Scottish Health Technical Memorandum 2021

(Part 2 of 2)

Operational management

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

Disclaimer

The contents of this document are provided by way of guidance only. Any party making any use thereof or placing any reliance thereon shall do so only upon exercise of that party's own judgement as to the adequacy of the contents in the particular circumstances of its use and application. No warranty is given as to the accuracy of the contents and the Property and Environment Forum Executive, which produced this document on behalf of NHSScotland Property and Environment Forum, will have no responsibility for any errors in or omissions therefrom.

The production of this document was jointly funded by the Scottish Executive Health Department and the NHSScotland Property and Environment Forum.

NHSScotland, P&EFEx, June 2001

Contents

1. Scope

General

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 and social services premises containing a high voltage system.

1.2 Guidance is given on the safe operation and maintenance of high voltage systems up to and including 36 kV, and it is applicable up to and including the first isolation point on the low voltage system for which "management" (see paragraph 2.9) of the premises has responsibility.

1.3 The use of electricity in health care and social services 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.

1.4 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" (see paragraph 2.7) are accountable for ensuring control; they are also responsible for the safe management, design, installation, operation and maintenance of the electrical systems.

1.5 Guidance is intended to assist duty holders to meet the requirements of the Electricity at Work Regulations 1989 ("the Regulations"), which are made under the Health and Safety at Work etc Act 1974 (HSW Act 1974). It is not an authoritative interpretation of the Regulations or other laws. Such interpretation can only be made by the courts.

1.6 Management of health care and personal social services premises, as employers, have a "legal" responsibility for ensuring compliance with the relevant Regulations. Statutory Instruments referred to within this document shall be deemed to include any revisions or amendments which have occurred since the date of the original statute.

Exclusions

1.7 Guidance in this document does not apply to high voltage systems/ installations associated with electromedical and X-ray equipment which have their own recognised safety procedures and documentation.

Purpose

1.8 The provision of effective procedures and their formalising into written instructions is essential for ensuring a safe system of working where this involves work on conductors or equipment of high voltage systems. This document makes recommendations for the allocation of duties to personnel and the manner in which these duties should be performed. Appendices include reproductions of an *Electrical safety rule book for high voltage systems (Safety rule book (HV)),* safety documents and logbook, which are essential components of a high voltage safety organisation.

Procedures

1.9 High voltage systems associated with health care and social services premises, by their nature, vary considerably in size and complexity. The procedures advocated in this document therefore cannot cover every circumstance and, consequently, may, in specific instances, require to be supplemented by local written procedures. These local arrangements should only be considered when, in the opinion of the "authorising engineer" (see paragraph 2.2), the guidance given in this document is inadequate for the particular circumstances. Any supplementary procedures written as a consequence must therefore maintain the same standards of electrical safety which are implicit within this guidance.

1.10 Because of the specialist nature of the risks, it is important that a carefully prepared procedure exists for dealing with routine servicing of high voltage installations and with any emergencies that arise.

1.11 The consequences of undertaking electrical maintenance or switching operations in terms of patient safety and well-being must be fully considered in advance following appropriate consultation with medical and administrative staff.

Standards

1.12 This document is primarily concerned with the safe operation and maintenance of high voltage equipment but it is equally important that the high voltage equipment installed:

a. complies with the appropriate British Standards and, where applicable, international and/or European Standards;

b. has been satisfactorily tested.

1.13 It is also mandatory that "Operating and maintenance" manuals (including "as installed" drawings and switchgear and transformer (S&T) schedules) for the high voltage system must be available to those involved in its operation and servicing. In order to maintain their value these documents must be regularly updated to include details of all modifications and extensions to plant and equipment as and when they occur.

1.14 Switchgear etc. should be standardised as far as practicable to reduce variety and facilitate easier servicing. Where manufacturers produce special attachments to facilitate servicing and testing, these should be bought with the electrical equipment and placed with other safety equipment. A list of recommended safety equipment and suggested locations is given in Appendix 6.

Duties

1.15 There is a legal obligation on all persons who may be concerned with the operation of, or work upon, the electrical equipment and systems at the managed premises to conduct their work so as to prevent danger or injury to themselves and/ or others. They should also be thoroughly conversant with all Regulations governing the work which they may have to undertake.

Security of information

1.16 The Electricity at Work Regulations 1989 highlight a need for the efficient recording of information which, in the event of any proceedings legal or otherwise arising from any contravention of the Regulations, may be used to form the basis for the duty holders' main defence. Consequently, management should consider its policy for the retention of information and the degree to which, if any, they consider security (back-up) copies of documentation should be held.

Other guidance

1.17 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. Definitions

2.1 The following definitions apply throughout this document and Appendices.

NOTE: The Electrical Safety Rules for High Voltage Systems, Appendix 2, includes the same definitions.

Personnel

2.2 **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".

2.3 **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.

NOTE: The suffix "electrical" associated with the definitions "authorised person" and "competent person" will only be used with letters of appointment to provide a clear differentiation between persons having similar titles but appointed for different duties, that is, medical gas systems, etc. The suffix has not been included against these terms when used within this document but is, however, implicit.

2.4 **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.

2.5 **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.

2.6 **Distribution control engineer** – an engineer employed by a Public electricity supply company and specifically authorised by that company to exercise the function of control over that company's switching operations.

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

2.8 **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.

2.9 **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.

2.10 **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.

2.11 **Systems control engineer** – an engineer appointed in writing by management and on duty at the control centre for the purpose of controlling the generation of electrical energy and its transmission.

General

2.12 **Charged** – when the electrical equipment has acquired a charge, either because it is "live" or has retained/regained a charge even though it may be disconnected from the rest of the system.

2.13 **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.

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

2.15 **Danger** – a risk of injury.

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

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

2.18 **Dead** – neither “live” nor “charged”.

2.19 **Department** – an abbreviation of the generic term “UK Health Departments” (Scottish Executive Health Department).

2.20 **Earthing**:

a. **earth** – the conductive mass of the earth, whose electric potential at any point is conventionally taken as zero;

b. **earthed** – connected to the general mass of earth in such a manner as will ensure at all times an immediate discharge of electrical energy without danger; when applied to electrical equipment and circuit conductors, all phases short-circuited and efficiently connected to earth;

c. **circuit main earth** – a safety earthing connection of an approved type applied by an authorised person and its position recorded before the issue of a safety document;

d. **additional earth** – earthing equipment of an approved type which is applied after the issue of a safety document (for example an earth applied at a point of work).

2.21 **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.

2.22 **Equipment** – abbreviation of “electrical equipment”.

2.23 **High voltage enclosure, cell or compartment** – an enclosure containing high voltage circuit conductors or electrical equipment or parts of either.

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

2.25 **Isolated** – the disconnection and separation of electrical equipment and circuit conductors, by use of an isolating device or alternative means, from every source of electrical energy in such a way that its disconnection and separation is secure.

2.26 **Isolating device** – a purpose designed item of equipment which provides a secure method of disconnecting and separating electrical equipment and/or circuit conductors from every source of electrical energy.

2.27 **Key locker** – an enclosure, usually forming part of the mimic diagram, and containing the logbook, safety documents, **danger/caution** notices and all keys associated with the safety of the high voltage system.

NOTE: The enclosure should be kept locked and the keys to the lock should be available only to an authorised person.

2.28 **Key safe** – a small box for the secure retention of keys associated with the safety of the high voltage system where more than one authorised person or permit holder is involved.

NOTE: The lid of the box should have facilities for at least three padlocks.

2.29 **Logbook** – a pro-forma logbook in which should be recorded:

a. all switching operations;

b. precautionary work prior to the issue of permits-to-work, sanctions-for-test and limitations-of-access;

c. dangerous occurrences;

as required to be reported by the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR). Other unusual occurrences should also be recorded in this logbook.

2.30 **Live** – implies connection to a source of electricity.

2.31 **Mimic diagram** – a permanently displayed single line circuit diagram contained in a lockable enclosure. It shows the complete high voltage system, with facilities for altering the switch and circuit breaker symbols etc. to show whether each such unit is closed, open or earthed. Low voltage circuits which can feed back to the high voltage circuits shall also be shown.

2.32 **Notices**:

a. **Caution notice** – a notice in approved form attached to electrical equipment conveying a warning against interference with such equipment, stating, for example, “CAUTION DO NOT INTERFERE”;

b. **Danger notice** – a notice in approved form attached to electrical equipment or sections when live calling attention to the danger of approach to or interference with such equipment or sections, stating, for example, “DANGER LIVE EQUIPMENT”.

2.33 **Operational restriction** – An operational restriction is a specific written instruction issued by the authorising engineer or the NHS in Scotland Property and Environment Forum in the form of a Hazard Notice, Safety Action Notice or similar official instruction modifying the normal operating procedures associated with a particular type of equipment.

2.34 **Safety documents** – one of the following:

a. **limitation-of-access** – a safety document which is issued and cancelled by an authorised person. It defines the limits and nature of work which may be carried out in the vicinity of live electrical equipment;

b. **permit-to-work** – a safety document which is a form of declaration signed and issued by an authorised person, to a person in charge of work to be carried out on any high voltage electrical equipment. It makes known to such person exactly what equipment is dead, isolated from all live circuit conductors, has been discharged, is connected to earth, and is safe to work on;

c. **sanction-for-test** – a safety document which is a form of declaration signed and given by an authorised person to a person in charge of testing of high voltage electrical equipment. It makes known to such person exactly what equipment is to be tested and the condition under which testing is to be carried out.

NOTE: Model safety documents are reproduced in Appendix 3.

2.35 **Safety sign** – a sign that gives a message about health or safety by a combination of geometric form, safety colour and symbol or text (that is, words, letters, numbers) or both:

a. **prohibition sign** – a safety sign indicating that certain behaviour is prohibited;

b. **warning sign** – a safety sign that gives warning of a hazard.

2.36 **Sub-station** – any premises, or part of premises or enclosure, in which electrical energy is transformed or converted to or from high voltage, or which contains high voltage switchgear.

2.37 **Supervision**:

a. **immediate supervision** – supervision by a person (having adequate technical knowledge, experience and competence) who is continuously available at the location where work or testing is in progress, and who attends the work area as is necessary for the safe performance of the work or testing;

b. **personal supervision** – supervision by a person (having adequate technical knowledge, experience and competence) such that they are at all times, during the course of the work or testing, in the presence of the person being supervised.

2.38 **Switching** – the operation of circuit breakers, switchgear or other methods of making or breaking circuit conductor(s) and/or the application and removal of circuit main earth conductor(s).

2.39 **Switching devices (switchgear)** – equipment which is designed and manufactured specifically for the task of switching.

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

2.41 **Test enclosure** – a temporary testing area containing electrical equipment to be tested and whose limits are clearly defined by a continuous red/white tape. The tape shall be at least 25mm wide and arranged at about 0.85m above floor level and provide a minimum safety clearance of 2.0m around electrical equipment.

2.42 **Voltage categories**:

a. **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;

b. **low voltage (LV)** - the existence of a potential difference (rms value for ac) not exceeding 1000 volts ac or 1500 volts dc between circuit conductors or 600 volts ac or 900 volts dc between circuit conductors and earth. (This definition for low voltage incorporates the “extra low voltage” range as defined under the IEE Wiring Regulations.)

3. Management safety policy

3.1 Management (see paragraph 2.9), and its nominated staff as “duty holders” (see paragraph 2.7), are responsible for the safety of high voltage (HV) electrical systems on their premises. The Electricity at Work Regulations 1989 impose duties on “employers” (see paragraph 2.8) to comply with these insofar as they relate to matters which are within their control. These duties are in addition to those imposed by the Health and Safety at Work etc Act 1974 (HSW Act 1974).

3.2 To satisfy these requirements management must have:

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

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

3.3 Within each management structure a chartered electrical engineer shall be formally appointed as an “authorising engineer” (see paragraph 2.2) with the responsibility for advising on and monitoring the application of the requirements of this document, *Escode - HV*. The person appointed to fill this position needs to have a commitment to the role and the responsibilities which it involves. The management which is 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, for implementing 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.

3.6 Management should formally nominate in writing a designated person (see paragraph 2.5) 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.

3.7 The operation and servicing of high voltage equipment in accordance with clearly defined rules and procedures should be entrusted only to persons who are technically competent and appropriately trained. These will be appointed in writing as “authorised” or “competent persons” (see paragraphs 2.3 and 2.4 respectively).

3.8 Management should, ideally, aim to become independent in respect of the management of the operation and servicing of their high voltage installations. This could be achieved by recruiting and training suitable staff for the purpose (see Appendix 5 which deals with training); alternatively, where this is not considered justified, it will be necessary to make arrangements using an independent organisation (that is, a local electricity company or other suitable contractor). In all instances it is essential that authorised persons are appointed to deal with "switching".

3.9 The extent to which control of systems and/or equipment is delegated to an independent organisation must take into account the complexity of the installation and the inherent risks involved to patients and/or sensitive equipment.

3.10 In situations where the electrical system/equipment is considered complex, or specialist knowledge is required, it is recommended that a level of control, commensurate with the risk, should be maintained by management personnel.

3.11 It must be emphasised that Regulation 3 of the Electricity at Work Regulations 1989 places duties on all those involved with electrical work insofar as they relate to matters under their control. The employment of contractors to carry out electrical work does not allow management to escape all responsibility.

3.12 Management should establish and maintain a system of equipment registration and control. The system should ensure that all electrical equipment for which they have a responsibility, and which is used at establishments which come within their control, is not only suitable for its purpose but is also maintained in an electrically safe and reliable condition.

3.13 A formal acceptance procedure is essential in order to ensure that the entry of all electrical equipment into service is properly administered. Management should also allocate responsibility for ensuring that the appropriate acceptance procedures are initiated, co-ordinated and carried through.

4. Roles and duties of personnel

Role of the authorising engineer

4.1 Within the geographical area for which the "authorising engineer" (see paragraph 2.2) has been appointed, they will be responsible for implementing, administering and monitoring the application of this guidance. The authorising engineer's roles include those described below:

a. appoint in writing sufficient "authorised persons" (see paragraph 2.3) to provide the necessary cover for all systems and installations for which management has responsibility;

b. define the exact extent of the systems and installations for which each authorised person is responsible;

c. if necessary, suspend or cancel the appointment of an authorised person and withdraw the certificate (see paragraph 4.18);

d. maintain a register of all authorised persons;

e. ensure that candidates for appointment as authorised persons:

(i) satisfy the qualification requirements of Appendix 5;

(ii) satisfy the training and familiarisation requirements (see Appendix 5);

(iii) can demonstrate adequate knowledge of each system, installation and type of equipment for which authorisation is sought;

(iv) have satisfied the authorising engineer as to their competence and ability.

4.2 The authorising engineer also issues to each authorised person, on appointment, a certificate valid for a period not exceeding three years and in the form given in Appendix 9.

4.3 They must also report to the 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.

4.4 Additionally they must review each authorised person's operational experience at intervals of not more than three years by examining the relevant operating records of the system(s) and recommend refresher training as necessary.

Duties of an authorising engineer

4.5 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.

4.6 Notify the Department of any known operational restriction issued by an electricity company, equipment manufacturer etc., or which arises locally.

4.7 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.

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

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

Appointment of an authorising engineer

4.10 A model form of letter for appointing an authorising engineer is given in Appendix 9.

Role of authorised persons

4.11 The authorised person will be responsible for practical implementation of the requirements contained within the management electrical safety policy for the systems and installations for which management has a responsibility, and for which the authorised person has been specifically appointed.

4.12 The authorised person's instructions and decisions on electrical matters within his jurisdiction are final. In the case of dispute the authorised person should stop any work or test to which the dispute is related and refer the matter to the authorising engineer for adjudication.

4.13 With large or complex installations more than one authorised person may be appointed for a system or installation. But at any one time only one authorised person shall have control of the system. The name of the authorised person who has control of the system, together with other details, shall be recorded in the logbook after displaying the appropriate notices on the mimic diagram. Any transfer of responsibility between authorised persons must also be recorded in the logbook.

Duties of authorised persons

4.14 The duties of authorised persons may be summarised as follows:

a. control the work on high voltage systems, prepare inspection, maintenance and safety programmes and progress the work;

b. ensure that all records concerning high voltage systems are kept up-to-date (see paragraph 4.15);

c. ensure that test equipment is maintained in good condition;

d. co-operate with the authorising engineer in matters of policy concerning high voltage systems;

e. report in writing any dangerous and/or unusual occurrences to the authorising engineer; and comply with requirements of paragraph 5.31 “Reporting of injuries or dangerous occurrences”;

f. appoint in writing competent persons and maintain a register of all appointments;

g. define the duties of appointed competent persons on the “Certificate of appointment” (see Appendix 9);

h. ensure that the necessary safety posters are displayed in sub-stations at all times;

i. issue and cancellation of safety documents;

j. high voltage switching operations;

k. routine inspection and testing of sub-station earthing;

l. routine inspection and testing of transformers and switchgear;

m. routine inspection and testing of high voltage protection systems including batteries.

4.15 Within each management's geographical area, an authorised person should be appointed with the additional duty of ensuring that all records related to the HV system are kept up-to-date.

Authorised persons – qualifications and training

4.16 The qualifications required to be eligible for appointment by management as an authorised person, together with the training programme for prospective candidates, are covered in Appendix 5.

Appointment of authorised persons

4.17 The authorised person shall be formally appointed by the authorising engineer for defined systems and installations. Appointment will be by the issue and acceptance of a certificate signed personally by both. Details of the recommended procedure, model format of pro-forma and certificates are given in Appendix 9.

Suspension or cancellation of appointment of an authorised person

4.18 The appointment of an authorised person may be suspended or cancelled by the authorising engineer who should take the following action:

a. inform in writing the authorised person, giving the reasons for the suspension or cancellation, details of any further training or experience or any further action considered necessary before re-appointment, and the expected duration of the suspension;

b. arrange a meeting with the authorised person to discuss the suspension and, where necessary, the cancellation;

c. retrieve from the authorised person their certificate of appointment, sub-station key(s), their copy of the *Electrical safety rule book for high voltage systems* and any other related items issued under the appointment procedure;

d. take the necessary measures to ensure alternative cover is provided.

Role and duties of competent persons

4.19 A competent person will be responsible for undertaking duties on high voltage systems. The limits of these duties will be clearly defined in accordance with an authorised person's instructions. While carrying out these duties the competent person must ensure that all safety measures are taken to prevent **danger**, avoid **injury** and prevent damage to equipment.

Qualifications for appointment of competent persons

4.20 To be eligible for appointment, competent persons must:

a. be competent to undertake work on the types of systems and equipment for which the appointment is sought;

b. be familiar with the types of systems and equipment on which work is required to be undertaken;

c. possess technical knowledge and sufficient experience to prevent any **danger** that may be presented by the work to be undertaken;

d. have an adequate knowledge of:

(i) the relevant parts of this, Electrical safety code for high voltage systems;

(ii) any local house rules;

(iii) those documents listed in the Reference section which are applicable to the systems and equipment on which work or tests are required to be undertaken;

e. have an adequate knowledge of, and within the preceding three years have received training in, first aid treatment for electric shock.

