NSF Guide to the European Standards for Drinking Water Treatment Units

with Detailed Comparison to the NSF/ANSI Standards

NSF International
The Public Health and Safety Company™

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Acknowledgement of CEN Approval

This document was prepared with the approval of CEN and its members. For compliance with European Standards, you will need to consult the complete standards. These can be purchased from CEN Member bodies. Contact details for CEN Members are available on the CEN website at www.cenorm.be.

INTRODUCTION

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Countries throughout the world are developing and adopting standards for the evaluation of point-of-use and point-of-entry drinking water treatment units. These initiatives are driven by the growing use of such technologies in businesses and homes, by those individuals who seek to improve the quality and the safety of their drinking water. Product standards are an important step forward to ensure such technologies are properly tested to established methods and criteria.

The European Committee for Standardization (Comité Européen de Normalisation)[1], or CEN, has been developing such standards, also referred to as European Norms, for all of Europe. Participating countries include the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

NSF has developed this reference Guide to assist manufacturers in their understanding of the contents of these product standards. By reviewing this Guide, manufacturers will learn the following:

- The European Standards applicable to their product(s).
- The test methods and criteria of the European Standards.
- Available performance claims that can be evaluated according to the European Standards.
- How the European Standards compare to the NSF/ANSI Standards.
- Available options by which manufacturers can claim product compliance with the European Standards.

This Guide will ultimately assist manufacturers in their product design and development decisions, particularly for those selling into both the European and North American markets.

Acknowledgements

NSF wishes to acknowledge the contributions of the Members of the CEN Working Group 13 Water Equipment Inside Buildings and the NSF Joint Committee on Drinking Water Treatment Units. Together, the highly respected representatives of both have successfully furthered global standards development, providing the foundation by which the public at large can have confidence in the products that improve their drinking water quality.

[1] European Committee for Standardization, Management Centre: rue de Stassart 36, B-1050 Brussels, www.cenorm.be

PRODUCT COMPLIANCE

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While many European standards require mandatory compliance resulting in the issuance of the CE mark, these standards presently do not. Any decision to mandate compliance with these standards would be a decision of individual countries. Such mandatory compliance is not expected. Currently, there are no European countries that mandate certification to these standards. It is expected, however, that individual countries will proceed with adoption of the standards over time and offer their local, voluntary certification mark. At the present time, declaration of conformance by the manufacturer is sufficient.

To assist manufacturers with their demonstration of compliance, NSF has implemented testing capabilities to all of the European Standards. To save both time and cost, NSF offers the option of providing a comprehensive test package that encompasses both the European Standards and the NSF/ANSI Standards. This combination allows for reduced testing, as some European Standard test methods encompass the NSF/ANSI Standard test methods, and vice versa. Further, NSF has developed unique methods that blend the individual method requirements of each Standard to accommodate the differences in a single test.

There are several levels of service available from NSF, including:

TEST ONLY – with a complete test report issued by NSF to clearly identify the performance of the product to the applicable European Standard.

DECLARATION OF CONFORMANCE – in the form of a signed certificate issued by NSF for those products that demonstrate full compliance with all requirements of the applicable European Standard.

NF CERTIFICATION – NSF offers certification for those products that demonstrate full compliance with all requirements of the applicable European Standard and the corresponding NSF/ANSI Standard.

NSF MARK – Through an exclusive agreement with the Centre Scientifique et Technique du Bâtiment (CSTB), one of Europe's leading research and evaluation centres, NSF is able to offer the premier NF Mark to our North American clients. Like the NSF Mark, the NF Mark is well respected by consumers, manufacturers and retailers across Europe.

GENERAL DESCRIPTION

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Table 1 provides a brief description of each of the ten European Standards for POU/POE products. Collectively, they encompass many of the treatment systems and technologies available in the marketplace today.

In comparison, they are aligned with the scope of many of the same NSF/ANSI Standards available today for drinking water treatment systems (Table 2). It is important to understand, however, that the European Standards do not assess material safety suitability, unlike the NSF/ANSI Standards. In addition, the European Standards are limited to plumbed-in treatment systems only. They would not address, for example, batch treatment systems including pitcher and jug-style devices. These products, conversely, are covered under the scope of the NSF/ANSI Standards. Beyond that, both the European and NSF/ANSI Standards are similar in addressing product literature requirements, structural integrity test methods and criteria, and contaminant reduction test methods and criteria.

Similar to the individual and varying state requirements in the U.S. relating to drinking water treatment use and acceptance, individual countries in Europe may have restrictions on the use and acceptance of drinking water treatment systems. The European Standards, like the NSF/ANSI Standards, do not provide information on such requirements. It is the responsibility of the manufacturer to seek out such requirements and obtain approval for those regions in which they plan to sell their product. NSF provides assistance to manufacturers in seeking such information and guidance for markets worldwide, and in obtaining necessary approvals.

This guide is prepared based on publicly available information. It is not intended to be a replacement for the standards themselves. Consulting the standards or individual Member States adopted standards is strongly recommended for authoritative information (www.cenorm.be).

Table 1. Reference Numbers and Titles for the European Standards and NSF/ANSI Standards

European Standard	Title	NSF/ANSI Standard	Title	Chart Page#
EN 13443-1:2002 +A1:2007	Water conditioning equipment inside buildings — Mechanical filters — Part 1: Particle rating 80 µm to 150 µm	42	Drinking water treatment units - Aesthetic effects	15
EN 13443-2:2005 +A1:2007	Water conditioning equipment inside buildings — Mechanical filters — Part 2: Particle rating 1 µm to less than 80 µm	42	Drinking water treatment units – Aesthetic effects	17
EN 14095:2003	Water conditioning equipment inside buildings — Electrolytic treatment systems with aluminum anodes	N/A*	N/A*	N/A*
EN 14652:2005 +A1:2007	Water conditioning equipment inside buildings — Membrane separation devices	58	Reverse osmosis drinking water treatment systems	21
EN 14743:2005 +A1:2007	Water conditioning equipment inside buildings — Softeners	44	Residential cation exchange water softeners	25
EN 14812:2005 +A1:2007	Water conditioning equipment inside buildings — Chemical dosing systems — pre-set dosing systems	N/A*	N/A*	N/A*
EN 14897:2006 +A1:2007	Water conditioning equipment inside buildings — Devices using mercury low-pressure ultraviolet radiators	55	Ultraviolet microbiological water treatment systems	23
EN 14898:2006 +A1:2007	Water conditioning equipment inside buildings — Active media filters	42	Drinking water treatment units – Aesthetic effects	13
		53	Drinking water treatment units – Health effects	13
EN 15161:2006	Water conditioning equipment inside buildings — Installation, operation, maintenance and repair	N/A*	N/A*	N/A*
EN 15219:2006 +A1:2007	Water equipment inside buildings — Nitrate removal devices	53	Drinking water treatment units – Health effects	19
N/A*	N/A*	62	Drinking water distillation systems	N/A*

* No corresponding standard.

