Scottish Health Technical Memorandum 2027

(Part 4 of 4)

Validation and verification

Hot and cold water supply, storage and mains services

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1. Introduction

1.1 This part outlines the principles involved in the commissioning and testing of the hot and cold water supply, storage and distribution systems for healthcare premises. It includes cold water storage cisterns, hot water storage cylinders and heat exchangers, together with water treatment and pressurisation units, pipework systems and circulation pumps. This part will apply to all healthcare premises, but some deviation may become necessary where the differing requirements for the various water authorities must be met.

1.2 Although many of its recommendations will be applicable, this document does not set out to cover fire-fighting services, nor water supply for industrial or other specialist purposes other than to indicate precautions that should be taken when these are used in association with other water services. The point at which a domestic activity becomes an industrial process, for example in food preparation, has not been defined and the applicability will need to be considered in each case.

1.3 As well as complying with the recommendations outlined in this document, any work relating to the commissioning and testing of the hot and cold water services, new or extended, in any healthcare premises shall also comply with:

a. the current Model Water Byelaws of the local water authority's;

b. BS 6700:1997, the British Standard Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages;

c. CIBSE Commissioning Code W: Water Distribution Systems.

1.4 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.

1.5 It is required that any persons proposing to carry out works on cold water distribution systems liase closely with the water authorities.

1.6 Whilst some guidance on the water services applications mentioned below is given in this memorandum, it is not intended to cover them fully:

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'.

Definitions

1.7 Definitions of terms are those contained in the Model Water Byelaws, BS 6100 Section 2.7 and 3.3 and BS 6700.

2. General requirements

Installation checks

2.1 The system should be regularly checked during installation to ensure that open pipes, valve ends, cylinder connections, etc. are sealed to prevent the ingress of dust/debris which could cause problems during commissioning and subsequent operation. Checks should also be made to ensure that fittings and materials are those listed in 'The Water Fittings and Materials Directory' and that lead solders are not being used.

Inspection of joints

2.2 Before pressure testing, the nominated person should identify a number of fittings to be cut out for examination in order to establish whether the quality of the finished joint meets the specification. The exact number to be cut out will vary according to the size of the installation, but as a guide a ratio of one fitting per 200 installations should be cut out. In any event, a minimum of two and not normally more than five fittings should be cut out for examination.

2.3 The fittings cut out should be cut open (quartered longitudinally) and examined. If unacceptable joints are found, adjacent fittings should be cut out until the extent of any faulty workmanship has been established.

2.4 The pipeline should be made good.

2.5 The tube and fitting should be internally clean and free from particulate matter. Some heat burnishing may be apparent and is acceptable.

Penetration of brazing alloy and solder

2.6 Due to tolerances of the capillary space on these pipes and fittings, full penetration of the brazing alloy may not occur and is not necessary.

2.7 The minimum penetration at any point must be three times the wall thickness of the tube or 3 mm, whichever is the greater.

Commissioning

2.8 Correct commissioning is vitally important for the satisfactory operation of the hot and cold water systems.

2.9 The hot and cold water service systems should be commissioned and tested in accordance with the guidelines set out in BS 6700, which details procedures to ensure that:

a. materials and equipment installed comply with other British Standards, and with the latest edition of the Water Fittings and Materials Directory, and are not otherwise unsuitable;

b. the work is done entirely within the specification for the scheme;

c. the installation complies in every respect with the water byelaws and regulations and the requirements of British Standards;

d. all the requirements of current legislation are met, both during construction of the installation and when it is completed, particularly with regard to the Health and Safety at Work etc Act 1974.

2.10 "As installed" record drawings and operating/maintenance instructions must be supplied at the time of handover. Schematic drawings should also be provided. Certified records of pressure testing and disinfection should also be made available.

2.11 The whole commissioning procedure should be carried out under the guidance of a single authority, although the involvement of specialists or manufacturers may be required for specific items of plant.

2.12 The commissioning person will need to obtain a commissioning brief which lists the various tests and measurements that are to be checked and recorded. Such data should include:

a. full design data on temperatures, water flow rates and pressures;

b. plant and equipment data;

c. drawings and schematics;

d. a list of test certificates to be provided.

2.13 Valid calibration certificates should be submitted and checked for all measuring equipment to be used by the commissioning engineers prior to commencement of commissioning.

