

# At a Glance

## Legionella

### DEVELOPMENT OF THE REGULATIONS:

The current regulations on legionella bacteria are contained in the **Approved Code of Practice (ACOP) L8**, which stems from the Health and Safety at Work etc. Act 1974 and the Control of Substances Hazardous to Health Regulations 2002 (COSHH).

If wet cooling towers are present, the conditions of the **Notification of Cooling Towers and Evaporative Condensers Regulations 1992** will also apply.

The most recent revision to the ACOP was in 2013 and its related Guidance was published separately (for the first time) in three documents: **HSG247 parts 1, 2 and 3**.

Sources: [www.hse.gov.uk/pubns/books/l8.htm](http://www.hse.gov.uk/pubns/books/l8.htm) and [www.hse.gov.uk/pubns/books/hsg274.htm](http://www.hse.gov.uk/pubns/books/hsg274.htm)

### THE PURPOSE OF THE ACOP L8 IS:

- to describe the management procedures required to reduce the risk from legionella bacteria
- to describe the legal responsibilities of building owners and operators for water management in respect of legionella bacteria
- to improve in four key areas: risk assessment; control schemes for managing risks; competence training; and monitoring and keeping records.

### SEPARATION OF THE ACOP FROM THE GUIDANCE:

In response to public consultation 2013/14, the Health and Safety Executive (HSE) decided to separate the ACOP from its guidance and publish three supporting documents: HSG274 parts 1, 2 and 3. The separation of the guidance from the ACOP L8 segregates the technical guidance from what the law requires and allows for it to be amended quickly. The HSE also plans for the technical guidance to be reviewed every four years so it can take technological advances into account.

- HSG 274 Part 1** offers detailed guidance on design and management of evaporative cooling systems such as cooling towers
- HSG 274 Part 2** offers the same for domestic hot and cold water systems
- HSG 274 Part 3** offers variations on guidance for 'other systems' that could pose a risk such as car washes and humidifiers. In particular, these 'other systems' can generate water droplets (spray) and may operate above ambient temperature, or may increase in temperature during operation. All these systems could therefore offer the ideal environment for legionella bacteria to grow.

### SUMMARY OF PUBLISHED REGULATIONS, SUPPORTING GUIDANCE AND BEST PRACTICE:

Health and Safety at Work Act 1974
Control of Substances Hazardous to Health Regulations 2002 (COSHH) .
ACOP L8 2013 Legionnaires' Disease—The Control of Legionella in Water Systems.
Legionnaires' Disease Technical Guidance HSG274, parts 1, 2 and 3.
CIBSE TM13— Minimising the risk of Legionnaires' Disease.
BSRIA Guides: BG 57/2015 Legionnaires' Disease - Risk Assessment and BG 58/2015 Legionnaires' Disease - Operation and Maintenance Log Book.
British Standard BS8580:2010. Sampling for Legionella bacteria in water systems. Code of practice.
British Standard BS7592:2008. Water quality. Risk assessments for Legionella control. Code of practice.
Health Protection Agency—Legionnaires' Disease guidance, data and analysis.

### KEY POINTS OF ACOP L8:

If you do not comply with the ACOP you can be prosecuted under health and safety legislation.

Ensure that duty holders carry out or initiate risk assessments.

Ensure understanding of all rules concerning buildings or activities where water is used or stored and where there is a means of creating or transmitting water droplets or spray (aerosols) which may be inhaled by occupants.

Note the separate, detailed Guidance in support of the ACOP on evaporative cooling systems (HSG274 part 1), domestic hot and cold water systems (HSG274 part 2), and other systems (HSG274 part 3).

### STEPS FOR REGULATORY COMPLIANCE WITH ACOP L8:

Appoint a person to be managerially responsible. The 'duty holder' has legal responsibility.

Carry out a thorough risk assessment.

Prepare a written scheme for preventing or controlling the risk. Review the risk assessment and control measures whenever there is a change of building use or HVAC system/pipes.