Table 2. Comparison of the Scope of the European Standards with the NSF/ANSI Standards

European Standard	Scope	NSF/ANSI Standard	Scope
EN 13443-2:2005 +A1:2007	Both POU and POE, plumbed-in only, mechanical filters, 1 µm to less than 80 µm	42	POU and POE, plumbed-in + non-plumbed-in
EN 14652:2005 +A1:2007	Microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO), both POE and POU; If pre- and post- filters are included, they must conform to the relevant standard	58	POU only, reverse osmosis only
EN 14743:2005 +A1:2007	Automatic, salt regenerating cation exchange water softeners	44	POE, cation exchange water softeners
EN 14897:2006 +A1:2007	POU and POE, low pressure mercury lamps with 85% of total radiation intensity at 254 nm	55	POU and POE, low pressure mercury lamps
EN 14898:2006 +A1:2007	Both POU and POE, plumbed-in only, “active” media filters only	42 / 53	POU and POE, plumbed-in + non-plumbed-in
EN 15219:2006 +A1:2007	Plumbed-in, automatic, salt regenerated anion exchange nitrate removal devices	53	POU and POE, plumbed-in + non-plumbed-in

MATERIAL SAFETY

The European Standards defer the matter of material safety largely to the well-established national requirements of individual countries, rather than to specify test methods and related criteria, as is the case with the NSF/ANSI Standards. To clarify this matter, the following statement is commonly found in the European Standards for products in contact with drinking water:

"Products intended for use in water supply systems must comply, when existing, with national regulations and testing arrangements that ensure fitness for contact with drinking water. The Member states relevant regulations and the EC Commission agreed on the principles of a future unique European Acceptance Scheme (EAS), which would provide a common testing and approval arrangement at European level.

If and when the EAS is adopted, European Product Standards will be amended by the addition of an Annex Z/EAS under Mandate M/136 which will contain formal references to the testing, certification and product marking requirements of the EAS."

Mandate M/136 was issued in May of 2001. Since that time, a significant amount of effort has been put forth to develop test procedures and harmonized product standards for a wide range of construction products. However, a revision to the Mandate was issued in September 2005 and it excludes Water Conditioning Equipment. At the time of writing this document, it is not clear whether these products will ultimately be included under the EAS, and until that time, national regulations of Member States will remain in effect.

CONTAMINANT REDUCTION CLAIMS

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Similar to the NSF/ANSI Standards, the European Standards include various contaminant reduction claims based on the Standard and applicable technology (Table 3). Each Standard describes the test method and criteria for their respective scope of technologies. Tables 6 through 11 provide a summary of these methods, along with a direct comparison of the same for the corresponding NSF/ANSI Standard.

Table 3. Contaminant Reduction Claims Available in each of the European Standards

European Standard	Scope	Contaminant Reduction Claims
EN 13443-1:2002 +A1:2007	Both POU and POE, plumbed-in only, mechanical filters, 80 µm to 150 µm	Particulate 80 µm to 150 µm
EN 13443-2:2005 +A1:2007	Both POU and POE, plumbed-in only, mechanical filters, 1 µm to less than 80 µm	Particulate 1 µm to less than 80 µm
EN 14095:2003 +A1:2007	Plumbed-in sacrificial aluminum anode systems, with DC current	System performance and safety
EN 14652:2005 +A1:2007	Microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO), both POE and POU; If pre- and post- filters are included, they must conform to the relevant standard	Microfiltration (MF) - particulate at manufacturer's size rating Ultrafiltration (UF) – manufacturer's claimed rejection of claimed contaminants, or surrogate chemicals (PEG or dextrane) Nanofiltration (NF) – manufacturer's claimed rejection of $MgSO_4$ Reverse osmosis (RO) – manufacturer's claimed rejection of NaCl
EN 14743:2005 +A1:2007	Automatic regenerating cation exchange water softeners	Hardness
EN 14812:2005 +A1:2007	Plumbed-in chemical dosing systems with pre-set dosing rate	Dosing for disinfection, corrosion inhibition, or scaling inhibition
EN 14897:2006 +A1:2007	POU and POE, low pressure mercury lamps with 85% of total radiation intensity at 254 nm	Dosage of 40 mJ/cm^2 required for both disinfection and bactericidal treatment devices
EN 14898:2006 +A1:2007	Both POU and POE, plumbed-in only, active media filters only	Chlorine, organics, odor and flavor, lead, copper, aluminum, hardness, and nitrate
EN 15219:2006 +A1:2007	Plumbed-in, automatic, salt regenerated anion exchange nitrate removal devices	Nitrate

STRUCTURAL INTEGRITY

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Structural integrity testing is required by nearly all of the European Standards. Cyclic and hydrostatic tests are typical of these standards, with variability in the specifics of these tests on a product-by-product basis. As with the many other areas of the these standards, there are numerous similarities when compared to the NSF/ANSI Standards. Table 4-1 and Table 4-2 provide a summary of the requirements for both.

Table 4-1. Structural integrity test conditions of the European Standards

Standard	Minimum Pressure Rating	Static Test: Pressure Factor[1]	Static Test: Duration	Cyclic Test: Number of Cycles	Cyclic Test: Minimum Pressure	Cyclic Test: Pressure Factor[2]	Cyclic Test: Cycle Frequency
EN 13443-1	1000 kPa (145 psig)	3	15 min	200,000	150 kPa (22 psig)	1.3	14-17/min
EN 13443-2	600 kPa (87 psig)	3	15 min	200,000	150 kPa (22 psig)	1.3	14-17/min
EN 14095	N/S[3]	2	10-12 min	N/S[3]	N/S[3]	N/S[3]	N/S[3]
EN 14652	1000 kPa (145 psig)	3	10 min	100,000	150 kPa (22 psig)	1.3	13-17/min
EN 14743	1000 kPa (145 psig)	1.5	10 min	5,000	150 kPa (22 psig)	1.3	14-17/min
EN 14812	1000 kPa (145 psig)	3	15 min	200,000	50 kPa (7.5 psig)	1.3	13-17/min
EN 14897	N/S[3]	N/S[3]	N/S[3]	N/S[3]	N/S[3]	N/S[3]	N/S[3]
EN 14898	1000 kPa (145 psig)	1.5	15 min	200,000	150 kPa (22 psig)	1.3	13-17/min
EN 15219	1000 kPa (145 psig)	1.5	10 min	5,000	150 kPa (22 psig)	1.3	14-17/min

[1]Static Test Pressure Factor is the multiplier applied to the minimum pressure rating to achieve the static test pressure.
[2]Cyclic Test Pressure Factor is the multiplier applied to the minimum pressure rating to achieve the cyclic test pressure.
[3]N/S means there is no specification in this standard for the referenced requirements.