Appointment of competent persons

4.21 A competent person should be formally appointed in writing by an authorised person for duties which are to be clearly defined on the "Certificate of appointment". Appointment will be by the issue and acceptance of the certificate signed by an authorised person.

4.22 Details of the recommended procedure, model format of pro-forma and certificates are given in Appendix 9.

4.23 A copy of the certificate is to be placed in the *High voltage system operational procedure manual.*

4.24 The authorised person shall maintain a register of all competent person appointments. Each competent person's appointment is to be reviewed by the authorised person at intervals not exceeding three years and by each new authorised person as soon as practicable after appointment.

4.25 A copy of the appointment record and review details should be placed in the *High voltage system operational procedure manual* (the 'Operational procedure manual'*).*

Suspension or cancellation of appointment of a competent person

4.26 The appointment of a competent person may be suspended or cancelled by an authorised person or the authorising engineer, who should take the following action:

a. retrieve from the competent person the certificate of appointment, sub-station key(s), their copy of the *Electrical safety rule rook for high voltage systems* and any other related items issued under the appointment procedure;

b. destroy the original certificate and overwrite all other copies of the certificate with the word "CANCELLED". This must be followed by the date of cancellation and the signature of the authorised person or authorising engineer responsible for the action;

c. note the cancellation on the competent person's appointment record;

d. notify in writing the suspension or cancellation of the appointment to all other authorised persons appointed for all systems and installations with which the competent person was associated;

e. inform in writing the competent person, giving the reason for the suspension or cancellation, details of any further training or experience or any further action considered necessary before re-appointment, and the expected duration of the suspension;

f. arrange a meeting with the competent person where appropriate to discuss the suspension and, where necessary, the cancellation.

Contractors' competent persons

4.27 Where a contractor has been appointed to provide competent persons for a system and installation it will be the authorised person's responsibility to ensure that each competent person is of a standard equivalent to that required by this guidance.

4.28 If the authorised person is of the opinion that a contractor's competent person is not working in accordance with the requirements of this, *Electrical safety code for high voltage systems* or is working in an unsafe manner, the authorised person has the authority to stop the work.

4.29 Where a contractor is providing the services of a competent person, the contractor should also be advised of any suspension or cancellation proceedings and be invited to attend any meetings.

Responsible person

4.30 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 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.

4.31 The authorised person will determine the level of supervision (immediate or personal) to be provided in relation to the nature of the work involved.

5. Safe working practices

Safety procedures

5.1 It is a requirement of the Electricity at Work Regulations 1989 that properly formulated and regulated safety procedures are instituted as a prerequisite to a safe system of working.

5.2 It is therefore essential that all work on high voltage systems, including electrical equipment and high voltage cables, or work which can be dangerous because of its close proximity to high voltage systems is formalised in written instructions and/or electrical safety rules.

5.3 The writing of instructions and/or electrical safety rules helps those involved to decide the manner in which the work is to be done and the precautions to be adopted for preventing **danger** and/or **injury**. It also provides documentary evidence of the procedures adopted, which may be vital in any subsequent enquiry following a dangerous occurrence.

Safety programme

5.4 The authorised person who will be responsible for issuing safety documents for all programmed work or tests on high voltage systems and equipment shall prepare in duplicate a safety programme detailing the activities which are to be carried out.

5.5 When the safety programme has been completed it should be countersigned by another authorised person who has a detailed working knowledge of the particular system involved. In the case of very simple systems, countersigning may not be considered essential and could be a subject of local house rules (see Appendix 3).

Safety documents

5.6 The function of the safety documents "Permit-to-work", "Sanction-for-test" and "Limitation-of-access" is to ensure that any work authorised on, or in close proximity to, high voltage systems or equipment is strictly controlled.

NOTE: Appendix 3 gives details of the various safety documents.

5.7 All safety documents should be A4 size. The minimum quality of the paper to be used for permits in these documents should be of adequate weight and quality to withstand handling on site, and a minimum standard of 80 gsm (grammes per square metre) is recommended.

5.8 Only one pad of each type of safety document shall be in use for each high voltage system.

5.9 When not in use, the pads are to be kept under lock in the mimic diagram cabinet.

5.10 A safety document must not be issued for work on any item of equipment which is already the subject of a sanction-for-test.

5.11 If additional or alternative work is to be sanctioned then the current safety document shall be cancelled in accordance with correct safety procedures and a new safety document issued to cover the additional or alternative work element.

5.12 The issue and cancellation of every safety document shall be recorded in the logbook.

5.13 Completely filled safety document pads must be retained in the mimic diagram cabinet or alternative lockable cabinet for a minimum period of three years after the date of the cancellation of the last safety document issued.

Electrical safety rule book for high voltage systems

5.14 All authorised or competent persons concerned with operating, maintenance or work on the high voltage systems of the managed premises shall be provided with a personal copy of management's Electrical safety rules for high voltage systems (the Safety rule book (HV)) and be required to sign for its receipt.

5.15 The Safety rule book (HV) should be of a loose leaf format approximately A6 in size and have a durable cover to allow for robust handling. It should be complete with a 6-ring mechanism to facilitate the inclusion of local house rules, and each section segregated using durable index dividers.

5.16 Each Safety rule book (HV) should be customised to identify the management responsible for its issue (see Appendix 2).

Safety equipment

5.17 Safety equipment to facilitate the safe operation and servicing of high voltage systems should be readily available to authorised persons. This should include:

a. a mimic diagram (see Appendix 4);

b. a complete set of numbered safety locks and keys and a key locker complete with easily identifiable key bunches for each high voltage distribution centre. There should be no duplicate keys. The key locker is usually arranged to form part of the mimic diagram cabinet (see Appendix 4);

c. a key safe to accommodate the appropriate safety keys whilst work is in progress;

d. a logbook for recording all switching operations, safety precautionary measures, repairs and any unusual occurrences concerning the high voltage system (see Appendix 8);

e. an operational procedure manual;

f. operating and maintenance manual(s);

g. printed pads of safety documents with serial numbers (see Appendix 3);

h. safety posters which should be permanently exhibited in each sub-station as follows:

i. (i) a poster showing an approved method for treatment of electric shock (see Appendix 2/E);

j. (ii) an extract of management's *Electrical safety rules for high voltage systems* (see Appendix 7);

k. testing, earthing equipment etc., for the use of authorised personnel. A full list of recommended safety equipment is listed in Appendix 6.

NOTE: The need to display an abstract of the Electricity at Work Regulations 1989 is no longer a statutory requirement. Posters displaying abstracts may be provided at locations as a reminder of the requirements of the Regulations but they must never be considered as an adequate substitute for proper training.

Operational restrictions

5.18 An operational restriction is a specific written instruction issued by the authorising engineer or the NHSScotland Property and Environment Forum in the form of a Hazard Notice, Safety Action Notice or similar official instruction modifying the normal operating procedures associated with a particular type of equipment.

NOTE: Where the operational restriction is initiated by the authorising engineer, it should, when relevant, be forwarded to the NHSScotland Property and Environment Forum for circulation nationally.

5.19 Any known operational restriction imposed or advised by an electricity company must be notified without delay to the authorising engineer and to the NHSScotland Property and Environment Forum.

5.20 On receipt of an operational restriction, the authorised person should:

a. acknowledge the receipt to the authorising engineer, indicating whether or not the equipment is included in the local system(s) or installations;

b. record the receipt in the logbook, and the action taken;

c. place a copy signed by each authorised person in the 'Operational procedure manual'.

5.21 Where the equipment covered forms part of the local systems and installations, the authorised person should:

a. withdraw any standing instructions permitting operation of the equipment (Revised standing instructions, incorporating the operational restrictions, may be issued if practicable.);

b. place a copy of the operational restriction, signed by each authorised person appointed for the local systems and installations, in the operating and maintenance manuals attached to the equipment maintenance and operating instructions to which it refers;

c. arrange any necessary inspections and remedial work.

5.22 The completion of inspections and remedial work should be noted in the logbook.

5.23 Copies of the inspection reports and details of any remedial work undertaken shall be:

a. placed in the 'Operational procedure manual';

b. forwarded to the authorising engineer.

Termination of an operational restriction

5.24 The termination of an operational restriction shall be noted in the logbook, and:

a. the copy of the operational restriction held in the 'Operational procedure manual' shall be overwritten with the word "CANCELLED" followed by the date of cancellation, countersigned by each of the authorised persons and retained in the manual;

b. any copy held with equipment or maintenance and operating instructions is to be overwritten with the word "CANCELLED" followed by the date of cancellation, and retained with the instructions;

c. any standing instructions which incorporate the conditions of the operational restriction should be withdrawn and replaced by new standing instructions.

Coolant and arc extinguishing media

5.25 The availability of economic and non-flammable substitutes to hydrocarbon insulating oil, as coolant and arc extinguishing media, has led to the production of equipment containing these alternative agents and their installation within health care and social services premises.

5.26 A number of these substitutes under certain conditions can be injurious to the health of employees. The Health and Safety legislation requires employers to ensure, so far as is reasonably practicable, the health, safety and welfare of their employees. It is essential when using alternative cooling or arc extinguishing media to ensure that the potential effects under all conditions have been fully investigated and safe working procedures produced to indicate the required action under both normal and emergency conditions, taking into account the environmental conditions.

5.27 Members of the rescue services who may attend site must be made aware of any risks and advised accordingly.

5.28 Information on a selection of alternative cooling and extinguishing agents and their potential effects is given in Scottish Health Technical Memorandum (SHTM) 2007; *Electrical services: supply and distribution*.

5.29 The information contained in SHTM 2007 must not be taken as an exhaustive list, as inevitably developments in this area will produce other alternatives.

5.30 The requirements of the Control of Substances Hazardous to Health (COSHH) Regulations 1999 (SI No 437) shall be considered when employing alternative cooling or arc extinguishing agents, etc within electrical equipment. In addition appropriate procedures and actions necessary to protect the health and safety of individuals must be taken. (It

should be noted that, under the COSHH Regulations, whilst the extinguishing agent may not be a listed substance in the formal sense it may still be a "hazardous substance" in the sense of creating a hazard which is comparable to that caused by a listed substance. The approved Code of Practice on the COSHH Regulations should be referred to for guidance.)

Reporting of injuries or dangerous occurrences

5.31 The reporting of injuries or dangerous occurrences resulting from electrical accidents at work comes within the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR), and management must comply with the legislation's requirements.

5.32 Formal procedures exist within the NHS for the reporting of accidents with, and defects in, medical products, buildings and plant and other medical and non-medical equipment and supplies. These should be followed where appropriate.

5.33 An investigation shall be carried out into each incident to establish the facts and consider what measures if any are necessary to improve the safety arrangements, and a full report of the incident prepared for submission to management. The investigation will be initiated and co-ordinated by the authorising engineer where it involves electrical systems and installations within his/her sphere of responsibility.

5.34 The authorised person on duty at the time of the incident will, unless prevented by extenuating circumstances, prepare a full report for submission to the authorising engineer.

5.35 To alleviate potential problems or criticism which may arise at any enquiry into a dangerous occurrence or incident, management should consider:

a. the questionable conflict of interests and impartiality of any investigation or subsequent report where it is carried out by those directly involved;

b. the reliability of evidence involving self-judgement.

5.36 It is strongly recommended that the personnel referred to in Chapter 4, ‘Roles and duties of personnel’, are only appointed to undertake the duties associated with a single role.

Security and admittance to sub-stations

5.37 All sub-stations should be kept locked, the locks being identical so that a single key will enable access to be gained to any sub-station over which management has control or a degree of control on a site.

5.38 Each authorised person should be issued with a key and, where considered appropriate under local house rules, a competent person may also be issued with a key.

5.39 For emergency use an additional key should be kept in a "break glass" fronted box located at a constantly manned location on the site. A log sheet should be provided in the key box together with instructions to the effect that, before taking the key, a person should first enter their name on the log sheet and state the reason for which the key is required.

5.40 No person other than an authorised person or competent person should be allowed to enter a sub-station unless accompanied by an authorised person or a competent person, or they are a responsible person covered by a limitation-of-access safety document.

5.41 The exception to the above paragraph is when the sub-station is protected with automatic fire extinguishing equipment. In this case an authorised person must render the automatic fire protection inoperative before entry is allowed.

6. Division of responsibilities between management and others

General

6.1 Whenever there is a division of responsibilities between management and others, the authorised person (see paragraph 2.3) appointed by management will issue instructions to other parties, as necessary, to prevent **danger**.

6.2 Where a specialist contractor has been appointed under contract or other arrangement by management, they shall be required to comply with:

a. management's electrical safety rules for high voltage systems;

b. the requirements of this safety code;

c. any instructions issued by management's authorised person in accordance with their electrical safety rules for high voltage systems.

Before the system or installation is accepted from a contractor

6.3 The contractor has control of the system and is not required to comply with this guidance. The contractor shall comply with any relevant Statutory Regulations and must take equivalent safety precautions to those identified within this safety code.

The contract should be advised of this guidance and given the opportunity to adopt its procedures.

6.4 Where it is known that management is to accept control of the system, the authorising engineer (see paragraph 2.2) should nominate an authorised person designate for the new system or installations.

6.5 The authorised person designate should liaise with the contractor in order to become familiar with the systems or installations for which responsibility is to be taken.

6.6 Where the contractor is responsible for part of a system or installation, the exact extent of both the contractor's responsibility and degree to which compliance with this guidance is required should be defined as part of the contract and one copy of the relevant section is to be sent to the authorising engineer and another is to be placed in the ‘Operational procedure manual’.

Public electricity supply company appointments

6.7 The Public electricity company may appoint local management-nominated authorised persons to operate their switchgear under defined conditions and in accordance with defined procedures. In such cases, appropriate authorised persons are to be nominated by the authorising engineer for appointment by the electricity company.

6.8 Each authorised person is to obtain from the electricity company's appointing officer a written agreement defining the responsibilities to be accepted and the regulations and procedures to be followed.

6.9 Each authorised person shall acknowledge, in writing, receipt of the agreement from the electricity company and acceptance of the responsibilities.

6.10 A copy of the agreement should be sent to the authorising engineer and another is to be placed in the 'Operational procedure manual'.

6.11 A copy of any relevant Public electricity supply company's regulations should be displayed in each nominated authorised person's office, and at any other location required by the regional electricity company.

6.12 Any action taken by the authorised person on behalf of the electricity company should be recorded in the logbook and in any documentation required by the electricity company.

6.13 Authorised persons appointed by the Public electricity supply company to operate their switchgear are, wherever possible, to provide advance warning to the electricity company and the authorising engineer before relinquishing the appointment.

7. Signs and notices

Safety signs

7.1 It is a legal requirement that all safety signs shall comply with BS 5378 Part 1 and The Health and Safety (Safety Signs and Signals) Regulations 1996. Any existing safety signs which do not satisfy this requirement must be replaced.

7.2 All permanently fixed signs installed with the intention of displaying a health or safety message shall be safety signs (see paragraph 2.35), having a geometric shape, colour and pictorial symbol conforming to the requirements of BS 5378 to ensure compliance with the Health and Safety (Safety Signs and Signals) Regulations 1996.

7.3 If supplementary text is considered necessary it shall be in accordance with the British Standard recommendation.

7.4 A warning sign should be fixed in a prominent position outside every sub-station, and accommodation where high voltage is present.

7.5 Where a gas flooding system is installed in a sub-station, or accommodation where high voltage is present, a safety sign with appropriate text shall be installed in a prominent position.

Temporary notices

7.6 **Danger** and **caution** notices must be prominently displayed at the relevant positions before the start of work or testing and before the issue of any permit-to-work or sanction-for-test.

7.7 **Danger** and **caution** notices using text only are not required to comply with the Health and Safety (Safety Signs and Signals) Regulations but where they are being supplied or replaced the safety colours and contrasting colours as in BS 5378 Safety Signs and Colours Part 1 1980 should be adopted.

7.8 Where management decides to use temporary safety signs instead of notices, these safety signs shall comply with the requirements of the Health and Safety (Safety Signs and Signals) Regulations 1996. Where this occurs, the references within the code to **danger** and **caution** notices shall consequently be redesignated “Prohibition” and “Warning” signs respectively.

7.9 Where joint access occurs, the appropriate organisations should agree the display method to be adopted. A mixture of temporary safety signs and notices must **not** be used in these locations in any circumstances.

7.10 Where joint access occurs it is recommended that management's logo is included on their temporary safety signs and notices to provide a clear differentiation.

7.11 Loops used for affixing "temporary notices" to equipment should be purpose-designed and of a non-conducting material.

8. Operating records

General

8.1 The introduction of the Electricity at Work Regulations 1989 means that it is essential to maintain accurate maintenance and operating records.

8.2 These records may, in the event of proceedings for an offence consisting of a contravention of the absolute requirements contained in the Regulations, be the duty holders' (see paragraph 2.7) main defence. The only defence to the absolute requirements of the Regulations is for any person to prove that they took all reasonable steps and exercised all due diligence to avoid the commission of the offence.

8.3 Other records which are considered essential to provide the necessary information are the logbook (see paragraph 2.29), safety documents (see paragraph 2.34), High voltage system operational procedure manual (the 'Operational procedure manual') and an 'Operating and maintenance manual'.

8.4 For each of management's high voltage systems for which an authorised person (see paragraph 2.3) is appointed, a bound stiff covered book (not loose leaf), titled, *Logbook*, is to be kept in the mimic diagram cabinet (see paragraph 2.31). (See also appendices 4 and 8.)

8.5 Entries in the logbook are to be made in chronological order, and are to show:

a. details of entry into a sub-station for whatever purpose;
b. operation or a sequence of operations of high voltage switchgear;
c. adjustment of the mimic diagram to indicate the present state of the system or installation;
d. the issue and return of a key;
e. the transfer of the authorised person's key;
f. the transfer and acceptance of responsibility between authorised persons;
g. the issue and cancellation of a safety document;
h. the withdrawal of a safety document, with the reason and the action taken;
i. the receipt and termination of an operational restriction (see paragraph 2.33);
j. any inspection and remedial action associated with an operational restriction;

k. the six-monthly inspections of **earthing** equipment;

l. the annual inspection of safety equipment;

m. the annual inspection of first aid equipment;

n. the loss of a safety document.

8.6 Completely filled record books are to be retained in the mimic diagram cabinet or other lockable cabinet for a minimum period of three years after the date of the last entry.

Operational procedure manual

8.7 For each of management's high voltage systems for which an authorised person is appointed, a ring binder file titled 'Operational procedure manual' shall be kept in the mimic diagram cabinet or other lockable cabinet.

8.8 The manual is to contain a copy of each:

a. certificate of appointment of a competent person;

b. operational restriction;

c. inspection report, and details of any remedial work undertaken in connection with operational restrictions;

d. cancelled operational restriction;

e. demarcation agreement with clients;

f. demarcation agreement with contractors;

g. operational agreement with the Public electricity supply company;

h. safety programme.

