**WATER SAFETY PLAN:**

**PART 4.1.2 – Control Measures – Hot and Cold-Water Systems**

**For**

**XXX Client Name Here XXX**

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#

# 1.0 INTRODUCTION

## 1.1 Water Safety Plan

This document is Part 4.1.2 – Control Measures – Hot and Cold-Water System of the Water Safety Plan [WSP]; which comprises:

Part 1.1 – Governance Policy

Part 2.1 – Design Control

Part 3.1 – Risk Assessment and Schematics

Part 4.1 – Control Measures

Part 4.2 – Standard Operating Procedures

Part 5.1 – Support Schemes

Part 6.1 – Logbook

The WSP has been developed in order to comply with the requirements of:

* BS8680 – Water Quality – Water Safety Plans – Code of Practice (2020);
* L8 – Legionnaires' disease. The control of legionella bacteria in water systems – Approved Code of Practice and guidance;
* HSG274 – Part 2 – The control of legionella bacteria in hot and cold water systems;
* HSG274 – Part 3 – The control of legionella bacteria in other risk systems;
* S/HTM04-01: Safe Water in Healthcare Premises (2016).

The contents and actions described within these documents come together to assist in the mitigation of risk associated with water systems and associated equipment.

The management of Water Safety is defined in the ‘Part 1.1 – Governance Policy’ which [broadly] details:

* roles and responsibilities for those involved in Water Safety;
* communication pathways;
* competency need for contractors.

## 1.2 Abbreviations

The following abbreviations are used throughout this document:

**AE[W]** Authorising Engineer [Water]

**ALARP** As low as reasonably practicable

**CP** Competent Person

**DIPC** Director of Infection Prevention and Control

**DRP[W]/AP[W]** Deputy Responsible Person [Water]/Authorised Person [Water]

**IPCO[W]** Infection Prevention and Control Officer [Water]

**IPCL** Infection Prevention and Control Lead

**IPCC** Infection Prevention and Control Committee

**HSE** Health and Safety Executive

**HTM** Health Technical Memorandum

**RP[W]** Responsible Person [Water]

**Shared Drive** Refers to the location of the water safety records held on the internal network

**SOP** Standard Operating Procedure

**TMV** Thermostatic Mixing Valve

**TVC** Total Viable Cell, a type of bacteriological analysis giving a general indication of the extent of any microbiological activity

**WSG** Water Safety Group

**WSP** Water Safety Plan

# 2.0 CONTROL STRATEGY

A temperature control regime is the method used by the Trust/Board/Organisation for water hygiene control as advocated in HTM04-01, ACOP L8:2013 and HSG274: Part 2:2014.

## 2.1 Temperature Control

Temperature control is the water treatment strategy used to control the proliferation of waterborne pathogens in all the Trust/Board/Organisation properties and is applied as follows:

* Domestic hot water storage is set to 60°C, with a return of 50°C;
* Domestic cold-water storage is less than 20°C.

### 2.1.1 Summary of Trust/Board/Organisation Risk System and Components

The schedule below details all the risk systems and components identified from the risk assessments. The contents of this WSP: Part 4.1 is based on these systems.

*[insert here]*

## 2.2 Supplementary Water Treatment

At the time of writing, no supplementary water treatment systems are used in any the Trust/Board/Organisation properties.

*[NB: where supplementary treatment is used it can be detailed here – with specific operational and monitoring procedure manuals created as additional WSP, i.e. 4.1.2 Control Measure – Silver Copper Ionisation].*

## 2.3 Point of Use Filters [POUF]

It is recognised that POUF to 0.2um do not eradicate waterborne pathogens [and may create additional problems as a result of microorganisms retained upstream of the filter seeding other parts of the system].

POUF shall be considered and agreed by the WSG only as an interim safeguard where control measures have been ineffective, prior to and during engineering remedial works, during periods of plumbing refurbishments and maintenance works, and where additional protection is required for vulnerable patients. In all cases, the IPCL shall determine the necessity of such filters being fitted to outlets.

Continuous long-term use of POUF shall be avoided, except where there is no effective alternative.

The following precautions shall be adopted:

* A detailed asset register of all filters in use shall be maintained, including the location, specific outlet, filter type, filter unique reference and expiry date;
* The WSG shall monitor and review the continued use of POUF and ensure that action plans are created and enacted for all filters used to make certain that individual filters do not exceed their expiry date and are removed from service at the earliest safe opportunity;
* The WSG shall ensure that training needs associated with the use of POUF have been identified and a training plan devised and implemented. This training should cover awareness of the filters and their purpose, the correct method of use, maintenance procedures, records required, foreseeable problems and who to report these to. As a minimum, training programmes should consider:
	+ Staff responsible for the installation, removal and replacement of filters
	+ Staff responsible for cleaning the areas where filters are in use
	+ Other staff in areas where filters are in use
* POUF should be changed in accordance with the manufacturers’ recommendations for the particular design in use, typically between 30 to 90 days from date of installation;
* Sufficient resources [i.e. stock of replacement filters and human resources] shall be maintained to ensure that all filters in use can be replaced without exceeding the expiry date;
* Once removed for whatever reason, a replacement filter should be fitted. When changing filters, it is recommended that sampling of water quality takes place at outlets identified as sentinel points before refitting a replacement filter. **Note:** some manufacturers’ claim that their filters are designed to be removed and refitted – this should only act upon where the manufacturers procedures have been reviewed and approved by the WSG and the staff removing and replacing the filters have been appropriately trained;
* It is essential to ensure that – where POUF is to be used – that they filtration conforms to ASTM F838 (filtration test for sterilising grade membranes) and that they are constructed of the appropriate materials (see HTM04-01 Part A, paragraph 4.22);
* Where POUF is used, backflow protection requirements need to be maintained in accordance with the *Water Supply (Water Fittings) Regulations* (1999)/*The Water Supply (Water Fittings) (Scotland) Byelaws* (2014). This may require additional backflow protection or modification of the system. In addition, sufficient activity space should be maintained to enable the outlet to be used without contaminating the filter;
* POUF should be checked regularly for correct operation, including flow rate [a poor rate of flow may be caused by premature blockage of the filter membrane or by air-locking], damage, leakage and cleanliness. Problem filters should be replaced;
* Where POUF is in place follow manufacturers’ instructions for cleaning, or they should be wiped clean as part of the basin/sink cleaning protocol as agreed by the WSG. Cleaning staff shall be trained on the appropriate methods;
* Where POUF is no longer required, on removal the outlet connection should be flushed, cleaned and disinfected to remove any accumulated biofilm.