Table 4-2. Structural integrity test conditions of the NSF/ANSI Standards

Standard	Minimum Pressure Rating	Static Test: Pressure Factor[1]	Static Test: Duration	Cyclic Test: Number of Cycles	Cyclic Test: Minimum Pressure	Cyclic Test: Pressure Factor[2]	Cyclic Test: Cycle Frequency
NSF/ANSI-42 and 53; < 8 inch diameter	100 psig (690 kPa)	3	15 min	100,000	0 psig (0 kPa)	150 psig (1,040 kPa) or pressure rating	N/S[3]
NSF/ANSI-42 and 53; ≥ 8 inch diameter	100 psig (690 kPa)	1.5	15 min	100,000	0 psig (0 kPa)	150 psig (1,040 kPa) or pressure rating	N/S[3]
NSF/ANSI-42 and 53; open discharge	100 psig (690 kPa)	1.5	15 min	10,000	0 psig (0 kPa)	50 psig (345 kPa)	N/S[3]
NSF/ANSI-44; >13 inch diameter	125 psig (860 kPa)	2.4	15 min	100,000	0 psig (0 kPa)	150 psig (1,040 kPa) or pressure rating	at least 8/min
NSF/ANSI-44; ≤ 13 inches diameter	125 psig (860 kPa)	2.4	15 min	100,000	0 psig (0 kPa)	150 psig (1,040 kPa) or pressure rating	at least 12/min
NSF/ANSI-55; < 8 inch diameter	100 psig (690 kPa)	2.4	15 min	N/S[3]	N/S[3]	N/S[3]	N/S[3]
NSF/ANSI-55; ≥ 8 inch	100 psig (690 kPa)	1.5	15 min	N/S[3]	N/S[3]	N/S[3]	N/S[3]
NSF/ANSI-55; open discharge	100 psig (690 kPa)	1.2	15 min	10,000	0 psig (0 kPa)	50 psig (345 kPa)	N/S[3]
NSF/ANSI-58	100 psig (690 kPa)	3	15 min	100,000	0 psig (0 kPa)	150 psig (1,040 kPa) or pressure rating	N/S[3]
NSF/ANSI-58; pumped systems	100 psig (690 kPa)	1.5	15 min	Burst test instead of cyclic[4]	N/S[3]	Burst test to 3 X pressure rating[4]	N/S[3]
NSF/ANSI-58; faucet attached	100 psig (690 kPa)	1.5	15 min	10,000	0 psig (0 kPa)	100 psig (690 kPa)	N/S[3]
NSF/ANSI-62	100 psig (690 kPa)	N/S[3]	N/S[3]	N/S[3]	N/S[3]	N/S[3]	N/S[3]

[1]Static Test Pressure Factor is the multiplier applied to the minimum pressure rating to achieve the static test pressure.
[2]Cyclic Test Pressure Factor is the multiplier applied to the minimum pressure rating to achieve the cyclic test pressure.
[3]N/S means there is no specification in this standard for the referenced requirements.
[4]Burst test for pumped systems with pump pressure requires achieving the required pressure for an instant.

DETAILED DESCRIPTIONS & COMPARISONS

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The following tables provide an in-depth summary of the requirements of the European Standards, structured so they directly compare and contrast to the corresponding NSF/ANSI Standards. These comparisons begin on Pages 11 and 12, with an evaluation of Product Literature Requirements. This is followed by Page 13, Table 6, the first of several charts that compare the major requirements for both standards.

NSF developed these tables with one specific purpose in mind — to provide value to manufacturers. The comparison approach adopted for the tables allows manufacturers to assess the likelihood that their products will conform to the European Standards, based on their conformance to the NSF/ANSI Standards, and helps identify those areas that may represent new or varied requirements.

Although the tables provide a significant level of detail, any specific technical issues should be confirmed by directly consulting the appropriate standards.

PRODUCT LITERATURE

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The European Standards have varying requirements for product literature, but similar in many ways to the general requirements of the NSF/ANSI standards. Requirements for permanent filter labels, installation and operating instructions, and replacement element packaging are all included in the European Standards. Table 5-1 provides a brief comparison of the requirements between the European and the NSF/ANSI Standards. Each standard lists the requirements for these various items individually, and the applicable standards should be consulted for such details.

With the adoption of EN15161:2006, each of the European Standards was updated to include more detailed installation, operation and maintenance instructions. This update is in the form of an annex referenced as "+A1:2007."

These more detailed requirements include information such as:

- equipment selection guidelines provided to the customer at the point of purchase
- detailed installation instructions including lists of equipment and accessories necessary for installation
- guidance on bringing the system into service
- responsibilities of third parties such as installation and service technicians
- maintenance checklists
- repair requirements
- troubleshooting guides

See Table 5-2 for an example comparison of requirements in the European and North American Standards.

Table 5-1. Product Literature Requirements

European Standard	NSF/ANSI Standard
Permanent filter label	Data plate
Performance data sheet (Membrane separation devices only)	Performance data sheet
Installation and operation instructions	Installation and operation instructions
Replacement element packaging (where appropriate)	Replacement element packaging (where appropriate)

Table 5-2. Example Product Literature Comparison: Instructions for Installation, Operation and Maintenance

EN 13443-2:2005	NSF/ANSI-42:2007

• Comprehensive instructions for installation, operation, and maintenance
  • Equipment Selection (pre-purchase)
  • Parts list, accessories and equipment list
  • Location of system within household
  • Commissioning (bringing into service)
  • Responsibilities of third party installers/service technicians
• Frequency and conditions for cartridge replacement
• Opening and draining of filter
• Removal and disposal of filter element
• Correct and hygienic insertion of replacement filter element
• Maintenance Requirements
• Repairs
• Troubleshooting
• Pressure drop chart
	• Model number and trade designation
	• Complete name, address and telephone number of manufacturer
	• Flushing and conditioning procedures
	• Rated service flow
	• Maximum working pressure
	• Maximum operating temperature
	• Detailed installation and maintenance requirements including, but not limited to, suggested frequency of filter replacement or service to the system, user responsibility, and parts and service availability
	• Sources of supply for replacement components
	• Statement noting the system and installation shall comply with applicable state and local regulations
	• Statement noting that the system is to be supplied with cold water only
	• Statement noting that the system conforms to NSF/ANSI 42 for the specific performance claims as verified and substantiated by test data

Table 6. EN 14898:2006 Water conditioning equipment inside buildings – Active media filters

