Classification: Official

Publications approval reference: PRN00620

NHS England

Health Technical Memorandum 06-02: Electrical safety guidance for low voltage systems

Preface

About Health Technical Memoranda

Health Technical Memoranda (HTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare.

The focus of Health Technical Memorandum guidance remains on healthcare-specific elements of standards, policies and up-todate established best practice. They are applicable to new and existing sites, and are for use at various stages during the whole building lifecycle.

Language usage in technical guidance

In HTMs and HBNs, modal verbs such as "must", "should" and "may" are used to convey notions of obligation, recommendation or permission. The choice of modal verb will reflect the level of obligation needed to be compliant.

The following describes the implications and use of these modal verbs in HTMs/HBNs (readers should note that these meanings may differ from those of industry standards and legal documents):

- "Must" is used when indicating compliance with the law.
- "Should" is used to indicate a recommendation (not mandatory/ obligatory), i.e. among several possibilities or methods, one is recommended as being particularly suitable – without excluding other possibilities or methods.
- "May" is used for permission, i.e. to indicate a course of action permissible within the limits of the HBN or HTM.

Typical usage examples

- "All publicly-funded organisations must ensure that all contracts established to collect and treat waste conform to the Public Contracts Regulations." [obligation]
- "All low voltage (LV) distributions should be configured as TN systems." [recommendation]
- "Alcohol hand gels that do not contain siloxanes may be rinsed out and the packaging recycled or placed into the municipal waste stream." [permission]

"Shall", in the obligatory sense of the word, is never used in current HTMs/HBNs.

Project derogations from the Technical Guidance

Healthcare facilities built for the NHS are expected to support the provision of high-quality healthcare and ensure the NHS Constitution right to a clean, safe and secure environment. It is therefore critical that they

are designed and constructed to the highest and most appropriate technical standards and guidance. This applies when organisations, providers or commissioners invest in healthcare accommodation (irrespective of status, e.g. Foundation and non-Foundation trusts).

Statutory standards plus technical standards and guidance specific to NHS facilities:

- Health Building Notes
- Health Technical Memoranda
- Complete list of NHS estates related guidance

The need to demonstrate a robust process for agreeing any derogation from Technical Guidance is a core component of the business case assurance process.

The starting point for all NHS healthcare projects at Project Initiation Document (PID) and/or Strategic Outline Case (SOC) stage is one of full compliance.

Derogations to standards will potentially jeopardise business case approval and will only be considered in exceptional circumstances. A schedule of derogations will be required for any project requiring external business case approval and may be requested for those that have gone through an internal approvals process.

While it is recognised that derogation is required in some cases, this must be risk-assessed and documented in order that it may be considered within the appraisal and approval process.

Derogations must be properly authorised by the project's senior responsible owner and informed and supported by appropriate technical advice (irrespective of a project's internal or external approval processes).

Sustainability and "Net Zero Carbon" targets

The UK is leading the way on tackling climate change and improving sustainability, and the NHS is leading the way in England.

In 2019, the UK became the first major economy to commit to net zero emission by 2050. In 2020, the NHS set out its intent to support this ambition through its 'Delivering a "Net Zero" National Health Service' report. The report sets a clear target for achieving a net zero health service for direct emissions by 2040 and indirect emissions by 2045.

In 2021, NHS England published supporting guidance for the NHS Estate in its 'Estates Net Zero Carbon Delivery Plan', available to NHS staff via the Estates and Facilities Hub on the FutureNHS website, and further guidance is planned over the coming years.

The NHS estate has a critical role to play in achieving net zero carbon emissions. It is vital that every opportunity is seized across the NHS to do so, and the NHS estate is an area where direct and cost-effective action can be taken with a high degree of confidence.

This guidance is not mandatory (unless specifically stated). However, any departures/ derogations from this HTM – including the measures implemented – should provide a degree of safety not less than that achieved by following the guidance set out in this HTM.

Executive summary

Status

This 2023 version of Health Technical Memorandum (HTM) 06-02 supersedes all previous versions of HTM 06-02 'Electrical safety guidance for low voltage systems'.

General

Guidance in this HTM applies to all healthcare facilities containing low voltage electrical systems.

Aim of this guidance

Guidance is intended to assist duty holders in meeting the requirements of the Electricity at Work Regulations, which detail the precautions to be taken against risk of death or personal injury from electricity in work activities.

Who should read this guidance?

This document will be of interest and practical help to those involved in the, operation and maintenance of electrical systems and equipment.

Main changes since the 2006 edition

- In this updated version of HTM 06-02, efforts have been made to ensure consistency in definitions by aligning them with existing definitions found in current regulations or British Standards. As part of this effort, a new definition has been added for an external contractor responsible for periodic inspection and testing. This individual is now referred to as the Skilled Person (LV), harmonising with the existing Skilled Person (Electrically) definition in BS 7671. In this HTM, this person is defined as:
  "a person who possesses, as appropriate to the nature of the work to be undertaken, adequate education, training, and practical skills, and who is able to prevent danger, or where appropriate, injury, and has been assessed to be competent by the Authorised Person (LV) for a specific task and is aware of specific requirements from this guidance in regards to the task but has not been formally appointed in writing as a Competent Person (LV)".
  Although the term used in BS 7671 is Skilled Person (Electrically), the HTM retains the "(LV)" suffix to maintain consistency with other roles mentioned in the HTM such Authorised Person (LV) and Competent Person (LV). This approach ensures coherence and avoids incongruity in terminology within the HTM.
- An important gap in the safety documents within the 2006 edition of HTM 06-02 has

been acknowledged, specifically for situations where live work or testing is required and where third-party contractors are involved in carrying out such tasks. Live work and testing are unavoidable, as outlined in paragraph 8.1 of this HTM. When this type of work or testing is required and the equipment is not IP2X or IPXXB, the work or test should be carried out by a site-appointed Competent Person (LV) who should then complete an LW1 self-check live-working form.
However, if a third-party contractor is responsible for carrying out the work, the current LW1 form is limited to self-checking and thereby cannot be issued by an Authorised Person (LV) to such contractors. Furthermore, a certificate of authorisation for live working is also impractical as permission from the Authorising Engineer is required to issue this form.
To address these limitations, an additional safety document has been introduced. The new form, titled LW2 – 'Authorisation for inspection, testing and work on or adjacent to live electrical equipment at low voltage', will be issued by an Authorised Person (LV) to a Skilled Person (LV) who is deemed competent to carry out the specified task but who is not necessarily appointed as a site-appointed Competent Person (LV). If a Skilled Person (LV) is to be used on site for numerous tasks then they should be formally appointed as a site-appointed Competent person (LV).
The LW2 may also be issued to a site-appointed Competent Person (LV) for tasks that cannot be completed using the LW1 form, such as work on batteries above 25V and/or 10Ah. The existing certificate of authorisation for live working is only issued for live work that requires permission from the Authorising Engineer.

- The existing self-check live working form (LW1) has also been adapted with the intention to make it more user-friendly and now includes "LW1" within the title, which was omitted from the form in the 2006 edition of the HTM.
- Chapter 8 on live working has been amended to incorporate changes around the new LW2 form and work on battery systems.
- Flowcharts on both live working and dead working procedures have been included to help to simplify decision-making when carrying out live working or testing on low voltage equipment.
- A table of example scenarios has been included to provide practical illustrations and enhance understanding of when to use an LW1, LW2 and certificate of authorisation for live working.
- Table 3 in Chapter 7 has been divided into two tables (Tables 3 and 4) to cover LV generators and UPS systems respectively.
- The model letters and appointments for Authorised Persons and Competent Persons have been simplified and reorganised to make the process more streamlined and less complex.
- The role of Senior Operational Manager (SOM) has been introduced as the "informed client" in this revised edition to bring the guidance in line with the recommended professional structure in HTM 00 – 'Policies and principles of healthcare engineering'.
- The permit-to-work, sanction-for-test, limitation-of access and certificate of authorisation for live working safety documents have been amended. All have a "Received by" signature box in Parts 1 and 2 of the forms. In Part 4 on cancellation, the word "destroyed" has now been replaced by "cancelled". The corresponding text in the main body of the HTM has also been amended to ensure alignment.
- A new "certificate of boundary demarcation" form has been added to the safety documents.

- A new “transfer of control certificate” form has been added to the safety documents.
- An addition in this revision is the option to produce electronic safety documents as an alternative to paper-based systems, providing advantages in reducing paperwork. No particular electronic system is endorsed or prescribed; however, whichever electronic system is chosen, electronic safety documents should be prepared with the same diligence as paper versions and incorporate, as a minimum, the essential elements shown in the relevant templates exemplified in Appendix 2.
- To facilitate easier navigation between HTM 06-02 and HTM 06-03, the structure of the chapters has been aligned as closely as possible, allowing readers to easily locate corresponding chapters/sections in both documents.
- The chapter on first-aid has been deleted as guidance is continually changing although the requirement for first-aid training remains.
- All references have been updated.

Acknowledgements

The following individuals and organisations have contributed to the development, drafting and production of this guidance:

Andrew Walch, Hard FM Lead, NHS Estates, NHS England

Anthony Goddard, Principal Electrical Engineer, NHS Wales Shared Services Partnership-Specialist Estates Services

Claire Hennessy, Director of Estates and Facilities, Birmingham Community Healthcare NHS Foundation Trust

Darren Griffiths, Managing Director, RSEarth Limited

David McCabrey, Principal Engineer, Department of Health, Northern Ireland

David McNeill, Principal Engineer, Health Facilities Scotland

David Wilson, Principal Engineer, Department of Health, Northern Ireland

Ian Storrar, Assistant Director Engineering and Assurance, NHS Scotland Assure, Health Facilities Scotland

Ian Truckle, HM Specialist Inspector (Electrical Engineering), Health and Safety Executive

John Prendergast, Publishing and Editorial, Archus Limited

Malcolm Hoggart, Technical author, Estates Engineering Compliance Consultant Ltd

Mark Richards, Technical author, Health Engineering Services FM Limited

Nigel Bolan, Senior Performance Standards Engineer, NHS Wales Shared Services Partnership-Specialist Estates Services

Paul Wheldon, Authorising Engineer, EMCOR Group (UK) plc

Peter Handforth, Peter Handforth Associates Ltd

Simon Russell, Deputy Director, NHS Wales Shared Services Partnership-Specialist Estates Services

Stephen Mason, HM Specialist Inspector (Electrical Engineering), Health and Safety Executive

Thomas Rodger, Head of Engineering, NHS Scotland Assure, Health Facilities Scotland

William Marr, Senior Engineer, Health Facilities Scotland

NHS England would also like to thank all those who took the time to comment and send contributions during the scoping and technical engagement phases of this document.

Contents

1 Scope

General

This 2023 version of Health Technical Memorandum (HTM) 06-02 supersedes all previous versions of HTM 06-02 'Electrical safety guidance for low voltage systems'.

1.1 Guidance in this HTM applies to all healthcare facilities containing low electrical voltage systems.

1.2 This HTM is intended to assist Duty Holders (see Chapter 2 for definitions) to meet the requirements of the Electricity at Work Regulations ("the Regulations"), which are made under the Health and Safety at Work etc. Act 1974. It is not an authoritative interpretation of the regulations or other laws. Only the courts can make such interpretation.

