Mitigating the risk of biological growth in a wholesome water supply- Reliance Worldwide Corporation CPD

This CPD module explores key considerations for preventing bacteria contamination in cold water supplies within healthcare applications. This will count as an equivalent hour of CPD.

One of the main challenges currently facing plumbing professionals, especially within healthcare settings, is the need to deliver a safe water supply while maintaining the highest hygiene levels to protect all users of the plumbing system. To ensure this is the case, it is crucial to understand the conditions in which bacteria can grow within a system, and what measures can be taken to help prevent bacteria growth.

The collective term for bacteria found in water supplies is known as Legionella Pnuemophila. There are over 50 types of this bacteria with half of those dangerous to humans. Commonly found in natural water systems such as lakes, rivers, and ponds, it is also prevalent in water supplies and plumbing systems where temperatures are high enough to enable growth, or where water remains stagnant for a period of time.

Bacteria are transmitted aerobically from small droplets of water that are contaminated and suspended in the air. Aerosol droplets that allow transmission of Legionella are commonly found in whirlpool spas, showers, cooling towers, taps with sprays, etc. However, Legionella can grow in any water system that is not properly maintained.

Legionnaires disease is among the greatest health concerns, so signs of the disease in the water supply system must be caught early to safeguard people from infection.

Legionella bacteria is contracted by breathing in tiny droplets of water containing the bacteria. The incubation period can be anywhere from two to ten days. Early symptoms can include fever, feeling lethargic and loss of appetite. Affected patients can also begin to develop a light cough, but the severity of this can potentially increase, and in some cases lead to lung inflammation and in extreme cases fatal pneumonia. Therefore, Legionella prevention is absolutely critical. In environments such as hospitals, where vulnerable people are deemed at a higher risk due to their age or weakened immune systems, it is even more important to get your approach to Legionella bacteria prevention correct.

Legislation and guidance on Legionella prevention

Building Regulations and Approved Codes of Practice demand that hot water is circulated at sufficiently high temperatures to stop bacteria growth in the water supply from multiplying to a level that will cause serious health problems to vulnerable groups of people. In the UK, Building Regulations stipulate that hot water should be stored at no less than 60°C and circulated at no less than 55°C to prevent the growth of Legionella.

Highlighted below is the effectiveness of Legionella growth dependent on water temperature:

Temperature Range	Effect on Legionella
70 to 80ºC	Disinfection range
66ºC	Legionella will die in 2 minutes
55ºC	Legionella will die in 5 to 6 hours
20 to 50ºC	Legionella growth range
Below 20ºC	Legionella can survive but are dormant

The Department for Health's 'Health Technical Memorandum (HTM04-01)' also provides comprehensive advice and sets out key guidance for healthcare professionals, design

engineers, estate managers, operations managers, contractors and the wider supply chain. It specifies legal requirements and information on design application; hot and cold water supply operation and maintenance; and storage and distribution systems used across different types of healthcare settings.

One of the main aims of HTM04-01 is to outline “How the correct selection of system components and correct use by occupants can help preserve the quality and hygiene of water supplies” (Department for Health, 2021). Section 4 of the document offers guidance on the prevention of Legionella bacteria within water supplies.

Guidance and requirements on Legionella control are also set out in The Health and Safety Executive’s ‘Approved Code of Practice L8 (ACOP L8).’ This should be followed to ensure legislation compliance. Legal obligations can be found within:

- The Health and Safety at Work etc Act 1974;
- The Control of Substances Hazardous to Health 2002; and
- The Management of Health and Safety at Work Regulations 1999.

Although there are alternative ways to comply, following ACOP L8’s guidance will give you confidence that any actions you take will sufficiently fulfil your legal obligations.

Common breeding grounds and how to prevent Legionella growth

Legionella bacteria, such as Pseudomonas aeruginosa, commonly grow in cold water systems when stagnation occurs – for example, low usage areas within a system. Although the spread of Legionella is mainly down to poor and inadequate system maintenance or design, it is often seeded unknowingly by system users by contact transfer at communal outlets. Therefore, regular monitoring through water sampling and prompt maintenance on highlighted risk areas is essential.

