NSF International Standard /
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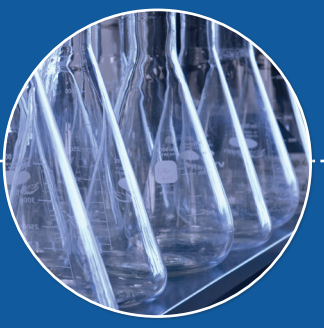
NSF/ANSI 244 - 2019

Drinking Water Treatment Units - Supplemental Microbiological Water Treatment Systems - Filtration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NSF International Standard /
American National Standard
for Drinking Water Treatment Units –

Supplemental Microbiological Water Treatment Systems – Filtration

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Contents

Foreword[2]

The purpose of this Standard is to establish minimum requirements for the reduction of microorganisms using mechanical filtration devices for supplemental treatment of microbiologically safe drinking water. This Standard is in keeping with the other NSF/ANSI DWTU standards that stress the supplemental drinking water treatment concept for reduction of certain aesthetic and health related contaminants from water supplies that have been treated to public water system standards, or otherwise are determined to be microbiologically safe as demonstrated by routine testing. The devices covered under this Standard are intended only for protection against intermittent incursions or accidental microbiological contamination of otherwise safe drinking water. 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. This Standard and the accompanying text are intended for voluntary use by certifying organizations, or laboratories, or manufacturers, or all three, to verify the requirements therein. It is the responsibility of the manufacturer to investigate and comply with applicable federal and state regulations, such as registration to the US EPA Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and regulatory requirements in all other countries and territories where the products are sold.

It is recognized that the federal, state, and local objectives are to provide safe water supplies without further user treatment. However, many users are concerned about the potential presence of contaminants of both aesthetic and health concern in their water supplies and need guidance as to the availability and reliability of tested and certified point-of-use (POU) and point-of-entry (POE) water treatment systems, especially those that claim microbiological reduction. This Standard will help to meet this need, but cannot be expected to address claims beyond those covered in this Standard.

Over the last century, both public and private water utilities, with regulatory guidance from federal and state agencies, have made significant improvements in water treatment to protect public health. This has been achieved through a multibarrier approach utilizing successive treatment technologies including source water management, slow sand filtration, chlorination, and other advanced treatment technologies. It is a goal of this Standard to make available to consumers tested and certified supplemental water treatment devices for an additional ‘final barrier’. These devices can further reduce the risks associated with microbial contamination especially when unknown incursions or accidental contamination occurs hours or days prior to issuance of a boil water advisory or warning (reference: *Rational for Supplemental Microbial Water Treatment Devices*, NSF International, Microbial Water Treatment Task Group, September 14, 2010).

Prior to adoption of this Standard, several other NSF/ANSI standards and NSF protocols have addressed microbiological treatment of drinking water for residential and individual consumer use:

— NSF Protocol P231, *Microbiological Water Purifiers*: Protocol P231 addresses systems that use chemical, or mechanical, or physical technologies, or all three, to filter and treat waters of unknown microbiological quality, but otherwise are presumed to be potable (adopted from the US EPA’s Guide Standard and Protocol for Testing Microbiological Water Purifiers).[3]

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[3] *Guide Standard and Protocol for Testing Microbiological Water Purifiers*, Report of Task Force, submitted by Steven A. Schaub to the US EPA, April 1987.

— NSF/ANSI 55, *Ultraviolet Microbiological Water Treatment Systems*: This Standard establishes requirements for POU and POE ultraviolet systems for use on nonpublic water supplies (non-PWS) and includes two optional classifications. Class A systems (40 mJ/cm^2) are designed to disinfect, or remove, or both, microorganisms from contaminated water, including bacteria and viruses, to a safe level. Class B systems (16 mJ/cm^2) are designed for supplemental bactericidal treatment of public drinking water or other drinking water, which has been deemed acceptable by a local health agency.

— NSF/ANSI 62, *Drinking Water Distillation Systems*: This Standard covers distillation systems designed to reduce several specific inorganic contaminants and includes provisions for testing and claiming reduction of microorganisms from public and private water supplies. These systems are intended for use only on disinfected potable water systems. The microbiological reduction test utilizes *Bacillus atrophaeus* spores as a surrogate organism for bacterial, viral and protozoan organisms.

— NSF/ANSI 53, *Drinking Water Treatment Units – Health Effects*, and NSF/ANSI 58 *Reverse Osmosis Drinking Water Units*: These standards cover many different contaminant reduction claims but allow only one microbiological claim for protozoan cyst reduction. Either 3 µ latex spheres or live *Cryptosporidium* can be selected as a surrogate for the protozoan cyst reduction test. These devices are for use on microbiologically safe drinking water.

