Mitigating Legionella with Piping

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Pipes can be described as the circulatory system of a building. Found behind every wall, under every floor, and in virtually every ceiling, they're responsible for delivering and disposing the vital fluids and gasses of a building's complex ecosystem. Though they're rarely the center of attention, pipes have recently made their way into news headlines amidst the 2020 coronavirus pandemic. COVID-19, the respiratory illness caused by coronavirus, can potentially spread through plumbing systems, and high rise plumbing systems have been implicated in a number of COVID-19 cases[1].

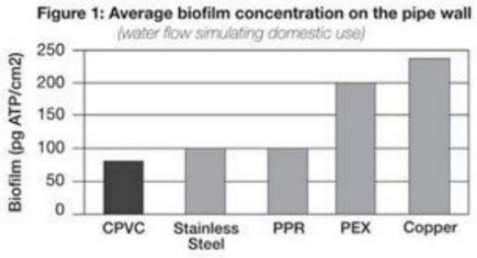
Smart plumbing design plays a fundamental role in mitigating harmful bacteria and viruses, but what about selecting the most suitable pipe for the application? Considering the aging infrastructure of the underground piping system in the United States, selecting durable, long-lasting piping is just as essential to this process. Each year, there are approximately 240,000 water main breaks in the United States[2] and according to the American Water Works Association, 44% of the entire infrastructure is considered poor.

Once water reaches a building's maintenance room for treatment, it enters the piping of the premise plumbing system. At this point, there are several piping attributes and conditions to consider in order to mitigate the growth of Legionella and the spread of disease:

1. **Age of Piping:** If the building is older, the age of the piping should be factored into your water management plan. As pipes age, problems like corrosion, pinhole leaks, biofilm and scale buildup are more common— each of which can affect Legionella growth.

2. **Corrosion Resistance:** Corrosion resistant materials are usually smoother, more durable, and longer lasting. Industrial processes including the manufacturing of piping often involve highly acidic ingredients such as iron-oxidizing bacteria, sulfate-reducing bacteria and acid-producing materials can lead to increased corrosion.

3. **Piping material:** In general, smooth piping doesn't harbor as much biofilm as rougher, more porous material. Studies show CPVC, stainless steel, and



[1] Pete DeMarco, "Digital Exclusive: Coronavirus in Plumbing Systems - How Did the Outbreak Occur in Hong Kong and Is There a Risk in the US?," March 10, 2020. Retrieved from https://www.phcppros.com/articles/11031-coronavirus-in-plumbing-systems-how-did-the-outbreak-occur-in-hong-kong-and-is-there-a-risk-in-the-us

[2] About the Water Infrastructure and Resiliency Finance Center. March 21, 2017. Retrieved from https://www.epa.gov/waterfinancecenter/about-water-infrastructure-and-resiliency-finance-center

polypropylene experience 50% less biofilm growth than copper and PEX, which is related to the smoothness of these materials.

4. **Chemicals:** When choosing piping materials, carefully consider the chemicals it will come into contact with in order to prevent corrosion and pinhole leaks. Not all pipe materials can tolerate continuous exposure to high chlorine levels or high temperatures. CPVC is treated with chlorine so it has fewer negative consequences from disinfectants. However, chloramines can change pH levels and increase corrosion in copper pipes, while PEX, polypropylene, and polybutylene require antioxidant treatments to withstand chlorine and other disinfectants.

5. **Correctly Sized Pipe:** Not only does oversized pipe slow down flow and reduce helpful turbulence within the waterways, it also increases the surface area for germ-harboring biofilm growth. Properly sized pipe helps maintain flow velocity and can even help to break up biofilm that may be developing on the inside of the pipe.

6. **Dead Legs:** These low-flow and no-flow areas provide safe refuge areas for Legionella. If there are existing dead legs within a building's piped infrastructure, consider implementing additional solutions to help mitigate these harmful bacteria.

7. **Efficient Flow:** Keep the water flowing. Continuous recirculation reduces biofilm while stagnant water promotes its growth. Although low flow has been recommended as one way to conserve water, it's not as effective against waterborne pathogens.

Plumbing design and piping both fundamentally impact the ability to mitigate the risk of Legionella and other pathogens. However, risk factors vary depending on different building sizes, applications, the type of hot water system used, and more. The first step towards a comprehensive water management program is to identify where bacteria may exist in your water system and understand the underlying conditions that may allow outbreaks to occur. Learn how to identify potential trouble areas, address these risks, and define your action plan at http://www.legionella-strategies.com.

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