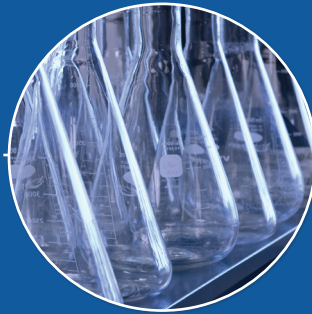




*NSF International Standard /
American National Standard*

NSF/ANSI 50 - 2017

**Equipment and Chemicals
for Swimming Pools, Spas,
Hot Tubs and Other
Recreational Water Facilities**



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NSF International Standard/
American National Standard
**Equipment and chemicals
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Evaluation criteria for materials, components,
products, equipment, and systems for use at
recreational water facilities

Standard Developer

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Foreword²

The purpose of this Standard is to establish minimum materials, design and construction, and performance requirements for components, products, equipment and systems, related to public and residential recreational water facility operation.

If a value for measurement is followed by a value in other units in parenthesis, the second value may be only approximate. The first stated value is the requirement.

This edition of the Standard contains the following revisions:

Issue 111

Language regarding UV disinfection was aligned with that in the MAHC.

Issue 116

Normative references were updated.

Issue 126

Language regarding shelf life testing for manufacturers of water quality testing devices was revised.

Issue 128

This issue updated the WQTD testing sections of the Standard.

Issue 129

Flow meter language was revised to reflect consideration of the devices being used in applications where specific gravity is greater than 1.0.

Issue 131

The title and scope were updated to include chemicals.

Issue 132

Specific criteria for metal contaminant limits were added.

Issue 134

Language adding clarity to effective size and uniformity coefficient calculations was incorporated.

Issue 135

Language regarding chemical feeders was revised.

Issue 136

This issue revised language regarding formulation testing in Annex 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.

Issue 137

Exposure assumptions were updated in Annex R.

This Standard was developed by the NSF Joint Committee on Recreational Water Facilities using the consensus process described by the American National Standards Institute.

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 Recreational Water Facilities at standards@nsf.org. or c/o NSF International, Standards Department, PO Box 130140, Ann Arbor, MI 48113-0140, USA.

NSF/ANSI Standard

Equipment and Chemicals for Swimming Pools, Spas, Hot Tubs, and other Recreational Water Facilities

Evaluation criteria for materials, components, products, equipment, and systems for use at recreational water facilities

1 General

1.1 Scope

This Standard covers materials, chemicals, components, products, equipment and systems, related to public and residential recreational water facility operation.

1.2 Variations in design and operation

A component varying in design and/or operation may qualify under this Standard. Appropriate tests and investigations shall indicate that the component performs as well as components conforming to this Standard. Such components shall meet the requirements for materials, finishes, and construction in this Standard.

1.3 Alternate materials

If specific materials are mentioned, other materials equally satisfactory from the standpoint of public health may be permitted.

1.4 Standard review

A complete review of this Standard shall be conducted at least every five years. These reviews shall be conducted by representatives from the industry, public health, and user groups, or agencies of the NSF Joint Committee on Recreational Water Facilities.

1.5 Normative references

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

21 CFR Chapter 1. *Code of Federal Regulations*³

21 CFR Part 58, Subchapter A. *Code of Federal Regulations*³

³ USFDA. 5600 Fishers Lane, Rockville, MD 20857 <www.fda.gov>

40 CFR Part 136. *Guidelines Establishing Test Procedures for the Analysis of Pollutants*⁴

40 CFR Part 141. *National Primary Drinking Water Regulations*⁴

40 CFR Part 143. *National Secondary Drinking Water Regulations*⁴

ASME, *Boiler and Pressure Vessel Code. 2017*⁵

ANSI/APSP–16 2011. *Standard Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs*⁶

ANSI/ASME A112.3.1 (2007). *Stainless Steel Drainage Systems for Sanitary DWV, Storm, and Vacuum Applications Above and Below Ground.*⁵