2.14 The commissioning should be carried out in a logical and methodical manner.

2.15 Guidance on procedures to be followed is given in CIBSE Commissioning Code W: Water Distribution Systems.

2.16 The installation, on completion, should be operated by the contractor as a whole and subjected to specified functional or performance tests.

2.17 Once the system meets the design intent, the final completion record sheet(s) should be completed. In the event of performance not being acceptable, the matter should be dealt with in accordance with the contract requirements.

3. Commissioning and testing checklists

3.1 The following is a summary of the key activities associated with pre-commissioning and commissioning of hot and cold water storage and distribution systems. The list is not intended to be comprehensive.

Cold water installations

3.2 Pre-commissioning checks can be carried out upon completion of the system installation, filling and pressure testing.

3.3 Pre-commissioning checks and tests to be applied are as follows. Check that:

a. systems have been provided and installed in accordance with specification and drawings and that the systems are charged with water, vented and free from leaks;

b. water storage cisterns are free from distortion and leaks, are properly supported and secured, are provided with correctly fitting covers and are in accordance with Water Byelaw 30;

c. distribution pipework is rigidly supported, insulated and incorporates adequate provisions for venting, draining, expansion, isolation and measurement of flow, temperature and pressure;

d. pipework systems have been pressure tested;

e. pipework systems and storage cisterns have been flushed, disinfected, appropriate certification received and that specified residual chlorine levels are attained;

f. pipework systems and storage/break tanks are correctly identified and marked;

g. regulating valves and flow control devices operate freely;

h. water meter(s) is/are fitted correctly;

i. electrical isolation, cross bonding and wiring of system components are installed in accordance with the current edition of BS 7671.

3.4 Upon satisfactory completion of the pre-commissioning tests, the commissioning tests can then be started.

3.5 Commissioning checks and tests to be applied are as follows. Check that:

a. overflows run freely and discharged water does not cause flooding or damage, and that drain-down points flow when released and are free from leaks when shut;

b. float operated valves function satisfactorily and are adjusted to give the correct water level;

c. control valves operate correctly and shut-off valves close tightly;

d. all electrical circuits are tested and the pump motor direction of rotation is correct, and that electrical controls and alarms function correctly;

e. operation of any safety or anti-flood device is satisfactory;

f. circulating or lifting pumps are free from excessive noise, vibration and leaks;

g. remote control of pumps (if appropriate) is satisfactory;

h. the installation is vented and regulated;

i. the flow rate into and out of storage cisterns is recorded;

j. all taps, mixers and outlets operate satisfactorily; and test and record mass flow from outlets in positions shown on record drawings;

k. temperature of water in storage cisterns and at taps is appropriate;

l. full load current of components does not exceed the recommended values;

m. the running current of components does not exceed the recommended values;

n. pump thermal overload trips are set;

o. system schematic is displayed in a frame in the relevant plantroom.

Hot water installations

3.6 Pre-commissioning checks can be carried out upon completion of system installation, filling and pressure testing.

3.7 Pre-commissioning checks and tests to be applied are as follows. Check that:

a. systems have been provided and installed in accordance with the specification and drawings;

b. the system is charged with cold water, vented and free from leaks;

c. hot water storage vessels are free from leaks and are properly supported and secured;

d. distribution pipework is rigidly supported, insulated and incorporates adequate provision for venting, drainage, expansion, isolation, and measurement of flow, temperature and pressure;

e. pipework systems, storage cylinders, etc. have been pressure tested, flushed and disinfected, and appropriate certification has been received; and that specified residual chlorine levels are attained;

f. pipework systems, calorifiers and cisterns are correctly identified and marked;

g. regulating valves and flow control devices operate freely;

h. all control and regulating valves are labelled or marked to correspond with reference numbers on record drawings;

i. electrical isolation, cross bonding and wiring of system components is installed in accordance with the current edition of BS 7671.

3.8 Upon satisfactory completion of the pre-commissioning checks, the commissioning checks and tests can then be started.