Requirement	EN 14898:2006	NSF/ANSI 42/53
Scope	Both POU and POE, plumbed-in only	POU and POE, plumbed-in + non-plumbed-in
Material safety	Materials suitability to comply with national regulations (where appropriate) until the introduction of the EAS	Formulation review and extraction testing per Section 4
Working pressure	At least 1,000 kPa (145 psig)	At least 100 psig (690kPa)
Performance Indication Device (PID)	• Required • Based on flow or time • No test for accuracy • Chemical reduction testing only to capacity	• Not required • Based on flow • Must be tested for accuracy if present, per NSF/ANSI 53 • NSF/ANSI 53 chemical reduction testing reduced from 200% of capacity to 120% of capacity if PID present
Backflow prevention	System to be fitted with backflow prevention device on inlet in accordance with national implementation of EN 1717	Air gap required
Capacity	Only one capacity per system	Only one capacity per system
Flow control	Not required; Contaminant reduction testing conducted at maximum of manufacturer's working flow range; If no flow control present, instructions to control flow rate required	Not required under NSF/ANSI 42; Contaminant reduction testing at manufacturer's rated service flow; Required under NSF/ANSI 53; Contaminant reduction testing at highest flow rate achieved at 60 psig (410 kPa) dynamic pressure
Contamination of system during replace-ment element changes	System design and operating instructions must address avoiding contamination of the system during element changes	Not addressed
Pressure drop	Limited to manufacturer's declared value; Minimum service flow is required for POE systems	Requirement addressed through minimum service flow for POU and POE with flow controller; For POE with no flow controller, 15 psig (103 kPa) max-imum pressure drop allowed at rated service flow
Chlorine reduction	• 1 mg/L influent • 90% minimum reduction = Class I, 75% to 90% reduction = Class II • 60 minute cycles, 50% on/50% off, 16 hours per day • Not less than 60 psig (410 kPa) pressure • Sampling at 10 unit volumes and every 10% to capacity • Two units tested, installed and preconditioned in accordance with manufacturer's instructions • Acceptance: Each sample from each filter shall be no less than claimed efficiency or the minimum for the above classification	• 2 mg/L influent • 50% reduction required • 20 minute cycles, 50% on/50% off or 10% on/90% off, 16 hours per day • 60 psig (410 kPa) dynamic influent pressure • Sampling at 10 unit volumes and every 10% to capacity • Two units tested, installed and preconditioned in accordance with manufacturer's instructions for POU, one for POE

Table 6. EN 14898:2006 Water conditioning equipment inside buildings – Active media filters, cont.

<table>
<tr><th>Requirement</th><th>EN
14898:2006</th><th>NSF/ANSI
42/53</th></tr>
<tr><td>Organic chemical reduction</td><td>• Maximum allowable effluent concentration based on regulated limit (EU Drinking Water Directive 98/83/EC, or, if contaminant not regulated, WHO Guidelines)
• Influent at 10X maximum allowable effluent concentration
• Chloroform is a surrogate for TTHM
• TOC concentration not specified
• 60 minute cycles, 50% on/50% off, 16 hours per day
• Not less than 60 psig (410 kPa) pressure
• Sampling at 10 unit volumes and every 10% to capacity
• Two units tested, installed and preconditioned in accordance with manufacturer's instructions
• Acceptance: mean % reduction efficiency for each chemical by each filter shall be no less than the claimed efficiency or the minimum (90%) specified in the standard, and no single result shall be less than 90% of that minimum</td><td>• Maximum allowable effluent concentration based on regulated limit (USEPA or other)
• Influent at 95th percentile of occurrence, 3X maximum allowable effluent concentration, or other
• TOC at least 1 mg/L
• 20 minute cycles, 50% on/50% off, 16 hours per day
• 60 psig (410 kPa) dynamic influent pressure
• Sampling variable by test, to 120% or 200% of capacity
• Two units tested, installed and preconditioned in accordance with manufacturer's instructions
• Acceptance: varies by test, usually no effluent data point may exceed maximum allowable effluent concentration</td></tr>
<tr><td>Taste and odor reduction</td><td>Based on reduction of geosmin, and 2,4,6-trichlorophenol tested separately (90% reduction from 0.15 µg/L and 20 µg/L challenge, respectively)
Test procedure otherwise as per organic chemical reduction above</td><td>Based on chlorine reduction test, with activated carbon only</td></tr>
<tr><td>Metals reduction</td><td>• Testing for all metals at pH 6.5 and pH 8.5
• Requirements for lead, copper, and aluminum included:
<table>
<tr><th>Contaminant</th><th>Influent concentration</th><th>Effluent percent reduction</th></tr>
<tr><td>Lead</td><td>100 ± 10 µg/L</td><td>90</td></tr>
<tr><td>Copper</td><td>3 ± 0.3 mg/L</td><td>80</td></tr>
<tr><td>Aluminum</td><td>600 ± 60 µg/L</td><td>70</td></tr>
</table>
• Test procedure and acceptance otherwise as per organic chemical reduction above
• Stock solutions are nitric acid preserved</td><td>• Testing for health effects metals at pH 6.5 and pH 8.5
• Requirements for many metals included. Influent challenges different from EN
• Maximum allowable effluent concentrations used, instead of percent reduction requirements
• Some stock solutions are not preserved with nitric acid</td></tr>
<tr><td>Nitrate, hardness and other inorganic chemicals</td><td>• Requirements for nitrate and hardness:
Nitrate influent 200+/-20 mg/L NO_3, 75% minimum reduction
Hardness influent 300+/- 30 mg/L $CaCO_3$, 50% minimum reduction
• Test procedure otherwise as per organic chemical reduction above</td><td>• Nitrate + nitrite tested together, 30 mg/L ± 10% influent concentration added as 27 mg/L NO_3 [as N] and 3 mg/L NO_2 [as N]
• Maximum effluent concentration = 10 mg/L [as N], with not more than 1 mg/L NO_2 [as N]</td></tr>
<tr><td>Structural integrity</td><td>• Cyclic for filter housings is 200,000 cycles from 150 kPa (22 psig) to 1.3X maximum working pressure
• Cyclic for the cartridge is 20,000 cycles from 150 kPa (22 psig) to 1.3 X maximum working pressure
• Hydrostatic is 15 minutes at 1.5 X pressure rating for permanent products</td><td>• Cyclic is 100,000 cycles 0 to 150 psig (1,040 kPa) for permanent products
• Hydrostatic is 15 minutes at 300 psig (2,070 kPa) or 3X pressure rating for permanent products
• Burst is 400 psig (2,760 kPa) or 4X pressure rating for permanent, non-metallic components</td></tr>
</table>

Table 7. EN 13443-1:2002 Water conditioning equipment inside buildings — Mechanical filters — Part 1: Particle rating 80 µm to 150 µm

