



Trends in Codes & Standards

Vinyl 360

November 11, 2020

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Agenda

- Codes and Standards – background
- Acceptance of Plastics
- Harmonization of Standards
- Microplastics
- Lead
- Water Conservation
- Microbial Hazards in Plumbing Systems

Codes and Standards for Water Products

- Water pipe, equipment used by water utilities are regulated by USEPA and state drinking water regulations.
- Water pipe, fittings and fixtures in buildings are regulated by state, county or city plumbing codes.
- There are thousands of local plumbing jurisdictions and codes, most are based on 1 of 2 “model” plumbing codes the UPC and IPC.
- These federal and state regulations and local plumbing codes reference standards that establish minimum requirements for products.

Model Codes Have Become Accepting of Plastics

- International Plumbing/Residential Codes readily accept plastics.
- Many restrictions are being lifted in the Uniform Plumbing and Mechanical Codes.
- Latest restriction lifted- CIPP liners were prohibited to be installed to repair cast iron in UPC. This language was appealed and rescinded.

Size of the Room

- Attendance at Plumbing and Mechanical model code meetings has been declining
- Now the size of the room can potentially grow again with electronic attendance.
- Participation becomes easier and less expensive to have your voice heard.

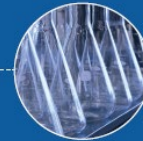
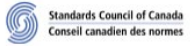
Standard Harmonization

- Manufacturers push dual SDO's to harmonize requirements
- SCC opens the doors for non-Canadian SDO's to write National Standards.

*NSF International Standard /
American National Standard /
National Standard of Canada*

NSF/ANSI/CAN 61 - 2019

**Drinking Water System Components -
Health Effects**



Microplastics

- WHO – 2019 “No reliable information suggests it is a concern...”
- Probably not an issue for codes at this point.
- NSF Drinking Water Treatment Unit Joint Committee
 - Forms task group
 - Removal of microplastics from drinking water
 - No known health effects from Microplastics
 - NSF 401- Emerging Contaminants

Microplastics

Proposed definition:

Solid polymeric materials to which chemical additives or other substances may have been added, which are particles which have at least three dimensions that are greater than 1 μm and less than 5,000 μm . Polymers that are derived in nature that have not been chemically modified (other than by hydrolysis) are excluded.

NSF Sustainability Standards

- **NSF/ANSI 140: Sustainability Assessment for Carpet**
- **NSF/ANSI 332: Sustainability Assessment for Resilient Flooring**
- **NSF/ANSI 336: Sustainability Assessment for Commercial Furnishings Fabric**
- **NSF/ANSI 342: Sustainability Assessment for Wallcovering Products**
- **NSF/ANSI 347: Sustainability Assessment for Single Ply Roofing Membranes**

NSF 358 - Geothermal Application for Plastic Piping

- **NSF 358-1 Polyethylene**
- **NSF 358-2 Polypropylene**
- **NSF 358-3 Crosslinked Polyethylene**
- **NSF 358-4 Raised Temperature Polyethylene.**



*NSF International Standard /
American National Standard*

NSF/ANSI 358-1 - 2020

**Polyethylene Pipe and Fittings
for Water-Based Ground-Source
"Geothermal" Heat Pump Systems**

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Occupational Exposure

ASTM E 3182

Occupant Exposure Screening Report

Addresses communicating potential human health risks from exposure to chemicals in building materials.

Problems:

- have all chemicals been identified?
- do we have toxicity potential at specified exposure levels?

Lead Continues to be a Issue

- The USEPA finalized a rule requiring third party certification of devices that convey drinking water to the lead content **requirements** of NSF 372:Drinking Water Systems Components – Lead Content.
- New criteria in NSF/ANSI/CAN 61 tightens the lead leaching allowance for plumbing products, lowering the maximum allowable limits of leached lead from plumbing endpoint devices from 5 ug to 1 ug. This only applies to faucets, drinking fountains and other endpoint devices. Device components like stop valves and riser tubing must meet a Q of 0.5 ug.

Water Conservation

- **US Department of Energy (DOE)** establishes flow rate requirements and are equivalent to ASME /CSA standards. Mandatory National Law.
- **US EPA WaterSense** program has requirements that are stricter than DOE.
- **California Energy Commission (CEC)** established very strict low flow rate requirements for products sold in CA. Many other states are adopting similar requirements.

