



Hygiene and controlling bacterial proliferation



Chemical shocks are ineffective over the long term



Thermal shocks are ineffective over the long term

## ABOUT LEGIONNAIRES' DISEASE

### What is Legionnaires' disease?

It is a serious **respiratory infection** caused by a bacterium named Legionella. The disease which follows, Legionnaire's, is mortal in 15 to 20% of cases.

Legionella is a **network bacterium** which develops in warm water in **pipework** or cisterns. It only becomes dangerous when inhaled when it may spread into the lungs and rapidly develop in white blood cells.

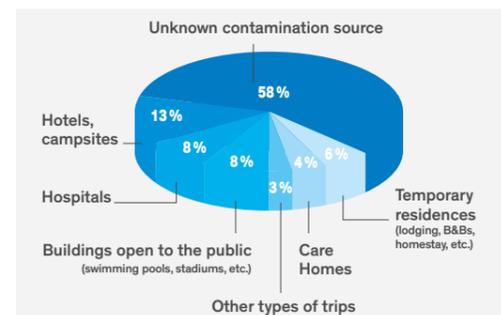
Legionnaires' disease is more likely to affect adults, especially older smokers and people with respiratory problems or weak immune systems.

Legionnaires' disease is treated with antibiotics. The World Health Organization (WHO) states that the alert level for Legionella starts at 1,000 Colony Forming Units (CFU) per litre of water (50 for hospitals).

### Which installations are at risk?

Legionnaires' disease develops in **stagnant water** between **25-45°C**, with an optimum temperature between 30-37°C. Humid areas with scale, mud or which have been affected by corrosion are more prone to Legionella development.

Environments at risk include sanitary hot water systems, cooling towers, health resorts, water fountains, shower rooms, spas, etc.



Source: French Institute for Public Health Surveillance, 2015, based on 1,389 declared cases

### Development of Legionella per temperature

Temperature	Development of Legionella
< 20°C	Dormant
25 - 45°C	Multiplies
50°C	90% die within 2 hours
60°C	90% die within 2 minutes

Source: CSTC Belgium 11/02

### Current curative treatments are ineffective

- Chemical shocks: a chlorine injection 50 ppm for 60 minutes (in Europe:  $\geq 10$  mg/litre for 8 hours).
- Thermal shock: circulating hot water at 60°C for 60 minutes (in Europe: 70°C for 30 minutes).

### A short term effect:

The system can be very quickly recolonised **within 3-4 weeks**. The inside of the pipework is covered by a biofilm: a sort of gel which bacteria stick to, feed on and proliferate in. The biofilm protects them and enables them to withstand temperature fluctuations (thermal shocks) and biocide products (chemical shocks).

During curative treatments, the risk is not only that the bacteria will get used to the treatment and thus develop their resistance to it, but above all will provoke detachment of bacteria aggregates which will be deposited closer to the water outlet and thus, to the user.

### Negative effect in distribution networks and drainage systems

They are not necessarily designed to withstand temperatures above 60°C or significant quantities of chlorine. They can cause **corrosion or an early wearing of the distribution and drainage system**.

### High risk for the user

- During the treatment, the user is exposed to high risks:
  - **3<sup>rd</sup> degree burns** in the case of a thermal shock.
  - **Poisoning** in the case of chemical shock treatment.

**Costly and difficult operation to undertake**  
Curative treatments are difficult to undertake fully at all points in the system (various deposits, dead-legs, heat loss, etc.). They require the water **supply to be out-of-service** and the mobilisation of **maintenance staff**.

To avoid these treatments it's important to act on three levels:

- **Avoid dead-legs and water stagnation.**
- Regularly **maintain** the system to prevent corrosion or scaling.
- **Produce and store hot water at a high temperature** that will prohibit bacterial proliferation.
- **Maintain the temperature** in the system with a circulating loop and mix the water as close as possible to the point-of-use.

The only **preventive treatments** that are effective in the long term are the ones recommended by the **UK Health and Safety Executive (HSE) technical guidance "HSG274 Part 2" in 2014**.

## REGULATIONS

HSE guidance recommends the monitoring of Legionella levels where there is a high risk of contamination. The guidance recognises that the traditional method of controlling the risk of Legionella development is to produce and distribute higher water temperatures. Yet, this significantly increases the risk of scalding. (Source: *Centre for Burns, St Joseph and St Luc Hospital, Lyon, France*).

