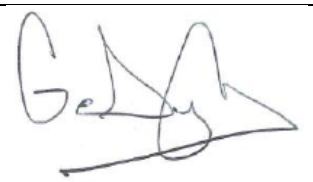
UNIVERSITY OF PLYMOUTH
ESTATES & FACILITIES

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Sign off;	
Signature	
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1.0	May 2020	B&E Maintenance Manager	Original publication
2.0	June 2022	B&E Maintenance Manager	Introduction of the ban on new combination water heaters and their removal. Removed the reference to Independent Auditor and change to Authorising Engineer (Water). Changed RP/DRP training requirement to 3 years. Updated and amended document storage locations. Added reference to Legionella RA Schedule. Updates to BS references. Comments by Authorising Engineer (Water). incorporated. Corrected contents page numbering. Added requirement for a Scalding RA
3.0	August 2024	B&E Maintenance Manager	Legal & technical review

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1.0 INTRODUCTION

The Universities policy is to control, prevent and minimise the risk from Legionella, pseudomonas and other water-borne micro-organisms to students, public and staff as low as reasonably practicable by designing, operating and maintaining plant and equipment in accordance with the Health and Safety Executive (HSE) documents L8 and HSG274, or any other relevant document that supersedes them. This procedure / Water Safety Plan (WSP) document extends details of the control methods and actions for the University premises in accordance with British Standard BS8680:2020 – Water Safety Plans – A Code of Practice. This document is supported by site water service risk assessments, which are in turn supported by individual site written schemes of control in accordance with HSE L8 and HSG274.

Copies of these documents are kept by the Responsible Person.

2.0 APPOINTMENTS

The University is committed to the written appointment of the necessary nominated Responsible Persons and Authorising Engineer (Water). Refer to the water safety policy for details of roles and responsibilities.

3.0 WATER SAFETY GROUP

The holistic nature of water safety management requires a multi-disciplinary team approach to be established. To this end, the University has established a water safety group which holds at least quarterly reviews to manage, review progress and seek assurance of strategic water management. A clear terms-of-reference (TOR) has been established.

4.0 TRAINING

The University is committed to ensuring that all appointed staff are trained and competent to discharge their roles and responsibilities adequately.

The following training will be completed:

Responsible Person – Role of the RP training course;

Deputy Responsible Person – Role of the RP training course;

Competent Person – CP training course; Legionella awareness

RP & DRP training will be subject to a formal refresher at least once every three years. CP training will be subject to a formal Legionella awareness refresher at least every two years.

5.0 WATER MANAGEMENT AUDIT

AUTHORISING ENGINEER (WATER) COMPLIANCE AUDIT

The University is committed to the following:

- Commission of an independent audit by the Authorising Engineer (Water);
- Completion of an annual legionellosis / water hygiene audit – this will be completed by the Authorising Engineer (Water)

The audits will be completed by a suitable Authorising Engineer (Water) on an annual basis. The Authorising Engineer (Water) will be a professional independent consultant with appropriate competence and professional credentials including membership of the Legionella Control Association (LCA).

The HSE standard water hygiene management audit questionnaire is applied for the Legionella / water hygiene audit. The form was developed based on the HSE format audit questionnaire (ISBN 978 0 7176 2206 1).

6.0 WATER SAFETY RISK ASSESSMENT

The University is committed to the following:

- Completion of a water safety & hygiene risk assessment in accordance with L8, HSG274 and BS8580 part 1 (Legionella) and part 2 (pseudomonas – where deemed relevant – seen as not applicable as there are no augmented care functions) (and if appropriate with HTM 04-01). A detailed specification will be developed by the Authorising Engineer (Water);
- These risk assessments will be reviewed formally when there is any significant change (in accordance with the Management of Health and Safety at Work Regulations (MHSWR)) and at least once per annum;

The risk assessment will be completed in accordance with COSHH regulations, L8, HSG 274, BS8580 and, if appropriate, HTM 04-01) or the best practice, guidance and standards current at the time of the start of the assessment exercise.

In accordance with BS 8580-Part 1:2019 (Legionella) and BS8580-Part 2:2022 (Pseudomonas – where deemed relevant – seen as not applicable as there are no augmented care functions), the risk assessment will include a formal document review. It is acknowledged that part 2 is not required in University sites as there are no augmented care patient areas.

The risk assessment will be provided in hard-copy and e-format (both in PDF and original file format) and uploaded to ZetaSafe.

Re-assessment

A formal, thorough water safety risk assessment shall be carried out at least once every four years; this frequency is based on the building, uses and systems, or whenever there is a reason to suspect that it is no longer valid, and be subject to an annual audit. Risk assessments will be in accordance with L8, HSG274 and BS8580 (part 1 and 2 where relevant). A full review will be completed in the event of any incident.

The specific frequency for each individual building can be found on the Legionella RA Schedule spreadsheet.

An audit of water safety will be completed by our Authorising Engineer (Water) on an annual basis, as specified earlier.

An indication of when to review the assessment and what needs to be reviewed should be recorded. This may result from: -

1) Changes to any of the systems originally deemed to impose a risk;
2) Changes to any other water system which may cause it to impose a risk;
3) Changes to the use of the premises or the activity of the undertaking;
4) The availability of new information about risks and control measures;
5) The results of monitoring checks which indicate that the formal control regimes may no longer be effective;
6) A case of Legionnaire's disease / legionellosis associated with the system.