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

1.4 As an employer, the Management of a healthcare facility has a legal responsibility to ensure that relevant regulations are complied with. Statutory instruments referred to within this document should be deemed to be the current versions including any revisions or amendments which have occurred since the date of the original statute.

1.5 The reliance on electrical supplies has increased to a point where they are essential for the operation of any organisation. In hospitals, there has been a substantial increase in reliance on electrical supplies, and particularly in the use of modern technologies – diagnostic equipment, intensive care, computer systems and bedhead services to name a few. The loss of supplies to these services is unacceptable, and most hospitals would be unable to function without resilient electrical supplies. HTM 06-01 – 'Electrical services supply and distribution' addresses the security of supply and emergency-generation issues; however, this would be of little use if the distribution circuits were compromised. This document provides procedural guidance on the safe isolation, operation and maintenance of electrical equipment.

1.6 This document should be used by all person (s) with roles and duties as described within Chapter 4 to ensure that the electrical systems and equipment are safe and fit for purpose. They have a responsibility to ensure the safety of personnel who are using or who are near such equipment.

1.7 Changes to the existing equipment and systems are inevitable. Any changes made to the installation/system(s) should be carried out in line with BS 7671, HTM 06-01 and the relevant standards and regulations and should meet the requirements of this guidance. Where major alterations or additions are proposed, including the procurement of major plant (which could adversely affect the existing installation) the Authorised Person(s),

Authorising Engineer and Electrical Safety Group (ESG) should be consulted. This is to ensure the electrical systems and equipment remain fit for use and any changes do not affect the safety of the electrical system or inhibit the operation and maintenance of the system. (See Chapter 4 for appointment, roles and duties of personnel.)

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 low voltage (LV) systems. This document makes recommendations for the allocation of duties to personnel and the manner in which these duties should be performed.

Procedures

1.9 Low voltage electrical systems associated with healthcare premises vary considerably in size and complexity. The procedures advocated in this document therefore cannot cover every circumstance and consequently, in specific instances, may need to be supplemented by local written procedures or rules. These local arrangements should only be considered when, in the opinion of the Authorising Engineer (LV), the guidance given in this document is inadequate for the particular circumstances. Any such supplementary procedures which are produced should therefore maintain the same standards of electrical safety as prescribed in this HTM.

1.10 Because of the specialist nature of the risks, it is important that carefully prepared procedures exist for dealing with the routine servicing of low voltage installations and with any emergencies that arise.

1.11 The consequences – in terms of patient safety and well-being – of undertaking electrical maintenance or switching operations should be fully considered following appropriate consultation between estates staff and necessary medical and administrative staff. Permission to interrupt supplies should be sought from the end-users or designated staff.

Note:

Where there is a disagreement or permission is refused, the Management should be consulted and any further activity and requirements should be agreed with the ESG.

Standards

1.12 This HTM is concerned with the safe operation and maintenance of low voltage equipment, but it is equally important that the low voltage equipment installed:

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

b. has been satisfactorily tested and commissioned

c. is maintained in accordance with manufacturers' recommendations.

1.13 It is important that operating and maintenance manuals (including, but not limited to, "as-fitted" drawings, LV switchgear information, distribution schematics and circuit lists) should be available to those involved in the operation and servicing of the electrical equipment and switchgear. In order to maintain their value, these documents should be regularly updated to include details of all modifications and extensions to the buildings, plant and equipment as and when they occur.

Duties

1.14 Under health and safety legislation, there is a legal obligation on all persons who may be concerned with the operation of, or who work on, the electrical equipment and systems, to

conduct their work so as to prevent danger or injury to themselves and/or others. Those persons should be thoroughly conversant with all the regulations and duties governing the work that they may have to undertake; they must comply fully with the safe systems of work for the electrical system on which they are to work.

Security of information

1.15 The Electricity at Work Regulations 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 of the Duty Holder's main defence. Consequently, the Management should consider its policy for the retention of information and contemplate how it will maintain, if at all, back-up copies of documents.

Application of this HTM

Note:

Regulation 16 of the Electricity at Work Regulations requires persons to be competent to prevent danger and injury. The Health and Safety Executive (HSE) publication 'HSR25: Memorandum of guidance on the Electricity at Work Regulations 1989' provides guidance on this.

1.16 The safety guidance as detailed in this document should be applied to any low voltage (LV) electrical installation under the control of the healthcare organisation or its agent, including but not being exclusive to:

a. the low voltage switchgear and cables from the first point of isolation on the low voltage system

b. LV electrical equipment under the ownership or control of the Management.

1.17 Where operation of high voltage switchgear is associated with low voltage work, reference should be made to Chapter 9 and HTM 06-03 – 'Electrical safety guidance for high voltage systems'.

1.18 The guidance within this HTM should be considered as representing best practice for all persons (whether or not directly employed by the Management) working on, working near, testing or operating electrical equipment and systems for which the Management is in control of the electrical danger.

1.19 This HTM is written to provide a safe framework within which work or testing can be carried out safely on permanently connected electrical equipment.

1.20 In the event of an apparent conflict between this HTM and a statutory requirement, the latter should be followed, and the Authorising Engineer (LV) should advise the Designated Person.

1.21 If it is necessary to depart from any requirement of this HTM, the Authorising Engineer (LV) should agree such departure in writing with the Designated Person. The Senior Operational Manager (SOM), Authorised Persons (LV) and ESG should also be notified. All variations should be recorded in the operational procedures manual (OPM) (see note on departures and derogations in the Preface).

1.22 Where control of the electrical danger is divided between the Management and others, Chapter 5 of this HTM should be followed.

1.23 Further advice on the application of this HTM should be obtained from the Authorising Engineer (LV).

Other safety guidance, related documents and procedures

1.24 Where the Management employees are required to work near LV electrical systems

and associated LV electrical equipment not owned or controlled by the Management, this document and related procedures should be used as a guide to safe working practice, but the owner's safe system of work should be followed when instructed.

Information, instruction and training

1.25 Arrangements should be made by the Management to ensure:

a. all employees are adequately trained, informed and instructed as required for 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 for which legal requirements, safety guidance, related documents and procedures should apply, and they understand the information and instructions provided

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 and they understand the information and instructions provided.

Access to this HTM

1.26 This HTM and, as appropriate, related documents and procedures should be stored in the OPM. All Management personnel actively involved with the LV systems should sign a register to state they are aware of where the guidance, related documents and procedures (plus any amendments) are held so they can be referenced as necessary when work is being carried out under this guidance.

Issue of the electrical safety handbook (LV)

1.27 The electrical safety handbook (LV) should be available to all persons working on or near electrical equipment under control of the Management. The Authorised Person (LV) should ensure that all Competent Persons (LV) and Skilled Persons (LV) have the electrical safety handbook (LV) available for reference as necessary when work is being carried out under this HTM.

Objections

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

Associated regulations and documents

1.29 This HTM is based on the associated regulations and documents listed in the References.

2 Definitions

2.1 The following definitions apply to this HTM (LV).

Personnel

Designated Person

2.2 The Designated Person is an individual appointed by a healthcare organisation (a board member or a person with responsibilities to the board) who has overall authority and responsibility for the low voltage electrical systems within the premises and who has a duty under the Health and Safety at Work etc. Act 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 (LV). See also chapter 3 in HTM 00.

Duty Holder

2.3 The Duty Holder is a person on whom the Electricity at Work Regulations impose a duty in connection with electrical safety.

Management

2.4 The Management is defined as the owner, occupier, employer, general manager, chief executive or other person in a healthcare organisation, or their appointed responsible contractor, who is accountable for the premises and who is responsible for issuing and implementing the Management Policy (see Chapter 3).

Senior Operational Manager (SOM)

2.5 The SOM should have operational and professional responsibility for the electrical services. It is important that the SOM has access to robust, service-specific independent professional support which can promote and maintain the role of the “informed client” within the healthcare organisation. This will embrace both the maintenance and development of service-specific improvements, support the provision of the intelligent customer role and give assurance of service quality.

Authorising Engineer (LV)

2.6 An Authorising Engineer (LV) is a suitably qualified engineer who has been appointed in writing by the Designated Person to take responsibility for the effective compliance auditing of this HTM and to provide technical advice. The person appointed should possess the necessary degree of independence from local Management to take action within this HTM.

Authorised Person (LV)

2.7 An Authorised Person (LV) is appointed in writing by the Designated Person on recommendation by the Authorising Engineer (LV) and is responsible for the practical implementation and operation with regard to work on, or the testing of, defined electrical equipment, in accordance with this HTM. See HTM 00 for a recommended management structure.

Duty Authorised Person (LV)

2.8 The Authorised Person (LV) on site with current responsibility for the system or installation who has accepted the Authorised Person duties and recorded the acceptance of this in the LV site logbook (see paragraph 4.16).

Competent Person (LV)

2.9 A person who possesses, as appropriate to the nature of the work to be undertaken, adequate education, training and practical skills, and who is able to prevent danger or, where appropriate, injury, and has been formally appointed in writing by an Authorised Person (LV), and who accepts a safety document for defined work.

Note:

The "defined work" may be work on the electrical system under control of the Authorised Person (LV) but may also be non-electrical tasks that are to be carried out within areas under control of Authorised Persons (LV). Any restrictions on a Competent Person's (LV) appointment should be clearly recorded on the Certificate of Appointment (see Chapter 4).

Skilled Person (LV)

2.10 A person who possesses, as appropriate to the electrical work to be undertaken, adequate education, training and practical skills, and who is able to prevent danger, or where appropriate, injury, and has been assessed to be competent by the Authorised Person (LV) for a specific electrical task and is aware of specific requirements from this guidance with regard to the task but has not been formally appointed in writing as a Competent Person (LV).

Note:

A Skilled Person (LV) may be issued with a safety document at the discretion of the Duty Authorised Person (LV) in instances where it is deemed inappropriate to appoint the person as a Competent Person (LV), as may be the case for a one-off piece of work. When a Skilled Person is likely to carry out work on site on a regular basis that would result in the issue of multiple safety documents, that person should be appointed as a Competent Person (LV) in line with this guidance.

Accompanying Safety Person (LV)

2.11 An Accompanying Safety Person is a person not directly involved in the work or test who has received training in emergency first-aid for electric shock and who has adequate knowledge, experience and the ability to avoid danger, keep watch, prevent interruption, apply first-aid and summon help. The person should be familiar with the system or installation being worked on or tested and should have been instructed on the action to be taken to safely rescue a person in the event of an accident.

Safety documents

Permit-to-work (LV)

2.12 A written authority signed and issued by the Duty Authorised Person (LV) to allow work to be undertaken on electrical equipment. It defines the scope of the work to be undertaken and makes known exactly what equipment is dead, isolated from all live circuit conductors and safe to work on.

Limitation-of-access

2.13 A written authority issued by the Duty Authorised Person (LV) for specified tasks to be undertaken in an area or location which is under the control of the Authorised Person(s) (LV) for electrical safety reasons, and for which a permit to work, LW1, LW2 or

certificate of authorisation for live working are not appropriate.

