

Drinking Water Treatment Devices and Filtration: Benefits of Standards Development and Conformity Assessment

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About NSF International 四 Standards Process **Conformity Assessment** DWTU Testing Methodology

Our Mission

NSF International is dedicated to being the leading global provider of public health and safety-based risk management solutions while serving the interests of all stakeholders, namely the public, the business community and government agencies.

NSF International is a global, independent, public health and safety organization.

Our mission and focus has always been protecting and improving human health.

NSF Around the Globe

NSF has clients in 180+ countries with 61 office and laboratory locations.



NSF Office & Lab Locations

NSF operates 61 offices and laboratories across the world.

NORTH AMERICA

- Ann Arbor, MI
- Aurora, Ontario, Canada
- o Boulder, CO
- o Chicago, IL
- Columbia, SC
- Dutch Harbor, AK
- o Guelph, Ontario, Canada
- o Littleton, NH
- o Montreal, Quebec, Canada
- o Richmond, CA
- San Diego, CA
- Seattle, WA
- o Waco, TX
- Washington, DC

LATIN AMERICA

- o Bogotá, Colombia
- o Guayaquil, Ecuador
- o Lima, Peru

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- Porto Alegre, Brazil
- o Querétaro, Mexico
- o Rio de Janeiro, Brazil
 - San José, Costa Rica
- São Paulo, Brazil
- o Santiago, Chile

ASIA / OCEANIA

- Auckland, New Zealand
- Bangkok, Thailand
- o Busan, Korea
 - Ho Chi Minh City, Vietnam
 - Hyderabad, India
- New Delhi, India
 - Seoul, Korea
- Shanghai, China
- o Suzhou, China
 - Taoyuan, Taiwan
- Tokyo, Japan

EMEA

- o Abu Dhabi, United Arab Emirates
- o Almeria, Spain
- Antwerp, Belgium
- Bologna, Italy
- Brussels, Belgium
- o Bucharest, Romania
- Hamburg, Germany
- o Istanbul, Turkey
- o Lille, France
- Northwich, United Kingdom
- Novara, Italy
- Oakdale, United Kingdom
- Oxford, United Kingdom
- Rheda-Wiedenbrück, Germany
- Sofia, Bulgaria
- o Stellenbosch, South Africa
- o Tunis, Tunisia
- York, United Kingdom
- Wavre, Belgium

NSF's Global Water Programs

NSF's global water program develops standards, and tests and certifies products that come into contact with drinking water, such as plumbing components, water treatment chemicals and drinking water filters, as well as pool and spa equipment.



NSF's Global Water Services

NSF developed many public health standards adopted by the U.S. EPA to protect drinking water; and standards promoting pool/spa safety.

NSF tests and certifies products to these and other industry standards.

Plumbing Products NSF/ANSI 14 and 61-Section 9; NSF/ANSI 372; UPC[®]; IPC[®]; ICC;

ASTM; ASSE; ASME

Filtration Products

NSF/ANSI 42, 44, 53, 55, 58, 62, 177, 401 and 419; NSF Protocols P231, P248 and P477 Municipal Water Products NSF/ANSI 60, 61 and 419



On-Site Wastewater Treatment and Reuse Devices NSF/ANSI 40, 41, 46, 245 and 350

Recreational Water Safety

NSF/ANSI 50: Pumps, drains, pool covers, filters and pool chemicals

Building Water Health

NSF/ANSI 444: *(in development)* NSF Protocols: P376, P453 and P459

ANSI Accredited Standards Development Organization

- The ANSI Essential Requirements include:
 - 1. Openness
 - 2. Lack of Dominance
 - 3. Balance
 - 4. Coordination and Harmonization
 - 5. Notification of Standards Development Coordination
 - 6. Consideration of Views and Objections
 - 7. Evidence of Consensus and Consensus Body Vote
 - 8. Standards Developer Appeal Process
 - 9. Written procedures
 - 10. Compliance with normative ANS policies and administrative procedures

Bringing Industry, Regulatory and Consumers Together



Industry

Aerospace, Automotive, Building and Construction, Food, Chemical, Consumer Products, Pharmaceutical, Medical Device, Dietary Supplement, Water Distribution and Treatment, Sustainability

Regulators

USDA, EPA, FDA, CPHC, HC and International, National, State, Local Government Agencies

Consumers

Educators and Consumer Groups

THE NSF STANDARDS PROCESS



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General Structure of Standards

- 1. General Section Includes purpose, scope, minimum requirements
- 2. Normative References
- 3. Definitions
- 4. Materials
- 5. Structural Performance
- 6. Minimum Performance Requirements
- 7. Elective Performance Claims (systems must claim at least one)
- 8. Instruction and Information (product literature)
- 9. Annex (if applicable)

NSF Health Advisory Board

- Composed of expert toxicologists and risk assessors from government, academia and industry.
 - Members include EPA, Health Canada and the University of Michigan School of Public Health
- Establishes maximum exposure levels for unregulated chemicals that have not been established by the U.S. EPA, Health Canada or other authoritative health body
 - Sets action levels in NSF/ANSI 60 and 61

