Scottish Health Technical Memorandum 2021

(Part 1 of 2)

Overview and management responsibilities

Electrical safety code for high voltage systems (Escode – HV)

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Contents

1. Scope

1.1 Guidance in this document (Scottish Health Technical Memorandum 2021; *Electrical safety code for high voltage systems (Escode – HV)* applies to all health care premises which have high voltage electrical systems. It applies to new and existing sites, including homes which are covered by the Registered Establishments (Scotland) Act 1998.

1.2 The use of electricity in these premises makes it essential that all electrical systems are managed without giving rise to **danger**. High voltage electrical safety is an integral part of the safety procedures which must be introduced.

1.3 Inadequate control and/or improper use of electricity is a danger to life and property. Owners, occupiers, general managers/chief executives and those responsible for electrical services as “duty holders” are accountable for ensuring control; they are also responsible for the safe management, design, installation, operation and maintenance of the electrical systems.

1.4 This guidance is intended to assist duty holders to meet the requirements of the Electricity at Work Regulations 1989 (“the Regulations”), which came into force on 1 April 1990 and which impose duties on employers, owners or occupiers of premises, and general managers/chief executives in respect of:

a. systems;

b. electrical equipment and conductors;

c. work activities on or near electrical equipment.

The Regulations impose similar duties on duty holders.

The Regulations also detail the precautions to be taken against risk of death or personal **injury** from electricity in work activities.

1.5 The Regulations are made under the Health and Safety at Work etc Act 1974 (HSW Act 1974.), This imposes duties principally on employers, the self-employed and employees – including certain classes of trainees.

1.6 This guidance is not an authoritative interpretation of the Regulations or other laws. Such interpretation can only be made by the courts.

Other guidance

1.7 Practical design guidance for electrical systems is contained in SHTM 2007; *Electrical services - supply and distribution,* and SHTM 2011; *Emergency electrical services.* Guidance on low voltage electrical safety is given in SHTM 2020; *Electrical safety code for low voltage systems (Escode – LV)*.

2. Management responsibilities

Statutory requirements

2.1 It is the responsibility of the owners and occupiers of premises, general managers and chief executives to ensure that their premises comply with all statutes.

2.2 Employers have a general duty, under the Health and Safety at Work etc Act 1974 (HSW Act 1974), so far as is reasonably practicable, to ensure the health, safety and welfare of their employees, residents and visitors to their premises. These duties are legally enforceable and the Health and Safety Executive have successfully prosecuted occupiers of premises under this statute. It is incumbent upon both owners and occupiers of premises to ensure that there is a management regime for the proper design, installation and operational management of plant, equipment and systems.

Electricity at Work Regulations

2.3 The principal statutory requirement for electrical safety in the workplace is the Electricity at Work Regulations 1989. The Regulations came into force on 1 April 1990. 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.

2.4 The Regulations are made under the HSW Act 1974 which imposes duties principally on employers, the self-employed and on employees – including certain classes of trainees. The Regulations impose duties on persons (duty holders) in respect of systems, electrical equipment and conductors and in respect of work activities on or near electrical equipment. These duties are in addition to the others imposed by the HSW Act 1974. The Regulations apply to all work situations covered by the HSW Act 1974 and they apply to equipment of any age. Therefore the guidance is equally applicable to new and existing premises. There are 33 Regulations in all, though Regulations 17 to 28 apply only to mines.

The Electricity Supply Regulations 1988 (amended 1994)

2.5 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 (now part of the Department of Trade and Industry) and may impose requirements which are in addition to those of the Electricity at Work Regulations 1989.

