



MEMORANDUM

TO: Joint Committee on Drinking Water Additives – System Components

FROM: France Lemieux, Chair of the Joint Committee

DATE: July 29, 2020

SUBJECT: Proposed revision to NSF/ANSI 372 – *Drinking Water System Components – Lead Content* (372i5r1)

Revision 1 of NSF/ANSI 372, issue 5 is being forwarded to the Joint Committee for consideration. Please review the proposal and **submit your ballot by August 19, 2020** via the NSF Online Workspace <www.standards.nsf.org>.

When adding comments, please identify the section number/name for your comment and add all comments under one comment number where possible. If you need additional space, please upload a word or pdf version of your comments online via the browse function.

Purpose

The proposed revision updates applicable normative references under Section 1.3 of NSF/ANSI 372 and will designate it as a National Standard of Canada (NSC).

Background

NSF/ANSI 372, which was last published in 2016, is approaching its 5-year deadline for ANSI review and publication. As a result, the reference to ASTM E29-08: Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications, is being updated to specify the most current published edition (reaffirmed in 2019).

In addition, NSF/ANSI 372 is being submitted to the Standards Council of Canada for designation as a National Standard of Canada (NSC).

If you have any questions about the technical content of the ballot, you may contact me in care of:

A handwritten signature in blue ink, appearing to read "F. Lemieux".

France Lemieux
Chair, Joint Committee on Drinking Water Additives – System Components
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[Note – the changes are seen below using strikeout for removal of old text and gray highlights to show the suggested text. ONLY the highlighted text is within the scope of this ballot.]

NSF/ANSI/CAN Standard for Drinking Water Additives

Drinking water system components - Lead content

1 Purpose, scope, and normative references

1.1 Purpose

This standard establishes procedures for the determination of lead content based on the wetted surface areas of products.

1.2 Scope

This standard applies to any drinking water system component that conveys or dispenses water for human consumption through drinking or cooking.

1.3 Normative references

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

ASTM E29-13(2019). *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*¹

ASTM E255-07 (2014). *Standard Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition*³

EPA SW 846 *Test Methods for Evaluating Solid Waste, Physical Chemical Methods, Method 3050 B – Acid Digestion of Sediments, Sludges, and Soils*²

EPA SW846, *Method 3052 - Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices*⁴

EPA SW 846, *Method 6010C – Inductively Coupled Plasma-Atomic Emission Spectrometry*⁴

Safe Drinking Water Act²

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2859 <www.astm.org>.

² Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268 <www.epa.gov>.

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1.4 Significant figures

For determining conformance with the specifications in this standard, the Rounding Method in ASTM E29¹ shall be used.

2 Definitions

2.1 coating: A covering or barrier applied to a substrate by electro, chemical deposition or via mechanical adhesion (paint).

2.2 liner: A barrier component which is mechanically attached and sealed to prevent water contact with another component. (Example: a tubular or cast brass spout with a thermoplastic sleeve inserted inside and sealed with an o-ring or other sealing material, such that water does not come into contact with the brass spout material.)

3 General requirements

Solders and fluxes shall have a lead content less than or equal to 0.2%. All other products shall have a weighted average lead content less than or equal to 0.25% based on the average of their wetted surface areas.

3.1 All components \leq 0.25%

If each component of a product has a wetted surface with a lead content of not more than 0.25%, then the product is considered compliant and no further evaluation is required.

3.2 Any components $>$ 0.25%

If any wetted components of a product has a surface area with a lead content of more than 0.25% lead, then the weighted average lead content shall be calculated according to section 4 to determine compliance.

3.3 Restriction on the use of lead containing materials

There shall be no lead added as an intentional ingredient in any product, component, material, or their coatings submitted for evaluation to this standard with the exception of brass or bronze meeting the definition of “lead free” under the specific provisions of the Safe Drinking Water Act² of the United States.