# 3.0 WATER SUPPLIES

## 3.1 Private Water Supplies

No such water sources exist within the estate.

***Note:*** *Natural water sources such as borehole supplies may be contaminated with Legionella. Sampling for Legionella shall be undertaken if such supplies are used in the future.*

Where private water supplies are used to feed domestic hot and cold-water systems they are considered drinking water systems. The design of storage systems, pipework, valve arrangements and other fittings used on the system shall be such that they do not allow contamination of the water systems, which could encourage microbial multiplication. These systems shall be configured in accordance with:

* The Private Water Supplies (England) Regulations (2016);
* The Private Water Supplies (Wales) Regulations (2017);
* The Private Water Supplies (Scotland) Regulations (2006);
* The Private Water Supplies Regulations (Northern Ireland) (2017).

Any water treatment system used on drinking systems must not cause a breach of the requirements of the *Water Supply (Water Fittings) Regulations* (1999)/*The Water Supply (Water Fittings) (Scotland) Byelaws* (2014).

Lead-free materials must be used for formation of capillary joints in domestic water systems.

## 3.2 Mains Cold Water Systems

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 utility companies are permitted to supply water to premises at temperatures up to 25°C. If incoming water temperatures are above 20°C, the water supplier 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.

### 3.3.1 Water Softening

Guidance on water hardness and softening details, public water supplies can have a hardness of up to 400 mg/L without preliminary softening. Hardness is due to calcium and magnesium salts in the water and is expressed in terms of milligrams per litre as CaCO3.

Classification of hardness [source HTM04-01 Part A]:



A generally acceptable range is between 80 and 150 mg/L, and not less than 60 mg/L.

Hard waters are unsuitable for many industrial and domestic purposes. When the temperature of water is raised, the hardness will be reduced by some of the bicarbonate dissolved salts (temporary hardness) coming out of solution and forming solids in suspension, some of which will be deposited on heating surfaces to form an adherent limescale, thus reducing the heat transfer rate. Scale deposition is a significant problem in pipework, reducing flow, efficiency and increasing the surface area for biofilm formation.

Treatment may therefore be necessary to remove or alter the constituents to render the water suitable for particular purposes and increase the effectiveness of control measures. The most common water-softening process used for the protection of hot water calorifiers is base-exchange softening. This process removes permanent and temporary hardness from water. The technique uses an ion-exchange process in which the calcium and magnesium ions in solution are removed and replaced by sodium ions.

In hard water areas, softening may well be needed to reduce risk. Generally, softening of a hard water supply may be required on feeds to the following:

1. steam boilers – to prevent sludge and limescale building up (see BS 2486);
2. hot water services where outlets (particularly showers) are affected by limescale;
3. laundries – high maintenance costs and the uneconomic uses of soap or detergents are caused by the presence of hardness.

Softeners using salt-regenerated ion-exchange resins increase the sodium content of the water during softening, and this may be undesirable for young children and infants (including the making up of babies’ bottles) and anyone on strict salt-restricted diets. These concerns can be avoided if water intended for drinking and cooking is not softened.

All water softeners must be installed with an appropriate backflow prevention device in accordance with the *Water Supply (Water Fittings) Regulations* (1999). Where softeners discharge to a drain, they must have an appropriate air break to the drain installed such as a type AA or an air-break-to-drain device in accordance with BS EN 1717 clause 9.

### 3.3.2 Filtration

Water delivered to premises may have been derived from various river and groundwater sources, the quality of which can be different, thus requiring a number of treatment processes. Filtration to an appropriate standard will normally have been carried out by the water undertaker or private water supply operator. Some treatment works use additional methods to remove minute and fine suspended particles from water. These include microfiltration, ozone, carbon and ion exchange systems.

In Scotland or where a private water supply is used on site, additional on-site filtration may be required as part of a multi-barrier point-of-entry treatment system. Advice should be sought from the appropriate undertaker on the need and form of such treatment.

There are ‘benefits and associated savings with the’installation of on-site filtration plant including:

* the requirement for periodic removal of sediment from storage tanks is eliminated along with the precautions associated with working in confined spaces;
* the need for a separate or divided storage tank to allow supplies to be maintained during sediment removal is eliminated;
* cold water storage tank lids would not require to be completely and readily removable for access to clean and de-sludge, leaving only the need to provide inspection covers;
* the amount of suspended solids carried into the piping network would be virtually eliminated as they would be retained within the filtration plant so that strainers could be omitted from shower thermostatic mixing valve assemblies. In filtration retrofit situations, existing strainer cartridges could be removed. In these situations, removal of strainers would also remove a catchment for biofilm and bacteria build-up.

## 3.3 Drinking Water Systems

Domestic hot and cold-water systems are considered drinking water systems. The design of storage systems, pipework, valve arrangements and other fittings used on the system shall be such that they do not allow contamination of the water systems, which could encourage microbial multiplication. These systems shall be configured in accordance with:

* *Water Supply (Water Fittings) Regulations* (1999)/*The Water Supply (Water Fittings) (Scotland) Byelaws* (2014);
* Water Fittings and Materials Directory;
* BS 8558;
* BS EN 806 (parts 1 to 5) for cold water storage.

All pipework carrying fluids which are NOT for drinking shall be labelled according to British Standard. This action shall assist in avoiding possible cross-connections between installations conveying drinking and non-drinking water or water from private supplies.

