵ regarding the concentration of the lowest calibration point, the laboratory shall apply the concentration factor due to sample preparation. For example, a sample 1 L extracted, and the extract concentrated to 1.0 mL, for a factor of 1,000, if the RL is set to 0.2 µg/L, then the lowest calibration point would be ≤ 0.2 mg/L.

NOTE — See Annex [I-2](#) for additional information on GC/MS and other alternative methods.

4.2.2 Exposure water

Systems and components shall be exposed to locally available tap water that has been adjusted to contain 50 ± 5 mg/L total dissolved solids (TDS) and 0.5 ± 0.05 mg/L free available chlorine (FAC), 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.

4.2.3 Exposure

4.2.3.1 The system or component(s) of a system shall be installed, flushed, and conditioned in accordance with the manufacturer's instructions using the exposure water specified in Section [4.2.2](#) at an initial inlet static pressure of 340 kPa (50 psig). Nonpressurized systems, e.g., pour through products, shall be exposed at atmospheric pressure.

4.2.3.1.1 For powdered activated carbon and polymer binders finer than 100 mesh, testing shall be conducted in flasks with a ratio of 200 g media to 1 L of exposure water specified in Section [4.2.2](#). For other media additives finer than 100 mesh, testing shall be conducted in flasks at the dose specified by manufacturer's instructions to 1 L of exposure water specified in Section [4.2.2](#). Testing shall be completed at ambient atmospheric pressure and at a temperature of 23 ± 2 °C (73 ± 3 °F). Sufficient flasks shall be utilized to collect a minimum of 600 mL of water at each pour off, or the necessary volume for analysis, whichever is greater. The flasks shall be conditioned in accordance with the manufacturer's instructions or shaken vigorously for 1 min, if no instructions are provided, and allowed to settle for 24 h. After 24 h of exposure, the sample water shall be collected, filtered using a fritted glass filter, and retained. The flasks shall be refilled with the same volume of exposure water that was extracted, conditioned in accordance with the manufacturer's instructions or shaken vigorously for 1 min, and allowed to settle for 24 h. A second water sample shall be collected, filtered, and retained. The flasks shall be refilled, conditioned in accordance with the manufacturer's instructions or shaken vigorously for 1 min, and allowed to settle for 24 h. A third

water sample shall be collected and filtered. All samples collected shall be composited and analyzed in accordance with Section [4.2.1](#). One control flask with 2 L of exposure water shall be processed in the same manner as above.

NOTE 1 — This section is only applicable if the manufacturer is unable to provide a coarser media sample (50 × 100 preferred) to test utilizing Sections [4.2.3.1](#) and [4.2.3.2](#).

NOTE 2 — A stopper or cap on the filter stem may be necessary to prevent dripping during exposure.

4.2.3.2 The system or component(s) shall be refilled with the exposure water specified in Section [4.2.2](#) and maintained for 24 h at a temperature of 23 ± 2 °C (73 ± 3 °F). A water sample shall then be collected in accordance with Section [4.2.3.3](#). The system or component(s) shall be flushed according to the manufacturer's instructions, refilled, and maintained for another 24 h at a temperature of 23 ± 2 °C (73 ± 3 °F). A second water sample shall be collected in accordance with Section [4.2.3.3](#). The system or component(s) shall again be flushed according to the manufacturer's instructions, refilled, and maintained for a third period of 24 h at a temperature of 23 ± 2 °C (73 ± 3 °F). A third water sample shall be collected in accordance with Section [4.2.3.3](#).

4.2.3.3 A daily 2-L 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 > 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 < 2 L, sufficient samples shall be exposed to provide at least $\frac{1}{3}$ of the volume required for analysis of extractant water 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 < 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.

4.2.3.4 All samples collected shall be composited and analyzed in accordance with Section [4.2.1](#). For multiple outlet systems, a composite sample shall be collected from all potable water outlets. The unit volume of the system shall be divided by the total number of potable water outlets and this amount shall be collected from each outlet. Systems that are designed to heat or cool the product water shall be connected to an appropriate power source and operated to heat or cool the water. The system shall be operated at the manufacturer's default temperature setting. If adjustable, the system shall be operated at the highest setting available.

4.2.3.5 Systems with adsorptive or absorptive media shall be tested with and without the media. Testing without media shall include removal of any granular adsorptive or absorptive media, and removal of any adsorptive or absorptive replacement elements. Systems that contain only encapsulated filter element(s) that are unable to be operated with the element removed, are exempt from without media extraction testing.

4.2.3.6 Systems with only encapsulated element(s) containing absorptive or adsorptive media but provide a component(s) to allow the consumer to dispense untreated water, without media extraction testing shall be performed on the system in the manner that the system is operated with the bypass component(s) installed. Additional conditioning instructions should be provided in this case if applicable.

NOTE — Systems may include an option or design feature which allow the water system to operate even when a filter cartridge is removed such as a bypass valve, dummy cartridge, bypass plug, or other bypass mechanism.

4.3 Gas chromatography / mass spectroscopy (GC/MS) analysis

4.3.1 General requirements for GC/MS analysis

When determined to be required following a product specific formulation review, U.S. EPA Analytical Methods for semivolatiles and volatiles that include mass spectral libraries shall be performed on products or components and shall include full range mass spectral libraries to monitor for nontarget compounds.

Testing for semivolatiles (e.g., U.S. EPA Method 625, 528, or 525.2)⁵ and volatiles (e.g., U.S. EPA Method 524.2 or 524.3)⁵ shall be conducted using the required target compounds in Tables [4.2](#) and [4.3](#), and the laboratory's RL shall be no greater than the RL listed in Tables [4.2](#) and [4.3](#).

4.3.1.1 Target compounds shall be validated in accordance with the requirements of the referenced method. U.S. EPA Methods 524.2 and 625⁵ have specific validation requirements including precision and accuracy requirements as well as demonstration of sensitivity (Method Detection Limit Study or MDL).