7.0 WATER ACTION PLAN

The University is committed to the identification and implementation of remedial measures identified by the audit and risk assessment process.

No:	Observation:	Source:	Recommendation	L (1-5)	C (1-5)	Risk Score (LxC):	Area:	Deadline:	Who Responsible:	Budget Cost:	Achieved Date:	Evidence Completed:	Post Recommendation Result:	Post Recommendation Risk:	Further Actions Needed:	Comments

Water Strategic Action Plan Structure

8.0 SYSTEM OPERATION & MONITORING

8.1 Maintenance and monitoring regimes

Maintenance and monitoring shall be in accordance with best practice at any current time. The University will comply with any relevant Statutory and Non-Statutory duties pertaining to water hygiene. All sampling and monitoring shall have a clear audit trail. All records required by L8, HTM 04-01, BS8580, COSHH Regulations and any other relevant instrument current at the time of application shall be maintained in a suitable and sufficient format.

The University will ensure that all records:

a) comply to current statutory and non-statutory provisions current at the time;

b) are representative of all services and systems present;

c) are up-to-date with a clear audit trail.

8.2 Preventing & Minimising the Risk from Exposure to Legionella

Strict procedures for water supply safety and disinfection are essential and particular attention should be paid to outlets.

Legionella may be present in very low concentrations in many water systems but by careful control it will be prevented from multiplying. In general, proliferation may be avoided by:

1) Removing all plant, taps and outlets and associated pipework which are not needed, due to disuse or under use;

2) Ensure that the hot water from the Calorifier Hot Water Generator is at or above 60˚C and that it does not fall below 50˚C in the circulation pipework. At such water temperatures there is a danger of scalding, which increases with temperature. At 50˚C the risk to most people will be negligible, however, the risk to young children, the very old and to those with sensory impairment, will be greater. A scalding assessment shall also be completed to ensure all required action areas are identified;

3) Where the risk of scalding is great, the use of fail-safe thermostatically controlled mixing valves (TMVs) (i.e. valves which are unaffected by changes in water pressure and automatically close the hot water supply if the cold water fails) located as near to the outlet as possible, will allow the hot water supply system to run safely at the higher temperatures, allowing the outlet temperature to be lower than 50ºC (nominally 43ºC);

4) As part of any project the PM should complete a Scalding Risk Assessment prior to the installation of any TMVs. The use of a TMV and a mixing tap is to be

avoided on individual outlets. The scalding RA should be sent to the Legionella Responsible Person prior to installation.

5) Keeping the length of pipework carrying blended water at 25-45ºC to the minimum (never more than 1m), preferably shorter;

6) Reducing the length of dead-legs of spurs from the main hot tap water circulation system to the minimum (maximum 5m), preferably much shorter;

7) Avoiding water stagnation (hot/cold water systems);

8) Introducing an appropriate level of maintenance and ensuring correct and safe operation;

9) Maintaining the cleanliness of water systems;

10) Keeping storage cisterns clean and sealed from extraneous matter and insulating where necessary to maintain temperatures below 20ºC;

11) Reducing the amount of water stored (24 hours maximum).

8.3 Cold Water Systems

Filtration of potable water

Filtration of potable water to a particle size of 0.2 microns is not uncommon, typically using “point-of-use” filters or cross-flow membrane filters. Such filters shall not be normally considered a long-term control method, but provide sound short-term solutions. Their use shall be as recommended by risk assessment, or local assessments. The Water Safety Group will assess and evaluate the use and continued use of such filters.

It is essential for filter cartridge elements to be changed at appropriate intervals in accordance with the manufacturer’s recommendations, taking into account local conditions. Filter membranes should also be chemically cleaned or replaced at the recommended periods and care must be taken to ensure that the “vessel” or “housing” containing the filter assembly is also disinfected appropriately during filter or membrane maintenance. A method statement will be provided by the contractor.

Pressurisation/Supply Pumps

Where two or more pumps are installed for pressurising systems, the pumps should be switched weekly to ensure that any standby or back-up pump is regularly brought into service as the main duty or lead pump, in order to minimise any danger of stagnation.

Cisterns and Tanks

The University will comply with the standards in L8, HSG274, (if appropriate HTM 04-01), The Water Supply (Water Fittings) Regulations, 1999 and WRAS and any other relevant standards current at the time of application.

All cold water storage cisterns and cold feed tanks must be examined, cleaned and disinfected regularly, dependent upon inspection. The inspection frequency will depend on site condition, but should be a least on a six monthly basis and any subsequent disinfection should include:

1) Isolating the cistern from the mains supply and the distribution pipe-work. Drain the cisterns;

2) Inspecting each cistern (internally and externally), reporting any foreign objects, biological material, excessive corrosion, deterioration or build-up of debris, configuration, condition etc (lid and insect screens etc) to the nominated person. Then proceed to clean and dry the cistern and carry out any remedial work and/or treatment required;

3) Refilling with fresh water and disinfecting using a recognised, approved method. Drain and flush the cistern to waste until no disinfectant can be detected; all Disinfection processes should follow the manufacturer's recommendations;

4) Checking operation of ball-valve for shut-off at the correct water level and for full discharge flow;

5) Refitting cistern cover, securely refastening and ensuring that suitable screening on pipes open to atmosphere and overflows exist and sufficient thermal insulation is in place and satisfactory.

