Upcoming Changes to NSF Std. 61

PNWS Quarterly Webinar

May 20, 2021

presented by
Michelle Call

TNEMEC

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- Pre-design site visits to help determine the scope of a project (e.g. surface preparation and existing coating analysis)
- Specification assistance
- Questions during bidding phase
- Contractor vetting
- On-site technical assistance
- Project close out documentation

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t. 801-282-2327 **e.** ccc@tnemec.com

Michelle Call

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AGENDA

- Overview of NSF & Upcoming Changes
- Industry Impact
- AWWA D102
- Coating Systems
- Impact on Potable Water Facility Owners, and Specifiers

OVERVIEW: NSF Std Development & Implementation

Who's involved?

- **Health Canada**: Health Effects Study (2015)
- **NSF International**: Health Advisory Board of the National Sanitation Foundation
- **ANSI**: American National Standards Institute
- **SDWA:** Safe Drinking Water Act; includes maximum contaminate levels (MCL)
- **US EPA/State Primacy Agencies:** EPA delegates enforcement of SDWA
- **AWWA**: American Water Works Association
- **Potable Water Facilities Owners/Specifiers**

So, What's Changed with NSF/ANSI Std. 61?

New NSF/ANSI/CAN Standard 61/600

- **NSF/ANSI/CAN Standard 61: *Drinking Water System Components- Health Effects* -** revised 2018
- Published April 2019
- Effective Date: ***January 1, 2023***
- Removes Annexes A & D (extractables) from Std 61
- Created First Edition of *new reference* standard for extractables: **NSF/ANSI/CAN Std 600: *Health Effects Evaluation and Criteria for Chemicals in Drinking Water***
- Significantly Lowers MCL's
  - Xylene-Toluene-Ethylbenzene

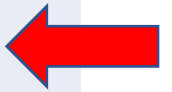
New NSF/ANSI/CAN Standard 600

- *"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."***

  NSF Memo 4-10-2019

Extraction Criteria Changes for NSF 61

		Previous Criteria			New NSF 61/600 Criteria		
Substance	CASRN	MCL/MAC or TAC (mg/L)	SPAC (mg/L)	STEL (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	--



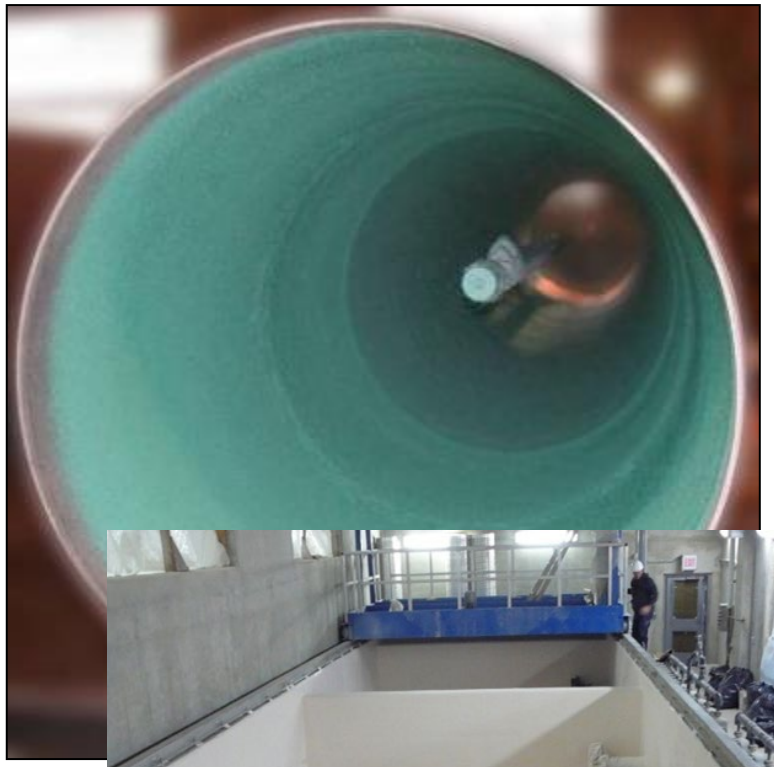
1/100th

Industry Impact

- NSF 61/600 **Effective: January 1, 2023**
- Will affect ALL coating manufacturers
- Current technologies that will meet new requirements:
  - MCU zinc-rich primers
  - Aromatic polyurethanes
  - 100% solids epoxies
- New technologies coming to meet new requirements