8.9 Each copy added to the manual must be sequentially numbered.

8.10 Copies of information contained within the manual should be retained for a minimum period of three years after the date of their cancellation or termination.

8.11 The manual is also to contain a copy of the current edition of the *Electrical safety code for high voltage systems (Escode - HV)*.

Operating and maintenance manuals

8.12 The need for accurate operating and maintenance manuals including "as installed" drawings is an intrinsic requirement of the Health and Safety at Work legislation which states that "the employee must be fully informed on equipment for which he is responsible".

8.13 The importance of these documents and the need for them to be regularly updated to take account of any developments, changes or modifications which may occur cannot be over-emphasised. They not only provide a vital

reference source for those who initially operate and maintain the system but are also essential to their successors to enable them to acquire a rapid and clear understanding of the system and the operational and maintenance needs involved.

8.14 For each of management's high voltage systems for which an authorised person is appointed, a ring binder file titled 'Operating and maintenance manual' is to be kept in the mimic diagram cabinet or other lockable cabinet when not in use.

8.15 The binder is to contain:

a. manufacturers' maintenance and operating instructions for equipment, each type of high voltage switchgear and the low voltage switchgear at the first **isolation** point included in the system or installation;

b. a copy of any current operational restriction applicable to any equipment included in (a) above;

c. a copy of the current "as installed" drawing(s) of the high voltage system up to and including the first **isolation** point on the low voltage system together with a switchgear and transformer schedule.

NOTE: Where a manufacturer's maintenance and operating instructions are already supplied within a suitable binder; in general only reference to their availability and location need be recorded within the 'Operating and maintenance manual'. However, where considered necessary for the adoption of safe working procedures, specific extracts from the instructions should be included within the 'Operating and maintenance manual'.

9. Servicing and maintenance

General

9.1 All high voltage equipment and installations should be regularly inspected, serviced and tested to ensure that they are maintained in a safe and serviceable condition. To achieve this a comprehensive system of "equipment management" is considered an essential feature of any maintenance programme. The safety procedures outlined in this document should be used to cover the work, and a record of all operations shall be kept in the logbook.

Equipment management

9.2 The purpose of equipment management is to ensure that all equipment used within management's geographical area is maintained in a safe and reliable condition. It also ensures that guidance on the objectives and principles of such a system, together with other useful related information, is contained within the "Health equipment information" publications.

NOTE: Copies of relevant Hazard and Safety Action Notices should also be made available.

Manufacturers' instructions

9.3 It is essential that personnel engaged on maintenance of equipment ensure that they have ready access to the relevant manufacturers' manuals and that they are used as the major reference guide to methods of working, dismantling, re-assembly and restoring to service.

Newly commissioned equipment

9.4 All newly installed equipment should have a full and detailed inspection and a complete range of tests and operational checks as part of the commissioning procedure. From a subsequent maintenance point of view the most important factor is to keep careful records of the condition of the equipment and, in particular, to record the actual settings of any adjustable components. Reference to these at future maintenance operations will:

a. help in deciding what interval of time should elapse between such operations (see paragraph 9.10);

b. provide benchmarks against which all later test results may be judged;

c. allow any deterioration in performance to be recognised and remedial action taken where necessary.

Frequency of maintenance

9.5 Because of the widely varying age and conditions of operation of the equipment incorporated in individual installations, it is not possible to lay down precise recommendations for intervals between maintenance in all circumstances. The introduction of modern switchgear and transformers for example, which incorporate new coolant and arc extinguishing media (such as vacuum, sulphur hexafluoride gas "SF_6" and synthetic coolants), has resulted in the life of the components and the associated frequency of maintenance being considerably extended beyond that of previous equipment using traditional hydrocarbon insulating oil.

9.6 To take advantage of new developments and recognised revisions to traditional maintenance and servicing periods, and the revenue savings which they can produce, the authorised person responsible for the maintenance and servicing of the high voltage system should produce a maintenance and inspection schedule which reflects the individual requirements of the equipment.

9.7 The schedule should incorporate:

a. routine maintenance proposals, based on periodic inspections supplemented at more extended intervals with operational checks and examination as required;

b. post-fault maintenance, which should be determined by consulting the manufacturer's handbook and by past experience.

9.8 Examples of sources of information which may be useful in assisting with the compilation of this schedule are the manufacturer's handbook, BS 6626:1985, and Estates Information Management System, etc.

Records

9.9 Records are of value in establishing the frequency of maintenance, therefore careful note should be taken of relevant items each time maintenance is performed.

9.10 Records should be initiated when each item of equipment is installed and should contain at least the following information:

a. manufacturer's details, including nameplate particulars of the equipment installed, its serial number and manufacturer's order number (if known) and the date of installation;

b. location of the manufacturer's manual and list of recommended spares;

c. date of last maintenance operation and note of the operation counter reading at that time, or an estimate of the number of operations;

d. type of maintenance carried out;

e. record of any findings where the condition of the equipment varied from the expected, action taken and the condition of important components when the equipment was put back in service:

f. details of fuse-link type and ratings, and relay settings;

g. details of the maximum system fault levels, and any changes to them;

h. any special safety requirements.

9.11 Every significant fault or breakdown should be recorded and analysed with a view to taking action to prevent its recurrence.

Sub-station earthing

9.12 All **earthing** conductors and connections should be inspected at 6-monthly intervals, special attention being given to the more vulnerable parts such as the final connection to **earth** electrodes and other external parts of the **earthing** system.

9.13 The earthing systems should be tested annually using a heavy current test method. (See Scottish Health Technical Memorandum 2007; *Electrical services - supply and distribution*.)

Fire extinguishing installations and equipment

9.14 Inspections and checks should be made as recommended in the relevant British Standard, or International and/or European Standard or other appropriate guidance.

9.15 Safety signs shall be maintained at the entrance to sub-stations advising of the installation of gas flooding systems (that is, CO_2 or Halon).

First aid and treatment for electric shock

9.16 All persons likely to work on high voltage systems shall receive instruction in first aid and practise these measures, particularly the methods of treating persons suffering from the effects of an electric shock. A record should be kept of all training. (See also Appendix 10.)

Appendix 1: Statutory Requirements

1. 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. The full text of the Regulations, which includes those parts relevant to the mining industries, is set out in Statutory Instrument 1989 No 635.

2. The Regulations are made under the Health and Safety at Work etc Act 1974 (HSW Act 1974). The HSW Act imposes duties principally on employers, the self-employed and on employees including certain classes of trainees. The Regulations impose duties on persons (referred to in the Memorandum of Guidance on the Electricity at Work Regulations 1989 as "duty holders") in respect of systems, electrical equipment and conductors and in respect of work activities on or near electrical equipment. (The above words in italics are defined in Regulation 2.) The duties are in addition to those imposed by the HSW Act 1974.

3. The guidance given in this document is intended to assist these duty holders in meeting the requirements of the Regulations insofar as they relate to high voltage systems in health care and social services premises. The purpose of this document is to identify the nature of the precautions necessary for the achievement of high standards of electrical safety in compliance with the duties imposed through the recommended practice of adopting safe systems of working with properly formulated and regulated written procedures.

4. Only those who have:

   a. sufficient or adequate technical knowledge;

   b. the experience to make the right judgements and decisions;

   c. the necessary skill and ability to carry them into effect

   should undertake work subject to these Regulations.

5. Because the Regulations state principles of electrical safety in a form which may be applied to any electrical equipment, and any work activity having a bearing on electrical safety, they apply to all electrical systems and equipment (as defined) whenever manufactured, purchased, installed or taken into use, even if their manufacture or installation pre-dates the Regulations. Where electrical equipment pre-dates the Regulations this does not of itself mean that the continued use of the equipment would be in contravention of the Regulations. For example, much of the equipment to which the Regulations apply may have been made to a standard, such as a British Standard, which has since been modified or superseded: that, in itself, does not mean that the equipment or its associated installation does not comply with the 1989 Regulations.

6. General guidance on the application of the Regulations is given in the 'Memorandum of Guidance on the Electricity at Work Regulations 1989' published by the Health and Safety Executive. In particular circumstances advice can be obtained from local offices of the appropriate Health and Safety Inspectorate.

Appendix 2: Electrical safety rules for high voltage systems

A. Form for recording issue of safety rule book (HV)

Safety rule book (HV) No [(1)]

[(2)]

Electrical safety rules for high voltage systems

These Rules must be read in conjunction with Electrical safety code for high voltage systems (Escode - HV) [(3)].

This Safety rule book (HV) is the property of [(2)] and is issued to the appointed person identified below.

This Safety rule book (HV) must not be transferred to any other person and shall be returned to the Authorising Engineer/ Authorised Person* on suspension or cancellation of the appointment.

[(4)] has satisfied the undersigned that he understands these Electrical safety rules for high voltage systems.

Signed

(Signature of authorising engineer/authorised person*)

Date

I hereby confirm that I understand these Electrical safety rules for high voltage systems and acknowledge receipt of this copy of the Safety rule book (HV).

Signed

(Signature of authorised/competent person*)

Date

**Delete as appropriate*

Notes

(1) Copies of the Safety rule book (HV) will be serially numbered and available separately in pocket book form for each authorised and competent person.

(2) The Electrical safety rule book (HV) should be customised by including the name of the management.

(3) Any Operational procedure manuals or other Electrical safety rules may be added if required.

(4) Name of authorised/competent person.

B. Form for recording receipt of safety rule book (HV)

Safety rule book (HV) No [(1)]

[(2)]

Electrical safety rules for high voltage systems

These Rules must be read in conjunction with Electrical safety code for high voltage systems (Escode - HV) [(3)].

This Safety rule book (HV) is the property of [(2)] and is issued to the appointed person identified below.

This Safety rule book (HV) must not be transferred to any other person and shall be returned to the authorising engineer/ authorised person* on suspension or cancellation of the appointment.

[(4)] has satisfied the undersigned that he understands these Electrical safety rules for high voltage systems.

Signed

(Signature of authorising engineer/authorised person*)

Date

I hereby confirm that I understand these Electrical safety rules for high voltage systems and acknowledge receipt of this copy of the Safety rule book (HV).

Signed

(Signature of authorised/competent person*)

Date

*Delete as appropriate

Notes

(1) Copies of the Safety rule book (HV) will be serially numbered and available separately in pocket book form for each authorised and competent person.

(2) The Electrical safety rule book (HV) should be customised by including the name of the management.

(3) Any Operational procedure manuals or other Electrical safety rules may be added if required.

(4) Name of authorised/competent person.

(When produced as a separate document this page will be removed from the Safety rule book (HV) following signature by both parties and will be retained by the authorising engineer.)

Text of 'Electrical safety rules for high voltage systems'

Foreword

Every management/employer has a duty under the Health and Safety at Work legislation to prepare and issue a general policy statement on health and safety at work, including the organisation and arrangements for carrying out that policy. For particular work or activities special rules, related documents and procedures are necessary in support of these policy statements. These *Electrical safety rules for high voltage systems* or equivalent safety rules are used to cover work and activities associated with the high voltage systems and equipment at the managed premises.

These *Safety rules (HV)* are intended as a guide to safe working for employees when they are required to work on or near the electrical systems/equipment at the managed premises.

These *Safety rules (HV)* have been approved by the Department and agreed with the Health and Safety Inspectorate.

Contents

1. Policy

Management summary

1.1 It is management policy to have all electrical systems and associated equipment for the distribution of electrical energy at high voltage, designed and installed that they may be operated safely when approved operational procedures are followed correctly. However, when switching for operational purposes, or when work such as maintenance, testing and repair has to be carried out or when, particularly, systems and equipment have to be taken temporarily out of normal operational use, it is necessary for the *Safety rules (HV)* and related documents and procedures to be applied to ensure the health and safety of all who are liable to be affected by any **danger** that might arise. The *Safety rules (HV),* as read with related documents and procedures, are based on the principle that they should state what should be done to ensure that specified work or activity may be carried out without **danger** so far as is "reasonably practicable" (see paragraph 1.6). The **dangers** that can arise are two-fold:

a. inherent **dangers** from systems and equipment, which are covered by the *Safety rules (HV);*

b. general **dangers** associated with the work as it proceeds, including, in addition to the work process, **dangers** from access and egress, the place of work and the working environment. (These **dangers** may be of a different kind, and under different control, from the inherent **dangers** in (a) above and may not be specifically covered by these *Safety rules (HV).)*

1.2 In the implementation of the *Safety rules (HV),* related documents and procedures, specified methods of work, and other forms of local instruction, management shall allocate responsibility for the achievement of health and safety from the inherent **dangers** mentioned in paragraph 1.1(a) above during the various stages of work or activity.

1.3 Management will also issue instructions and allocate responsibility for dealing with the general **dangers** mentioned in paragraph 1.1(b) above.

1.4 It is management policy that the persons in charge of the various stages of the work or activity should have the appropriate competence and authority and shall understand the *Safety rules (HV),* related documents and procedures, the methods of work and any local instructions. Such persons shall understand the **dangers** that might arise and the precautions to be taken over the whole period of the work or activity. Management policy requires that all persons at work are adequately instructed and supervised and are competent to avoid **danger**, according to the circumstances of the work they are doing, and that the relevant legal requirements, the *Safety rules (HV)* and other required health and safety precautions are observed at all times.

Definitions

Definition of "shall"

1.5 Where "shall" is used in these rules with no qualification, this indicates a mandatory requirement with no discretion permitted and no judgement to be made.

Definition of "reasonably practicable"

1.6 Where a statement is qualified by the words "reasonably practicable", a slightly less strict standard is imposed. It means that an assessment must be made considering, on the one hand, the magnitude of the risks of a particular work activity or environment, and on the other hand the cost in terms of the physical difficulty, time, trouble and expense which would be involved in taking steps to eliminate or minimise those risks. The greater the degree of risk the less weight that can be given to the cost of measures needed to prevent that risk.

2. General provisions

Scope and application of the Safety rules (HV)

2.1 These *Safety rules (HV)* shall be applied to:

a. high voltage systems up to and including 36 kV;

b. the low voltage switchgear cables up to and including the first **isolation** point on the low voltage system;

c. associated electrical equipment under the ownership or control of the management under whose authority they have been issued.

These, or equivalent safety rules, shall normally be the only rules applicable to such systems and electrical equipment and shall have application, in accordance with management instructions, together with related documents and procedures, for the whole course of the work for which they are intended.

2.2 Where operation of low voltage switchgear is not associated with high voltage work, the requirement for safety documents as indicated in these *Safety rules (HV)* does not apply, and reference should be made to SHTM 2020, *Electrical safety code for low voltage systems (Escode – LV).*

Other safety rules, related documents and procedures

2.3 In addition, or as an alternative, to the application of these *Safety rules (HV)* and related documents and procedures, other rules, documents and procedures issued by management or by other authorities, shall be complied with in accordance with management instructions. Although the appendices to these *Safety rules (HV)* are not, in themselves, individual electrical safety rules for high voltage systems, they shall be read in conjunction with the rules to which they relate and form important supporting information for the implementation of the *Safety rules (HV).*

2.4 Where management employees are required to work near electrical systems and associated electrical equipment not owned or controlled by the management, these *Safety rules (HV)* and related procedures shall be used as a guide to safe working practice.

Information and instruction

2.5 Arrangements shall be made by management to ensure:

a. that all employees concerned are adequately informed and instructed as to the systems and electrical equipment which are affected by a particular operation or work (whether or not they are owned or operated by the management) and which legal requirements, safety rules, related documents and procedures shall apply;

b. so far as is reasonably practicable, that other persons who are not employees but who may be exposed to **danger** by the operations or work also receive adequate information and instruction.

Issue of Safety rules (HV)

2.6 A copy of these *Safety rules (HV)* and, as appropriate, related documents and procedures shall be issued to such employees of the management and such other persons as determined by the authorising engineer. Such employees and other persons shall sign a receipt for a copy of these *Safety rules (HV),* related documents and procedures (plus any amendments) and shall keep them in good condition and have them available for reference as necessary when work is being carried out under these *Safety rules (HV).*

Variation of Safety rules (HV)

2.7 In exceptional or special circumstances these *Safety rules (HV)* may be varied to such an extent as is necessary and approved by the authorising engineer. Such variation shall always be in writing and shall ensure that safety requirements are satisfied in some other way.

Objections

2.8 When any person receives instructions regarding the operation of or work upon the high voltage system and associated electrical equipment at the managed premises, they shall report any objections on safety grounds to the carrying out of such instructions to the persons issuing them, who shall then have the matter investigated and, if necessary, referred to a more senior level for a decision before proceeding.

Duties

2.9 Management has a duty to comply with the requirements of the Health and Safety at Work legislation, the Electricity at Work Regulations and other relevant statutory provisions and the various regulations affecting health and safety including electrical safety.

2.10 It is also the duty of all employees and contractor's employees, employed in connection with the management electrical systems, to comply with the above legislation as far as is required in relation to their operations or work on the systems.

2.11 In particular it shall be the duty of every employee whilst at work:

a. to take reasonable care for the health and safety of themselves and of other persons who may be affected by their acts or omissions at work;

b. as regards any duty or requirement imposed on their employer, or any other person by or under any of the relevant statutory provisions, to co-operate with them so far as is necessary to enable that duty or requirement to be performed or complied with.

2.12 In addition Section 143 of the Factories Act requires all employees to use any means or appliance provided (by the employer or management) for securing safety, and also not wilfully to do anything likely to endanger themselves or others.

2.13 All persons concerned with the operation of, or work on, electrical systems must make themselves conversant with the relevant statutory requirements and with these *Safety rules (HV).* Ignorance of the requirements or rules will not be accepted as an excuse for neglect of duty.

Injuries or dangerous occurrences

2.14 The reporting of injuries or dangerous occurrences resulting from electrical accidents at work comes within the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR), and management must comply with the legislation requirements. Unusual occurrences which do not fall within the RIDDOR requirements shall be noted in the logbook.

2.15 The authorised person shall prepare a report on each accident involving injury to persons or damage to equipment. Equipment defects shall be reported through the appropriate reporting procedure.

2.16 All reports shall be submitted to the authorising engineer.

Failure of supply

2.17 A failure of supply, from whatever cause, on any part of the high voltage systems, shall be noted in the logbook. During failures of supply, all equipment and circuit conductors shall be regarded as being **live** until **isolated**, checked with a voltage indicator and **earthed**.

Telephone and radio messages

2.18 Every message transmitted using telephones or portable radios that relates to the operation of the high voltage system shall be written down and repeated to the sender to ensure that it has been accurately received. Essential details of each message, including the name of the sender and time it was received, shall be recorded in the logbook.

NOTE: The operation of radios, pagers, mobile phones and similar transmitter receivers should not be permitted in switchrooms where the switches may contain microprocessors.