LW1: Self-check safety precautions

2.14 A self-check form to be completed by a Competent Person (LV) prior to carrying out work, inspection or testing on (or near) live equipment (see paragraph 8.1 on live working procedures) or by an Authorised Person (LV) when issuing a certifcate of authorisation for live working.

LW2: Authorisation for inspection, testing and work on or adjacent to live electrical equipment at low voltage

2.15 A form to be issued by a Duty Authorised Person (LV) to a Skilled Person (LV) to carry out work, inspection or testing on (or near) live equipment as per the examples in paragraph 8.1.

Certificate of authorisation for live working

2.16 This is a safety document, which is a form of declaration, signed and issued by a Duty Authorised Person (LV) with permission from the Authorising Engineer (LV) to the Competent Person (LV) or Skilled Person (LV) in charge of the work to be carried out live. It makes known to that person exactly what equipment should be worked on, with details of the work to be undertaken live, what safety equipment is to be used, and the safety precautions to be taken.

Permission for disconnection

2.17 A form to be completed prior to work on electrical equipment under the control of end-users or designated staff.

Safety signs

Caution sign

2.18 This is a temporary, non-metallic sign bearing the words “caution – persons working on equipment” and “do not switch on” which should be used at a point-of-isolation.

Danger sign

2.19 This sign is a temporary, non-metallic sign bearing the words “danger live equipment” and “do not touch” which should be placed where there is live equipment adjacent to a point of work.

Switchroom sign

2.20 This is a permanent sign bearing the words “electrical switchroom” and “no unauthorised access”.

Voltage range

2.21 The following ranges of voltage (rms values for AC) are defined as follows:

Extra low voltage: not exceeding 50 V AC or 120 V ripple-free DC whether between conductors or to earth

Low voltage (LV): not exceeding 1000 V AC or 1500 V DC between conductors, or 600 V AC or 900 V DC between a conductor and earth

High voltage (HV) : a potential exceeding low voltage.

General definitions

Additional earth: earthing equipment of an approved type applied after the issue of a safety document (for example an earth applied at a point-of-work).

Audit: the structured process of collecting independent information on the efficiency, effectiveness and reliability of the safe system

of work, and drawing up plans for corrective action (see Appendix 4). ("Independent" does not necessarily mean external to the organisation.)

Authorised Person's (LV) key: a key that controls access to the key cabinet.

Authorised Person's (LV) key box: a single locked box that is used for the control of the Authorised Person's (LV) key.

Charged: the item has acquired a charge either because it is live or because it has become charged by other means such as by static or induction charging, or has retained or regained a charge due to capacitance effects even though it may be disconnected from the rest of the system.

Circuit breaker: a device capable of making, carrying and breaking normal load currents and also making and automatically breaking, under pre-determined conditions, abnormal currents such as short-circuit currents. It is usually required to operate infrequently although some types are suitable for frequent operation.

Competent/Competence: application of skill, knowledge, experience and behaviour consistently to achieve a specific outcome.

Complex circuit: a circuit which is normally operated at low voltage and which requires more than one point-of-isolation from known voltage sources to ensure safety at the point-of-work.

Conductor: a conductor of electrical energy.

Confirm dead: demonstrate dead with the use of suitable test equipment designed for the purpose that no electrical potential liable to cause danger or injury is present once conductors are made accessible, after the issue of safety documentation.

Note: the test equipment should be checked for correct operation before and after use.

Danger: risk of injury or death.

Dangerous condition: a condition that is likely to lead to a dangerous occurrence.

Dangerous occurrence: an incident involving a discharge of electrical energy by overload or short circuit, or accidental damage to electrical plant which may cause significant risk of death to any person, or results in stoppage of electrical plant for a period longer than 24 hours.

Dead: a conductor that is neither "live" nor "charged" at a potential equal to or not significantly different from that of earth at the worksite.

Defect notification: a written safety instruction, in the form of DIN (Dangerous Incident), SOP (Suspension of Operational Practice), NEDeRS (National Equipment Defect Reporting Scheme) or Defect issued via the Energy Networks Association, or similar official instruction issued by the Authorising Engineer (LV), notifying of a dangerous occurrence with the potential to alter the normal operating procedures associated with a particular type of equipment.

Distribution network operator (DNO) (also known as distribution system operator (DSO)): organisation that owns and operates the electric power distribution system (power lines and infrastructure) which delivers electricity to end-users.

Earthed: connected to the general mass of earth in such a manner as to ensure at all times an immediate discharge of electrical energy without danger or harm.

Note: this term is not to be used in the context of a functional earth.

Electrical equipment: anything used, intended to be used or installed for use in order to generate, provide, transmit, transform, rectify, convert, conduct, distribute, control, store, measure or use electrical energy.

Electrical Safety Group (ESG): a multi-disciplinary group responsible for ensuring that all electrical safety issues are monitored, recorded and acted on, in line with the relevant legislation and guidance. (See chapter 3 in HTM 06-01 for a more comprehensive description.)

Energised: implies connection to a source of electricity at a potential significantly different from that of earth at the worksite and which presents an electrical hazard.

Healthcare organisation: organisation that provides or intends to provide healthcare services.

Informed client: an informed client recognises and adopts best practice in policies and procedures to ensure electrical safety is maintained. A client is "informed" when:

- it understands its capability and capacity and also where it is lacking in relation to discharging their duties
- it is effective in gaining and using knowledge to make informed decisions
- it is efficient at organising itself for the task, and
- it designs and retains a sufficient degree of flexibility to be able to adapt to the demands of the operational estate.

Injury: death or personal injury as a direct or indirect consequence of electric shock, electrical burn, electrical explosion or arcing, or from fire or explosion initiated by electrical energy, where any such death or injury is associated with the generation, provision, transmission, transformation, rectification, conversion, conduction, distribution, control, measurement or use of electrical energy.

Isolate: disconnect and separate electrical equipment from every source of electrical energy in such a way that the disconnection and separation is secure.

Isolation and earthing diagram: a diagram attached to a permit-to-work illustrating the safety measures taken.

Key cabinet: a cabinet for the sole purpose of retaining all keys relative to the site's LV system(s) to which the Authorised Person (LV) has control.

Key register: a record of keys held in the OPM issued by the Authorised Person (LV) to persons authorised to access LV switchrooms.

Live: implies connection to a source of electrical energy.

Live functional testing: the testing of electrical equipment/system while live which does not involve live working.

Live working: the connection/disconnection of electrical equipment or components while live and/or working near to exposed electrical connections or conductors.

Lockable document cabinet: a lockable cabinet suitable for storing the electrical safety documents, temporary safety signs, distribution system records, etc. used in the application of this HTM. This cabinet should not be used to store anything not associated with this HTM.

LV site logbook: a book in which all matters relating to the electrical system should be recorded.

Method statement: a written instruction describing in a logical sequence how a task will be carried out in a way that secures health and safety and includes all the control measures.

NHS Premises Assurance Model: the NHS has developed the NHS Premises Assurance Model (NHS PAM), whose remit is to provide assurance for the healthcare environment and to ensure patients, staff and visitors are protected against risks associated with hazards such as unsafe premises.

Operational procedures manual (OPM): a hard-copy folder and/or electronic filing system containing information relating to the control and operation of the low voltage system in accordance with this HTM.

Personal supervision: supervision given by a person having adequate technical knowledge and experience, who is present at all times.

Practice improvement notice: a notice issued by the Authorising Engineer requiring improvements to be made in the observed working practices. The notice will relate to specific task(s) and will give a target date and/or time by which the improvements must be in place before similar task(s) can continue to be carried out.

Protective equipment: equipment used to protect persons from danger in the working environment. Protective equipment includes items such as special tools, protective clothing, insulating screens, safety harnesses, protective visors, etc.

Prove dead: demonstrate dead with the use of approved test equipment designed for the purpose that no electrical potential liable to cause danger is present (before safety documentation is issued).

Note: the test equipment should be checked for correct operation before and after use.

Reasonably practicable: where a statement is qualified by the words "reasonably practicable", it means the following as defined in 'HSR25: Memorandum of guidance on the Electricity at Work Regulations 1989': "Generally, you should do everything 'reasonably practicable' to protect people from harm. This means balancing the level of risk against the measures needed to control the real risk in terms of money, time or trouble. However, you do not need to take action if it would be grossly disproportionate to the level of risk. In the context of the Regulations, where the risk is very often that of death, e.g. from electrocution, and where the nature of the precautions which can be taken are so often very simple and cheap, e.g. insulation, the level of duty to prevent that danger approaches that of an absolute duty."

Risk assessment: the analysis of the risks to health and safety inherent in a system and their significance in a particular context.

Safety key-box: a box having two locks, each of which should have only one key. It should be be so arranged that both locks must be released before access can be gained to the contents of the box.

Safety lock: a padlock indelibly coloured red, with a metal hasp, having a single key that differs from all other keys provided for the system or installation, used for securing the means of isolation and prevent the removal of temporary earths where fitted.

Safety programme: a written programme prepared by an Authorised Person (LV) setting out the sequence of operations to be followed before safety documents are issued and the operations to be followed to restore supplies. It should include the purpose of the proposed work or test, the sequence of safety operations to be performed and details of the safety documents issued including the reinstatement process for the electrical system on completion of the work and/or test.

Single line drawing: a single line drawing of the whole site system showing all major LV equipment in its normal operational state.

Spiking gun: an item of safety equipment used to demonstrate that a cable is dead.

Standard operating procedures (SoP): local written procedures for electrical equipment. Written authority, applicable for up to three years and reviewed annually, issued by an Authorised Person to undertake regular defined tasks.

Substation: any premises, or part thereof, which contain equipment for either transforming or converting energy to or from

high voltage (other than transforming or converting solely for the operation of switching devices or instruments), or for switching, controlling or regulating energy at high voltage.

Suspension notice: a notice issued by the Authorising Engineer or regulatory body requiring specified works in progress to be suspended immediately pending action to ensure that compliance with the existing safe system of work can be achieved or a modified system introduced. This may follow an Authorising Engineer's or regulatory body's system improvement notice being issued.

Switchgear: an assembly of main and auxiliary switching equipment for operation, regulation, protection or other control of an electrical installation.

Switchroom: a room or enclosure which contains low voltage distribution switchgear.

System (electrical system): includes all parts of a system (for example, conductors and electrical equipment connected to a single source or multiple sources of electrical energy).

Working lock: A padlock that is not a safety lock, which is used to secure equipment that is either in the "off" or "on" position, to prevent unauthorised operation whilst in an operational state.

3 Management policy

3.1 The Management and its nominated staff as “Duty Holders” are responsible for the safety of low voltage (LV) electrical systems on their premises. The Electricity at Work Regulations impose duties on “employers” to comply with these insofar as they relate to matters that are within their control. These duties are in addition to those imposed by the Health and Safety at Work etc. Act.

3.2 To satisfy these requirements, the Management should have:

- a clearly defined electrical safety policy
- a programme for the operation and servicing of their low voltage system(s) and equipment
- a means by which the policy and programme can be managed, implemented, monitored, and reviewed.