NSF Standard - Not Just For Tanks

- Applies to areas that come into DIRECT contact with potable water
- Tanks
- Pipes
- Fittings
- Valves
- Pumps
- Membrane Filter Tanks



NSF 600 PRODUCT DATASHEETS & LABELS

SPECIAL QUALIFICATIONS

Series 22-WH11 Off-White, 22-1218 Light Blue and 22-1255 Beige are certified by **NSF International** in accordance with **NSF/ANSI/CAN Std. 61** and the extraction requirements of **NSF/ANSI/CAN 600** and are qualified for use on tanks and reservoirs of 50 gallons (189 L) capacity or greater, pipes 10 inches (25.4 cm) diameter or greater, pumps one (1) inch (2.5 cm) in diameter or greater, valves 1/2 inch (1.2 cm) diameter or greater and fittings 1/2 inch (1.2 cm) in diameter or greater. Series 20HS, FC20HS, 91-H_2O, 94-H_2O, N140, N140F, V140 and V140F are the only Std. 61 certified primers for use with Series 22. Reference Tnemec's certified product listing at www.nsf.org for details on the maximum allowable DFT. Series 22 conforms to **AWWA C 210**.

NSF®

Certified to
NSF/ANSI/CAN 61
NSF/ANSI/CAN 600

WWW.NSF.ORG

Coatings - Tank

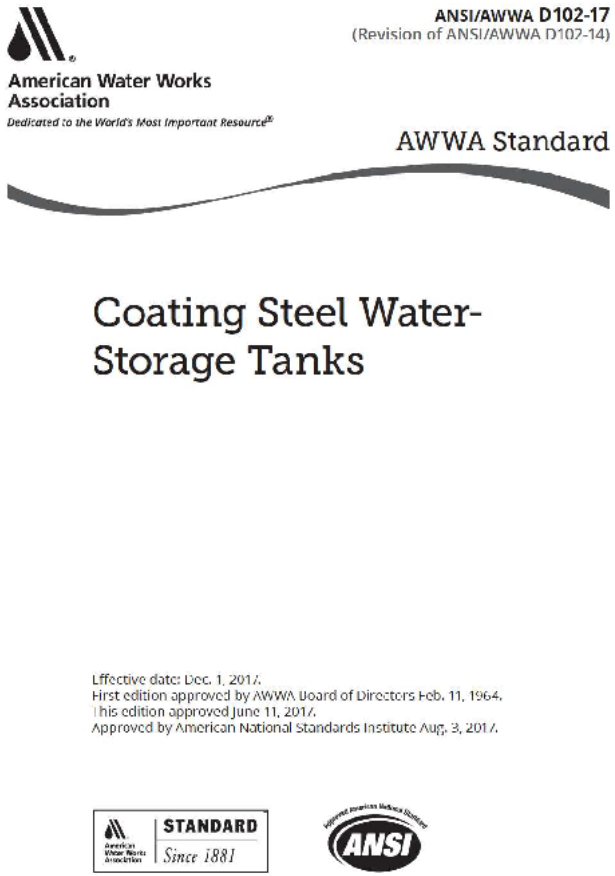
22 Epoxoline[1] [2]	>= 50 gal.
F098-0H20 Hydro-Zinc[2] [3]	>= 70,000 gal.
Series 1 Omnithane 1216 Greenish-Gray[17]	>= 1000 gal.
Series 1220 Tnemec Epoxy[2] [4]	>= 200 gal.
Series 141 Epoxoline[5]	>= 500 gal.
Series 20 Pota-Pox[20]	>= 6000 gal.
Series 215[2] [21]	>= 200 gal.
Series 215ML[2] [21]	>= 200 gal.
Series 406 Elastoshield[18]	>= 50,000 gal.
Series 91-H2O™ Hydro-Zinc™[2] [8]	>= 1500 gal.
Series 94-H2O Hydro Zinc[2] [7]	>= 400 gal.
Series FC20 Pota-Pox (Fast Cure)[9]	>= 6000 gal.
Series FC22 Epoxoline[2] [22]	>= 25 gal.
Series L140 Pota-Pox Plus[2] [10]	>= 50,000 gal.
Series L140F Pota-Pox Plus Fast Cure[2] [11]	>= 50,000 gal.
Series N140 Pota-Pox Plus[24]	>= 1,000 gal.
Series N140 Pota-Pox Plus[2] [23]	>= 500 gal.
Series N140F Pota-Pox Plus Fast Cure[25]	>= 1,000 gal.
V140 Pota-Pox Plus[15]	>= 50,000 gal.
V140F Pota-Pox Plus Fast Cure[16]	>= 50,000 gal.