Requirement	EN 13443-1:2002	NSF/ANSI 42
Scope	POE, plumbed-in only, mechanical filters, 80 µm to 150 µm	POU and POE, plumbed-in + non-plumbed-in
Material safety	Materials suitability to comply with national regulations (where appropriate) until the introduction of the EAS; Copper/zinc alloys containing more than 10% zinc may be subject to dezincification standards in certain countries	Formulation review and extraction testing per Section 4
Working pressure	At least 1,000 kPa (145 psig)	At least 100 psig (690 kPa)
Backwashing	Permitted; Design required to provide uninterrupted water supply during backwashing	Permitted; Particulate reduction testing completed at manufacturer's recommended interval with at least one backwash at the midpoint of the test
Backflow prevention	System to be fitted with backflow prevention device on inlet and air break to drain (backwashable filters) in accordance with national implementation of EN 1717	Air gap required
% Reduction of Particles (Filter Rating)	Maximum filter rating (10% max. by mass of particles able to pass through) shall be between 100 µm and 150 µm, and the minimum filter rating (90% max. by mass of particles able to pass through) shall be between 80 µm and 120 µm	• 85% for specific particle size classification • Particles in 80 µm to 150 µm size range outside scope of NSF/ANSI 42
Noise limits	Maximum noise levels are specified per EN ISO 3822-3	None
Contamination of system during replacement element changes	System design and operating instructions must address avoiding contamination of the system during element changes; Replacement cartridges must be individually wrapped	Not addressed
Clean pressure drop	50 kPa (7.5 psig) maximum pressure drop allowed at the nominal flow rate	Requirement addressed through minimum service flow for POU and POE with flow controller; For POE with no flow controller, 15 psig (103 kPa) maximum pressure drop allowed at rated service flow
Filter surface velocity	Surface velocity shall not exceed 0.15 $m^3/(h\ cm^2)$ for backwashable filters, and 0.025 $m^3/(h\ cm^2)$ for replaceable cartridge filters at the nominal flow rate	Not addressed
Pressure strength of filter elements and components	Operate filter with open discharge inlet pressure of 80% of rated pressure of housing for 60 minutes; No visible deformation of the filter cartridge may result	Not addressed
Structural integrity	• Cyclic for filter housings is 200,000 cycles from 150 kPa (22 psig) to 1.3X nominal pressure (minimum 1,000 kPa (145 psig)) • Hydrostatic is 15 minutes at 3X nominal pressure rating for permanent products • Bending moment test required, based on size of filter and end connections (threaded and flanged vs. compression); Specified bending force is applied to a pipe connected to the filter for 30 to 40 seconds; No permanent deformation, fissures, or rupture of the filter housing are permitted	• Cyclic is 100,000 cycles 0 to 150 psig (1,040 kPa) for permanent products • Hydrostatic is 15 minutes at 300 psig (2,070 kPa) or 3X pressure rating for permanent products • Burst is 400 psig (2,760 kPa) or 4X pressure rating for permanent, non-metallic components

Table 7. EN 13443-1:2002 Water conditioning equipment inside buildings — Mechanical filters — Part 1: Particle rating 80 µm to 150 µm, cont.

Requirement	EN 13443-1:2002	NSF/ANSI 42
Particulate Reduction Test Method	• Sieved spherical glass beads used as test particles • The beads are sieved into fractions in increments of 20 µm to 30 µm • One test per fraction at the upper and lower ranges of filter particle ratings is conducted, with a third test of an intermediate fraction conducted if necessary • 1 to 4 grams of beads are used for each test • All beads are to be introduced into the filter at a flow velocity of 0.5 m/second relative to the inlet diameter, within 5 to 10 minutes • The test is repeated three times, with new replaceable cartridges used, or after backwashing • The deviation in the results shall not exceed ± 5%	• Filters in the size range of 80 µm to 150 µm not addressed by NSF/ANSI 42

Table 8. EN 13443-2:2005 Water conditioning equipment inside buildings — Mechanical filters — Part 2: Particle rating 1 µm to less than 80 µm

Requirement	EN 13443-2:2005	NSF/ANSI 42
Scope	Both POU and POE, plumbed-in only, mechanical filters, 1 µm to less than 80 µm	POU and POE, plumbed-in + non-plumbed-in
Material safety	Materials suitability to comply with national regulations (where appropriate) until the introduction of the EAS	Formulation review and extraction testing per Section 4
Working pressure	Minimum pressure rating of 6 PN (600 kPa, 87 psig)	At least 100 psig (690 kPa)
Backwashing	Permitted. Design required to provide uninterrupted water supply during backwashing	Permitted. Particulate reduction testing completed at manufacturer's recommended interval with at least one backwash at the midpoint of the test
Performance Indication Device (PID)	Recommended, but no requirements	No requirements for PIDs for mechanical filters
Backflow prevention	System to be fitted with backflow prevention device on inlet and air break to drain (backwashable filters) in accordance with national implementation of EN 1717	Air gap required
% Reduction of Particles	99.8% at manufacturer's claimed particle rating	85% for specific particle size classification
Particle Retention Capacity	For non-backwashing filters, must be equal to or greater than manufacturer's claim, if any	Not addressed
Contamination of system during replace-ment element changes	System design and operating instructions must address avoiding contamination of the system during element changes; Replacement cartridges must be individually wrapped	Not addressed
Clean pressure drop	Limited to manufacturer's declared value; Manufacturer must specify maximum acceptable pressure drop after backwash for backwashing systems	Requirement addressed through minimum service flow for POU and POE with flow controller; For POE with no flow controller, 15 psig (103 kPa) maximum pressure drop allowed at rated service flow
Maximum pressure drop	Manufacturer must specify maximum pressure drop at which the cartridge is to be changed	Not addressed
Cartridge collapse pressure	Clogging of filter with either ISO medium or ISO coarse dust (see Particulate Reduction Test Method, below, for determination of which dust) used to establish pressure drop to 80% of rated pressure of housing; Clean water is then recircu-lated through the filter for 30 minutes; No discontinuity in pressure rise allowed, no falloff in differential pressure of the clogged filter while recirculating clean water, and no visible damage to filter after stopping test and cleaning	Not addressed
Cartridge cyclic differential pressure resistance	• 500 cycles of 20 seconds with flow sufficient to generate pressure drop of 200 kPa (29 psig) • No falloff in pressure drop > 10% permitted • No visible damage to cartridge permitted • Bubble point of cartridge after test shall not vary more than 15% from bubble point prior to test	Not addressed
Particle shedding	Number of background particles or fibers ≥ 5 µm shall not exceed manufacturer's specifications after cartridge is conditioned according to manufacturer's instructions	Not addressed

Table 8. EN 13443-2:2005 Water conditioning equipment inside buildings — Mechanical filters — Part 2: Particle rating 1 µm to less than 80 µm, cont.