3.9 Commissioning checks and tests to be applied are as follows. Check that:

a. drain-down points flow when released and are free from leaks when shut;

b. air vents and release valves open correctly and are airtight when shut off;

c. all temperature and other controls are adjusted and calibrated to agreed design limits of system performance;

d. all electrical circuits are tested and the pump motor direction of rotation is correct and that electrical controls and alarms function correctly;

e. control valves operate correctly and shut-off valves close tightly;

f. heat exchangers operate satisfactorily;

g. primary heating circuits are adjusted and regulated, and thermostatic settings are correct;

h. bypass circuits and automatic control valves operate correctly;

i. circulating pumps are free from excessive noise, vibration and leaks;

j. remote and automatic control of pumps (if appropriate) is satisfactory; there are no leaks at joints under maximum flow conditions;

k. secondary circuits are regulated and vented;

l. thermostatic mixing and regulating valves are adjusted and set to desired values;

m. all taps, mixers and outlets operate satisfactorily;

n. water flow quantities at all plant items, regulating valves and flow measuring valves are recorded;

o. mass flow from taps, main and other outlets in positions shown on record drawings is satisfactory;

p. pressure drop at heat exchangers at full design demand flow is tested and recorded;

q. hydraulic balancing of hot water secondary circulation system is carried out to ensure that minimum temperatures are achieved in all parts of the circuit;

r. full load current of components does not exceed the recommended values;

s. the current running of components does not exceed the recommended values;

t. pump thermal overload trips are set;

u. system schematic is displayed in a frame in the relevant plant rooms.

4. Associated activities

Pressure testing

4.1 Pressure testing must be carried out before disinfection. Except where otherwise specified, testing of underground pipelines should be carried out in accordance with BS 5886, CP 312 and CP 2010-2, as appropriate for the pipeline material.

4.2 Open pipes should be capped and valves closed to avoid contamination.

Temperature testing

4.3 These tests should be performed prior to contractual handover and bringing the system into use. Separate temperature measuring and recording equipment should be used, that is, independent of any building management system. It will be necessary to have systems fully operational and to simulate typical draw-off of water.

4.4 Tests should include:

a. measuring the incoming water temperature at the main water meter;

b. testing the inlet, outlet and surface water temperatures of cisterns and cold water feed/header tanks for the hot water calorifiers. The temperature should not be greater than 2°C above that measured at (a);

c. testing the flow and return temperatures of calorifiers and boilers. These should not be less than 60°C and 50°C respectively;

d. testing the temperature at hot and cold water draw-off points, at sinks, wash-hand basins and baths, etc. A steady state temperature of between 50°C (nominally 55°C) and 60°C at hot water draw-off points should be reached within one minute. At cold water draw-off points a temperature of not greater than 2°C above the temperature measured in the storage system should be reached within one minute of running the water;

e. testing the thermostatic mixing valves to ensure they achieve the correct outlet temperature, for example 43°C to 48°C maximum;

f. testing the outlet temperature of bidets, which should be 37°C to 38°C.

Disinfection

General

4.5 The system should be disinfected in accordance with SHTM 2040; *The control of legionellae in healthcare premises - a code of practice* and should be brought into use within seven days of disinfection having been carried out unless all of the following are adhered to:

a. hot water temperatures are maintained;

b. cold water temperatures are maintained;

c. regular flushing (every seven days) is carried out.

4.6 Once filled, systems should not be drained unless full disinfection is to be undertaken before the system is brought into use again.

4.7 For design-and-build contracts, the brief must include the requirement that adequate certification of disinfection is provided by the contractor. On other contracts, tests must be witnessed and certified. During the post-handover period prior to occupation it is the client's responsibility to ensure that system temperatures are maintained and regular flushing is carried out, or to implement full re-disinfection.

Cold water systems

4.8 The requirements for disinfection subsequent to flushing out to remove debris, etc. are essentially those given in SHTM 2040; *The control of legionellae in healthcare premises-a code of practice*. Further guidance is available in *Pre-Commission Cleaning of Water Systems*, issued by BSRIA, 1991, which deals with design/installation considerations, system flushing and chemical cleaning.

4.9 Alternative disinfectants may be used provided satisfactory disinfection is achieved. The infection control team should be consulted and advice should also be sought from the Drinking Water Inspectorate.

4.10 Proprietary solutions of disinfectant should be used in accordance with the manufacturers' instructions. The COSHH Regulations require that the risks from using the disinfectant for each task are assessed to ensure that the control procedures adopted are suitable for the particular application.