Functional guidance

2.6 The Property and Environment Forum Executive, Institution of Electrical Engineers and the Health and Safety Executive produce the following guidance notes and other publications which are of interest:

a. Property and Environment Forum Executive (P&EFEx):

i. SHTM 2007; *Electrical services – supply and distribution;*

ii. SHTM 2011; *Emergency electrical services*;

iii. SHTM 2020; *Electrical safety code for low voltage systems (Escode – LV);*

b. Institution of Electrical Engineers (IEE):

Regulations for Electrical Installations BS 7671: 1992;

c. Health and Safety Executive:

PM 32, PM 53, GS 27, GS 33, GS 34, GS 37, GS 38, GS44, HS(G) 13.

2.7 These give detailed advice on design of certain equipment, safe working practices, maintenance and repair of equipment, installation practice for particular environments, etc.

2.8 There are many national and international codes of practice written by standards-making authorities, trade associations and other bodies, setting out standards and procedures applicable to particular industries, processes or hazards. These may provide useful detailed expansion of the guidance given in Escode – HV but it must be borne in mind how, and by whom, these codes have been drawn up.

2.9 Anyone who manages, designs, purchases, installs, constructs, commissions, operates or maintains high voltage electrical systems and equipment who needs advice should refer to appropriate guidance. This may be found in national, international and harmonised or industry standards and codes of practice or Health and Safety Executive guidance; or they should seek expert advice.

Operational management

Managerial authority and responsibility

2.10 Management (see paragraph 2.22) should appoint in writing a “designated person” and an “authorising engineer” (see paragraphs 2.24 and 2.25).

2.11 They should also clearly define:

a. an electrical safety policy for the operation and servicing of their high voltage electrical system(s) and equipment;

b. a means by which the policy can be managed, implemented, monitored and reviewed.

2.12 All personnel must be made fully aware in writing of their safety responsibilities, as required by statute, and they must be given the necessary information and training to properly understand and carry them out. This also extends to organisations, or individuals to whom work has been contracted.

2.13 Management should produce guidance for electrical safe working practice and procedures. This should clearly indicate where appropriate general and technical advice can be obtained, and whether this is available from within the organisation or from an outside source.

Reporting of injuries or dangerous occurrences

2.14 The reporting of injuries or dangerous occurrences resulting from electrical accidents at work is covered by the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR). Management shall comply with these requirements.

2.15 Unusual occurrences which do not fall within the RIDDOR requirements should be reported as set out in SHTM 2021; *Electrical safety code for high voltage systems,* Part 2, 'Operational management'.

Monitoring and record keeping

2.16 It is a requirement of the Electricity at Work Regulations 1989 that the design, installation, testing and commissioning, operation and maintenance of the high voltage electrical system and equipment are fully integrated to prevent danger.

2.17 Every electrical installation should be inspected and tested to verify that the requirements of the Electricity at Work Regulations 1989 are met, before being put into service. Inspection and testing may take place during construction and/or at completion.

2.18 For new installations, formal completion and inspection certificates should be provided at handover and form part of the historical record and documentation.

2.19 Precautions shall be taken to ensure high standards of electrical safety and these must be reflected in management's strategies for appointing key personnel, training, operational management, design, adopting safe working procedures and practices, etc, together with the establishment of

satisfactory monitoring to ensure the electrical safety policies are being effectively implemented.

2.20 Records of planned, routine and emergency maintenance and untoward occurrences, etc, should be formally kept. Without effective monitoring and records, duty holders cannot demonstrate that they have complied with the requirements for installation and maintenance of electrical systems and equipment.

2.21 In the event of proceedings contravening the Electricity at Work Regulations 1989, these records may be a duty holder's main defence in proving that they took all reasonable and procedural steps, and exercised due diligence to avoid committing an offence.

Designated staff functions

2.22 **Management** – the owner, occupier, employer, general manager, chief executive or other person who is accountable for the premises and who is responsible for issuing or implementing a general policy statement under the HSW Act 1974.

2.23 **Employer** – any person or body who:

a. employs one or more individuals under a contract of employment or apprenticeship;

b. provides training under the schemes to which the Health and Safety (Training for Employment) Regulations 1990 apply.

