LEGIONELLA RISK ASSESSMENT AND WATER HYGIENE SURVEY REPORT

Report Prepared For	Diocese of Swansea and Brecon
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Report Number	5575LS171
Report Date	18th September 2015
Site Image	
Report Version	Version 1

This document Contains a risk assessment of all the sites water services. The survey was carried out in accordance with HSE ACoP L8 2001.

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SECTION 1 - PREFACE

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SECTION 2 – INTRODUCTION

This risk assessment has been carried out in order to ascertain the possible risk of contracting Legionellosis, including Legionnaire's disease, from water systems and to identify remedial works required and produce a scheme for the prevention or control of the risks.

This report relates to the risk assessment and water hygiene survey carried out at The Vicarage, 21 Hawthorne Avenue, Swansea, SA2 0LR. The survey was conducted by Emmanual Weston BSc. (Hons) TechIOSH AIEMA of PHH Environmental on the 24th August 2015 on behalf of PHH Environmental.

2.1 Assessment of Risk

To assess the risk of Legionellosis associated with water usage at this site, each of the water services are surveyed and allocated scores. The scoring system enables necessary remedial actions to be easily prioritised. This method of assessment is designed to identify features, which contribute or combine to form an increased risk and to aid in the design of a scheme to control the risk of Legionellosis.

SECTION 3 – EXECUTIVE SUMMARY OF ACTIONS REQUIRED

4.1 In accordance with ACOP L8, a risk assessment must be carried out and reviewed at least every 2 years or whenever there is reason to believe that the current assessment is no longer valid. The schematic diagram of the system must also be regularly updated. We strongly recommend that regular review meetings are arranged to ensure that necessary remedial actions are completed and that monitoring programmes are being carried out effectively.

4.2 Every site must have a clearly defined plant management structure with responsible persons nominated for each task. The training records and competency of all site staff involved in the management of the systems should be recorded within the site logbook. We would strongly advise that clear responsibility pathways are established and maintained and that regular training reviews be arranged to ensure compliance.

4.3 ACOP L8 paragraphs 67, 68 and 69 place great emphases on record keeping particularly relating to the logbook recording contractor site visits, certificates of disinfection, and details of persons responsible for various maintenance tasks (i.e. temperature monitoring and sampling).

4.4 ACOP L8 requires that the site logbook is completed fully and records relating to the maintenance of the systems be retained for at least five years.

SECTION 4 – NOTES ON THE ASSESSMENT OF RISK

5.1 The Control of Substances Hazardous to Health Regulations 1999 (COSHH) relate to the risk from hazardous micro-organisms, including Legionella and chemicals such as biocides and chlorine. Under these regulations risk assessments and the adoption of appropriate precautions are required to be made.

5.2 The Approved Code of Practice ACOP L8, *The control of Legionella bacteria in water systems* sets out further requirements for dealing with this risk. It applies whenever water is stored and used in a way which may create a reasonably foreseeable risk of exposure to Legionella bacteria and in particular to the following plant and systems whenever the Health and Safety at Work, etc. Act 1974 applies: -

a) Water systems incorporating a cooling tower.

b) Water systems incorporating an evaporative condenser.

c) Hot and cold water systems.

d) Other plant and systems containing water which is likely to exceed 20^{O}C and which may release a spray or aerosol during operation or being maintained.

5.3 Such systems may include: - Humidifiers, showerheads and little used outlets, air washers, display fountains and indoor water features, spa baths and whirlpools, dental equipment and other systems. While this is not an exclusive list, it identifies those systems most likely to cause infection.

Other plant and systems containing water which is likely to exceed 20^{O}C and which can release a spray or aerosol (a cloud of water droplets and/or particles) during operation or when being maintained may also present a risk.

5.4 The Approved Code of Practice (ACOP) places responsibility on employers and others to: -

a) Identify and assess sources of risk.
b) Prepare a scheme for preventing or controlling the risk.
c) Implement and manage precautions.
d) Keep records of the precautions implemented.
e) Appoint person to be managerially responsible.

5.5 The ACOP also sets out the responsibilities of manufacturers, importers, suppliers and installers of products and services. It is enforced by the Health and Safety Executive Inspectors in factories, hospitals, laboratories, education establishments, docks and construction sites. In shops, offices, warehouses, hotels and catering establishments it is enforced by local authorities who have also responsibilities for public health.

5.6 Duties under the ACOP are qualified by the condition that they must be “reasonably practicable”. This means that both the degree of risk and the cost and difficulty of applying control measures should be accounted for in determining what measures should be taken.