Another common breeding area for Legionella bacteria is in expansion vessels. Often installed to cold water supplies serving instantaneous, unvented hot water, they are designed to prevent overpressure from thermal expansion. However, they are a common area for stagnation and bacteria growth to occur. This bacterium even has the potential to contaminate upstream of the vessel, impacting the entire water supply. Once this point is reached, it is a difficult task to resolve the problem, with the safest solution being to re-pipe the entire system – an expensive and time-consuming task.

The spread of Legionella can also be caused by poor system design - an example being long lengths of straight pipework which can stagnate in low-use areas. These are often referred to as ‘dead legs’ and are also common where unused pipework runs are left dormant and capped off – therefore not terminating at an outlet.

One way to prevent the conditions that facilitate bacteria growth is to install a potable flow-through type expansion vessel, rather than a conventional vessel. With separate inlet and outlet connections, the vessel adds turbulence to the supply when water is drawn, eliminating the potential for stagnant water contamination. Most installers, however, will be familiar with the challenge of fitting these vessels in commercial environments, with their size making it difficult to navigate tight spaces.

Advancements in technology mean that this problem can now be avoided, with Anti-Legionella Valves becoming a popular option, such as those from Reliance Valves. Featuring an integral tee-piece, Anti-Legionella Valves allow the vessel to be installed directly to serving pipework, providing a straightforward and highly effective solution. The expansion vessel can then be screwed directly into the centre branch of the fitting. Reliance Valves’ Anti-Legionella Valves

are available in sizes ranging from ½" to 1 ¼", and therefore can work on any size potable vessel ranging from 2 up to 500 litres.

As well as significantly reducing the space required, compact Anti-Legionella Valves remove the complexity of creating safe water systems in commercial environments. With an internal paddle circulating water inside the vessel, the device creates turbulence when water is drawn through it, ultimately preventing stagnation and eliminating the potential for bacteria to grow.

It is important to note that the valve must be left in the open position once installed or any maintenance is completed to ensure that the vessel is not isolated from the system it is supposed to serve. Although other forms of treatment like UV, or silver ionisation can help in reducing the bacteria within the system at source, point of use protection is key to enable security in especially high-risk system areas.

The most common prevention is to store and distribute hot water at a consistently high temperature to enable thermal disinfection – which will kill the bacteria. Thermal cycles at temperatures above 70°C, should be conducted regularly to be effective. In circulating hot water systems (also referred to as secondary hot water), temperatures can vary as the water circulates from the heat source to around the building, therefore installing specialist valves, like Thermal Balancing Valves (TBVs) will ensure that this supply temperature remains consistent across the entire system, eliminating the conditions required for Legionella to grow. This enables a more sustainable and energy-efficient hot water network, however, the scalding risk to the end user is extremely high.

To prevent scalding, a TMV3-approved Thermostatic Mixing Valve (TMV) must be installed at every outlet, such as Reliance Valves' Heatguard TMV3-8. A TMV mixes hot & cold water to ensure a safe and stable hot water temperature at outlets. These valves must be installed in accordance with the TMV3 scheme and guidance can be found within the HTM 04-01: Supplement Performance Specification D08, which highlights information like test parameters, installation and best practice guidance, as well as maintenance and testing frequencies. This information is also contained within the valve manufacturer's instructions.

It is equally important to ensure all TMV devices are effective and maintained. HTM 04-01 also details that comprehensive records and regular checks are conducted and recorded. Ultimately, everyone has a role to play in keeping water systems safe, and professional installers can work closely with their customers to eliminate the risk of bacteria affecting the water supply.

For more information or to register for one of Reliance Valves in-person CPD courses, please visit www.reliancevalves.com. Alternatively, contact Tom Bailey, RWC Specification Manager, at tom.bailey@rwc.com or on 07970 672 636.

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