

1. Why this guidance?

Legionnaires' disease is a type of pneumonia which can cause serious illness in persons who are susceptible such as those over 50 years, smokers, and those with underlying health conditions. In Europe just under 1 in 10 of those who acquire Legionnaires' disease die. Legionnaires' disease and the milder form, which is a flu like illness called Pontiac fever, is caused by the growth of *Legionella* in building water systems which are not adequately managed. Aerosolized water from systems containing *Legionella* can cause Legionnaires' disease or Pontiac fever to exposed persons. Closure of buildings, parts of buildings or their restricted use, can increase the risk for *Legionella* growth in water systems and associated equipment including evaporative air conditioning systems, spa pools / tubs and other equipment if they are not managed adequately.

2. Which buildings is this guidance aimed at and why is this guidance important?

Whilst this guidance is aimed at hotels, campsites, cruise ships etc. it is relevant to all public, residential and office buildings with similar water systems. It is very important that, during this pandemic, you manage and keep all water systems safe whilst closed or during partial shutdowns for the future health and safety of guests, visitors and staff. The procedures you follow now will have an impact on how soon you can open your facilities without causing harm to health.

3. Where should I start?

Review your risk assessment and update it to reflect your current water system usage and other systems or equipment which have reduced use or are shut down. Document how you will protect staff, visitors and others from *Legionella* growth who remain on your property and when it is re-opened. If required, get help from an experienced and competent water treatment advisor, public health or environmental health authorities. **Where national guidelines or legislation are in place then you must follow those.**

4. Key points to remember about Legionella risk

It is important to remember that *Legionella* will grow in water systems to levels which may cause infection where:-

- the temperature of the water is between 25 °C and 50 °C (This does not have to be in the entire system, just relatively small areas at these temperatures will allow *Legionella* to grow and they can then infect other parts of the system and will be subsequently difficult to control). It is therefore important to prevent the hot water from cooling below 50 °C and the cold from warming above 25 °C
- Other risk factors include:
 - poor or no flow in the water system,
 - the use of materials which provide protective niches and nutrients for growth and biofilm formation including sludge, scale, rust, algae and other organic matter which may collect in the system pipework and calorifier particularly during periods of stagnation,
 - there is a means of creating and disseminating inhalable droplets such as aerosols generated by: evaporative cooling systems (e.g. cooling towers and evaporative condensers), operating a tap, showering, operating a spa pool or indoor fountain, flushing a toilet, other equipment such as pressure washers, spray irrigation systems, footbaths, etc. should also be managed so they will not pose a risk when the building is re-opened
 - there is the potential for contamination from poor quality source water (and absence of point-of-entry (POE) treatment), For example where supply quality is:
 - not from a public utility
 - not of consistent potable quality
 - intermittent or through a bowser or other supply method.

5. Maintain your normal control regimes

If you intend that the building is to be closed for less than a month or you still have some room occupancy you can also make the decision to follow your normal control regimes or if you will be closed for longer than a month but you wish to remain safe to re-open immediately after the closure then follow steps 1-10.

1. Maintain your normal control regime so that the hot water is circulating throughout all parts of the system and flow temperature is maintained at ≥ 60 °C and the return on all loops is at ≥ 50 °C.
2. The temperature reaches all outlets at ≥ 50 °C within one minute and the cold reaches ≤ 25 °C after running the outlet (normal flow, avoid splashing) for 2 minutes. If using a biocide, maintain target levels throughout all of the system.

3. Flush gently (to reduce aerosols) all hot and cold outlets (showers and taps) at least weekly until they achieve the above temperatures. Where there are thermostatic mixer valves ensure the pipework feeding them achieves the same temperatures. Flush all WC cisterns, urinals, by-passes and any other points on the network
4. Ensure drinking water storage tanks remain at 0.2-1.0 ppm of free chlorine
5. Adjust your monitoring regime to be able to verify these levels have been achieved at all sentinels and other little used outlets.
6. Ensure you keep all documentation for inspection including: - reviewed and amended risk assessments (these can be annotated by hand) monitoring data and remedial actions, with evidence of who carried out the work, add time date and signature.

6. Manage other systems

Check what other systems are on site which could pose a risk of Legionnaires' disease e.g. evaporative cooling towers, swimming pools, spa pools etc. and decide which systems need to be maintained and which systems are to be shut down.