3.3 In addition to ensuring that all statutory requirements relating to electrical safety are observed, the Management should have:

- a clearly defined electrical safety policy
- a structure, appropriate to the complexity of the work, for implementing the policy – including an outline description of individual’s duties and responsibilities
- procedures for ensuring the effective administration of the policy
- a system of monitoring to ensure that the policy is being effectively pursued within the managed premises
- a programme of training to ensure the awareness of all staff on the use of electricity and general electrical safety
- appropriate training for relevant professional and technical staff
- a procedure for dealing with any emergencies that may arise
- electrical business continuity plans in place for prolonged loss of power.

3.4 The Management should formally nominate and appoint in writing a Designated Person with responsibility for the LV electrical safety policy.

3.5 Within the Management structure a Senior Operational Manager (SOM) should be appointed, who has access to robust, service-specific independent professional support which can promote and maintain the role of the “informed client” within the healthcare organisation.

3.6 The electrical safety policy should demonstrate the commitment of the Management to self-regulation and reflect the uniqueness and special needs of the managed premises for which it is written by (but not limited to):

- recognising the importance of the subject
- ensuring that responsibilities both legal and managerial are clearly defined and understood throughout the organisation

- establishing an ESG in accordance with chapter 3 in HTM 06-01. The ESG is a multidisciplinary group formed to assess all aspects of electrical safety and resilience required for the safe development and operation of healthcare premises, and it should inform the following areas:
  - the design process for new healthcare premises
  - the design process for modifications to existing premises
  - commissioning
  - operational management
  - maintenance
  - decommissioning and removal of equipment
- 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
- monitoring and reviewing at regular intervals and not exceeding three years the effectiveness of the policy and progress concerning its implementation
- ensuring that clear and concise records are kept of all activities involved in the implementation of the policy.

3.7 An electrical engineer should be formally appointed as an Authorising Engineer (LV) with the responsibility for advising the Management on implementing, administering and monitoring the application of the requirements of this HTM. The person appointed to fill this position needs to have a commitment to the role and the responsibilities which it involves, and should be independent of the organisation. The Management who are responsible for the appointment also have a duty to monitor the effectiveness of the Authorising Engineer (LV) in fulfilling this role. This monitoring requirement is particularly important if the Authorising Engineer (LV) is either self-employed or employed by an organisation outside the management structure. Appendix 4 contains an audit procedure and forms.

3.8 The operation and servicing of low voltage equipment in accordance with clearly defined rules and procedures should be entrusted only to persons who are technically competent and appropriately trained. These should be Authorised Persons (LV), Competent Persons (LV), a DNO/DSO or third-party contractors who have been assessed to be competent (see Chapter 5).

3.9 It is strongly recommended that the Management should aim to become independent of third parties in respect of the management of the operation of their low voltage systems. This should be achieved by recruiting, training and appointing staff to manage the systems.

3.10 Where services are delivered in-house, a full audit trail of performance and effectiveness of appointed roles should be monitored by the Authorising Engineer and maintained by the SOM or the Designated Person. Alternatively, where this is not considered practicable, it will be necessary to make arrangements using an independent third-party organisation (that is, a local distribution network operator or other suitable contractor). Any appointed independent third-party organisation must demonstrate suitable competencies to undertake the appointed roles, which should be regularly audited by the Management to ensure ongoing compliance with this guidance.

3.11 The extent to which control of systems and/or equipment is delegated to an independent third-party organisation should take into account the inherent risks involved to patients and/or sensitive equipment and the complexity of the installation. Accordingly, it is

recommended that a level of control, commensurate with the risk, should be maintained by Management personnel.

Note:

Regulation 3 of the Electricity at Work Regulations 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 the Management to escape responsibility.

3.12 The Management should record and maintain a system of equipment registration and control. The system should ensure that all LV electrical equipment and associated buildings 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 necessary in order to ensure that the entry of all electrical equipment into service is properly administered. The Management should also allocate responsibility for ensuring that the appropriate acceptance procedures are initiated, coordinated and carried through.

3.14 Where the contractual arrangement of a site is such that a third-party organisation has the responsibility for the management and/or operation of low voltage systems and equipment (for example, PFI), it is strongly recommended that their organisational structure and operating procedures align with the recommendations of this HTM.

3.15 The healthcare organisation should ensure that appropriate monitoring regimes are in place for the period of such a concession and that this is incorporated into the concession contract.

3.16 Where the healthcare organisation employs staff at the workplace, or in any way has control of the workplace or the maintenance of it, then the healthcare organisation will retain a “Duty Holder” responsibility although it will not necessarily be the sole Duty Holder.

Electronic versions of safety documentation

3.17 There are advantages in reducing the amount of paperwork associated with the safety document process. Therefore, rather than being paper-based, safety documents (for example, permit to work, limitation of access and any other safety documents required by this HTM) can be produced electronically. A number of healthcare organisations are now using this type of system. In the first instance, authorisation for introducing such a system should be given by the ESG and the Authorising Engineer. However, whatever system is chosen, electronic safety documents must be prepared with the same diligence as paper versions of safety documents and incorporate, as a minimum, the essential elements shown in the relevant templates exemplified in Appendix 2, with date and time stamp and the system used must comply with applicable guidance given in this HTM. Suitable back-up systems should be available in the event of software failure or power outage. Whatever system is used, access to the records should be protected and limited to those who need access only.

Management of an adverse event

3.18 The Management is responsible for determining the appropriate level and format of any investigation into reported adverse events and safety incidents, including near misses, injury or death. In determining the course of action, the Management should consider any potential conflict of interest that may exist with persons who are appointed under this HTM and ensure that investigations remain impartial and

independent at all times. Persons leading any investigations should be suitably trained to undertake this task. This may require an independent specialist third party or, on occasion, it may be appropriate to utilise the services of the Authorising Engineer (LV) where no conflict of interest has been identified.

4 Appointment, roles and duties of personnel

General

4.1 Any person who works on low voltage electrical equipment or systems (including the control, operation or testing thereof) to which this HTM (LV) applies has the responsibility to ensure that they comply with, and implement, the principles and processes outlined in this HTM together with any relevant regulations, codes of practice or procedures. Ignorance of the relevant legal requirements, codes and procedures, and the guidance given in this HTM may not be accepted as an excuse for neglect of duty.

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

4.3 Any written authorisation given to persons to perform their designated role in implementing this HTM should indicate the class of operation and/or work permitted and the section of the electrical system to which the authorisation applies.

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

a. control – including:

   (i) before work commences – receiving permissions, giving instructions on how to implement precautions, and sanctioning the issue of safety documents

   (ii) after completion of work – acknowledging cancellation of safety documents and giving instructions on how to safely restore equipment or the system to service

b. making safe or restoring equipment – including:

   (i) before work commences – taking action to make equipment or system safe for work, and issuing safety documents

   (ii) after completion of work – cancelling safety documents, and taking action to safely restore equipment or the system to service

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

4.5 It is strongly recommended that the personnel assigned to the roles and duties defined in this chapter are only appointed to

undertake the duties associated with a single designated role.

4.6 Persons involved with electrical safety should form part of the electrical safety group (ESG) and carry out the functions in accordance with HTM 06-01, HTM 06-02 and HTM 06-03.

Roles and duties of the Designated Person (LV)

4.7 Each healthcare organisation should appoint a person as Designated Person. The roles in relation to this HTM are described below.

a. appoint in writing an Authorising Engineer (LV) for all systems and installations for which the Management has responsibility

b. appoint in writing the SOM for all electrical systems for which the Management is responsible

c. review the Authorising Engineer's (LV) appointment annually to ensure the Authorising Engineer's (LV) duties have been carried out in accordance with this HTM

d. ensure that sufficient potential Authorised Persons (LV) are identified and nominated to meet the number identified as required by the Authorising Engineer

e. appoint in writing Authorised Persons (LV) after receiving recommendation from the Authorising Engineer (LV) and taking into consideration the number of Authorised Person disciplines undertaken by the individual person

f. ensure that sufficient funding is provided for training of staff to manage the low voltage systems

g. agree any local variations to this guidance with the Authorising Engineer (LV), Authorised Persons (LV) and the ESG.

Role and duties of the Senior Operational Manager

4.8 The Senior Operational Manager (Electrical) will maintain the role of the "informed client" within the healthcare organisation. The role in relation to this HTM is described below.

a. Ensure this HTM and, as appropriate, related documents and procedures are available to certain Management employees and other persons as determined by the Authorising Engineer (LV). Such employees and other persons should sign a receipt for a copy of this HTM, related documents and procedures (plus any amendments), keep them in good condition and have them available for reference as necessary when work is being carried out under this HTM.

b. Agree any local variations from this HTM. The Authorising Engineer (LV) should agree such departure in writing with the Designated Person. The SOM and the ESG should also be notified.

c. Liaise with the Authorising Engineer (LV), acknowledge receipt of the audit report from the Authorising Engineer (LV), make any comments considered necessary and compile an action plan in consultation with the site Authorised Persons (LV) and the Authorising Engineer (LV). The Authorising Engineer (LV) should review the progress on the action plan at the next audit.

d. Carry out duties assigned or delegated to them by the Designated Person (as described in Chapter 3 of HTM 00).

Role and duties of the Authorising Engineer (LV)

4.9 The Authorising Engineer (LV) is the independent advisor to the healthcare organisation with responsibility for monitoring and auditing the application of this HTM. The Authorising Engineer's (LV) roles include the following:

a. assess and recommend in writing sufficient Authorised Persons (LV) to provide the necessary cover for all systems and installations for which the Management has responsibility

b. define the exact extent of the systems and installations for which each Authorised Person (LV) is responsible and, where appropriate, any part of the system which is excluded from the Authorised Person (LV)'s responsibilities

c. if necessary, suspend or cancel the appointment of an Authorised Person (LV) and recommend the withdrawal of the certificate

d. maintain a register of all Authorised Persons (LV)

e. ensure that candidates for appointment as Authorised Persons (LV):

   (i) satisfy the qualification requirements

   (ii) satisfy the training and familiarisation requirements

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

   (iv) have satisfied the Authorising Engineer (LV) as to their competence and ability

f. be part of the ESG.

4.10 The Authorising Engineer (LV) should also:

- ensure on appointment, a certificate valid for a period not exceeding three years has been issued to each Authorised Person (LV)
- report to the Management any deficiency in the number of suitably trained and experienced Authorised Persons (LV) where this significantly impairs Management's ability to provide a safe and efficient service
- review each Authorised Person (LV)'s operational experience at intervals not exceeding three years by examining the relevant operating records of the system(s), and recommend refresher training as necessary
- audit the performance and record the operational experience of each Authorised Person (LV) every 12 months
- undertake comprehensive audits, in accordance with the application of this HTM, to all systems and installations
- ensure that defect notifications received have been sent out, retained, actioned and evidenced in the OPM
- notify NHS England of any known defect notifications which affect site operations or which arise locally
- when requested by the ESG, support investigations of reported injuries and dangerous occurrences involving electrical systems and installations within the Authorising Engineer's (LV) sphere of responsibility, when not assigned as investigation lead by the ESG.