Safety posters

2.19 In each room containing high voltage electrical equipment, the following posters shall be prominently displayed:

a. a poster showing an approved method of treatment for electric shock;

b. extract of the management Electrical safety rules for high voltage systems (see Appendix 7).

2.20 The need to display an Abstract of the Electricity at Work Regulations 1989 is no longer a statutory requirement. Posters displaying abstracts may be provided at locations as a reminder of the requirements of the Regulations but they must never be considered as an adequate substitute for proper training.

Emergency resuscitation and first aid

2.21 In order for resuscitation techniques to be effective, those who may be required to exercise them must receive proper training and regular practice. Wherever possible an approved first aid course should be undertaken.

Admittance to sub-stations

2.22 All sub-stations shall be kept locked when unattended.

2.23 No person other than an authorised person or competent person shall enter a room containing high voltage equipment unless accompanied by an authorised person, competent person or covered by a permit-to-work, sanction-for-test or limitation-of-access issued by an authorised person.

2.24 The exception to paragraph 2.23 is when the sub-station is provided with “automatically controlled fire protection” when the requirements of this document (Appendix 2, paragraph 5.20 “Fire protection equipment”) will apply.

Action in an emergency

2.25 Authorised persons shall go firstly to the mimic diagram cabinet. The first authorised person on site shall display the “Work on high voltage system in progress” notice and lock the “Authorised person on site” slide lock-sign in the exposed position.

2.26 Any other authorised person attending the site, on seeing either of these notices, shall take no action until they have contacted the authorised person who displayed the notice.

3. Definitions

3.1 When the *Safety rules (HV)* are produced in a separate booklet the definitions set out in Chapter 2 “Definitions” of *Electrical safety code for high voltage systems – Operational management* will be included. (Definitions shall be construed as having the same authority as the remainder of the *Safety rules (HV).)*

4. Procedures for initiation to work

Authorisation for working in close proximity to high voltage equipment and cables

4.1 No work shall be carried out in a sub-station, or elsewhere, where there is any risk due to close proximity of high voltage electrical equipment including cables, unless authorised by a limitation-of-access.

4.2 All such work shall be under the personal supervision of the responsible person named on the limitation-of-access.

Safety preparations for work

4.3 Before issuing a permit-to-work, an authorised person shall:

a. ensure that the competent person to whom it will be issued is fully conversant with the high voltage system and the details of the work to be done;

b. record in the logbook details of the switching operations and other safety measures intended to be carried out to make the system safe to work on, and when they are completed;

c. alter the mimic diagram to show the exact state the switches and circuit **earths** will be after having made the system safe to be worked on;

d. display the “Work on HV system in progress” notice in the mimic diagram cabinet;

e. carry out the switching operations, test the conductors to be worked on to ensure they are **dead** and apply circuit main **earths**;

f. fix **danger** and **caution** notices, fences and barriers to make the work site safe from the hazards associated with the high voltage system;

g. at the point of work identify and mark the equipment to be worked upon.

Access

Access to high voltage enclosures and equipment

4.4 The following restrictions apply:

a. barriers (including plates on access ladders) cutting off access to enclosures, chambers, cubicles or cells containing **live** high voltage conductors shall normally be kept locked;

b. no person except an authorised person, or person acting under their immediate supervision, shall have access to any such enclosure, chamber, cubicle or cell in which a **live** conductor is exposed;

c. all spout shutters not required for immediate work or operation shall, if not otherwise made inaccessible, be locked shut.

Access for the operation of high voltage switchgear

4.5 The following points apply:

a. high voltage switching shall be carried out by an authorised person or by a competent person acting under the authorised person's personal supervision, except when necessary to **isolate** in an emergency when a competent person will have access to sub-stations where emergency tripping facilities are available. These circuit breakers will be fitted with locks preventing unauthorised re-closure. The authorised person shall be informed of all high voltage emergency switching;

b. locks shall be applied as necessary to prevent unauthorised operation of switchgear (except emergency tripping as referred to above);

c. circuit breakers shall in general be re-closed a maximum of twice after opening under fault conditions. The equipment shall be inspected at the first opportunity after opening under fault conditions;

d. when switchgear shows any sign of defect or malfunction after operating, its condition shall be reported immediately to the authorising engineer and it shall be examined before further operation;

e. making **live** or **dead** by visual signal or pre-arranged understanding after an agreed interval of time, is forbidden.

Safety keys

4.6 The following points apply:

a. each authorised person shall be issued with a personal key to enable them to gain access to all sub-stations and also a key to the key locker. A spare of each of these keys shall be located in a “break glass” fronted box at an agreed 24-hour manned location for emergency use only;

b. should the spare keys be required, the person concerned should enter their name on a log-sheet to be kept in this key locker and give the reason for requiring the key;

c. all other keys to safety locks associated with the high voltage system shall be kept in the key locker when not in use, unless a key safe is being used. The keys for each distribution centre shall be kept in a separate clearly labelled bunch. No spare keys shall be retained;

d. the key locker shall be kept locked except when keys are being removed from or returned to it. It is important that the key locker is kept locked when work is in progress to prevent unauthorised removal of keys;

e. a key safe shall be provided to house the safety keys associated with the work, when more than one authorised person or permit holder is concerned. The key safe shall be secured by the personal padlock of each authorised person concerned. For this purpose each authorised person shall be issued with a padlock and key. There shall be no duplicate keys.

Precautions to be taken before working on high voltage systems

4.7 No work shall be undertaken on high voltage electrical equipment unless the authorised person prior to the issue of a safety document has positively identified, to the individual who is to carry out the work, the equipment involved.

Work on high voltage electrical equipment

4.8 No person shall undertake any repairs, maintenance, cleaning, alteration or such work, on any part of high voltage electrical equipment unless such parts of the electrical equipment are:

a. **dead**;

b. **isolated**, and all practicable steps taken to lock off from all points of supply – including voltage and auxiliary transformers and common neutral **earthing** equipment from which the electrical equipment may become **live**;

c. efficiently connected to **earth** at all points of disconnection of supply to such equipment, or between such points and the point(s) of work; and **caution** notices fixed;

d. screened where necessary to prevent **danger** and **danger** notices fixed;

e. released for work by the issue of a permit-to-work or sanction-for-test;

f. efficiently connected to **earth** at or close to the point of work where necessary to prevent **danger** from induced voltages.

Caution and danger notices

4.9 **Caution** and **danger** notices shall be fixed as follows:

a. **caution** notices on all switchgear controlling the electrical equipment which has been made **dead** and on which work is to proceed. **Danger** notices shall also be attached (where applicable) on or adjacent to **live** electrical equipment at the limits of the zone in which work may be carried out;

b. **caution** notices, **danger** notices, barriers and screens shall be fixed or moved only under the personal supervision of an authorised person.

Procedure for issue of a permit-to-work

4.10 The following procedures apply to the issue of a permit-to-work:

a. the authorised person shall enter on the permit-to-work full details of the precautions which have been taken to make the equipment safe and write on the permit-to-work the exact details of the work on an item of equipment to be carried out;

b. the top copy of the permit-to-work shall be issued to the competent person in charge of the work, who, after reading its contents and signifying to the authorised person that the instructions etc. are fully understood, shall acknowledge its receipt by signing the declaration on Part 2 of the permit-to- work;

c. the recipient of the permit-to-work shall retain possession of the top copy at all times whilst the work detailed on the permit-to-work is being carried out;

d. where more than one working party is concerned a permit-to-work shall be issued to the competent person in charge of each working party, and cross reference made on each permit to the fact that other permits are in use at the same time giving details of the serial numbers of the permits involved;

e. if, during the course of the work, it is found necessary to change the scope of the work, the existing permit-to-work shall be returned to the authorised person and cancelled; and a new permit-to-work issued, clearly detailing the revised work;

f. carbon copies shall not be removed from the permit-to-work book even when a permit-to-work is cancelled before issue.

Procedure for cancelling a permit-to-work

4.11 When work for which a permit-to-work has been issued is suspended or completed, the competent person to whom it was issued shall sign the declaration on Part 3 of the permit and return the permit-to-work to the authorised person. They shall cancel the permit by signing the declaration on Part 4 and destroy the original of Part 1 in the presence of the competent person.

Procedure for issue of a sanction-for-test

4.12 The following procedures apply to the issue of a sanction-for-test:

a. the authorised person shall enter on the sanction-for-test full details of the precautions which have been taken to make the equipment safe and write on the sanction-for-test the exact details of the work to be carried out;

b. the top copy of the sanction-for-test shall be issued to the competent person in charge of the work, who, after reading its contents and signifying to the authorised person that the instructions etc. are fully understood, shall acknowledge its receipt by signing the declaration on Part 2 of the sanction-for-test;

c. the recipient of the sanction-for-test shall retain possession of the top copy at all times whilst the work detailed on the sanction-for-test is being carried out;

d. if, during the course of the test, it is found necessary to change the scope, the existing sanction-for-test shall be returned to the authorised person and cancelled and a new sanction-for-test issued, clearly detailing the revised work;

e. a sanction-for-test safety document is not to be issued for work on any item of equipment which is already the subject of a permit-to-work;

f. carbon copies shall not be removed from the sanction-for-test book even when a sanction-for-test is cancelled before issue.

Procedure for cancelling a sanction-for-test

4.13 When work for which a sanction-for-test has been issued is suspended or completed, the competent person to whom it was issued shall sign the declaration on Part 3 of the document and return the sanction-for-test to the authorised person who shall cancel the document by signing the declaration on Part 4. They should destroy the original of Part 1 in the presence of the competent person.

Procedure for issue of a limitation-of-access

4.14 The following procedures apply to the issue of a limitation-of-access:

a. the authorised person shall enter on the limitation-of-access details of the work to be done and the safety precautions applicable;

b. the top copy of the limitation-of-access shall be issued to the responsible person in charge of the work, who, after reading its contents and signifying to the authorised person that the instructions etc. are fully understood, shall acknowledge its receipt by signing the declaration on Part 2 of the limitation-of-access document;

c. the recipient of the limitation-of-access shall retain possession of the top copy at all times whilst the work detailed on the limitation-of-access is being carried out;

d. where more than one working party is concerned, a limitation-of-access shall be issued to the responsible person in charge of each working party;

e. carbon copies shall not be removed from the limitation-of-access book even when a limitation-of-access is cancelled before issue.

Procedure for cancelling a limitation-of-access

4.15 When work for which a limitation-of-access has been issued is suspended or completed, the responsible person to whom it was issued shall sign the declaration on Part 3 of the document and return the limitation-of-access to the authorised person who shall cancel the document by signing the declaration on Part 4. They should destroy the original of Part 1 in the presence of the responsible person.

Precautions to be taken before working on low voltage systems

4.16 When work is carried out on low voltage systems the following precautions shall be taken:

a. the consequence of shock or serious burns from short circuit associated with low voltage systems may be serious or, in some circumstances, fatal. Work on low voltage electrical equipment and conductors shall be done when they are made **dead**;

b. when working on low voltage electrical equipment and conductors which have been made **dead**, suitable precautions shall be taken by screening or other means to avoid **danger** from inadvertent contact with **live** conductors within the zone of work;

c. when transformers can be paralleled on the low voltage side, the switchgear shall be locked in the off position before any work is carried out under a permit-to-work on the high voltage side of the system. When work is to be carried out on the transformer, it shall be in accordance with this document (Appendix 2 paragraphs 5.5-5.8 “Work on transformers”);

d. when work and/or testing is to be carried out which necessitates **live** working then strict compliance with all the requirements of Section 6 of these *Safety rules (HV)* is essential.

Precautions to be taken before working on high voltage generators

4.17 When work is carried out on high voltage generating plant and directly connected equipment, the following additional precautions shall be taken:

a. the generator shall be at rest;

b. the generator HV winding shall be **isolated** and **earthed** initially, through the generator main circuit breaker. Temporary **earths** shall only then be applied afterwards to the winding in the terminals enclosure;

c. the field circuit shall be **isolated** and locked off (open), where it is energised from a separate supply. Where motor driven exciters or batteries are provided, the switch controlling the motor or **isolating** the batteries supply shall be locked off (open);

d. neutral **earth** resistor (NER) shall be **isolated** from the generator neutral connection at the NER switchboard;

e. high voltage winding LV heaters fuse links shall be withdrawn, before any work commences within the generator stator casing;

f. LV instrument or control supplies shall be **isolated** at the fuse links;

g. the prime mover providing the motive power to the generator and any associated valves controlling the flow of fuel or steam shall be **isolated** and locked off. In the case of an internal combustion prime mover, the starting battery, compressed air or hydraulic equipment shall also be made inoperative by locked switch and/or valve isolation and/or depressurising;

h. **danger** or **caution** notices shall be prominently displayed at all points of **isolation** referred to in (b), (c), (d), (e), (f) and (g) as appropriate;

i. to ensure a safe system of work, the permit-to-work procedures shall be applied;

j. when manual barring gear is to be applied to generating plant, a permit-to-work must be issued;

k. generating plant shall not be allowed to operate with any part of its protective enclosures (mechanical or electrical) removed, unless for special test purposes where it should be the subject of a sanction-for-test by an authorised person.

Earthing

Circuit mains earths

4.18 The following precautions shall be observed when high voltage electrical equipment is to be discharged and **earthed**:

a. the circuit breaker or specially provided **earth** switch shall be used to make the **earth** connection. Where a circuit breaker is used the electrical and mechanical trip mechanism shall be rendered inoperative. After closing, the circuit breaker or **earth** switch shall be locked in the **earth** position, whilst it is the circuit main **earth**;

b. where (a) is not practicable, the high voltage electrical equipment shall be tested to ensure that it is **dead** and shall then be discharged and **earthed** by an approved **earthing** lead applied by means of a pole or other approved method in accordance with this document (Appendix 2, paragraph 4.22 "Procedure for the use of **earthing** leads").

Earthing leads and connections

4.19 **Earthing** leads and associated clamps shall be examined immediately prior to use. They shall be of an "approved type" and of adequate capacity to carry the prospective fault current of the system at the point of application. **Earthing** leads and associated clamps shall never be improvised. They shall be properly stored, maintained and recorded.

NOTE: "Approved type" shall mean "accessories manufactured and tested for the required duty and available from the equipment manufacturer or their recommended supplier for specific use with his equipment".

Operation of earthing switches

4.20 No high voltage **earthing** switch shall be operated or circuit main **earth** connection attached or removed except by an authorised person.

Recording of circuit main earths

4.21 The precise location of each circuit main **earth** shall be recorded on the permit-to-work and in the logbook.

Procedure for the use of earthing leads

4.22 The following procedure shall be observed when using **earthing** leads:

a. verify that the circuit is **dead** by means of a voltage indicator of approved type, the indicator itself being tested immediately before and after verification;

b. **earthing** leads shall be connected to the **earth** system before being secured to phase conductors. They shall be secured to the phases only by means of a pole or other approved equipment. Care must be taken to ensure that good contact is made;

c. all phases shall be **earthed**, even if work is to be carried out on one phase only;

d. **earthing** leads shall not be applied in any cell or compartment in which there is any exposed metal **live** at high voltage;

e. when **earthing** leads are being removed, they shall be disconnected from phase conductors first and the **earth** system last;

f. the manufacturers' **earthing** equipment only shall be used for the purpose of **earthing** spout contacts of switchgear. The insertion of hand or any tool in contact spouts for this purpose is forbidden.

Testing of high voltage electrical equipment

4.23 When any high voltage electrical equipment is to be subject to a test voltage before being connected to the high voltage systems, a sanction-for-test shall be issued by an authorised person. The authorised person, although not carrying out the work personally, shall ensure that such electrical equipment and all circuitry which may become **live** when the test voltage is applied is adequately guarded. Alternatively they should ensure that barriers are erected to form a test enclosure, with **danger** notices fixed in conspicuous positions at all approaches to the test enclosure during the period the electrical equipment may be subject to high voltage.

4.24 All cables shall be discharged before and after the application of test voltage.

4.25 Temporary conductors used for testing purposes shall be of an adequate size and easily visible and identifiable.

4.26 For test connection to spout contacts, test bushes as supplied by the switchgear manufacturer shall be used. Test connections shall not be applied in a cell or compartment in which there is any exposed metal live at high voltage.

NOTE: This rule does not exclude the use of approved voltage indicators, or approved devices for testing and phasing out circuits.

5. Instructions for work on particular items of electrical equipment

Work on remotely and automatically controlled electrical equipment

5.1 Before work is carried out on remotely or automatically controlled equipment such as circuit breakers, isolators, tap changing gear, or associated air compressors, all remote control and automatic features shall first be rendered inoperative. No work shall be carried out on the controlling equipment, wiring or relays except by the authorised person or competent person working under the personal supervision of the authorised person.

Work on busbar spouts of multi-panel switchboards

5.2 When work is to be carried out on busbar spouts, the following operations shall be carried out **in strict sequence**:

a. the authorised person shall enter details of necessary safety precautions and switching operations in the logbook, and alter the mimic diagram;

b. the section of the busbar spouts on which work is to be carried out shall be isolated from all points of supply from which it can be made **live**;

c. the isolating arrangements shall be locked so that they cannot be operated, and shutters of **live** spouts locked shut. **Caution** notices shall be fixed to the isolating controls;

d. busbars shall be checked by means of an approved voltage indicator to verify that they are **dead**, the indicator itself being tested immediately before and after verification. The checking with the voltage indicator shall be done on the panel to which the circuit main **earths** are to be applied. This test shall also be made on the panel on which the work is carried out;

e. circuit main **earths** shall be applied at a panel on the **isolated** section of the busbar other than that at which work is to be done, using the method recommended by the switchgear manufacturers. The insertion of the hand or any tool into the contact spouts for this purpose is forbidden;

f. an **earth** connection shall also be applied to all phases at the point of work;

g. where applicable, **danger** notices shall be attached on or adjacent to the **live** electrical equipment at the limits of the zone in which work shall be carried out;

h. the permit-to-work shall be issued to cover the work to be done. During the course of the work, where applicable the **earth** connection(s) at the point of work may be removed one phase at a time. Each phase **earth**

connection shall be replaced before a second phase **earth** connection is removed;

i. on completion of the work, the permit-to-work shall be cancelled.

Work on feeder spouts, voltage transformer spouts or single panel busbar spouts

5.3 When work is to be carried out on feeder or voltage transformer spouts, or on busbar spouts of a single panel, the following operations shall be carried out **in strict sequence**:

a. the authorised person shall enter details of necessary safety precautions and switching operations in the logbook, and alter the mimic diagram;

b. the spouts on which work is to be carried out shall be **isolated** from all points of supply from which they can be made **live**;

c. the **isolating** arrangements shall be locked so they cannot be operated, and the shutters of **live** spouts shall be locked shut. **Caution** notices shall be fixed to all **isolating** controls;

d. spout contacts shall be checked by means of an approved voltage indicator to verify that they are **dead**, the indicator itself being tested before and after verification;

e. the circuit shall be **earthed** with approved **earthing** equipment at the point of work and where practicable at all points of the **isolation** from the supply. For the purpose of **earthing** metal-clad switchgear, approved appliances only shall be used. The insertion of the hand or any tools into contact spouts for this purpose is forbidden;

f. a permit-to-work shall be issued;

g. during the course of the work, where practicable, the **earth** connection(s) at the point of work may be removed one phase at a time. Each phase **earth** connection shall be replaced before a second **earth** connection is removed;

h. on completion of the work the permit-to-work shall be cancelled.