Implement and manage precautions.

Keep records/log book of the precautions implemented.

### Quick Facts

#### WHO IS THIS TOPIC GUIDE FOR?

- Facilities managers
- Building owners
- Building operators
- Landlords
- Health and safety officers
- Water treatment specialists

#### WHAT IS LEGIONNAIRES' DISEASE?

Legionnaires' disease is one of the infections caused by Legionella pneumophila (Lp) and other bacteria from the family Legionellaceae. The bacteria are present in the environment in soil and water and can survive and thrive in potable hot water systems. More than 50 species of legionella have been identified and half of these can cause various infections described as legionellosis.

#### INCIDENCES OF RECORDED OUTBREAKS

There are between 300-400 outbreaks recorded by the UK authorities each year - with under 200 cases originating within the UK.

According to the "Annual epidemiological report 2014. Respiratory tract infections", about half of these figures are due to exposure to contaminated communal and healthcare facilities and the rest through travel abroad.

The latest recorded major incidences in the UK were in 2012, in Edinburgh and Stoke on Trent, when 120 people contracted legionnaires' disease and four people died.

The HSE's legionella committee has examined outbreaks over a ten year period from 2002-2012 and identified common causes for outbreaks. The findings of the report are available at [http://www.hse.gov.uk/research/hsl\\_pdf/2012/hex1207.pdf](http://www.hse.gov.uk/research/hsl_pdf/2012/hex1207.pdf)

#### WHAT IS THE IMPACT OF LEGIONNAIRES' DISEASE?

Persons contracting the disease initially experience symptoms similar to severe flu that then develops into a life-threatening pneumonia. Legionella can be successfully treated with antibiotics if diagnosed in the early stages.

### INTRODUCTION

This topic guide offers at-a-glance reference information to the issues of legionella bacteria, regulatory and guidance frameworks, advice and further reading.



### HISTORY OF LEGIONNAIRES' DISEASE

The name 'Legionnaires' disease' was created in 1976, after a major outbreak in Philadelphia at a Legionnaires' Convention held at the Bellevue-Stratford Hotel. 221 attendees contracted the disease and 24 people died. On January 18, 1977, the source was traced to a previously unknown strain of bacteria, subsequently named Legionella, and the species that caused the outbreak was named Legionella pneumophila (Lp).

### WHO IS AT RISK?

Legionnaires' disease is a pneumonia that principally affects vulnerable groups whose immunity may be low such as the elderly and people with respiratory issues or pre-existing medical conditions.

Other people may also be susceptible due to illness and suppressed immune systems. Reportedly, men are 2.6% more susceptible than women and there are more recorded incidences with people over the age of 65.

### HOW IS THE DISEASE SPREAD?

Legionnaires' disease is contracted due to inhaling legionellae bacteria in water droplets or aerosol (spray) water sources, for example, from cooling towers, showers and taps. There are no recorded cases of person-to-person transmission of the disease. Domestic hot water systems operated at low temperature, as well as being ideal for bacterial growth, may also provide the means by which aerosols or water droplets are generated and the organisms dispersed into the atmosphere.

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### WHERE DO THE LEGIONELLA BACTERIA OCCUR?

Legionella bacteria are ubiquitous in the natural environment but multiply to hazardous concentrations in warm water. Typical sources of human infection are man-made water systems that provide the ideal conditions for legionella growth and subsequently generate sprays or aerosols.

For example:

HVAC equipment	cooling towers, evaporative condensers, humidifiers.
Hot and cold water services	taps, showers, spa baths.
Other sources	sprinklers, hose reels, fountains, car washes, fountains, machine tool cooling, horticultural misting.