4.11 In addition the Authorising Engineer should:

- sanction any interpretation of this HTM, any local house rules and any deviation that may be necessary for their application, and agree in writing with the ESG, Authorised Persons (LV), SOM and Designated Person, as appropriate,

any local deviation from this HTM that may be necessary for their application to a particular item of equipment or location

- ensure that any amendments to this HTM are brought formally to the attention of, and are understood by, all Authorised Persons (LV)
- ensure that the Management is informed of any known defect notifications issued by a distribution network operator, manufacturer or supplier of electrical equipment which is applicable to equipment within the areas for which the Authorising Engineer (LV) is responsible
- ensure that a system is in place to circulate relevant information on defect notifications and dangerous occurrences to all Authorised Persons (LV) (see paragraphs 6.15–6.24)
- investigate all dangerous occurrences involving electrical equipment, systems and installations for which the Authorising Engineer (LV) is responsible
- where live working is considered appropriate, and a certificate of authorisation for live working is being considered, give written authority to an Authorised Person (LV) before the live working takes place
- agree in writing any local deviation from this HTM that may be necessary for their application to a particular item of equipment or location.

4.12 The Authorising Engineer (LV) should undertake audits at intervals not exceeding 12 months. These audits should review the competency of all Authorised Persons (LV) and the issue and cancellation of safety documents as well as a review of the site safety equipment and operating records, including the safe systems of work and safety procedures recommended by this HTM. The Authorising Engineer's (LV) audit should include a meeting with Authorised Persons (LV) and an inspection of the systems or installations to which their appointments refer. Separate audits should be carried out for each site or geographical area to which the Authorising Engineer (LV) has been appointed.

4.13 A written report of the audit should be compiled, listing unsatisfactory items seen and any deficiencies found, recommendations made and any training or retraining of Authorised Persons (LV) considered necessary. This should include an assessment against the NHS PAM and be issued to the Designated Person or SOM and Authorised Persons (LV). Items identified in the audit report should be reported to the ESG and actioned as necessary.

Roles and duties of the Authorised Person (LV)

4.14 The Authorised Person (LV) should be responsible for:

- the practical implementation and operation of this HTM, and
- the systems and installations for which the Management is in control of danger and for which the Authorised Person (LV) has been appointed.

4.15 The Authorised Person's (LV) instructions and decisions on electrical matters may be considered final and should be complied with. In the case of a dispute, the Authorised Person (LV) should stop the work or test and refer the matter to the Authorising Engineer (LV) for adjudication.

4.16 More than one Authorised Person (LV) may be appointed for a system or installation but, at any one time, only one Authorised Person (LV) should take on the responsibility of Duty Authorised Person (LV). The name of the Duty Authorised Person (LV) should be displayed in a prominent position that can only be altered by an Authorised Person (LV). Transfer of responsibilities between Authorised Persons (LV) should be recorded in the LV site logbook.

4.17 Where there is more than one Authorised Person (LV) appointed for a system or installation, the Authorising Engineer (LV) should be advised of the Authorised Person (LV) who is nominated as being in overall charge with responsibility for multiple sites, and who is in control of records and contractors, etc. Where an Authorised Person (LV) is nominated to be in overall charge, this should be recorded in the OPM.

4.18 The duties of Authorised Persons (LV) are summarised as follows:

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

b. ensure that any alterations or installation of equipment do not compromise the electrical system

c. ensure that all records (including maintenance, testing and commissioning records) concerning low voltage systems are kept up-to-date

d. record all low voltage switching operations in the LV site logbook

e. ensure that any person working on the system is competent to do so

f. ensure that test equipment is maintained in good condition

g. cooperate with the Authorising Engineer (LV) in matters of policy concerning low voltage systems

h. report in writing any dangerous and/or unusual occurrences to the Designated Person and Authorising Engineer (LV)

i. appoint in writing Competent Persons (LV) and maintain a register of all appointments

j. define the duties of appointed Competent Persons (LV) on the certificate of appointment

k. make routine inspections of switchrooms

l. ensure that the necessary safety posters and signs are displayed in switchrooms at all times

m. issue and cancel safety documents in accordance with this HTM.

4.19 The Authorised Person (LV) should inform the Authorising Engineer (LV) of:

a. any defects found in electrical equipment

b. any dangerous occurrence

c. any dangerous practices observed in the course of his duties.

4.20 The Authorised Person (LV) also:

- arranges for, supervises or undertakes cable detection or location work within the geographical area of the Authorised Person's (LV) appointment
- appoints Competent Persons (LV) for defined work and maintains a register of Competent Person (LV) appointments including dates of appointment, the date the appointment is due to expire and details of training and training dates. This register should be kept in the OPM with copies of all current Competent Person (LV) certificates
- confirms the competencies of any LV contractors carrying out any work on the LV system and obtains letters of competency from the employer (this is expected to be carried out at the time of contractor tender evaluation or as required by the Authorising Engineer). (Note: this should be controlled under a Control of Contractors policy.) Documents should be stored within the OPM
- when necessary assesses a Skilled Person (LV) for defined work on defined equipment, and ensures they are aware of the requirements of this HTM and the

"Electrical safety handbook". A note of this action should be recorded in the logbook

- ensures that all records for the system including cable routes, electrical schematics, operating manuals and maintenance schedules for which the Authorised Person (LV) is appointed are completed and kept up-to-date.

4.21 Authorised Persons (LV) should monitor the performance of all Competent Persons (LV) in carrying out their duties under this HTM. Monitoring should be carried out to ensure the Competent Persons (LV) maintain the relevant level of competency and adherence to the safe systems of work. This should include:

a. visiting work sites and communicating on safety issues

b. visiting switchrooms and electrical enclosures to ensure high standards of tidiness and availability of appropriate safety equipment every three months.

4.22 Authorised Persons (LV) should take action to rectify and report in writing to the Authorising Engineer (LV) any deficiencies found. A copy of this report should be placed in the OPM.

Role and duties of the Competent Person (LV)

4.23 Competent Persons (LV) should comply with this HTM using the appropriate safety documentation when carrying out all work as instructed.

4.24 Competent Persons (LV) should use safe methods of work, safe means of access and the personal protective equipment and clothing provided for their safety.

4.25 Competent Persons, when recipients of a safety document, should:

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

b. read the contents of any safety documentation issued and confirm to the person issuing this 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. keep 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 or system or enter the area concerned until further notice if, during the course of work, a hazard which could result in danger arises or is suspected. The situation should be reported immediately by the Competent Person (LV) to the Duty Authorised Person (LV) in the first instance.

4.26 Competent Persons (LV) should not start or restart work under a safety document issued to another Competent Person (LV).

4.27 Having accepted a safety document, the Competent Person (LV) may only undertake or supervise the work or test specified until the task is complete and the Competent Person (LV) has signed part 3 of the permit, which is retained in the pad. Neither the Competent Person (LV) nor any person under the direct control of the Competent Person (LV) should attempt to undertake any other duties.

4.28 The Competent Person (LV) should not leave the location of the work to undertake other work or tests while the defined work is in progress. If the Competent Person (LV) has to

temporarily leave the location of the work or test to carry out other work or tests, the task should be suspended, and adequate safety precautions taken to prevent danger. The task should not be resumed until the Competent Person (LV) has returned to the location of the work or test.

4.29 Competent Persons (LV) clearing a safety document should do so only after all persons working under the safety document have been withdrawn from, and warned not to work on, the low voltage equipment or system concerned. Where appropriate, they should ensure that all tools, gear and loose material have been removed, guards and access doors have been replaced and the workplace is left tidy.

Role and duties of the Accompanying Safety Person (LV)

4.30 The Accompanying Safety Person is a person not directly involved in the work or test, who should have adequate knowledge, experience and the ability to avoid danger. They are required to keep watch, prevent unauthorised interruption of the work or test, be able to apply first-aid and summon help.

4.31 The Accompanying Safety Person (HV) should have received training in emergency first-aid in accordance with this HTM.

4.32 The Duty Authorised Person (LV) or the Competent Person, as appropriate, who will be responsible for the work or test to be attended should ensure that the Accompanying Safety Person understands their intended role and fully understands how to disconnect the equipment being worked on or tested from all sources of supply and how to switch off any test equipment or disconnect it from its source of supply.

4.33 The Accompanying Safety Person should be in attendance when the Duty Authorised Person (LV) considers it necessary and in circumstances such as the following:

a. while equipment is being proved or confirmed dead when working in accordance with Tables 2, 3 and 4

b. where equipment cannot be confirmed dead until the Competent Person (LV) has made conductors accessible under a permit to work

c. where working or testing in accordance with Table 1 when the means of isolation is not positively identified

d. while inspection, fault-finding or testing is being undertaken on live low voltage equipment

e. while work is being undertaken on live low voltage equipment

f. while the Authorised Person (LV) is spiking a cable

g. while work or testing is being carried out by a Skilled Person (LV) under an LW2 form that has been issued by a Duty Authorised Person (LV).

Appointment of an Authorising Engineer (LV)

4.34 An Authorising Engineer (LV) should be appointed in writing by the Designated Person on behalf of the Management. Due diligence reviews should be conducted when a new Authorising Engineer (LV) is appointed by the Management. Letters of appointment and acceptance of the appointment should be in the form illustrated in Appendix 3.

4.35 An Authorising Engineer (LV) should be appointed or reappointed for defined systems and installations for no longer than five years.

4.36 A person should be nominated by the Authorising Engineer (LV) and appointed by the Management to provide absence cover or deputise for the Authorising Engineer (LV). Any person appointed should, as far as is

reasonably practicable, meet the criteria set out in this HTM and be acceptable to the Management.

4.37 A copy of the letter of appointment should be in the OPM.

Appointment and reappointment of an Authorised Person (LV)

Appointment of an Authorised Person (LV)

4.38 An Authorised Person (LV) should be formally appointed by the Designated Person on the recommendation of the Authorising Engineer (LV) for periods not exceeding three years. Appointment will be by the issue and acceptance of a certificate of appointment signed by all three parties. Details of the recommended procedure, model letters and certificates are given in Appendix 3 together with additional guidance in Appendix 6.

4.39 Records should be held in the OPM.

Review of an Authorised Person's (LV) appointment

4.40 Each Authorised Person's (LV) appointment should be reviewed every three years to ensure that the Authorised Person (LV) is still suitable for appointment as an Authorised Person (LV). If suitable, the appointment process should be followed, the certificate of appointment form reissued and the appointment record in Appendix 3 completed.

Suspension of an Authorised Person's (LV) duties

4.41 The appointment of an Authorised Person (LV) may be suspended or cancelled for reasons of safety by the Authorising Engineer (LV). The Authorising Engineer (LV) should take the following actions:

a. arrange a meeting with the Authorised Person (LV) to discuss the suspension and, where necessary, the cancellation

b. arrange a meeting with the Designated Person and SOM to discuss the suspension or cancellation and any action necessary to maintain the availability of an Authorised Person (LV)

c. inform (in writing) the Authorised Person (LV), giving the reasons for the suspension or cancellation, details of any further training or experience considered necessary before reappointment and the expected duration of the suspension or cancellation

d. retrieve from the Authorised Person (LV) their certificate of appointment and all related items issued under the appointment procedure; in the case of cancellation, the Authorising Engineer (LV) should destroy the original certificate and overwrite all other copies with the word "cancelled" followed by the date and his signature

e. (with regard to the suspension or termination of the appointment) notify in writing all other Authorised Persons (LV) appointed for all systems and installations with which the Authorised Person (LV) was associated.