Withdrawable equipment

5.4 When withdrawable electrical equipment has been disconnected from all supplies and withdrawn from its normal live position, its conductors shall be discharged to **earth** but need not remain connected to **earth**. The enclosure should be locked off and a **danger** notice fixed.

Work on transformers

5.5 When work is to be carried out on the connections to, or the windings of, a transformer, the switchgear or fuse gear controlling all windings shall be opened and locked in this position. The transformer shall be **earthed** with

approved **earthing** equipment at all points of **isolation** from high voltage supplies. Additionally, associated voltage and auxiliary transformers shall be **isolated** to prevent the possibility of the transformers being made **live** by feedback. Before a permit-to-work is issued the authorised person shall, at the point of work in the presence of the competent person, identify and mark the transformer to be worked upon.

5.6 Where work is to be carried out on a high voltage/low voltage transformer, and the low voltage windings of the transformer are controlled by a switch or **isolator**, the switch or **isolator** shall be locked open, or other physical means shall be used to prevent the switch being closed during the course of work.

5.7 The transformer shall be **isolated** from all common neutral **earthing** equipment from which it may become **live**. This does not require the disconnection of solidly **earthed** neutrals or neutral equipment connected solely to the transformer on which work is to be done.

5.8 **Caution** notices shall be fixed at all points of **isolation** including those at low voltage.

Work on high voltage cables

5.9 Before issuing a permit-to-work for work on high voltage cables, the authorised person in addition to the procedure described in this document (Appendix 2, paragraph 4.8 “Work on high voltage electrical equipment”) shall clearly identify and mark at all points of work the cable to be worked upon. The cable shall then be spiked at all points of work, preferably with a remotely controlled spiking gun.

5.10 No person shall touch any exposed insulation which covers or supports any conductor on a high voltage system unless the conductor is **dead** and **earthed**.

Work on low voltage cables

5.11 When work is to be carried out on a low voltage cable which has been made **dead**, it shall be **isolated** from all points of supply and **caution** notices affixed. All reasonably practicable steps must be taken to prevent the cable being made **live** inadvertently, including locking off any switchgear and the removal of any fuses or links. Keys, fuses or links shall be kept in a safe place. The circuit shall be proved **dead** by means of an approved indicator, the indicator itself being tested immediately before and after the verification.

Electrical equipment which can be made live from a Public electricity supply company's system

5.12 Except in an extreme emergency, any switching which may affect a Public electricity supply company's network shall be carried out with the full knowledge and agreement of the electricity company's distribution control engineer concerned. The switching operation shall be recorded by the authorised person.

5.13 Switching to the distribution control engineer's instructions, or with his consent, shall be carried out without undue delay. All switching, whether to a distribution control engineer's instructions or with his consent, or under conditions of emergency, shall be reported to the distribution control engineer as soon as possible after each operation.

5.14 Where work is to be carried out on electrical equipment which is directly connected to a Public electricity supply company's high voltage network, then switching, earthing, deposit of safety keys in the key safes and issuing of any permit-to-work or sanction-for-test shall be the responsibility of an authorised person appointed by the electricity company.

Access to, and work in, underground chambers, vessels and confined spaces

Access procedures

NOTE: Reference should be made to the Confined Spaces Regulations 1997 and The Health and Safety Executive Guidance Note CS 5 'Entry into confined spaces'.

5.15 The following points apply:

a. barriers, doors or gates restricting access to underground chambers or similar confined spaces, in which dangerous fumes or other hazards are present or likely to be present, shall normally be kept locked and the control of keys shall be in accordance with an approved procedure;

b. when any person has to enter any such place or similar confined space in which the above **dangers** are present or likely to be present, to such an extent as to involve risk of persons being overcome or otherwise endangered, such precautions shall also include the issue of a limitation-of-access safety document in accordance with this document (Appendix 2, paragraph 4.14 "Procedure for issue of a limitation-of-access"). And the arrangements for access and work and the precautions to be taken shall be in accordance with approved procedures.

Vessels containing oil or flammable liquids

NOTE: Reference should be made to the guidance contained in the Health and Safety Executive Guidance Note CS 15; 'Cleaning and gas freeing of tank containing flammable residues'.

5.16 The following points apply:

a. smoking and exposed flames are prohibited in the vicinity of open vessels containing, or which have contained, oil or any other flammable substance, until the precautions specified in (b) have been taken;

b. work on such vessels involving the application of heat is forbidden until all practicable steps have been taken to prevent fire or explosion, either by removal of the flammable substance and any fumes or by rendering them non-explosive and non-flammable.

Equipment containing SF_6

5.17 Work on any equipment containing SF_6 should be carried out in accordance with the special instructions specified by the manufacturer. (See also SHTM 2007; *Electrical services: supply and distribution*.)

5.18 In normal circumstances SF_6 is non-toxic; however, when exposed to an electric arc it decomposes to form toxic compounds which will normally be contained within the equipment. In the rare event of any decomposition products being present in the atmosphere warning indications such as a pungent odour similar to rotten eggs or irritation of the upper respiratory tract and eyes will become apparent. Where this occurs personnel should immediately get into fresh air even if no equipment failure is apparent. The authorised person must be informed.

Coolant and arc extinguishing media

5.19 Work on any equipment containing an alternative to hydrocarbon insulating oil as coolant and arc extinguishing media should be carried out in accordance with any special instructions specified by the manufacturer. (See also SHTM 2007; *Electrical services: supply and distribution*.)

Fire protection equipment

Automatic control

5.20 Before work or inspections are carried out in any enclosures protected by automatic fire extinguishing equipment:

a. the automatic control shall be rendered inoperative by the authorised person and the equipment left on hand-control. A **caution** notice shall be attached and displayed whenever the automatic fire extinguishing system is inoperative;

b. precautions taken to render the automatic control inoperative must be noted on any safety document issued for work in the protected enclosure;

c. the automatic control will be restored by the authorised person immediately after the persons engaged on the work or inspections have withdrawn from the protected enclosure.

Portable extinguishers

5.21 Only (CO_2) or dry powder extinguishers must be used in the vicinity of **live** electrical equipment and a safety clearance of at least 300 mm shall be maintained. After the discharge of portable extinguishers in an enclosed space, personnel shall withdraw from that space until the precautions set out in paragraph 5.22 below have been taken.

General

5.22 After any explosion or fire, or after the discharge of extinguishers in an enclosed space, the space must be thoroughly ventilated before entry of personnel, unless suitable breathing apparatus is worn.

5.23 Further information is available in NHS in Scotland Firecode publications.

6. Safety precautions and procedures for work on live electrical equipment

General

6.1 It is a requirement of the Electricity at Work Regulations and these *Safety rules (HV)* that work on electrical equipment and conductors should only be carried out when they are made **dead**, **isolated** and **earthed** from all sources of supply, and the other safety requirements as set out in these *Safety rules (HV)* have been satisfied.

6.2 When testing is to be carried out which necessitates **live** working then:

a. suitable precautions (including the need for suitable protective equipment) shall be taken to prevent **injury**;

b. effective control shall be provided for any area where there is **danger** from **live** equipment or conductors;

c. another person or persons shall be in accompaniment where in the opinion of the duty holder that person could contribute significantly to ensuring that **injury** is prevented. That person must have adequate knowledge and experience to avoid **danger** and have been instructed on the action to be taken in the event of an emergency;

d. only approved instruments should be used for electrical, phase identification and rotation or similar measurements – never improvise;

e. in cases where working arrangements so require, approved procedures for the control of the work including the issue of safety documents shall apply.

7. Responsibilities of persons

General

7.1 It is the duty of all persons who may be concerned with the control, operation, work or testing, on or in the near vicinity of equipment to which these *Safety rules (HV)* apply, to implement the rules and to comply with them and with related codes and procedures. Ignorance of the relevant legal requirements, the *Safety rules (HV)*, codes or procedures shall not be accepted as an excuse for neglect of duty.

7.2 The responsibilities placed upon persons may include all or part of those detailed in this section, depending on the role of the persons.

7.3 Any written authorisation given to persons to perform their designated role in implementing the *Safety rules (HV)* shall indicate the class of operation and/or work permitted and the section of system to which the authorisation applies.

7.4 Persons involved in achieving safety from the inherent dangers of the system, to allow work or testing to commence on equipment and its subsequent restoration to service, will be concerned in separate, broadly identifiable areas of responsibility, as follows:

a. **control** – including:

b. (i) before work commences - instructing actions to implement precautions and sanctioning the issue of safety documents;

c. (ii) after completion of work - acknowledging cancellation of safety documents and instructing actions to restore equipment to service;

d. **making safe or restoring equipment** – including:

e. (i) before work commences - taking action to make equipment safe for work and issuing safety documents;

f. (ii) after completion of work - cancelling safety documents and taking action to restore equipment to service;

c. **work** – which includes receipt of a safety document, execution of the required work to its completion, or termination and clearance of the safety document.

Competent persons

7.5 The responsibilities of competent persons include those specified below. Competent persons must ensure that their responsibilities are implemented.

7.6 Competent persons shall comply with these *Safety rules (HV)* when carrying out work whether instructions are issued orally or in writing.

7.7 Competent persons shall use safe methods of work, safe means of access and the personal protective equipment and clothing provided for their safety.

7.8 Competent persons, when recipients of a safety document, shall:

a. be fully conversant with the nature and the extent of the work to be done;

b. read the contents and confirm to the person issuing the safety document that they are fully understood;

c. during the course of the work, adhere to, and instruct others under their charge to adhere to, any conditions, instructions or limits specified on the safety document;

d. retain the safety document and (where appropriate) keys in safe custody, and correctly implement any management procedure to achieve this;

e. when in charge of work, provide immediate or personal supervision as required;

f. warn all persons as quickly as possible to withdraw from, and not to work on, the equipment concerned until further notice if, during the course of work, a hazard which could result in **danger** arises or is suspected. The situation shall be reported immediately by the competent person to an authorised person.

7.9 Competent persons shall not start or restart work under a safety document issued to another competent person without the written permission of that other competent person.

7.10 Competent persons clearing a safety document shall do so only after all persons working under the safety document have been withdrawn from, and warned not to work on, the equipment concerned. Where appropriate they shall ensure that all tools, gear and loose material have been removed, guards and access doors replaced and the workplace left tidy.

Authorised persons

7.11 In addition to responsibilities as competent persons, authorised persons shall have the following additional responsibilities within the limits imposed by their certificates of appointment.

7.12 Correctly implementing approved procedures to ensure that all precautions to achieve safety from the inherent **dangers** of the system are completed, including:

a. confirming that safety precautions at all locations are complete;

b. meeting the requirements of the relevant sections of these rules.

7.13 Prior to the issue of a safety document, deciding, where appropriate:

a. whether additional **earths** are required and, if so, the number and points of application;

b. whether any action is required to contain or dissipate stored energy;

c. whether any additional precautions are necessary;

d. whether personal supervision is required;

and also, ensuring that:

e. safety from the inherent **dangers** of the system has been achieved and will be maintained where the requirements of the safety document are completely implemented;

f. the contents of the safety document to be issued are correct and unambiguous.

7.14 When issuing a safety document:

a. fully explain the contents of the safety document to the recipient and ensure that the recipient understands the nature and extent of the work or testing to be done and the safety precautions to be taken;

b. issue the safety document together with (as appropriate) any keys and circuit identification flags, and note all additional **earths**.

7.15 When cancelling a safety document:

a. ensure that the requirements of the clearance section have been completed correctly;

b. check that all items issued with the safety document have been returned or accounted for;

c. check the operational state of the equipment.

8. Local house rules

This section should contain all additions/amendments to the *Safety rules (HV)* that are introduced by local management.

Appendix A Safety programme

Programme Serial No

(Complete precisely and legibly in BLOCK CAPITALS) Location

1. Purpose of proposed work/test*(*Delete as appropriate*)

Enter details:

2. Equipment which the proposed sequence of operations will make safe to work on or test

Enter details:

3. Date countersigned programme is required to commence

4. Sketch of isolating and earthing arrangements

5. Sequence of operations

(Consult any relevant operating and maintenance instructors before completing this part)

Entry No	Location & identity of equipment	Operation & reason *(Rule off each entry)*	Items required	Time of operation

Notification

I hereby confirm that prior notification has been given to those departments affected by the proposed operation and that contingency arrangements where required for critical areas can be implemented in an emergency.

Signed_____Name_____

Position/Title_____Date_____

Originating authorised person

Signed_____Address_____

Name_____ _____

Date_____ _____

Countersigned authorised person*

I hereby declare that I have checked the above Safety Programme, and am satisfied that, to the best of my knowledge , it will enable the proposed work or test to be carried out safely and in accordance with the 'Electrical safety code for high voltage systems'. I have knowledge of, and have access to a current diagram of, the System and Equipment concerned.

Signed_____Address_____

Name_____ _____

Date_____ _____

**Subject to local house rules, countersignature may not be required on simple high voltage systems*.

Appendix B **Permit-to-work** Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

Part 1: Issue

Issued to _____

I hereby declare that it is safe to work on the following high voltage electrical equipment which has been made **dead**, **isolated** from all **live** conductors and is connected to **earth**:

All other electrical equipment is dangerous to work on

The system is **isolated** at	
The system is **earthed** at	
Danger notices are posted at	
Caution notices are posted at	
Other precautions taken are	
The following work shall be carried out	

No other work shall be carried out

Other Permits to-work in use are	

Authorised person

Signed_____ Time_____ Date_____

Part 2: Receipt

I hereby declare that I accept responsibility for carrying out the work on the electrical equipment as detailed on this Permit-to-work and that no attempt will be made by me or persons under my control to work on any other electrical equipment.

Signed_____ Status_____

Time_____ Date_____

Part 3: Clearance

I hereby declare that the work for which this Permit-to-work was issued is now suspended/completed* and that all persons under my charge have been withdrawn and warned that it is no longer safe to work on the electrical equipment specified on this Permit-to-work and that all gear, tools, etc have been removed.

Signed_____ Status_____

Time_____ Date_____

** Delete as appropriate*

Part 4: Cancellation

This Permit-to-work is hereby cancelled. The original has been returned to me and destroyed in the presence of the signatory to Part 3.

Signed_____ Status_____

Time_____ Date_____

Appendix C **Sanction-for-test** Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

Part 1: Issue

Issued to_____

The following high voltage electrical equipment has been made safe in accordance with 'Safety rules for high voltage systems' for the testing described on this Sanction-for-test to proceed:

All other electrical equipment is dangerous to work on

The points of **isolation** are	
Circuit main **earths** are applied at	
Brief description of testing to be carried out	

Authorised person

Signed_____ Time_____ Date_____

Part 2: Receipt

I hereby declare that I accept responsibility for the testing described on this Sanction-for-test and for taking the precautions necessary to prevent danger.

Signed_____ Status_____

Time_____ Date_____

Part 3: Clearance

All persons under my charge have been withdrawn and warned that it is no longer safe to carry out testing on the electrical equipment detailed on this Sanction-for-test and all additional **earths** have been removed.

The testing is completed/incomplete ***. All gear and tools have/have not*** been removed. The operational state of the electrical equipment is the same as at the time of issue of this sanction-for-test apart from the exceptions noted below:

Exceptions; (if none, state ”none”)_____

Signed_____ Status_____

Time_____ Date_____

** Delete as appropriate*

Part 4: Cancellation

This sanction-for-test is hereby cancelled. The original has been returned to me and destroyed in the presence of the signatory to Part 3.

Signed_____ Authorised person

Time_____ Date_____

Appendix D Limitation-of-access

Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

1. **This form must not be used for work on electrical equipment for which an electrical Permit-to-work or Sanction-to-test is required.**

2. On completion of the work the holder must surrender this Limitation-of-access as directed for cancellation, after which no work shall be done.

Part 1: Issue

Issued to_____

In the employ of _____
being a responsible person, is hereby given permission to carry out the work described below:

Location

Work

No other work shall be carried out

Remarks

Authorised person

Signed_____ Time_____ Date_____

Part 2: Receipt

I hereby declare that I accept responsibility for carrying out work in accordance with this Limitation-of-access and no other work will be done by me or the persons under my charge at the location referred to in Part 1 of this document.

Signed_____
(being the person to whom this form is issued)

Time_____ Date_____

Part 3: Clearance

I hereby declare that the work for which the Limitation-of-access was issued is now suspended/completed* and that all persons under my charge have been withdrawn.

Signed_____
(being the person to whom this form was issued)

Time_____ Date_____
** Delete as appropriate*

Part 4: Cancellation

Signed_____
(being the person authorised to cancel this form)

Time_____ Date_____

On completion of the work the holder must surrender this Limitation-of-access as directed for cancellation, after which no work shall be done.

Appendix E

Poster giving details of treatment for electric shock

Treatment for electric shock

(Immediate and speedy action is necessary)

Free from contact

Switch off current immediately or send someone to do so. Do not attempt to remove a person from contact with high voltage unless suitable articles insulated for the system voltage are used for this purpose. When attempting to free a person from contact with low voltage use rubber gloves, boots, or mat, or insulated stick, but if these are not available use a loop of rope, cap or coat to drag the person free. Whatever is used should be dry and non-conducting.

After release

DO NOT WASTE TIME. If possible, lay casualty on a firm, dry surface and if there is no sign of breathing IMMEDIATELY COMMENCE ARTIFICIAL RESPIRATION. If possible, send for an ambulance and doctor.

If the chest fails to rise during inflation the airways are blocked and external cardiac compression must not be carried out until the airways are unblocked. Check that the jaw is lifted, the head tilted back and that the mouth and throat are clear, If there are still no obvious signs of recovery check the pulse, and if it is felt, continue with artificial respiration. If the neck pulse is not felt, commence:

Cardiac resuscitation

1. With the hand cup-shaped, strike the chest over the heart position once, without follow through weight. If the heart restarts, indicated by signs of recovery and a pulse which can be felt, continue with lung inflations.

2. If still no pulse, start external cardiac compression.

External cardiac compression

3. Place the heel of one hand on the lower half of the casualty's breastbone and cover this hand with the heel of the other hand.

4. From a kneeling position by the side of the casualty, rock forward with arms held straight so that the breastbone is pushed 4 to 5 cm. Release pressure immediately. Continue with rocking motion at a rate of 80 times a minute.

5. Every 15 compressions, give 2 inflations. Where there are two First Aiders present, one should undertake 5 chest compressions while the other undertakes 1 lung inflation and checks the effectiveness of the chest compressions. Continue with this ratio of compressions to inflations until signs of recovery are noticed.