For U.S. EPA Method 625,⁵ the minimum instrument operation requirements for GC/MS analysis shall be in accordance with those protocols as defined by the method with the following modifications:

- to guard against significant drift from an initial instrument calibration to subsequent instrument batches, the average chromatographic peak area of each internal standard in the calibration curve shall be determined. The chromatographic peak area of each internal standard in the continuing calibration shall be > 50% and not > 200% of that average;
- due to the number of characteristics of the analytes associated with Method 625, while a continuing calibration check (CCC) is performed, concentrations of 10% of the target compounds for each analysis (e.g., base / neutral, base / neutral / acid, acid) shall be allowed to fall outside the range of 70% to 130% (outlier) of the true value. None of the concentrations shall be allowed to fall below 50% or above 200% of the true value. If a positive sample analyte result is identified for any outlier, a second CCC shall be performed. If the second CCC determines the sample analyte result no longer to be an outlier, the sample shall be reanalyzed. However, if the second CCC also determines the analyte to be an outlier, a new calibration curve shall be determined and the sample shall be reanalyzed.

NOTE — At the laboratory's discretion, a calibration may be performed specifically for the compound in question, with the reporting of its data from this second calibration. It should be understood, that if the laboratory utilizes this approach (calibrating for the specific analyte) all method requirements as specified by Method 625 should be achieved.

4.3.1.2 TICs are identified by comparison of the spectrum of the unknown to the mass-spectral reference library utilizing “probability-based matching” (as available from instrument manufacturers) as well as interpretation by the analyst. The laboratory shall report the TIC with the best match factor (the match factor shall not be reported) except in the following circumstances:

- due to the complex nature of GC/MS interpretation and identification, when reviewing the list of possible matches for any particular TIC peak, the laboratory has the authority to assign the identification to a compound “hit” with a lower numeric match factor from the library search algorithm;
- the laboratory may determine that none of the returned compounds by the automated search algorithm is a good match for the unknown peak. In this case the compound is reported as an “Unknown”;
- the laboratory may utilize manual spectral interpretation to identify the peak in question;
- all TICs detected at a concentration ≥ 3.0 ppb shall be reported; and

— the library used during the analysis shall be National Institute of Standards and Technology (NIST) NIST207 or most current version. Additional spectra libraries may be used to assist in the identification of unknown compounds. For TICs, the concentration is estimated by comparison of its total ion area response to the total ion area response of the nearest internal standard. For TICs, a response factor of “1” (one) shall be utilized for the purposes of calculating the TICs estimated concentration.

NOTE — It should be understood that when utilizing mass-spectrometer library searches to identify unknown chromatographic peaks (sometimes called “TICs”) that the concentration is estimated assuming that the response of the TIC is the same as the internal standard. However, for example, when analyzing for traditional semivolatile compounds by U.S. EPA Method 625,⁵ the range of response factors is typically 0.1 to 2. Because the response factor is used as a reciprocal, and assuming that the response for the TIC falls within the range of the compounds for which the system is typically calibrated, the true concentration for this TIC would range up to 10 times greater to one half the reported TIC concentration.

4.3.1.3 Unknown compounds – contaminants detected by GC/MS analysis but are not identified and quantified against a known mass spectrum or standard shall be evaluated as follows:

- a) The molecular weight shall be reported or, if no molecular ion is identifiable, a minimum value for the molecular weight (for example, if the highest mass ion for the TIC has a m/z of 143, then report $MW \geq 143$).
- b) The chemical class information shall be reported if this determination is possible.
- c) The laboratory shall report the presence of the common halogens chlorine and bromine utilizing their characteristic “M+2” patterns.
- d) The product material formulation(s) shall be reviewed for potential identification of the unknown contaminant(s) as an ingredient or byproduct;
- e) The manufacturer shall be notified and requested to provide supporting information that enables identification of the unknown contaminant(s);
- f) Structure activity relationships (SAR) shall be utilized when sufficient structural identification of the unknown contaminant(s) can be made; and
- g) Alternative methods of analysis that may identify the unknown contaminant(s) shall be considered, such as classifying the unknown into a chemical class.

Contaminants that are identified after performing one or more of the above steps shall be evaluated in accordance with Sections [4.1.3.2](#) and [4.1.3.3](#). The product manufacturer, laboratory toxicologist and laboratory chemist shall assist 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 when needed. Standard validation is needed when the identified compound is not reported in the formulation review conducted in Section [4.2](#).

NOTE — Items b and c above may be automated utilizing software available from NIST with their mass-spectral database.

4.3.1.4 Contaminants detected by GC/MS analysis for which no identification can be made after performing the above steps shall not be considered in the determination of product compliance to this standard. When unknown contaminants are detected in the extractant water, the testing laboratory shall report the analytical results.

4.4 Materials in contact with the user's mouth

Materials not in contact with water but in contact with the user's mouth during normal use shall meet the requirements of NSF/ANSI 51 for food zone materials.

Table 4.1
Extraction testing parameters (metals)

Analyte	CAS Number	Maximum reporting limit (RL) (mg/L)	U.S. EPA Method(s)
aluminum	7429-90-5	0.1	200.7, 200.8
antimony	7440-36-0	0.001	200.8, 200.9
arsenic	7440-38-2	0.001	200.8, 200.9
barium	7440-39-3	0.2	200.7, 200.8
beryllium	7440-41-7	0.001	200.7, 200.8, 200.9
cadmium	7440-43-9	0.001	200.8, 200.9
chromium	7440-47-3	0.01	200.7, 200.8, 200.9
copper	7440-50-8	0.1	200.7, 200.8
lead	7439-92-1	0.001	200.8, 200.9
manganese	7439-96-5	0.01	200.7, 200.8
mercury	7439-97-6	0.001	200.8, 245.1
nickel	7440-02-0	0.01	200.7, 200.8
selenium	7782-49-2	0.005	200.8, 200.9
thallium	7440-28-0	0.001	200.8, 200.9