4.42 On suspension or withdrawal of an appointment, the key to the key-box should be returned, or the combination of the Authorised Person's (LV) key-box should be changed.

4.43 The Management, with assistance from the Authorising Engineer, should take the necessary action to ensure alternative cover is provided.

Note:

In the event of an Authorised Person (LV) stepping down from their duties for whatever reason, the Management should inform the Authorising Engineer (LV) and collect all equipment and keys issued as part of the Authorised Person's (LV) duties.

Appointment of a Competent Person (LV)

4.44 A Competent Person (LV) should be formally appointed for a maximum of three years in writing by an Authorised Person (LV) for duties which should be clearly defined on the certificate of appointment. Appointment should be by the issue and acceptance of the certificate, which should be signed by the Competent Person (LV) and the Authorised Person (LV).

4.45 The defined work for a Competent Person (LV) may be electrical work on the electrical system under control of the Authorised Person (LV) but may also be non-electrical tasks that are to be carried out within areas under control of the Authorised Person (LV). Any restrictions on a Competent Person's (LV) appointment should be clearly recorded on the Certificate of Appointment.

4.46 Details of the recommended procedure, pro forma and certificates are given in Appendix 3.

4.47 The certificate with a copy of the appointment record and review details should be retained in the OPM.

4.48 The Authorised Person (LV) should maintain a register of all Competent Person (LV) appointments. Each Competent Person's (LV) appointment should be reviewed/audited by the Authorised Person (LV) at intervals not exceeding one year and by each new Authorised Person (LV) as soon as practicable after appointment.

4.49 To be eligible for appointment, prospective Competent Persons (LV) should:

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

b. be familiar with the types of installation and equipment that they will be required to work on or test

c. possess the necessary technical knowledge, skill and experience relevant to the nature of the work or tests to be undertaken to prevent danger and injury

d. have an adequate knowledge of the relevant parts of this HTM, any agreed local variations and any regulations which are applicable to the installations and equipment on which work or tests are to be undertaken

e. have an adequate knowledge of first-aid, and – within the last three years – have successfully completed an emergency first-aid training course.

4.50 The prospective Competent Person (LV) should attend a formal interview with an Authorised Person (LV) appointed for the system or installations for which the appointment is sought.

4.51 If an Authorised Person (LV) is of the opinion that a Competent Person (LV) is not carrying out work in accordance with this HTM, or is working in an unsafe manner, the Authorised Person (LV) should stop the work, have the equipment or installation made safe and have the Competent Person (LV) removed from the working area.

Note:

In the event of a Competent Person (LV) stepping down from their duties for whatever reason, the Authorised Person should remove them from the Competent Person's register, inform the Authorising Engineer (LV), and collect all equipment and keys issued as part of the Competent Person's (LV) duties.

Suspension of a Competent Person's (LV) duties

4.52 The appointment of a Competent Person (LV) may be suspended or cancelled for reasons of safety by an Authorised Person (LV) who should take the following action:

a. retrieve from the Competent Person (LV) any switchroom key(s) for low voltage systems and any other related items issued under the appointment procedure

b. in the case of cancellation, destroy the original certificate and overwrite all other copies of the certificate with the word "cancelled". This should be followed by the date of cancellation and the signature of the Authorised Person (LV) or Authorising Engineer (LV) responsible for the action

c. note the cancellation on the Competent Person's (LV) 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 (LV) was associated

e. inform in writing the Competent Person (LV), giving the reason for the suspension or cancellation, details of any further training or experience or any further action considered necessary before reappointment, and the expected duration of the suspension

f. arrange a meeting with the Competent Person (LV), where appropriate, to discuss the suspension and, where necessary, the cancellation

g. take the necessary action to ensure alternative cover is provided.

Contractor's Authorised Persons (LV), Competent Persons (LV) and/or Skilled Person (LV)

4.53 Where a contractor has been appointed to provide Authorised Persons (LV) for a system or installation, they should be appointed by the Management as per the Authorised Person appointment procedure outlined in this HTM. The Management should seek the advice of their Authorising Engineer as required.

4.54 Any contractors' Competent Persons (LV) or Skilled Persons (LV) should have adequate education, training, practical skills and familiarisation of the site to fulfil any duty assigned to them. The contractor should provide the Management with a letter of competence detailing their competence which should be stored within the OPM.

4.55 Any Skilled Person (LV) who will be carrying out work on the healthcare site for an extended period of time should be appointed as a Competent Person (LV) as per the appointment procedure outlined in this HTM.

4.56 The Authorised Person (LV) is responsible for ensuring that any Competent Person (LV) or Skilled Person (LV) is of a standard equivalent to that described in Appendix 6 and is familiar with the site and this guidance and the safety guidance handbook.

4.57 If the Management with support from their Authorising Engineer is of the opinion

that a contractor's Authorised Person (LV) and/or Competent Persons (LV) are not working in accordance with the requirements of this HTM, or are working in a dangerous manner, the Management should consult with their Authorising Engineer and appointments should be suspended as per the procedures outlined in this HTM.

4.58 Where a contractor or third party is providing the services of Authorised Person (LV) and/or Competent Person (LV), the contractor or third party should be advised of any suspension or cancellation proceedings and be invited to attend any meetings.

Suspension notices

4.59 Improvement notices and/or prohibition notices for safety breaches on LV electrical systems can be issued by the Authorising Engineer (LV) or regulatory bodies such as the HSE.

5 Demarcation of responsibilities between the Management and others

General

5.1 Whenever there is a division of responsibilities between the Management and others, the Authorised Person (LV) appointed by the Management should issue instructions to other parties, as necessary, to prevent danger. Example documents associated with this Chapter are given in Appendix 2.

5.2 Where a specialist contractor has been appointed under contract or other arrangement by the Management, they should be required to comply with:

a. the Management's electrical safety guidance for low voltage systems

b. the requirements of this HTM or equivalent safety procedures (equal to or better than this HTM) which should be agreed in advance by the Designated Person/SOM, Authorised Person (LV) in conjunction with the Authorising Engineer (LV)

c. any instructions issued by the Management's Authorised Person (LV) in accordance with their electrical safety policy and procedures for low voltage systems.

5.3 Where there is a demarcation of responsibilities between the Management and others, the Authorised Person (LV) is, on relevant matters to Authorised Persons' (LV) duties, to liaise with the other party (or parties) as necessary to avoid danger including defining access protocols to switchrooms.

5.4 Each demarcation of responsibilities should be recorded in writing and precisely described on a diagram. The point of demarcation must be at a cable termination and should be at the outgoing terminals of a switch or circuit breaker. An example demarcation form can be found in Appendix 2.

5.5 Each proposed demarcation of responsibilities should be approved by the Authorising Engineer (LV) before it is finally agreed with the other party (or parties) involved.

5.6 A copy of the diagram should be prominently displayed at each substation and/or switchroom under joint control.

5.7 One copy of the agreement, including the diagram, should be sent to the Authorising Engineer (LV) and another should be placed in the OPM.

5.8 Where another organisation transfers control of electrical danger to the Management for the duration of a contract, the Authorised Person (LV) appointed by the Management to

be in control of the electrical danger should request, from the other organisation, details in writing of any known hazards (including potentially explosive atmospheres, polychlorobiphenyls (PCBs), etc.) that are, or may be, present. A copy of these details should be placed in the OPM and another copy should be given to the Management contractor(s), if appointed.

Note

The other organisation has a duty to provide such details under Section 4 of the Health & Safety at Work etc. Act.

Where the Management provides a supply to (has control of the danger for) another organisation's system or installation (shops, cafeterias, franchised lets, etc.)

5.9 The healthcare organisation is responsible for the supply cable, metering equipment, supply switch and conductors up to the supply terminals of the installation. The healthcare organisation is not responsible for the electrical installation downstream of the supply terminals.

5.10 If the installation is known to be unsafe or likely to cause interference upstream to the system, the supply should be disconnected until all defects are remedied. The Authorised Person (LV) in conjunction with the consumer's electrical responsible person should ensure that a written agreement is available defining the demarcation between the healthcare organisation and the consumer's equipment, indicating boundaries, operation maintenance procedures and protection systems for the equipment. The document should be located in the OPM.

5.11 The Authorised Person(s) (LV) (or, for a new site, the Authorised Person (LV) Designate) should liaise with the other organisation's Duty Holder to agree the point of demarcation and the points of contact for both parties. Once the Authorising Engineer (LV) has approved this, the formal agreement should be drawn up and signed by both parties.

Where the Management does not have control of the danger for a system or installation

5.12 Contractors who are to undertake work or tests on parts of systems or installations for which the Management does not have control of the electrical danger are not required to comply with this HTM, but should comply with the statutory regulations and/or any safety rules and procedures issued by the organisation having control of the electrical danger.

Where contractors are to undertake installation work on an existing system or installation for which the Management has control of the danger

5.13 Before any installation work is undertaken by contractors on an existing system or installation for which the Management has control of the danger, the person responsible for that installation work must liaise directly with the Duty Authorised Person (LV) to ensure that the work is undertaken in accordance with this HTM and that the contractor's risk and method statements be made available prior to commencing the safety programme. The Duty Authorised Person (LV) should retain overall responsibility for the systems and installations. Where contractors or a distribution network operator (DNO) are

carrying out work under their own safety rules, they still need to liaise with the Duty Authorised Person (LV).

For new work before the system or installation is accepted from the contractor

5.14 Prior to the construction period of the contract, the contractor(s) should agree in writing with the Management, the safety measures to be implemented in relation to the works including key provision and access arrangements and appropriate safe systems of work, including testing, switching, commissioning and handover arrangements.

5.15 During the construction period of the contract, the contractor(s) should have control of the management of all aspects of health and safety of the works including electrical danger in accordance with the demarcation agreement and should comply with all relevant statutory regulations. The contractor(s) is not required to comply with this HTM unless they are imposed by the conditions of contract; however, where practicable it is strongly recommended that this HTM is followed to allow for an easier transition to the Management's safe systems of work at handover.

5.16 Where it is known that the Management will accept control of the electrical danger, it is recommended that the Authorising Engineer (LV), in conjunction with the Duty Holder for the site involved, appoints an Authorised Person (LV) to take responsibility for the new systems or installations when they are officially handed to the Management for day-to day operation and maintenance.

5.17 The Authorised Person(s) (LV) should liaise with the contractor's Duty Holder in order to become familiar with the systems or installations for which they will eventually take control of the electrical danger.

5.18 Where the contractor's Duty Holder is responsible for part of a system or installation, the exact extent of the contractor's responsibility should be agreed in writing. This should take the form of a demarcation agreement.