6. Check heart beat after first minute and then after every three minutes.

7. When normal breathing recommences, place casualty in recovery position.

Other injuries

Control of bleeding

Apply firm pressure directly to the wound.

Cover with a clean dressing and bandage firmly in place.

If bleeding continues add further dressings on top of the first and increase the pressure by bandaging firmly into place.

Treatment of burns

Burns should be cooled with cold water, if available.

Then cover with a clean, preferably sterile, dressing and bandage lightly in position

If transfer to hospital is desirable, dial 999 and request the local ambulance service.

First aid appliances

The first aid equipment provided shall be used only for the purpose intended.

The Health and Safety (First Aid) Regulations 1981, (SI 917), place a general duty on employers to make adequate first aid provision for their employees if they are injured or become ill at work. Employers must inform their employees of the provision made for them.

An Approved Code of Practice for the Health and Safety (First Aid) Regulations 1981 gives practical guidance on how to meet the requirements of the Regulations and Approved Code.

The Regulations, the Approved Code and the guidance notes are published together in the Health and Safety Executive booklet “First Aid at Work” HS(R)11.

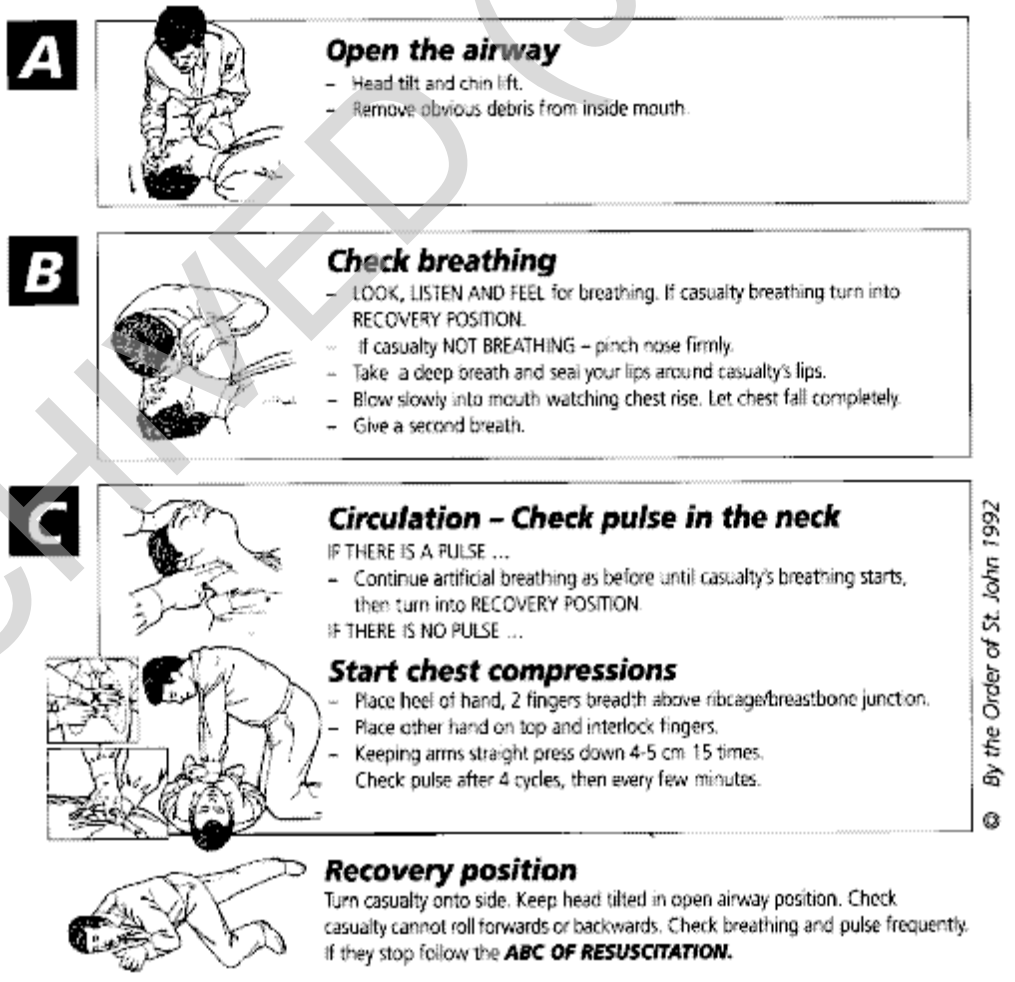
Electric Shock

KEEP CALM - SHOUT FOR HELP - SWITCH OFF ELECTRICITY.

Safeguard yourself when removing the casualty from a hazard. If the casualty is still in contact with electricity and the supply cannot be isolated immediately, don't waste time searching for a switch, stand on dry, non-conducting material (rubber mat, wood, linoleum). Use rubber gloves, dry clothing, length of dry rope or wood to pull or push the casualty away from the hazard.

WARNING: HIGH VOLTAGE If the casualty is within 18 metres of a high current voltage, never attempt to rescue, or even approach them until the power is cut off and the supply isolated.

If the casualty appears unconscious and gives no response, follow the **ABC OF RESUSCITATION:**



Appendix 3: Model safety documents

A. Safety Programmes

Safety programmes
for
high voltage systems

For use at ……

1. These procedures must be followed for **programmed work or tests** on high voltage systems and equipment:

   a. prior to the issue of a permit-to-work or a sanction-for-test for high voltage equipment the activities to be carried out must be detailed on a safety programme;

   b. the safety programme is to be completed in duplicate and is to indicate:

      i the purpose of the proposed work or test;

      ii the equipment that the proposed sequence of operations will make safe;

      iii the commencement date for the proposed operations;

      iv the name of the originating authorised person;

      v for work or tests on high voltage equipment, the name of the countersigning authorised person, where considered necessary;

      vi the sequence of operations proposed, indicating:

         - the location at which each operation is to be performed;
         - the identity of each item of switchgear to be operated;
         - the operation to be performed;
         - the reason for the operation;
         - any items (for example keys, locks, signs) required;

      vii an electrical diagram showing the points at which the equipment will be isolated and earthed;

      viii any intended special instructions or safety measures;

      ix confirmation, where applicable, that prior notification has been given to those departments affected by the proposed operation and that contingency arrangements, where required for critical areas, can be implemented in an emergency;

   c. for all programmed work or tests on high voltage equipment, the authorised person completing the safety programme, where it is considered justified because of the size or complexity of the system involved, is to have the original countersigned by another authorised person. This authorised person must have knowledge of the particular system and installation and access to a current diagram of that system and installation*;

d. the authorised person is to refer to the original of the safety programme while carrying out the programme;

e. the authorised person is to show the electrical diagram on the safety programme to the prospective competent person, while also showing that person the safety arrangements at the points of **isolation** and at the places of work or test;

f. before commencing the work detailed on the safety programme, the copy must be placed in the operational procedure manual. The authorised person is to note on the original the time of each switching operation for subsequent entry in the operational procedure manual. On completion of the programme, the original must be substituted for the copy which may then be destroyed.

*For example, a simple system involving only one or two transformers in a radial configuration without any complex low voltage interconnections would not normally require countersigning.

Front - original

Safety programme

Programme Serial No

(Complete precisely and legibly in BLOCK CAPITALS) Location

1. Purpose of proposed work/test*(Delete as appropriate)

Enter details:

2. Equipment which the proposed sequence of operations will make safe to work on or test

Enter details:

3. Date countersigned programme is required to commence

4. Sketch of isolated and earthing arrangements

Front - copy

Safety programme

Programme Serial No

(Complete precisely and legibly in BLOCK CAPITALS) Location

1. Purpose of proposed work/test*(Delete as appropriate)

Enter details:

2. Equipment which the proposed sequence of operations will make safe to work on or test

Enter details:

3. Date countersigned programme is required to commence

4. Sketch of isolated and earthing arrangements

Back - original

5. Sequence of operations

(Consult any relevant operating and maintenance instructions before completing this part)

Entry No	Location & identity of equipment	Operation & reason (Rule off each entry)	Items required	Time of operation

Notification

I hereby confirm that prior notification has been given to those departments affected by the proposed operation and that contingency arrangements where required for critical areas can be implemented in an emergency.

Signed_____ Name_____

Position/Title_____
Date_____

Originating authorised person

Signed_____ Address_____

Name_____ _____

Date_____ _____

Countersigning authorised person*

I hereby declare that I have checked the above Safety Programme, and am satisfied that, to the best of my knowledge, it will enable the proposed work or test to be carried out safely and in accordance with the 'Electrical safety code for high voltage systems'. I have knowledge of, and have access to a current diagram of, the System and Equipment concerned.

Signed_____ Address_____

Name_____ _____

Date_____ _____

**Subject to local house rules, countersignature may not be required on simple high voltage systems.*

Back - copy

5. Sequence of operations

(Consult any relevant operating and maintenance instructions before completing this part)

Entry No	Location & identity of equipment	Operation & reason (Rule off each entry)	Items required	Time of operation

Notification

I hereby confirm that prior notification has been given to those departments affected by the proposed operation and that contingency arrangements where required for critical areas can be implemented in an emergency.

Signed_____ Name_____

Position/Title_____
Date_____

Originating authorised person

Signed_____ Address_____

Name_____ _____

Date_____ _____

This duplicate copy must be placed in the Operational procedure manual before the programme is carried out. On completion of the programme, the original must be substituted for this duplicate, which may then be destroyed.

B. Permit-to-work

Permit-to-work
for
high voltage systems

Before writing out a permit

Enter details in logbook
Alter the mimic diagram
Isolate the system where necessary
Fix padlocks where necessary

Fix the **earth** connections
Fix **danger** notices
Fix **caution** notices
Spike cables where necessary

For use at ……

Rules for issue by authorised person

When you are satisfied that it is safe to work:

Make out Part 1 of the Permit-to-work form, explain and issue the original to the competent person in charge of the work or test. Retain the copy in the Permit-to-work book. Be sure that the competent person signs the Declaration on Part 2 of the Permit.

When the work is completed or suspended:

Be sure that the competent person signs the Declaration on Part 3 of the Permit.

Satisfy yourself that it is safe to make the affected parts live or if the work is suspended that it is safe to leave the work site unattended.

Cancel the Permit by signing the Declaration on Part 4.

Destroy the original of Part 1.

Enter details of switching etc in the logbook, alter the mimic diagram and carry out any necessary switching operations.

Return the Permit-to-work book, the logbook, and switchgear keys to the mimic diagram cabinet and lock it up.

Carbon copies must not be removed, even when the Permit-to-work is cancelled before use.

Circuit main earths

Circuit main earths shall only be fixed or removed by an authorised person.

Front- original

Permit-to-work

Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

Part 1: Issue

Issued to _____

I hereby declare that it is safe to work on the following high voltage electrical equipment which has been made **dead**, **isolated** from all **live** conductors and is connected to **earth**:

All other electrical equipment is dangerous to work on

The system is **isolated** at

The system is **earthed** at

Danger notices are posted at

Caution notices are posted at

Other precautions taken are

The following work shall be carried out

No other work shall be carried out

Other Permits to-work in use are

Authorised person

Signed_____ Time_____ Date_____

Front - copy **Permit-to-work** Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

Part 1: Issue

Issued to _____

I hereby declare that it is safe to work on the following high voltage electrical equipment which has been made **dead**, **isolated** from all **live** conductors and is connected to **earth**:

All other electrical equipment is dangerous to work on

The system is **isolated** at	
The system is **earthed** at	
Danger notices are posted at	
Caution notices are posted at	
Other precautions taken are	
The following work shall be carried out	

No other work shall be carried out

Other Permits to-work in use are	

Authorised person

Signed_____ Time_____ Date_____

Back - original

Part 2: Receipt

I hereby declare that I accept responsibility for carrying out the work on the electrical equipment as detailed on this Permit-to-work and that no attempt will be made by me or persons under my control to work on any other electrical equipment.

Signed_____ Status_____

Time_____ Date_____

Part 3: Clearance

I hereby declare that the work for which this Permit-to-work was issued is now suspended/completed* and that all persons under my charge have been withdrawn and warned that it is no longer safe to work on the electrical equipment specified on this Permit-to-work and that all gear, tools, etc have been removed.

Signed_____ Status_____

Time_____ Date_____

** Delete as appropriate*

Part 4: Cancellation

This Permit-to-work is hereby cancelled. The original has been returned to me and destroyed in the presence of the signatory to Part 3.

Signed_____ Status_____

Time_____ Date_____

Back - copy

Part 2: Receipt

I hereby declare that I accept responsibility for carrying out the work on the electrical equipment as detailed on this Permit-to-work and that no attempt will be made by me or persons under my control to work on any other electrical equipment.

Signed_____ Status_____

Time_____ Date_____

Part 3: Clearance

I hereby declare that the work for which this Permit-to-work was issued is now suspended/completed* and that all persons under my charge have been withdrawn and warned that it is no longer safe to work on the electrical equipment specified on this Permit-to-work and that all gear, tools, etc have been removed.

Signed_____ Status_____

Time_____ Date_____

** Delete as appropriate*

Part 4: Cancellation

This Permit-to-work is hereby cancelled. The original has been returned to me and destroyed in the presence of the signatory to Part 3.

Signed_____ Status_____

Time_____ Date_____

C. Sanction-for-test

Sanction-for-test
for
high voltage systems

For use at ……

Rules for issue by authorised person

When you are satisfied that it is safe to test:

Make out Part 1 of the Sanction-for-test form, explain and issue the original to the competent person in charge of the work or test. Retain the copy in the Sanction-for-test book. Be sure that the competent person signs the Declaration on Part 2 of the Sanction.

When the test is completed or suspended:

Be sure that the competent person signs the Declaration on Part 3 of the Sanction.

Satisfy yourself that it is safe to make the affected parts live or if the work is suspended that it is safe to leave the work site unattended.

Cancel the Sanction by signing the Declaration on Part 4.

Destroy the original of Part 1.

Enter details of switching etc in the logbook, alter the mimic diagram and carry out any necessary switching operations.

Return the Sanction-for-test book, the logbook, and switchgear keys to the mimic diagram cabinet and lock it up.

Carbon copies must not be removed, even when the Sanction-for-test is cancelled before use.

Circuit main earths

Circuit main earths shall only be fixed or removed by an authorised person.

Front - original

Sanction-for-test

Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

Part 1: Issue

Issued to_____

The following high voltage electrical equipment has been made safe in accordance with 'Safety rules for high voltage systems' for the testing described on this Sanction-for-test to proceed:

All other electrical equipment is dangerous to work on

The points of **isolation** are	
Circuit main **earths** are applied at	
Brief description of testing to be carried out	

Authorised person

Signed_____ Time_____ Date_____

Front - copy **Sanction-for-test** Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

Part 1: Issue

Issued to_____

The following high voltage electrical equipment has been made safe in accordance with 'Safety rules for high voltage systems' for the testing described on this Sanction-for-test to proceed:

All other electrical equipment is dangerous to work on

The points of **isolation** are	
Circuit main **earths** are applied at	
Brief description of testing to be carried out	

Authorised person

Signed_____ Time_____ Date_____

Back - original

Part 2: Receipt

I hereby declare that I accept responsibility for the testing described on this Sanction-for-test and for taking the precautions necessary to prevent danger.

Signed_____ Status_____

Time_____ Date_____

Part 3: Clearance

All persons under my charge have been withdrawn and warned that it is no longer safe to carry out testing on the electrical equipment detailed on this Sanction-for-test and all additional **earths** have been removed.

The testing is completed/incomplete ***. All gear and tools have/have not*** been removed. The operational state of the electrical equipment is the same as at the time of issue of this sanction-for-test apart from the exceptions noted below:

Exceptions; (if none, state "none")_____

Signed_____ Status_____

Time_____ Date_____

** Delete as appropriate*

Part 4: Cancellation

This sanction-for-test is hereby cancelled. The original has been returned to me and destroyed in the presence of the signatory to Part 3.

Signed_____ Authorised person

Time_____ Date_____

Back - copy

Part 2: Receipt

I hereby declare that I accept responsibility for the testing described on this Sanction-for-test and for taking the precautions necessary to prevent danger.

Signed_____ Status_____

Time_____ Date_____

Part 3: Clearance

All persons under my charge have been withdrawn and warned that it is no longer safe to carry out testing on the electrical equipment detailed on this Sanction-for-test and all additional **earths** have been removed.

The testing is completed/incomplete ***. All gear and tools have/have not*** been removed. The operational state of the electrical equipment is the same as at the time of issue of this sanction-for-test apart from the exceptions noted below:

Exceptions; (if none, state" none")_____

Signed_____ Status_____

Time_____ Date_____

** Delete as appropriate*

Part 4: Cancellation

This sanction-for-test is hereby cancelled. The original has been returned to me and destroyed in the presence of the signatory to Part 3.

Signed_____ Authorised person

Time_____ Date_____

D. Limitation-of-access

Limitation-of-access for high voltage systems

For use at ……

Rules for issue by authorised person

When you are satisfied that the responsible person fully understands the dangers that exist and the limitations of the work being undertaken:

Make out Part 1 of the Limitation-of-access form, explain and issue the original to the responsible person in charge of the work. Retain the copy in the Limitation-of-access book. Be sure that the responsible person signs the Declaration on Part 2 of the Limitation.

When the work is completed or suspended:

Be sure that the responsible person signs the Declaration on Part 3 of the Limitation.

Satisfy yourself that the work is complete and is safe in all respects or if the work is suspended that it is safe to leave the work site unattended.

Cancel the Limitation by signing the Declaration on Part 4.

Destroy the original of Part 1.

Enter details in the logbook.

Return the Limitation book and the logbook to the mimic diagram cabinet and lock it up.

Carbon copies must not be removed, even when the Limitation-of-access is cancelled before use.

Front - original

Limitation-of-access

Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

1. **This form must not be used for work on electrical equipment for which an electrical Permit-to-work or Sanction-to-test is required.**

2. On completion of the work the holder must surrender this Limitation-of-access as directed for cancellation, after which no work shall be done.

Part 1: Issue

Issued to_____

In the employ of _____
being a responsible person, is hereby given permission to carry out the work described below:

Location

Work

No other work shall be carried out

Remarks

Authorised person

Signed_____ Time_____ Date_____

Front - copy

Limitation-of-access

Form No

(Complete precisely and legibly in BLOCK CAPITALS) Serial No

1. **This form must not be used for work on electrical equipment for which an electrical Permit-to-work or Sanction-to-test is required.**

2. On completion of the work the holder must surrender this Limitation-of-access as directed for cancellation, after which no work shall be done.

Part 1: Issue

Issued to_____

In the employ of _____
being a responsible person, is hereby given permission to carry out the work described below:

Location

Work

No other work shall be carried out

Remarks

Authorised person

Signed_____ Time_____ Date_____

Back - original

Part 2: Receipt

I hereby declare that I accept responsibility for carrying out work in accordance with this Limitation-of-access and no other work will be done by me or the persons under my charge at the location referred to in Part 1 of this document.

