



Scottish Health Technical Memorandum 2027

(Part 1 of 4)

Overview and management responsibilities

Hot and cold water supply, storage and mains services

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1. Introduction

- 1.1 Scottish Health Technical Memorandum 2027; *Hot and cold water supply, storage and mains services*, is published in four separate parts. It is equally applicable to both new and existing sites and gives comprehensive advice and guidance to healthcare management, design engineers, estate managers and operations' managers on the legal requirements, design applications, maintenance and operation of hot and cold water supply, storage and distribution systems in all types of healthcare premises.
- 1.2 Current statutory legislation requires both “management” and “staff” to be aware of their individual and collective responsibility for the provision of hot and cold water supplies, storage and distribution in healthcare premises.
- 1.3 Healthcare premises are dependent upon water to maintain a safe and comfortable environment for patients and staff, and for treatment at all levels of clinical and surgical care.
- 1.4 The development, construction, installation and maintenance of hot and cold water supply systems are vital for public health. Water quality is influenced by political, environmental and technical issues. It is governed by legislation, water byelaws, building regulations, approved codes of practice and technical standards intended to safeguard quality.
- 1.5 Interruptions in water supply can disrupt healthcare activities. The design of systems must ensure that sufficient reserve water storage is available to minimise the consequence of disruption, while at the same time ensuring an adequate turnover of water to prevent stagnation in storage vessels.
- 1.6 While some guidance on the water services applications mentioned below is given in this memorandum, reference should be made to:

laundry – see Health Building Note 25; Health Building Note is suitable for use in Scotland subject to the amendments contained in the Management Executive Letter MEL 94/108

sterile supply departments – see Health Building Note 13; Scottish Hospital Planning Note 13 issued with MEL 94/63

hydrotherapy pools – see Public Health Laboratory service booklet, *Hygiene for Hydrotherapy Pools*.

SHTM 2040; *The control of legionellae in healthcare premises – a code of practice* should be consulted for guidance on the prevention of legionnaires' disease.



Definitions

- 1.8 Definitions of terms are as those contained in BS 6100 Sections 2.7 and 3.3, BS 6700 and Model Water Byelaws.

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2. Management responsibility

Management accountability

- 2.1 Management has the overall responsibility for implementing procedures to ensure that reliable hot and cold water supply, storage and distribution systems operate within the organisation.
- 2.2 These procedures should demonstrate that any person on whom the statutory duty falls has fully appreciated the requirement to provide an adequate supply of hot and cold water of suitable quality. Though compliance with this guidance may be delegated to staff, or undertaken by contract, accountability cannot be delegated.
- 2.3 Regular assessments should be made at least annually, using this guidance, to establish the extent of the risk. Shortfalls should be clearly recorded and the proposed control measures, with timescales, developed. A review should be undertaken whenever there is a substantial change in physical or environmental conditions.
- 2.4 The objective must be to institute management procedures to ensure that compliance is continuing and not notional. The prime purpose of the assessment is to be able to demonstrate that management has identified all the relevant factors, has instituted corrective or preventive action and is monitoring the plans being implemented.
- 2.5 This guidance should be applied to all healthcare premises, however small, where there is a duty of care under the Health and Safety at Work etc Act 1974.

Statutory requirements

- 2.6 It is the responsibility of management to ensure that their premises comply with all statutes.
- 2.7 Management (owners or occupiers) of healthcare premises have an overriding general duty of care under the Health and Safety at Work etc Act 1974. Therefore, they should ensure that the water supply, storage and distribution services can be provided within the terms of the following legislation.

Health and Safety at Work etc Act 1974

- 2.8 Employers have a general duty, under the Health and Safety at Work etc Act 1974 to ensure, so far as is reasonably practicable, the health, safety and welfare of their patients, employees and visitors who may be affected by workplace activities.
- 2.9 These duties are legally enforceable and the Health and Safety Executive have successfully prosecuted employers including Health Authorities and Trusts under this statute. It falls upon owners and occupiers of premises to ensure that there is a management regime for the proper design, installation and maintenance of plant, equipment and systems. Failure to have a proper system of work and adequate control measures can also be an offence even though an outbreak of, for example, legionnaires' disease or other such incident has not occurred.

The Management of Health and Safety at Work Regulations 1999

- 2.10 These regulations require every employer to make a suitable and sufficient assessment of all risks to health and safety of employees and the public caused by work activities. In addition to legionella, other risks from a hot and cold water distribution system include deterioration of water quality, scalding at hot water outlets and danger due to bursting at excessive pressures.

Control of Substances Hazardous to Health (COSHH) Regulations 1999

- 2.11 In the context of hot and cold water supply, storage and mains services, these regulations apply to micro-organisms, such as legionellae and to the chemicals which may be used to control the growth of micro-organisms in water supply. Employers have a duty to assess the risks from exposure to these substances to ensure that they are adequately controlled.

Public Health (Infectious Diseases) (Scotland) Regulations 1975

- 2.12 These regulations require that a properly appointed officer shall inform the chief medical officer, of any serious outbreak of any disease which to his knowledge has occurred.

For further reference refer to: Public Health (Notification of Infectious Diseases) (Scotland) Regulations 1988, Public Health (Notification of Infectious Diseases) (Scotland) Amendment Regulations 1989. The Scottish Office, Department of Health, Advisory Group on Infection, Scottish Infection



Manual. Guidance on core standards for the control of infection in hospitals , healthcare premises and at the community interface (1998).