2.24 **Designated person** – an individual who has overall authority and responsibility for the high voltage electricity system within the premises and who has a duty under the HSW Act 1974 to prepare and issue a general policy statement on health and safety at work, including the organisation and arrangements for carrying out that policy. This person should not be the authorising engineer.

2.25 **Authorising engineer (High Voltage)** – a chartered electrical engineer with appropriate experience, possessing the necessary degree of independence from local management, who is appointed in writing by management to implement as appropriate, administer and monitor the safety arrangements for the high voltage electrical supply and distribution systems of that organisation to ensure compliance with the Electricity at Work Regulations 1989 and to assess the suitability and appointment of candidates in writing to be "authorised persons".

2.26 **Authorised person** – an individual possessing adequate technical knowledge, and having received appropriate training, appointed in writing by the authorising engineer to be responsible for the practical implementation and operation of management's safety policy and procedures on defined electrical systems.

2.27 **Competent person** – a person recognised by the authorised person as having sufficient technical knowledge and experience to enable them to prevent **danger** and who may be nominated to receive and clear specified safety documents.

2.28 **Responsible person** – an individual who has been given permission in writing by an authorised person, normally but not necessarily, for a particular non-electrical task where it is considered that the inherent risk of **danger** and/or **injury** from electrical equipment requires extra vigilance. Permission is to be by the issue and acceptance of a Limitation-of-access, safety document.

2.29 **Duty holder** – a person on whom the Electricity at Work Regulations 1989 impose a duty in connection with safety.

2.30 It may not be the most efficient utilisation of manpower to have authorising engineers associated with a specific management geographical area. It is recommended therefore that one authorising engineer is appointed for each major geographical area.

Role and duties of the authorising engineer

2.31 Within the geographical area for which the authorising engineer has been appointed, they will be responsible for advising on and monitoring the application of this guidance. The authorising engineer's roles include those described below.

2.32 Appoint in writing sufficient authorised persons to provide the necessary cover for all systems and installations for which management has responsibility.

2.33 Define the exact extent of the systems and installations for which each authorised person is responsible.

2.34 If necessary, suspend or cancel the appointment of an authorised person and withdraw the certificate (see paragraph 2.37).

2.35 Maintain a register of all appointed authorised persons.

2.36 Ensure that candidates for appointment as authorised persons:

a. meet the qualification requirements (see SHTM 2021; *Electrical safety code for high voltage systems,* Part 2*,* 'Operational management');

b. meet the training and familiarisation requirements (see SHTM 2021; *Electrical safety code for high voltage systems*, Part 2,'Operational management');

c. can demonstrate adequate knowledge of each system, installation and type of equipment for which authorisation is sought;

d. have satisfied the authorising engineer as to their competence and ability.

2.37 Issue to each authorised person, on appointment, a certificate valid for a period not exceeding three years in the form shown in SHTM 2021*; Electrical safety code for high voltage systems,* Part 2, 'Operational management'.

2.38 Report to management any deficiency in the number of suitably trained and experienced authorised persons where this significantly impairs management's ability to provide a safe and efficient service.

2.39 Review each authorised person's operational experience at intervals of not more than three years by examining the relevant operating records, and recommend refresher training as necessary.

Duties of an authorising engineer

2.40 On receipt of an "operational restriction" related to high voltage systems and/or equipment, ensure that all authorised persons are made aware of it, and receive copies.

2.41 Notify the Department of any known operational restriction issued by a Public electricity supply company, equipment manufacturer, etc, or which arises locally.

2.42 Initiate and co-ordinate the investigations of reported injuries and dangerous occurrences involving electrical systems and installations within the authorising engineer's sphere of responsibility.

2.43 Sanction any interpretation of this guidance, any local house rules, and any deviation, that may be necessary for their application.

2.44 Ensure that any amendments to this guidance are brought formally to the attention of, and are understood by, all appropriate personnel.