<table>
<tr><th>Requirement</th><th>EN
13443-2:2005</th><th>NSF/ANSI
42</th></tr>
<tr><td>Structural integrity</td><td>• Cyclic for filter housings is 200,000 cycles from 150 kPa (22 psig) to 1.3X working pressure
• Hydrostatic is 15 minutes at 3X pressure rating for permanent products</td><td>• Cyclic is 100,000 cycles 0 to 150 psig (1,040 kPa) for permanent products
• Hydrostatic is 15 minutes at 300 psig (2,070 kPa) or 3X pressure rating for permanent products
• Burst is 400 psig (2,760 kPa) or 4X pressure rating for permanent, non-metallic components</td></tr>
<tr><td>Particulate Reduction Test Method</td><td>• Constant flow rate
• Test dust dosed into test filter inlet; Water recycled after passing through downstream (clean-up) filters
• Influent dust levels alternating between 5 mg/L (counting phase) and 100 mg/L (clogging phase)
• Online particle counters upstream and downstream of filter used to measure filtration efficiency during periods with 5 mg/L influent dust level
• Retention capacity (cartridge filter only) determined by mass of dust needed to achieve specified pressure drop
• ISO medium or ISO coarse test dust used depending on manufacturer’s rating of cartridge:
<table>
<tr><th>Manufacturer’s Rating, µm</th><th>Test Dust</th></tr>
<tr><td>0 to 25</td><td>ISO medium</td></tr>
<tr><td>25 to 80</td><td>ISO coarse</td></tr>
</table>
• Testing required at manufacturer’s rated service flow, with end pressure drop varying by cartridge type
<table>
<tr><th>Filter Type</th><th>End Point, kPa</th><th>End Point, psig</th></tr>
<tr><td>Surface</td><td>250</td><td>36</td></tr>
<tr><td>Depth</td><td>150</td><td>22</td></tr>
<tr><td>Backwash</td><td colspan="2">Manufacturer’s set point for backwash</td></tr>
</table></td><td>• 60 psig (410 kPa) initial dynamic pressure, not readjusted during test
• Testing initially at manufacturer’s rated service flow
• Cycling of flow on and off with 1-3 minute cycle
• ISO fine, ISO coarse, or Intermediate faction test dust used according to Class being tested:
<table>
<tr><th>Class</th><th>Size from, µm</th><th>Size to, µm</th><th>Test Dust</th></tr>
<tr><td>I</td><td>≥ 0.5</td><td>< 1</td><td>ISO fine</td></tr>
<tr><td>II</td><td>≥ 1</td><td>< 5</td><td>ISO fine</td></tr>
<tr><td>III</td><td>≥ 5</td><td>< 15</td><td>ISO fine or coarse</td></tr>
<tr><td>IV</td><td>≥ 15</td><td>< 30</td><td>ISO coarse</td></tr>
<tr><td>V</td><td>≥ 30</td><td>< 50</td><td>Int. fraction</td></tr>
<tr><td>VI</td><td>≥ 50</td><td>< 80</td><td>Int. fraction</td></tr>
</table>
• Sufficient dust to achieve minimum influent particle count used; no limit on influent dust level
• End of test is 75% reduction in flow rate
• Samples at start-up, fourth cycle, and 75% reduction in flow rate</td></tr>
</table>

Table 9. EN 15219:2006 Water conditioning equipment inside buildings - Nitrate removal devices

Requirement	EN 15219:2006	NSF/ANSI 53
Scope	Plumbed-in, automatic, salt regenerated anion exchange nitrate removal devices	POU and POE, plumbed-in + non-plumbed-in
Material safety	Materials suitability to comply with national regulations (where appropriate) until the introduction of the EAS	Formulation review and extraction testing per Section 4
Working pressure	1,000 kPa (145 psig)	At least 100 psig (690 kPa)
Requirements for regeneration after stagnation, and microbial growth control features	A note indicates that additional features, such as regeneration after stagnation, and microbial growth control features, may be required for certain jurisdictions	None
Structural integrity	• 5,000 cyclic test from 150 kPa (22 psig) to 1.3X working pressure • 10 minute hydrostatic test to 1.5X working pressure or 1,000 kPa (145 psig), whichever is greater	• Cyclic is 100,000 cycles 0 to 150 psig (1,040 kPa) • Hydrostatic is 15 minutes at 300 psig (2,070 kPa) or 2.4X pressure rating, whichever is greater • Burst is 400 psig (2,760 kPa) or 4X pressure rating for permanent, non-metallic components
System operation at varying pressure	System operation and regeneration must be effective from 200 kPa (29 psig) to 60% of the maximum design pressure	Minimum and maximum operational pressures must be stated by manufacturer
Backflow prevention	System to be fitted with backflow prevention device on inlet and air break to drain in accordance with national implementation of EN 1717; There is a vacuum test if an inlet backflow prevention device is not evident	Air gap of 2 pipe diameters or 1 inch, whichever is smaller, required on drain line
Noise limits	Maximum noise levels are specified per EN ISO 3822-3	None
Air vents	System design to release any trapped air is required	None
Regeneration trigger accuracy	• Time clock regeneration must be accurate to within 30 minutes of nominal setting • Volume controlled regeneration must be accurate to within 10% of the nominal value • Regeneration triggered by exhaustion must have capacity within 10% of the rated capacity	No requirements regarding accuracy of time clocks or meters
Efficiency	• Efficiency of 140 grams of nitrate ion/kg of salt (64 g per lb of salt) is required • Regeneration water volume must not exceed 0.40 L per gram of nitrate removed	• Not addressed
Rinse effectiveness	• Sodium content after regeneration must not exceed 1.5 mmol/L over that of the inlet water; Contribution from regeneration is taken into account for mixed bed systems	• Not addressed
Pressure drop	• No more than 100 kPa (14.5 psig) at 15 °C at the nominal flow rate, with bypass and blending valve closed, if fitted	• No more than 15 psig (103 kPa) at the rated service flow

Table 9. EN 15219:2006 Water conditioning equipment inside buildings - Nitrate removal devices, cont.