DOE, WaterSense, CEC

Required flow Rates (gpm)				
Product	DOE	CEC	WS	ASME/CSA
Residential Kitchen	2.2	1.8	n/a	2.2
Residential lavatory	2.2	1.2 ^b	1.5	2.2
Public lavatory	0.5	0.5	n/a	0.5
Metering Faucet	0.25/cycle	0.25/cycle	n/a	0.25/cycle
Pre-rinse Spray valves	1.6	1.6	1.28	1.6
Showerheads	2.5	2.0 ^a	2.0	2.5

a: change to 1.8 in 2018

b: implemented 1 July 2016 Previous 1.5

WaterSense

- WaterSense, a partnership program by the U.S. EPA, seeks to protect the future of USA water supply by offering people a simple way to use less water with water-efficient products, new homes, and services.
- WaterSense covers:
 - Tank type toilets
 - Pre-rinse spray valve
 - Lavatory faucets
 - Irrigation controllers WB
 - Flushing urinals
 - Flushometer valves
 - Showerheads

WaterSense Process

- The product manufacturer enters into a WaterSense partnership agreement with EPA.
- Manufacturers can sign a WaterSense partnership agreement with EPA once a draft specification has been released for a product they produce/carry or manufacture under a private label. Under the partnership agreement, manufacturers will have 12 months to obtain certification of a product that conforms to a relevant WaterSense specification.

WaterSense Process

- Have the product certified for conformance to the WaterSense specification by an EPA licensed certifying body. Manufacturers apply directly to the licensed certifying body for certification and to obtain the WaterSense label.
- NSF is a licensed certifying body and can provide the necessary testing and certifications.

California Energy Commission (CEC)

- CEC is a division of the California Natural Resources Agency. The Commission has responsibility for activities that include forecasting future energy needs, promoting energy efficiency through appliance and building standards, and supporting renewable energy technologies.
- One of its prominent responsibilities is maintenance of the California Energy Code.

Why is this important?

- Due to the severe prolonged drought conditions in California the Governor signed an executive order mandating state wide water use reductions.
- The CEC has responded by lowering the maximum flow rate requirement in order to conserve water.



Potential Problems with Low Flow

- Lower flow rates in piping designed for 2x current flow:
 - May lead to stagnation and longer water age in building
 - Less chlorine residual
 - Growth of microorganisms
 - » Such as legionella

Potential Problems with Low Flow

- Similar problems can happen with stagnant water in buildings due to COVID shutdowns.

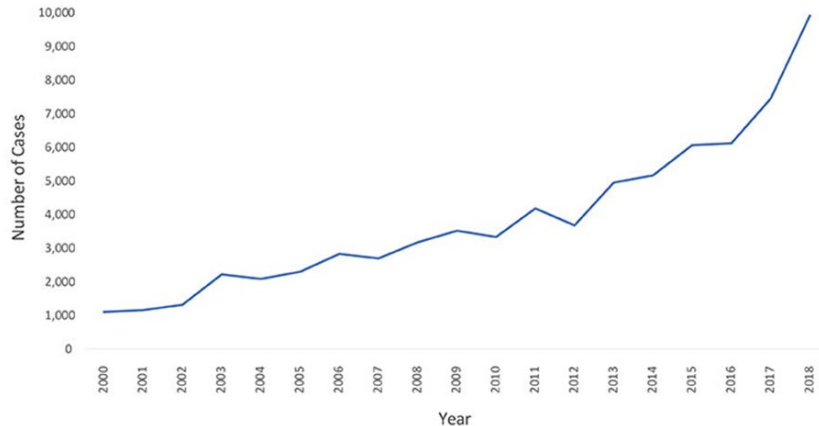
Legionella

- #1 cause of waterborne disease outbreaks
 - ~10,000 reported cases of Legionnaires' disease in 2018
- Bacteria found naturally in soil, surface water, and groundwater
- 60+ species with *Legionella pneumophila* causing most of the reported cases of disease



Rapidly Increasing Disease Burden In U.S. Significantly Under Reported

Legionnaires' disease is on the rise in the United States
2000-2018



Source: Nationally Notifiable Diseases Surveillance System

<https://www.cdc.gov/legionella/images/national-incidence.jpg>

- According to the National Academies of Sciences, Engineering and Medicine (NAS), “the Committee conservatively estimated that the number of persons with Legionnaires’ disease ranges from **52,000 to 70,000 in the United States each year**”.

- The “estimate is about **10 times higher** than the current reported disease incidence” and “this extent of underestimation of national reported data is supported by other studies”.