Water Supply Regulations

- 2.13 The Water Supply (Water Quality) (Scotland) Regulations 1990 (as amended), apply to water supplied to any hospital which is used for domestic purposes such as drinking, washing or cooking. Two additional sources of advice on drinking water quality are:
- a. the Director of Public Health;
 - b. the World Health Organisation 'Guidelines for drinking water quality' 1993.
- 2.14 The Private Water Supplies (Scotland) Regulations 1992 (Statutory Instrument 1992/574) cover private water supplies such as boreholes and wells.

Food Safety Act 1990

- 2.15 The Food Safety Act 1990 covers water used for food preparation or food manufacture and also includes water used for drinking. Food Safety (Temperature Control) Regulations 1995 will also apply as will the Food Safety (General Food Hygiene) Regulations 1995.

Approved Code of Practice

- 2.16 The Health and Safety Commission have published an, 'Approved Code of Practice (ACOP)' and the Health and Safety Executive have produced a guidance note (HS(G)70) entitled, 'The control of legionellosis including legionnaires' disease'. The onus is on management to demonstrate that procedures in place are as good as, or better than, those required by the ACOP.
- 2.17 Compliance with the guidance given in SHTM 2040 will satisfy the ACOP requirements for the control of legionellosis.
- 2.18 The health service, with responsibility for the wider aspects of public health and the operation of NHS in Scotland premises, is expected to be particularly vigilant. The number of outbreaks of legionnaires' disease is relatively small, but outbreaks are considered to be avoidable. Management must also acknowledge that incidents or outbreaks cause widespread concern, especially if associated with healthcare premises. Investigation of these outbreaks has shown that they are generally related to a breakdown in management systems. Design flaws and defects have also been implicated as the cause of some outbreaks.



- 2.19 Hence, managers need to satisfy themselves by monitoring, that effective control procedures are being implemented. It is not sufficient merely to devise procedures.

Model Water Byelaws

- 2.20 All water authorities responsible for water supply have a statutory duty to enforce their byelaws for the prevention of waste, undue consumption, misuse and contamination of water supplied by them.
- 2.21 In 1989 new model water byelaws came into effect and these are set out, along with the water industry's interpretation of these provisions, in the 'Water Supply Byelaws Guide 1989'. The WRc (Water Research Centre) operates the Evaluation and Testing Centre which provides advice on byelaws on a national basis and administers the Water Byelaws Scheme which tests and lists water fittings and materials for compliance with the byelaws. The 'Water Fittings and Materials Directory' contains information on suitable fittings and materials and is updated every six months.

Building Regulations

- 2.22 Part P of Schedule 1 of the Building Standards (Scotland) Regulations 1990 provides the functional requirements for the unvented hot water storage systems.

Building Services Research and Information Association

- 2.23 Application Guide AG4/94 Guide to legionellosis - temperature measurements for hot and cold water services. A practical guide which sets out the main activities which are essential for compliance with the HS(G)70 guidance on water temperatures. Its principle on planning, measurement and site procedure are equally applicable to healthcare premises.

British Standards

- 2.24 BS 6700: 1997 is the British Standard specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.
- 2.25 BS 1710: 1984 is the British Standard specification for identification of pipelines and services.

Operational management

- 2.26 Managers should ensure that an operational plan is in place for each site under their control. This document should comprise:
- up-to-date drawings and descriptions of all the supply storage and distribution systems within those premises;
 - step-by-step instructions to operate, maintain, control and shut down the water supply, storage and distribution systems within those premises;
 - a schedule of possible emergency incidents causing loss of the water supply from the water authority. Each item in the emergency incident schedule should include guidance on operational procedures to re-establish a stable wholesome water supply. In re-establishing the water supply, input from the infection control team and the Consultant in Communicable Disease Control may be required.
- 2.27 A routine of staff training should be implemented by management on the systems' basic operational procedures, and also on those system procedures required during an emergency.
- 2.28 Only properly trained nominated persons should be appointed by management to control the operation of emergency equipment.

Designated staff functions

Management

- 2.29 Management is defined as the owner, occupier, employer, general manager, chief executive or other person who is ultimately accountable for the safe operation of healthcare premises.
- 2.30 A person intending to fulfil any of the staff functions specified below should be able to prove that they possess sufficient skills, knowledge and experience so as to be able to perform safely the designated tasks.

Infection control officer

- 2.31 Infection control officer-or consultant microbiologist, if not the same person, nominated by the management to advise on monitoring infection control policy and for the maintenance of water quality.

Nominated person

- 2.33 A nominated person (water), possessing adequate professional knowledge and with appropriate training, should be nominated in writing by management to devise and manage the necessary procedures to ensure that the quality of water in healthcare premises is maintained. The person will be required to liaise closely with other professionals in various disciplines.



In addition, the person should possess a thorough knowledge of the control of legionellae and would ideally be a chartered engineer.

- 2.34 This person's role, in association with the infection control officer and maintenance staff, involves:
- a. advising on the potential areas of risk and identifying where systems do not comply with this guidance;
 - b. liaising with the water authorities and environmental health departments and advising on the continuing procedures necessary to ensure acceptable water quality;
 - c. monitoring the implementation and efficacy of those procedures;
 - d. approving and identifying any changes to those procedures;
 - e. ensuring that equipment which is to be permanently connected to the water supply is properly installed;
 - f. ensuring that adequate operating and maintenance instructions exist and adequate records are kept.
- 2.35 Implementation of an effective maintenance policy must incorporate the preparation of fully detailed operating and maintenance documentation and the introduction of a logbook system. The "nominated person" should appoint a deputy to whom delegated responsibilities may be given. The deputy should act for the nominated person on all occasions when the nominated person is unavailable.
- 2.36 The nominated person should be fully conversant with the design principles and requirements of water systems and should be fully briefed in respect of the cause and effect of water-borne organisms, for example *Legionella pneumophila*. The appointment of an engineer as the nominated person is appropriate in that the responsibility can extend to the operation and maintenance of associated plant. It is recognised that the nominated person cannot be a specialist on all matters and must be supported by specialists in specific subjects such as water treatment and microbiology, but he/she must undertake responsibility for calling upon and co-ordinating the activities of such specialists.