[1] Colors: 1255 Beige, 1218 Blue, WH11 White
Number of Coats: 1-2
Maximum Field Use Dry Film Thickness (in mils): 50
Maximum Thinner: 5% Thinner #2
Recoat Cure Time and Temperature: 16 hours at 75°F
Final Cure Time and Temperature: 5 days at 75°F
Special Comments: Mix ratio of Part A to Part B is 1:1 by volume. Optional use with fiberglass flake S211-0220. The fiberglass flake can be added up to a rate of 1% by weight after the Parts A and B are mixed together. Certified for use as a primer or topcoat with any NSF Certified Tnemec coating system provided that both primer and topcoat meet their individual certified end uses.

[2] Meets the health effects requirements of NSF/ANSI/CAN 600 according to the requirements of NSF/ANSI/CAN 61 including the most current health effects criteria for xylenes, toluene, and ethylbenzene.

AWWA Std. D102

- Industry standard that describes coating systems for coating and recoating the **inside** and **outside** surfaces of steel tanks used for potable water storage
- Provides the **minimum requirements**, including materials, coating systems, surface preparation, and inspection and testing
- Industry technical reference for owners and engineers to specify and enforce
- Updated D102 Standard coming soon



AWWA D102-17 COATING SYSTEMS

INSIDE COATING SYSTEMS

ICS No. 1	2 coat epoxy system 8.0 mils minimum
ICS No. 2	3 coat epoxy system 12.0 mils minimum
ICS No. 3	1 coat system of 100% solids epoxy with optional zinc or epoxy primer 20.0 mils minimum
ICS No. 4	100% solids polyuréthane 25.0 mils minimum
ICS No. 5	3 coat system of organic zinc rich primer and 2 coats of epoxy coating 10.5 mils minimum
ICS No. 6	2 coat system of organic zinc rich primer and 1 coat of epoxy coating 12.5 mils minimum