5.7 Systems susceptible to colonisation by Legionella and which incorporate a potential means for creating and disseminating water droplets should be identified and the risk they present should be assessed. Risk should be assessed not just for the routine operation or use of the system but also in relation to breakdown, abnormal operation, commissioning or unusual circumstances.

The assessment should take account of: -

a) The potential for droplet formation.
b) Water temperature.
c) The likely risk to those who will inhale droplets.
d) Means of preventing or controlling the risk.

5.8 Droplets may be created in various ways such as spraying, bubbling and impact with hard surfaces. Large drops may be reduced to respirable size by further impact or evaporation, and these smaller particles may persist for long periods or be carried on air currents.

5.9 In assessing risk and drawing up precautions particular attention should be paid to circumstances where:-

a) The population contains a high proportion of susceptible people as, for example, in many hospitals or nursing homes, or

b) The number of people at potential risk is high as, for example, in densely populated areas.

5.10 A risk assessment carried out in accordance with ACOP L8 (2001) guidelines governing the control of Legionellosis must be carried out in such a way as to provide the following: -

"A comprehensive evaluation of the risk to health arising from the storage and use of water, specifically the risk of creating circumstances under which Legionella bacteria may survive, multiply or become airborne in water systems such as cooling towers, evaporative condensers, domestic hot and cold water services, humidifiers, spa pools and baths".

Any such assessment must be "suitable and sufficient" to achieve the above objectives.

5.1 What is a "Suitable and Sufficient" Risk Assessment?

- A detailed plan of the system in place.
- Details of how the systems operate.
- The nature and degree of risk posed by the system.
- Details of remedial actions required to minimise the risk.
- The setting up of a management system to manage and control any risk, including a full chain of responsibility of competent personnel, methods for monitoring any future risk and a means of recording such actions.

N.B.: Any risk assessment must be reviewed whenever there is a reason to believe that the original

assessment may no longer be valid. This may be necessary due to any of the following: -

- Changes to the plant or water system or its use.
- Changes to the use of the building itself.
- The availability of new information relating to the control of any risk.
- As a result of checks indicating that control measures are no longer effective.
- A case of Legionnaires' disease/Legionellosis is associated with the system.
- Regularly (at least every two years).

SECTION 5 – RISK ASSESSMENT FINDINGS

Risk Ratings	4	3	2	1	0
Number of items that require attention - Legionella risks	0	2	1	0	20
Number of items that require attention - General risks	0	1	0	0	22

The above chart confirms the risk rating, by category, produced from the risk assessment at this property. The 'Landlord Corrective Actions' report lists the individual recommendations which are specific to reducing the potential for risk. Please read in conjunction with the risk rating guidance chart at the end of the report.

Description of the property and water systems:

Mid terraced pre-war built housewith ground floor and first toilet and electric shower facilities. Bath to first floor. Heating and hot wat supplied via a combi boiler. Property is currently occupied with a high water turn over. Cold water is supplied directly via the mains.

Floor	Location	Asset	Comments
FF	Bathroom	Bath	
FF	Bathroom	Electric Shower	
FF	Bathroom	WHB	
FF	WC	Toilet	
GF	Kitchen	Sink	Sink is clean and well maintained.
GF	Shower Room	Electric Shower	
GF	Shower Room	Toilet	
GF	Shower Room	WHB	
GF	Utility	Combination Boiler	Boiler is serviced/checked annually
GF	Utility	Washing Machine	