4.11 A suitable proprietary test kit should be used for site measurements of residual disinfection agents.

4.12 Disinfection should not be undertaken before materials, for example linings in cisterns, have fully cured.

4.13 Pipework under pressure from the mains should be disinfected through an injection point and the disinfectant residual measured at the end of the

pipeline. It is normal water industry practice to use a chlorine dose of not less than 20 mg/l (ppm) and, because the nature of the installation is likely to lead to unavoidable contamination, it is usual practice to leave the chlorine solution in the pipes for 24 hours before thoroughly flushing out with fresh water. Junctions which are to be inserted into existing pipelines should be disinfected prior to installation.

4.14 All disinfection of pipework under pressure from the mains must be carried out in accordance with the requirements of the local water authority. Failure to ensure close liaison between the contractor and the water authority during design, construction, pressure testing or commissioning could present a potential risk of back-flow of contaminated materials or chemicals into the public water supply. Site supervision to ensure compliance with any requirements specified by the local water authority is strongly recommended.

4.15 All cisterns should be internally cleaned to remove all visible dirt and debris. The cisterns and distributing pipework should be drained, filled with fresh water and then drained completely. The cistern(s) should then be refilled and their supply servicing valves closed. On re-fitting it is normal practice to add high doses of sodium hypochlorite to the water in the cistern(s), for example to give a calculated chlorine concentration of 50 ± 10 mg/l (ppm) in the water, and leave the water to stand for one hour. Whatever disinfection method is used, the concentration should be adjusted if necessary. The use of a high dose ensures an adequate residual concentration to allow proper disinfection of the downstream services. Each tap or fitting should then be opened, progressively away from the cistern(s), and water discharged until the disinfectant is detected. Each tap or fitting should then be closed, and the cistern and pipes left charged for a further one hour. The tap(s) furthest from the cistern(s) should be opened and the level of disinfectant in the water discharged from the tap(s) measured. If the levels set are not achieved, the disinfection process should be repeated.

4.16 As soon as possible after disinfection, the distribution pipework should be drained and thoroughly flushed through with fresh water and re-filled (see paragraphs 4.6 and 4.7). Appropriate hazard warnings should be placed on all taps throughout the building during disinfection procedures.

4.17 After disinfection, microbiological tests for bacteria colony counts at 22°C and 37°C and coliform bacteria including Escherichia coli for drinking water at 37°C and 44°C should be carried out under the supervision of the infection control team to establish that the work has been satisfactorily completed. Water samples should be taken from selected areas within the distribution system. The system should not be brought into service until the infection control team certifies that the water is of potable quality.

Hot water installations

4.18 Cold feed cisterns, hot water calorifiers, water heaters, direct-fired HWS boilers and distribution pipework should be disinfected in accordance with the procedures described for cold water installations. Advice should be sought from equipment manufacturers to ensure that proposed disinfection chemicals will not adversely affect performance. No heat source should be applied during the disinfection procedure, including final flushing.

Discharge of waste water used during disinfection procedures within buildings

4.19 Contaminated water that is run to waste into a natural watercourse or a drain leading to it should be treated in accordance with the requirements of the authority responsible for land drainage and pollution control. The authority responsible for that sewer should be informed. Dechlorination can be achieved using either sulphur dioxide or sodium thiosulphate. 20 g of sodium thiosulphate crystals are required to dechlorinate 500 litres of water containing 20 mg/ l free chlorine.

5. Documentation

5.1 It is essential that a full report of all commissioning and testing activities is compiled and handed over to the responsible engineer for incorporation within the operation and maintenance manuals.

5.2 These commissioning and testing records will be required in order that hospital maintenance personnel can make periodic checks to ensure that the installation continues to operate as intended.

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**	BSI Standards		
	Section 2.7: Public Health. Environmental Engineering		1992	
	Section 3.3: Sanitation		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**	BSI Standards		
	Part 1: Specification for one-piece cisterns of capacity up to 500L		1991	AMD 7382, 12/92
	Part 2: Specification for one-piece cisterns of nominal capacity from 500L to 25000L		1992	
BS 7671	**The requirements for wiring installations** *(The IEE wiring regulations)*	BSI Standards	2001	16th 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	

Publication ID	Title	Publisher	Date	Notes
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	2nd 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. *Water treatment for building services systems application guide*	BSRIA	1993	
AG 1/87	Armstrong, J. H. *Operating and maintenance manuals for building services installations application guide*	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. *Hygiene for hydrotherapy pools*	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	

Publication ID	Title	Publisher	Date	Notes
	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	