Conditions favouring rapid growth of legionella bacteria include:

Water temperatures	Temperatures should be between 25°C and 50°C. Optimum temperature for bacteria growth is between 37°C (normal human body temperature) and 42°C.
The availability of nutrients	Examples of nutrients that 'feed' the bacteria include sludge in pipework and excessive biofilm on surfaces in contact with water.
Stagnation	Slow moving or stagnant water encourages biofilm and allows the accumulation of hazardous concentrations of bacteria.

### WHY CONDUCT RISK ASSESSMENTS?

- The purpose of the risk assessment is to survey water systems within buildings and identify those that are at risk of developing legionella bacteria.
- Risk assessments should identify all water systems within the building whether they present a potential risk of legionellosis.
- It's a legal requirement for most buildings other than owner-occupied dwellings.

### SAFE TEMPERATURES FOR DOMESTIC HOT WATER

Store hot water above 60°C in hot water tanks (or calorifier)	Heating water daily above 60°C will kill 90% of Legionella pneumophila within two minutes. Heating above 70°C will kill the bacteria almost instantly.
Distribute hot water above 50°C	Hot water must be distributed above 50°C to prevent bacteria proliferation (ideally 55°C from domestic taps).
Keep cold water below 20°C	Cold water will not kill Legionella pneumophila but will prevent it

### HOW TO CONTROL THE RISKS

Key messages for facilities managers, building owners and operators:

- Understand your legislated responsibilities for health and safety.
- Carry out risk assessments and implement the findings.
- Maintain domestic water temperatures outside the legionellae growth range.
- Avoid excessive water storage and stagnation.
- Treat cooling towers and other risk systems with biocides.
- Keep records of regular monitoring.

<b>Temperature regime</b>	Maintain cold water below 20°C and hot above 50°C at outlet (or supply to thermostatic mixing valve).
<b>Water treatment</b>	Maintain chemical disinfection of non-potable water systems such as cooling towers and spa baths.
<b>Remove redundant pipe-work</b>	Areas where water can stagnate such as dead legs and taps that are not used very often should either be removed or the systems flushed once a week.
<b>System design</b>	Low usage outlets (such as for cleaner's sinks) should be sited upstream of more frequently used outlets to avoid stagnation.  Long runs of cold water pipe in ceiling voids should be avoided as these will pick up temperature.
<b>Legal responsibility</b>	Appoint someone (within an organisation) with legal responsibility to ensure water safety and maintain records.  Although risk assessments and day-to-day monitoring and maintenance may be delegated internally or to a subcontractor, the legal responsibility for compliance remains with the building owner/operator.
<b>Record keeping</b>	Document all water treatment and monitoring activity and responses to the risk assessment.  Records must be readily available on site.
<b>Training</b>	Properly train staff to maintain and operate the water systems correctly.  Training must ensure complete understanding of the water systems involved, including design and operation; knowledge of water treatment processes; and awareness of factors governing legionella bacteria risks; and controlling the risks.
<b>Certification</b>	Regular validation of qualifications and experience for contractors used for risk assessment and system maintenance. Reputable companies will likely be members of the Legionella Control Association.

### Cooling towers: friend or foe?

Legionellae bacteria are ubiquitous in the natural environment and an opportunistic pathogen. They do not need man-made systems to proliferate but we have, by accident, created several situations in modern buildings that potentially provide the perfect conditions for the bacteria to rapidly multiply to hazardous concentrations. The key to risk reduction or elimination is the avoidance of these conditions or the introduction of measures to kill off the bacteria before they kill us.

In reality, the risk of dying from Legionnaires disease is small, especially if you are relatively young and fit. You are on average 2700 times more likely to die of cancer. However, while building operators can't generally eliminate your risk of cancer, they can more or less eliminate your risk of Legionnaires' disease through sensible design decisions and good standards of maintenance.

Those risk reduction measures are based around avoiding the conditions that favour the rapid multiplication of the bacteria, and preventing them being released into the air for potential victims to inhale. One consequence of this has been a vast reduction in recent years in the number of cooling towers associated with building services.

