



THE *LEGIONELLA* RISK: A BRIEF EDUCATION

WHAT IS *LEGIONELLA*?

- Legionellosis is a term for any disease caused by *Legionella* bacteria.
- It is a common bacteria found in natural and man-made water systems.
- Although *Legionella* bacteria are found everywhere, they flourish in potable and nonpotable water systems.

QUICK FACTS

- It is under diagnosed, and not as rare as you think.
- Cooling towers, evaporative condensers, humidifiers, domestic/potable hot water systems, fountains, spas, and respiratory equipment are all systems that can harbor and create an active growing environment and support the spread of the *Legionella*.
- *Legionella* cannot be passed between people. It is only transmitted to humans through airborne particles, i.e., inhaling or aspirating contaminated droplets from water systems that have not been properly cleaned and disinfected.
- Each year, an estimated 10,000 to 18,000 people are infected with the *Legionella* bacteria in the United States.
- Up to 30% of these cases prove to be fatal.
- Legionnaire's disease can cause cough, high fever, pneumonia, and death. It can be treated effectively with antibiotics.
- It is preventable.

WHO IS AT RISK?

Groups at high risk include people who are middle-aged or older—especially cigarette smokers—people with chronic lung disease or weakened immune systems and people who take medicines that weaken their immune systems (immunosuppressive drugs).

WHAT IS STANDARD 188?

- Standard 188-2015 has established minimum legionellosis risk management requirements for building water systems.
- Standard 188-2015 defines a specific set of practices for analyzing, monitoring, and minimizing the risk of *Legionella* in building water systems.

DOES IT MATTER?

Yes.

Standard 188-2015 outlines compliance requirements for building owners to implement to mitigate the *Legionella* risks posed by building water systems.

GIVE ME THE OVERVIEW

Legionellosis: Risk Management for Building Water Systems

ASHRAE 188-2015 requires building owners to implement and follow a “Water Management Program” (WMP) if they have any of the following on-site:

- Cooling Towers and/or Evaporative Condensers
- Whirlpool Spas
- Ornamental/Decorative Fountains
- Air Washers, Humidifiers, or Misters
- Any other device(s) that release(s) aerosols

Potable plumbing systems require a WMP if the following are true for your building:

- A centralized hot water system supplying multiple housing units
- More than 10 stories, includes below-grade levels
- Residents over the age of 65
- Any area(s) housing or administering care to individuals with certain health factors



STANDARD 188 PROGRAM ELEMENTS

PROGRAM TEAM

Identify your Program team for development and implementation.

BUILDING SURVEY & FLOW DIAGRAMS

Describe potable and nonpotable water systems and develop water-system schematics.

ANALYSIS OF WATER SYSTEMS

Evaluate control measures for locations of hazardous conditions.

CONTROL MEASURES

Determine locations where control measures must be applied.

MONITORING & CORRECTIVE ACTIONS

Establish procedures for monitoring controls and take corrective actions if out of set limits.

CONFIRMATION

Establish procedures to confirm program is being implemented and controlled: verify and validate, repeat.

DOCUMENTATION

Establish documentation and communication for all Program activities.

DON'T JUST MANAGE *LEGIONELLA* BACTERIA. EFFECTIVELY CONTROL IT.

DON'T BE DISCOURAGED

...BY THE COMPLEXITY OR DETAILS OF THE STANDARD. WE ARE INDUSTRY EXPERTS AND WE CAN FULLY SUPPORT YOU.

HOW WE CAN HELP

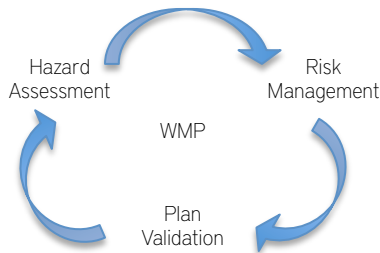
ASHRAE Standard 188-2015 does not contain all the necessary details for effective prevention, disinfection and control of *Legionella*. That's why we're here!

Aqualine Water Treatment Products, Inc. has more than 30 years of industry experience in water management, and is prepared to assist you with ASHRAE Standard 188-2015 compliance.