Non-Mains Water Supplies

Natural water sources such as borehole supplies may be contaminated with legionellae. Sampling for Legionella testing shall be undertaken where such supplies are used.

Cold Water Cisterns and Cold Feed Tanks

All new domestic cold water storage cisterns and tanks shall comply with the requirements of the Water Supply [Water Fittings] Regulations 1999 for cold water storage [heating system header tanks - F&E are excluded]. The University is subject to a risk assessment over a two year programme as required by the new ACoP. The findings of the risk assessments includes prioritised recommendations. The actions necessary to bring existing tanks to the standards required by the Water Supply [Water Fittings] Regulations 1999, and timescales appropriate are tabled in the legionellosis risk minimisation scheme and are to be reviewed as part of legionellosis risk re-assessment.

All cold water storage tanks with a water storage capacity of greater than 1000 litres containing potable water are to be examined and the temperature tested on a regular six monthly cycle and cleaned on an annual basis as required.

All other domestic cold water storage tanks are to be examined on an annual basis [where possible to coincide with the annual legionellosis risk re-assessment exercise], and cleaned and disinfected as detailed in the Tank Cleaning Procedure as required.

Connections to Outside Services

The existence of these connections and their necessity is checked on an annual basis.

Pressurisation / Supply Pumps

Where two or more pumps have been fitted for pressurisation systems, the lead pump shall be changed over at least weekly in order to avoid water stagnation.

Dates and times of the manual pump change-over shall be recorded in the plant room log book. Print-outs of regimes for automatic systems will be adequate.

Where pumps have not been in service for a period of four weeks or greater, or have been removed for any reason, the pump and associated pipework shall be thoroughly washed out and disinfected before being brought back into service. Disinfection of pumps shall be to 50ppm free residual chlorine for 1 hour and pumps shall be totally submerged during this period. Incident report record sheet shall be completed giving details of why the pump was out of use. Details of any such action shall be recorded in the plant room log book.

Internal Surfaces of cisterns and Tanks

The material of internal surfaces of cisterns should be listed in the WRc Directory of Water fittings and Materials. After thorough cleaning, but before Disinfection, any pitting caused by rust must be cleaned and treated. Care must be taken to ensure that any protective coating is properly air cured after application (as specified in the WRc directory), with particular regard to the number of days necessary to complete the curing process before refilling with fresh water.

Temperature checks

The temperature of the cold water storage systems / service should be checked at least twice per year and records maintained. The timing of tests will usually be:

i) A period of high ambient temperature, probably a warm afternoon.

ii) During the winter when heating systems are in use.

Where there are fixed maximum and minimum thermometers, the temperatures are best taken in spring and autumn so that you can record also the summer (highest in autumn reading) and inter (lowest in spring reading). Separate

thermometric measuring and recording equipment should be used, that is, independent of any building management system. Any electronic thermometers will be calibrated on an annual basis to the required standard.

Borehole water must be regularly bacterial and temperature tested and should not be more than 20ºC.

Testing the temperature at cold water draw-off points in sinks, wash-hand basins, and baths etc. Ideally, a temperature of not more that 20ºC should be reached within two minutes of running (although we will also comply with the guidance in HTM 04-01 where appropriate).

Monthly testing and recording of outlet temperatures at sentinel points on all installed systems.

Flushing of Outlets

All cold water outlets shall be flushed at least once per week for a minimum of 3 minutes (undertaken by Estates & Facilities or the Faculty) and records kept of flushing.

Outlets that are identified as low use (i.e. less that every 72 hours) should be removed and the system pipe-work modified to eliminate any blind-ends or dead-legs. Where the outlets cannot be removed then the outlets should be flushed at least once per week.

8.4 Hot Water Services

Hot Water Calorifiers

Calorifiers should be subjected to regular cleaning and maintenance procedures which include the following:

i) Yearly draining to minimise the accumulation of sludge;

ii) Whenever dismantled, for statutory inspection or every year in the case of water/water Calorifiers, Calorifiers should be thoroughly cleaned to remove sludge and loose debris and scale;

iii) Whenever a Calorifier is taken out of service (at least annually for inspection purposes), or its flow temperature falls below the accepted level for any reason the Water Hygiene Group and Trust Infection Control team & on-call microbiologist must be informed**.** It should be refilled, drained, refilled again and the entire contents brought up to and held at a temperature of >65ºC (preferably 70ºC) for at least one hour. A Calorifier shunt pump will significantly reduce the heat-up time. The Calorifier should remain isolated until the procedure is completed. When bringing Calorifiers back online, it is important that service valves are opened **slowly** to avoid any disturbance of sedimented debris. Calorifiers which are to be taken out of service for more than a few days should be drained and should not be refilled until ready for return to service, and then should be subject to disinfection.

The drain valve should be left open throughout the period the calorifier is out of use;

iv) Users are reminded that if a Calorifier is colonised by Legionellae and is then drained and opened for maintenance purpose there can be a risk to maintenance personnel of infection;

v) Where it is known or established that gross over capacity exists, and where it is practicable to do so, it should be removed;

vi) Where the draining is not possible, a quarterly blow-down should be carried out.

The storage of domestic hot water should be arranged to ensure that a water outflow temperature of at least 60ºC is achieved. It is important to maintain temperatures above this figure [Legionellae organisms will survive for only a short period of time above this temperature - approximately two [2] minutes].

Permanent continuous monitoring of water temperatures via a building management system or data logger is recommended for higher risk premises in order to demonstrate performance.

