Scottish Health Technical Memorandum 2023

(Part 1 of 2)

Overview and management responsibilities

Access and accommodation for engineering services

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Contents

1. Scope

1.1 This Scottish Health Technical Memorandum (SHTM) covers access and accommodation for engineering services. It makes reference to the Construction (Design and Management) Regulations 1994; this guidance applies to all service installations within healthcare premises; however, further data is available in other SHTMs for specific services.

1.2 A modern hospital may require 50 or more different engineering services and others may be added later as new techniques are developed. Hospital buildings may have a useful life of at least 60 years and during this period engineering services will have to be renewed. Unless adequate space is provided initially, the cost of renewing services will be excessive and their extension may be impossible.

1.3 The guidance given in this part of SHTM 2023 should be followed for all new installations and for refurbishment or upgrading of existing installations.

2. Management responsibilities

Statutory requirements

2.1 The following are important statutory requirements relevant to access and accommodation for engineering services:

a. the Health and Safety at Work etc Act 1974;

b. the Management of Health and Safety at Work Regulations 1999 (SI 3242);

c. the Workplace (Health, Safety and Welfare) Regulations 1992 (SI 3004); the Regulations deal with the physical requirements of the workplace. Managers concerned with the engineering systems installed within should pay particular attention to the Regulations on maintenance, temperature, cleanliness, room dimensions and space, and traffic routes;

d. the Provision and Use of Work Equipment Regulations 1998 (SI 2306); these aim to ensure the provision of safe work equipment and its safe use;

e. the Manual Handling Operations Regulations 1992. The Regulations require employers to make an ergonomic assessment of all manual handling operations which involve a risk of injury, and to reduce the risk as far as reasonably practicable. Factors to be assessed include the nature of the task, the load, the working environment and individual capability. Managers should assess the risks associated with loading and unloading of all engineering service equipment to be installed and later removal of the equipment;

f. the Electricity Act 1989;

g. the Electricity Supply Regulations 1988 (as amended 1994). These impose requirements regarding the installation and use of electric lines and apparatus of suppliers of electricity, including provisions for connections with earth. These Regulations are administered by the Engineering Inspectorate of the Electricity Division of the Department of Energy and may impose requirements which are in addition to those of the Electricity at Work Regulations;

h. the Electricity at Work Regulations 1989 (SI 635). The principal statutory requirement for electrical safety in the workplace is the Electricity at Work Regulations 1989. The purpose of the Regulations is to require precautions to be taken against the risk of death or personal injury from electricity in work activities;

i. the Construction (Design and Management) Regulations 1994 (the Condam regulations). These place new duties upon clients, designers and contractors to rethink their approach to Health and Safety so that it is taken into account and then coordinated and managed effectively throughout all stages of a construction project from conception, design

and planning through to execution of works on site and subsequent maintenance and repair;

j. Health and Safety Guidance Note GS5 Entry to Confined Spaces. The guidance note covers spaces where there is a possibility of a build-up of gas or vapour, or where there is likely to be a deficiency of oxygen;

k. Approved code of practice 'The Control of Asbestos at Work Regulations' 1987;

l. Approved code of practice 'Work with asbestos insulation, asbestos coating and asbestos insulating board';

m. The Building Standards (Scotland) Regulations 1990, with amendments;

n. NHS in Scotland Firecode – Fire precautions in Healthcare premises.

3. Other obligations

3.1 Management has responsibility for ensuring that all service installations are specified, designed, installed, and maintained in a cost-effective manner. Maintenance costs are significant and management should ensure that consideration is given at the design and installation stage to the future maintenance of all services and equipment including the dismantling and replacement of the equipment during the life of the building.