Lead-free materials must be used for formation of capillary joints in domestic water systems.

Any water treatment system used on drinking systems must not cause a breach of the requirements of the *Water Supply (Water Fittings) Regulations* (1999)/*The Water Supply (Water Fittings) (Scotland) Byelaws* (2014).

Wet fire protection systems, i.e. hose, sprinklers, wet risers must be isolated from any drinking water supply by a method which is permissible by the *Water Supply (Water Quality) Regulations* (1999)*The Water Supply (Water Fittings) (Scotland) Byelaws* (2014).

These supplies when fed from a drinking supply are very rarely used, stagnation occurs, and conditions prevail which encourage microbial multiplication.

## 3.4 Non-drinking Water Systems

Rainwater, surface runoff water, grey water, private water supplies, drainage of foul water, emergency use water tanks are classed as non-drinking water supplies and as such a potential source of pathogenic contamination. All non-drinking water systems shall be colour-coded and labelled as such. Emergency use water tanks to be kept isolated from other water systems (drinking and non-drinking), by a suitable means which prevents back flow and microbial contamination.

# 4.0 OPERATION OF PREMISES

This procedure is designed to prevent the risk of waterborne bacteria developing in a new building/department following handover to occupancy.

At the point of handover all relevant information as detailed in WSP Part 2.1 – Design Control shall be submitted to the RP[W], including:

* system performance together;
* as-fitted drawings;
* design criteria of the domestic hot water systems and cold-water services;
* certificates of chlorination for all systems;
* flushing records post chlorination of all outlets;
* testing and commissioning data.

## 4.1 Procedure Until Occupation of New Premises

### 4.1.1 Routine Operation of Water Outlets

Occupancy of the new property shall 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. From handover until the time at which the building is fully occupied, flushing all outlets shall be undertaken at least daily to simulate turnover of water in the system, as the design intent.

The risk assessment [see WSP Part 3.1] shall indicate if any additional measures are required such as continuous dosing of a biocide.

In all buildings water draw off from all outlets shall form part of the normal daily usage. Written confirmation for this practice shall be requested from end-users by the RP[W]. The end-user shall be requested to identify any areas within their demise that do not receive normal daily usage and notify the DRP[W]/AP[W].

## 4.2 Procedure in the Event of Closure of Part or All of a Building

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 DRP[W]/AP[W] of the details.

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

The period of closure shall 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:

|  |
| --- |
| **Procedures for Building Closure by Duration/Classification** |
| **Duration of Closure** | **Classification of Closure** | **Action Required** |
| <60-Days | Temporary Closure | At least twice weekly flushing of all outlets. Flush each outlet until the temperature at the outlet stabilises and is comparable to supply water and purge to drain. Toilet cisterns shall be flushed, allowed to refill and flushed again on each occasion.A record sheet shall be completed on each occasion and this shall be signed by the person undertaking the task and their supervising manager. All records are to be retained and copied to the DRP[W]/AP[W].It is the responsibility of the relevant manager to notify the DRP[W]/AP[W] of their intention to re-open a temporarily closed area.At the end of the closure period or after 60-days has elapsed (whichever occurs first) a review shall take place to identify if the area can be reoccupied. If the area is to be reoccupied within the near future (within 30 days) then the twice weekly flushing shall continue.Before the closed area is re-occupied the DRP[W]/AP[W] shall carry out an inspection and test of the water systems:* Cold water storage tanks – inspection and temperature checks;
* DHW generators – confirm operation, stat settings and pumps as well as temperature checks;
* Sentinel points – legionella samples;
* All outlets – check temperatures.

DRP[W]/AP[W] shall arrange for any remedial works that may be required including legionella samples [see WSP Part 4.1.4].In the instance that part or all of a building is to remain closed with no planned re-opening date [this shall be classed as ‘Indefinite Closure’], negotiations must be held as detailed above and funding be made available to the DRP[W]/AP[W] in order to disconnect and drain the water services within the affected area. |
| >60-Days | Temporary Closure | Temporary closure >60 days, would require the water system within the building to remain charged as the building is planned to be reoccupied. Such instances of this may occur could include a pandemic situation where the general public are put into lockdown and have to remain at home, as such workplaces and building buildings are now unoccupied.**Detail of Works:****Small buildings** – mains fed water and point of use water heaters only:* Leave charged with water;
* Turn off water heaters – either CP or site personnel to complete;
* Look to flush at least twice weekly – either CP or site personnel to complete LUO flushing form [see WSP Part 4.1.1];
* Before reoccupation:
	+ IF FLUSHED:
		- Turn on water heaters – either CP or site personnel to complete.
		- Check cold and hot water temperatures are compliant – CP to complete using sentinel temperature form.
		- Final flush all outlets and reoccupy within 48 hours – either CP or site personnel to complete LUO flushing form.
	+ IF **NOT** FLUSHED:
		- Complete the process ‘safe purging of stagnant water’ [see Section 6.3 below] of all outlets.
		- Turn on water heaters – either CP or site personnel to complete.
		- Check cold and hot water temperatures are compliant – CP to complete using sentinel temperature form.
		- Take legionella samples from sentinel points\*\*.
		- INTRODUCE flushing of all outlets at least twice weekly until sample results are returned, if results are clear then reoccupy within 48 hours.
		- Where sample results return positive counts >1000 cfu/L and the building has to open then Point Use Water filters shall be installed by the CP [complete POUF install form] at those affected outlets to allow the building to open and then investigate reason for legionella count and resolve.