- **At 50°C:** Scalding in 7 sec. and 3<sup>rd</sup> degree burn in 100 sec.
- **At 60°C:** 3<sup>rd</sup> degree burn in 3 sec. on average (5 sec. for an adult, 1 to 2 sec. for a child).

**HSG274 Part 2 recommends the installation of thermostatic mixing valves where there is a high risk of scalding to users e.g. very young, very elderly, infirm, mentally disabled and physically disabled.**

- Hot water should be distributed so that it reaches a temperature of 50°C (55°C in healthcare premises) within one minute at the outlets.
- Thermostatic mixing valves should be installed as close as possible to the point-of-use.

### HSG 274 Part 2, 2014

- HSE guidance for the control of Legionella bacteria in hot and cold water systems states that monitoring for Legionella should be carried out:
- when water is treated with biocides or when distribution temperatures are reduced from HSE guidelines.
  - where water treatment regime control levels are not being consistently achieved.
  - where there is a high-risk of contamination e.g. hospitals and care homes.
  - where an outbreak of legionellosis has been identified.

A risk assessment is required to identify:

- **Monitoring frequency of installations** for all points of use considered at-risk:
  - **Sentinel points** for **temperature** measurement and **bacteriological testing**:
    - **Once a week** in healthcare facilities.
    - **Once a month** for all other facilities receiving public.
- DELABIE recommends two water assessments: one on the first draw-off, to detect Pseudomonas aeruginosa and one on the second to detect Legionella.
- If the hot water systems haven't been used for several weeks, **samples for Legionella assessment** have to be taken just after the purge of the system and within two weeks before receiving the public.

### Legionella monitoring levels

Alert level	< 100 CFU/L
Remedial action level	> 100 up to 1,000 CFU/L
Curative action level	> 1,000 CFU/L

CFU/L: Colony Forming Units per litre

### The control of Legionella bacteria in hot and cold water systems

Guidance on compliance with the relevant parts of the Management of Health and Safety at Work Regulations 1999 in public premises: (Source: *UK Health and Safety Executive, HSG 274 Part 2, 2014*)

It recommends:

- **Minimum temperatures to limit the risk of development of Legionella.**
- **Maximum temperatures to limit the risk of scalding.**
- **At the calorifier outlet the hot water temperature must constantly be above 60°C.**

• **In storage equipment**, water must be maintained at a **minimum temperature of 60°C**.

• **At every point in the distribution system**, hot water must be delivered to the outlet at **50°C** (55°C in healthcare facilities) within **one minute** of turning on the tap.

The HSE advises that long pipe runs between TMVs and outlets should be avoided and should not exceed **2 metres in length**.

The maximum temperature of sanitary hot water at the point-of-use is set at:

- 44°C for bath fill (46°C if assisted)
- 41°C for showers
- 41°C for washbasins, with special dispensation for catering applications.

(Source: *Health and Safety Executive information sheet 09/12; TMVA Code of Practice, 2000*).



PREMIX SECURITY



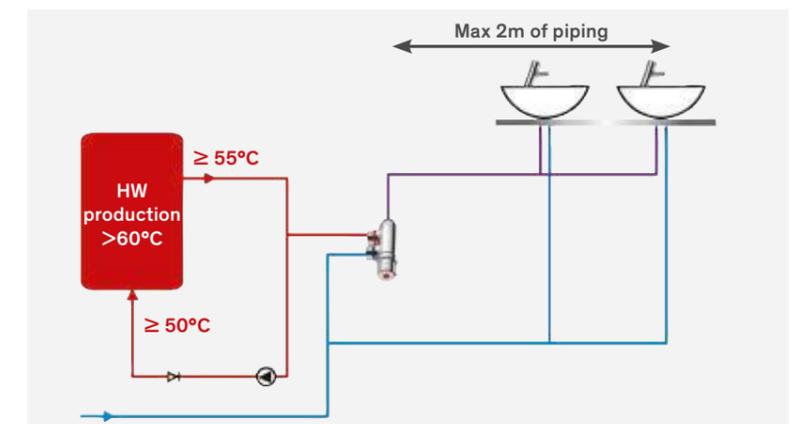
PREMIX COMFORT



PREMIX COMPACT



PREMIX NANO



Pipes between centralised thermostatic mixing valves and the points-of-use should not be longer than 2 metres.