The outflow water temperature, under prolonged maximum continuous demand [at least 20 minutes] from calorifiers should not be less than 60ºC.

While it is accepted that occasionally under peak instantaneous or prolonged demand that the water outflow temperature will fall, it is not acceptable if this occurs frequently [more than twice in any 24 hour period] and / or for long periods [exceeding 20 minutes].

Under no circumstances shall the domestic hot water flow temperature fall below 50ºC.

It is recommended that disinfection by pasteurisation is undertaken if the water temperature of the calorifier falls below 45ºC.

The temperatures should be maintained 24 hours a day, seven days per week.

A minimum domestic hot water circulation temperature of 50ºC shall be maintained.

Calorifier Operation

Calorifiers in high risk premises such as healthcare are to be run 24 hours per day, 7 days per week, and the domestic hot water circulation pump kept running. Should it be necessary for interrupted operation or shut-down over night, then the calorifier should be allowed to maintain its water storage temperature and the domestic hot water pump should be started up to ensure full temperature through-out the distribution system for at least one hour prior to occupation of the premises.

Hot Water Circulating Pumps

Circulating pumps should be of adequate performance to ensure a minimum circulation temperature of 50ºC (flow out from the DHWS vessel of greater than 60ºC).

Only one domestic hot water distribution pump should be installed near the calorifier, and a spare pump kept for immediate replacement in the event of pump failure.

In circumstances where it is impracticable to remove pumps (that is, when leaving the standby available for immediate connection into the HWS circulating system) the pumps should be switched daily to ensure that any standby or back-up pump is regularly brought into service as the main duty or lead pump. It may be more effective to utilise an auto-changeover system, in which case more frequent switching would be appropriate.

It is not permissible to shut down the pumped circulation system. To do so will lead to the loss of the required system temperatures.

Combination Water Heaters

The University will not allow the installation of combination style water heaters; all future works should remove these water heaters where they are currently installed. These water heaters have been found to encourage microbiological growth.

Trace Heating

Electrical trace heating should be checked routinely, at least annually, to ensure that it maintains the water temperature above 55ºC, care should be taken to ensure there are no cool spots.

Temperature Checks

During a period of low ambient temperature, check the temperatures of the outflow from the HWS Calorifier to establish that the temperature is above 60ºC and that the temperature at the return connection is not less than 55ºC. The most distant draw-off point on the system should be checked to ensure that the temperature reaches a steady state value of greater than 50ºC within one minute of running the water at full flow.

The checking of water temperatures at Calorifiers and at sentinel points on a monthly basis.

Flushing of Outlets

All hot water outlets (including thermostatic mixing valves) shall be flushed at least once each week for a minimum of 3 minutes (undertaken by Estates, Facilities or the Faculty) and records kept of flushing.

Outlets that are identified as low use should be removed and the system pipe-work modified to eliminate dead-legs. Where the outlets cannot be removed then the outlets should be flushed once per week for a minimum of 3 minutes.

Thermostatic Mixing Valves

All thermostatic mixing valves (TMV's) shall be inspected and tested for safe temperature control every six months and adjusted, cleaned and disinfected as necessary.

Showers

The showers will be flushed and cleaned at the recommended frequency in the relevant guidance, in a manner that prevents aerosol creation. At time of writing the guidance is that showers and spray taps shall be dismantled, cleaned and removable parts, heads, inserts and hoses cleaned and descaled where appropriate on a quarterly basis or as indicated by the rate of fouling and other risk factors (e.g. patient susceptibility, temperature, previous results, position on pipe-work, frequency of use etc).

Hyper-chlorination of shower heads, hoses and angle valve strainers has only a short-lived effect on Legionella. Automatic drain valves are ineffective in maintaining a reduction in the number of Legionella in shower water. Regular (at least twice weekly) flushing of showers reduces Legionella proliferation. The most effective management of showers will be achieved by the removal of unnecessary showers and the regular daily use of others. All shower heads and hoses will be inspected, de-scaled and disinfected on a quarterly basis as appropriate (see above).

8.5 Servicing and Maintenance

General

All equipment and installations should be regularly inspected, serviced and tested to ensure that they are maintained in a safe and serviceable condition. To achieve this, a comprehensive system of planned maintenance is considered essential. All defects and remedial actions should be recorded by a suitable and auditable means (ZetaSafe Compliance Management software).

Planned Maintenance

The purpose of planned maintenance is to ensure that all equipment and installations used within management's geographical area is maintained in a safe and reliable condition.

Clear records of all remedial actions taken, all PPMs completed (and performance and progress data), all monitoring records etc. must be provided to the Water Safety Group in the form of a tracker report.

Manufacturer's Instructions

It is essential that personnel engaged on maintenance of equipment ensure that they have ready access to the relevant manufacturer's manual and that it is used as the major reference guide to methods of working, dismantling, re-assembly and restoring to service. These are to be stored in the ZetaSafe database against the asset.

Newly Commissioned Equipment

All newly installed equipment should have a full and detailed inspection and a complete range of tests and operational checks as part of the commissioning procedure. From a subsequent maintenance point of view, the most important factor is to keep careful records of the condition of the equipment and, in particular, to record the initial test results and the actual settings of any adjustable components. Reference to these at future maintenance operations will:

i) Help in deciding what interval of time should elapse between such operations;

ii) Provide benchmarks against which all later test results may be judged;

iii) Allow any deterioration in performance to be recognised and remedial action taken where necessary.

