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## Legionella Control In Residential Property

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### **1.0 Introduction to Legionella and Legionnaires' Disease**

1.1 Legionella is the name given to a group of bacteria which occur in almost all fresh water, including in all likelihood from time to time, the mains. They are also found in streams, rivers and lakes, in soil and in compost. The name comes from an outbreak of pneumonia affecting delegates at a conference of the American Legion in 1976, which affected almost 200 and killed around 30, some within only a few days.

1.2 Generally, legionella are not a direct problem as they occur in low concentrations in water and do no harm; it is quite safe for normally healthy people to drink water containing legionella although anyone with a serious medical condition does run a risk of infection. The danger only arises if the numbers increase significantly in warm water and the water is inhaled in fine droplets (an aerosol) such as is produced by showers and to a lesser extent taps, ballcocks etc.

1.3 Legionnaires' disease is very serious, being an acute pneumonia, and it kills approximately one in eight of those infected. Those who survive will have had an extremely unpleasant experience and may be left permanently disabled. There are two other illnesses caused by legionella, Pontiac fever and Lochgoilhead fever, which are not fatal and do not lead to disability.

## 2 What is Required in Managed Residential Property

2.1 The law makes no demands about legionella control in the home, but in any premises where business is involved the Health and Safety at Work Act (HSWA) applies and this includes managed dwellings. The duties fall to the employer and employee rather than the resident and the details are laid out in a number of sets of regulations, an approved code of practice (known as L8), several guidance notes and the Health and Safety Executive Website. In general, the responsibility lies with whoever arranges for any maintenance or repairs, whether that person pays or recovers payment from the resident.

2.2 First, and inescapably, there must be a risk assessment. This does not have to be very complex and expensive for a typical residential building (although it would be for a large commercial building, hospital or industrial plant), it needs to be “suitable and sufficient”. “Suitable and sufficient” means exactly what it says, the assessment must be appropriate to the system and the use it is being put to and it must be thorough. In general, residential property has very simple water systems and a suitable and sufficient assessment is correspondingly simple and may even save more money on unnecessary “remedial works” or “precautions” than it costs to carry out.

2.4 The purpose of the risk assessment is to find out and formally record how much of a problem legionella is likely to be. The assessment must be right, as it could (in the extreme) be tested in a court of law. After many years a British Standard is to be published in late 2010 (BS8580:2010) to clearly state risk assessment requirements.

2.5 There also needs to be a schematic diagram, which is a simple drawing which shows the layout of the water systems. Schematic diagrams do not include all details such as every servicing valve and tap, but they should include the origin of the water (usually the mains), branches to supply drinking water taps, cold water tank(s), any hot water service calorifiers in the area being covered and the configuration of the distribution systems. The purpose of a schematic diagram is to enable someone who is not familiar with the building and may not be experienced in reading technical drawings to understand the water systems quickly and easily.

2.6 Once the risk assessment has been carried out, the person who is responsible has to decide what needs to be done to control the legionella risk or to eliminate it (which is unlikely). A good risk assessment will make clear how great the risk is and will give guidance as to how it can be satisfactorily controlled. In rare cases, the conclusion of the risk assessment might be that the risk is insignificant and that no further action is needed.

2.7 Assuming the risk cannot be eliminated, or that it would not be reasonably practicable to do so (reasonably practicable means doing everything which can be done, except where the cost would be disproportionate to the benefit in terms of reducing the risk), any faults need to be put right (which often reduces the risk significantly) and a programme of inspections, checks, measurements and hygiene maintenance (the “scheme of control”) needs to be drawn up and implemented. Any system which is correctly designed and installed, reasonably well maintained and operated according to its design needs only a simple scheme of control and relatively little in the way of intervention; examples for two different building types are set out in section 4.

2.8 Having assessed the risk, decided what needs to be done to control it, put the programme into effect, all that remains is to manage the water system, ensure faults are fixed and to keep a record of actions.

### 3 Debugging the Legionella Management myths in Managed Residential Property

#### 3.1 Chlorination (disinfection) of cold water storage tanks / inspection of hot water calorifiers

It is common practice for cold water tanks to be disinfected annually, but the guidance from the HSE in L8 is to inspect them annually and clean and disinfect them only when the inspection indicates the need. Money can be (and is) wasted on unnecessary tank disinfection, an independent risk assessment / routine checks will provide an unbiased answer.

It is very uncommon (but often not very difficult) to inspect the interior of a hot water calorifier or to clean and descale it, although the HSE advocates annual inspection and cleaning and descaling as indicated where necessary.

#### 3.2 Microbiological testing - TVC and Legionella

Microbiological testing for Legionella and TVCs are not generally required in residential property. Diplslides are specifically recommended against by the HSE in L8.

The few circumstances when testing is appropriate are as follows.

#### Requirement for TVCs

- When drinking water is supplied via a tank, six monthly microbiological checks are required. Appropriate checks would be TVC at 37°C x 48hr, TVC at 22°C x 72hr, coliforms and *E. coli*. A mains water sample should be taken at the same time for comparison and the TVCs should be no more than 10 times greater in the water from the tank; there should be no coliforms and the presence of *E. coli* should be treated as a serious failure and referred to a specialist for advice.