Table 4.2
Extraction testing parameters (semivolatiles)

Analyte	CAS number	Maximum reporting limit (RL) (mg/L)	Reference Method(s)
2,4,6-trichlorophenol	88-06-2	0.001	525.2, 528, 625
2,4-dichlorophenol	120-83-2	0.001	525.2, 528, 625
2,4-dimethylphenol	105-67-9	0.01	525.2, 528, 625
2,6-di-tert-butyl-4-methoxyphenol	489-01-0	0.003	525.2, 528, 625
2-methylnaphthalene	91-57-6	0.003	525.2, 528, 625
2-nitrophenol	88-75-5	0.001	525.2, 528, 625
2-phenyl-2-propanol	617-94-7	0.005	525.2, 528, 625
3,3-dichlorobenzidine	91-94-1	0.001	525.2, 528, 625
3- and 4-methylphenol m- and p-cresol	106-44-5 108-39-4	0.001	525.2, 528, 625
4-chloro-3-methylphenol	59-50-7	0.07	525.2, 528, 625
4-tert-butylphenol or p-tert-butylphenol	98-54-4	0.05	525.2, 528, 625
acenaphthene	83-32-9	0.004	525.2, 528, 625
acenaphthylene	208-96-8	0.0004	525.2, 528, 625
acetophenone	98-86-2	0.02	525.2, 528, 625
anthracene	120-12-7	0.0003	525.2, 528, 625
benzo(a)pyrene	50-32-8	0.0002	525.2, 528, 625
benzothiazole	95-16-9	0.003	525.2, 528, 625
bis(2-ethylhexyl)adipate	103-23-1	0.04	525.2, 528, 625

Table 4.2
Extraction testing parameters (semivolatiles)

Analyte	CAS number	Maximum reporting limit (RL) (mg/L)	Reference Method(s)
bis(2-ethylhexyl)phthalate	117-81-7	0.001	525.2, 528, 625
butyl benzyl phthalate	85-68-7	0.1	525.2, 528, 625
chrysene	218-01-9	0.003	525.2, 528, 625
diethyl phthalate	84-66-2	0.6	525.2, 528, 625
dimethyl phthalate	131-11-3	0.001	525.2, 528, 625
di-n-butyl phthalate	84-74-2	.07	525.2, 528, 625
fluoranthene	206-44-0	0.0003	525.2, 528, 625
isophorone	78-59-1	0.04	525.2, 528, 625
naphthalene	91-20-3	0.04	525.2, 528, 625
n-nitroso-di-n-butylamine	924-16-3	0.0006	521, 525.2, 528
n-nitroso-di-n-propylamine	621-64-7	0.0005	521, 525.2, 528
n-nitrosodiphenylamine	86-30-6	0.007	521, 525.2, 528
o-cresol or 2-methylphenol	95-48-7	0.001	525.2, 528, 625
pentachlorophenol	87-86-5	0.0005	525.2, 528, 625
phenanthrene	85-01-8	0.0003	525.2, 528, 625
phenol	108-95-2	0.2	525.2, 528, 625
phenyl sulfone	127-63-9	0.002	525.2, 528, 625
pyrene	129-00-0	0.0006	525.2, 528, 625

Table 4.3
Extraction testing parameters (volatiles)

Analyte	CAS number	Maximum reporting limit (RL) (mg/L)	Reference Method(s)
1,1,1,2-tetrachloroethane	630-20-6	0.001	524.2, 524.3
1,1,1-trichloroethane	71-55-6	0.02	524.2, 524.3
1,1,2,2-tetrachloroethane	79-34-5	0.0005	524.2, 524.3
1,1,2-trichloroethane	79-00-5	0.0005	524.2, 524.3
1,1-dichloroethene	75-35-4	0.0007	524.2, 524.3
1,1-dichloropropene	563-58-6	0.0005	524.2, 524.3
1,2,3-trichlorobenzene	87-61-6	0.0005	524.2, 524.3
1,2,3-trichloropropane	96-18-4	0.004	524.2, 524.3
1,2,4-trichlorobenzene	120-82-1	0.007	524.2, 524.3
1,2-dibromo-3-chloropropane	96-12-8	0.0002	524.2, 524.3
1,2-dibromoethane	106-93-4	0.0002	524.2, 524.3
1,2-dichlorobenzene	95-50-1	0.06	524.2, 524.3
1,2-dichloroethane	107-06-2	0.0005	524.2, 524.3
1,2-dichloropropane	78-87-5	0.0005	524.2, 524.3

Table 4.3
Extraction testing parameters (volatiles)