7. Ensure all systems which continue to operate, follow their normal control, monitoring and documentation regimes.
8. For systems which are to be closed, where possible either drain and dry thoroughly, or disinfect so all parts of the system reach 50 ppm free chlorine for 1 hour (or equivalent), flush through and drain.
9. For temporarily closing pools refer to <https://www.pwtag.org/guidance-on-temporary-pool-closure/> .
10. Disinfect all water systems before bringing into use again.

7. Managing systems to be shut down

If it is likely that the building is to be closed for more than a month, or you have made the decision not to heat your hot water for energy conservation or have no-one on site, then follow one of these options:

7.1. Closing down without draining

11. Before closing the system down, turn off the calorifier (heated storage water tanks), drain from the base until the water runs clear, valve off the water supply and drain.
12. Where the system has not been disinfected recently or there have been problems with temperature or biocide levels then consider carrying out a full system disinfection with flushing through to all outlets to achieve 50 ppm free chlorine or equivalent biocide for at least an hour.
13. Flush through and refill and check the biocide is at the highest target normal operating level at the furthest outlets.

When restarting,

14. Carry out a full system disinfection of the cold-water system, flushing through to all outlets to achieve 50 ppm free chlorine or equivalent biocide for at least an hour checking that this level is achieved at the furthest outlets, top up when required.
15. Flush out and refill the system to achieve maximum normal operating target levels of disinfection (equivalent to at least 0.2 ppm free chlorine).
16. Refill and reheat the calorifier to 60 °C. and when the calorifier/ storage water has been heated to 60 °C throughout, open the valves and flush through all outlets taking care to avoid any scalding risk.
17. Monitor temperatures and biocide levels where applicable, adjust where necessary, for at least 48 hours and then take *Legionella* samples from the sentinel outlets (microbiological samples taken before 48 hours following disinfection may give false negative results).
18. When you are satisfied the hot and cold-water systems are under control then reopen the building.
19. Ensure you keep all documentation for inspection: including the review and update of risk assessments (these can be annotated by hand) including monitoring data etc., with evidence of who carried out the monitoring, add time date and signature.
20. Follow the advice for other additional waters systems or equipment as above.

7.2. Draining systems down

Any system which is drained, unless very small and simple and can be physically dried, will pose a risk when restarted as there will be remaining pockets of water and condensation which is sufficient to allow microorganisms including *Legionella* to grow.

21. Carry out a full system disinfection flushing through to all outlets to achieve 50 ppm free chlorine or equivalent biocide for at least an hour and then drain.
22. Before re-opening follow steps 14-20 as above

8. Where biocides are NOT used or allowed

23. When drained down, blow air through the system to dry as thoroughly as possible

When restarting

24. Flush the cold system from every outlet
25. Refill and reheat the calorifier to 60 °C and when the calorifier/ storage water has been heated to 60 °C throughout, open the valves and flush through all outlets taking care to avoid any scalding risk.
26. Monitor temperatures and adjust where necessary, for at least 48 hours and then take *Legionella* samples from the sentinels

Follow steps 18 to 20 as above.

Please note

Whilst every effort has been made to ensure the accuracy of the material contained in this publication, all water systems are individual in nature as a result of their design, materials and usage. The author(s) do not accept any responsibility whatsoever for loss or damage occasioned or claimed to have been occasioned, in part or in full, as a consequence of any person acting or refraining from acting, as a result of a matter contained in this publication.

These guidelines have been developed by experts from the ESCMID Study Group for *Legionella* Infections including:- Dr Susanne Surman-Lee (Chair) (UK), Dr Vicki Chalker (UK), Dr Sebastian Crespi (Spain), Dr Birgitta de Jong (Sweden), Dr Lara Payne Hallstrom (Sweden), Dr Jaana Kutsenov (Finland), Dr John V Lee (UK), Dr Maria Louisa Ricci (Italy), Mr Wilco van der Lugt (Netherlands), Dr Jimmy Walker (UK).

If you notice any mistakes in these guidelines or have suggestions for improving them, please address them to susannelee@leegionella.co.uk

Please see also the European Guidelines which include the 15 point plan for how to manage water systems safely

<https://www.ecdc.europa.eu/sites/portal/files/documents/Legionella%20GuidelinesFinal%20updated%20for%20ECDC%20corrections.pdf>