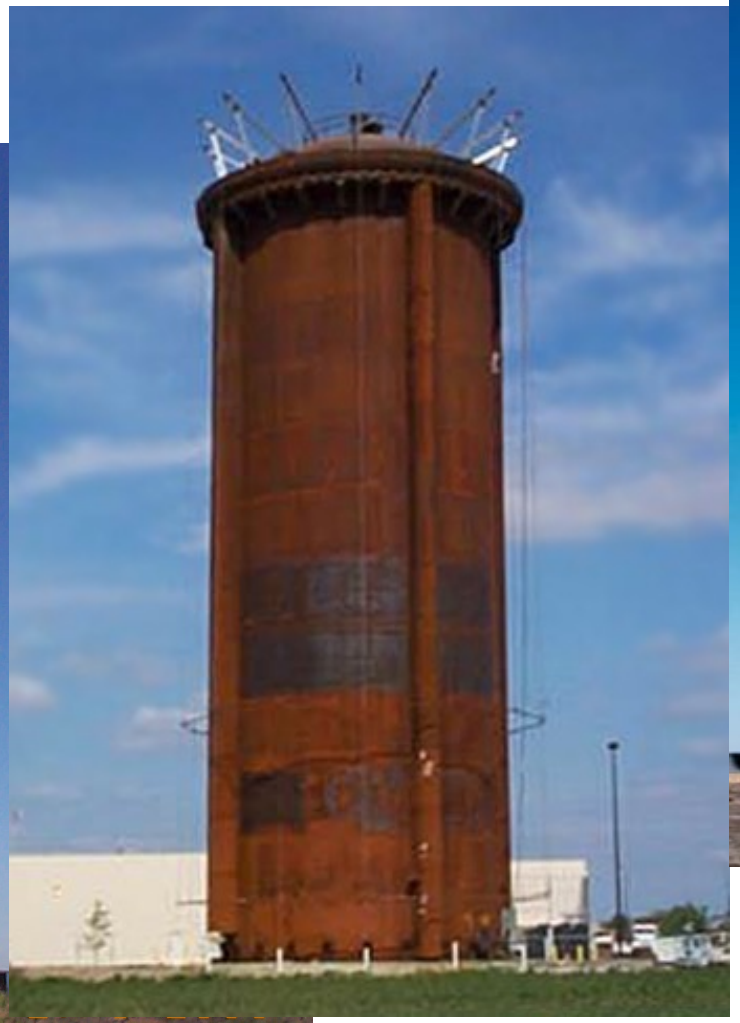
AWWA D102-17 COATING SYSTEMS

OUTSIDE COATING SYSTEMS

OCS No. 1	3 coat alkyd system (4 coat optional) 4.0 mils minimum
OCS No. 2	3 coat miceaous iron oxide moisture cured urethane system 7.0 mils minimum
OCS No. 3	3 coat water borne acrylic or acrylic emulsion system 6.5 mils minimum
OCS No. 4	3 coat zinc/aliphatic polyurethane/fluorourethane system 6.5 mils minimum
OCS No. 5	3 coat epoxy/epoxy/aliphatic polyurethane system 6.5 mils minimum
OCS No. 6	2 coat system of organic zinc rich primer and 1 coat of epoxy coating 6.5 mils minimum
OCS No. 7	3 coat waterbased epoxy/epoxy/polyurethane system 6.0 mils minimum

Let’s talk about steel tank coatings…

Let’s start with why?



What do you want the coatings to do?

1) **Corrosion Protection**
2) **Aesthetics**
3) **Immersion Service**
4) **Color & Gloss Retention**
5) **Abrasion Resistance**
6) **… ??**

Interior?

Exterior?

COATING SYSTEM

- A coating system consists of the following:
  - Surface Preparation
  - Primer Coat
  - Intermediate Coat (not always required)
  - Immersion Systems – Stripe Coat
  - Finish Coat
- Meets NSF 61/600 requirements
- Use AWWA D102 as guideline

How long do you want the coatings to last? (service life expectations)

How Do I Determine What to Specify ?

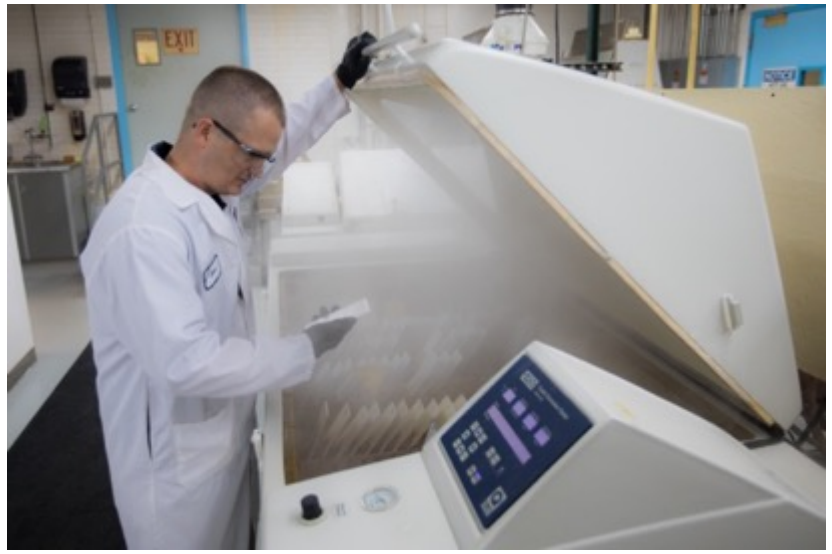
Standard ASTM Tests

ACCELERATED TESTING

- UV Exposure
- Sunlight Concentrator
  - EMMAQUA
- Salt Fog
- UV/Prohesion

ACCELERATED WEATHERING TESTS

- UV Exposure (QUV-A)
  - Closely simulates natural sun
  - Cycles Include:
    - 4 hours UV/4 hours condensation
    - 8 hours UV/4 hours condensation
- EMMAQUA
  - Equatorial mount with mirrors and water
  - Intensity of 8 suns
  - Tracks sun movement