Maintenance technician

- 2.37 A person who, in the opinion of the nominated person, has sufficient technical knowledge and the experience necessary to carry out maintenance and routine testing of the water, storage and distribution system.

Tradesperson

- 2.38 A person who is appointed in writing by the nominated person to carry out, under the control of the maintenance technician, work on the water, storage and distribution system.



Installer

- 2.39 A person or organisation responsible for the provision of the water, storage and distribution system.

Contractor

- 2.40 The person or organisation designated by management to be responsible for the supply and installation of hot and cold water services, and for the conduct of the installation checks and tests.

Contract supervising officer

- 2.41 The person authorised by the hospital management to witness tests and checks under the terms of contract. He/she should have specialist knowledge, training and experience of hot and cold water supply, storage and mains services and SHTM 2027.

Record keeping

- 2.42 Management should ensure that an accurate record of all assets relating to the hot and cold water distribution systems is set up and regularly maintained. They must also ensure that records of all maintenance, inspection and testing activities are kept up-to-date and properly stored.

Water economy and energy management

- 2.43 Managers should ensure that water economy and energy management policies are set up and adhered to. The requirements of such policies are briefly outlined in Chapter 4.

3. Description of systems

3.1 The following sections give a brief description of hot and cold water systems.

Source of supply

3.2 Normally, the source of water supply to a health building is by one or more service pipe connections from the mains of a water authority. If the quantity and rate of flow is inadequate, or if the cost of providing the service connection appears to be uneconomical, alternative sources of supply such as boreholes or wells may be investigated.

3.3 The feasibility of a private supply should be decided by comparing the capital and revenue costs with the long-term cost of water supplied from the statutory authority. Due consideration should be given to the long-term costs of a private supply and account should be taken of potential deterioration in water quality and/or capacity of the private supply source.

3.4 Provision should be included for alternative water supply arrangements to meet an emergency, regardless of the source or sources of supply finally adopted. Alternative arrangements would include the provision of a second service connection from the statutory water authority or a private supply. The water quality requirements applicable to the main supply apply also to any alternative supplies.

3.5 Physical interconnection of pipework and valves of a statutory water authority's supply with any private supply is normally prohibited by water byelaws in order to eliminate backflow from one supply into the other. The statutory water authority should be advised of the NHS need to use any private supply as well as the statutory water authority's supply, and advice should be sought on the limitations imposed in respect of break cisterns and interconnection thereafter.

3.6 All water intended for human consumption is required by legislation to comply with the quality standards laid down in the Water Supply (Water Quality) Scotland Regulations 1990. These regulations apply to water sampled at the point where the water is available for use and embrace not just drinking water but also water used for domestic purposes.

Water treatment

3.7 While potability is not normally affected by such characteristics as hardness, colour, and (within limits) smell and/or taste, a measure of treatment may be necessary to provide a more acceptable supply, for example to protect equipment from deterioration.



- 3.8 Treatment may also be considered necessary where the water is to be used in humidification plant, steam boilers, laundries or other heating processes.

Water storage

- 3.9 Water is stored in large developments like health buildings for three basic reasons:

- a. to provide reserve supply during failure of the source cold water supply to the development;
- b. to reduce the maximum demand on the cold water main;
- c. to provide accommodation for displaced cold feed water resulting from the expansion of any water subjected to heat.

- 3.10 The purpose for which the storage is used can vary, but this has only a minor effect on design. The range of uses is generally covered by the following:

- a. cold water for drinking, washing and cooking;
- b. cold water feed to hot water services;
- c. treated cold water for laundries, heating, cooling, etc. when local supplies are unsuitable;
- d. supplies to equipment or areas deemed to present a backflow contamination risk;
- e. feed and expansion for heating service;
- f. fire-fighting.

- 3.11 The water byelaws and BS 6700 specify minimum standards for cold water storage cisterns to ensure that the stored water is retained at a potable standard suitable for domestic use.

- 3.12 Guidelines on the prevention of legionnaires' disease (see SHTM 2040) must also be considered in relation to water storage.

- 3.13 In general terms, water storage should be designed such that stored water is regularly used and not allowed to stagnate. These aims would be realised by ensuring that the stored volume is no more than the volume of water used within the building on a daily basis. However, the storage capacity should be sized to cover a 12-hour interruption on the assumption that measures will be taken to minimise water usage during any prolonged disruption.

- 3.14 In the event of an interruption to the supply, staff should be informed of the need to economise on water use, so extending the duration of the stored supply.



- 3.15 Storage cisterns should be located to minimise heat gains. To restrict microbiological growth it is important that the temperature of stored water is kept as low as practical, not more than 20°C.

Cold water distribution system

- 3.16 The design and installation of the cold water distribution system should comply with the water byelaws and BS 6700.
- 3.17 The design of the pipework should ensure that there is no possibility of a cross-connection between installations conveying potable water and installations containing non-potable water or water supplied from a private source. There should be no possibility of backflow towards the source of supply from any tank, cistern or appliance, whether by gravity backflow, back-pressure backflow or backsiphonage. A schematic drawing of a hot and cold water services distribution system can be found in Figure 1.