Requirement	EN 15219:2006	NSF/ANSI 53
Capacity and Brine accuracy	• Capacity shall be at least 90% of the capacity specified by the manufacturer; 15 runs shall be conducted at a service flow of at least 30% of the nominal flow rate • After 24 hours, five more runs are conducted; These runs are used for capacity determination; The capacity is the average determined from the five runs; At least one run must be conducted at 200 kPa (29 psig) pressure, as well as at 60% of the maximum design pressure • During these five runs, samples at the inlet and outlet must be analyzed at 15%, 50%, 75% and 100% of the cycle and analyzed for sodium content to determine that there is no brine infiltration into the treated water • Leakage is not subtracted when determining exchange capacity • The brine system is used for delivery of salt when conducting capacity testing; Brine accuracy is evaluated by weight for the five capacity runs; Individual runs must not vary more than 10% from the average • Test water contains 150 ± 10 mg/L nitrate and 150 ± 10 mg/L sulfate • Effluent at the end of the run may not exceed 25 mg/L nitrate • Multiple salt settings not addressed • Water must be available to service during regeneration	• Testing conducted with 30 mg/L ± 10% added as 27 mg/L nitrate (as N) and 3 mg/L nitrite (as N) • Effluent may not exceed 10 mg/L nitrate as N, with not more than 1 mg/L as nitrite (as N) • Flow rate is highest achievable flow rate at 60 psig initial dynamic inlet pressure • Samples collected at start-up, 25%, 50%, 75%, 100%, and 120% of manufacturer's rated capacity for those devices with performance indicators, and at start-up, 50%, 100%, 150%, 180%, and 200% of manufacturer's rated capacity for those devices without performance indicators • Regeneration not addressed • Brine accuracy not addressed

Table 10. EN 14652:2005 Water conditioning equipment inside buildings – Membrane separation devices

Requirement	EN 14652:2005	NSF/ANSI 58
Scope	Membrane filtration systems with a particle rating below 1 µm microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO), both POE and POU; If pre- and post- filters are included, they must conform to the relevant standard	POU only, reverse osmosis only
Material safety	Materials suitability to comply with national regulations (where appropriate) until the introduction of the EAS	Formulation review and extraction testing per Section 4
Working pressure	At least 1,000 kPa (145 psig) or 1.6 MPa (232 psig), if connected with a pressure-regulating valve	At least 100 psig (690 kPa)
Upstream backflow prevention	System to be fitted with backflow prevention device on inlet and air break to drain (crossflow/backwashable filters) in accordance with national implementation of EN 1717	Air gap of 2 pipe diameters or 1 inch, whichever is smaller, required on drain line; Alternate air gap devices must pass vacuum test
System air vent	Design to ensure that trapped air is removed	None required
Pressure drop	MF and UF have a pressure drop requirement; The maximum pressure drop shall not exceed the declared value by more than 10% at the recommended nominal flow rate; The housing and membrane components of pressure drop must be evaluated separately	Not addressed

Structural integrity	• Cyclic for filter housings is 100,000 cycles from 150 kPa (22 psig) to 1.3X working pressure
	• Hydrostatic testing (MF, UF, NF, RO membranes); 10 minute hydrostatic test to 3X working pressure
	• Differential pressure resistance of the module (MF and UF membranes operating in dead-end mode); Module progressively blinded with silica test dust to 80% of nominal pressure; No discontinuity in pressure rise allowed and no visible damage to filter after stopping test and cleaning
	• Cyclic differential pressure resistance of the module (MF and UF membranes operating in dead-end mode)
	  • 500 cycles of 20 seconds with flow sufficient to generate pressure drop of 200 kPa (29 psig)
	  • Differential pressure variation of 10% max
	  • No visible damage
	  • Bubble point of cartridge after test shall not vary more than 15% from bubble point prior to test
		• Cyclic is 100,000 cycles 0 to 150 psig (1,040 kPa) for permanent products
		• Hydrostatic is 15 minutes at 300 psig (2,070 kPa) or 3X pressure rating for permanent products
		• Burst is 400 psig (2,760 kPa) or 4X pressure rating for permanent, non-metallic components

Table 10. EN 14652:2005 Water conditioning equipment inside buildings – Membrane separation devices, cont.

Requirement	EN 14652:2005	NSF/ANSI 58
Contaminant reduction	• Filtration rating (MF) – 90% reduction of microspheres of the particle size claimed by the manufacturer at the manufacturer's maximum recommended pressure drop, with pass/fail based on comparing fluorescence of influent and effluent • Organic molecule rejection – molecular cut-off (UF, NF, RO if claimed) - 90% rejection of the declared capacity of specific organics required, at specific concentrations and other test conditions as specified by the manufacturer • Salinity rejection rate (NF and RO) - 99% of the rated rejection capacity is required (i.e., tested rejection must be at least 99% of claimed rejection); Pre- and post- filters are removed, along with the pressurized storage tank, for testing; For RO, a 750 mg/L solution of NaCl is used; for NF a 2,070 mg/L solution of magnesium sulfate heptahydrate is used; Test pressure is 350 kPa (50.8 psig); A 7 day protocol for sample collection, identical to Standard 58 is used, except that sample size is not specified • Recovery rate (MF, UF, NF, RO operating in cross-flow mode) - Calculated when testing the relevant rejection rate; Calculated recovery shall be at least 95% of the claimed recovery rate • Daily production shall be at least 95% of the claimed value; Measured for 1 hour on day 1 and day 7, and averaged	• TDS reduction required based on 7 day test using challenge of 750 mg/L sodium chloride with pre- and post- filters removed, test pressure 50 psig (340 kPa); Sample size is specified and varies by day of test • Recovery rate calculated on day 1 and day 7 of test; Efficiency rate for systems with automatic shut-off valve and storage tank calculated on day 1 and day 7 while daily production rate is measured • Daily production rate calculated on day 1 and day 7 of test while filling storage tank; Systems with automatic shutoff valve are evaluated during complete and partial tank fills • Other ionic and mechanical contaminants evaluated using similar protocol
Performance indication	• Not required	• Required for health effects claims, varies by contaminant, sampling services or kits allowed

Table 11. EN 14897:2006 Water conditioning equipment inside buildings – Devices using mercury low-pressure ultraviolet radiators

Requirement	EN 14897:2006	NSF/ANSI 55
Scope	POU and POE, low pressure mercury lamps with 85% of total radiation intensity at 254 nm; Disinfection devices differentiated from bactericidal treatment devices	POU and POE, low pressure mercury lamps; Class A and Class B devices differentiated
Material safety	Materials suitability to comply with national regulations (where appropriate) until the introduction of the EAS	Formulation review and extraction testing per Section 4
Working pressure	To be specified by manufacturer	At least 100 psig
Structural integrity	• Not required	• Cyclic is 10,000 cycles 0 to 50 psig (340 kPa) only for open discharge • Hydrostatic is 15 minutes at 240 psig (1,640 kPa) or 2.4X pressure rating for permanent, non-open discharge products • Burst is 400 psig (2,760 kPa) or 4X pressure rating for permanent, non-metallic components
Required dosage	• 40 mJ/cm^2	• Class A = 40 mJ/cm^2 • Class B = 16 mJ/cm^2
Monitor requirements	• Disinfection devices require UV sensor and monitor • A lamp function indicator is required for bactericidal treatment devices • Other controller output requirements are specified, including an irradiance monitor for disinfection devices	• UV sensor, monitor, and alarm required for Class A systems • Lamp function indicator required for Class B systems
Flow control	• Not required; The manufacturer is also to provide data for acceptable flow rates given UV transmittance of the water; At least three measurement points covering the whole operational range are required	• Required; UV dose testing conducted at highest achievable system flow rate over operating pressure range of system
Lamp burn-in prior to testing	• 100 hour burn-in required; The manufacturer must provide an appropriate method to vary the output of the lamps	• Not required for Class A • 100 hour burn-in required for Class B
Test organism	• *Bacillus subtilus*	• Class A = MS-2 coliphage (ATCC #15597B) • Class B = *Saccharomyces cerevisiae* (ATCC #18824)
Dose-response curve	• 10 to 80 mJ/cm^2	• Class A = 0 to 60 mJ/cm^2 • Class B = 0 to 24 mJ/cm^2

Table 11. EN 14897:2006 Water conditioning equipment inside buildings – Devices using mercury low-pressure ultraviolet radiators, cont.