Drinking Water Treatment Unit Standards

- 1973 NSF/ANSI 42 Filters Aesthetic Claims
- 1980NSF/ANSI 53Filters Health Claims
- 1981 NSF/ANSI 58 <u>Reverse Osmosis</u>
- 1987 NSF/ANSI 44 Water Softeners
- 1989 NSF/ANSI 62 Distillation
- 1991 NSF/ANSI 55 <u>Ultraviolet</u>
- 2004 NSF/ANSI 177 Shower Filters
- 2014 NSF/ANSI 401 Emerging Compounds
- 2018 NSF/ANSI 244 Supplemental Microbiological

Municipal Standards

2015 NSF/ANSI 419 Public Drinking Water Equipment -EPA LT2 Rule for Cyst Reduction

Drinking Water Treatment Unit Protocols

2003	NSF P231	Microbiological Water Purifiers
2012	NSF P72	Iodine Radioisotope Reduction (JWPA)
2015	NSF P477	Microcystin Reduction (now in Std 53)
2016	NSF P473	<u>PFOS/PFOA Reduction (now in Std 53)</u>

Upcoming:

2018	NSF	P343

2018 NSF P376

2019 NSF 459

Air to water generator technology Filters for Health care settings (shower and handwashing) - Legionella Biofilm

What is Conformity Assessment?

Conformity Assessment

Demonstration that specified requirements relating to a product, process, system, person or body **are fulfilled**



ISO/IEC 17000:2004

Conformity Assessment – Vocabulary and general principles Why Perform Conformity Assessment?

WTO Technical Barriers to Trade Agreement recognizes "the important contribution that...conformity assessment schemes can make...by improving efficiency of production and facilitating the conduct of international trade"

Benefits of Conformity Assessment and Standardization

- Facilitates trade globally and eliminates barriers
- Builds confidence and reduces risk for customers
- Give confidence that products requirements are met
- Benefits the user as they can make better purchase decisions
- Benefits the supplier as products may more easily gain market acceptance



Certification Process Overview



Material Safety Overview

- Material Safety testing is a standard requirement for every certified product.
- Testing to assure against leaching of contaminants above the pass/fail criteria.
- Testing is conducted over 3 days with samples collected after each 24 hours, then compounded and analyzed.



Structural Integrity Overview

- Structural Integrity is a minimum requirement for pressure bearing systems and components.
- Testing to assure against leaking or other consequences while under pressure.



Structural Integrity Overview

- Two tests, hydrostatic and cyclic
 - Hydrostatic tests the system or component's ability to hold pressure over time.
 - Cyclic tests the system or component's ability to withstand the water hammer effect over time.
- Pressure and number of cycles changes based on specific system specifications.



- Testing conducted from 0 psi to 50-150 psi.
- Testing conducted to either 10,000 or 100,000 cycles.
- Test units are flushed to purge air.
- Pressure increased to maximum pressure in 1 second or longer.
- Pressure in test units is returned to 2 psi before next cycle begins.
- Test units checked for leaks throughout testing.

Hydrostatic Testing



- Testing conducted between 1.5 and 3 times the maximum working pressure.
 - Or between 150 300psi if this value is higher than would be achieved with the system pressure rating.
- Test units are flushed to purge air.
- Pressure raised at constant rate to reach test pressure within 5 minutes.
- Test pressure maintained for 15 minutes and units inspected for leaks.

Contaminants

- Systems designed for reduction of specific substances that may be present in drinking water supplies (public or private)
- Supplies considered to be microbiologically safe and of known quality
 - Microbiologically Unsafe Water
 - Known to contain disease-causing bacteria, viruses or other microbiological agents;
 - Determined unsafe by an appropriate health or regulatory agency



Mandatory Testing for Elective Claims



- Contaminant Reduction Claims
 - Claims are specific to:
 - Capability of device
 - Manufacturer's wishes
 - Certified systems must have at least one contaminant reduction claim (components do not).



Testing Parameters



- All tests run in duplicate (test two units) except for POE systems under NSF/ANSI 42.
 - Prototypes allowed, as long as filtration element is in production configuration.
 - Line Pressure of 60 psi
 - Flow Control:
 - Allowed under NSF/ANSI 42



- Tests are usually run 16 hours per day.
 - Can depend on sampling points.
 - Units are cycled on/off for 15 to 40 minute cycles at a 50/50 or 10/90 rate

Testing Parameters

Standard 42

• Test to 100% capacity

Standard 53 (health effects)

- Test to 200% capacity without Performance Indication Device (PID)
- Test to 120% capacity with PID

Use of the NSF Mark

Component vs System Listing

- Component Listed products cannot bear the mark on the product, only packaging
 - Avoid confusion over use in a non-certified system
- System Listed products require the use of the mark
 - Have passed at least 1 elective performance claim



Thank you!

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