

Home

Articles

Product Directory

Product Showcase

Purchasing Study

Information

Reader Service

Subscriptions

About Us

Links

Contact Us

Site Map

Articles

CONSIDERATIONS TO PREVENT GROWTH AND SPREAD OF LEGIONELLA IN HVAC SYSTEMS

If we have learned one thing about Legionnaire's Disease since its discovery in 1976, it's that the bacteria that causes it thrive under certain conditions that exist within heating, ventilating and air conditioning (HVAC) systems. But, with proper system design and maintenance, adverse health risks can be avoided.

Affecting up to 100,000 people a year in the United States, Legionnaire's Disease is a pneumonia-like and sometimes-fatal illness that took its name from the American Legion Convention it "crashed" at the Bellevue-Stratford Hotel in Philadelphia. It is caused by the bacterium *Legionella Pneumophila* which thrives in wet areas where conditions are favorable to growth. Carried in water vapor aerosols as small as 1 to 5 microns, the bacteria may be inhaled. Entering the deepest part of the lungs, the bacteria can attack any individual -- particularly someone with a weakened immune system.

Once an individual has been exposed to *Legionella Pneumophila* pneumonia-like symptoms appear within 2 to 10 days of the exposure. The symptoms exhibited can include fever, chills, muscle aches, diarrhea, headache and a dry cough. Mortality rates of approximately 15 percent are frequently quoted for the disease, however treatment with antibiotics is usually effective.

The Ideal Bacteria Incubator

Within the context of HVAC systems, a number of potential breeding grounds for the bacteria exist. The most common location for the proliferation and amplification of *Legionella Pneumophila* within the HVAC system is the cooling tower. However, the bacteria thrive in humidifiers, drain pans and other sources where standing water may accumulate.

In the normal operation of a cooling tower, a number of conditions exist that are conducive to the survival and transport of the bacteria:

- A standing pool of water.
- Water temperature that is satisfactory to support bacteria growth -- the bacteria typically proliferate between 68 degrees Fahrenheit and 113 degrees Fahrenheit with significant growth occurring between 95 degrees Fahrenheit and 110 degrees Fahrenheit.
- Dirt and other particulate matter easily enter the open water system. These can provide nutrients for the *Legionella Pneumophila*
- Water mist is generated, allowing the bacteria to become airborne.

In fact, *Legionella Pneumophilais* present in the water samples of nearly all cooling towers. However, the levels of bacteria found in most cases are below those that would typically cause human health effects. So, while the mere presence of the bacteria is not cause for alarm, control of its levels is critical in minimizing the potential for detrimental health effects. Such control can be accomplished through the diligent design of the HVAC system, and the administration of an appropriate maintenance program including proper water treatment.

Minimizing Risk by Design



At the design and installation stage of an HVAC system, a number of considerations should be made to limit the potential for the growth of this bacterium and to minimize the potential for inhalation should it become airborne. These include:

- Locate the cooling towers far enough away from outdoor air intakes and other ventilation inlets (such as windows) to eliminate entrainment of water mist in the intake air. Prevailing winds should be considered in selecting a site for the cooling tower and outdoor air intakes.
- Locate cooling tower discharge away from outdoor air intakes, occupied areas, pedestrian walkways and other areas where people may frequently be present.
- Design enclosures for cooling towers to minimize or eliminate the potential for drift from the cooling tower.
- Locate kitchen and bathroom exhausts so that the exhausted air is not brought back into the building through the outdoor air intakes.
- Specify air-handling units with sloped, corrosion-resistant drain pans.
- Locate outdoor air intakes to minimize or eliminate the entry of rainwater.

Maintaining a "Clean" System

Once a system has been properly installed, a number of operation and maintenance tasks can be performed to minimize the potential for elevated levels of the *Legionella Pneumophila* bacteria. These include:

- Chemically clean and flush the cooling tower before putting it into initial service and before annual start-up if located in milder climates where seasonal operation is required.
- Ensure easy access to facilitate frequent, routine cleaning and maintenance.
- Maintain a proper water treatment program, including biocide treatment, to minimize the potential for bacteria growth.
- Perform regularly scheduled quantitative analysis of the cooling tower water for *Legionella Pneumophila*. Remember that the mere presence of the bacteria should not be cause for alarm.
- Remove standing water from air handling unit drain pans and rectify problems to allow for proper drainage.
- Correct conditions contributing to the collection of standing water near outdoor air intakes.

When designing and installing an HVAC system, numerous factors must be considered from mechanical, aesthetic, functional and indoor air quality perspectives. However, minimizing the potential for the amplification of the *Legionella Pneumophilabacteria* in HVAC systems need not be expensive or difficult. The proper design of the HVAC system is an important first step. Once the system is designed and installed, appropriate operation and maintenance is critical in achieving this goal. Operating and maintenance schedules must be developed early, and diligently followed to control this bacterium below the levels that may cause health effects.

Jeff Coleman is senior product manager for service marketing in Carrier's Commercial Systems and Services Division, Syracuse, N.Y. For other insights regarding air quality, contact your Carrier representative for a copy of Carrier's Indoor Air Quality, A Guide for Management.

[Home](#)|[Articles](#)|[Product Directory](#)|[Product Showcase](#)|[Purchasing Study](#)|[AS&HM Information](#)|[Reader Service](#)|[Subscriptions](#)|[About Us](#)|[Links](#)|[Contact Us](#)|[Site Map](#)

indus y