Analyte	CAS number	Maximum reporting limit (RL) (mg/L)	Reference Method(s)
1,3,5-trimethylbenzene	108-67-8	0.0005	524.2, 524.3
1,3-dichlorobenzene	541-73-1	0.06	524.2, 524.3
1,4-dichlorobenzene	106-46-7	0.007	524.2, 524.3
2-butanone	78-93-3	0.4	524.2, 524.3
2-chlorotoluene	95-49-8	0.01	524.2, 524.3
2-ethyl-1-hexanol	104-76-7	0.005	524.2, 524.3
4-chlorotoluene	106-43-4	0.0005	524.2, 524.3
4-isopropyltoluene	99-87-6	0.0005	524.2, 524.3
4-methyl-2-pentanone	108-10-1	0.7	524.2, 524.3
acetone	67-64-1	0.6	524.2, 524.3
acetophenone	98-86-2	0.02	524.2, 524.3
acrylonitrile	107-13-1	0.0006	524.2 SIM
benzene	71-43-2	0.0005	524.2, 524.3
bis(2-chloroethyl)ether or di-(2-chloroethyl)ether	111-44-4	0.0003	524.2, 524.3
bromobenzene	108-86-1	0.0005	524.2, 524.3
bromochloromethane	74-97-5	0.009	524.2, 524.3
bromodichloromethane	75-27-4	0.001	524.2, 524.3
bromoform	75-25-2	0.001	524.2, 524.3
bromomethane	74-83-9	0.001	524.2, 524.3
carbon disulfide	75-15-0	0.7	524.2, 524.3
carbon tetrachloride	56-23-5	0.0005	524.2, 524.3
chlorobenzene	108-90-7	0.01	524.2, 524.3
chloroform	67-66-3	0.001	524.2, 524.3
chloromethane	74-87-3	0.003	524.2, 524.3
cis-1,2-dichloroethene	156-59-2	0.007	524.2, 524.3
cyclohexanone	108-94-1	1.0	524.2, 524.3
dibromochloromethane	124-48-1	0.001	524.2, 524.3
dichlorodifluoromethane	75-71-8	0.0005	524.2, 524.3
ethyl acrylate	140-88-5	0.001	524.2, 524.3
ethylbenzene	100-41-4	0.014	524.2, 524.3
methyl acrylate	96-33-3	0.001	524.2, 524.3
methyl methacrylate	80-62-6	0.1	524.2, 524.3
methyl tert-butyl ether	1634-04-4	0.0005	524.2, 524.3
methylene chloride	75-09-2	0.0005	524.2, 524.3
n-butyl acrylate	141-32-2	1	524.2, 524.3
n-butylbenzene	104-51-8	0.0005	524.2, 524.3
sec-butylbenzene	135-98-8	0.0005	524.2, 524.3
styrene	100-42-5	0.01	524.2, 524.3

Table 4.3
Extraction testing parameters (volatiles)

Analyte	CAS number	Maximum reporting limit (RL) (mg/L)	Reference Method(s)
t-butyl alcohol, t-butanol, or tert-butanol	75-65-0	0.1	524.2, 524.3
tetrachloroethene	127-18-4	0.0005	524.2, 524.3
tetrahydrofuran	109-99-9	5	524.2, 524.3
toluene	108-88-3	0.006	524.2, 524.3
xylene (total) o-xylene p-xylene m-xylene	95-47-6 106-42-3 108-38-3	0.009	524.2, 524.3
trans-1,2-dichloroethene	156-60-5	0.01	524.2, 524.3
dichloropropene (total) cis-1,3- trans-1,3-	542-75-6 10061-01-5 10061-02-6	0.0005	524.2, 524.3
trichloroethene or trichloroethylene	79-01-6	0.0005	524.2, 524.3
trichlorofluoromethane	75-69-4	0.2	524.2, 524.3
total trihalomethanes (TTHMs) bromodichloromethane bromoform chloroform dichlorobromomethane	—	0.001	524.2, 524.3
vinyl chloride	75-01-4	0.0002	524.2, 524.3

Table 4.4
Materials listed in U.S. Code of Federal Regulations, Title 21,
not requiring formulation review

Sections	Material
172.880 178.3700	petrolatum
172.888 178.3720	synthetic petroleum wax
172.878	white mineral oil
172.884	odorless white petroleum hydrocarbons
172.886 178.3710	petroleum wax
173.25	Ion exchange resins – provided that the subsection stating the composition of the resin is specified.
173.65	divinyl benzene copolymer
178.3620	mineral oil
Part 184	Direct food substances affirmed as generally recognized as safe – when used in accordance with any conditions of use specified for the substance.
solvents	Solvents that may be considered for solvent bonding without review are limited to acetone, methyl ethyl ketone, cyclohexanone, and tetrahydrofuran. Mixtures such as solvent cements shall be evaluated against NSF/ANSI/CAN 61 or shall be subject to formulation review. NOTE — Solvent bonding is not recommended, as solvents soak into synthetic materials and leach back out into water at relatively high levels for long periods of time. In addition, solvents can contaminate the work area and can be adsorbed by carbon in the work area. Solvents that have been reprocessed or recycled shall not be used.

5 Structural performance

5.1 Structural integrity

The purpose of testing structural integrity performance is to evaluate the materials, design, and fabrication quality of the complete water treatment system.

5.2 Acceptance

Each test of structural integrity (cyclic pressure and hydrostatic pressure) shall be performed on a separate system. If the complete water treatment system is tested, a separate test of the system pressure vessel is not required.

Complete systems, pressure vessels, and components shall be tested for structural integrity in accordance with Section [5.4](#) at the pressures specified in Table [5.1](#). When more than one pressure is specified in Table [5.1](#), testing shall be done at the higher pressure.

Complete systems, pressure vessels, and components shall be watertight when tested for structural integrity under Section [5.4](#). Weepage shall be considered acceptable at the beginning of a test, but weepage shall not begin in the middle of a test.

5.3 Working pressure

5.3.1 The pressure vessel(s) and all other components of a water treatment system that are subject to line pressure shall be designed and constructed to maintain structural integrity at a pressure of 690 kPa (100 psig) or the maximum working pressure, whichever is greater.

5.3.2 Portable systems not designed for direct connection to a pressurized supply line shall be designed and constructed to maintain structure under the maximum pressure of the intended end use.

5.4 Structural integrity test methods

5.4.1 Apparatus

An enclosure shall be provided for each system tested to prevent injury to personnel or property damage if the system fails.

An apparatus that may be used for the cyclic and hydrostatic test is shown schematically in Figure [1](#). Pressure measuring instruments shall have a precision and accuracy of 2% at the point of measurement.