**Other buildings** – mains fed water/cold water storage tanks and DHW generators:* Leave charged with water;
* Turn off DHW generators – CP to complete;
* Look to flush at least twice weekly – either CP or site personnel to complete LUO flushing form;
* Before reoccupation:
	+ IF FLUSHED:
		- Turn on DHW generators – CP to complete.
		- Complete an inspection of:
			* Cold water storage tanks – inspection and temperature checks – completed by CP or contractor\*\*.
			* DHW generators – confirm operation, stat settings and pumps as well as temperature checks – completed by CP or contractor\*\*.
		- Take legionella samples from sentinel points – completed by contractor\*\*.
		- Check cold and hot water temperatures are compliant at all outlets – CP or contractor\*\* to complete using sentinel temperature form.
		- CONTINUE flushing of all outlets at least twice weekly until sample results are returned, if results are clear then reoccupy within 48 hours.
		- Where sample results return positive counts >1000 cfu/L and the building has to open then Point Use Water filters shall be installed by the CP [complete POUF install form] at those affected outlets to allow the building to open and then investigate reason for legionella count and resolve. Complete risk assessment.
	+ IF **NOT** FLUSHED:
		- Undertake flush of all outlets following ’safe purging of stagnant water’ [see Section 10.7] – completed by CP or contractor\*\*.
		- Turn on DHW generators and complete thermal disinfection process [see Section 9.3] – completed by CP or contractor\*\*.
		- Complete an inspection of:
			* Cold water storage tanks – inspection and temperature checks – completed by CP or contractor\*\*.
			* DHW generators – confirm operation, stat settings and pumps as well as temperature checks -- completed by CP or contractor\*\*
		- Clean and disinfection of cold-water storage tanks [see Section 9.2] and distribution systems [see Section 9.1] – completed by contractor\*\*.
		- Take legionella samples from sentinel points 2-7 days post chlorination – completed by contractor\*\*.
		- Check cold and hot water temperatures are compliant at all outlets – CP or contractor\*\* to complete using sentinel temperature form.
		- INTRODUCE flushing of all outlets at least twice weekly until sample results are returned, if results are clear then reoccupy within 48 hours.
		- Where sample results return positive counts >1000 cfu/L and the building has to open then Point Use Water filters shall be installed by the CP [complete POUF install form] those affected outlets to allow the building to open and then investigate reason for legionella count and resolve.

Arrange for any remedial works that may be required including legionella samples [see WSP Part 4.1.4].\*\* The use of specialist contractors and access to UKAS laboratories for water sample analysis could be in high demand. Early collaboration with contractors on proposed opening of buildings needs to be completed to allow for planning of work. |
| >60-Days | 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 above, and funding made available to the DRP[W]/AP[W] by the manager of the department that is closing, in order to disconnect and drain the water services within the affected area. The relevant manager shall be aware that considerable cost for modifications could be needed to achieve this requirement in some large properties.**Detail of Works**Where relevant:* all water tanks associated with the affected area shall be drained, cleaned and dried out;
* All pipework and devices shall be drained and where applicable DHW generator [or other storage vessels] shall be opened up, cleaned and left open to the atmosphere;
* Pipework shall be disconnected from the mains services and capped off, mains cold water services shall be isolated and capped off from the system and all relevant pipework drained;
* Notices shall be posted throughout the affected area stating that all water services are disconnected;
* The Estates Department shall be responsible to ensure that an adequate water seal exists in unused toilets to prevent odours from the foul drain system entering the premises;
* Adequate records of actions, and amended water service schematic diagrams shall be produced by the Estates Department showing the relevant modifications and disconnections made to the water systems. The Completed Remedial Works Record Sheet shall be used for record keeping purposes.

**Procedure in the Event of 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 Estates Department prior to the re-occupation exercise.The Estates Department shall require the following information: * The planned re-opening date;
* Any proposed changes of use of the area;
* Any areas which shall not be used.

The Estates Department shall 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. |

# 5.0 MONITORING AND OPERATION OF DOMESTIC HOT AND COLD-WATER SYSTEMS

## 5.1 Monitoring Equipment

Use of a digital thermometer unit with a touch and immersion probe is recommended for taking temperatures.

Water temperature records should always be traceable to the temperature measurement equipment used.

All new devices [thermometer unit and associated probes [immersion and contact]] will be purchased with a UKAS calibration having been completed prior to use. Each device [thermometers and probes] will have a unique identifying reference [e.g. asset number, serial number etc.] for traceability and auditing.

The accuracy of all portable thermometers and probes used by CPs/specialist water hygiene contractor is to be validated regularly [at least every three [3] months].

On an annual basis the calibration of all thermometers and associated probes will be verified or, alternatively they can replaced with a new device that meets the requirements stated above. Verification or replacement shall occur in good time so that no device exceeds the anniversary date of its calibration certificate. Copies of all calibration certificates are to be retained with the associated thermometer.

The DRP[W]/AP[W] will ensure that calibration validation of the thermometer is scheduled at least annually.

The DRP[W]/AP[W] will ensure that evidence of calibration and validation checks is maintained for all temperature measurement equipment used in monitoring, maintenance and risk assessment and kept up to date and available for inspection. This includes portable equipment used by sub-contractors and BMS sensors [where fitted].

The validation test records and calibration certificates are to be retained for inspection during the period they remain current and for a further five years.

[See WSP Part 4.2 – SOPS for details on the validation check process.]

## 5.2 Monitoring of Domestic Hot and Cold-Water Systems

In accordance with the Health and Safety Executive’s HSG274 Technical Guidance:

“The frequency of inspecting and monitoring the hot and cold water systems shall depend on their complexity and the susceptibility of those likely to use the water. The risk assessment should define the frequency of inspection and monitoring depending on the type of use and user and particularly where there are adjustments made by the assessor to take account of local needs.”