Assessment Photo's

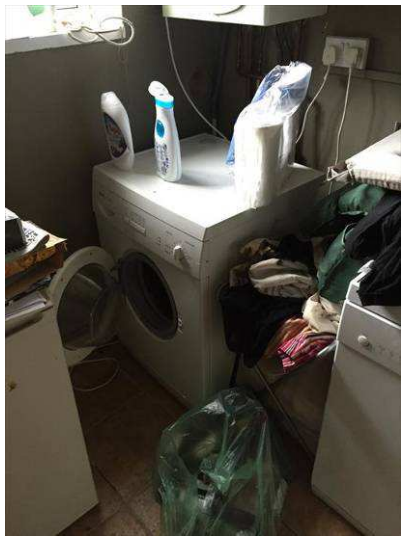
Title: Combination Boiler

Comments: LR: 0 GR: 0

Title: Kitchen Sink

Comments: LR: 0 GR: 0

Title: Washing Machine

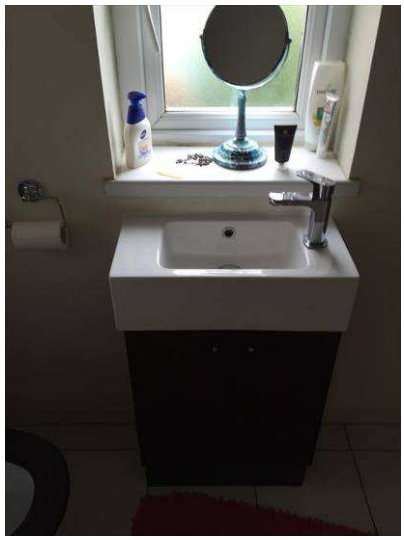


Comments: LR: 0 GR: 0

Title: GF Toilet

Comments: LR: 0 GR: 0

Title: GF WHB



Comments: LR: 0 GR: 0

Title: GF Electric Shower

Comments: LR: 0 GR: 0

Title: FF WC

Comments: LR: 0 GR: 0

Title: FF Bath

Comments: LR: 0 GR: 0

Title: FF Mixer Shower

Comments: LR: 2 GR: 0

Shower shows signs of rust and scaling and should be disinfected and cleaned on a monthly basis.

Title: FF WHB

Comments: LR: 0 GR: 0

Landlord Responsibilities:

(ACoP L8:2013 Para 48) The statutory duty holder is required to appoint a Competent Person (Responsible person). The appointed competent 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. The Landlord is the statutory duty holder and would be responsible for the following points detailed below:

The Landlord is the statutory duty holder and is responsible for: -

- Ensuring there is a legionellosis risk assessment of the water systems for the property.
- Maintaining records of corrective actions taken.
- Appointing competent individuals to complete tasks.
    - Any subcontractor appointed to clean and disinfect water systems must produce evidence that they are competent to do so.
- Annually (or when the property is re let) consider if any of the following have changed.
    - Changes to the water system or its use.
    - Changes to the use of the building (New high susceptibility tenant).
    - The availability of new information about risks or control measures.
    - The results of checks indicating that control measures are no longer effective.
    - Or if a case of legionellosis is associated with the system.

If they have ensure the risk assessment is up dated.

- Issue the specific guidance below to the tenant on the safe use of the water systems within the property.
    - To inform the landlord if hot water & cold water temperatures can't be maintained.
    - Cleaning requirements of water fittings such as showers and spray taps etc.
    - Ensure outlets are used or flushed at least weekly.
- Void properties
    - Mothballing is a compromise between adequate control of microbial growth and the use of water for flushing (while avoiding waste). Short term voids can be controlled by flushing the entire water system once a week.
    - Longer term voids are often left filled with water for mothballing and not drained down as moisture will remain within the system enabling biofilm to develop where there are pockets of water or high humidity. The systems should be recommissioned as though they were new (ie thoroughly flushed, cleaned and disinfected) before returning to use.
    - If systems are drained they should be recommissioned as though they were new (ie thoroughly flushed, cleaned and disinfected) before returning to use.

Landlords Corrective Actions

Question	LR	GR
1, Has the duty holder (Landlord) appointed a Responsible person?	3	0

Answer: No – There is no defined responsible person.
Recommendation: Formally appoint and record a responsible person for legionella control.

Question	LR	GR
2, Is the responsible person competent or do they have access to competent help?	3	0

Answer: NA - No responsible person has been appointed
Recommendation: Appoint a service provider to aid the responsible person in identification of any risks and to define precautionary measures.

Question	LR	GR
8, Are outlets (including showers) clean and regularly used?	2	0

Answer: No – There is no indication that showers are routinely cleaned.
Recommendation: The tenant should be informed that contaminated outlets need to be cleaned as indicated by the rate of fouling.

Question	LR	GR
23, Are Water Supply (Water Fittings) Regulations regarding backflow protection in place?	0	3

Answer: Showerheads can be submerged in the WC.
Recommendation: There are several ways to achieve adequate backflow protection where a showerhead can reach a WC, (Check valves are theoretically not sufficient). (i) Fit a shorter hose to the shower so that it doesn't reach the WC pan. (ii) Fit a shower screen between the bath and WC, so the hose isn't long enough to reach round it to the WC. (iii) Use a restraining ring or clip to fasten the hose to a shower rail or wall so that it cannot reach the WC. The restraining ring or clip should be designed and fitted so that it is robust enough not to be easily broken or have the hose removed from it.

Landlords Control Scheme

Combination Water Heater

Annually - In domestic premises it is unlikely to be reasonable to conduct annual internal water heater inspections. However external conditions and confirming that the unit can reach design temperatures is recommended. Failure to achieve temperatures may require internal inspection or replacement.