It is of note that the precedent of making microbiological reduction claims for systems used on microbiologically safe water has previously been established in NSF/ANSI 55 with Class B systems (for bacteria only), NSF/ANSI 62 *Drinking Water Distillation Systems* (for bacteria, viruses and protozoan cysts), and in NSF/ANSI 53 and 58 (for protozoan cysts only).

The protocols in this Standard require testing with surrogate microorganisms to demonstrate a device's capability for reducing pathogenic bacteria, viruses and protozoan cysts utilizing mechanical filtration as the primary removal mechanism. The surrogate microorganisms utilized and the rationale for selecting them are:

— *Raoultella terrigena* (*Rt*): This nonpathogenic bacterium is previously known as *Klebsiella terrigena* and was selected as the surrogate bacterium for use in the original US EPA Guide Standard and Protocol (ref. 2). *Rt* is a rod-shaped organism ranging in size from 0.3 µ to 1.5 µ by 0.6 µ to 6.0 µ. Its successful use as a surrogate bacterium in NSF P231 is well documented;

— MS-2 coliphage virus: This nonpathogenic phage viral particle is hydrophobic, is small in size (0.025 µ to 25 nm), has an isoelectric point[4] (pI) of 3.9, and has been successfully used by NSF and researchers for many years to test submicron membrane filters; and

— fr coliphage virus: This nonpathogenic phage viral particle is very small (0.019 µ to 19 nm) and has a pI of 8.9. It also has been successfully used by NSF and researchers to test submicron membrane filters.

Protozoan cyst reduction can be claimed without testing only if the devices meet the reduction requirements for both bacteria and viruses. Reduction claims cannot be made only for bacteria or only for viruses. This Standard also includes requirements for the manufacturer's quality control verification, maximum shelf life, effective life indication, maximum use life (one year for dead-end filters and two years for membrane filters with reject or waste streams) and simulated accidental contamination event test (SACET) at the end of the three week test to simulate 'worst case' water with microbiological incursion.

The microbiological reduction requirements' acceptance criteria are consistent with the *US EPA Guide Standard and Protocol for Microbiological Water Purifiers*: 99.9999% bacteria reduction (6 log), 99.99% virus reduction (4 log) and 99.95% cyst reduction (3.3 log).

[4] Isoelectric point (pI or IEP) is the pH at which a protein or viral particle carries a net neutral charge. Below the isoelectric point the particle carries a net positive charge, above it a net negative charge.

This edition of the Standard contains the following revisions:

Issue 4

This revision clarifies the requirements to demonstrate good manufacturing practices under the general requirements of Section 1. It also revised the performance data sheet requirements under Section 8 to clarify that it is the class of organism being claimed, rather than the specific surrogate organism used in the test.

Issue 5

This revision corrects an error in the structural integrity table (Table 5.1).

This revision also includes an editorial update to the names of the Annexes within. The Annexes are being changed from alpha characters to numeric, preceded by a 'Normative' or 'Informative'. The Annexes have also been reordered so the Normative Annexes appear first, followed by the Informative Annexes. The table below shows the previous name of the Annex with the corresponding new name of the Annex:

Annexes	
Previously known as:	**Now known as:**
Annex A	Normative Annex 1 (N-1)
Annex B	Normative Annex 2 (N-2)
Annex C	Normative Annex 3 (N-3)
Annex D	Normative Annex 4 (N-4)
Annex E	Informative Annex 1 (I-1)
Annex F	Normative Annex 5 (N-5)

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, PO Box 130140, Ann Arbor, Michigan 48113-0140, USA.

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NSF/ANSI Standard
for Drinking Water Treatment Units –

Supplemental Microbiological Water Treatment Systems – Filtration

1 General

1.1 Purpose

It is the purpose of this Standard to establish minimum requirements for the reduction of microorganisms using mechanical filtration devices for supplemental treatment of microbiologically safe drinking water. Mechanical filtration devices covered by this Standard are intended for use only on water supplies that have been treated to public water system standards or otherwise are determined to be microbiologically safe as demonstrated by routine testing. They are intended only for protection against intermittent incursions or accidental microbiological contamination of otherwise safe drinking water. 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 supplemental microbial control of specific organisms that may occasionally be present in drinking water (public or private) because of intermittent incursions. Certain of these specific organisms that may be introduced into the drinking water are considered established or potential health hazards. This Standard establishes requirements for POU and POE drinking water treatment systems, and the materials and components used in these systems.

1.3 Minimum requirements

This Standard establishes minimum requirements. Variations may be permitted when it is verified that, compared to the systems covered in this Standard, the alternate systems are as resistant to wear and physical damage or provide equivalent operation or performance. Systems with components or functions covered under other NSF or NSF/ANSI Standards or criteria shall comply with those applicable requirements.

1.4 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.

1.5 Mechanical and microbial reduction performance claims

1.5.1 All NSF/ANSI 244 performance claims shall be verified and substantiated by test data generated under the requirements of NSF/ANSI 244.