SARS-CoV-2 X LEGIONELLA

	COVID-19	Legionnaires' Disease
Mortality	1-3%	10%
Risk factors	Smokers and former smokers Pre-existing lung diseases Low health conditions Elderly	Smokers and former smokers Pre-existing lung diseases Low health conditions Elderly
From infection to symptoms	2-14 days	2-10 days
Symptoms	Cough Fever Short breathing / Difficulty breathing Pneumonia	Cough Fever Short breathing / Difficulty breathing Pneumonia
Serious cases	The infection can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death	Infection is a type of pneumonia and complications include lung and kidney failure, septic shock and even death

Studies have pointed to relatively high co-infection of coronavirus and *Legionella* in the same patient

Building Water Systems Associated with Elevated Water Pathogen Risks



Plumbing



Cooling towers



Decorative fountains



Pools and spas



On-site water storage



Ice machines

Prevention of Outbreaks is Possible with Effective Water Management

9 in 10
CDC investigations
show almost all
outbreaks were
caused by problems
preventable with
more effective
water management.

<https://www.cdc.gov/vitalsigns/pdf/2016-06-vitalsigns.pdf>

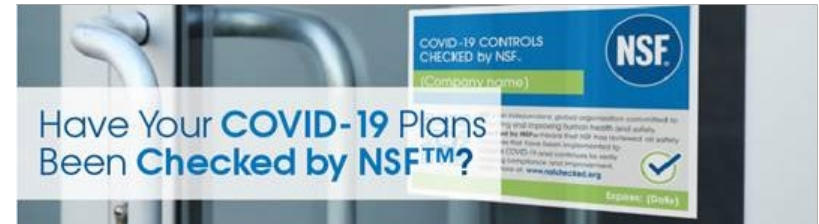
World Health Organization

“The most effective means of consistently ensuring the safety of a drinking water supply is through the use of a **comprehensive risk assessment** and **risk management** approach that encompasses all steps in water supply.”

Chapter 4 of the Third Edition of the WHO Guidelines for
Drinking-water Quality (2004)

Guidance and Regulatory Expectations

- CDC—Guidance for Reopening Buildings After Prolonged Shutdown Or Reduced Operation, Resuming Business Toolkit, and Guidance for Monitoring Building Water
- EPA—Maintaining or Restoring Water Quality in Buildings with Low or No Use
- State and local requirements
- Checked by NSF™—COVID-19 Reopening COVID Preparedness Guide



COVID-19

AND ITS EFFECT ON YOUR BUILDING WATER HEALTH

NSF

Preventing the Amplification of Waterborne Pathogens in Low Occupancy Buildings in Times of National Crises

The critical actions taken to slow and prevent the spread of COVID-19 worldwide, such as physical distancing and temporary shutdowns of businesses, have resulted in an unprecedented decline in the utilization of water in commercial, education, hospitality and manufacturing facilities. While we manage the risks from COVID-19, it is critical that we also control the physical, microbiological and chemical risks associated with low- or non-operating building water systems.

TOP RISK AREAS

The top risks we see in buildings with low or no utilization during this time are:



Amplification of *Legionella*
and other waterborne pathogens due to water age



Leaching of lead
and other metals into water distribution systems,
causing drinking water quality issues



Expedited corrosion of plumbing components
leading to premature pipe failure and unexpected
costs for emergency repair



Which building types are most likely at risk?



Commercial



Educational/Cultural



Hospitality



Manufacturing



Medical

PRACTICAL STEPS FOR RISK PREVENTION

There are several practical steps that can be taken to help prevent risks from amplifying in your building:

- 1 Keep water flowing to reduce water age
- 2 Strategically monitor disinfectant residuals
- 3 Maintain routine treatment of cooling towers and other aerosol-generating water systems
- 4 Control water temperature ranges to reduce amplification of *Legionella* and other waterborne pathogens
- 5 Put in place water quality monitoring strategies (disinfectant residual, pH, temperature, microbiological analysis)
- 6 Keep your records updated and defensible (verification and validation)
- 7 Incorporate water safety into your business continuity plans. Prior to returning to normal service, a site-specific plan for evaluating and documenting the safety of water systems must be prepared.

TAKING ACTION

Conclusions

- Sustainability of products/mfrs may never be directly mandated by codes.
- Certain parameters of sustainability
 - Energy conservation
 - Water conservation
 - Contamination Potential
 - Chemical
 - Microbial
 - Physical



Thank You!

Questions?

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