The actions described in the following table shall form the basis of the monitoring and maintenance programme:

| **SERVICE** | **ACTION TO TAKE** | **FREQUENCY** |
| --- | --- | --- |
| DHW generators | Inspect calorifiers internally by removing the inspection hatch or using a boroscope and clean by draining the vessel. The frequency of inspection and cleaning should be subject to the findings and increased or decreased based on conditions recorded. | Annually, or as indicated by the rate of fouling. |
| Where there is no inspection hatch, purge any debris in the base of the calorifier to a suitable drain Collect the initial flush from the base of hot water heaters to inspect clarity, quantity of debris, and temperature. | Quarterly [healthcare]/Annually [non healthcare], but may be increased as indicated by the risk assessment or result of inspection findings. |
| Check DHW generator flow temperatures (thermostat settings should modulate as close to 60°C as practicable without going below 60°C) Check calorifier return temperatures (not below 50°C). | Monthly. |
| De-stratification shunt pumps | Check for correct operation of shunt pumps and confirm correct timer settings (where applicable). | Monthly. |
| DHW circulation pumps | Check domestic hot water (DHW) circulation pumps for correct operation. | Monthly. |
| Hot water services | For non-circulating systems: take temperatures at sentinel points (nearest outlet, furthest outlet and long branches to outlets) to confirm they are at a minimum of 50°C within one minute. | Monthly. |
| For circulating systems: take temperatures at return legs of principal loops (sentinel points) to confirm they are at a minimum of 50°C. Temperature measurements may be taken on the surface of metallic pipework. | Monthly. |
| Hot water services (continued) | For circulating systems: take temperatures at return legs of subordinate loops, temperature measurements can be taken on the surface of pipes, but where this is not practicable, the temperature of water from the last outlet on each loop may be measured and this should be greater than 50°C within one minute of running. If the temperature rise is slow, it should be confirmed that the outlet is on a long leg and not that the flow and return has failed in that local area. | Quarterly (ideally on a rolling monthly rota). |
| All HWS systems: take temperatures at a representative selection of other points (intermediate outlets of single pipe systems and tertiary loops in circulating systems) to confirm they are at a minimum of 50°C to create a temperature profile of the whole system over a defined time period. | Representative selection of other outlets on a rotational basis to ensure the whole system is reaching control temperature. |
| Point-of-use (POU) water heaters (no greater than 15 litres) | Check water temperatures to confirm the heater operates at 50–60°C or check the installation has a high turnover. | Monthly to six-monthly, or as indicated by the risk assessment. |
| Combination water heaters | Inspect the integral cold water header tanks as part of the cold water storage tank inspection regime, clean and disinfect as necessary. If evidence shows that the unit regularly overflows hot water into the integral cold water header tank, instigate a temperature monitoring regime to determine the frequency and take precautionary measures as determined by the findings of this monitoring regime. | Annually. |
| Check water temperatures at an outlet to confirm the heater operates at 50–60°C. | Monthly. |
| Cold water tanks | Inspect cold water storage tanks and carry out remedial work where necessary, using the photo guide detailed below [source HSG274 part 2]. | Annually. |
| Check the tank water temperature remote from the ball valve and the incoming mains temperature. Record the maximum temperatures of the stored and supply water recorded by fixed maximum/minimum thermometers where fitted. | Annually (Summer) or as indicated by the temperature profiling. |
| Cold water services | Check temperatures at sentinel taps (typically those nearest to and furthest from the cold tank, but may also include other key locations on long branches to zones or floor levels). These outlets should be below 20°C within two minutes of running the cold tap. To identify any local heat gain, which might not be apparent after one minute, observe the thermometer reading during flushing. | Monthly. |
| Take temperatures at a representative selection of other points to confirm they are below 20°C to create a temperature profile of the whole system over a defined time period. Peak temperatures or any temperatures that are slow to fall should be an indicator of a localised problem. | Representative selection of other outlets on a rotational basis to ensure the whole system is reaching control temperature. |
| Check thermal insulation to ensure it is intact and consider weatherproofing where components are exposed to the outdoor environment. | Annually. |
| Showers and spray taps | Dismantle, clean and descale removable parts, heads, inserts and hoses where fitted. | Quarterly or as indicated by the rate of fouling or other risk factors, e.g. areas with high risk patients. |
| Point-of-use (POU) filters | Record the service start date and lifespan or end date and replace filters as recommended by the manufacturer (0.2 µm membrane POU filters should be used primarily as a temporary control measure while a permanent safe engineering solution is developed, although long-term use of such filters may be needed in some healthcare situations). | According to manufacturer’s guidelines. |
| In-line strainers | Where fitted, inspect, clean, descale and disinfect any strainers or filters associated with TMVs or other sensitive equipment. | Annually[or on a frequency defined by the risk assessment, taking account of any manufacturer’s recommendations] |
| Base exchange softeners/Reverse osmosis (RO) Units | Visually check the salt levels and top up salt [if required]. Undertake a hardness check to confirm operation of the softener. Conductivity or RO permeate monitored and regeneration cycle initiated as required. | Weekly, but depends on the size of the vessel and the rate of salt consumption. |
| Service and disinfect | Annual, or according to manufacturer’s guidelines. |
| Multiple use filters | Backwash and regenerate as specified by the manufacturer. | According to manufacturer’s guidelines. |
| Infrequently used outlets | Consideration should be given to removing infrequently used showers, taps and any associated equipment that uses water. If removed, any redundant supply pipework should be cut back as far as possible to a common supply (e.g. to the recirculating pipework or the pipework supplying a more frequently used upstream fitting) but preferably by removing the feeding ‘T’. | As required. |
| Infrequently used equipment within a water system (i.e. not used for a period equal to or greater than seven days) should be included on a flushing regime. Flush the outlets until the temperature at the outlet stabilises and is comparable to supply water and purge to drain Regularly use the outlets to minimise the risk from microbial growth in the peripheral parts of the water system, sustain and log this procedure once started. In some circumstances, more frequent flushing may be required as indicated by the risk assessment. | Weekly, or as indicated by the risk assessment. |
| Thermostatic mixing valves (TMVs) | Risk assess whether the TMV fitting is required, and if not, remove. | Initial risk assessment to be reviewed at least annually. |
| Where TMVs are needed, inspect, clean, descale and disinfect any strainers or filters associated with TMVs. To maintain protection against scald risk, TMVs require regular routine maintenance carried out by competent persons in accordance with the manufacturer’s instructions. | Six Monthly or on a frequency defined by the risk assessment, taking account of any manufacturer’s recommendations. |
| Expansion vessels | Where practical, flush through and purge to drain. Where fitted, removable bladders or diaphragms should be changed according to the manufacturer’s guidelines or as indicated by the risk assessment. | Monthly to six monthly, as indicated by the risk assessment. |