Requirement	EN 14897:2006	NSF/ANSI 55
Test conditions	• Disinfection devices: Irradiance (measured with device sensor) across range of UV transmittance measured at 3 data points; Sodium thiosulfate used to lower transmittance; Six more data points collected across manufacturer's recommended flow rate, three are varying irradiance by adding sodium thiosulfate, three are varying irradiance by reducing lamp output; No start-up samples are collected, as system must display a signal that minimum irradiance has been reached when the system starts up • Bactericidal treatment devices: Data at 3 points is while varying flow rate, and UV transmittance; The data is collected at lowest, highest, and mid-point of the manufacturer's specified flow range and UV transmittance • A graph of flow rate vs. irradiance for disinfection devices or flow rate vs. transmittance for bactericidal treatment devices, is developed, which establishes the "operational range" of the device	• Class A: Transmittance reduced to 70% or alarm set point, whichever is lower, by addition of PHBA; Sampling at start-up, and during equilibrium flow conditions • Class B: Transmittance reduced to 70% by addition of PHBA; Sampling at start-up, and during equilibrium flow conditions
Sensor	• Extensive requirements for the sensor, including selectivity of wavelength, linearity of signal, and stability of signal for a year; Requirements are verified by the manufacturer	• Must activate successfully 100 times consecutively when tested

Table 12. EN 14743:2005 Water conditioning equipment inside buildings – Softeners

Requirement	EN 14743:2005	NSF/ANSI 44
Scope	Automatic, salt-regenerating cation exchange water softeners	POE, cation exchange water softeners
Material safety	Materials suitability to comply with national regulations (where appropriate) until the introduction of the EAS	Formulation review and extraction testing per Section 4
Working pressure	1,000 kPa (145 psig)	At least 125 psig (860 kPa)
Requirements for blending devices, regeneration after stagnation, and microbial growth control features	A note indicates that additional features, such as blending devices, regeneration after stagnation, and microbial growth control features, may be required for certain jurisdictions	None
Structural integrity	• 5,000 cyclic test from 150 kPa (22 psig) to 1.3X working pressure • 10 minute hydrostatic test to 1.5X working pressure or 1,000 kPa (145 psig), whichever is greater	• Cyclic is 100,000 cycles 0 to 150 psig (1,040 kPa) • Hydrostatic is 15 minutes at 300 psig (2,070 kPa) or 2.4X pressure rating, whichever is greater • Burst is 500 psig (3,450 kPa) or 4X pressure rating for permanent, non-metallic components
System operation at varying pressure	System operation and regeneration must be effective from 200 kPa (29 psig) to 60% of the maximum design pressure	Minimum and maximum operational pressures must be stated by manufacturer
Backflow prevention	System to be fitted with backflow prevention device on inlet and air break to drain in accordance with national implementation of EN 1717; There is a vacuum test if an inlet backflow prevention device is not evident	Air gap of 2 pipe diameters or 1 inch, whichever is smaller, required on drain line
Noise limits	Maximum noise levels are specified per EN ISO 3822-3	None
Air vents	System design to release any trapped air is required	None
Regeneration trigger accuracy	• Time clock regeneration must be accurate to within 30 minutes of nominal setting • Volume controlled regeneration must be accurate to within 10% of the nominal value • Regeneration triggered by exhaustion must have capacity within 10% of the rated capacity	No requirements regarding accuracy of time clocks, meters, or hardness monitors
Efficiency	• Efficiency of 2,810 grains/lb of salt (400 g per kg of salt) is required • Regeneration water volume must not exceed 5.65 gallons per 1,000 grains (0.33 L per g) of hardness removed	• Efficiency is optional • System must achieve 3,350 grains/lb (475 g per kg) of salt to claim efficiency • System must use no more than 5 gallons of regenerant water per 1,000 grains (0.29 L per g) of hardness removed
Rinse effectiveness	• Chloride content after regeneration must not exceed 1.5 mmol/L over that of the inlet water	• Net chloride content no greater than 100 mg/L after regeneration
Pressure drop	• No more than 100 kPa (14.5 psig) at the nominal flow rate, with bypass and blending valve closed, if fitted	• No more than 15 psig (103 kPa) at the rated service flow

Table 12. EN 14743:2005 Water conditioning equipment inside buildings – Softeners, cont.

Requirement	EN 14743:2005	NSF/ANSI 44
Capacity and Brine accuracy	• Capacity shall be at least 90% of the capacity specified by the manufacturer; 15 runs shall be conducted at a service flow of at least 30% of the nominal flow rate • After 24 hours, five more runs are conducted; These runs are used for capacity determination; The capacity is the average determined from the five runs; At least one run must be conducted at 200 kPa (29 psig) pressure, as well as at 60% of the maximum design pressure • During these five runs, samples at the inlet and outlet must be analyzed at 15%, 50%, 75% and 100% of the cycle and analyzed for chloride content to determine that there is no brine infiltration into the softened water • The hardness reduction calculation does not include subtraction of leakage • The brine system is used for delivery of salt when conducting capacity testing; Brine accuracy is evaluated by weight for the five capacity runs; Individual runs must not vary more than 10% from the average • Hardness of the test water is 17.5 ± 2.9 grains/gallon (3 ± 0.5 mmol/L) • End point hardness shall be no more than 10% of influent hardness • Multiple salt settings not addressed • Water must be available to service during regeneration	• Tested with inlet water 20 ± 2 grains per gallon (3.4 ± .34 mmol/L) at ½ of the rated service flow; End point at 1 grain per gallon (0.17 mmol/L) hardness; Three runs within 10% of the average of the three are required; Capacity calculation involves subtraction of leakage • Low, medium, and high salt settings tested with measured brine introduced; Additional salt settings may be interpolated • Brine accuracy evaluated separately; Weight of brine tank measured before and after regenerations; Alternate procedure available for systems using saturated brine • Water must be available to service during regeneration
Conformance by calculation	None	Procedures, calculations, and limitations included

NOTES

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