3.2 In order to satisfy these requirements, it is recommended that management:

a. appoint a person responsible for the coordination of all services to be installed in a project. The person appointed may be the planning supervisor for all new projects in compliance with Construction (Design and Management) Regulations;

b. ensure that a project file is available for all new projects including alterations, extensions etc. The project file should contain maintenance information, drawings and details on the access to equipment for maintenance and eventual removal at the end of the equipment's useful life;

c. ensure that adequate space is provided for engineering services to allow maintenance staff appropriate access to service the equipment. Access should be allocated on the basis of the frequency of inspection, servicing, and cost of providing access to the equipment;

d. adequately brief the designers of the maintenance policy currently in operation on the site;

e. ensure that new work does not restrict the access to existing plantrooms and equipment;

f. ensure that coordination of the engineering services, including drainage and the building structure, is the responsibility of a nominated person from the engineering consultants working on the project or an independent professional consultant.

3.3 The presence of asbestos products within a site will require implementation of the following approved codes of practice: 'The Control of Asbestos at Work Regulations' 1987; and 'Work with asbestos insulation, asbestos coating and asbestos insulating board' 1988. The Department of the Environment advises that owners of buildings arrange for their property to be surveyed for the presence of asbestos. Locations of asbestos should then be marked on hospital plans and the material's condition should be monitored and managed. If such a survey has been carried out in the past by, for example, a Health Board, it may be appropriate to consider whether an update is necessary with the regard to the condition of asbestos-containing materials already identified.

4. Functional guidance

4.1 Management should ensure that all building services systems meet their functional requirements with a high degree of reliability.

4.2 Guidance notes and other publications issued from time to time by the Scottish Executive Health Department, the Health and Safety Executive (HSE) and by the engineering institutions give detailed advice, and update the legal requirements on such matters as installation and maintenance of equipment.

4.3 The competence of all personnel appointed should be checked, and work should only be allocated to those deemed competent to carry out the function assigned.

4.4 Coordination of the building services and structure is a key factor in providing adequate access to equipment, and the management should appoint a single authority with the responsibility of organising the space allocation within the building.

4.5 A zoning policy allocating particular zones for specific services should be agreed at an early stage in the design of any new project to allow designers freedom within the zoning rules to route the services for which they are responsible. The zoning policy should also allocate crossover zones through which the services may be routed below or above other services. It should be the responsibility of the coordinating authority to agree the layout of the completed systems.

4.6 Before putting into service any new engineering systems, the installation should be inspected and confirmation obtained that the maintenance procedures outlined in the project file (as defined in the Condam regulations) can be carried out. All equipment should be accessed and tested for replacement, and resetting procedures and certificates should be provided to form part of the record documentation to be held in the project file.

5. Development planning

5.1 With the increasing complexity of modern hospital services, it is more than ever essential that the engineering and architectural aspects of a project are developed simultaneously from its inception.

5.2 The purpose of early collaboration is to ensure that planning of medical requirements and communications is properly integrated with the following engineering aspects:

a. services distribution;

b. plant location;

c. future development.

5.3 At the earliest stages of planning, designs should be based on an overall conception of the complete scheme. It is essential to foresee as far as possible what provisions should be made for the passage of services etc. through different parts of the structure, not only for present requirements but also for possible future developments. It is important to ensure that any construction does not preclude the accommodation of further services in the future.

5.4 Engineering services are necessarily continuous, and must not be obstructed by structural design which might restrict such continuity. The effect of any such obstruction will be felt far beyond its own locality, and may isolate large areas of buildings from services.

5.5 It is therefore most important that the basic structural design should permit sufficient space for the services, and all such space must be regarded as inviolable. Difficulties in this area will be minimised if the services engineer is responsible for public health engineering.

5.6 The provision of extra space for future plant and services should be related to the probable requirements. If there is little likelihood of an increase, the extra space allowed should be minimal, but a margin of up to one-third above the net basic requirement may well be justified. Possible developments in the remote future should be dealt with at the time of their design.

5.7 The development of detailed engineering drawings will produce accurate information on service space requirements, but these will not be available until a later stage. If a satisfactory estimate of space requirements can be made during the preparation of the sketch plans, serious and costly revisions will be avoided.