Hot water storage and distribution

- 3.18 Hot water services should be designed and installed in accordance with the water byelaws and BS 6700. The hot water system may be of either the vented or the unvented type.
- 3.19 The components of a hot and cold service system as used within hospitals are shown in Figure 1; some installations may have fewer, or additional, features or components.
- 3.20 A vented system usually consists of a cold water storage cistern situated above the highest outlets, which feeds a hot water storage vessel (for example a calorifier or direct-fired boiler).
- 3.21 An unvented system usually has the hot water storage vessel connected to the mains water supply via a pressure-reducing valve. The components of a directly-heated unvented hot water system are shown in Figure 2. Refer to BS 7206: 1990, 'Specification for Unvented hot water storage units and packages'.
- 3.22 The hot water taken from the top of the storage vessel will be circulated around the building in a piped distribution system. The individual outlets, taps, mixing valves or other outlet devices will be served from the distribution system.
- 3.23 Particular attention is drawn to the requirement to incorporate within the design, measures to ensure the water is retained in a wholesome condition. Guidance on the control of legionellae in healthcare premises is given in SHTM 2040. In order to ensure that the temperature of the water in the distribution system is within acceptable limits, a hot water secondary circulation will be required in which hot water is continuously circulated between the storage vessel and the various outlets. Alternatively, the



distribution system may be electrically trace-heated to maintain the required temperature in the pipework.

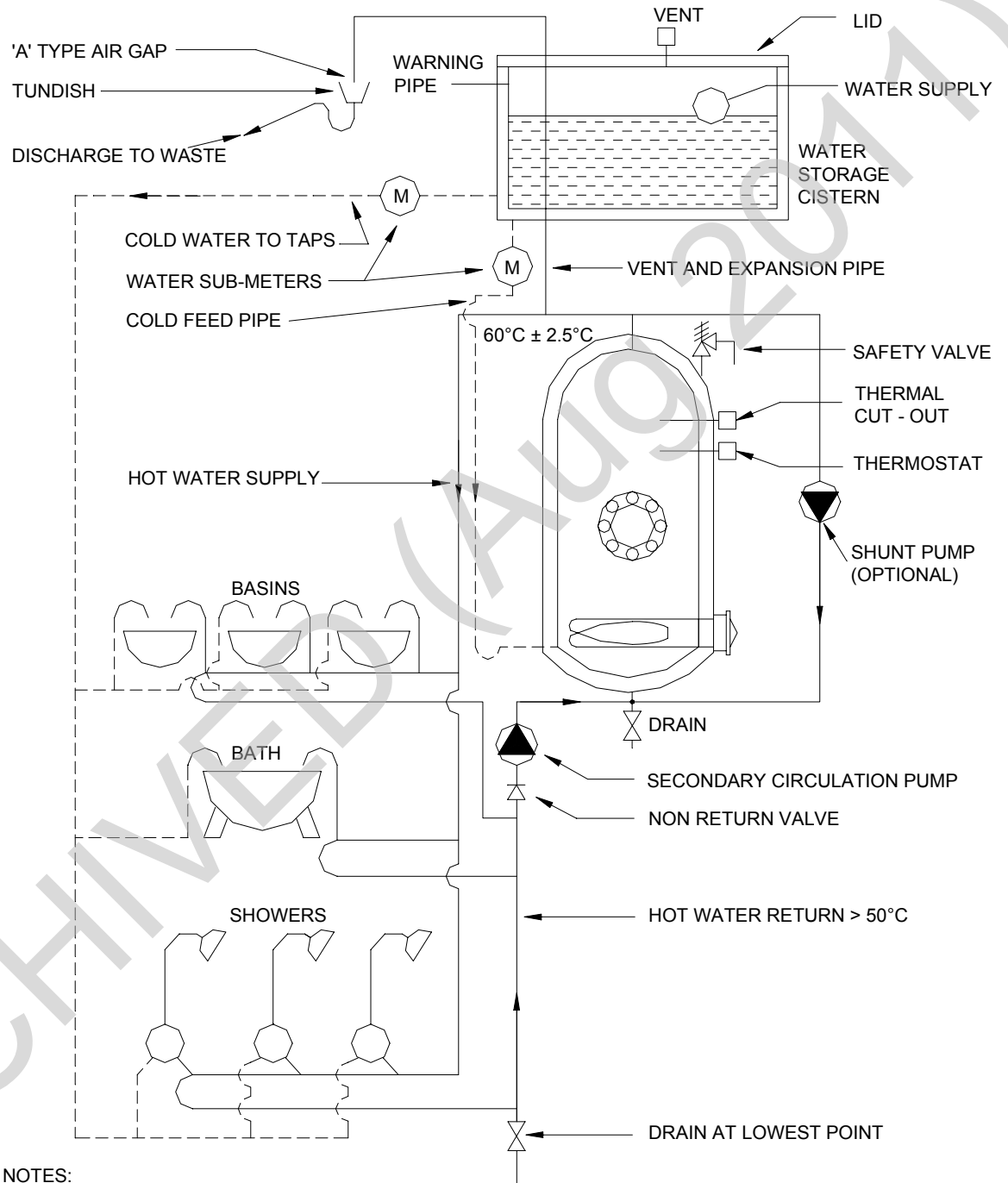
- 3.24 Recommendations regarding safe hot water and surface temperatures, given in Scottish Health Guidance Note, 'Safe hot water and surface temperatures', apply to all ward accommodation, residents' rooms and those areas to which patients, residents and visitors have free access (including public areas). Until the recommended precautions are put into effect, staff should be made aware of the potential danger and should take the necessary steps to protect patients, residents and visitors. Areas which do not meet these recommendations should be identified and plans to comply as soon as reasonably practicable should be devised. Reference should also be made to the Model Engineering Specification (MES) DO8 Thermostatic Mixing Valves (Healthcare premises).