## 5.3 Operation of Domestic Hot and Cold-Water Systems

|  |  |  |
| --- | --- | --- |
| **System/Service** | **Task** | **Frequency** |
| Domestic cold-water pressurisation pumps | * Switch over pumps automatically;
* Or, manually.
 | DailyDaily |
| Domestic water tanks | * Where multiple tanks, operate in parallel;
* Where one or more tanks are drained, ensure that all interconnecting pipework and mains cold feed are drained and vented;
* Check tank temperatures and visually inspect and carry out remedial [where necessary] – using the photo guide detailed below [source HSG274 part 2].
 | Start-upAt changeoverAnnually |
| DHW Generator | * Where multiple, operate in parallel;
* Where one or more DHW generators are drained, ensure that all interconnecting pipework and cold feed are drained and vented;
* Thermostat set to achieve minimum flow temperature of 60°C and a return temperature of at least 50°C.
* In premises with high vulnerability occupants, DHW generator to operate 24 hrs per day, 7 days per week. In other premises operate by time clock, to achieve full temperature for at least one hour per day.
 | Start-upAt changeoverMonthlyStart-up |
| DHW generator shunt pumps | * Control by time clock;
* In premises with high vulnerability occupants, DHW generator shunt pumps to operate 24 hours per day, 7 days per week.
 | 1 hour per day |
| Continuously |
| DHW distribution pumps | * In premises with high vulnerability occupants, distribution pumps to operate 24 hours per day, 7 days per week;
* In other premises operate by time clock, to achieve full temperature one hour before occupation and one hour after each day;
* Manual check that the distribution pump[s] are operating effectively [by temperature checks].
 | Start-upMonthly |
| Monthly |

## 5.4 Operation of Cold-Water Services

### 5.4.1 Cold Water Tanks

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°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°C within 2 minutes 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.

### 5.4.2 Connections to Outside Services

The existence of these connections and their necessity is checked on an annual basis and recorded, ensuring that an appropriate back flow prevention device has been installed applicable to the connection’s usage and the outlet is still in use/required.

**NB**: where the outside connection is used to feed jet washer/high pressure washers, these devices require their own dedicated fluid category 5 break tank [depending on where the washer was being used].

### 5.4.3 Connections to Inside Services

Vending machines, ice machines and chilled water dispensers shall be checked annually and recorded to ensure such units are connected to a drinking water supply (not softened). These connections shall be via a double check valve and upstream of outlet/s known to receive a high throughput of water of a regularly used outlet but not exceeding three [3] metres in supply pipe length.

All devices shall be used regularly daily. Where it is suspected such a device has not been operated for periods greater than one week it shall be discharged with the spray head under water to prevent the release of aerosols. If the device is not required, it shall be isolated from use and removed. The supply feed pipe work shall also be removed and cut back to the T joint of the main supply.

Each cold-water dispenser will:

* The supplier/installer shall provide a risk assessment and a work method prior to any installation;
* Estates shall be notified of the planned installation and they shall then provide a connection for the supplier/installer of the device to connect to. The water supply to the device shall not exceed 3 metres from a high use outlet;
* The supply feed to the device shall not be exposed to heat sources, i.e. heat exhaust vent at the rear of the device/radiator;
* A chlorination certificate for each device installed shall have to be supplied by the supplier/installer;
* If a ward/dept. require such a device they shall have responsibility to ensure appropriate cleaning processes are developed and undertaken as well as ensuring a maintenance contract is in place.

### 5.4.4 Pressurisation/Supply Pumps

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

Dates and times of the manual pump change-over shall be recorded in the plant room logbook. Printouts of regimes for automatic systems shall 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 in accordance WSP Part 5.1.1.

An Incident Report Form shall be completed giving details of why the pump was out of use.

### 5.4.5 Hydraulic Accumulator Vessels

HSG 274 Part 2, Info box 2.1 states:

“Where water is boosted via pumps, hydraulic accumulators (pressurised vessels that buffer variations in pressure so acting like a shock absorber) are often used to reduce pressure surges from the pumps and may reduce the demand frequency. When correctly installed, hydraulic accumulators shall partially fill and empty between each pump run and should exchange water at regular intervals, which shall reduce the risk of stagnation.”

These vessels may not fill and empty where the system pressure and temperature remains steady and can therefore represent a dead-leg in the water system. Internal bladders are often made of synthetic rubber such as EPDM and may support the growth of microorganisms including legionella and shall therefore be checked to ensure that they are approved against [BS6920-1:2014](https://shop.bsigroup.com/ProductDetail?pid=000000000030311871). Vessels with a ‘flow through’ design shall be specified as they provide less opportunity stagnation.

Vessels in systems operating at steady temperature and pressure may have long periods without exchanging any significant amount of water and therefore can be at risk of aiding microbial growth.

To minimise the risk of microbial growth, the flow through type expansion vessel shall be installed:

* in cool areas on cold flowing pipes;
* mounted as close to the incoming water supply as possible;
* mounted vertically on pipework to minimise any trapping of debris;
* with an isolation and drain valve to aid flushing and sampling;
* to minimise the volume retained within them;
* designed to stimulate flow within the vessel.

At least annually the gas pressure shall be checked and maintained as per manufacturers’ instructions and as indicated by the risk assessment.

## 5.5 Operation of Domestic Hot Water Services

The term ‘DHW Generator’ is used to describe any of the types of DHW generator below:

* Calorifiers;
* Direct gas fired water heaters;
* ‘Angelery’ [compact, tankless water heater];
* Plate heat exchangers;
* Hot water cylinders;
* Buffer vessel.