6. Plant and plantrooms

6.1 Plant requirements will depend upon the type, design and function of the building. Consideration should be given to the following points:

a. services and plant to be accommodated;

b. optimum siting, in terms of distribution and the effect on adjacent accommodation;

c. optimum size;

d. floor loading when plant is fixed, and during installation;

e. space and access requirements for installation and possible subsequent renewal;

f. space and access requirements for proper and safe operation and maintenance;

g. ventilation and combustion air;

h. adequate lighting and heating;

i. fire precautions;

j. safety requirements;

k. the possibility of noise nuisance;

l. heat insulation;

m. minimum heights;

n. drainage;

o. surface finishes.

7. Distribution requirements

General

7.1 The assessment of requirements must be considered with respect to communication, areas, plant and distribution, and be related to the site, size and shape of buildings. Accommodation for vertical services will be decided during the preparation of the development plan. This information will be in the form of total areas required, to be sub-divided later as design work proceeds.

Distribution

7.2 As far as is practicable, departments which impose a heavy load on the engineering services should be grouped and located near to the main distribution centres to avoid long runs of large capacity mains. It will generally be found advantageous for services to follow the main communication routes.

Distribution to plantrooms

7.3 Generally the first plantroom to be sited is the energy centre, so that the main services routes can be determined. Energy centres are usually sited in an industrial complex for the hospital, although consideration may be given to siting at roof level.

7.4 The next step will be to decide the areas required for other plantrooms.

7.5 Consideration should be given to the degree of flexibility that is necessary to allow for possible changes in the use of hospital departments.

7.6 In multi-storey buildings, a smaller number of large vertical ducts with adequate provision for horizontal distribution above ceiling level and below structural members will give the most flexible arrangement. A large number of smaller vertical ducts with ceiling spaces for horizontal distribution as necessary, will generally be less flexible.

7.7 The omission of space above ceilings produces the least flexible arrangement.

7.8 Convenient access should be provided to all service spaces.

7.9 In single-storey buildings, accommodation should preferably be provided in a walkway service duct below floor level. Sufficient headroom should be allowed for installation and maintenance purposes. If a service trench is provided, removable covers should be provided over the complete length of the trench.

8. Access

General

8.1 Access to services, excluding requirements for initial installation, should be considered for operation, maintenance and replacement.

Frequent access

8.2 Plant, valves, switchgear etc. requiring frequent attention for operation of the system or for maintenance, all need immediate access. If enclosed, access should be by hinged doors. Adequate clearance should be provided for ease of working.

Intermittent access

8.3 Items not in frequent use or requiring maintenance only at intervals of some months, need ready access, which may be by means of floor traps or removable panels in walls and false ceilings etc. It is recommended that access panels be fixed by means of quick-release fasteners, such as carriage locks, rather than by screws and cups.

8.4 Access should be arranged, as far as possible, to enable work to be carried out without affecting hospital routine. Access points should be convenient to items requiring attention, and in the case of rodding eyes, sufficient space should be provided to facilitate rodding of the pipework.

Renewal of services

8.5 Some services may have to be renewed once or twice during the useful life of a building. Accommodation should be planned to allow for this and take into account both weight and size of major items. Where emergency renewals are not envisaged, the removal of door frames, windows, and even partitions and non-structural walls may be considered. The renewal of minor items does not usually create problems, except for pipe lengths.

8.6 The destruction of finishes to open up a trench or vertical duct or to increase the size of an existing means of access, could be more economic than the provision of expensive, rarely-used permanent access. The saving must be considered with regard to the cost and inconvenience incurred at the time of replacement.

9. Working in confined spaces

9.1 Working within confined spaces should be covered by a “permit-to-work system” covering safe working practices in accordance with the “permit-to-work”.

9.2 Where no “permit-to-work” system is in operation, it is important to ensure the work is undertaken only after a full investigation and resolution of the following matters has been completed, and the engineer has been informed in writing of the proposals:

a. assessment of the task to be undertaken;

b. identification of the hazards of the task;

c. decision on methods of the working to avoid hazards;

d. implementation of a system of work to incorporate these methods;

e. monitoring of the operation of the system of work.

9.3 Prior to the entry of personnel into the space and the commencement of work, the space must be demonstrated to be safe by testing that no toxic or asphyxiant gases are present and that oxygen levels are adequate.