Materials of construction

- 3.25 Systems should be in accordance with BS 6700 and BS 6920 and materials used in hot and cold water distribution should be listed in the latest edition of the Water Fittings and Materials Directory, published by the WRc.

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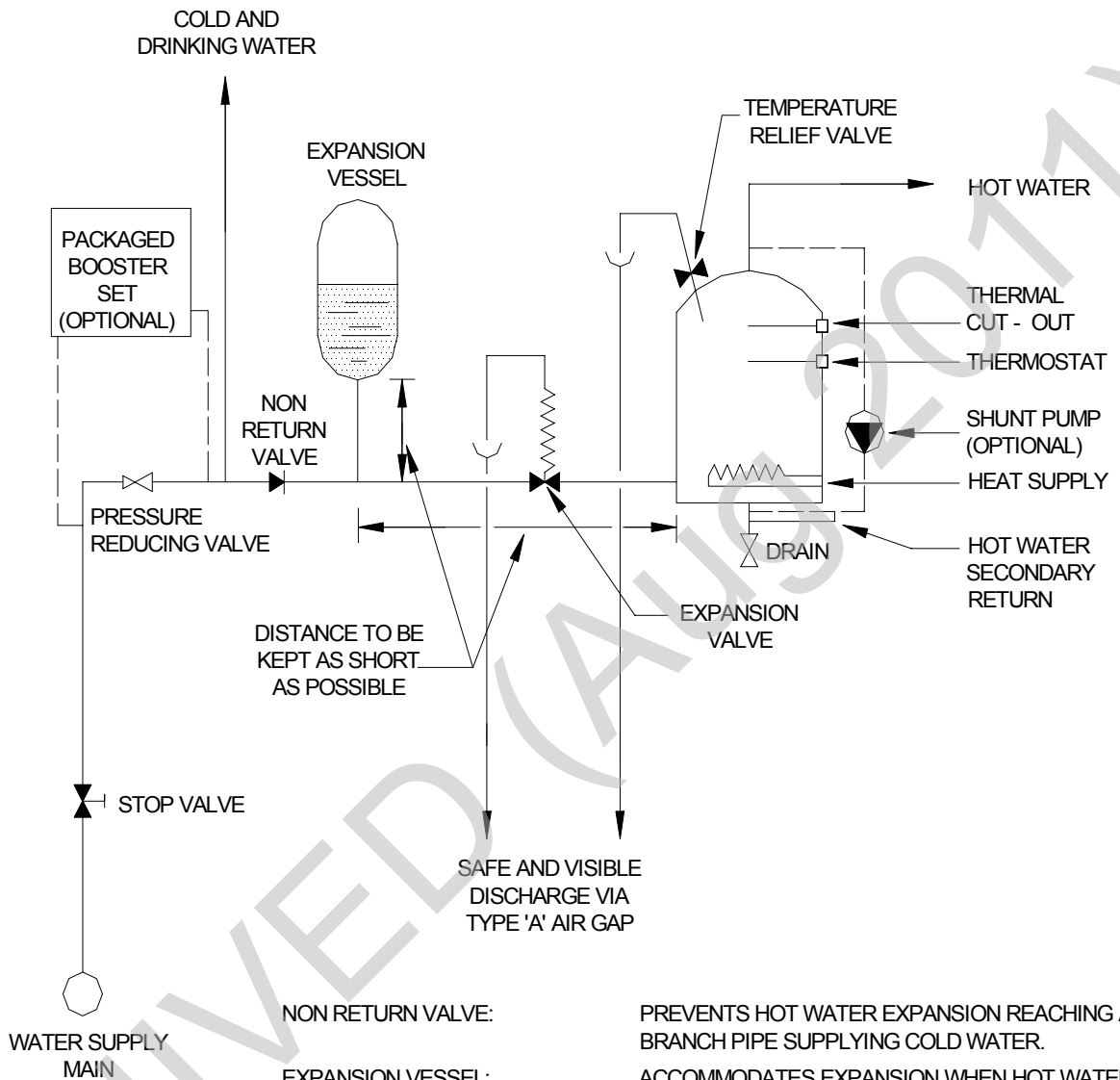
Figure 1: Schematic Hot and Cold Service Distribution



NOTES:

1. ALL PIPEWORK TO BE INSULATED
2. ISOLATING AND CONTROL VALVES NOT SHOWN
3. ALL DRAINS SHOULD DISCHARGE TO WASTE VIA A TYPE 'A' AIR GAP

Figure 2: Directly Heated Unvented System



- NON RETURN VALVE: PREVENTS HOT WATER EXPANSION REACHING A BRANCH PIPE SUPPLYING COLD WATER.
- EXPANSION VESSEL: ACCOMMODATES EXPANSION WHEN HOT WATER IS HEATED UP FROM COLD.
- EXPANSION VALVE: DISCHARGES EXPANDED WATER UPON FAILURE OF THE EXPANSION VESSEL.
- TEMPERATURE RELIEF VALVE: USED AS A BACK-UP IN THE EVENT OF FAILURE OF BOTH THE THERMOSTAT AND THE THERMAL CUT-OFF.
- THERMAL CUT-OFF: CUTS OFF HEAT SOURCE AT A PREDETERMINED MAXIMUM TEMPERATURE.
- THERMOSTAT: CONTROLS THE TEMPERATURE OF STORED WATER AT $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$.



Validation and verification

- 3.26 Pre-commissioning, commissioning and testing are activities that must be carried out once the hot and cold water systems have been installed or repaired, to ensure that the systems comply with the specification before handover.
- 3.27 Commissioning involves setting a static system into motion and adjusting the system so that it operates within specified tolerances.
- 3.28 Testing involves the checking of pipework, plant, equipment and controls to ensure that they operate within specified limits of temperature, pressure etc.
- 3.29 Further information on this subject can be found in Part 4 'Validation and verification' of this SHTM.