5.19 All electrical test certificates and the appropriate handover certificates for the new installations should be fully completed and signed by the contractor and presented to the Management for review and for formal acceptance by the Management before handover being accepted.

6 General precautions

Security and admittance to switchrooms

6.1 Every site should have a written key procedure and key register as part of the OPM. This should include details on the types of key in use (master key, switchroom/ substation specific keys, etc.) and levels of access permissions including procedure for issuing, returning or cancelling keys (for example, electronic access devices).

6.2 All access doors to each substation, switchroom and enclosure containing low voltage electrical equipment should be kept securely locked when unattended.

6.3 Each switchroom should have dedicated key-suiting to ensure that, where keys are issued to a person(s), access be limited only to the area(s) covered under a safety document (for example, permit to work or limitation of access) issued by an Authorised Person (LV). The key-suiting may incorporate a master key that would grant access to all areas. The use of the master key should be limited to Authorised Person(s) (LV) only. The master key should be kept in the Authorised Person's (LV) key cabinet and there should be some form of access control to allow the Duty Authorised Person (LV) to gain access to the master key in the key cabinet.

Notes:

1. A combination key box may be used in situations where the Authorised Person (LV) considers its use beneficial in managing the system.

2. The combination should be changed whenever it is suspected that the key system has been compromised.

6.4 Where considered appropriate under the safe systems of work, a Competent Person (LV) or Skilled Person (LV) may also be issued with a key to a switchroom to carry out work. The issue and return of the key should be recorded by the Authorised Person (LV) in the key register and LV site logbook.

6.5 Unless in receipt of a safety document, no person other than an Authorised Person (LV) or Competent Person (LV) may enter a switchroom unless they are accompanied by an Authorised Person (LV) or a Competent Person (LV).

6.6 Where the switchroom is provided with an automatically controlled fire protection system, persons entering must be trained for entry into such rooms.

Authorised Persons' office

6.7 The Management should designate an appropriate room suitable for Authorised Persons to undertake their duties as specified in this HTM.

Security of electrical equipment

6.8 All electrical equipment should be secured against unauthorised access and operation. If electrical equipment is not located within a switchroom or other enclosure, access and operation of such equipment should only be by the use of a tool or key.

Availability of electrical supplies

6.9 If the supplies of electricity are to be made unavailable or are to be put at risk via working on stand-by generators or uninterruptible power supplies, the Authorised Person (LV) or Competent Person (LV) responsible for the work should contact the person in charge of the area, and a signed “permission for disconnection” form should be obtained before the equipment is isolated.

Operational keys

6.10 The following will apply:

a. Only Duty Authorised Persons (LV) should have access to the master key to the key cabinet.

b. All other keys to operational locks and padlocks associated with the low voltage equipment should be kept in the key cabinet when not in use. It is important that the key cabinet is kept locked to prevent unauthorised removal of keys.

Lockable document cabinet

6.11 All documents specified in this HTM should be kept in a lockable document cabinet situated in the Authorised Person’s (LV) office. The lockable document cabinet should be kept locked when not in use, and the key kept in the working key cabinet.

Safety locks

6.12 Before a permit-to-work is issued, and before a Competent Person (LV) commences work, safety locks must be applied at all points-of-isolation and where temporary earths are applied.

Safety key-boxes

6.13 A safety key-box as a minimum should have two locks, each of which should have only one key: one key should be issued to the person receiving the safety document and the other key should be retained by the Duty Authorised Person (LV). It should be so arranged that all locks must be released before access can be gained to the contents of the box.

6.14 The number or type of safety key-boxes should be discussed and agreed with the Authorising Engineer (LV):

- when in use, each safety key-box should contain the keys to safety locks associated with only one permit-to-work
- after the safety locks have been applied, and before a permit-to-work is issued, the keys to all the safety locks should be placed in a safety key-box, and both locks of the box should be secured. When the permit is issued, the Authorised Person (LV) should retain the Duty Authorised Person’s (LV) key and give the Competent Person’s (LV) key to the Competent Person (LV)
- the Competent Person (LV) should retain the Competent Person’s (LV) key until the permit-to-work is cancelled or the work suspended.

Dangerous occurrences

6.15 A dangerous occurrence should be reported to the Duty Authorised Person (LV) as soon as reasonably practicable.

6.16 The Authorised Person (LV) should as soon as practicable send a preliminary report of the dangerous occurrence to the Authorising Engineer (LV), the healthcare organisation's safety group and/or ESG.

6.17 Any notifications and reports required to satisfy statutory or other management requirements should be issued.

6.18 Where required, dangerous occurrences must be reported to the Health & Safety Executive in line with the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR).

6.19 Upon instruction from the Management, the Authorising Engineer (LV) should investigate or assist with investigations into each dangerous occurrence and issue a report to the Designated Person. The report should be sufficiently detailed to enable the sequence of events leading to the occurrence to be determined. Where reasonably practicable, the report should include photographs taken before any items of equipment involved in the dangerous occurrence are disturbed. In certain instances the Management may instruct an independent investigation.

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

- the questionable conflict of interests and impartiality of any investigation or subsequent report where it is carried out by those directly involved
- the reliability of evidence involving self-judgement.

Defect notifications

6.21 A defect notification is a written safety instruction in the form of dangerous incident notification (DIN), suspension of operating practice (SOP) or national equipment defect report (NEDeRS) issued via the Energy Networks Association (ENA), notifying of a dangerous occurrence with the potential to alter the normal operating procedures associated with a particular type of equipment.

6.22 A record of all defect notifications is available to NHS Trust estates staff and the Management through NHS England's estates & facilities management team through the NHS Estates Team Collaboration Hub. To access the Hub, email: England.efmportalsubmissions@nhs.net

6.23 Any identified defect that may result in the issue of a DIN, NEDeRS or SOP advised by the ENA must be notified without delay to the Authorising Engineer (LV) as soon as the Authorised Person (LV) on site is made aware. For reporting defects,email: England.mb-defectsandfailures@nhs.net

6.24 On receipt of a defect notification that applies to equipment on site, the Authorised Person (LV) should:

a. inform the Authorising Engineer (LV) and the ESG and in conjunction with the Authorising Engineer notify NHS England of the notification, indicating whether the equipment is included in the local system(s) or installations

b. record the receipt in the LV site logbook and the action taken

c. store a version of the notification signed by all site Authorised Persons (LV) in the OPM

d. arrange for any inspection and remedial work required

e. where considered necessary, fix a defect notification on each item of equipment involved and report the satisfactory completion of any remedial works to the Authorising Engineer (LV).

Temporary earthing equipment

6.25 Proprietary earthing equipment should be used where available. A suitable device designed for the purpose should be used.

6.26 Proprietary earthing equipment should be inspected by the user before and after use.

6.27 A Duty Authorised Person (LV) should inspect proprietary earthing equipment provided by the Management every 12 months, and the inspection recorded in the LV site logbook.

Location of underground cables

6.28 Where it is proposed to carry out excavation work on sites for which Authorised Persons (LV) have been appointed, it is the responsibility of the Duty Authorised Person (LV) to ensure that all underground power cables within the proposed areas of excavation are located and their positions marked before the ground is disturbed.

Note:

Hand digging should be utilised when excavating in the proximity of buried high/low voltage cables. Any party undertaking such work should provide site-specific risk assessments and method statements indicating the safety measures to be implemented.

The HSE's 'HSG47: Avoiding danger from underground services' outlines the potential dangers of working near underground services and gives advice on how to reduce risks. It explains the three basic elements of a safe system of work during excavation:

- planning the work
- locating and identifying buried services
- safe excavation.

6.29 No person should use cable location and tracing devices unless they are competent to do so and have been specifically trained in their use. A certificate should be issued by the instructor on successful completion of the training. A copy of this should be attached to the Competent Person (LV)'s certification placed in the OPM.

6.30 Training in the use of cable location and tracing devices should normally be given by the manufacturers of the equipment, but alternatively it may be given by another training provider, certified and approved as being capable and competent to deliver the training.

Switching methods

Safety switching

6.31 Planned switching on any complex circuit or switching in preparation for the issue of a permit-to-work should be in accordance with the following sequence of events:

a. Write a safety programme (which details all switching and requires notification to users of any disconnections), an isolation and earthing diagram and arrange for another Authorised Person (LV) to check and countersign the safety documents if reasonably practical.

b. Write the programme a reasonable period in advance of the proposed start of the work.

c. Complete the necessary switching and issue of safety documents as detailed in the safety programme. Record times of each switching action/document issue.

d. Enter summary details of the switching undertaken and safety documents issued in the logbook. Reference serial numbers of the safety programme, isolation and earthing diagram and permit(s).

e. On completion of work, cancel the permit-to-work and complete switching to restore supplies to normal as detailed in the safety programme. Record times of each action.

f. File the completed safety programme, isolation and earthing diagram and cancelled safety documents in the OPM, in chronological order.

g. Return the permit-to-work book to the lockable document cabinet located within the Authorised Persons' office.

Fault-switching

6.32 Fault-switching is the switching of the LV network to disconnect a faulty part of the network and restore supply to the remaining healthy part of the system that was affected by the fault. Fault-switching is not emergency switching. Healthcare premises should have stand-by generators and uninterruptible power supply systems (UPS) to enable them to cope with a sudden unexpected loss of supply without an immediate life-threatening situation being created. However, loss of supply is a serious problem which could develop into an emergency – prompt action is therefore required to restore supply.

6.33 If more than one person is switching, one Authorised Person (LV) should be in overall control of the fault-switching and should maintain an accurate record of the operational state of the network. The Duty Authorised Person will direct and sanction all fault-switching.

6.34 The essential steps in fault-switching are:

a. remain calm and assess the situation as it develops

b. record in writing what protection operated as the result of the initial fault

c. inspect all switchgear for signs of distress before operating it

d. plan fault-restoration switching a few steps at a time and write down planned switching before carrying it out. Record all switching activities and times

e. reset lifts, pumps, etc. as required.

Emergency switching

6.35 Emergency switching is switching that is required to remove an immediate threat to life (for example, opening an incoming switch to disconnect supplies to an LV board in which an electrician has accidentally made contact with live busbars).

6.36 Emergency switching, when required, may be undertaken without the need to complete any of the sequence steps detailed for planned or fault-switching.

6.37 Persons who undertake emergency switching should do so in a manner that does not put themselves or others at risk of injury.

Fire protection equipment

Automatic control

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

a. the automatic control must be rendered inoperative by the Authorised Person (LV) and the equipment left on hand-control. A caution sign should 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 (LV) immediately after the persons engaged on the work or inspections have withdrawn from the protected enclosure.

Portable extinguishers

6.39 Only portable fire extinguishers rated for the electrical voltage to be encountered may be used near live electrical equipment, and a safety clearance of at least 1000 mm should be maintained.

6.40 After any explosion or fire, the space should be thoroughly ventilated before entry of personnel, unless suitable breathing apparatus is worn by suitably trained persons.

6.41 Portable firefighting equipment should only be used by staff who are trained and confident in its use and without putting themselves at risk (see also the HTM 05-03 series –'Fire safety in the NHS: operational provisions').