Aqualine has worked and consulted with some of the world's foremost experts on *Legionella* to discuss the management of *Legionella* bacteria in building water systems.

Using our years of expertise and expert partners, we can provide guidance in establishing your Water Management Program "WMP" by assisting in the following ways:

- Consultation and Education to the "Program Team"
- Aiding in the description and schematic building of the "Building Water Systems" and "Flow Diagrams"
- Developing a plan for a comprehensive and ongoing Legionella monitoring program
- Providing confirmation of control measures at each control location through validation and documentation
- Support corrective actions when monitoring indicates control parameters are outside limits



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THE AQUALINE WATER SAFETY PLAN

A program of regular water treatment, maintenance, and inspections for cooling towers is much more effective than periodic disinfection. You can't manage what you don't measure. This may sound stupid but it must be said: the best way to validate *Legionella* control in a water system is to test the water for *Legionella*.

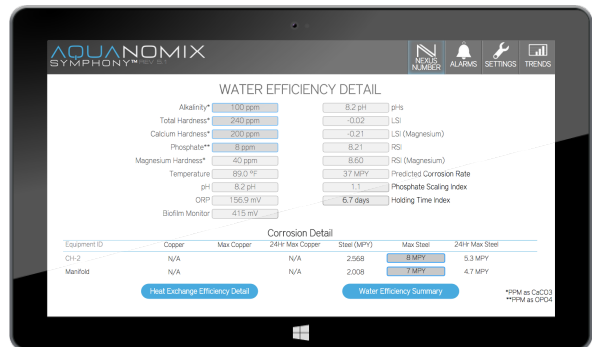
Aqualine uses powerful dual alternating biocide oxidizers and microbiological control to kill *Legionella* bacteria in cooling systems. This is the industry standard and the best practice (ASHRAE). Furthermore, Aqualine follows *Legionella* response recommendations from accredited agencies, such as AWT, ASHRAE, CDC to reduce corrosion, scale, deposit, and biofilm.

Aqualine has also implemented a diagnostic tool called Symphony™ that continuously commissions the water quality, water use and energy efficiency.

Symphony™ is a constant-commissioning analytics solution by Aquanomix that examines building water quality in near real-time and alerts operators to any issues.

Symphony™ will give an early indication of biofilm activity, which is typically a precursor to *Legionella* development. This helps to control bacterial growth and to maintain an efficient and reliable cooling system.

SYMPHONY™



SIX KEYS TO DISINFECTING COOLING TOWERS SAFELY

Building owners should consider six key safety precautions to disinfect their cooling towers:

- 1. Perform “online” rather than “offline” disinfection unless full physical cleaning is absolutely necessary at the time.** Cooling towers can be disinfected “online” or “offline.” The online procedure involves only chemical disinfection while the cooling tower is operating. The offline procedure involves shutting the cooling tower down and scrubbing it physically in addition to disinfecting it with chemicals. A full offline disinfection and cleaning is more thorough but is expensive and presents some serious risks, as discussed below.

Although the online method does not address the physical cleaning of the cooling tower, it is effective in killing *Legionella* and is much safer, cheaper, and quicker. It is also less corrosive. A typical online disinfection basically amounts to maintaining a free chlorine concentration of approximately 5 parts per million (ppm) for at least 6 hours. More information on the method can be found in the Cooling Technology Institute’s publication *Legionellosis Guideline: Best Practices for Control of Legionella*, which can be downloaded for free at www.cti.org.