Operational management

- 3.30 Operating staff need to be provided with the necessary operation and maintenance manuals and record drawings for any new or refurbished hot and cold water systems, clearly identifying what actions must be carried out to ensure that the system will operate as intended throughout its working life.
- 3.31 Operation and maintenance manuals should be produced in accordance with established guidelines.
- 3.32 Further information on this subject can be found in Part 3 'Operational management' of this SHTM.

4. Management summary

General

- 4.1 The water supply, storage and distribution service should be periodically re-assessed by management and improved where necessary to ensure that it maintains an adequate water supply to the healthcare premises facilities.
- 4.2 Where new healthcare premises are to be built in separate phases, the water supply, storage and distribution service for the whole premises should as far as possible be planned and evaluated at the design stage. This will enable the total water supply requirement to be assessed in the planning stages, and appropriate areas of accommodation to be allocated.
- 4.3 Within this general guideline, the aim should be to keep water services as simple as practicable.
- 4.4 Where existing facilities do not meet the standards recommended in this SHTM, management should carry out a risk assessment which should involve the infection control team to establish the extent and priority of action required for compliance. Action must then be taken to meet standards recommended in this SHTM.
- 4.5 A procedure of routine checks to ensure a potable and adequate water supply is recommended in Part 3 'Operational management' of this SHTM. Managers should ensure that tests are done even if they cause minor disruption to hospital services.

Water management

- 4.6 A water management policy should be set up to define actions which should be taken to ensure that water is used economically and wastage is minimised. Such a policy should include the recommendations of the report of the Audit Commission for local authorities and the NHS entitled, 'Untapped Savings: Water Services in the NHS' and NHS Estates, 'A strategic guide to water and sewerage policy for general managers and chief executives'.

Energy management

- 4.7 An energy management policy should be set up to define actions which should be taken to minimise energy consumption. An effective maintenance plan will also contribute to minimising energy consumption. Further guidance is given in 'Encode' and 'A strategic guide to energy management for general managers and chief executives'.



Maintenance

- 4.8 Management is ultimately responsible for the provision of a wholesome water supply in the premises under its authority. An effective maintenance policy will be instrumental in achieving this end.
- 4.9 Regulation 6 of the Provision and Use of Work Equipment Regulations 1998 requires that every employer shall ensure that work equipment is maintained in an efficient state, in efficient working order and in good repair. The employer's COSHH assessment should have identified maintenance, examination and control measures to reduce the risk from exposure to hazardous substances. Regulation 9 of COSHH requires those control measures to be implemented.
- 4.10 Planned maintenance can be divided into two distinct policies:
- a. operate plant until failure occurs, where:
 - (i) the consequences of failure will not create a safety hazard;
 - (ii) the consequences of failure will not affect the business operation of the building occupants;
 - (iii) the costs of repair/replacement are not excessive;
 - (iv) the reaction to failure can be planned in advance;
 - b. preventative maintenance: this involves a series of inspections at regular intervals and monitoring operating parameters in order to avoid failure by implementing timely remedial work. Further information on this topic can be found in Technical Note TN14/92, 'Decisions in Maintenance' by the Building Services Research and Information Association (BSRIA).

Maintenance responsibility

- 4.11 Once a maintenance policy has been decided upon, a maintenance engineer must be given the responsibility for implementing it. Maintenance responsibilities include:
- a. the provision of adequately trained and supervised manpower;
 - b. clear definitions of the equipment and services to be maintained, together with the procedures to be carried out on them;
 - c. monitoring of the quality of the work carried out to ensure that it is consistently acceptable;
 - d. the implementation of financial control procedures.

Contract maintenance

- 4.12 The increasing complexity of building services equipment has resulted in a growing reliance on contractors for the provision of maintenance services. The decision to use either a contractor or direct labour must be taken in the light of local circumstances. BSRIA Application Guide 4/89 provides advice on aspects to be considered when obtaining contract maintenance. The guidance contained in PROCODE should also be implemented for the appointment of contractors.

Maintenance brief

- 4.13 The maintenance manager requires a brief from the management which sets out in a clear and unambiguous manner the following requirements:
- scope of work;
 - budgeting – overall and single-item limits;
 - level of reliability;
 - response time required to correct faults;
 - criteria for quality of service;
 - reporting procedure;
 - accountability and responsibility;
 - energy-saving policy;
 - health and safety policy.
- 4.14 The above requirements are necessary regardless of whether the work is carried out by contractors or in-house staff.

Performance monitoring

- 4.15 This involves the inspection of systems and records at a frequency, and in such detail, as to enable management to form an opinion regarding compliance with the agreed criteria.
- 4.16 If a contractor is commissioned to carry out maintenance and in-house expertise is not available to monitor their performance, an independent professional adviser should be retained to carry out this function. Using another maintenance contractor in a monitoring role could lead to a conflict of interest. An appropriate consultant may be appointed and reference should be made to PROCODE for such an appointment.



- 4.17 A performance monitoring checklist follows:
- a. Is the required level of service being met?
 - b. Is all the required plant being maintained?
 - c. Are environmental conditions being maintained?
 - d. Is maintenance carried out to the agreed standard?
 - e. Are proper replacement parts being used?
 - f. Are agreed spares being held on site?
 - g. Are records being correctly maintained?
 - h. Is the maintainer using the agreed standard of staff and number of staff, and making the agreed number of visits?
 - i. Is the plant being operated to achieve optimum energy usage?
 - j. Are health and safety requirements complied with?
 - k. Are only agreed sub-contractors being employed?
 - l. Are the client and typical users of the building satisfied?
 - m. Where maintenance is on a labour-plus-parts basis do invoices accurately reflect work carried out?
 - n. Are breakdowns occurring too often?
 - o. Is adequate consideration given to the potential environmental impact of contractors action, for example, discharge of chlorinated water, discharge of water treatment chemicals either to river or sewerage systems?