Frequency of Maintenance

The Responsible Person responsible for the maintenance and servicing will produce a maintenance and inspection schedule which reflects the individual requirements of the equipment.

The schedule will incorporate:

1) Routine maintenance proposals, based on periodic inspections supplemented at more extended intervals with operational checks and examination as required;

2) Post-fault maintenance, which should be determined by consulting the manufacturer's handbook and by past experience.

8.6 Other Risk Systems

Monitoring requirements for other risk systems shall be in accordance with HTM 04-01 and HSE ACoP L8 and Guidance HSG274.

8.7 Cleaning and Disinfection

Water systems will be cleaned and disinfected under the following circumstances:-

Circumstances Requiring Cleaning & Disinfection:

System/ Service	Circumstance Requiring Cleaning and Disinfection	Frequency
Domestic cold water tank	New installations.	As required
	Empty tank re-commissioning.	As required
	Tank temperature exceeds 20ºC.	As required
	Tank contains moderate sediment, i.e. a complete covering of the tank base.	As required
	Tank contains moderate corrosion.	As required
	Contamination of tank by vermin or vermin faeces.	As required
	Gross organic contamination e.g. large number of dead insects.	Annually
	Regular programme for high risk healthcare category.	2 yearly
	Regular programme for medium risk healthcare category.	5 yearly
	Regular programme for non-healthcare premises [excluding small tenanted residential properties].	As required
	Consultant advice - interpretation of microbiological results.	
Domestic cold water distribution system	New installations and small modification/ additions.	As required
	Contamination of tank by vermin or vermin faeces.	As required
	Gross organic contamination e.g. large number of dead insects.	As required
	Consultant advice - interpretation of microbiological results.	As required
Domestic hot water calorifier	New installations and modifications / additions.	As required
	Calorifier falls below 45ºC.	As required
	Empty calorifier recommissioning.	As required
	Contamination of header tank by vermin or vermin faeces.	As required
	Regular programme [excluding small tenanted residential properties].	Annually
	Consultant advice - interpretation of microbiological results.	As required
Domestic hot water distribution system	New installations and modifications / additions.	As required
	Contamination of header tank by vermin or vermin faeces.	As required
	Consultant advice - interpretation of microbiological results.	As required

Air handling unit	Contamination by vermin or vermin faeces.	As required
	Gross organic contamination e.g. large number of dead insects.	As required
	Chiller battery, drip trays and drainage pipework.	6 monthly

9.0 SYSTEM PPM REQUIREMENTS

9.1 Scheme of Control

This control scheme applies to all the domestic water systems under University responsibility.

This Written Scheme should be read in conjunction with the Policy on Legionella.

9.2 Overview

The Written Scheme is subject to change based on Risk Assessment, Monitoring Results and mechanical changes to the water systems.

Parameter	Review Frequency	Responsibility	Record Location	Notes
Risk Assessment	Every 4 years, or as required and Annual Audit.	Responsible Person (RP) (TBC)	ZetaSafe	
University Policy	Annually	Responsible Person (RP)	Health, Safety & Wellbeing Intranet	
Audit of Compliance	Annually	Responsible Person (RP). Completed by IA/AE (Empathy)	OneDrive. Legionella folder	
Schematic Drawings	Annually	TBC	ZetaSafe	
	When Changed	TBC		
Training	RP / AP – Every 3 years	Responsible Person (RP)	OneDrive. Legionella folder	
	CP - Every 2 years	Responsible Person (RP)		
Review Meeting	Quarterly	Responsible Person (RP)	OneDrive. Legionella folder	
Records Review and Remedial Actions	As required	AP / RP	OneDrive. Legionella folder	
	Weekly	AP / CP	OneDrive. Legionella folder	
	Monthly	Responsible Person (RP)	OneDrive. Legionella folder	

Review Frequencies.

9.3 Correct and Safe Operation

The correct and safe operation is detailed below:

Area	No.	Correct and Safe Operation
Hot Water Storage	1	Hot water is stored at 60ºC or above 24 hours per day
	2	Hot water calorifiers have a shunt pump installed that operates for at least 1 hour per day anytime between 10pm and 5am as appropriate
	3	Hot water calorifiers are fed with a softened water or have some other scale prevention device installed
	4	Hot water calorifiers are inspected once per annum and cleaned if required
	5	Hot water calorifiers are blown down to remove any accumulated sludge
Hot Water Temperature	5	Hot water is distributed to all outlets and returned to the calorifiers at 50ºC or above.
Cold Water Storage	6	Cold water storage tanks comply with Water Fittings Regulations and have less than 24 hours storage
	7	The maximum heat gain between make up and stored temperature in a cold water storage tank is 2ºC
	8	Cold water storage tanks are inspected every 6 months and cleaned if required
Cold Water Temperature	9	Cold water is distributed to all outlets at less than 20ºC
Stagnation	10	All low use outlets are flushed for a minimum of 2 minutes twice per week (including temporarily closed areas where the water system in the area is part of a larger system). Daily flushing will be completed where Pseudomonas issues and concerns exist for at least 5 minutes
	11	All duty/standby plant is alternated at least weekly
	12	Dead-legs identified are removed within 6 months
Microbiological Monitoring	13	Water is maintained free from all types of legionella bacteria and with a total viable count within EU drinking water guidelines
Showers	14	Shower heads and hoses are kept clean of scale
Plant	15	All plant is installed and maintained to the standards required by ACoP L8 and HTM 04-01
Mixer Valves	16	All mixer valves are checked and cleaned a minimum of every 6 months

Correct and Safe Operation.