Signed_____
(being the person to whom this form is issued)

Time_____ Date_____

Part 3: Clearance

I hereby declare that the work for which the Limitation-of-access was issued is now suspended/completed* and that all persons under my charge have been withdrawn.

Signed_____
(being the person to whom this form was issued)

Time_____ Date_____
** Delete as appropriate*

Part 4: Cancellation

Signed_____
(being the person authorised to cancel this form)

Time_____ Date_____

On completion of the work the holder must surrender this Limitation-of-access as directed for cancellation, after which no work shall be done.

Back - copy

Part 2: Receipt

I hereby declare that I accept responsibility for carrying out work in accordance with this Limitation-of-access and no other work will be done by me or the persons under my charge at the location referred to in Part 1 of this document.

Signed_____
(being the person to whom this form is issued)

Time_____ Date_____

Part 3: Clearance

I hereby declare that the work for which the Limitation-of-access was issued is now suspended/completed* and that all persons under my charge have been withdrawn.

Signed_____
(being the person to whom this form was issued)

Time_____ Date_____
** Delete as appropriate*

Part 4: Cancellation

Signed_____
(being the person authorised to cancel this form)

Time_____ Date_____

On completion of the work the holder must surrender this Limitation-of-access as directed for cancellation, after which no work shall be done.

Appendix 4: Mimic diagram and key locker

Mimic diagram

1. The mimic diagram shall be:

   a. provided at the main high voltage sub-station/ switchroom designated for the system;

   b. in the form of a single line diagram indicating all high voltage circuits comprising the high voltage system together with any low voltage inter-connecting circuits that can back feed to the high voltage system (that is, generators, UPS systems, etc);

   c. fully equipped with switch, circuit breaker, transformer, generator, UPS etc symbols complying with the requirements of BS3939. The switching equipment symbols shall incorporate the facility to indicate whether the switch contacts are open, closed or earthed;

   d. an accurate representation of the system referred to in (b) with all switching devices shown in their relative positions;

   e. drawn to show all equipment and switching devices, clearly and correctly labelled;

   f. totally enclosed within a cabinet having full width transparent doors complete with integral lock.

   g. The cabinet shall incorporate a lower section, either desk top console or drop down door arrangement, secured by an integral lock, to accommodate the key locker, **danger/caution** notices together with the logbook, operational procedure manual, operating and maintenance manual, safety documents and the keys to all safety locks associated with the system.

Keys

2. Complete sets of keys for each sub-station shall be housed within the cabinet and shall be labelled to correspond with the nomenclature used on the mimic diagram.

Notices

3. The cabinet shall be equipped with “Work on high voltage system in progress” and “Authorised person on site” notices so arranged that they can only be displayed by an authorised person having a key to the key locker.

4. Where it is not practicable to keep in the mimic diagram cabinet all the documents specified in this appendix, some of these documents may be kept in a lockable cabinet within the authorised person’s office.

Appendix 5: Qualification and training requirements for authorised persons

General

1. Prospective authorised persons shall be nominated by management and appointed by the authorising engineer. It is imperative that staff selected for training have the necessary basic technical knowledge and proper temperament for the nature of the work involved. Attention is drawn to Regulation 3 of the Electricity at Work Regulations 1989. Paragraph 2(b) states, “It shall be the duty of every employee while at work to comply with the provisions of these Regulations in so far as they relate to matters which are within his control.”

Technical knowledge and experience

2. Regulation 16 also refers, as follows: “No person shall be engaged in any work activity where technical knowledge or experience is necessary to prevent **danger** or, where appropriate, **injury**, unless he possesses such knowledge or experience, or is under such degree of supervision as may be appropriate having regard to the nature of the work.”

3. The scope of technical knowledge or experience may include:

   a. adequate knowledge of electricity;

   b. adequate experience of electrical work;

   c. adequate understanding of the system to be worked on, and practical experience of that class of system;

   d. understanding of the hazards which may arise during the work and the precautions which need to be taken;

   e. ability to recognise at all times whether it is safe for work to continue.

4. To be eligible for appointment, candidates are to:

   a. have an adequate knowledge of *Escode - HV* and any local rules that may apply;

   b. be technically competent to operate safely, and make safe to work on or test, the systems, installations and equipment for which the appointment is sought;

   c. be familiar with the systems, installations and equipment for which appointment is sought;

   d. have successfully completed an authorised persons’ electrical course at a training establishment, approved by the authorising engineer;

e. have an adequate knowledge of, and within the preceding three years have received training in, first aid treatment for electric shock.

Training and familiarisation

5. Training of authorised persons shall include attendance at approved centres, familiarisation with systems on the sites for which appointment is sought and on-site training in the practical application of the '*Electrical safety rules for high voltage systems*'.

6. Since each site's high voltage system will be different, it shall be a requirement that the prospective authorised person becomes familiar with the systems on all sites for which appointment is sought. Such familiarisation shall include the following:

   a. a good working knowledge of the procedures associated with the operation of this guidance and any agreed local variations;

   b. a good working knowledge of the layout of the high voltage systems including location of sub-stations, access thereto, cable routes, mimic diagram, key locker and key safes;

   c. a good working knowledge of the operation under normal, failure and fault conditions of all the principal components of the systems and installations, such as switchgear, transformers and standby generating sets;

   d. knowledge of the location of, the use of and how to obtain access to, all loose operational equipment, all safety equipment, test and indicating equipment and temporary notices/safety signs;

   e. a good understanding of all the necessary safety measures to be taken to avoid **danger** and prevent damage to equipment;

   f. knowledge of any necessary liaison with local staff, contractors, distribution control engineer and other authorised persons.

7. On-site training shall consist of a practical exercise on an energised system under the personal supervision of an authorised person. Ideally this should be conducted at the site(s) for which appointment is sought. Where this would cause a prolonged shut down (on a site with radial feeders) the exercise shall be conducted on the nearest installation possessing a ring main system. The exercise could then consist of:

   a. a closing operation on the high voltage ring main;

   b. earthing down a cable between sub-stations;

   c. applying an earth via a circuit breaker and using a high voltage indicator;

   d. using equipment with a high voltage indicator to "phase out" the ring;

   e. any other tests considered necessary.

8. In addition to the practical exercise a written exercise based on the system for which appointment is sought shall be carried out. It should consist of explaining the procedures to be adopted to prepare equipment for repair or maintenance, from arriving on site to proving equipment dead, and issue of the permit-to-work. Reference shall be made to the switchgear and transformer schedule. Specimen entries shall be made in a copy of a logbook sheet and a permit-to-work. The exercise shall be set by the authorising engineer.

9. When the foregoing training has been completed, the authorising engineer shall interview the prospective authorised person, based on previous activities and the written exercise. If considered suitable for the appointment the authorising engineer shall make a formal offer of the appointment in writing (see Appendix 9). Upon acceptance of the position the authorised person shall be given a personal copy of management's *Electrical safety rules for high voltage systems* for which a signature is required (see Appendix 2), together with a sub-station key and the key giving access to the mimic diagram key locker.

10. To remain eligible for appointment, the authorised person shall successfully complete a course of refresher training at intervals not exceeding three years. The course should normally consist of the following topics:

    a. Health and Safety at Work Regulations, Electricity at Work Regulations and management's *Electrical safety rules for high voltage systems*;
    b. supply networks and equipment;
    c. high voltage earthing, low voltage earthing and testing;
    d. fault level and equipment rating;
    e. system protection;
    f. planned routine maintenance;
    g. practical switching on a live system;
    h. case studies involving preparation of switching schedules;
    i. appreciation of the use of test and loose equipment, for example secondary injection, 10 kV megger, spiking gun and cable location equipment.

11 All training activities shall be recorded in writing and shall be held by management and a copy shall be made available to the authorising engineer.

Appendix 6: Safety equipment

1. The Electricity at Work Regulations 1989, Regulation 4(4) states that "any equipment provided under these Regulations for the purpose of protecting persons at work on or near Electrical Equipment shall be suitable for the use for which it is provided, be maintained in a condition suitable for that use and be properly used."

2. The following safety equipment should be provided and stored so as to be maintained in a suitable condition ready for use and to be safe from unauthorised interference:

   a. at a base in each management geographical area:

      1 - secondary injection test set;

      1 - cartridge fired cable spiker;

      1 - high voltage indicator with adaptor for phasing out and proving unit;

      1 - set of cable location equipment;

      1- 10 kV dc insulation tester;

      1 - null balance earth megger;

   b. in care of each authorised person:

      1 - **earth** megger tester;

      1 - key to sub-stations;

      1 - key to key locker;

      2 - personal padlocks and keys (no duplicates);

      1 - copy of the *Memorandum of Guidance on the Electricity at Work Regulations 1989;*

      1 - copy of management's *Electrical safety rules for high voltage systems*;

      1 - copy of *Escode - HV: Part 5*;

      1 - heavy duty hand torch;

      2 pairs -safety rubber gloves to BS697 1986;

c. at the main sub-station designated for the system:

1 - mimic diagram and key locker*;

1 - logbook for high voltage systems;

1 - operational procedure manual;

1 - set of the operating and maintenance manuals;

1 - pad of permits-to-work;

1 - pad of sanctions-for-test;

1 - pad of limitation-of-access forms;

1 - switchgear and transformer schedule;

1 - protection grading chart;

1 - key safe for multiple activity work;

1 - key plate for each sub-station with keys to all padlocks used;

1 - high voltage indicator and proving unit;

d. at the main and each subsidiary sub-station:

1 - poster showing an approved method for treatment of electric shock;

1 - extract of management's, *Electrical safety rules for high voltage systems* (One each of above posters to be in all rooms containing high voltage equipment.);

1 - approved **earth** lead and pole (for additional earths);

1 set - loose **earthing** gear (where non-integral facility exists);

1 set - spare of each type of control and indication lamps and fuses where applicable;

1 set - spare of each type and/or size of high voltage HRC fuses where applicable;

1 set - special tools for each type of switchgear, for example winding handle, tank bolt spanner, slow closing handle - mounted on rack;

1 set - test probes for each type of switchgear (May be shared between sub-stations if on a large site with common manufactured equipment. In this case minimum of two sets.);

1 - glazed framed schematic diagram of high voltage system;

1 - gas flooding instructions with lock-off facilities where installed;

- sufficient CO_2 portable extinguishers, size and quantity depending on room size;

3 - **danger** notices/prohibition signs as appropriate;

3 - **caution** notices/warning signs as appropriate.

*Where it is not practicable to keep in the mimic diagram cabinet all the documents specified in this appendix, some of these documents may be kept in a lockable cabinet at the authorised person's office.

Appendix 7: Extracts from the Electrical Safety Rules for High Voltage Systems

FOR THE PURPOSE OF THESE RULES A HIGH VOLTAGE SYSTEM INCLUDES SWITCHGEAR, HV CABLES, TRANSFORMERS & LOW VOLTAGE SWITCHGEAR AND CABLES UP TO & INCLUDING THE FIRST ISOLATION POINT FROM THE TRANSFORMER

I GENERAL

a. No person other than an Authorised Person or Competent Person shall enter a Sub-Station or Test Enclosure unless accompanied by an Authorised Person, Competent Person or covered by a Permit-to-Work/Sanction-for-Test or Limitation-of-Access form (except where rule 5.20 applies) when an Authorised Person must render the Automatic Fire Protection Control inoperative before entry.

b. All work in a Sub-Station or Test Enclosure shall be under the Personal Supervision of a Competent Person, Except where a Limitation-of-Access applies.

c. All persons operating or working on an HV System shall comply with the Management's Electrical Safety Rules for High Voltage Systems and the Electricity at Work Regulations 1989.

d. No High Voltage switching shall be carried out except by an Authorised Person, or a Competent Person under his Personal Supervision, Except in the event of Extreme emergency when to avoid injury Electrical Equipment may be tripped by the Competent Person.

e. All Dangerous or unusual Occurrences and electrical accidents shall be reported to the Authorising Engineer or Authorised Person.

II BEFORE COMMENCING TO WORK/TEST the Authorised Person shall ensure that the Competent Person understands the Safety Document system, is fully conversant with the nature and the extent of the work to be done and has

a. received and read a Safety Document for each section of work/testing involved and has confirmed to the person issuing the Document(s) that they are fully understood;

b. satisfied himself that the Authorised Person has demonstrated that safe working conditions exist;

c. confirmed by visual inspection that any automatic fire extinguisher system covering the space in which work is to be undertaken has been isolated by the Authorised Person;

d. proved to the Authorised Person that he is familiar with an approved method of treatment for electric shock and resuscitation.

III WHILST WORKING the Competent Person shall:

a. limit the work to that covered by the Permit-to-Work;

b. ensure that he is not alone nor leaves any assistant alone whilst High Voltage Electrical Equipment is being worked upon or any Danger exists on the High Voltage System.

IV WHILST TESTING the Competent Person shall:

a. limit the testing to that covered by the Sanction-for-Test;

b. ensure that he is not alone nor leave any assistant alone whilst High Voltage Electrical Equipment is being tested or any Danger exists;

c. ensure that when High Voltage tests are to be applied, and area containing the accessible parts, test equipment and test connections are taped off by red/white tapes supported from posts to form a Test Enclosure. This Enclosure shall be under Personal Supervision at all times and 'DANGER' Notices must be exhibited and be visible from all possible angles of approach.

V ON COMPLETION OF WORK/TESTING the Competent Person shall:

ensure that the Permit-to-Work/Sanction-for-Test has been returned to the Authorised Person for cancellation.

DEFINITIONS

NOTE: The definitions given below are an abridged version of the specific definitions contained with the Safety Rule Book (HV).

a. **Authorised Person:**

A person appointed by the Management to be responsible for any work or Switching of High Voltage Installations.

b. **Competent Person:**

A person approved by the Authorised Person for the duties to be performed.

c. **Responsible Person:**

A person approved by the Authorised Person for the duties to be performed as defined on the Limitation-of-Access document.

d. **Permit-to-Work:**

A completed and signed official Safety Document.

e. **Sanction for Test:**

A completed and signed official Safety Document.

f. **Limitation of Access:**

A completed and signed official Safety Document.

g. **Test Enclosure:**

A temporary testing area containing Electrical Equipment to be tested and whose limits are clearly defied by a continuous red/white tape. The tape shall be at least 25mm wide and arranged at about 0.85m above floor level and provide a minimum safety clearance of 2.0m around Electrical Equipment.

h. **Danger:**

A risk of injury.

i. **Danger Notice:**

A notice in approved form is attached to Electrical Equipment or sections when Live, calling attention to the danger or approach to or interference with such Equipment or sections.

j. **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.

k. **Injury:**

Death or personal injury from electric shock, electric burn, electrical explosion or arcing or from fire or explosion initiated by electrical energy.

l. **Sub-Station:**

Any room or enclosure or enclosed part thereof which contain Electrical Equipment for either transforming or converting energy to or from High Voltage or for Switching, controlling or regulating the energy at High Voltage and which allows access after the Electrical Equipment is in a position, and includes the Electrical Equipment therein.

m. **Switching:**

The operation of circuit breakers, switchgear, fuses or other methods of making or breaking Electrical Circuit Conductor(s) and/or the application and removal of Circuit Main Earth Conductor(s).

n. **Supervision:**

(i) Immediate Supervision
Supervision by a person (having adequate technical knowledge, experience and competence) who is continuously available at the location where work or testing is in progress and who attends the work area as is necessary for the safe performance of the work or testing.

(ii) Personal Supervision:
Supervision by a person having adequate technical knowledge, experience and competence, such that he is at all times during the course of the work or testing in the presence of the person being supervised.

o. **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.

p. **Low Voltage (LV):**

The existence of a potential difference (rms value for ac) not exceeding 1000 volts ac or 1500 volts dc between Circuit Conductors or 600 volts ac or 900 volts dc between Circuit Conductors and Earth.

NOTE This definition for Low Voltage incorporates the Extra Low Voltage range as defined under the IEE Wiring Regulations - 16th Edition.

Appendix 8: Logbook for high voltage systems

Logbook
for
high voltage systems

For use at ……

1. All switching operations and precautionary measures taken prior to the issue of a permit-to-work should be recorded before the permit is issued.

2. The names of all persons who are authorised to work in sub-stations or on high voltage cables should be entered in the logbook with details of the work or other reason for their presence within the risk area.

3. Telephone or radio messages related to the operation of the high voltage system should be recorded.

Date	Time	Location	Circuit or Switch concerned	Operation and/or remarks (including placing of circuit main earths, permits-to-work, sanctions-for-test, etc)	Safety measures taken Sketches or other details, telephone or radio messages, etc	Names of persons entering sub-station	Permit-to-work number	To whom issued	Signature of issuing officer

Appendix 9: Model forms, letters and certificates

A. Model letter for appointing an authorising engineer

B. Model letter for accepting an appointment as an authorising engineer

C. Appointment of an authorised person (electrical)

- Part 1 - Nomination procedure
- Part 2 - Personal details
- Part 3 - Certification of satisfactory training and familiarisation
- Part 4 - Certificate of approval

D. Model letter for appointing an authorised person (electrical)

E. Model letter for accepting an appointment as an authorised person (electrical)

F. Model form of certificate of appointment for an authorised person

- Part 1 - Appointment record
- Part 2 - Certificate of appointment
- Part 3 - Record of refresher training
- Part 4 - Record of first aid training

G. Appointment of a competent person (electrical)

- Part 1 - Nomination procedure
- Part 2 - Personal details
- Part 3 - Approval and scope of appointment

H. Model letter for appointing a competent person (electrical)

J. Model letter for accepting an appointment as a competent person (electrical)

K. Certificate of appointment as a competent person for high voltage systems

Annex A: Model letter for appointing an authorising engineer

Letters of appointment should be on management's headed paper.

Management should check that proposed appointees are suitably qualified (see paragraph 2.2).

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 this document "Definitions" (paragraph 2.2), 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.

Annex B: Model letter for accepting an 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.

Annex C: Appointment of an authorised person (electrical)

Appointment of an authorised person (electrical)

Part 1: Nomination procedure

Details of proposed appointment						
Type: New appointment/Renewal/Revised coverage* *Delete as appropriate						
Dear ……. You have been nominated for appointment as an authorised person in respect of the system(s), installation(s) and location(s) indicated below: 1. …… 2. …… 3. ……						
Voltage	**Types of system or installation** (Insert details of systems/installations for which the authorised person is to be appointed)	**Location** (Enter (✓))				
		1	**2**	**3**	**4**	**5**
HV	Ring distribution system					
	Radial distribution system					
	Single generating set installation					
	Multiple generating set installation					
	Others (give details of any other HV systems or installations)					
If you agree to be considered for appointment as an authorised person for the system(s) and installation(s) indicated at the above location(s), and are willing to accept the appointment if offered, please complete Part 2 of the form and return it to me as soon as possible. Yours faithfully Authorising engineer **(On completion of Part 1 pass to the prospective authorised person for completion of Part 2)**						

Part 2: Personal Details

(To be completed by the prospective authorised person or on their behalf by the organisation by whom they are employed)

Name……

Current grade and job title……

Technical qualifications

Details of apprenticeship

Details of previous experience as an authorised person (if any)

Details of training received

Courses	Location	Dates

First aid training for treatment for electric shock

I confirm that I would be willing to accept the appointment as an authorised person (electrical) for the system(s), installation(s) and location(s) listed in Part 1 of this form.