References

NOTE:

Where there is a requirement to address a listed reference, care should be taken to ensure that all amendments following the date of issue are included.

Publication ID	Title	Publisher	Date	Notes
Acts and Regulations				
	The Building (Scotland) Act	HMSO	1959	
	Clean Air Act	HMSO	1993	
	Electricity Act	HMSO	1989	
	Food Safety Act	HMSO	1990	
	Health and Safety at Work etc Act	HMSO	1974	
	Registered Establishments (Scotland) Act	HMSO	1998	
	The Water (Scotland) Act	HMSO	1980	
	Water Resources Act	HMSO	1991	
SI 2179 & 187	The Building Standards (Scotland) Regulations (as amended)	HMSO	1990	
	The Building Standards (Scotland) Regulations: Technical Standards Guidance	HMSO	1998	
SI 1460	Chemicals (Hazard Information and Packaging for Supply) Regulations (CHIP2)	HMSO	1997	
SI 3140	Construction (Design and Management) Regulations	HMSO	1994	
SI 437	Control of Substances Hazardous to Health Regulations (COSHH)	HMSO	1999	
SI 635	Electricity at Work Regulations	HMSO	1989	
SI 1057	Electricity Supply Regulations (as amended)	HMSO	1988 (amd 1998)	
SI 2372	Electromagnetic Compatibility Regulations (as amended)	HMSO	1992	
SI 1763	Food Safety (General Food Hygiene) Regulations	HMSO	1995	
SI 2200	Food Safety (Temperature Control) Regulations	HMSO	1995	
SI 2451	Gas Safety (Installation and Use) Regulations	HMSO	1998	



Publication ID	Title	Publisher	Date	Notes
SI 917	Health & Safety (First Aid) Regulations	HMSO	1981	
SI 682	Health & Safety (Information for Employees) Regulations	HMSO	1989	
SI 2792	Health and Safety (Display Screen Equipment) Regulations	HMSO	1992	
SI 341	Health and Safety (Safety Signs and Signals) Regulations	HMSO	1996	
SI 1380	Health and Safety (Training for Employment) Regulations	HMSO	1990	
SI 2307	Lifting Operations and Lifting Equipment Regulations (LOLER)	HMSO	1998	
SI 3242	Management of Health and Safety at Work Regulations	HMSO	1999	
SI 2793	Manual Handling Operations Regulations	HMSO	1992	
SI 1790	Noise at Work Regulations	HMSO	1989	
SI 3139	Personal Protective Equipment (EC Directive) Regulations (as amended)	HMSO	1992	
SI 2966	Personal Protective Equipment at Work (PPE) Regulations	HMSO	1992	
SI 574	Private Water Supplies (Scotland) Regulations	HMSO	1992	
SI 2306	Provision and Use of Work Equipment Regulations (PUWER)	HMSO	1998	
SI 1550	Public Health (Notification of Infectious Diseases (Scotland) (Amendment)) Regulations	HMSO	1989	
SI 3163	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)	HMSO	1995	
SI 1333 (S129)	Water Supply (Water Quality) (Scotland) (Amendment) Regulations	HMSO	1991	
SI 119 (S11)	Water Supply (Water Quality) (Scotland) Regulations	HMSO	1990	
SI 3004	Workplace (Health, Safety and Welfare) Regulations	HMSO	1992	
British Standards				
BS 864	Capillary and compression tube fittings of copper and copper alloy	BSI Standards		
BS 1212	Float operator valves Part 1: Specification for piston type float operated valves (copper alloy body) (excluding floats)	BSI Standards	1990	



Publication ID	Title	Publisher	Date	Notes
BS 1710	Specification and identification of pipelines	BSI Standards	1984 (1991)	AMD 612 10/85
BS 2486	Treatment of water for steam boilers and water heaters	BSI Standards	1997	
BS 3505	Specification for unplasticized polyvinyl chloride (PVC-U) pressure pipes for cold potable water	BSI Standards	1986	AMD 6130, 11/88
BS 3506	Specification for unplasticized PVC pipe industrial uses	BSI Standards	1969	AMD 1152, 9/73; AMD 1777, 7/5
BS 5886	Methods for field pressure testing of asbestos-cement pipelines	BSI Standards	1980	
BS 6100	Glossary of building and civil engineering terms Section 2.7: Public Health. Environmental Engineering Section 3.3: Sanitation	BSI Standards	1992 1992	
BS 6700	Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages	BSI Standards	1997	
BS 6920	Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water	BSI Standards		
BS 7206	Specification for unvented hot water storage package and units	BSI Standards	1990	
BS 7491	Glass fibre reinforced plastic cisterns for cold water storage Part 1: Specification for one-piece cisterns of capacity up to 500L Part 2: Specification for one-piece cisterns of nominal capacity from 500L to 25000L	BSI Standards	1991 1992	AMD 7382, 12/92
BS 7671	The requirements for wiring installations (<i>The IEE wiring regulations</i>)	BSI Standards	2001	16 th edition
BS 8007	Code of practice for design of concrete structures for retaining aqueous liquids	BSI Standards	1987	