1 x Combination Boiler - Located GF Utility

Management/Letting Agent Responsibilities

- Ensure there is a signed Service Agreement / Contract to cover all points above.
- The Service Agreement / Landlord Contract should confirm responsibilities and formal lines of communication.
- Hold a current copy of the risk assessment and corrective actions.
- Have a system to ensure the Landlord has actioned the significant corrective actions detailed in the risk assessment.
- Annually (or when the property is re let) consider if any of the following have changed.
    - Changes to the water system or its use.
    - Changes to the use of the building (New high susceptibility tenant).
    - The availability of new information about risks or control measures.
    - The results of checks indicating that control measures are no longer effective.
    - Or if a case of legionellosis is associated with the system.

If they have ensure the risk assessment is up dated.

Ensure the tenant has been issued with the site specific requirements for the safe use of the water systems within the property.Tenant Responsibilities

The control scheme below has been designed to ensure the water system is safe for you the tenant to use and it is in your own best interest to follow the guidance detailed below where applicable to the water systems within the building.

- Ensure that all water outlets are used at least weekly.
    - If not flush for at least 2 minutes before use (care should be taken to avoid the creation of aerosols).
    - Outside bib taps should also be flushed when not in use.
    - Dishwashers and washing machines should also be considered.
    - If the property has been left empty for any reason including holidays flush all outlets for at least 2 minutes.
- Water stored in water butts should not be used for spraying or as a supply for a water jet washer.
- Report to the Landlord/Management/Letting Agent any defects in the water system within the property.

Tenants Control Scheme

Showers

Monthly - Showers should be cleaned monthly or when there is evidence of visual contamination. Most well-known supermarkets have propriety branded cleaning products to carry out this task (follow the instructions on the label carefully). Dismantle, clean and descale all removable parts.

1 x Electric Shower - Located GF Shower Room
1 x Electric Shower - Located FF Bathroom

Understanding Risk Assessment

''A risk assessment is an important step in protecting your workers and your business, as well as complying with the law. It helps you focus on the risks that really matter in your workplace - the ones with the potential to cause real harm'' (Health and Safety Executive INDG163 rev2).

This risk assessment uses basic definitions:

- A hazard is anything that may cause harm, such as chemicals, electricity, or Legionella bacteria;
- A risk is the chance, high to low, that someone could be harmed by Legionella or other hazards noted multiplied by the severity. Since Legionella infections are serious (even fatal) the severity factor is always high.

Risk Assessment Responsibilities

The responsibility for implementing and completing the corrective measures remains with the Statutory Duty Holder or nominated Responsible Person. We would recommend that you read the HSE ACoP L8: 2013 Legionnaires' disease. The control of legionella bacteria in water systems.

This can be down loaded from http://www.hse.gov.uk/pubns/priced/l8.pdf

Technical guidance is available in HSG274 Parts 1 to 3, please see further guidance section. Failing to action the findings of a risk assessment may result in Legionella bacteria proliferating in the water systems inspected. Legionella is potentially fatal.

The use of L8MS-Risk software does not negate the responsibility of the service provider to ensure the Risk Assessor is competent to undertake legionellosis risk assessments. It is imperative that all operatives using L8MS-Risk are suitable trained. To include:

- Use of the software.
- Principals of risk assessment.

A sound knowledge of legionella legislation, water system design and control practices. Risk Assessment Ratings

LR - Legionella Risk Ratings

LR - Legionella Risk Rating has been used to prioritise corrective actions relating directly to legionella control. Our assessment is based on the residual risk with the current design & control systems in place. Failure of the current control system could easily result in the water system reverting to a far higher risk rating - the water systems inherent risk.

Level 0	• HAZARD (Legionellosis) x LIKELIHOOD (Very Low) = RISK (Minimal) • No additional action required.
Level 1	• HAZARD (Legionellosis) x LIKELIHOOD (Low) = RISK (Slight risk under abnormal operating conditions) • Take actions when other more significant risks have been completed.
Level 2	• HAZARD (Legionellosis) x LIKELIHOOD (Possible) = RISK (Possible risk with existing operating conditions) • Take actions when operationally practicable, time periods often programmed to fit with shutdowns or planned maintenance.
Level 3	• HAZARD (Legionellosis) x LIKELIHOOD (Present) = RISK (Probable risk with existing operating conditions) • Take actions as soon as possible, time periods are typically a few months maximum.
Level 4	• HAZARD (Legionellosis) x LIKELIHOOD (High) = RISK (Imminent risk of harm or loss) • Take immediate action to reduce the risk, this may include taking systems off line.