ANSI/ASME A112.6.3 – 2016 (R2007). *Floor and Trench Drains*⁵

ANSI/ASME A112.6.4 – 2003 (R2012). *Roof, Deck and Balcony Drains*⁵

ANSI/ASME A112.19.17 (2010). *Safety Vacuum Release Systems (SVRS) for Residential & Commercial Swimming Pool, Spa, Hot Tub, Wading Pool Suction System*⁵

ANSI/ASME B40.100 – 2005. *Pressure Gauge and Gauge Attachments*⁵

ANSI/IAPMO Z124.7-2013. *Prefabricated Plastic Spa Shells*⁷

ANSI/IAPMO Z124.1.2 – 2005. *Plastic Bathtub and Shower Units*⁵

ANSI/IAPMO Z124.1.2 – 2005. *Plastic Bathtub and Shower Units*⁷

ANSI/IAPMO Z1033-2015. *Flexible PVC Hoses and Tubing for Pools, Hot Tubs, Spas, and Jetted Bathtubs*⁷

ANSI/UL 1081 2016, 7th. *Swimming Pools, Pumps, Filters and Chlorinators*⁸

ANSI/UL 1261 2016, 6th. *Electric Water Heaters for Pools and Tubs*⁸

ANSI/UL 1563 2009. *Standard for Electric Hot Tub, Spas and Associated Equipment*⁸

ANSI/UL 2017 2011. *General Purpose Signaling Devices and Systems*⁸

APHA, *Standard Methods for the Examination of Water and Wastewater*, 23rd edition⁹

ASTM C136/C136M-2014: *Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates, 2004*¹⁰

ASTM D1894 – (2014). *Standard Test Method for Static and Kinetic Coefficients of Plastic Film and Sheeting*¹⁰

⁴ USEPA Environmental Monitoring and Support Laboratory. Cincinnati, OH 45268 <www.epa.gov>

⁵ ASME. 3 Park Avenue, New York, NY 10016-5990 <www.asme.org>

⁶ Association of Pool and Spa Professionals. 2111 Eisenhower Avenue, Alexandria, VA 22314 <www.apsp.org>

⁷ IAPMO. 5001 E. Philadelphia St., Ontario, CA 91761 <www.iapmo.org>

⁸ UL – Underwriters Laboratory. 2600 N.W. Lake Rd., Camas, WA 98607-8542 <www.ul.com>

⁹ American Public Health Association. 800 I Street NW, Washington, DC 20001 <www.APHS.org>

¹⁰ ASTM International. 100 Barr Harbor Drive, West Conshohocken, PA 19428-2859 <www.ASTM.org>

ASTM D2464 – (2013). *Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80*¹⁰

ASTM D2466 – (2015). *Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40*¹⁰

ASTM D2467 – (2006). *Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80*¹⁰

ASTM, D3739 – 2010. *Standard Practice for Calculation and Adjustment of the Langelier Saturation Index for Reverse Osmosis*¹⁰

ASTM E11 – 2009. *Standard Specification for Wire Cloth Sieves for Testing Purposes, 2009*¹⁰

ASTM F1346-03. *Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas, and Hot Tubs*¹⁰

ASTM F2049-11 (2017) *Standard Guide for Fences/Barriers for Public, Commercial and Multi-Family Residential Use Outdoor Play Areas*¹⁰

ASTM F2208-2014. *Standard Safety Specification for Residential Pool Alarms*¹⁰

ASTM F2387 (2004). *Standard Specification for Manufactured Safety Vacuum Release Systems (SVRS) for Swimming Pools, Spas and Hot Tub*¹⁰

ASTM F2409-10 (2016). *Standard Guide for Fences for Non-Residential Outdoor Swimming Pools, Hot Tubs, and Spas*¹⁰

ASTM F2699-08 (2013) *Standard Guide for Fences for Commercial and Public Outdoor Water Spray/Play Areas*¹⁰