Definitions

2.45 **Circuit conductor** – any conductor in a system which is intended to carry electrical current in normal conditions, but does not include a conductor provided solely to perform a protective function by connection to earth or other reference point.

2.46 **Conductor** – a conductor of electrical energy.

2.47 **Danger** – a risk of injury.

2.48 **Dangerous condition** – a condition that is likely to lead to a dangerous occurrence.

2.49 **Dangerous occurrence** – an incident which involves a source of electrical energy and which gives rise to danger to any person.

2.50 **Department** – an abbreviation of the generic term “UK Health Departments” Department of Health, The Scottish Office.

2.51 **Electrical equipment** – includes anything used, intended to be used or installed for use to generate, provide, transmit, transform, conduct, distribute, control, measure or use electrical energy.

2.52 **Equipment** – abbreviation of electrical equipment.

2.53 **High Voltage (HV)** – the existence of a potential difference (rms value for ac) normally exceeding 1000 volts ac between circuit conductors or 600 volts between circuit conductors and earth.

2.54 **Injury** – death or personal injury from electric shock, electric burn, electrical explosion or arcing, or from fire or explosion initiated by electrical energy.

2.55 **System** – a system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy, including such source and such equipment.

3. Management summary

3.1 Management and its nominated staff as duty holders are responsible for the safety of high voltage (HV) electrical systems on their premises. The Electricity at Work Regulations 1989 impose duties on employers to comply with these insofar as they relate to matters which are within their control. These duties are in addition to the ones imposed by the Health and Safety at Work etc Act 1974. To satisfy these requirements, management should ensure that there is:

a. a clearly defined electrical safety policy and programme for the operation and servicing of their high voltage electrical system(s) and equipment;

b. means by which the policy and programme can be managed, implemented, monitored and reviewed.

3.2 Management should formally nominate in writing a designated person (see paragraph 2.24) with responsibility for the HV electrical safety policy.

The electrical safety policy should demonstrate the commitment of management to self-regulation and reflect the uniqueness and special needs of the managed premises for which it is written, by:

a. recognising the importance of the subject;

b. ensuring that responsibilities both legal and managerial are clearly defined and understood throughout the organisation;

c. establishing the arrangements for preventing **danger** or **injury** to persons from electrical causes in connection with work activities and ensuring that high standards of electrical safety are reflected in the management, design, installation, operation and maintenance of systems and equipment in respect of premises owned or occupied by them;

d. monitoring and reviewing at regular intervals the effectiveness of the policy and progress concerning its implementation;

e. ensuring that clear and concise written records are kept of all activities involved in the implementation of the policy.

3.3 Management is also required to formally appoint in writing (see Appendix 1) an authorising engineer with the responsibility for implementing, administering and monitoring the application of the requirements of *Electrical safety code for high voltage systems (Escode – HV)*. The person appointed to fill this position must be a chartered electrical engineer and have a commitment to the role and the responsibilities which it involves. Management responsible for the appointment also has a duty to monitor the effectiveness of the authorising engineer in fulfilling this role. This monitoring

requirement is particularly important if the authorising engineer appointed is either self-employed or employed by an organisation outside the management structure.

3.4 It may not be the most efficient utilisation of manpower to have authorising engineers associated with a specific management geographical area. It is recommended therefore that one authorising engineer is appointed for each major geographical area.

3.5 In addition to ensuring that all statutory requirements relating to electrical safety are observed, management shall have:

a. a clearly defined electrical safety policy;

b. a structure, appropriate to the complexity of the work, to carry out the policy, including an outline description of individual responsibilities;

c. procedures for ensuring the effective administration of the policy;

d. a system of monitoring to ensure that the policy is being effectively pursued within the managed premises;

e. a programme of training to ensure the awareness of all staff on the use of electricity and general electrical safety;

f. appropriate training for relevant professional and technical staff;

g. a procedure for dealing with any emergencies that may arise.

Appendix 1

Model letters

Letters of appointment should be on management headed paper. Management should check that proposed appointees are suitably qualified (see paragraph 2.25).