GR - General Risk Ratings

GR - General Risk Rating has been used to prioritise corrective actions relating to general safety concerns, such as working at heights, or scalding risks pointed out under our duty of care.

Level 0	• No additional action required.
Level 1	• Take actions when other more significant risks have been completed.
Level 2	• Take actions when operationally practicable.
Level 3	• Take actions as soon as possible.
Level 4	• Take immediate action to reduce risk.

We as a service provider are unable to define exact time scales for corrective action as this is dependent on any other risks within your organisation and the budget available for corrective actions. A programme of implementation should be devised.

SECTION 6 - WARRANTY

PHH Environmental (UK) Ltd (PHH) warrants to the company, organisation, or individual to whom this report is addressed that the investigation described in this report has been conducted with a reasonable level of care and skill, in accordance with standards currently prevailing in the health, safety, and environmental consulting profession.

The warranty stated above is subject to the following:

- the investigation conducted by PHH has been limited to the scope of work and budget described in our quotation and contract and this report,
- this report has been prepared taking into account current government regulations, and does not reflect regulations which may be enacted in the future,
- except as stated, PHH has not made an independent verification of historical or analytical results provided by third parties,
- where indicated or implied in this report, conclusions are based on visual observation of the site at the time of this assessment, and
- the conclusions of this report do not apply to any areas of the site not available for testing or inspection.

This report is intended for the exclusive use of the company, organisation, or individual to whom it is addressed. It may not be used or relied upon in any manner whatsoever, or for any purpose whatsoever, by any other person. PHH makes no representation of fact or opinion of any nature whatsoever to any person other than the company, organisation, or individual to whom this report is addressed. The warranty stated above may not be assigned.

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Reviewed by:

Name: Michael Preece

For & on behalf of:

PHH Environmental (UK) Ltd

SECTION 7 - BIBLIOGRAPHY

The following documents were referenced in the construction of this report:

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- Control of Substances Hazardous to Health Regulations 2004 (COSHH). Health and Safety Executive
- Management of Heath and Safety at Work Regulations. Health and Safety Executive.
- Safety, Health and Welfare at Work Act.
- Water Fittings and Materials Directory. Water Regulations Advisory Scheme.
- The Water Supply (Water Fittings) Regulations 1999. The Stationery Office Limited, 1999.
- The Water Regulations Guide. Water Regulations Advisory Scheme, 2000
- Health Technical Memorandum 04-01 – The control of legionella, hygiene, 'safe' hot water, cold water and drinking water systems. Published by TSO December 2006.
- British Standard 6700, 2006: Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. British Standards Institution 2006
- Thermostatic Mixing Valves Manufacturers Association (TMVA) Recommended Code of Practice for Safe Water Temperatures.

Statutory Instrument 1992 No. 2225, The Notification of Cooling Towers and Evaporative Condensers Regulations 1992.

- BS 8580:2010 Water Quality – Risk Assessments for Legionella Control – Code of Practice.

SECTION 8 – APPENDIX

The following extracts from the ACOP L8 (2001) (Legionnaire's Disease – The Control of Legionella Bacteria in Water Systems) are included in this document: -

☒ **Schematic Diagram – Key to Abbreviations/Legends**

☒ **RA02 - Checklist 2 – Checklist: Hot and Cold Water Services**

☒ **RA04 - Figure 5 – Typical Gravity System with Recirculation**

☒ **RA06 - Glossary**

☒ **RA07 - Table 3 – Monitoring the Temperature Control Regime**

EXTRACT FROM ACOP L8 (2001)