#### Requirement for Legionella sampling

- If the routine controls of keeping cold water cold and keeping hot water hot fail, samples should be analysed for legionella weekly until control is restored. Although this may sound extreme, it would not be if the failure were corrected promptly.
- If a method other than temperature is used for legionella control, such as proportional dosing of chlorine dioxide, (for example where temperature control cannot be achieved in a dilapidated or incorrectly configured system, or where low hot water temperatures are maintained for economic, environmental or scald protection reasons) samples should be analysed for legionella monthly for a year to prove the effectiveness of the regime.
- Where residents are at especial risk, such as in care homes, samples should be analysed for legionella and the risk assessment should indicate where to take the samples and how often.
- Finally, samples will be taken if a system is suspected of being the source of one or more cases of legionnaires' disease (or Pontiac fever or Lochgoilhead fever). It is likely these samples will be taken by an investigating officer rather than the building manager.

### 3.3 Reactions to Risk Assessment

The difficulty of carrying out a risk assessment which has to balance a lethal risk with a low likelihood that it will happen can follow on into the management and often results in a tendency to do too much or nothing at all. Clearly, doing nothing at all is not acceptable and would be wholly indefensible if someone were to be infected or if an environmental health officer were to carry out an inspection, but doing too much can be just as wrong, especially if it results in diverting expenditure from what is more important to what is more evident (or more profitable for the consultant or maintenance contractor).

#### **4 Examples of Schemes of Control and Records to be Kept**

4.1 Many simple tasks do not require detailed method statements and do not involve any hazards, so the written scheme of control could consist of a few words describing what to do, a frequency and a procedure for addressing nonconforming results. This approach has been used wherever possible in the examples which follow.

4.2 More complex tasks such as tank cleaning and disinfection require method statements and these are usually provided by the contractor carrying out the work. The responsible person should check that the contractors method statements are safe and suitable.

4.3 Typical programmes of control for two types of residential premises are set out on the following pages. A simple log sheet which provides spaces for recording measurements and comments should be drawn up to match the programme in each building. All records should be signed by the person who carried out the work, dated and retained for five years.

#### 4.4 System comprising of cold water storage tank(s) + Landlords outlets + Calorifier

- Risk Assessment
  - It may be sufficient to amend this when faults have been put right, otherwise it should be reviewed by the assessor. Normally risk assessments are reviewed every two years to make sure they are kept up to date.
- Schematic diagram
  - It may be sufficient to amend this if any minor changes are made, otherwise it is normally reviewed with the risk assessment to make sure it is kept up to date.
- Log Book
  - All documents and records of checks etc need to be signed and dated and filed in the site log book
- Weekly
  - Flush any taps etc which have not been used in the last week.
- Monthly checks
  - Check the temperatures at the taps nearest and furthest from the tank and calorifier (sentinel points) and a selection of others to include all areas over the course of a year. The cold should be less than 20°C after two minutes running, the hot should be at least 50°C within one minute running.
  - Check the temperature of the flow from the calorifier (60°C) and the return (at least 50°C).
- Six monthly checks
  - Check the incoming mains water temperature and the temperature in the tank remote from the ballvalve (if safely accessible).
  - If the tank supplies drinking water, submit samples of tank and mains water for bacteriological analysis (TVC 30°C, TVC 22°C, coliforms and *E. Coli*).
- Annual checks
  - Inspect the exterior and interior of the cold water tank(s) and decide whether to clean and disinfect.
  - Draw a sample from the base of the hot water calorifiers(s) and check for sediment, inspect the interior if practicable and decide whether to be clean and descale.

#### 4.5 System comprising of cold water storage tank(s) / Landlords outlets (cold only)

- Risk Assessment
  - It may be sufficient to amend this when faults have been put right, otherwise it should be reviewed by the assessor. Normally risk assessments are reviewed every two years to make sure they are kept up to date.
- Schematic diagram
  - It may be sufficient to amend this if any minor changes are made, otherwise it is normally reviewed with the risk assessment to make sure it is kept up to date.
- Log Book
  - All documents and records of checks etc need to be signed and dated and filed in the site log book
- Weekly
  - Flush any taps etc which have not been used in the last week.
- Monthly checks
  - Check the temperatures at the taps nearest and furthest from the tank (sentinel points) and a selection of others to include all areas over the course of a year. The cold water temperature should be less than 20°C after two minutes.
- Six monthly checks
  - Check the incoming mains water temperature and the temperature in the tank remote from the ballvalve (if safely accessible).
  - If the tank supplies drinking water, submit samples of tank and mains water for bacteriological analysis (TVC 30°C, TVC 22°C, coliforms and *E. Coli*).
- Annual checks
  - Inspect the exterior and interior of the cold water tank(s) and decide whether to clean and disinfect.

