

New Lead Standards for Drinking Water Products

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Topics

- Introduction to NSF
- Lead Leaching
- NSF 61
- Safe Drinking Water Act Revision
- Lead Content Standards
 - NSF 61-G
 - NSF 372
- Marking



NSF = National Sanitation Foundation

- Founded 1944
- University of Michigan
- Today independent not-for profit
- Standards Development
- Food, Water, Public Health
- Product Certification
- Food Safety
- Drinking Water Safety
- Wastewater



NSF Standards Development Process



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NSF/ANSI Standard 61- Scope

- Pipes and Related Products (pipe, hose, fittings)
- Protective and Barrier Materials (cements/coatings)
- Joining and Sealing Materials (gaskets, adhesives, lubricants, solvent cements)
- Process Media (activated carbon, filter media)
- Mechanical Devices (water meters, valves, filters)
- Mechanical Plumbing Devices (faucets, drinking fountains, and components)

Standard 61 Requirements

1. What contaminants migrate or extract into water?
2. Are they below maximum allowable level?

- Formulation disclosure by manufacturer.
- Formulation review of product.
- Extract contaminants from product into water.
- Analyze extraction water for contaminants.
- Perform toxicology evaluation of contaminants.

NSF/ANSI 61

Drinking Water System Components

– Health Effects

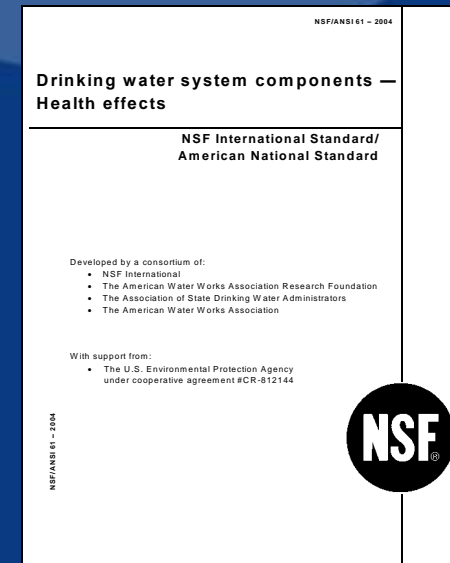
Acceptance criteria ...

Regulated contaminants:

Includes USEPA and Health Canada regulated contaminants and EPA's health advisories.

Non-regulated contaminants:

More than 600 risk values have been set by NSF to address leaching of chemicals from materials that contact drinking water. Utilizing Annex A Toxicology Review and Evaluation Procedures.



Pb acceptance criteria

The lower acceptance criteria resides in Annex F of Standard 61 with an implementation date of July 1, 2012.

Current Criteria		New Criteria	
TAC	15 ug/L	TAC	5.0 ug/L
SPAC	1.5 ug/L	SPAC	0.50 ug/L
Q	11 ug	Q	5 ug (3 ug) ¹
¹ – Supply stops, flexible plumbing connectors, and miscellaneous components			

NSF 61 lead content restrictions

3.5 Restriction on use of lead containing materials

There shall be no lead added as an intentional ingredient in any product, component, or material submitted for evaluation to this standard, with the following exceptions:

- Brass or bronze meeting the definition of “lead free” under the specific provisions of the Safe Drinking Water Act of the United States.
- Trace amounts required for operation of products used to monitor the characteristics of drinking water, such as the glass membranes used with some selective ion or pH electrodes.
- Materials of components with a diluted surface area less than or equal to $0.0001 \text{ in}^2/\text{L}$.

Note – To the maximum extent possible, lead should not be added as an intentional in any product covered by the scope of this standard. The exception above relative to the diluted surface area has only been included in recognition of formulation information exemption for applications with this condition.

Safe Drinking Water Act Revision

- S3874-2010
- Redefines Lead Free
 - a weighted average of 0.25% for pipe, pipe or plumbing fitting or fixture
 - 0.2% solders and flux
- Effective Date January 4, 2014

Safe Drinking Water Act Revision- Exemptions

- pipes, pipe fittings, plumbing fittings, or fixtures, including backflow preventers, that are used exclusively for non-potable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not anticipated to be used for human consumption

Safe Drinking Water Act Revision- Exemptions

- toilets, bidets, urinals, fill valves, flushometer valves, tub fillers, shower valves,
- service saddles, or water distribution main gate valves that are 2 inches in diameter or larger

NSF/ANSI 372 Drinking Water System Components- Lead Content

- Scope: Any drinking water system component that conveys or dispenses water for human consumption through drinking or cooking.
- Basic Requirements originated from California Health and Safety Code
- First standardized in optional Annex G of NSF-61.
- Now Annex G of NSF-61 references NSF 372.