LEGIONNAIRES' DISEASE: THE CONTROL OF LEGIONELLA BACTERIA IN WATER SYSTEMS

Checklist 2 – Checklist Hot and Cold Water Services

RECOMMENDED INSPECTION FREQUENCIES FOR RISK SYSTEMS

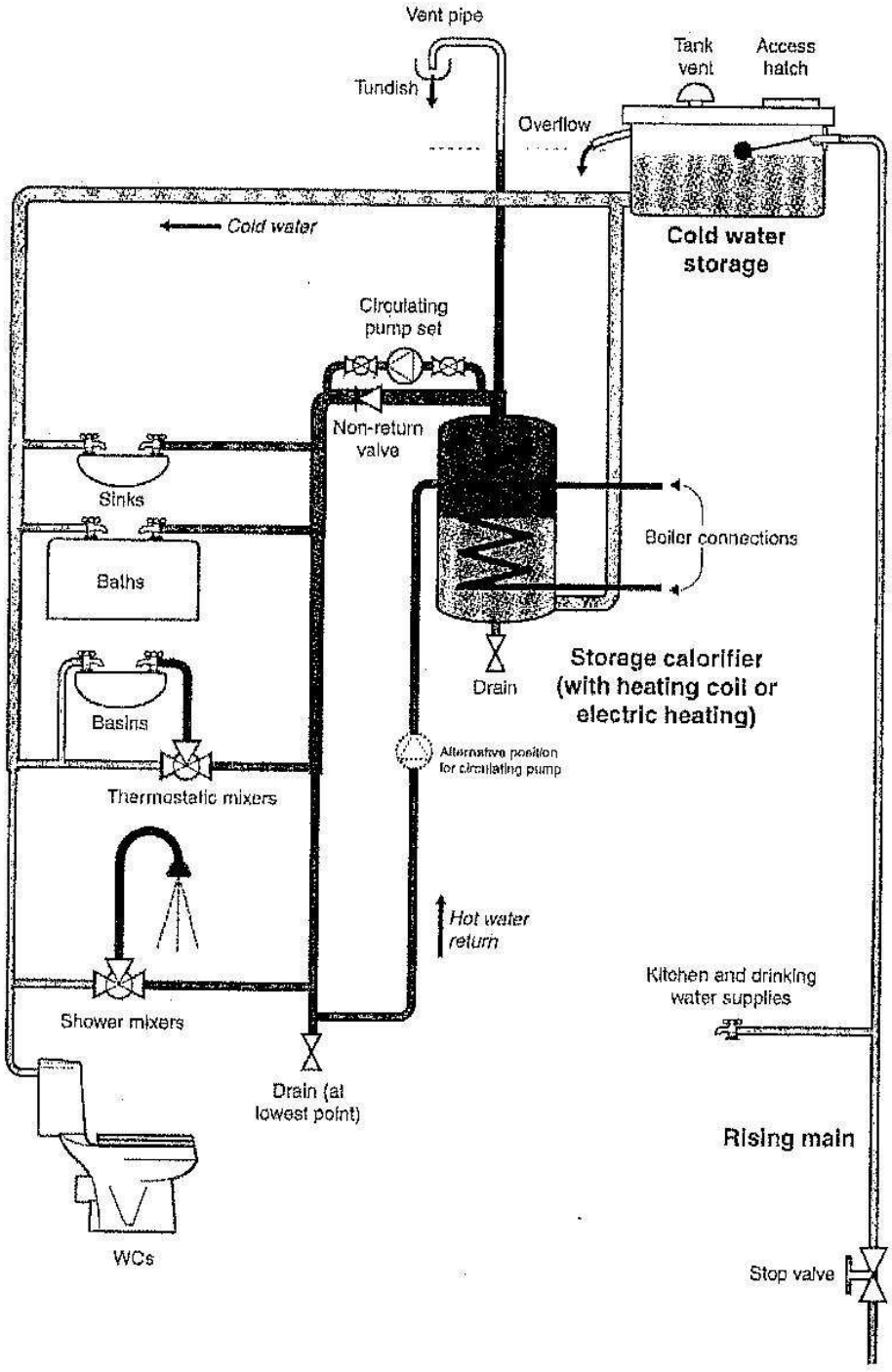
The following table shows the recommended inspection frequencies for hot and cold water services:-

Service	Task	Frequency
Hot Water Services	Arrange for sample to be taken from hot water calorifiers, in order to note condition of drain water.	Annually
	Check temperatures in flow and return calorifiers.	Monthly
	Check water temperature up to one minute to see if it has reached 50^{o}C in the sentinel taps.	Monthly
	Visual check on internal surfaces of calorifiers for scale and sludge. Check representative taps for temperature as above on a rotational basis.	Annually
Cold Water Services	Check tank water temperature remote from ball valves and mains temperature at ball valve. Note maximum temperatures recorded by fixed max/min thermometers where fitted.	Six-Monthly
	Check that temperature is below 20oC after running the water for up to two minutes in the sentinel taps.	Monthly
	Visually inspect cold water storage tanks and carry out remedial work where necessary. Check representative taps for temperature as above on a rotational basis.	Annually
Showerheads	Dismantle, clean and descale showerheads and hoses.	Quarterly or *As Necessary*
Little-Used Outlets	Flush through and purge to drain, or purge to drain immediately before use, without release of aerosols.	Weekly

EXTRACT FROM ACOP L8 (2001)