## 5.0 Glossary

Aerosol	A fine mist of water droplets created by a shower and to a lesser extent a tap or floatvalve.
Calorifier	A vessel for heating water, usually cylindrical in shape. Calorifiers may be heated by boiler system water, electric elements or (rarely in residential property) steam. (See also water heater).
Chlorination	The use of dilute chlorine solution (usually from sodium hypochlorite) to disinfect part or all of a water system. When carrying out chlorination the concentration of chlorine and the contact time both need to be specified and controlled. The usual concentration is 50 ppm and the usual contact time is 1 hr. (See also disinfection, ppm and mg/litre)
Chlorine dioxide / ClO <sub>2</sub>	A chemical usually supplied in two liquids which are mixed in a proprietary device for treating water as a alternative to conventional temperature control. Usually used where dilapidated or badly modified systems cannot maintain control temperatures throughout, but may be used as an economic, environmental (carbon footprint reduction), or scald protection measure. (See also TMV).
Coliform	A type of bacteria, usually harmless, but not found in mains water and therefore a useful indicator of external contamination.
Dipslide	A simple field test for TVC, not applicable in residential property.
Disinfection	Treating a water system to reduce the number of bacteria to an acceptable level, usually by chlorination. Disinfection is not sterilisation, which means reducing the number of bacteria to zero and is not practicable. (See also chlorination)
E. Coli	Abbreviation for Escherichia coli, bacteria common in excrement but rare elsewhere and therefore a useful indicator of faecal contamination.
EHO / Environmental Health Officer	Local authority official who enforces the Health and Safety at Work Act in small to medium sized non-industrial premises. (See also HSE).
Escherichia coli	A type of bacteria common in excrement but rare elsewhere and therefore a useful indicator of faecal contamination.
Heterotrophic count	Another name for TVC.
HSE / Health and Safety Executive	Government department which enforces the Health and Safety at Work Act in large and industrial premises. (See also EHO).
L8	A guidance document on legionella control in two parts, the first being an approved code of practice (ACoP) and the second more detailed guidance. Though it is not strictly speaking the law, it has "special legal status" and can be enforced (like The Highway Code). The full title of L8 is <i>Legionnaires' disease. The control of legionella bacteria in water systems Approved code of practice and guidance.</i>

Legionnaires' disease	The infection of a person with legionella bacteria, causing pneumonia. A very serious condition which is often fatal.
Legionella	The bacteria which cause legionnaires' disease (and Pontiac fever and Lochgoilhead fever).
Legionella risk assessment	A reasoned judgement of the significance of legionella in a particular context, such as when occupying a building or carrying out a task (see also legionellosis risk assessment).
Legionellosis	Plural of legionellosis.
Legionellosis	Legionnaires' disease, Pontiac fever or Lochgoilhead fever.
Legionellosis risk assessment	A reasoned judgement of the significance of legionella in a particular context, such as when occupying a building or carrying out a task (see also legionella risk assessment).
Lochgoilhead fever	The infection of a person with legionella bacteria which does not cause pneumonia. Less serious than legionnaires' disease and not fatal (see also Pontiac fever).
Log book	A file, which can be hard copy or electronic, in which <b>all</b> records relating to the control of legionella are kept.
mg/litre	An alternative way of expressing ppm (parts per million)
Outbreak	Two or more cases of legionnaires' disease (or Pontiac fever or Lochgoilhead fever) within 6 months. Positive legionella analysis of any number of water samples is NOT an outbreak.
Parts per million	See ppm.
Plate count	Another name for TVC.
Pontiac fever	The infection of a person with legionella bacteria which does not cause pneumonia. Less serious than legionnaires' disease and not fatal (see also Lochgoilhead fever).
ppm	An abbreviation for parts per million. A measure of concentration ten thousand times less than per cent, used to specify the concentration of chlorine when carrying out disinfection. ppm is exactly the same as mg/litre.
Risk assessment	A reasoned judgement of the significance of any hazard in a particular context, such as when carrying out a task.
Schematic diagram	A simplified drawing of the layout of the water systems intended for anyone not familiar with the building, but not necessarily able to read a technical drawing.
Scheme of control	A set of tasks scheduled at intervals to check and control the risk of legionella.
Tank	More correctly called a cistern, a vessel for holding water. Break tanks are typically small and are placed between the incoming mains and booster pumps. Storage tanks are large and hold a reserve of water.

<p>TMV / thermostatic mixing valve</p>	<p>A three way valve which blends cold and hot water and delivers warm water for washing, showering or bathing. Used as a scald protection device, usually only required where users are very young, very old or otherwise infirm. Blended (warm) water pipeworks should be as short as possible, ideally no longer than 1m. TMVs require regular maintenance.</p>
<p>TVC</p>	<p>Total Viable Count (of bacteria): a measure of the overall NOT legionella bacteria level. TVCs cannot be used to predict the occurrence of legionella.</p>
<p>Water heater</p>	<p>A small unit providing hot water to one or two outlets or facilities. Legionella control guidance from the HSE makes no distinction between calorifiers, which are usually fairly large and supply many outlets and water heaters.</p>
<p>Water treatment</p>	<p>See chlorine dioxide.</p>