Model letter for appointing an authorising engineer

Dear [(1)]

Appointment as authorising engineer (High Voltage)

You are hereby appointed as the authorising engineer for

[(2)] to undertake the duties set out

[(3)] [until further notice (4)].

Please confirm your acceptance of the appointment by signing and returning to me a copy of the attached letter.

Signed

(on behalf of management)

Notes

(1) Insert name of person being offered the appointment.

(2) Insert the title of the (management)

(3) Either include a complete reference to the duties as detailed in "Designated staff functions" (paragraph 2.25), or provide a separate list of the duties.

(4) A fixed period may be inserted. However, since management has a duty to monitor and review the performance of the authorising engineer, this terminology provides the facility to cancel the appointment at any stage.

Model letter for acceptance of appointment as an authorising engineer

Dear [(1)]

Appointment as authorising engineer (High Voltage)

I acknowledge receipt of the appointment letter dated

[(date)] as my authority to act as authorising engineer for [(2)] and will to the best of my ability carry out the authorising engineer's duties as set out [(3)].

Signed

Notes

(1) Insert name or title of person to whom the letter is to be returned.

(2) Insert title of the management.

(3) Same wording as item (3) on the model letter of appointment.

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 1713	Confined Spaces Regulations	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 2792	Health and Safety (Display Screen Equipment) Regulations	HMSO	1992	

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
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	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 162	**Specification for electrical power switchgear and associated apparatus** *(Replaced in part by BS 5486 Part 1: 1977 and DS 5227: 1975)*	BSI Standards	1961	
BS 921	**Rubber mats for electrical purposes** *(1987 specification)*	BSI Standards	1976	
BS 3939-1	**Graphical symbols for electrical power, telecommunications and electronics diagrams. General information, general index**	BSI Standards	1986	
BS 5378	**Safety signs and colours** **Part 1:** Specification for colour and design **Part 2:** Specification for colorimetric and photometric properties of materials **Part 3:** Specification for additional signs to those given in BS 5378: Part 1	BSI Standards	1980 1980 1982	

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
BS 5405	**Code of practice for maintenance of electrical switchgear for voltages up to and including 145 kV** *(Replaced in part by BS 6423: 1983 and BS 6626: 1985)*	BSI Standards	1976	
BS 6423	**Code of practice for maintenance of electrical switchgear and control gear for voltages up to and including 650V**	BSI Standards	1983	
BS 6626	**Code of practice for maintenance of electrical switchgear and control gear voltages above 650V and up to and including 36kV**	BSI Standards	1985	
BS 7671	**The requirements for wiring installations** *(the IEE wiring regulations)*	BSI Standards	1992	16th Edition
HSE and HSC publications				
PM 53	Emergency private generation: electrical safety	HSE		
GS 6	Avoidance of danger from overhead electric lines	HSE		
GS 27	Protection against electric shock	HSE		
GS 33	Avoiding danger from buried electricity cables	HSE		
GS 44	Electrical working practices (in preparation)	HSE		
HS(6) 47	Avoidance of danger from underground services	HSE		
HS(R) 25	Memorandum of Guidance on the Electricity at Work Regulations	HSE	1989	
HS(R) 7	A guide to safety signs regulations	HSE	1980	
	Approved code of practice health and safety (first aid) regulations		1981	
	Guidance notes for the health and safety (first aid) regulations		1981	
CS 5	Part 1: Entry into confined spaces Part 2: Cleaning and gas freeing of tanks containing flammable residues	HSE	1977	
CS 15	Cleaning and gas freeing tank containing flammable residues	HSE		
Scottish Health Technical Guidance				
SHTM 2007	Electrical services: supply and distribution	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

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
SHTM 2015	Bedhead services	P&EFEx	2001	CD-ROM
SHTM 2020	Electrical safety code for low voltage systems (Escode – LV)	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 Purpose 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
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