Signed …….. Date ……

Address……

……..

(On completion of Part 2, return this form to the management representative as indicated in Part 1)

Part 3: Certificate of satisfactory training and familiarisation

Dear ……(Authorising engineer)

I wish to nominate …….. for appointment as an authorised person for the system(s), installation(s) and location(s) indicated in Part 1 of this form. Authorised person training familiarisation and on-site training have been satisfactorily completed, and I know of no impediment to the discharge of authorised person duties. Would you please arrange to interview the candidate as soon as possible.

Signed……Date ……

Address……..

…….

…….

(On completion of Part 3, send this form to the authorising engineer)

Part 4: Certificate of approval
(To be completed by the authorising engineer)

The application for the appointment of …….. as an authorised person for the system(s), installation(s) and locations indicated in Part 1 is/is not approved*, and is to take effect from …… for a period of ……. years.

Signed …….. Date …….

Address ……

……

……

**Delete as appropriate*

Date for appointment to be reviewed	Satisfied/Not Satisfied	Cert issue date

Annex D: Model letter for appointing an authorised person (electrical)

Letters of appointment should be on management's headed paper.

Dear…….

Offer of appointment as an authorised person (electrical)

You are hereby offered appointment as an authorised person for the duties identified in management's *Electrical safety code for high voltage systems (Escode - HV)* for the ……. (systems and installations)……at……. (locations)……for a period of …….. (not more than 3) years, commencing on ……(date).

Please confirm your acceptance of the appointment and the receipt of the enclosed Certificate of appointment by signing and returning a copy of the attached letter.

Yours sincerely

Authorising engineer

Annex E: Model letter for accepting an appointment as an authorised person (electrical)

Dear ……(Authorising engineer)

Acceptance of appointment as an authorised person (electrical)

I accept the appointment as an authorised person for the systems, installations and locations indicated in your letter dated……

I acknowledge receipt of the Certificate of appointment no ……. as my authority to act, while on duty, as an authorised person for the systems, installations and locations indicated on that certificate.

I note that, while on duty as an authorised person, I will be responsible for the practical implementation and operation of management's *Electrical safety code for high voltage systems (Escode - HV)* for the systems and installations for which [(1)] has control of the safety, and for which I have been appointed.

I will to the best of my ability follow the procedures as set out in the above Safety code and any written local variations notified to me by or agreed with the authorising engineer.

Yours sincerely

(1) Insert title of the management

Annex F: Model form of certificate of appointment for an authorised person

The certificate issued to the authorised person should be in the form of a small card which should be available at all times if challenged to produce it for inspection. A copy of the information contained on the certificate shall be retained by the authorising engineer.

Certificate of appointment as a [(1)]authorised person

Certificate no……..

This is to certify that

……is appointed a [(1)] authorised person for the purposes of the duties identified in management's 'Electrical safety code for high voltage systems'.

The appointment applies only to the locations and to the electrical systems and installations set out in Part 2 of this certificate.

The appointment is valid only until the expiry date indicated in Part 1.

Signed…….. Authorised person's signature
(Authorising engineer)

Name……

Date……..

If found please return this certificate to:

……

……

(1) Insert the management's title if required

Appointment record: Part 1

This certificate is valid only until the last expiry date indicated below.

Issue	Issue date	Validity (Years)	Expiry date	Authorising engineer's signature
First issue				
First review				
Second review				
Third review				

Notes:

Certificate of appointment: Part 2

Location(s)	Exact extent of the systems * and installations to which this appointment relates
** Identify HV systems and installations.*	

Record of refresher training: Part 3

To be completed by the authorising engineer

Each authorised person's operational experience is to be reviewed by the authorising engineer at intervals of not more than three years and refresher training in authorised person's duties arranged as necessary.

Course title	Date completed

Record of first aid training: Part 4

To be completed by the authorising engineer or his representative

Each authorised person is to receive refresher training in First Aid treatment for electric shock at not more than three-yearly intervals.

First aid training	Date completed

Annex G: Appointment of a competent person (electrical)

Part 1: Nomination procedure
(to be completed by the authorised person)

Details of proposed appointment
Type: New appointment/Renewal/Revised coverage* **Delete as appropriate*
Dear …….. You have been nominated for appointment as competent person in respect of the system(s), installation(s) and location(s) indicated below. 1. …… 2. …… **3.** …….
The duties which acceptance of this post will involve are: (a) (b) (c) (d) *[Add specific duties if required*] If you agree to be considered for appointment as a competent person for the system(s) and installation(s) indicated at the above location(s), and are willing to accept the appointment if offered, please complete Part 2 of the form and return it to me as soon as possible. Yours faithfully **(On completion of Part 1 pass to the prospective competent person for completion of Part 2)**

Part 2: Personal details

Name……. Current grade and job title……
Technical qualifications
Details of apprenticeship
Training received
I have attended the following relevant training courses:

Course	Date(s)

First aid training for treatment for electric shock
I confirm that I would be willing to accept the appointment as a competent person (electrical) for the system(s), installation(s) and location(s) listed in Part 1 of this form. Signed …….. Date …… Address…… …….. **(On completion of Part 2 return this form to the authorised person)**

Part 3: Approval and scope of appointment (To be completed by the authorised person)

I hereby confirm that……

a. is competent to undertake work on the types of system and equipment for which the appointment is sought;
b. is familiar with the types of systems and equipment on which work is to be undertaken;
c. possesses technical knowledge or sufficient experience to avoid any **danger** that may be presented by the work to be undertaken;
d. has adequate knowledge of those parts of management's 'Electrical safety code for high voltage systems', any local house rules and those documents listed in *References* which are applicable to the systems and equipment on which the work or testing is to be undertaken;
e. has adequate knowledge of and within the past three years has received training in First Aid treatment for electric shock, and is suitable for appointment as a competent person to work on or test the following systems and equipment within the limitations identified (1).

(1) Indicate where the limitations of the appointment are identified, possibly on an attached sheet.

Systems and equipment	**Location (as Part 1)** (Enter (✓))		
	1	2	3
[Insert details]			
[Insert details]			
[Insert details]			

Signed …….. Authorised person (electrical)

Name …… Date ……..……

Address……..

(On completion of Part 3 send one copy to the authorising engineer)

Annex H: Model letter for appointing a competent person (electrical)

Letters of appointment should be on management's headed paper.

Dear…….

Offer of appointment as a competent person (electrical)

You are hereby offered appointment as a competent person for the duties identified on the enclosed Certificate of appointment number for a period of …… (not more than 3) years, commencing on ……(date).

Your appointment covers the following location(s) ……

……

*Following receipt of your acceptance of this appointment you will be handed switchroom key(s) and sub-station key which you will be required to keep in your custody at all times.

On termination of this appointment you will return the key(s) to the authorised person.

Please accept the appointment and acknowledge receipt of the enclosed certificate by signing and returning a copy of the attached letter.

Yours sincerely

Signed…….
Authorised person
Date …….

**Delete if sub-station key is not available.*

Annex J: Model letter for accepting an appointment as a competent person (electrical)

Dear…….

Acceptance of appointment as a competent person (electrical)

I hereby accept appointment as a [(1)] competent person for the duties identified on the enclosed Certificate of appointment for a period of ……..(not more than 3) years, commencing on ……..and acknowledge receipt of my Certificate of appointment no……

I note that the appointment covers the following location(s)……..

……..

I have been made aware of the dangers that exist and I will to the best of my ability ensure that I, and any others working under or with me, prevent **danger** or where appropriate **injury** to ourselves and others, and do not cause damage to electrical equipment.

I will not carry out any work beyond the limitations specified on the Certificate of appointment unless I am appointed the competent person for a particular task by the issue and acceptance of a Safe-to-work permit or Live working permit, or unless I am under the personal supervision of a competent person so appointed.

*I also accept responsibility for the switchroom key(s) and sub-station key which will be handed to me following receipt of my acceptance of the appointment and will keep these in my custody at all times.

On termination of this appointment I will return the key(s) to the authorised person.

Yours sincerely

Signed…….

Date ……

Copy to authorising engineer

(1) Insert the management's title if required.

**Delete if sub-station key is not available.*

Annex K: Certificate of appointment as a competent person for high voltage systems

Certificate of appointment
as a competent person for high voltage systems

Certificate no……

This is to certify that ……
is appointed a competent person for the following locations until the expiry date shown overleaf.

1. ……

2. ……

3. ……

Duties:

(a) to accompany any non-competent person when entering a high voltage sub-station or enclosure for any purpose, except where that person is a responsible person in possession of a valid limitation-of-access safety document and to remain within the building until the work is complete;

(b) to carry out maintenance tasks within the building as directed but not on high voltage equipment unless issued with a permit-to-work by an authorised person;

(c) to trip the high voltage switchgear in case of emergency;

(d) [Add specific duties if required]

Signed …… Authorised person

Name …….. Date ……..

Signed …… Authorised person

Name …….. Date ……..

Signed …… Authorised person

Name …….. Date ……..

(A copy of this certificate is to be placed in the Operational procedure manual)

Appointment record

(To be completed by the authorised person(s))

This certificate is valid only until the last expiry date indicated below.

Issue	Issue date	Validity (Years)	Expiry date	Signatures
First Issue				
First renewal/review				
Second renewal/review				
Third renewal/review				

Appendix 10: First Aid equipment

General

1. This appendix gives guidance on the provision, storage and identification, contents and inspection of First Aid equipment.

2. The Health and Safety (First Aid) Regulations 1981* state that “An employer shall provide, or ensure that there are provided, such equipment and facilities as are adequate and appropriate in the circumstances for enabling First Aid to be rendered to his employees if they are injured or become ill at work."

3. Practical guidance on the application of these Regulations may be found in the following Health and Safety Executive publications:

   a. Approved Code of Practice: Health and Safety (First Aid) Regulations 1981;

   b. Guidance Notes for the Health and Safety (First Aid) Regulations 1981.

Fixed equipment

4. Where the First Aid facilities are not readily available a First Aid box is to be fixed permanently in each indoor sub-station for which management is responsible.

5. A safety sign in accordance with BS5378, and a current list of First Aiders, are to be displayed adjacent to these First Aid boxes.

First aid boxes

6. Each first aid box is to contain the following:

   1 - list of contents;

   1 - guidance leaflet;

   1 - resuscitation leaflet;

   1 - dressing adhesive, assorted pink;

   1 - dressing, gauze single - 100 mm x 100 mm;

- dressings, sterilised unmedicated:

    2 - medium No 8;

    2 - large No 9;

    3 - bandage, triangular;

    1 - bandages, crepe - 50 mm x 4.5 m;

    1 - 75 mm x 4.5 m;

    1 - 100 mm x 4.5 m;

2 - eye pad, single oval sterilised with bandage;

1 - tape, micropore 25 mm x 5 m;

2 - wipes, antiseptic;

5 (envelopes) - skin closures, strip 38 mm x 66 m;

1 - scissors, stainless steel 125 mm blunt/sharp;

2 (pairs) - gloves, disposable polythene;

1 - forceps, splinter (tweezers) 120 mm stainless steel;

1 - resuscitation airway.

7. The quantity of each item in the above list is to be regarded as the minimum, and may be increased according to local circumstances.

Inspection

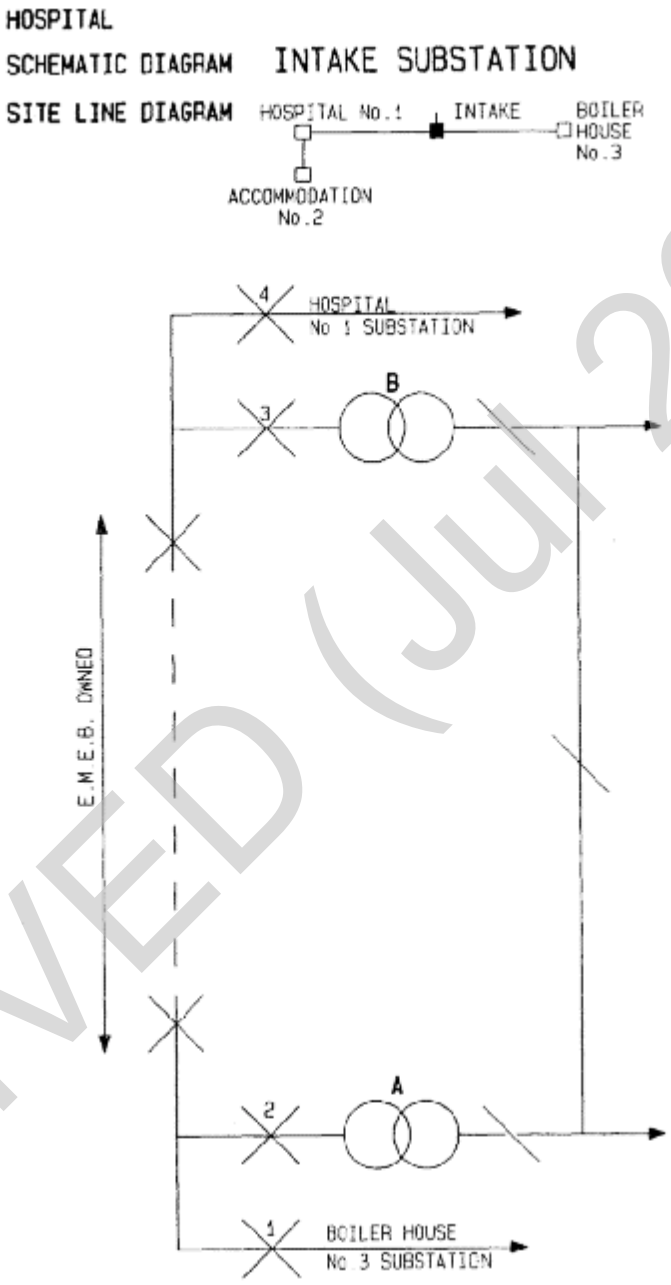
8. At intervals not exceeding one year, the contents of First Aid boxes are to be checked, and any missing or out-of-date items shall be replaced. The result of the inspection and confirmation of any action taken is to be noted in the operational procedure manual.

Appendix 11: Switchgear and transformer schedules (S & T)

An example of an S & T schedule produced in traditional format which provides a complete overview or site distribution system together with information on the equipment is shown on page 133 of HTM 2021 'Operational management' and has not been reproduced in this document.

An example of an alternative arrangement which provides information in an A4 format using a single line diagram to show the site distribution with separate sheets for each sub-station schematic and equipment schedule is shown on the following pages.

ALTERNATIVE S & T SCHEDULE USING A4 FORMAT



SWITCHGEAR AND TRANSFORMER SCHEDULE Intake Substation

Hospital:

LOCATION			INTAKE SUBSTATION				
COLUMN NUMBER			1	2	3	4	
SWITCHGEAR TYPE			OCB IVIF 13C	OCB IVIF 13C	OCB IVIF 13C	OCB IVIF 13C	
OWNER/MAKER			YORKSHIRE	YORKSHIRE	YORKSHIRE	YORKSHIRE	
MAKER'S SERIAL No			13/27102	13/27103	13/27105	13/27106	
RATING MVA OCB and BB AMPS			250 400 400	250 400 400	250 400 400	250 400 400	
LABEL			ACCOM. NO. 1 SUB	TRANSFER NO. 1	TRANSFER NO. 2	HOSPL. NO. 2 SUB	
INTERLOCK							
TYPE OF CLOSING			MANUAL SPRING	MANUAL SPRING	MANUAL SPRING	MANUAL SPRING	
TRIP COIL RATING			30V DC	2AO/L 2AE/F	2AO/L 2AE/F	30V DC	
TLF RATING TYPE AMPS SWG HRC FUSE RATING				TLF 5A	TLF A		
RELAYS	FUNCTION & TYPE	A overcurrent	IDMT CDG31			IDMT CDG31	
		B earth fault	IDMT CDG31			IDMT CDG 31	
		C					
		D					
	PROTECTION GRADING	A plug setting & TMS	175% 0.175			175% 0.175	
		B plug setting & TMS	70% 0.2			70% 0.2	
		C plug setting & TMS					
		D plug setting & TMS					
INSTRUMENTS	type/scale range		AMMETER 0-200	AMMETER 0-40	AMMETER 0-40	AMMETER 0-200	
	type/scale range						
CURRENT TRANSFORMERS	No VA class Pri amps		3 15 T10 200	3 15 T10 80/40	3 15 T10 80/40	3 15 T10 200	
VOLTAGE TRANSFORMERS	Ratio Phase VA Class						
CABLE BOX ARRANGEMENT			REAR DOWN	REAR DOWN	REAR DOWN	REAR DOWN	
EARTHING ARRANGEMENT			INTEGRAL	INTEGRAL	INTEGRAL	INTEGRAL	
MANUAL TRIP ARRANGEMENT			PUSH BUTTON	PUSH BUTTON	PUSH BUTTON	PUSH BUTTON	
ADDITIONAL INFORMATION				L.V. CASTELL INTERLOCKED	L.V. CASTELL INTERLOCKED		

TRANSFORMERS															
REF	SITE	MAKER	Type	PRI Volts	Sec Volts	Vector GP	KV	%Z	TAPPINGS	SETTING	OIL CAPACITY	Total WT	FITTINGS	LABEL	Serial No.
A	INTAKE	BONAR	O.N.	11,000	433	DY11	500	4.7	+ / -2.5 & 5%	NORMAL	550 LITRES	2340 KG	BREATHER	NO.1	02/70/175
B	INTAKE	BONAR	O.N.	11,000	433	DY11	500	4.7	+ / -2.5 & 5%	NORMAL	550 LITRES	2340 KG	BREATHER	NO.2	02/69/415
C															
D															

TRANSFORMER DRAWINGS	
A	T10/5186 C
B	T10/5186 C
C	
D	
E	

REFERENCE DRAWING	
CABLE ROUTES	MEW 6522
SINGLE LINE DIAGRAM	MW 6612
SWITCHGEAR OUTLINE	8907 2E
SWITCHGEAR WIRING DIAGRAM	8591-YC & YE
GRADING CHART	DR/1

ELECTRICITY AUTHORITY'S SUPPLY	
Authority	EMEB
Service Voltage	11,000
Authorised Demand	2 MVA
Fault Level	179 MVA
CT Ratio	400/5
|Relay Type	IDMT CDG
O/C Setting	PS% 125 TSMO.15
E/F Setting	PS% 125 TSMO.15

SUBSIDIARY EQUIPMENT	
Item	Location
DC BATTERY	INTAKE
TEST PROBE	INTAKE
TEST PROBE	ACCOMMODATION
EARTHING	HOSPITAL N:1

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