All have a means of producing and storing domestic hot water.

High risk premises such as healthcare the DHW generators are to be run 24 hours per day, 7 days per week, and the domestic hot water circulation pump kept running.

In other healthcare premises which do not operate through the night then the system shall shut down one hour after closure and shall come back on line for before re-occupation on the next day ensuring the system has achieved circulation of 60°C through the distribution system for at least one hour.

### 5.5.1 DHW Generators and Distribution Temperatures

The storage of domestic hot water shall be arranged to ensure that a water outflow temperature of at least 60°C is achieved. The outflow water temperature, under prolonged maximum continuous demand [at least 20 minutes] from DHW Generators shall not be less than 60°C.

Under no circumstances shall the domestic hot water flow temperature fall below 50°C. If this occurs a disinfection by thermal pasteurisation shall been undertaken.

A minimum domestic hot water circulation temperature of 50°C non-healthcare and 55°C healthcare shall be maintained at sentinel points on circulating systems or sentinel outlets on non-recirculating systems, temperatures shall be achieved within 1 minute.

Temperatures at return legs of subordinate loops [but where this is not practicable, the temperature of water from the last outlet on each loop may be measured and this should be greater than **55°C** within one minute of running]. If the temperature rise is slow, it should be confirmed that the outlet is on a long leg and not that the flow and return has failed in that local area. Taken quarterly.

Temperature measurements may be taken on the surface of metallic pipework for return loop monitoring.

Permanent continuous monitoring of water temperatures via a building management system or remote data monitoring systems is recommended for monitoring sentinel points.

The outflow water temperature, under prolonged maximum continuous demand [at least 20 minutes] from DHW Generators shall not be less than 60°C.

While it is accepted that occasionally under peak instantaneous or prolonged demand that the water outflow temperature shall 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].

Should it be necessary for interrupted operation or shut-down over night, then the DHW Generator shall be allowed to maintain its water storage temperature and the domestic hot water pump shall be started up to ensure full temperature through-out the distribution system for at least one hour prior to occupation of the premises.

### 5.5.2 Domestic Hot Water Circulation Pumps

Domestic hot water circulation pumps shall perform in such a way to ensure a minimum water circulation temperature of 50°C non-healthcare and 55°C healthcare throughout the system.

Only one domestic hot water distribution pump shall be installed near the DHW Generator. Spare pumps are readily available for replacement in the event of pump failure.

Multiple distribution pumps on new installation are prohibited.

Where multiple distribution pumps exist then the duty/stand by pumps shall be switched over daily, with records kept.

It is not permissible to shut down the pumped circulation system. To do so shall result in a loss of the required distribution temperatures.

### 5.5.3 DHW Generator Flushing

Each DHW generator shall be flushed quarterly [healthcare – HTM04-01, Part B, para 7.34] / annual [non healthcare] through its drain valve by opening the drain valve. Precautions to be taken to minimise the release of any aerosol [i.e. direct to drain for hoses/fixed pipes].

DHW generator flushing shall be carried out after temperature checks on the DHW generator and system have been completed. The DHW generator blow down record sheet and DHW generator monthly temperature record sheet shall be completed and returned to the DRP[W]/AP[W].

### 5.5.4 Electric Water Heaters

Point of use water heaters [no greater than 15 litres]:

* Check water temperature to confirm heater achieves 50°C non-healthcare and 55°C healthcare. Monthly to six monthly.

Combination water heaters:

* Are not advocated for use in healthcare premises;
* Check water temperature to confirm heater operates at 55°C. Monthly to six monthly;
* Inspect integral cold water [as part of tank inspections program] and clean and disinfect as necessary.

### 5.5.5 DHW Generator – Renewable Energy Source for DHW Generators

At present the Trust/Board/Organisation does not make use of solar and/or ground/air source heat as a means of generating domestic hot water for any sites. There are no current plans for such projects. The WSG would need to be consulted about any such future plans.

# 6.0 OUTLET MANAGEMENT

## 6.1 Normal Daily Use

All outlets in clinical areas are to receive ‘normal daily use’, comprising both regular use by staff, visitors and/or patients and daily running as part of the end-user’s routine hygiene procedures.

## 6.2 Little Used Outlets [LUOs]

Outlets which are not subject to normal daily use shall be classed as LUOs.

LUOs may include the following types: showers, baths, wash hand basins, sinks, WCs, sluices, bidets, and taps.

LUOs shall be flushed for as long as necessary to ensure that the entire contents of the outlet and its associated supply pipework are replenished with fresh water. Flush the outlet until the water temperature at the outlet is comparable to the temperature of the water source. The date, time, duration of flushing and water temperature at the outlet and at the source shall be recorded and signed by the operative undertaking the task.

LUOs shall be identified by the DRP[W]/AP[W], CP, Facilities Assistance, or Department Managers using knowledge of the site use and occupancy. A schedule of LUOs shall be maintained for each site and reviewed annually or whenever there is a change to the use of the building. Where LUOs have been identified then management options must be adopted to manage the risk of stagnant water in the system, this shall include either:

* removal of disused outlet/s and associated pipework surplus to requirements; or
* placing the outlet on a weekly [non-healthcare] or twice weekly [healthcare] flushing programme including the completion of record form.

A communication shall be issued by WSG periodically [at least 6monthly [biennial]] basis to all building/dept. managers to outline their responsibility for ensuring the daily use of all outlets. The email shall advise where daily running is not achievable then management options must be adopted to manage the risk of stagnant water in the system, this shall include placing the outlet on a flushing programme including the completion of record form. Or the removal of the outlet/s and associated pipework.

## 6.3 Safe Purging of Stagnant Water

Stagnant water may potentially contain large numbers of waterborne pathogens such as Legionellae. To avoid the risk of legionellosis, precautions shall be taken to avoid the creation of aerosols and to avoid individual exposure from aerosols that maybe present.

