

Implications of NSF Std. 61 Changes and an Asset Management-Based Data Driven Protocol for Potable Water Coatings Selection

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ABSTRACT

The National Sanitation Foundation (NSF) has recently revised the NSF/ANSI/CAN Std. 61 “*Drinking Water System Components –Health Effects Standard*” resulting in the creation of a new standard, NSF/ANSI/CAN Std. 600 “*Health Effects Evaluation and Criteria for Chemicals in Drinking Water*”. This results in changes in potable water asset owners’ options for protective coating systems. As well, in June 2021 AWWA published a new revision of the AWWA D102-21 *Coating Steel Water-Storage Tanks*. Many owners fail to realize a protective coatings system is itself an asset, and asset management principles should be applied to the selection of a protective coating system.

This paper will review the changes in the NSF Std 61 and the implications for the coating systems. The coating systems for steel potable water storage tanks listed in the new AWWA D102-21 will be reviewed. The presentation will explain how asset management’s goals centred on life cycle costing will yield the longest service life, lowest life cycle cost and the most sustainable solution. An asset management-based data driven protocol is presented using a recent survey of case histories in North America, ASTM test data with a review of published papers offering service life estimates. Suggestions will be offered on procurement practices and specifications to ensure purchasing goals are aligned with sustainable solutions.

Key words: Potable water, NSF 61, NSF 600, steel water tanks, protective coatings, service life, life cycle costing

INTRODUCTION

Protective coatings are utilized for asset preservation on welded steel potable water tanks. The technology available to the Owner or Specifier is diverse and can be difficult to select the most sustainable solution. Data based service life assessment of the various coating options provides the best avenue for completing life cycle costing estimates for decision making.

Regulations on the design limitations of various coatings is a constantly changing aspect that must be researched and understood to ensure proper compliance.

Both of these aspects are discussed in this paper along with their logistic impacts.

CHANGES TO NSF/ANSI/CAN STANDARD 61

The recent revision and publication of NSF/ANSI/CAN 61 has resulted in the creation of **NSF/ANSI/CAN Standard 600: Health Effects Evaluation and Criteria for Chemicals in Drinking Water**. Notable changes include the removal of annexes A and D which reference the extractable limits, and the creation of a new reference standard NSF Standard 600 and the recognition of being regulation in the United States and Canada.

As stated by an NSF memo (4-10-2019)

“The new standard creates a single reference source for the toxicological review and evaluation procedures of treatment chemicals added to drinking water and **those substances imparted to drinking water through contact with drinking water systems components.**”

Starting January 1st, 2023, NSF Standard 61 will require NSF Standard 600's new significantly lower allowable extractable level for three commonly used solvents in potable water coatings. The three solvents impacted are xylene, toluene and ethylbenzene. All materials in contact with potable water in immersion and/or condensation, must meet these requirements. Certification of compliant materials will initially reference both NSF 61 and NSF 600.

The three extractables have been enforced in Ontario, Canada since 2003 due to aesthetic complaints from communities. In 2017, the Canadian government followed suit and updated the allowable concentrations in drinking water. These updated concentrations are reflected in the new NSF Std. 600.

Table 1: Updates to NSF 61's Material Extractables

Substance	CASRN	Previous Criteria			New NSF 61/600 Criteria		
		MCL ¹ /MAC ² or TAC ³ (mg/L)	SPAC ⁴ (mg/L)	STEL ⁵ (mg/L)	MCL/MAC or TAC (mg/L)	SPAC (mg/L)	STEL (mg/L)
Xylenes	All Isomers	10	1	--	0.09 (total)	0.009 (total)	--
Ethylbenzene	100-41-4	0.7	0.07	--	0.14	0.014	--
Toluene	108-88-3	1	0.1	--	0.06	0.006	--

¹ MCL = Maximum Concentration Limit

² MAC = Maximum Allowable Concentrations

³ TAC = Total Allowable Concentration

⁴ SPAC = Single Product Allowable Concentration

⁵ STEL = Short Term Exposure Limit

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These changes will impact a number of the available coating systems outlined in AWWA D102-21 as many of them contain large portions of these regulated compounds. It is expected that the industry will adjust through the use of different solvent combinations, high solids products and water-based technologies to ensure the extractable limits are met for these three solvents.

AWWA D102-21: COATING STEEL WATER STORAGE TANKS

American Water Works Association (AWWA) D102-21 Coating Steel Water-Storage Tanks is the industry standard for the use of coatings and linings for welded steel water tanks. The six (6) interior coating systems (ICS) and seven (7) exterior coating systems (OCS) are detailed in Tables 2 and 3 [1]. Little detail is provided in these standards to assist the decision maker in selecting the best long-term solution. Appendix Section A.1 does include this suggestion; “As an aid in selecting coating systems for a particular site, it is recommended that the purchaser establish the site-specific conditions of exposure and then conduct an economic evaluation of the several coating systems using life-cycle cost analysis techniques.”

Of the six (6) interior coating systems that are under the restrictions of NSF 61, four (4) of the coating systems contain solventated/low solids technologies. It is assumed that a portion of the available products that meet the system definitions will not meet the new NSF Std 61 extractables requirements.

Table 2: AWWA D102-21 Exterior Coating Systems

AWWA D102-21 Interior Coating System	Generic Description
ICS No. 1	Two (2) coat 2-component Solventated Epoxy system
ICS No. 2	Three (3) coat 2-component Solventated Epoxy system
ICS No. 3	One (1) or Two (2) coat: 2-component High Solids Epoxy system with an optional Zinc Rich Primer
ICS No. 4	One (1) coat: 100% Solids Aromatic Polyurethane system with an optional primer
ICS No. 5	Three (3) coat: 2-component Solventated Epoxy system with an Organic Zinc Rich Primer
ICS No. 6	Two (2) coat: 2-component Solventated Epoxy system with an Organic Zinc Rich Primer