ASTM G154-16: *Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials*¹⁰

CEC-400-2016-002 Title 20. *California Energy Commission 2009 Appliance Efficiency Regulations*¹¹

CSA B45.5/IAPMO Z124.1.2 – 2005 2011. *Plastic Bathtub and Shower Units*⁷

DVGW 2006. *UV disinfection devices for drinking water supply—requirements and testing. DVGW W294-1, -2, and -3.*¹²

IAPMO, PSZ1033-2013c. *Flexible PVC Hose for Pools, Hot Tubs, Spa, and Jetted Bathtubs*⁷

NFPA 70, Article 30. 2017. *National Electrical Code (NEC)*¹³

NSF/ANSI 14. *Plastics piping system components and related materials*

NSF/ANSI 42. *Drinking water treatment units – Aesthetic effects*

NSF/ANSI 51. *Food equipment materials*

¹¹ California Energy Commission. 1516 Ninth St., Sacramento, CA 95814 <www.energy.ca.gov>

¹² German Gas and Water Management Union (DVGW). Bonn, Germany <www.dvgw.de/english-pages/>

¹³ National Fire Protection Association. 1 Batterymarch Park, Quincy, MA 02269 <www.NFPA.org>

NSF/ANSI 60. *Drinking water treatment chemicals – Health effects*

NSF/ANSI 61. *Drinking water system components – Health effects*

NSF/EPA ETV, *Generic Protocol for Development of Test / Quality Assurance Plans for Ultraviolet (UV) Reactors*

ÖNORM M 5873-1 *Plants for the disinfection of water using ultraviolet radiation - Requirements and testing - Low pressure mercury lamp plants, 2001*¹⁴

SAE Steel Numbering System¹⁵

USEPA, 1993. *Methods for the Determination of Inorganic Substances in Environmental Samples*¹⁶

USEPA, 1990. *Methods for the Determination of Organic Compounds in Drinking Water Supplement*¹⁶

USEPA-600/4-79-020. *Methods for the Chemical Analysis of Water and Wastes*, March 1983¹⁶

USEPA *Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule*, November 2006¹⁶

2 Definitions

2.1 accessible: Fabricated to be exposed for cleaning and inspection using simple tools (screwdriver, pliers, open-end wrench, etc.).

2.2 accuracy: The nearness of a measurement to the accepted or true value.¹⁷ The accuracy is expressed as a range, about the true value, in which a measurement occurs (i.e., ± 0.5 ppm). It can also be expressed as the percent recovery of a known amount of analyte in a determination of the analyte (i.e., 103.5%).

2.3 agitation: Mechanical or manual movement to dislodge filter aid and dirt from the filter element.

2.4 air assist backwash: A compression of air in the filter effluent chamber using an air compressor or water pressure from the recirculating pump. When released, it rapidly decompresses and forces water in the filter tank through the elements in reverse direction to dislodge the filter aid and accumulated dirt and carry them to waste.

2.5 alternate sand-type media: Granular material(s) specified to be used instead of sand in a sand-type filter.

2.6 amps: The current, in amperes, under the motor data plate horsepower at rated volts.

2.7 analyte: Parameter that is a subject of the water analysis such as pH or free chlorine.

2.8 automated controller: A system of at least one chemical probe, a controller, and auxiliary or integrated component, that senses the level of one or more swimming pool or spa / hot tub water parameters and provides a signal to other equipment to maintain the parameter(s) within a user-established range.

¹⁴ Beuth Verlaq GmbH. 10772 Berlin, Germany <www.beuth.de/langanzeige/OENORM-5873-1/en/41105768.html>

¹⁵ SAE International. 400 Commonwealth Drive, Warrendale, PA 15096-001 <www.sae.org>

¹⁶ Superintendent of Documents, U.S. Government Printing Office. Washington, DC 20402 <www.gpo.gov>

¹⁷ Skoog D.A., West D.M., *Fundamentals of Analytical Chemistry*, 2nd ed., Holt Rinehart and Winston, Inc. 1969, p.26