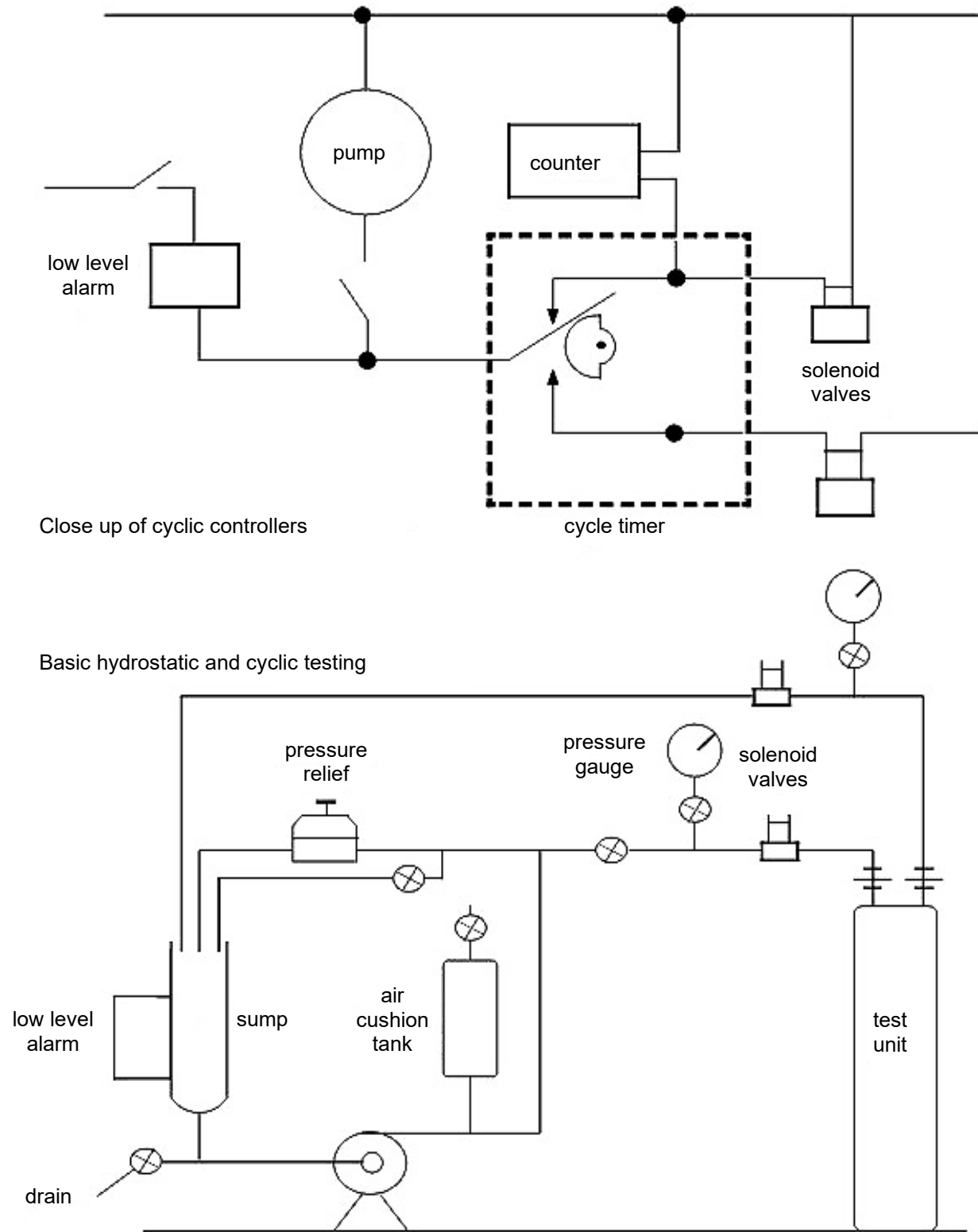


Figure 1
Structural testing apparatus

5.4.2 Hydrostatic pressure test – Complete systems

Systems designed to operate only at atmospheric pressure shall be exempt from the hydrostatic pressure test but shall be watertight in normal use. For complete systems designed for open discharge the components downstream of the system on/off valve that are not subject to pressure under the off mode, and that either contain no media subject to plugging or are not designed to contain media, shall be exempt from the hydrostatic pressure test but shall be watertight in normal use. Components that are downstream of the system on/off valve but upstream of media subject to clogging shall meet the requirements of this section. The following procedure shall be used for the hydrostatic pressure testing of other complete systems:

- a) A water temperature of 18.5 ± 5.5 °C (65 ± 10 °F) shall be used. The test water shall be adjusted to a temperature at which condensation will not form on the surface of the test unit.
- b) The inlet of the test system shall be connected to the apparatus as shown in Figure 1. The system shall be in conformance with its normal state of use, with the option of plugging drain lines.
- c) The test system shall be filled with water and flushed to purge air from the system.
- d) The hydrostatic pressure shall be raised at a constant rate so that the test pressure specified in Table 5.1 is reached within 5 min. The rate of pressure increase shall not be > 690 kPa/s (100 psig/s).
- e) The test pressure shall be maintained for 15 min. The system shall be inspected periodically through the end of the test period to check whether the system is watertight.

5.4.3 Hydrostatic pressure test – Metallic pressure vessels

The permanent increase in the circumference of the pressure vessel shall not be $> 0.2\%$ of the original circumference when the vessel is tested in accordance with the procedures below. The circumference shall be measured at the midpoint of the side wall of the vessel and at 30 cm (12 in) intervals. The top or bottom head deflection of the pressure vessel shall not exhibit a permanent deflection exceeding 0.5% of the vessel diameter.

The test rig for metal tanks shall allow the installation of instrumentation required to measure the change in tank circumference and the deflection of the top and bottom heads. This may require elevating the tank. Distance measuring instruments or methods shall be accurate to 0.0025 cm (0.001 in).