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	
	Health and Safety at Work etc Act	HMSO	1974	
	Registered Establishments (Scotland) Act	HMSO	1998	
	The Water (Scotland) Act	HMSO	1980	
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 1994)	
SI 2372	Electromagnetic Compatibility Regulations (as amended)	HMSO	1992	
SI 2451	Gas Safety (Installation and Use) Regulations	HMSO	1998	
SI 917	Health & Safety (First Aid) Regulations	HMSO	1981	
SI 682	Health & Safety (Information for Employees) Regulations	HMSO	1989	
SI 2115	Control of Asbestos at Work Regulations (as amended)	HMSO	1987	
SI 1713	Confined Space Regulations	HMSO	1997	

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
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	
	Highly Flammable Liquids and Liquefied Petroleum Gases Regulations	HMSO	1972	
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 2306	Provision and Use of Work Equipment Regulations (PUWER)	HMSO	1998	
SI 3163	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)	HMSO	1995	
SI 3004	Workplace (Health, Safety and Welfare) Regulations	HMSO	1992	
British Standards				
BS 349	**Specification for identification of the contents of industrial gas containers** (AMD 6132, 5189)	BSI Standards	1973	
BS 1319	**Specification for medical gas cylinders, valves and yoke connections** (AMD 3029, 6179, 4603, 6184)	BSI Standards	1976	
BS 5378	**Safety signs and colours**	BSI Standards		
BS 5499	**Fire safety signs and graphic symbols**	BSI Standards		
BS 5266	**Code of practice for emergency lightning**	BSI Standards	1988	
BS 8313	**Code of practice for accommodations of building services in duct**	BSI Standards	1997	

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
Scottish Health Technical Guidance				
SHTM 2007	Electrical services supply and distribution	P&EFEx	2001	CD-ROM
SHTM 2010	Sterilization	P&EFEx	2001	CD-ROM
SHTM 2011	Emergency electrical services	P&EFEx	2001	CD-ROM
SHTM 2014	Abatement of electrical interference	P&EFEx	2001	CD-ROM
SHTM 2020	Electrical safety code for low voltage systems (Escode – LV)	P&EFEx	2001	CD-ROM
SHTM 2021	Electrical safety code for high voltage systems (Escode – HV)	P&EFEx	2001	CD-ROM
SHTM 2022	Medical gas pipeline systems	P&EFEx	2001	CD-ROM
SHTM 2024	Lifts	P&EFEx	2001	CD-ROM
SHTM 2025	Ventilation in healthcare premises	P&EFEx	2001	CD-ROM
SHTM 2027	Hot and cold water supply, storage and main services	P&EFEx	2001	CD-ROM
SHTM 2045	Acoustics	P&EFEx	2001	CD-ROM
SHPN 1	Health service building in Scotland	HMSO	1991	
SHPN 2	Hospital briefing and operational policy	HMSO	1993	
SHTN 1	Post commissioning documentation for health buildings in Scotland	HMSO	1993	
SHTN 4	General Purposes Estates and Functions Model Safety Permit-to-Work Systems	EEF	1997	
	NHS in Scotland – PROCODE	P&EFEx	2001	Version 1.1
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

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
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				
EH 40	HSE Occupational Exposure limits	HSE	Annual	
MES	Model Engineering Specifications	NHS Estates	1997	As required
Approved code of practice	The Control of Asbestos at Work Regulations	HMSO	1987	
Approved code of practice	Work with Asbestos Insulation, Asbestos Coating and Asbestos Insulating Board	HMSO	1988	
HSE Publications				
CS 4	Keeping of LPG in cylinders and similar containers	HMSO	1986	
CS 5	Part 1: Entry into confined spaces Part 2: Cleaning and gas freeing of tanks containing flammable residues	HMSO	1977	
Miscellaneous References				
	Space allowances for building services distribution systems: detail design stage (TN 10/92)	Building Services Research and Information Association (BSRIA)	1992	
	The safe storage of gaseous hydrogen in seamless cylinders and similar containers (CP 8)	British Compressed Gases Association	1986	