A badly-maintained cooling tower that becomes seriously contaminated with legionellae bacteria has the potential to spread aerosol-containing bacteria over a wide area and infect hundreds of people. So, why can't we swap all cooling towers for dry coolers and eliminate the risk? The answer is that cooling towers are by far the most efficient way of dissipating low temperature waste heat from industrial processes and building cooling systems. Dry coolers usually result in higher overall energy consumption and increased carbon emissions for the process relative to cooling towers though for small systems this can be more than offset by the reduced capital maintenance costs. For large systems cooling towers remain the most cost-effective choice and good maintenance and chemical water treatment will eliminate the risk of spreading bacteria and causing Legionnaires' disease.

### Sampling for legionella bacteria

Cooling towers are routinely sampled for legionella and other bacteria to verify the effectiveness of the disinfection regime. Domestic water systems are only sampled where there is concern over the condition or control of the system, where the system relies on supplementary disinfection processes or following a suspected outbreak.

Action levels for legionellae in domestic water (colony forming units per litre)

<b>Up to 100 CFU/litre</b>	– Continue monitoring. NB Lower limits may be set for high risk populations such as those in hospital.
<b>100-1000 CFU/litre</b>	– Review control measures & risk assessment. Consider disinfection.
<b>&gt; 10,000 CFU/litre</b>	– Resample to confirm. Review control measures & risk assessment. Carry out remedial disinfection. Continue sampling to confirm regained control.

**BSRIA BOOKSHOP** - free PDF downloads for members of the following items at [www.bsria.co.uk](http://www.bsria.co.uk):

**Water Treatment for Closed Heating and Cooling Systems**, Brown R, BSRIA, BG 50/2013, October 2013, 104pp

**Legionnaires' Disease - Risk Assessment**, Brown R and Deramchi S, BSRIA, BG 57/2015, February 2015, 89pp

**Legionnaires' Disease - Operation and Maintenance Log Book**, Brown R and Deramchi S, BSRIA, BG 58/2015, May 2015, 80pp

### BSRIA LEGIONELLA WEBINAR

26th June 2015 - Legionnaires' Disease Guides  
Download the recording: [www.bsria.co.uk/download/asset/legionella-webinar-recording-mp4](http://www.bsria.co.uk/download/asset/legionella-webinar-recording-mp4)

Download the presentation: [www.bsria.co.uk/download/asset/legionella-presentation-webinar-pdf](http://www.bsria.co.uk/download/asset/legionella-presentation-webinar-pdf)

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### RESOURCES (NON-REGULATORY)

**Health and Safety Executive (HSE)**  
[www.hse.gov.uk/legionnaires/](http://www.hse.gov.uk/legionnaires/)  
Plenty of peripheral, related documentation on managing legionella bacteria.

**Legionella Control Association**  
[www.legionellacontrol.org.uk](http://www.legionellacontrol.org.uk). A source for certified assessors, qualifications and training.

**European Working Group for Legionella Infections**  
[www.ewgli.org](http://www.ewgli.org). A source research on epidemiological and microbiological aspects of legionnaires' disease.

**Water Management Society (WMSoc)**  
[www.wmsoc.org.uk](http://www.wmsoc.org.uk). Information, training and industry contacts for legionnaires' disease.

**UK Water Treatment Association (UKWTA)**  
[www.ukwta.org](http://www.ukwta.org). Source of consumer information on legionella bacteria.

**British Association for Chemical Specialities (BACS)**. [www.bacsnet.org](http://www.bacsnet.org).

**Commissioning Specialists Association (CSA)**. [www.csa.org.uk](http://www.csa.org.uk)

### BSRIA INFORMATION CENTRE AND LIBRARY:

Many articles, books and other publications on legionella bacteria / legionnaires' disease, including those mentioned in the references below, are available to members on loan or photocopy on request at [www.bsria.co.uk](http://www.bsria.co.uk); or telephone 01344 465571. All copyright conditions apply.

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