4 Weighted average lead content calculation

The weighted average lead content of the product shall be calculated using the surface area and lead content information established under section 4.1. For internal NPT (pipe) threads, engagement of male components into female threads will assume that 25% of the length of the female thread remains exposed as wetted surface area.

All of the wetted surfaces are to be included in the weighted average lead content calculation, not just those surfaces that contain lead.

The results of the weighted average lead calculation shall be rounded to two decimal places prior to determination of compliance.

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4.1 Component surface areas and lead content

The following information shall be established to determine the weighted average lead content:

- a list of all components and materials and their corresponding surface areas that come into direct contact with water;
- the maximum lead content of each material as specified by reference to a national or international standardized material specification (e.g. UNS copper alloy specification). If the material is not formulated to a national or international standardized specification, the manufacturers material specification shall be used.

4.2 Formula for determining weighted average lead content

The following formula shall be used when calculating the weighted average lead content of products:

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

where;

- WLC = weighted average lead content of product
- LC_c = maximum lead content of the c^{th} component
- WSA_c = wetted surface area of the c^{th} component
- WSA_t = total wetted surface area of all components
- n = number of wetted components in product

NOTE — An example calculation of the weighted average lead content of a product is provided in Annex A.

5 Percentage lead content of water contact surfaces

The maximum lead content of the material specification used to produce wetted components shall be used to determine compliance with this standard. When the actual percent of lead in the chemical composition of individual components is to be determined, the procedures in 7 shall be followed.

5.1 Liners

When lead-bearing surfaces have been excluded from water contact by use of a rigid liner (e.g. plastic sleeve) sealed with a permanent barrier, the lead content of the liner shall be used.

5.2 Coatings

When coatings are used, the lead content of the coated substrate shall be used in the calculation of weighted average lead content.

5.3 Lead removal technologies

For components where the wetted surface areas have been treated with a lead removal technology, the percent lead composition shall be based on the material used to manufacture the component prior to application of the surface treatment.

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6 Lead content verification testing

6.1 Lead content testing

Lead content verification testing shall be performed on representative product, materials, or components using the methodologies in 7 and shall at a minimum include screening of the following:

- a) Materials with lead content specifications greater than zero.
- b) Any materials, including coatings and their substrates, with wetted surfaces areas in excess of 10% of the wetted surface area of the product.

NOTE – Although lead content verification testing has not been required on all components, the above criteria has been selected to represent those with the greatest potential for containing lead and those with the greatest potential for significant impact if its material contains lead as an impurity.

The results of testing shall be determined acceptable, if:

- the lead content is found to be less than or equal to the material specification used to determine product compliance with this standard; or
- the weighted average lead content of the product is in compliance with the requirements of this standard when the results of testing are used in lieu of the material specification.

7 Analytical procedures for determining percent lead content of materials

7.1 Lead content screening

Screening may be used to check the lead content in the following cases, but not limited to:

- Screening of components where no lead is expected (e.g. certain plastics, elastomers, coatings);
- Screening of components where lead is expected for comparison to material specification information; and
- Initial screening of components to identify and prioritize items for further testing.

XRF (X-Ray Fluorescence), OES (Optical Emission Spectroscopy) Arc /Spark, SEM (Scanning Electron Microscopy) /EDS (Energy Dispersive Spectrometer) are acceptable methods for screening components, provided the instrument is calibrated to standard reference materials. Other applicable screening methods may be employed, provided that adequate performance can be demonstrated. The following should be taken into consideration with a screening method:

- Surfaces scanned should be clean, dry, and free of coating. Even slight overspray of coatings can significantly reduce lead content readings.
- Part finishes that remove surface lead, such as acid washes, will affect surface lead content readings and may affect the value of the screening analysis.

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- Part size, shape, and condition of the surface can impact reading. Area analyzed should be no smaller than the instrument observation window. Shapes, such as curved surfaces, should be minimized.
- Lower lead content parts may require longer read times and the average of several measurements (3 or more) with different orientation to produce accurate results.