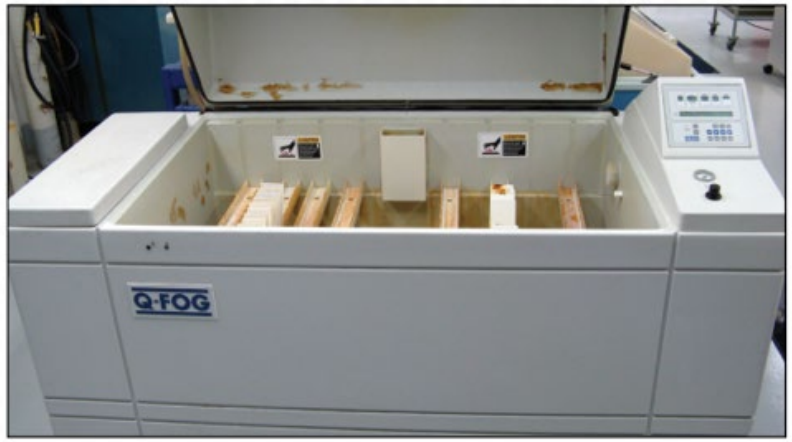
ASTM ACCELERATED TESTS

ASTM B 117

STANDARD PRACTICE FOR OPERATING SALT SPRAY (FOG) APPARATUS

ASTM G 85

STANDARD PRACTICE FOR MODIFIED SALT SPRAY (FOG) TESTING



ASTM D 5894

STANDARD PRACTICE FOR CYCLIC SALT FOG / UV EXPOSURE OF PAINTED METAL, (ALTERNATING EXPOSURES IN A FOG/ DRY CABINET AND A UV/CONDENSATION CABINET)

ASTM B 117

STANDARD PRACTICE FOR OPERATING SALT SPRAY (FOG) APPARATUS

HOW IT'S DONE

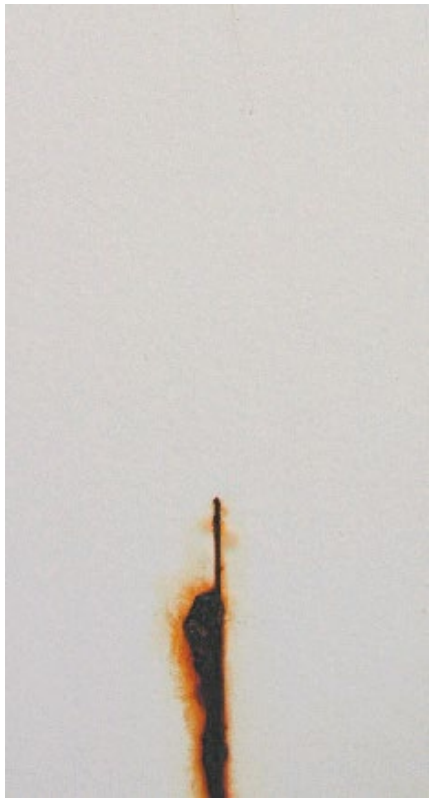
Coated panels are scribed to the substrate with a straight line or "X scribe" and placed in a cabinet that produces a continuous 100°F fog from a 5% sodium chloride solution, producing an environment of 100% humidity. Panels are periodically checked for rusting on the plane and at the scribe and compared to photographic standards for percent blistering and rust creepage at the scribe. It is not uncommon for some zinc/epoxy/urethane systems to last for 10,000 hours with little rust. Conversely, a thin film or inexpensive film may only survive 200 – 300 hours before extensive rusting/blistering.

LEVELS OF CORROSION PROTECTION

Testing Standard: Salt Fog (ASTM B 117)