The following procedure shall be used for the hydrostatic pressure testing of metallic pressure vessels:

- a) The test unit shall be installed on the elevated rack or stand. The test unit shall be prepared and filled as specified in Section 5.4.2, steps a, b, and c.
- b) An appropriate measuring device, such as an extensometer or dial micrometer, shall be installed vertically against the tank bottom head and either the tank top head, the top mounted control valve, or another component solidly mounted to the tank top.
- c) An appropriate measuring device, such as an extensometer or periphery tape, shall be installed around the tank perpendicular to its axis and 15 cm (6 in) above its bottom. Additional measurement devices shall be placed, vertically spaced not > 30 cm (12 in) apart, up the side sheet of the tank. The uppermost device shall be within 30 cm (12 in) of the tank top head. If the tank length is < 61 cm (24 in), a measuring device should be placed at the midsection. When extensometers are used, the flexible wire shall be wrapped once around the tank perpendicular to its axis and 15 cm (6 in) above its bottom. One end of the wire shall be fastened to a solid post at the same elevation. The other end shall be fastened to a second post at the same elevation by means of a spring so as to maintain the wire taut. The blocks shall be fastened to each end of the wire, adjacent to the tank, so that they are spaced 15 to 20 cm (6 to 8 in) apart. For larger tanks, the spacing shall be permitted to be increased to avoid

contact between the blocks and the tank. Blocks shall be attached to each wire wrap as previously specified.

d) Initial readings shall be taken from the measurement devices before the test unit is pressurized. When extensometers are used, the distance between the blocks on each wire shall be measured with a micrometer caliper.

e) The test unit shall be pressurized as specified in Section [5.4.2](#), steps d and e.

f) Final readings shall be taken from the extensometers or measurement devices with no pressure on the unit.

g) The difference between the readings of each measurement device is the measure of permanent deformation of either the tank bottom or top head. The difference in measurement around the tank is the increase in tank circumference.

5.4.4 Cycle test

Systems designed to operate at atmospheric pressure shall be exempt from the cyclic pressure test but shall be watertight in normal use. For complete systems designed for open discharge the components downstream of the system on/off valve that are not subject to pressure under the off mode, and that either contain no media subject to plugging or are not designed to contain media, shall be exempt from the cyclic pressure test but shall be watertight in normal use. Components that are downstream of the system on/off valve but upstream of media subject to clogging shall meet the requirements of this section.

The following procedure shall be used for the cyclic testing:

a) A water temperature of 20 ± 3 °C (68 ± 5 °F) shall be used throughout the test. The test water shall be adjusted to a temperature at which condensation will not form on the surface of the test unit.

b) The inlet of the test system shall be connected to the test apparatus as shown in Figure [1](#). The system shall be in conformance with its normal state of use, with the option of plugging drain lines.

c) The test system shall be filled with water and flushed to purge air from the system.

d) The counter shall be set to zero, or its initial reading shall be recorded and pressure cycling initiated. The pressure rise shall be ≥ 1 s and the pressure in the test unit shall return to < 14 kPa (2 psig) before the initiation of another cycle.

e) The pressure shall be cycled as specified in Table [5.1](#). The system shall be inspected periodically through the end of the test period to check whether the system is watertight.

5.4.5 Personal hand held devices

Personal hand-held devices that do not meet the definition of a squeeze bottle shall be exempt from structural integrity testing but shall be watertight during all testing.

5.4.5.1 Cycle test – Squeeze bottle

Structural integrity performance for squeeze bottles shall be evaluated by applying 20 ± 1 kg of force in 5-s intervals. The outlet of the bottle shall be plugged.

The following procedure shall be used for testing:

- a) Use a water temperature of 20 ± 3 °C (68 ± 5 °F) throughout the test. Adjust the test water to a temperature at which condensation will not form on the surface of the test unit.
- b) The test bottle shall be evaluated at the following fill volumes: 95%, 75%, 50%, and 25% of the total unit void volume. For each fill volume, fill the test bottle with water and plug the outlet.
- c) Connect the test bottle to the mechanical hand apparatus shown in Figure 4. The apparatus shall be positioned around the center of the test bottle unless an alternate location to grip the bottle is specified in the manufacturer's literature.
- d) The volume (mL) per squeeze of the test bottle shall be measured to determine the number of squeezes that shall be applied to the bottle during the test (volume dispensed from a half full bottle during a 5-s squeeze with 20 ± 1 kg of force). The total number of squeezes shall be evenly divided among each fill volume, so that each fill volume is being run for 25% of the test. The test bottle shall be evaluated as follows:
 - for devices with replaceable cartridges, the test bottle shall be tested to 400% capacity of the cartridge life; or
 - for single-use, disposable devices, the test bottle shall be tested to 200% capacity of the cartridge life.
- e) The bottle shall be operated with 20 ± 1 kg of force applied by the mechanical hand for $5 \pm .5$ s. The force rise at the initiation of each cycle shall be $1.5 \pm .5$ s. Each squeeze shall be followed by a minimum 5-s rest period with < 0.5 kg of force applied to the bottle. This operational cycle shall be performed for the required number of squeezes at each bottle fill volume.
- f) The system shall be inspected for watertightness periodically throughout the test, prior to each change in fill volume, and at the end of the test.

