

LEGIONELLA: Building Manager's Guide

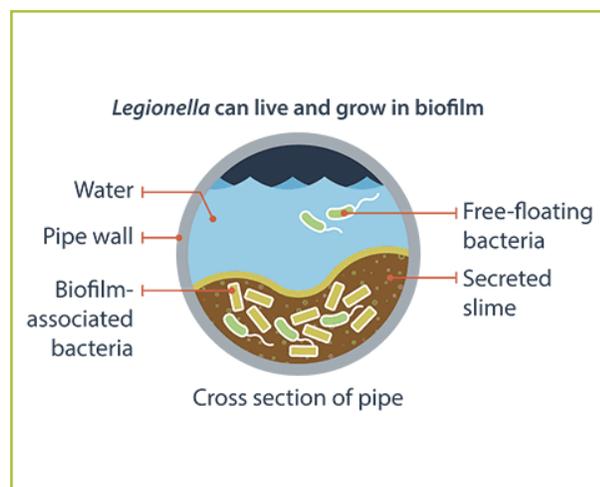


Proper building maintenance plays an important role in helping to prevent the spread of the *Legionella* bacteria that cause outbreaks of Legionnaire's disease, a serious type of pneumonia that can be fatal. *Legionella* outbreaks can occur anywhere water can be aerosolized (form tiny water droplets or mists that can be inhaled) but they are most commonly associated with complex water systems, including those found in hotels, hospitals, cruise ships, and long-term care facilities. If your facility has a complex water system, you should have a Water Management Plan in place to reduce the risks of an outbreak.

What factors promote growth of *Legionella* bacteria?

Certain conditions in water systems promote bacterial growth at levels that can lead to illness and outbreaks. Factors associated with *Legionella* growth include:

- ▶ **Low chlorine concentrations:** *Legionella* is more tolerant of chlorine than other bacteria and will grow if concentrations aren't high enough.
- ▶ **Temperature:** *Legionella* prefers 25°-42°C (77°-107.6° F) but can sometimes be found in cold water.
- ▶ **Plumbing design:** infrequently used, slow-moving, or stagnant water in dead-end lines, attached hoses, shower nozzles, hot water tanks, etc. promote the growth of bacteria.
- ▶ **Plumbing materials:** aerators, rubber washers, and fittings can promote growth.



What can I do to prevent an outbreak?

Prevention measures include cleaning and appropriate maintenance of water systems, hot tubs, fountains, and other environments where *Legionella* bacteria can grow. Implementing an effective Water Management Program (WMP) also helps prevent legionellosis outbreaks.

Basic parts of a WMP include:

- ▶ Keeping water temperatures outside the range for *Legionella* growth;
- ▶ Preventing stagnant water
- ▶ Ensuring disinfection
- ▶ Maintaining devices to prevent scale, corrosion, or biofilm growth
- ▶ Surveying systems regularly

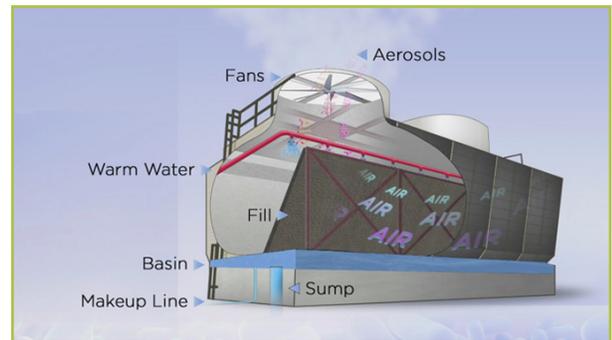


PREVENTION/MAINTENANCE

- ▶ **Plumbing Design:** Proper design of water systems can reduce risks associated with stagnant water and ensure that the cold water stays cold and hot water stays hot. Using appropriately sized pipes for the volume of water needed and eliminating dead-end legs will reduce stagnant water.
 - **Advantages:** Effective prevention method; Design changes don't need to be repeated and should reduce the need for ongoing maintenance, thus reducing long-term costs.
 - **Disadvantages:** Can be expensive and labor intensive in the short-term, particularly in existing buildings

► **System Maintenance:** Proper system maintenance will help prevent long-term bacterial growth. When cooling towers are shut down, drain the water to minimize any stagnant water. During startup of cooling towers, pre-treat the water with hyper-chlorination methods. Hot tubs should be drained frequently and treated with chlorine. Any water system that is not in frequent use, such as hotel showers following a week or more of no or low occupancy or unoccupied buildings, should be periodically flushed to reduce the build-up of bacteria.

- **Advantages:** System maintenance will minimize the risk of Legionella outbreaks and outbreak-related deaths.
- **Disadvantages:** Requires training of staff and ongoing costs



ELIMINATION OF COLONIZED BACTERIA

- **Thermal Eradication** (super heat and flush): Increase the temperature of the hot water tank to at least 70°C (158°F) and then flush the entire water system for at least 30 minutes.
 - **Advantages:** No specialized equipment required; There are only minimal costs and does not trigger additional drinking water regulations .
 - **Disadvantages:** Labor-intensive process; Possibility of scalding ; Does not prevent recolonization of Legionella bacteria.
- **Shock Hyper-chlorination:** Use pulse injection of chlorine into water system so chlorine concentration is 20-50 ppm. Water is then flushed out, and when refilled, the chlorine will return to normal concentration ranges.
 - **Advantages:** Achieves systemic disinfection and provides residual disinfection; Minimizes the recolonization of the bacteria for longer than thermal eradication; does not trigger additional drinking water regulations .
 - **Disadvantages:** Can cause corrosion of the pipes; Once levels have diminished, the bacteria will eventually recolonize; When chlorine reacts with organic materials, can produce potential carcinogens

TREATMENT:

- **Continuous Hyper-chlorination:** Continuous injection of chlorine via an installed system.
 - **Advantages:** Minimizes the recolonization of bacteria
 - **Disadvantages:** Chlorine will not inactivate bacteria in stagnant or low-circulating water. When chlorine reacts with organic materials, it can produce potential carcinogens. This process requires compliance with additional drinking water regulations.
- **Copper and Silver Ionization:** Positively charged copper and silver ions are introduced into the recirculating hot water to prevent recolonization of the bacteria
 - **Advantages:** Relatively inexpensive; Easy to install and maintain; Kills bacteria and minimizes recolonization
 - **Disadvantages:** Electrodes accumulate scale and sediment and must be cleaned regularly. Fluctuations in ion concentrations in the water can cause discoloration of water and skin. This process requires compliance with additional drinking water regulations.
- **Ultraviolet (UV) Light:** UV lights are typically installed at the point of use, like faucets and showerheads, to kill bacteria.
 - **Advantages:** Easy installation; No adverse effects on plumbing; No change to water's taste; Does not trigger additional drinking water regulations.
 - **Disadvantages:** Routine systemic disinfection needed; Works best with another treatment technique; Areas where UV lights areas are installed need to be cleaned regularly because there is chance of scale and sediment formation.

Where to get more information

The Rhode Island Department of Health:

<http://health.ri.gov/diseases/respiratory/?parm=65>

The Centers for Disease Control and Prevention (CDC):

<https://www.cdc.gov/legionella/index.html>

CDC's Developing a Water Management Program to Reduce Legionella

Growth & Spread in Buildings: <https://www.cdc.gov/legionella/downloads/toolkit.pdf>