NSF 61 evaluates all potential contaminants from drinking water products

NSF 61-G evaluates potential contaminants and weighted average lead content of $\leq 0.25\%$

NSF 372 evaluates products for a weighted average lead content of $\leq 0.25\%$

Lead Content Calculation

Core requirement:

Weighted average lead content $\leq 0.25\%$

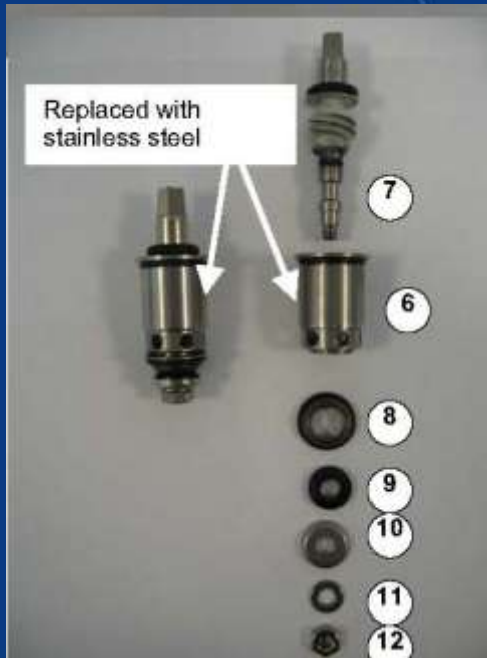
Formula:

$$WLC = \sum_{c=1}^n \left(LC_c \times \left[\frac{WSA_c}{\sum_{t=1}^n WSA_t} \right] \right)$$

where;

- WLC = weighted average lead content of product
- LC = percentage lead content of component
- WSA = wetted surface area of component
- n = number of wetted components in product

Example faucet



Example weighted average lead content calculation

Component No.	Wetted surface area ¹ (total = 61.94 in ²)	% wetted surface area (total = 100%)	% lead content	Contributing % lead
1	17.31	27.95	0.05	0.01
2	1.15	1.85	2.86	0.05
3	4.99	8.05	0.23	0.02
4	18.25	29.46	0.05	0.01
5	11.14	17.98	0	0.00
6	4.02	6.49	0	0.00
7	1.09	1.75	1.30	0.02
8	0.54	0.87	0	0.00
9	0.91	1.48	2.54	0.04
10	0.76	1.23	0	0.00
11	1.02	1.64	2.54	0.04
12	0.35	0.56	2.54	0.01
13	0.43	0.69	2.54	0.02

Weighted average lead content = **0.23%**
(in compliance)

Are Coatings Permitted?

**When used evaluate
the lead content of
substrate**

**Acid Washed products
evaluated based on
untreated substrate**



How does NSF verify lead content?

1. Manufacturer disclosure
2. Metal certification
3. Factory inspection
4. Product testing

Production Facility Inspection

- Perform production area walk-through.
- Review production processes & quality control program.
- Identify sources of potential contamination.
- Verify product formulations and sources of materials.
- Select samples for testing.
- Review record system and view key records.
- Verifying Calibration of Equipment.
- Corrective Action Report

Lead content screening by XRF

- Single component products (e.g. fittings) can be analyzed directly.
- Multi-components products are disassembled
- Either may require cutting to expose surface areas



Material dissolution and lead content by ICPMS

- Sample of the part is acquired by coring.
- Measured portion of shaving taken for test.
- Material is first placed into solution. For many materials this simply requires addition of acid.



Material dissolution and lead content by ICPMS

- Dissolved solution is then diluted to known volume with DI water.
- Lead content of solution is then determined by ICPMS and findings related back to the lead percent in part sampled.



Product Failures

- If NSF certified products fail monitoring tests, production is put on hold.
- Manufacturer must find source problem, correct
- NSF retests product.
- Non-compliant product is destroyed.
- If public health concern, product can be recalled and public notice can be given.

Marking:

Standard 61 Certified	Standard 61 & Low Lead Certified	Low Lead Certified
NSF [®] - 61 NSF [®] pw	NSF [®] - 61-G NSF [®] pw-G	NSF [®] ≤ 0.25% Pb NSF [®] - 372

NSF 372: Drinking Water System Components – Lead Content

Are the Annex G Certification marks going away?

- No, NSF will continue to offer and support “NSF-61G” or “NSF pw-G” marking on products as long as it is of value.
- It is anticipated that all drinking water products will continue to be required to meet both NSF-61 and low lead requirements, so this marking will continue to be predominant.

Thanks....!

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