Publication ID	Title	Publisher	Date	Notes
BS EN 1057	Copper and copper alloys. Seamless, round copper tubes for water and gas in sanitary and heating applications	BSI Standards	1996	
CP 312	Code of practice for plastics pipework (thermoplastic material). Parts 1 to 3	BSI Standards	1973	
CP 2010-2	Code of practice for pipelines. Design and construction of steel pipelines in land	BSI Standards	1970	
Scottish Health Technical Guidance				
SHTM 2005	Building management systems	P&EFEX	2001	CD-ROM
SHTM 2011	Emergency electrical services	P&EFEX	2001	CD-ROM
SHTM 2020	Electrical safety code for low voltage systems (Escode – LV)	P&EFEX	2001	CD-ROM
SHTM 2023	Access and accommodation for engineering services	P&EFEX	2001	CD-ROM
SHTM 2040	The control of legionellae in healthcare premises – a code of practice	P&EFEX	2001	CD-ROM
SHGN	The Pressure Systems and Transportable Gas Containers Regulations 1989	P&EFEX	2001	CD-ROM
SHGN	'Safe' hot water and surface temperatures	P&EFEX	2001	CD-ROM
SHPN 1	Health service building in Scotland	HMSO	1991	
SHPN 2	Hospital briefing and operational policy	HMSO	1993	
SHPN 13	Sterile services department	HMSO		MEL 94/63
SHTN 1	Post commissioning documentation for health buildings in Scotland	HMSO	1993	
SHTN 2	Domestic hot and cold water systems for Scottish Health Care Premises	P&EFEX	2001	CD-ROM
SHTN 4	General Purposes Estates and Functions Model Safety Permit-to-Work Systems	EEF	1997	
	Strategic guide to water and sewerage policy for General Managers and Chief Executives	HMSO	1993	
Scottish Infection Manual	Guidance on core standards for the infection of hospitals, healthcare premises and at the community interface	HMSO	1998	
	NHS in Scotland – PROCODE	P&EFEX	2001	Version 1.1



Publication ID	Title	Publisher	Date	Notes
NHS in Scotland Firecode				
SHTM 81	Fire precautions in new hospitals	P&EFEX	1999	CD-ROM
SHTM 82	Alarm and detection systems	P&EFEX	1999	CD-ROM
SHTM 83	Fire safety in healthcare premises: general fire precautions	P&EFEX	1999	CD-ROM
SHTM 84	Fire safety in NHS residential care properties	P&EFEX	1999	CD-ROM
SHTM 85	Fire precautions in existing hospitals	P&EFEX	1999	CD-ROM
SHTM 86	Fire risk assessment in hospitals	P&EFEX	1999	CD-ROM
SHTM 87	Textiles and furniture	P&EFEX	1999	CD-ROM
SFPN 3	Escape bed lifts	P&EFEX	1999	CD-ROM
SFPN 4	Hospital main kitchens	P&EFEX	1999	CD-ROM
SFPN 5	Commercial enterprises on hospital premises	P&EFEX	1999	CD-ROM
SFPN 6	Arson prevention and control in NHS healthcare premises	P&EFEX	1999	CD-ROM
SFPN 7	Fire precautions in patient hotels	P&EFEX	1999	CD-ROM
SFPN 10	Laboratories on hospital premises	P&EFEX	1999	CD-ROM
UK Health Technical Guidance				
CP 312	Code of practice for plastic pipework (thermoplastic material)		1973	
EH 40	HSE Occupational Exposure limits	HSE	Annual	
MES	Model Engineering Specifications	NHS Estates	1997	As required
	Strategic guide to water and sewerage policy for general managers and chief executives	NHS Estates	1993	
Chartered Institute of Building Service Engineers (CIBSE)				
	Environmental design; guide A	CIBSE	1999	
	Installation and equipment data; guide B	CIBSE	1986	
	Reference data; guide C	CIBSE	2001	(expected)
	Water distribution; commissioning code series W	CIBSE	1994	
TM 13	Minimising the risk of Legionnaires' disease	CIBSE	2000	
OOM	Guide to ownership, operation and maintenance of building services	CIBSE	2000	



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Miscellaneous References				
	Model Water Byelaws: Dept. of the Environment	HMSO	1986	
	The microbiology of water: part 1	HMSO	1994	
	Untapped savings: water services in the NHS	HMSO	1993	
ISBN 0117530107	The bacteriological examination of water supplies: methods for the examination of waters and associated materials (Report 71)	HMSO	1982	
ISBN 0901144347	Chemical disinfection in hospitals	HMSO	1993	2 nd edition
HS(G)70	The control of legionellosis including legionnaire's disease	HMSO	1993	
	Pre-commission cleaning of water systems	BSRIA	1991	
TN 14/92	Decisions in maintenance	BSRIA		
AG 2/93	Hejab, M. <i>Water treatment for building services systems application guide</i>	BSRIA	1993	
AG 1/87	Armstrong, J. H. <i>Operating and maintenance manuals for building services installations application guide</i>	BSRIA	1990	
AG 4/94	Guide to legionellosis – temperature measurements for hot and cold water services	BSRIA		
	Water supply byelaws guide	Water Research Centre	1989	
	Guidelines for drinking water quality: recommendations	WHO, HMSO	1993	
	Water fittings and materials directory	Water Research Centre		Published every 6 months
	Dadswell, J. V. <i>Hygiene for hydrotherapy pools</i>	Public Health Laboratory Service	1990	
	Water supplies and water consumption (engineering datasheet DY 1)	DHSS	1973	
	Water supplies: conservation (engineering datasheet DY 3)	DHSS	1973	
	The prevention or control of legionellosis (including legionnaires' disease): approved code of practice	HMSO	1991	



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	Standards for commercial spas: installation, chemical and water treatment	Swimming Pool and Allied Trade Association	1989	
	Hygiene for hydrotherapy pools: report of a working party on hygiene for hydrotherapy pools	Hospital Infection Research Laboratories	1986	

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