LEGIONNAIRES' DISEASE: THE CONTROL OF LEGIONELLA BACTERIA IN WATER SYSTEMS

Figure 5 – Typical Gravity System with Recirculation



EXTRACT FROM ACOP L8 (2001)

LEGIONNAIRES' DISEASE: THE CONTROL OF LEGIONELLA BACTERIA IN WATER SYSTEMS

Glossary

Aerosol	A suspension in a gaseous medium of solid particles, liquid particles or solid and liquid particles having negligible falling velocity.
Algae	A small, usually aquatic, plant which requires light to grow, often found on exposed areas of **cooling towers**.
Air-conditioning	A form of air treatment whereby temperature humidity and air cleanliness are all controlled within limits determined by the requirements of the air-conditioned enclosure.
Antibodies	Substances in the blood which destroy or neutralise various toxins or **components of bacteria** known generally as antigens. The antibodies are formed as a result of the introduction into the body of the antigen to which they antagonistic as in all infectious diseases.
Bacteria	(Singular bacterium) a microscopic, unicellular (or more rarely multicellular) organism.
Biocide	A substance which kills **micro-organisms.**
Biofilm	A community of **bacteria** and other **micro-organisms**, embedded in a protective layer with entrained debris, attached to a surface.
Blow-down/ bleed-off	Water discharged from the system to control the concentration of salts or other impurities in the circulating water; usually expressed as a percentage of recirculating water flow.
Calorifier	An apparatus used for the transfer of heat to water in a vessel by indirect means, the source of heat being contained within a pipe or coil immersed in the water.
Chlorine	An element used in **disinfection.**
Cold Water Service (CWS)	Installation of plant pipes and fitting in which cold water is stored, distributed and subsequently discharged.
Cooling Tower	An apparatus through which warm water is discharged against an air stream; in doing so part of the water is evaporated to saturate the air and this cools the water. The cooler water is usually pumped to a heat exchanger to be reheated and recycled through the tower
Concentration Factor	Compares the level of dissolved solids in the cooling water with the dissolved in the **make-up water** (also known as cycle of concentration). Usually determined by comparison of wither the

	chloride or magnesium hardness concentration.
Corrosion Inhibitors	Chemicals which protect metals by: (a) passivating the metal by the promotion of a thin metal oxide film (anodic inhibitors); or (b) physically forming a thin barrier film by controlled deposition (cathodic inhibitors).
Dead end/ blind end	A length of pipe closed at one end through which no water passes.
Deadleg	Pipes leading to a fitting through which water only passes when there is draw-off from the fitting.
Dip slide(s)	A dip slide is a means of testing the microbial content of liquids. It be dipped in the liquid to be sampled. It is then incubated to allow microbial growth. The resulting microbial colonies are estimated by reference to a chart.
Disinfection	A process which destroys or irreversibly inactivates **micro-organisms** and reduces their number to a non-hazardous level.
Distribution circuit	Pipework which distributed water from hot or cold water plant to one or more fittings/ appliances.
Domestic Water Services	Hot and cold water intended for personal hygiene, culinary, drinking water or other domestic purposes.
Drift	Circulating water lost from the tower as liquid droplets entrained in the exhaust air stream; usually expressed as a percentage of circulating water flow but for more precise work it is parts of water per million by weight of air for a given liquid to gas ratio .
Drift Eliminator	More correctly referred to as drift reduces or minimisers – equipment containing a complex system of baffles designed to remove water droplets from **cooling tower** air passing through it.
Evaporation Condenser	A heat exchanger in which refrigerant is condensed by a combination of air movement and water sprays over its surface.
Evaporation Cooling	A process by which a small portion of a circulating body of water is caused to evaporate thereby taking the required latent heat of vaporisation from the remainder of the water and cooling it.
Fill/ Packing	That portion of a **cooling tower** which constitutes its primary heat transfer surface; sometimes called **"packing" or "pack"**.
Fouling	Organic growth or other deposits on heat transfer surfaces causing loss in efficiency