9.4 Additional Items for High Risk Areas

Where the Risk Assessment and/or the results of routine monitoring as shown that the Risk is significant then the following points are required to ensure safe operation

Hot Water	1	The frequency of stored and distributed water temperature testing is increased as agreed by the Water Safety Group (WSG)
Showers	2	Showers and hoses are removed from service
Microbiological Monitoring	3	The frequency and number of samples is increased as agreed by the WSG
Filtration	4	Filters known to be effective against legionella are fitted at point of use where identified as necessary and agreed with the WSG.

High Risk Areas Items.

Notwithstanding the requirements of the Policy, the Water Safety Group has the authority to change or increase the scheme of control on water systems deemed to be at increased risk.

9.5 Monitoring, Maintenance and Testing Schedule

Below are listed the tasks carried out, the frequency, who is responsible and where the records are located. We will follow the latest standards in HSG274, L8, HTM 04-01 or any standard current at the time of application.

Task	Specification	Frequency	Record Location
Hot Water Storage	Calorifier flow >60ºC Calorifier return >50ºC	Continual on BMS Monthly	ZetaSafe
	Shunt pump working	Monthly/BMS	BMS
	Water softener - Total hardness less than 10ppm	Daily	?????
	Inspect calorifiers and drain water and clean if required	Annually	ZetaSafe
	Blown down until water runs clear	Quarterly	ZetaSafe
Hot Water Temperature	Sentinel outlets as defined by HSG274 as >50ºC	Monthly	ZetaSafe
	Rotational DHW outlets above 50ºC	Representative selection on a rotational basis so that the Estate systems are represented during a 5 year period	ZetaSafe
POU Water Heaters	Check temperatures are 50-60ºC	Monthly to Six-Monthly based on risk	ZetaSafe
Cold Water Storage	Cold water storage tanks comply with Water Fittings Regulations and	Six monthly	ZetaSafe

	have less than 24 hours storage		
	The maximum heat gain between make up and stored temperature in a cold water storage tank is 2ºC	Six monthly	ZetaSafe
	Inspect tanks, check insulation and clean if required	Six monthly or annually as appropriate	ZetaSafe

Monitoring, Maintenance & Testing Schedule.

9.5 Monitoring, Maintenance and Testing Schedule (Continued)

Cold Water Temperature	Sentinel as defined in HSG274 and random outlets below 20ºC	Monthly	ZetaSafe
	Rotational DCW outlets less than 20ºC	Representative selection on a rotational basis so that the Estate systems are represented during a 5 year period	ZetaSafe
POU Filters	These will be used as a short-term solution only. Monthly replace, clean, chlorinate housing etc.	Monthly	ZetaSafe
Stagnation	Flush all low use outlets	Twice weekly or daily as appropriate	ZetaSafe
	Alternate duty/standby plant	Weekly/BMS	BMS
	Identify and remove dead-legs	Zeta Services (when identified)/As required	ZetaSafe
Microbiological Monitoring	Take designated hot and cold sentinel and random samples monthly as per schedule and test for TVC, E.coli, Coliforms, Legionella, Pseudomonas	Monthly	ZetaSafe

Monitoring, Maintenance & Testing Schedule.

9.5 Monitoring, Maintenance and Testing Schedule (Continued)

Task	Specification	Frequency/By Whom	Record Location
Shower heads & hoses	De-scale and disinfect as required and appropriate	Quarterly	ZetaSafe
TMV / Mixer Valve check	Risk assessment of requirement for TMV.	Annual Bi-annually	ZetaSafe

	Check inlet temperatures, outlet temperature, failsafe and clean strainer		
Flexible Hoses	Complete a risk assessment as specified earlier and remove where present.	Zeta Services	ZetaSafe

Monitoring, Maintenance & Testing Schedule.

9.6 Additional Items for High Risk Areas

Task	Specification	Frequency	Record Location
Hot Water Storage	Calorifier flow >60ºC Calorifier return >50ºC	Daily	ZetaSafe
Hot Water Temperature	Sentinel and random outlets above 50ºC	Weekly	ZetaSafe
Microbiological Monitoring	Increase frequency of testing to 4 x normal level	Monthly	ZetaSafe
Microbiological filtration	Change POU / Pall filters where present.	Monthly	ZetaSafe

Additional High Risk Monitoring, Maintenance & Testing Schedule.

9.7 Management of Defects

A formal log book system has been established and is maintained and up-to-date with a clear audit trail and complete records.

10.0 BACTERIAL SAMPLE REACTION PROTOCOL

10.1 Background

The University will complete bacterial sampling as identified appropriate through risk assessment, in accordance with L8, HSG274, and as agreed by the Water Safety Group (WSG).

10.2 Samples for Legionella testing are taken:-

- Monthly from hot water systems treated with biocides where storage and distribution temperatures are reduced from those recommended in the HSE's ACOP/Guidance Document L8. At the time of preparation of these procedures, there are no such systems within the University;

- Weekly from hot water systems where control levels of the treatment regime, i.e. temperature in this case, are not consistently achieved – these samples should be taken until the system is brought back under control;

- When an outbreak is suspected or has been identified;

- Regularly where a faculty specialises in services for "high risk" patients as identified by risk assessment and as agreed by the WSG.