Safe purging of stagnant water should be completed to any outlet where it has not been flushed for more than 1 week.

The specific precautions may vary according to the circumstances, but typically include:

* Running a hose from the outlet into a container of clean water;
* Running hoses directly into a drain cover;
* Running fire hoses at a distance from occupied buildings;
* Closing windows and air conditioning intakes where aerosols are created outdoors;
* Wearing respiratory protective equipment [remember this does not protect nearby members of the public and others who are not wearing masks].

Care shall be taken to avoid the possibility of back siphoning into mains water supplies.

## 6.4 Showers

Showers which are rarely used shall be drained and disconnected along with all redundant pipework so that no live blind-end pipework remains in situ. Disconnections in patient and clinical staff areas shall only be carried out following consultation with the relevant clinical staff.

All showers are run daily by the Facilities Assistance as part of routine cleaning procedures and recorded.

Shower heads and hoses are replaced with new products, on a quarterly basis.

## 6.5 Thermostatic Mixing Valves [TMVS]

All TMVs shall be subject to in-service testing as per HTM04-01: Supplement – ‘Performance specification D 08: thermostatic mixing valves (healthcare premises)’. In practice this means that each valve will be inspected and tested every 6 months at which time incoming hot and cold-water temperatures will be checked along with the output temperature and a failsafe test will be completed.

On an annual basis each TMV will be subject to a strip down and overhaul including temperature and failsafe check.

Shall be operated in accordance with the temperatures outlined below [source HTM04-01 Part B]:



|  |
| --- |
| **Wash-hand basins and sinks** Wherever wash-hand basins are installed, a mixed water temperature outlet is required: a risk assessment should be undertaken, which is overseen by the WSG, that considers the needs of patients and service-users to determine whether there is a scalding risk and whether additional protection is required [e.g. a type 1 with temperature stop, type 2 or type 3 mixing valve – see options below]. **Hazard warning signs for scalding risk should be displayed if appropriate.** For outlets not intended for hand-washing [e.g. sinks in kitchens, dirty utilities or cleaners’ rooms], TMVs should not be installed. All installations require a hot water hazard warning sign. [The temperature could equate to the maximum temperature available from the calorifier.]Note: Microbiological risks should also be considered for all installations. Options: 1. Separate hot and cold taps;2. Mixed temperature outlet: * Type 1 – a mechanical mixing valve with or without temperature stop [i.e. manually blended];
* Type 2 – a thermostatic mixing valve: BS EN 1111 and or BS EN 1287;
* Type 3 – a thermostatic mixing valve with enhanced performance: HTM04-01: Supplement – ‘Performance specification D 08: thermostatic mixing valves (healthcare premises)’ Type 3 TMVs should have undergone third-party testing and certification to the requirements of HTM04-01: Supplement – ‘Performance specification D 08: thermostatic mixing valves (healthcare premises)’.
 |
| Notes: 1. Where installed, it is preferable that thermostatic mixing devices are fitted directly to the mixed temperature outlet or be integral with it, and be the method of temperature and flow control, i.e. the mixing device should not be separate nor supply water via a second tap or manual mixer since there will be many cases where draw-off of cold water will not occur. If a separate thermostatic device is used, it should be fitted as close to the outlet as possible, which should be a flow-only control. Where ‘T’ type mixing valves are installed, they should be readily accessible for maintenance. 2. In the case of bidets with ascending sprays or a handle douche, which may be accidentally immersed, the water supply should be independently fed from storage with no draw-offs at a lower level [i.e. a break-tank arrangement]. Appropriate backflow protection must be provided.3. Automatic taps [timed flow] can be considered as a result of a risk assessment and should be specified as appropriate for the conditions of use, either type 2 or 3. If the temperature is non-user adjustable, they should be supplied via a type 2 or 3 TMV set to 39-40°C. The sensors should include a timer that can be adjusted to take account of the optimum washing time: this is particularly for scrub sinks. Sensors should be offset or positioned such as to reduce the risk of accidental contamination of the outlet and be positioned so that POU filters can be used. Facilities for overriding the sensors will be necessary. When a duty cycle setting exists, it should be activated to avoid stagnation. [If there is more than one tap/outlet, e.g. in the case of scrub sinks, then all should deliver water to avoid stagnation.]4. In the case of dual-function delivery devices, i.e. bath/shower diverter, type 3 valves should deliver the temperature appropriate to each outlet, e.g. bath max 44°C or 46°C, shower 41°C. [Refer also to the commissioning procedure section in HTM04-01: Supplement – ‘Performance specification D 08: thermostatic mixing valves (healthcare premises)’.]5. Taps, components and fittings should be removable and easily dismantled for cleaning and disinfection.6. Where manual mixing devices with a temperature stop are installed, it is important to ensure that the normal maximum delivery temperature is controlled to safe limits. Installation, commissioning and maintenance should take account of the system’s dynamic pressure and temperature changes, and the seasonal changes in incoming cold water temperatures.7. This table does not cover birthing pools. |

All TMVs shall be checked every 6 months, where a pre-TMV inlet temperature and outlet temperature are checked including a failsafe check.

On an annual basis each TMV shall be subject to a strip down and overhaul including temperature and failsafe check.

## 6.6 Flexible Pipe Installation

When completing a new installation all fittings shall be made with fixed tails direct to the outlet. Flexible tails for installations shall only be used when fixed tail installation is not possible, for example on the following appliances: adjustable height baths and wash hand basins, washing machines, dishwashers and mechanical sluices for bedpans.

When flexible tails have been installed then a check valve shall also be fitted before the flexible pipework.

## 6.7 Jet Washers/High Pressure Hoses

These units create considerable aerosol and as previously mentioned the use of such devices shall be avoided. Where this is not possible then the water supply to such units must be from a drinking water supply and have a suitable water category 5 protection [typically a type AA AB air gap and break tank].

The hose end of the device must not be inserted in a body of water, whilst in or out of use, to prevent back siphoning.