Unprimed
32 hours

Alkyd
500 hours

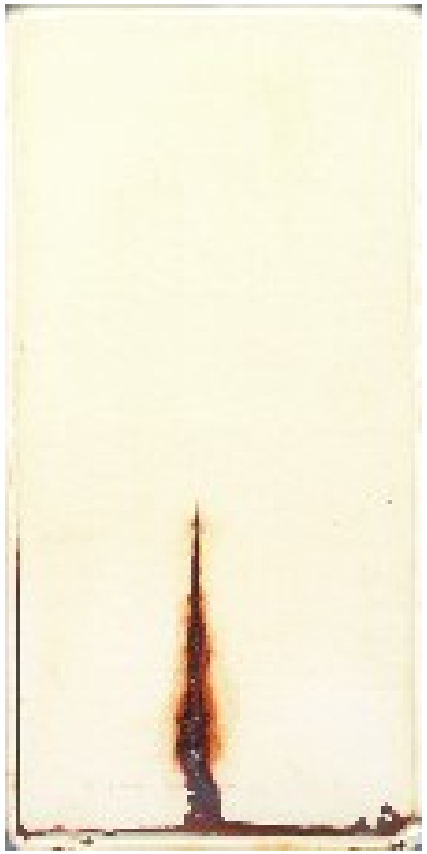


Epoxy
4,000 hours

Zinc-Rich Urethane
10,000 hours

ASTM B117 – SALT FOG – 10,000 hours

3 Coats Epoxy



1 Coat Zinc/
2 Coats Epoxy

ASTM G 85

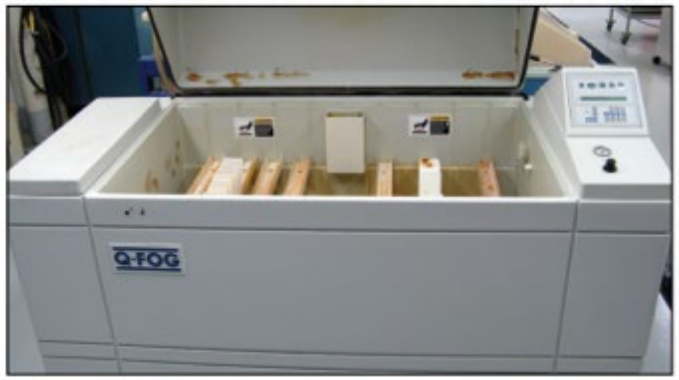
STANDARD PRACTICE FOR MODIFIED SALT SPRAY (FOG) TESTING

HOW IT'S DONE

Panels are placed in a cabinet that produces a vapor of 0.05% sodium chloride and 0.35% ammonium sulfate from solution. Panels are exposed to one hour vapor @ 75°F, then one hour dry @ 95°F. They are periodically checked for rusting and blistering at the scribe and usually run until failure.

ASTM D 5894

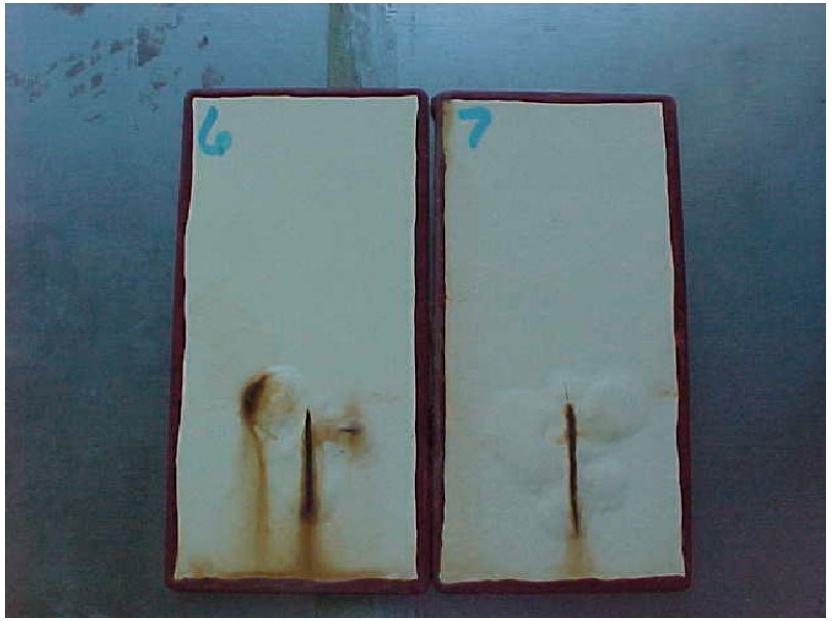
STANDARD PRACTICE FOR CYCLIC SALT FOG / UV EXPOSURE OF PAINTED METAL, (ALTERNATING EXPOSURES IN A FOG/ DRY CABINET AND A UV/CONDENSATION CABINET)



HOW IT'S DONE

Scribed panels are first placed in the QUV cabinet where they are exposed to cycles of four hours of UV exposure followed by four hours of condensation without UV light for one week. The panels are then transferred to the prohesion cabinet where they are exposed to one hour of an ambient temperature fog (0.05% sodium chloride and 0.35% ammonium sulfate) and one hour dry at 95°F (35°C) for a week. This two week operation represents one cycle, and panels are checked periodically for rust and blisters and usually run until failure.