10.3 Action Levels for Legionella in Hot and Cold Water Systems

Legionella Bacteria [cfu/litre]	Action Required
1-100	Investigate and act accordingly, but largely considered under control.
More than 100 but less than 1000	Either: If only one or two samples are positive, system should be resampled. If a similar count is found again, a review of the control measures and risk assessment should be carried out to identify any remedial actions. If the majority of samples are positive, the system may be colonised, albeit at a low level, with Legionella. Disinfection of the system should be considered but an immediate review of control measures and risk assessment should be carried out to identify any other remedial action required.
More than 1000	The system should be resampled and an immediate review of the control measures and risk assessment carried out to identify any remedial actions including possible disinfection of the system.

10.4 Laboratory Competence

Samples for Legionella shall be tested by a UKAS accredited laboratory that takes part in the PHLS Water Microbiology External Quality Assessment Scheme for the isolation of Legionella from water.

11.0 DESIGN STANDARDS AND PREFERRED SOLUTIONS

11.1 Background

We have developed a minimum design standards and preferred solutions document, in accordance with L8, HSG274 (if appropriate HTM 04-01) and as agreed by the Water Safety Group (WSG). This is a live document and is not repeated here.

11.2 Training, Competence of Contractors etc.

Estates Services will require water safety training in accordance with L8, HSG274 and HTM 04-01 (2016).

There are currently seven Approved Contractors Schemes in the UK.
Four are approved by the water undertaker for the area which they supply.

- A Plus (Anglian Water)
- TAPS (Thames Water)
- Watermark Scheme (Severn Trent water)
- WIAPS (administered by WRAS on behalf of sixteen water undertakers)

Three are certified by the Regulator

- Association of Plumbing and Heating Contractors (APHC)
- Chartered Institute of Plumbing and Heating Engineers (CIPHE)
- Scottish and Northern Ireland Plumbing Employers' Federation (SNIPEF)

11.3 Contractor competence/code of conduct

The roles and responsibilities of contractors involved in the control regime shall be defined in writing, in contract documents. Any agreed deviation from the initial contract documents shall be mutually agreed and documented as part of the contract review process. The competence of such contractors will be assessed. The minimum requirement for new contractors shall be registration with the Code of Conduct Association. For Legionella testing laboratory competence see the section of this document dealing with Legionella sampling.

All work will be completed in accordance with the University Legionella / Water Safety Policy, Procedures / Written Scheme and in accordance with L8, HSG274, HTM 04-01 (if relevant), or any other relevant standard current at the time of work. All work will be completed by competent staff members using only WRAS / WRc approved materials and techniques, any dead-legs and non-compliant arrangements will not be permitted. Any such discrepancies will be rectified as soon as possible by the contractor to the required standard at their cost.

12.0 CLOSURE & OCCUPATION OF NEW PREMISES

12.1 Occupation of New Premises - Procedure Until Occupation

This procedure is designed to prevent the risk of legionellosis developing in a new building / department through the interim period following construction, commissioning and hand over to occupancy.

Design and Build Contracts **-** outbreaks of Legionnaires disease have been associated with 'design and build' type contracts, under which the client retains no clerk of works on site and where there is no 'commissioning' period on completion of the work. It is vital that immediately before occupation that cleaning and disinfection is undertaken.

Once the system is in use and has been cleaned and chlorinated prior to hand over, a Responsible Person shall be nominated to monitor and observe the system and ensure that the system is operated in accordance with the University 'Procedure for Temporary Closure' and the relevant record sheets completed.

At the point of hand over all relevant information on system performance together with as-fitted drawings and design criteria of the domestic hot water systems and cold water services shall be submitted to the relevant Officer who will be responsible for the premises.

Occupancy of the new property should be as soon after hand over as possible to prevent further costs being incurred due to the need for re-chlorination of the water systems.

12.2 Maintenance Actions/Checks Prior to Occupation by a New Tenant

Whenever the expected time delay between vacation of accommodation by one tenant and occupation by the next is greater than one week, the following actions should be taken:

The accommodation unit is visited by a member of the Estates Trade Team, within one week prior to occupation. The following actions are taken, in the order stated:-

- The hot water system is switched on;
- All WCs are flushed twice [on full flush where dual flush type];
- The cold water storage tank, where present, is checked for gross contamination e.g. microbiological growth, the presence of organic debris or live organisms such as insects – in the event of discovering such contamination the Estates Helpdesk is informed to arrange tank cleaning and disinfection. The remaining actions below are not undertaken until the cleaning and disinfection of the tank is complete;
- Each hot and each cold water outlet is run for three minutes, creating as little aerosol as possible;
- The shower head is removed and the shower hose run underwater for three minutes;

- The hot water system is left switched on;
- Any defects are reported to the Estates Helpdesk and wherever possible, rectified prior to tenant occupation.

These actions apply to accommodation served by either a conventional hot water system or a combination boiler.

12.3 Procedure in the Event of Closure of Part or All of a Building

12.3.1 Background

Where part or all of a building is going to close for a period of greater than one week, the relevant manager must notify the Responsible Person [*Legionella*] of the details.

Following a closure decision, negotiations between the relevant manager and the Responsible Person [*Legionella*] must take place to ensure that the following procedure is established and documented, and to clearly define what actions named individuals shall perform.