Table 5.1
Structural integrity testing requirements

	Hydrostatic pressure test	Cyclic pressure test
Complete systems		
complete systems with pressure vessels having a diameter < 203 mm (8 in)	3 × maximum working pressure or 2,070 kPa (300 psig)	100,000 cycles at 0 to 1,040 kPa (0 to 150 psig) or maximum working pressure
complete systems with pressure vessels having a diameter ≥ 203 mm (8 in)	2.4 × maximum working pressure or 2,070 kPa (300 psig)	100,000 cycles at 0 to 1,040 kPa (0 to 150 psig) or maximum working pressure
complete systems designed for open discharge ^a	1.5 × maximum working pressure or 1,040 kPa (150 psig)	10,000 cycles at 0 to 345 kPa (0 to 50 psig)
complete portable systems pressurized by user ^b	1.5 × maximum working pressure	—
Components		
metallic pressure vessels having a diameter < 203 mm (8 in) ^c	3 × maximum working pressure or 2,070 kPa (300 psig)	100,000 cycles at 0 to 1,040 kPa (0 to 150 psig) or maximum working pressure
metallic pressure vessels having a diameter ≥ 203 mm (8 in) ^c	2.4 × maximum working pressure or 2,070 kPa (300 psig)	100,000 cycles at 0 to 1,040 kPa (0 to 150 psig) or maximum working pressure
nonmetallic pressure vessels having a diameter < 203 mm (8 in)	3 × maximum working pressure or 2,070 kPa (300 psig)	100,000 cycles at 0 to 1,040 kPa (0 to 150 psig) or maximum working pressure
nonmetallic pressure vessels having a diameter ≥ 203 mm (8 in)	2.4 × maximum working pressure or 2,070 kPa (300 psig)	100,000 cycles at 0 to 1,040 kPa (0 to 150 psig) or maximum working pressure
disposable pressure vessels and components	3 × maximum working pressure or 2,070 kPa (300 psig)	10,000 cycles at 0 to 1,040 kPa (0 to 150 psig) or maximum working pressure
valves and controls ^d	3 × maximum working pressure or 2,070 kPa (300 psig)	100,000 cycles at 0 to 1,040 kPa (0 to 150 psig) or maximum working pressure
NOTE — When a choice is given in this table, testing shall be done at the greater pressure. ^a See Sections 5.4.2 and 5.4.4 for qualified exemptions. ^b Portable systems designed to utilize only atmospheric pressure or gravity flow shall be exempt from the hydrostatic pressure test but shall be watertight in normal use. ^c Metallic pressure vessels require measurement of circumference and head deflection. The pressure vessel circumference shall not exhibit a permanent increase of > 0.2% when measured at the midsection and at 30-cm (12-in) intervals. The top and bottom head deflection of the pressure vessel shall not exhibit a permanent deflection exceeding 0.5% of the vessel diameter. ^d Subject to line pressure and tested as separate components.		

6 Minimum performance requirements

6.1 Elements

Filters and similar replacement components shall be readily removable.

6.2 Waste connections

If provided, waste connections or drain outlets shall be designed and constructed to provide for connection to the sanitary waste system through an air gap of two pipe diameters or 25 mm (1 in), whichever is larger.

6.3 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. The lower edge of the outlet shall be at an elevation not < 51 mm (2 in) above the flood rim of the waste receptacle.

6.3.1 Drinking fountain outlets

6.3.1.1 The drinking water outlet shall be protected by a guard designed to (1) prevent a user from directly contacting the outlet while drinking from the system, and (2) prevent foreign matter from dropping vertically into the outlet. The guard shall be of such width, height, and design that the user's mouth or lips cannot readily touch the outlet. Spaces between the outlet and guard shall be readily accessible for cleaning.

6.3.1.2 The outlet and guard shall be designed to discourage hose connections or other improper uses.

6.3.1.3 The drinking fountain outlet shall be set to direct water flow at an angle from the vertical to prevent water in a jet from returning to the outlet. The flow from the outlet shall not touch the guard.

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

6.4 Hazards

All components shall be free of nonfunctional rough or sharp edges or other hazards that may cause injury to persons adjusting, servicing, or using the system.

6.5 Operation temperature

The complete system shall be designed to operate at a maximum temperature $\leq 38^{\circ}\text{C}$ (100°F).

6.6 Rated service flow

For systems connected to a pressurized line, the rated service flow rate shall be equal to or less than the minimum, initial clean system flow rate obtained during contaminant reduction testing at an inlet pressure of 410 ± 20 kPa (60 ± 3 psig) and a water temperature of $20 \pm 3^{\circ}\text{C}$ ($68 \pm 5^{\circ}\text{F}$). For systems with an internal pump, the rated service flow rate shall be equal to or less than the minimum, initial clean system flow rate obtained during contaminant reduction testing. For manual fill or pour through systems, the rated service flow rate shall be equal to or less than the minimum, initial clean system flow rate obtained during contaminant reduction testing.

A system shall not have a rated service flow that is less than the applicable value specified in Table [6.1](#).

6.7 POE rated pressure drop

6.7.1 Without built-in flow control

POE systems shall have no > 105 kPa (15 psig) initial pressure drop at the rated service flow with an inlet pressure of 210 kPa (30 psig) and a water temperature of 20 ± 3 °C (68 ± 5 °F). The rated service flow shall be ≥ 15 LPM (4 GPM).

6.7.2 With built-in flow control

POE systems with built-in flow control shall have no > 103 kPa (15 psig) initial pressure drop at a flow rate equal to or > 15 LPM (4 GPM) with an inlet pressure of 210 kPa (30 psig) and a water temperature of 20 ± 3 °C (68 ± 5 °F).

6.8 Minimum service flow

The minimum, initial, clean system flow rates specified in Table 6.1 shall be attainable by the system at an inlet pressure of 210 kPa (30 psig) and a water temperature of 20 ± 3 °C (68 ± 5 °F), with a fully open outlet.

Table 6.1
Minimum service flow

Type of system	Minimum service flow rate
point of use systems connected to a pressurized line:	
countertop connected to sink faucet with diverter	0.8 LPM (0.2 GPM)
faucet mount with diverter	0.8 LPM (0.2 GPM)
faucet mount without diverter	1.9 LPM (0.5 GPM)
plumbed-in	1.9 LPM (0.5 GPM)
plumbed-in to separate tap with reservoir	7.6 LPD (2 GPD)
plumbed-in to separate tap without reservoir	0.8 LPM (0.2 GPM)
special systems (e.g., glass filler and ice maker for refrigerator, systems designed for nonhome use)	exempt
point of use systems not designed for direct connection to a pressurized supply line (batch systems):	
countertop manual fill with or without internal pump	exempt
pour through	exempt

6.9 Active agents and additives

Where an active agent or additive is used in the drinking water treatment process, the product water shall not contain that substance (or its degradation products) at a concentration of toxicological significance as given by the U.S. EPA *Primary Drinking Water Regulations*,⁵ by the Health Canada *Maximum Acceptable Concentrations*,⁸ by any U.S. Federal regulatory agency, or at a concentration that exceeds constituent limits of the U.S. EPA *Secondary Drinking Water Regulations*⁵ for all sample points. If the substance does not have a maximum drinking water concentration established by U.S. EPA or Health Canada, a TAC shall be established according to the requirements of NSF/ANSI/CAN 600, Section 3.