SUMMARY OF DIFFERENCES



- **B117 Salt Fog**
  - 5% Sodium Chloride
  - 100ºF Fog
  - 100% Humidity
- **G85 Modified Salt Fog**
  - .05% Sodium Chloride, .35% Ammonium Sulfate
  - Cycle: 1 hr. 75ºF Vapor, 1 hr. 95ºF dry
- **D5894 Cyclic Salt Fog/UV**
  - 4 hrs. QUV, 4 hrs. condensation – 1 week
  - 1 hr. 75ºF Vapor, 1 hr. 95ºF dry – 1 week
    - .05% Sodium Chloride, .35% Ammonium Sulfate
  - Two weeks = 1 cycle

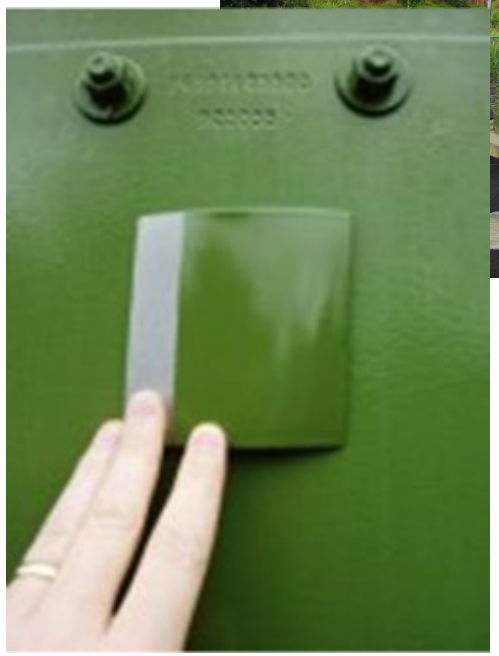
Product Performance Comparison

Performance Criteria	CDOT Section 522 Requirements	Series N69/73
Corrosion Weathering - ASTM D 5894	Minimum 6 cycles ASTM D 1654 Corrosion 8 or Higher ASTM D 714 Blistering 8 or Higher	No blistering, cracking, rusting or delamination after 7,000 hours (20.8 cycles) ASTM D 1654 Corrosion 10 ASTM D 714 Blistering 10
Impact - ASTM D 2794	Minimum 90 inch pounds	No visible cracking or delamination of film after 160 in lbs.
Adhesion - ASTM D 4541	Method B or E - Minimum 500 psi	No less than 2,040 psi
Abrasion—ASTM D 4060	Maximum 90 mg loss after 1,000 cycles CS10 or CS 17 wheel	No more than 96 mg loss after 1,000 cycles
Flexibility - ASTM D 522	Method B - Pass 180° over 3/8" mandrel	Pass - No cracking or delamination of film. No less than 39% elongation

Kakela Makai, HI

Service Life = 20 years

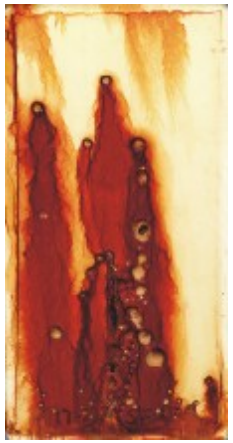
Estimated Service Life = 30 years



CASE HISTORIES

Zinc Rich Primer/Epoxy
22 Years
22,000 Tanks

ASTM B 117 Salt Fog
10,000 Hours



3c Epoxy

Zn/2c Epoxy

Impact on Potable Water Facility Owners/Specifiers

- NSF/ANSI/CAN Standards 61 & 600 Adopted & Finalized
- **Effective: 1/1/2023**
- Not Retroactive
- Will Require Updates to Specifications
- Will Require Updates to Maintenance Plans

SUMMARY

- NSF Std 61 & New Std 600 will impact coating systems
- Effective 1/1/2023
- Update and verify that your specifications for Water Tanks, Pipes, Valves, Fittings, and Pumps are compliant.

Questions?

- **Michelle Call**
- **mcall@tnemec.com**