12.3.2 Period of Closure

The period of closure should be established at the earliest point in negotiations. The period for which an area is closed can play an important part on the cost implication and involvement of a closure.

12.3.3 Temporary Closure

Where a closure is expected to not exceed 60 days a nominated individual shall be identified to run every tap for 3 minutes and flush every toilet weekly. The nominated individual should then complete the record sheet, signed by themselves and their relevant manager, the completed form being forwarded to the Responsible Person [*Legionella*].

Before the closed area is re-occupied the Estate Services shall carry out an inspection and test of the water systems and report its condition to the Responsible Person [*Legionella*] for any remedial works that may be required.

It is the responsibility of the relevant manager to notify the Estates Services of their intention to re-open a temporarily closed area.

12.3.4 Indefinite Closure

In the instance that part or all of a building is to close with no planned re-opening date, or where the closure period exceeds 60 days, negotiations must be held as detailed in the “background” subsection above, and funding made available to the Estate Services by the manager of the faculty that is closing, in order to disconnect and drain the water services within the affected area. The relevant manager should be aware that considerable cost for modifications could be needed to achieve this requirement in some large properties.

12.4 Re-occupation of an Indefinitely Closed Area

In the event of re-occupation of an indefinitely closed area, full negotiations must take place between the relevant manager and the Estate Services prior to the re-occupation exercise.

The Estates Services will require the following information: -

- The planned re-opening date;
- Any proposed changes of use of the area;
- Any areas which will not be used.

Estate Services will provide the relevant manager with a cost to put the water systems [for which the relevant manager must provide funding] back in service.

Before the water system is put back into service, any necessary modifications and maintenance shall be carried out prior to the cleaning of the system.

13.0 EMERGENCY & OUTBREAK ACTIONS

We will follow the procedures detailed in L8, HSG274 and where appropriate HTM 04-01 (2016).

14.0 TEMPERATURE MONITORING & CHECKS

Temperature checks on the calorifier and distribution system should be carried out as detailed below on a monthly, six monthly and annual basis. In the event of a non-compliance, the Responsible Person [*Legionella*] shall be informed immediately. Use of a digital thermometer with a touch and immersion probe is recommended.

Although the HSE recommends spot temperature checks, the HTM 04-01 requires a temperature excursion limit of less than 20 minutes, therefore continuous monitoring will be necessary in certain circumstances. The frequency of such monitoring is to be based on a risk decision [i.e. balance risk, cost and difficulty for the system].

Cold water storage tank temperatures should be checked during periods of high ambient temperatures [e.g. afternoons between June and August] water temperatures should be no greater than 20^{o}C. At the same time, the furthest and nearest draw off points in the system should be checked to ensure that the water distribution temperatures are less than 20^{o}C within 1 minute of running the water [at full flow]. A similar temperature check regime should be undertaken during the winter months to identify the performance of cold water distribution systems and the impact of heat gain from heating systems.

Hot and cold water distribution temperatures from sentinel taps:

For domestic hot water services, these are the first and last taps on a re-circulating system. For cold water systems or non-recirculating hot water systems this is the nearest and furthest taps from the storage tank.

For cold water outlets, the temperature should be below **20°C** after two minutes of running the water. For hot water outlets, the temperature should reach **50°C** within a minute of running the water.

Calorifier flow and return temperatures:

Outgoing water from the calorifier should be at least **60°C**, and water returning to the calorifier should be at least **50°C**. These temperatures can be taken from adequately calibrated temperature gauges fitted to the vessel and return pipework. If temperature gauges are not fitted, then suitable surface temperature probes may be used.

Input temperature to thermostatic mixer valves:

Where fitted, the input temperatures to thermostatic mixer valves should be at least **50°C** within a minute of running the water. Outlets with TMV's should be monitored on a sentinel basis as detailed above.

Incoming mains cold water:

Where there is a cold water storage tank, this should be measured at the ball valve outlet. The water should preferably be below **20°C**. However, during a prolonged hot summer the incoming water may rise above this temperature. Under the Water Supply [Water Quality] Regulations, water utilities are permitted to supply water to premises at temperatures up to **25°C**. If incoming water temperatures are above **20°C**, the water undertaker should be advised to see if the cause of the high temperature can be found and removed.

Monitoring should ideally be carried out so that one check takes place in the summer months and the other in the winter months.

Representative number of taps on a rotational basis:

In order to ensure that the whole system is reaching satisfactory temperatures for Legionella control, the outlet temperatures should be taken from a representative number of outlets other than sentinel taps.

For cold water outlets, the temperature should be no greater than 20°C within two minutes of running the water. For hot water outlets, the temperature should reach 50°C within a minute of running the water.

Where water temperatures fail to satisfy the criteria described, the Responsible Person [*Legionella*] shall be informed, and a full investigation must follow.

15.0 RECORDS RETENTION

Retention Period

The following types of records are kept.

Record	Retention Period
The policy and procedures documents	Throughout the period for which they remain current and for at least two further years
Risk assessments	
Risk minimisation scheme and details of its implementation	
Monitoring, inspection, test and check results, including details of the state of operation of the system	At least five years

Review

Quarterly management review meetings shall be held in order to assess the progress with respect to management issues.

Regular progress review meetings or at least teleconferences with the Authorising Engineer (Water) [at least quarterly] will be held to identify progress against the action plan in order to identify any problems with the implementation of specific remedial measures.