If you use the offline method:
- 2. Perform an online disinfection of the cooling tower prior to cleaning it physically.** Otherwise the *Legionella* risk could get worse before it gets better. Physically cleaning a cooling tower without disinfecting it chemically beforehand is like aggressively sweeping a dirty garage floor—you might eventually get it clean but in the short term you’ll inhale a lot of dust. Hence precaution #4 below.
- 3. Provide personal protection equipment for the workers.** Respirators will reduce their risk of inhaling *Legionella* bacteria. Boots, protective clothing, and goggles will help protect their eyes and skin from chemicals.
- 4. Close building outdoor air intakes within the vicinity of the cooling tower.** The Centers for Disease Control and Prevention (CDC) has recommended closing intakes within 30 meters.
- 5. Do it properly.** Check with organizations such as the [Cooling Tower Institute](http://www.coolingtowerinstitute.org) and the [American Society of Heating, Refrigerating and Air-Conditioning Engineers](http://www.ashrae.org) for their latest recommendations. Follow instructions on chemical product labels. Keep records of the procedure, including the chemicals used, the time the chemicals were added to the system, and chlorine and pH test results. Be sure to follow all EPA and other applicable regulations and observe safety precautions. Utilizing a highly qualified and experienced water treatment specialist is the best way to ensure proper protocol is followed.
- 6. With either method – online or offline – you need to understand the long-term limitations of the procedure.** Studies have shown that *Legionella* bacteria may reemerge within only days after fully disinfecting a cooling tower. A program of regular water treatment, maintenance, and inspections provides better protection than periodic disinfection. The same applies to plumbing systems, hot tubs, and other water systems that can harbor and transmit *Legionella* — the best protection is to implement a water management plan per [ANSI/ASHRAE Standard 188-2015](http://www.ansi.org), as laid out on previous pages of this document.



Excerpted from Matt Freije,
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COOLING TOWER CONTROL STRATEGY

RECOMMENDED ACTIONS BASED ON CONCENTRATION-BASED TARGETS*

Test Result (cfu/mL)	Strategy
Not Detected**	<p>1. Maintain <i>Legionella</i> monitoring ** Maintain water treatment program</p>
Detected at ≥ 10 but < 1000 cfu/mL	<p>2. Investigate</p> <ol style="list-style-type: none"> Review water treatment program. Take necessary remedial action including immediate online disinfection and undertake control strategy described in footnotes. <p>3. Retest water within 3 to 7 days of plant operation:</p> <ol style="list-style-type: none"> If not detected, continue to retest water every 3 to 7 days until two consecutive samples return readings of not detected and return to maintenance strategy. If detected at < 100 cfu/mL, repeat control strategy with online disinfection and retest. If detected at ≥ 100 < 1000 cfu/mL, investigate problem and review water treatment program, immediately carry out online disinfection, retest and repeat control strategy. If detected at ≥ 1000 cfu/mL, undertake control strategy with online disinfection and retest.
Detected at ≥ 1000 cfu/mL	<p>4. Investigate</p> <ol style="list-style-type: none"> Review water treatment program. Take necessary remedial action including immediate online decontamination and under take control strategy. <p>5. Retest water within 3 to 7 days of plant operation</p> <ol style="list-style-type: none"> If not detected, continue to retest water every 3 to 7 days until two consecutive samples return readings of not detected and return to maintenance strategy. If detected at < 100 cfu/mL, repeat control strategy with online disinfection and retest. If detected at ≥ 100 < 1000 cfu/mL, investigate problem and review water treatment program, immediately carry out online disinfection, retest and repeat control strategy. If detected at ≥ 1000 cfu/mL investigate problem and review water treatment program, immediately carry out system decontamination, retest and repeat control strategy. See footnote for online and system disinfection information.

*This information is based on the control strategies from the Australia/New Zealand Standard. [See Australian/New Zealand Standard AS/NZ S 3666.3:1998 for process details]

**Limit of detection < 10 cfu/mL. Monthly monitoring required in Australia, no in U.S. Online Disinfection = Dose the cooling water system with either a different biocide or similar but increased concentration to that of the regular water treatment program. Online decontamination = dose recirculating water with chlorine-based compound equivalent to at least 5 mg/L free residual chlorine for at least one hour (maintain pH at 7.0-7.6). System decontamination = maintain 5-10 mg/L free residual chlorine for minimum of one hour, drain and flush with disinfected water, clean wetted surfaces, refill and dose to 1-5 mg/L of free residual chlorine at pH 7.0-7.6 and circulate for 30 minutes.



Borrowed from Special Pathogens Laboratory: The Legionella Experts
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