Collection of product water samples for the analysis of active agents or their degradation products, employed in the aesthetic improvement of drinking water, shall be in accordance with the sampling schedule(s) for the verification of specific reduction claims or as otherwise specified in this standard. At least one sample shall be collected immediately after a rest period of at least 8-h duration.

⁸ Health Canada. Address Locator 0900C2, Ottawa, Ontario K1A 0K9, Canada. <www.canada.ca/en/health-canada.html>

Sampling for an active agent or additive shall be performed using the performance test procedure that is likely to result in the highest potential extraction of the active agent or additive. Determination of the appropriate test procedure shall consider the following parameters:

- the chemical composition of the challenge water used in the performance test; and
- the duration of rest periods prior to the specified sampling points in the performance test.

NOTE — The performance test used to evaluate extraction of an active agent or additive may be a test other than that performed to verify other performance claim(s) made by the manufacturer. Some examples are provided in the following table:

Type of active agent	Recommended test protocol for active agent evaluation
copper / zinc media	chlorine reduction
silver	bacteriostasis

7 Elective performance claims – Test methods

7.1 General requirements

7.1.1 Health effects claims

Claims for reduction of health effects contaminants (biological, chemical, physical, or radiological) shall not be verified under this standard. Such claims shall be tested for conformance to NSF/ANSI 53.

7.1.2 Apparatus

A test apparatus capable of providing specified flow rates and static pressures shall be used. Refer to Figure 2 for an example diagram.

Any suitable pressure or delivery system

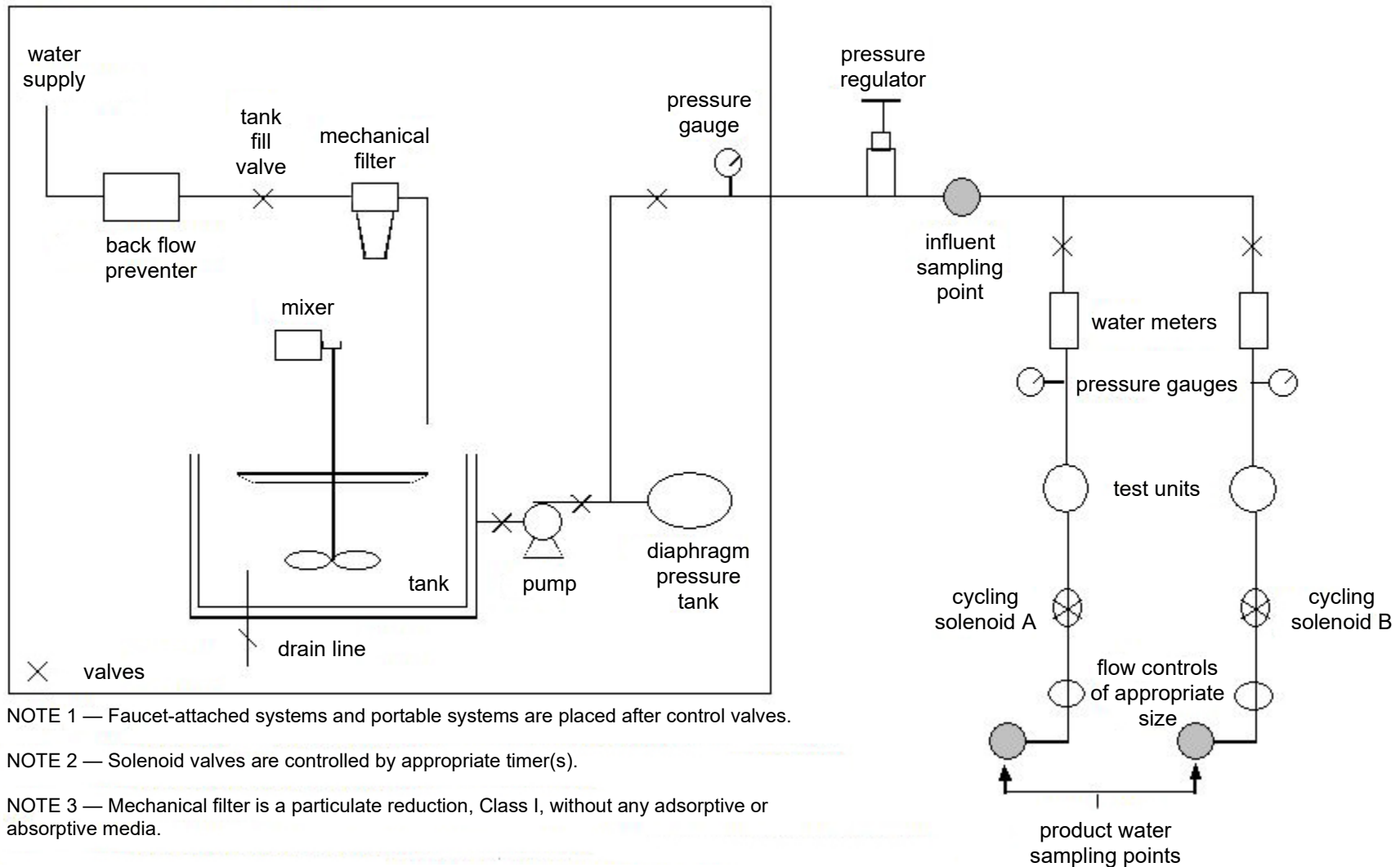


Figure 2
Example test apparatus