Half-life	Ration of system volume to purge rate.
Hot Water Service (HWS)	Installation of plant, pipes and fittings in which water is heated, distributed and subsequently discharged (not including cold water feed tank or cistern).
Legionnaires' Disease	A form of pneumonia caused by **Legionella** bacteria.
Legionella	The genus **Legionella** belongs to the family legionellaceae which is over 40 species. These are ubiquitous in the environment and found in a wide spectrum of natural and artificial collections of water.
Legionella	Type of aerobic **bacterium** which is found predominantly in warm water environments. (singular of **Legionellae**)
L. pneumophila	One of the causative organisms of **Legionnaires' disease**.
Legionellosis	Any illness caused by exposure to **Legionella**.
Pontiac Fever	A disease caused by species of Legionella, an upper respiratory illness less severe than **Legionnaires' disease**.
Make-up Water	Water which is added to cooling water system to compensate for wastage (e.g. via system leaks), evaporative loss and bleed.
Micro-organism	An organism of microscopic size including **bacteria**, fungi and viruses.
Non-oxidising Biocide	A non-oxidising biocide is one that functions by mechanisms other than oxidation, including interference with cell metabolism and structure.
Nutrient	A food source for **micro-organisms**.
Oxidising biocide	Agents capable of oxidising organic matter, e.g. cell material, enzymes or proteins which are associated with microbiological populations resulting in death of the micro-organisms. The most commonly used oxidising biocides are based on chlorine or bromine (halogens) which liberate hypochlorous or hypobromous acids on hydrolysis in water. The exception is chlorine dioxide, a gas which does not hydrolyse but which functions in the same way.
Pasteurisation	Heat treatment to destroy **micro-organism** usually at high temperature.
Planktonic	Free floating micro-organisms in an aquatic system.

Ppm	Parts per million: a measure of dissolved substances given as the number of parts there are in a million parts of solvent. It is numerically equivalent to milligrams per litre mg/l with respect to water.
Pond/ Sump	Collection of cooling water at the base of a cooling tower.
Retention time	Time a chemical is retained in the system.
Scale Inhibitors	Chemicals used to control scale. They function by holding up the precipitation process and/or distorting the crystal shape, thus preventing the build-up of a hard adherent scale.
Sero-group	A sub-group of the main species.
Sentinel Taps	For a hot water services – the first and last taps on a recirculating system. For cold water systems (or non-recirculating hot water systems), the nearest and furthest taps from the storage tank. The choice of sentinel taps may also include other taps which are considered to be represented a particular risk.
Sessile	Aquatic micro-organisms adhering to a surface normally as part of a Biofilm.
Sludge	A general term for soft mud-like deposits found on heat transfer surfaces or other important sections of a cooling system. Also found at the base of calorifiers and cold water storage tanks.
Shunt Pump	A circulation pump fitted to hot water service/ plant to overcome the temperature stratification of the stored water.
Slime	A mucus-like exudate which covers a surface produced by some **micro-organisms**.
Stagnation	The condition where water ceases to flow and is therefore liable to microbiological growth.
Strainers	A coarse filter usually positioned upstream of sensitive component such as a pump control valve or heat exchanger to protect it from debris.
Thermal Disinfection	Heat treatment to disinfect a system.
Thermostatic Mixing Valve	Mixing valve in which the temperature at the outlet is pre-selected and controlled automatically by the valve.
Total Viable Counts (TVC)	The total number of culturable **bacteria** (per volume or area) in a given sample (does not include Legionella).
Risk Assessment	Identifying and assessing the risk from **Legionellosis** from work activities and water sources on premises and determining any necessary precautionary measures

Windage Physical loss of water from a **cooling tower** caused by draught of air or wind – water is lost around the base of the cooling tower as a result of cross winds as opposed to **drift**.

EXTRACT FROM ACOP L8 (2001)

LEGIONNAIRES' DISEASE : THE CONTROL OF LEGIONELLA BACTERIA IN WATER SYSTEMS

Table 3 – Monitoring the Temperature Control Regime

Frequency	Check	Standard to Meet		Notes
		Cold Water	**Hot Water**	
Monthly	Sentinel taps.	The water temperature should be below 20°C after running the water for up to two minutes.	The water temperature should be at least 50°C within a minute of running water.	This check makes sure that the supply and return temperatures on each loop are unchanged, i.e. the loop is functioning as required.
	If fitted, input to TMV's on a sentinel basis.		The water supply to the TMV temperature should be at least 50°C within a minute of running the water.	One way of measuring this is to use a surface temperature probe.
	Water leaving and returning to calorifier.		Outgoing water should be at least 60°C, return at least 50°C.	If fitted, the thermometer pocket at the top of the calorifier and on the return leg are useful points for accurate temperature measurements could be carried out and logged by a building management system.
Six-Monthly	Incoming cold water inlet (at least once in summer).	The water should preferably be below 20°C at all times.		The most convenient place to measure is usually at the ball valve outlet to the cold water storage tank.
Annually	Representative number of taps on a rotational basis.	The water temperature should be 20°C after running the minutes.	The water temperature should be at least 50°C of running the water.	This check makes sure that the whole system is reaching satisfactory temperatures for

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