When considering the points above the screening method may not be suitable for determining lead content, in which case the lead content shall be determined in accordance with 7.2

7.2 Lead content analysis of materials

7.2.1 Sampling of components

Samples from components can be obtained by various methods, such as drilling, turning, sawing, or milling. Where possible, blend material from a minimum of three areas taken at random locations across the part, so as to obtain a sample that is representative of the properties of the entire component. Care should be taken not to include coating materials in the sampled material. With the exception of very large parts, test pieces should be drilled or sawn completely through in order to avoid over- or under-representation of the center portion.

NOTE – Additional guidance on sampling of copper alloys is provided in ASTM E255: Standard Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition¹.

7.2.2 Sample preparation

Dissolve a minimum of 1.0 gram of sample in accordance with U. S. EPA SW-846² Method 3050B, Method 3052, or equivalent. Other applicable sample preparation methods may be employed, provided that adequate performance can be demonstrated for the analytes and matrices of interest.

7.2.3 Analysis

Analysis for metals should be performed, except as otherwise provided for herein, in accordance with currently accepted EPA SW-846² Method 6010C, or equivalent. Other applicable chemical analysis methods may be employed, provided that adequate performance can be demonstrated for the analytes and matrices of interest.

7.2.4 Quality control

Sample preparation and analysis procedures shall be validated for the analytes and matrices to be tested. All the quality assurance/quality control protocols and other requirements specified in the method being used shall be followed. If a specified protocol is not followed, a justification for the deviation shall be explicitly addressed.

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Informative Annex 1 ~~Annex A~~³
(Informational)

The information contained in this annex is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this annex 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.

Example weighted average lead content calculation

The following is an example of how this weighted average lead content calculation is conducted on a faucet with 13 wetted components.

1. Identify those components of the faucet that water comes into contact with during the normal operation (wetted components).
2. Use the maximum percentage of lead content within each component (supplied by the component manufacturer or supplier). Table 1, column 4 provides the maximum lead content for each of the wetted components.
3. Determine the percent of wetted surface area represented in each component using the part specifications.
 - a. The *wetted surface area* of each component that comes into direct contact with water is required under 3.1 (to be provided by the manufacturer). Table 1, column 2 shows the *wetted surface area* of the subject faucet.
 - b. Add the areas of the wetted surface for each component together: this is the *total wetted surface area of the faucet*.
 - c. For each component, determine the ratio of its wetted surface area to that of the total wetted surface area of the product.
4. Calculate the weighted average lead content of the faucet by totaling the percent lead contribution for the components that make up the wetted surface of the faucet (Table 1, column 5). For the faucet to be in compliance with requirements, this total must be no more than 0.25%.

³ ~~The information contained in this annex is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this annex 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.~~

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Table 1. Example of weighted average lead content calculations

1 Component No.	2 Wetted surface area ¹ (total = 61.96 in ²)	3 Ratio wetted surface area	4 % lead content	5 % lead Contribution
1	17.31	0.2794	0.05	0.0140
2	1.15	0.0186	2.86	0.0531
3	4.99	0.0805	0.23	0.0185
4	18.25	0.2945	0.05	0.0147
5	11.14	0.1798	0	-
6	4.02	0.0649	0	-
7	1.09	0.0176	1.30	0.0229
8	0.54	0.0087	0	-
9	0.91	0.0147	2.54	0.0373
10	0.76	0.0123	0	-
11	1.019	0.0164	2.54	0.0418
12	0.35	0.0056	2.54	0.0143
13	0.43	0.0069	2.54	0.0176
Total of contributing percent lead =				0.2342%
Weighted average lead content =				0.23% (in compliance)
NOTE – Calculated data for each component in columns 3 and 5 show in this table with four decimal places to increase readability. When the calculation is performed, rounding to two decimals is only performed on the final result.				