Control of Legionella bacteria in water systems

Introduction

Legionnaires' disease is a potentially fatal pneumonia caused by *Legionella* bacteria. Infection is caused by breathing in small droplets of water contaminated by the bacteria. The disease cannot be passed from one person to another. Everyone is potentially susceptible to infection but some people are at higher risk, e.g. those over 45 years of age, smokers and heavy drinkers, those suffering from chronic respiratory or kidney disease and people whose immune system is impaired.

Legionella bacteria are common in natural water courses and as they are widespread in the environment, they may contaminate and grow in other water systems such as cooling towers and hot and cold water services. The bacteria thrive at temperatures between 20°C-45°C if the conditions are right, e.g. if a supply of nutrients is present such as rust, sludge, scale, algae and other bacteria. Although the bacteria can survive low temperatures they are killed by high temperatures.

Legal requirements

The general duties of the *Health and Safety at Work (Jersey) Law 1989* (HSW Law) applies to the control of legionella. This means that 'dutyholders', (employers and those with responsibilities for the control of premises eg landlords) are required to ensure, so far as is reasonably practicable, that water systems do not pose a risk to health.

Although there are no prescriptive legal requirements in Jersey which relate to the control of legionella, reference can be made to the UK Health and Safety Executive's (HSE) documentation as the standards which should be met to achieve compliance with the HSW Law.

A revised Approved Code of Practice "*Legionnaires' disease. The control of legionella bacteria in water systems L8 (fourth edition)*" was published by the HSE in 2013. This fourth edition is supported by guidance in the publication '*Legionnaires' disease. Technical Guidance HSG274*'. Copies of these publications are available from www.hse.gov.uk

The principal requirements of the UK Approved Code of Practice include the following:

- identify and assess sources of risk
- if appropriate, prepare a written scheme for preventing or controlling the risk
- implement, manage and monitor precautions
- keep records of the precautions
- appoint a competent person with sufficient authority and knowledge of the installation to help take the measures needed to comply with the law

Water systems

A water system includes all plant/equipment and components associated with that system, e.g. all associated pipe-work, pumps, feed tanks, valves, showers, heat exchangers, quench tanks, chillers etc. It is important that the system is considered as a whole and not, for example, the cooling tower in isolation. Deadlegs and parts of the system used intermittently, also need to be included since they can create particular problems with microbial growth going unnoticed. Once brought back on-line they can cause heavy contamination, which could disrupt the efficacy of the water treatment regime.

A reasonably foreseeable risk of exposure to legionella bacteria exists in:

- water systems incorporating a cooling tower
- water systems incorporating an evaporative condenser
- hot and cold water systems

- other plant and systems containing water which is likely to exceed 20^{o}C and which may release a spray or aerosol (i.e. a cloud of droplets and/or droplet nuclei) during operation or when being maintained, eg spa pools.

Not all systems require elaborate assessment and control measures. In some cases, a simple risk assessment may show that the risks are low and therefore no further action will be necessary. Examples include:

- in a small building without individuals 'at higher risk' from legionella bacteria
- where daily water usage is inevitable and sufficient to turn over the entire system
- where cold water is directly from a wholesome mains supply (no cold water tanks)
- where the only outlets are toilets and wash hand basins (no showers)

Management of legionella
The successful management of legionella requires a systematic approach to be taken and it is recommended that the following actions are taken:

Step 1: Identify all water systems on the premises

Step 2: Assess the risk
For there to be a risk of acquiring legionellosis, a number of factors are required such as:

- the presence of legionella bacteria
- conditions suitable for growth of the organism eg suitable temperature (20^{o}C-45^{o}C) and a source of nutrients, eg sludge, scale, rust, algae and other organic matter
- a means of creating and disseminating breathable droplets, eg the aerosol generated by cooling tower, showers or spa pools
- the presence (and numbers) of people who may be exposed, especially in premises where occupants are particularly vulnerable, eg healthcare and nursing and residential homes

The risk posed by each system will vary and a number of factors need to be considered. The following matters should be taken into account when carrying out the assessment:

- the source of system supply water, for example, whether from a mains supply or not
- possible sources of contamination of the supply water within the premises before it reaches the cold water storage tank, calorifier, cooling tower or any other system using water that may present a risk of exposure to legionella bacteria
- the normal plant operating characteristics
- unusual, but reasonably foreseeable operating conditions, for example breakdowns
- any means of disinfection in use
- the review of any control measures
- the local environment.

If there is insufficient expertise within the organisation to carry out the risk assessment, then outside help should be sought from a third party such as a consultancy, water treatment company or a person experienced in carrying out such risk assessments. Persons who carry out the risk assessment should have the ability, experience, instruction, information, training and resources to enable them to carry out their tasks competently and safely.

In particular, they should know:

- potential sources of legionella bacteria and the risk they present
- measures to be adopted including precautions to be taken for the protection of people concerned and their significance
- measures to be taken to ensure that controls remain effective and their significance

Step 3: Responsibility
If an assessment shows that there is a reasonably foreseeable risk and it is reasonably practicable to prevent exposure or control the risk from exposure, then a competent person or person(s) should be appointed by the dutyholder to help undertake the measures needed to ensure the risks are controlled. The appointed person or persons should have sufficient authority, competence and knowledge of the installation to ensure that all operational procedures are carried out in a timely and effective manner.

Where the dutyholder does not employ someone with the necessary competence, they may need to appoint people from outside the organisation. In that instance, the dutyholder should take all reasonable steps to ensure the competence of those carrying out work, who are not under their direct control, and that responsibilities and lines of communication between the relevant parties are properly established and clearly laid down.

Step 4: Prepare a written scheme for controlling the risk
As part of the management process, a written scheme should be prepared and should include, with reference to the risk assessment:

- up-to-date plan showing the layout of the plant or water system
- a description of the correct and safe operation of the system
- precautions to be taken
- checks to ensure efficiency of the scheme and the frequency of such checks
- remedial actions if the scheme is shown to be ineffective

Precautions/ Control measures include:

- avoiding water temperatures between 20°C-45°C and conditions favouring legionella bacteria growth and other microorganisms
- avoiding water stagnation
- avoiding the use of materials that harbour bacteria or provide nutrients for microbial growth
- controlling release of water spray
- maintenance of the cleanliness of the system and the water in it
- use of water treatment techniques
- taking action to ensure the correct and safe operation and maintenance of the water system

Step 5: Keep records
The appointed competent person must record the significant findings and ensure appropriate records are kept. Records should include details about:

- the appointed responsible person(s) for conducting the risk assessment, managing, and implementing the written scheme
- any significant findings of the risk assessment
- the written scheme and its implementation
- details about the state of operation of the water system, ie in use/ not in use
- the results of any monitoring, inspection, test or check carried out, and the dates

These records should be kept for 2 years after they are no longer current with the monitoring, inspections, tests and checks records kept for 5 years.

Further information
Further information can be found at www.hse.gov.uk/legionnaires or alternatively contact the Health and Safety at Work Inspectorate.