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

6.42 The following points apply:

a. Arrangements for access and work, and the precautions to be taken, should be in accordance with the Confined Spaces Regulations, the HSE's 'Safe work in confined spaces: Confined Spaces Regulations 1997. Approved Code of Practice and guidance L101', local procedures and confined spaces permits.

b. No person at work should enter a confined space to carry out work for any purpose unless it is not reasonably practicable to achieve that purpose without such entry.

c. No safety document should be issued to any Competent Person (LV) for works in a confined space unless the individual(s) are trained, competent and certified to work in confined spaces.

d. The person who manages confined spaces for the healthcare organisation should be consulted when issuing safety documents for work in confined spaces.

e. 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, should be kept locked and the control of keys be maintained in accordance with an approved procedure.

f. For any electrical work within a confined space, safety documentation associated with this HTM should be issued in addition to any safety documents for access to confined spaces.

Cable identification

6.43 Phase conductors in a new installation or an alteration/addition to an existing installation should be coloured as required by BS 7671. Other phase conductors may be brown, black, red, orange, yellow, violet, grey, white, pink or turquoise.

6.44 In a two-or three-phase power circuit, the phase conductors may all be of one of the permitted colours, and either identified L1, L2, L3 or marked brown, black, grey at their terminations to show the phases:

- brown phase – L1
- black phase – L2
- grey phase – L3
- blue (neutral) – N.

Circuit identification

6.45 The NICEIC (National Inspection Council for Electrical Installation Contractors) recommend within distribution boards that the circuit number comes first and then the phase identification:

a. circuit 6 brown phase is marked – 6L1

b. circuit 8 black phase is marked – 8L2

c. circuit 10 grey phase is marked – 10L3

d. circuit 7 blue (neutral) is marked – 7N.

6.46 Circuit identification on drawings should be in the same manner, with the distribution board identification coming first:

a. distribution board LP6 on circuit 6 – LP6/6/L1

b. distribution board L4 on circuit 8 – L4/8/L2

c. distribution board P2 on circuit 10 – P2/10/L2

d. distribution board C6 on circuit 7 – C6/7/N.

Note

Three-phase circuits should be numbered in a similar manner, that is, LP6/6/L1L2L3.

7 Safety precautions and procedures for work on low voltage systems made dead

General

7.1 All work or testing on electrical equipment and conductors made dead should be carried out following the procedures within this Chapter and Tables 1–4.

7.2 Work on low voltage electrical equipment including conductors should be carried out while such electrical equipment and conductors are dead and isolated from all sources of supply and after being proved or confirmed dead at the point-of-work by means of an approved voltage testing device, which should be checked for correct operation before and after use. Exceptions to this rule are for the circumstances described in Chapter 8.

7.3 When work is to be carried out on low voltage equipment made dead, all reasonably practicable steps must be taken to prevent the electrical equipment and/or conductors being made live inadvertently during the work, including locking-off any switchgear, removal of any fuses, links or similar approved methods.

7.4 Making electrical equipment and/or circuit conductors dead or live by means of a signal or prearranged understanding after an agreed interval of time is not an acceptable practice.

Isolation

7.5 In achieving isolation, the following steps should be carried out where reasonably practicable:

a. the application of a safety system to prevent the circuit breaker or switch being closed or fuse replaced whenever the equipment allows its use. Use of special locking devices to allow the use of safety locks is required

b. a visible break in air should be obtained whenever possible

c. a caution sign should be fixed.

Note:

In exceptional circumstances, if isolation of the neutral conductor is required, this should be risk-assessed and advice from the Authorising Engineer (LV) should be sought.

7.6 Circuits to be worked on must be isolated from all known voltage sources including alternative energy sources (wind generators, photovoltaic cells, etc.) and generators or battery systems.

7.7 Competent Persons (LV) may carry out isolations on the load side of a final circuit for

work or testing that is to be conducted by the Competent Person (LV). A permit-to-work is not required. A caution sign and safety lock should be applied at the point-of-isolation. It is recommended that an individual's name is added to the caution sign to aid location of the person in charge of the work.

7.8 The Competent Person (LV) responsible for the work or test should retain any keys to safety locks applied as part of the isolation.

7.9 Where a permit-to-work is not required and isolation is achieved by the removal of fuses or links, and it is not practicable to apply a safety lock, the Competent Person (LV) responsible for the work or test must securely retain the removed fuses or links. A caution sign should be displayed.

7.10 When a permit-to-work is required, the Duty Authorised Person (LV) should isolate any circuits and equipment. All keys to safety locks applied by the Duty Authorised Person (LV) should be held in such a way that the safety locks cannot be removed without the permit-to-work being cancelled and until any safety lock/safety key-box keys held by the Competent Person (LV) have been returned to the Duty Authorised Person (LV):

Example –
(a) Safety key-box with two keys: one for the Duty Authorised Person (LV) and one for the Competent Person (LV).

(b) A multi-lock hasp applied with two safety locks: one key to be held by the Duty Authorised Person (LV) and the other by the Competent Person (LV).

7.11 Caution signs should be securely fixed at all points-of-isolation for the electrical equipment and conductors that have been made isolated and dead, and on which work is to be carried out. Danger signs must be attached where reasonably practicable for any adjacent live circuit conductors (or electrical equipment containing live circuit conductors) that are adjacent to the point-of-work.

7.12 In cases where the work is concerned only with the external earthed metal parts of electrical equipment and no contact can be made with live conductors, or where the connected electrical equipment is physically removed from its normal location, the Authorised Person (LV) may allow some of the measures under paragraphs 7.3 and 7.11 to be omitted providing they are satisfied that the measures taken are still adequate to prevent danger.

Note:

Work on a final circuit can be safely carried out with isolation of all known live conductors at the controlling distribution board fuse-way only – that is, isolation from the known voltage source only – since the likelihood of supply via a generator connected to the same circuit is considered remote. However, work on the busbars of a sub-main switchboard would require isolation of all circuits connected to the board (not just the incomer or known voltage supply), since it is feasible for a generator to be connected to one of the many circuits normally supplied from the sub-main board.

Permit-to-work

7.13 A permit-to-work should be issued on equipment that has been switched off, isolated and made dead, for work:

- on a complex circuit
- on a main or sub-main LV switchboard or distribution board
- on cables
- on stand-by power supplies such as (but not limited to) generators, battery storage systems, UPS systems and solar PV installations
- whenever the Authorised Person (LV) deems it necessary to ensure a safe system of work.

7.14 A permit-to-work should be issued by an Authorised Person (LV) to a Competent Person (LV) or Skilled Person (LV). The permit holder (recipient) should supervise all members of the working party so as to ensure that only work as detailed on the permit is undertaken and that this is done in a safe manner.

7.15 The Duty Authorised Person (LV) should ensure that the recipient who is to receive the permit fully understands all details and safety precautions required to undertake the work safely as detailed on the permit. The Authorised Person (LV) should confirm the recipient's understanding of permit requirements by:

a. fully explaining at the point-of-work where the circuit has been proved dead and all safety precautions that are to be taken

b. listening to the recipient read the permit aloud (permits should be completed in capitals, that is, printed to aid clarity) and confirming accuracy

c. questioning the recipient by asking relevant open questions (those which require more than a simple "yes" or "no" reply).

7.16 A permit-to-work should only be issued after:

a. the electrical equipment/conductors to be worked on have been isolated from all voltage sources and wherever possible the means of isolation secured by locking

b. the equipment/conductors have been proved or confirmed dead at the point-of-work by the Authorised Person (LV) who is to issue the permit in the presence of the recipient who is to receive it

c. the Authorised Person (LV) is satisfied that the potential recipient fully understands all the necessary safety precautions to complete the task as detailed on the permit.

Issue of a permit to work to a contractor

7.17 A contractor's employee may be issued with a permit-to-work, providing the Authorised Person (LV) completes the actions required by this HTM and is satisfied of the capability and competence of the individual. Contractors who are to receive a permit to work should be appointed as Competent Persons (LV) but this may be impractical in all instances. In such cases a permit-to work-may be issued to Skilled Persons (LV) at the discretion of the Authorised Person (LV).

7.18 The Management or any third party who have procured and approved the issue of a contract to a contracting company clearly also has a duty to ensure the capability and competence of the company and its employees.

7.19 The Authorised Person (LV) should have confirmation that checks have been made to determine the satisfactory technical and safety competence of the company and employees by taking into account the requirements of Chapter 4 and Appendix 6.

Safety programmes and isolation and earthing diagrams

7.20 A safety programme together with an isolation and earthing diagram are required for all planned work and/or tests which require the issue of a permit-to-work.

7.21 The safety programme and isolation and earthing diagram should be written by the Authorised Person (LV) who is responsible for the issue of the permit-to-work.

7.22 If the equipment to be worked on is a complex circuit, the safety programme and isolation and earthing diagram should be

countersigned by another Authorised Person (LV) with knowledge of the site and system.

Working on cables

Identification and spiking of LV cables

7.23 Before the conductors of a cable are cut or exposed, a point-of-isolation for the cable and the point-of-work on the cable should be identified with certainty.

7.24 Identification of a mains voltage or street-lighting cable other than at a labelled termination point may be regarded as clear and certain if the cable can be seen throughout its length, or if it can be clearly seen between the point-of-isolation and the point-of-work.

7.25 In the absence of clear and certain identification of a cable, it should be spiked at the point-of-work. Before spiking, it may be necessary to carry out signal injection using the cable cores. Further tests can be repeated after spiking and the results compared. Where only one cable exists in a given location and accurate records indicate that only one cable is present, signal injection may be dispensed with if the Duty Authorised Person (LV) agrees.

7.26 The spiking of cables should only be carried out under the direct supervision of a Duty Authorised Person (LV) and by a person who has been specifically trained in the operation of the equipment to be used.

7.27 Where more than one cable exists on a single route, the Authorised Person (LV) should identify and label the cable to be worked on. All other cables should be regarded as live, and danger signs attached.

7.28 Approved live-working methods may be used as an alternative to spiking. Such work is usually only undertaken by specialist contractors (for example, electricity supply companies). If these methods are used, a certificate of authorisation for live working should be issued in accordance with Chapter 8.

Additional precautions for dead work or testing on generating plant

7.29 When dead work or testing should be carried out on generating plant, paragraphs 7.1–7.12 apply.

7.30 Where possible, any work or test undertaken on generating plant should be carried out with the equipment completely isolated from all sources of supply in accordance with Table 3.

7.31 Where it is not possible for the work or testing to be undertaken dead or it is not possible to completely isolate generating plant from all sources of supply, the guidance in Chapter 8 should be followed.

7.32 When dead work or testing is carried out on generating plant (including combined heat and power plant) and directly connected equipment, the following additional precautions should be taken by personnel competent to carry out the task:

a. the generator should be at rest and isolated from all sources of supply

b. the field circuit must be isolated and locked off where it is energised from a separate supply

c. where motor-driven exciters are provided, the switch controlling the motor should be isolated and locked off

d. the prime mover providing the motive power to the generator, and any associated valves controlling the flow of fuel or steam, should be isolated and locked off

e. in the case of an internal combustion engine prime mover, the starting

equipment should also be made inoperative

f. caution signs should be prominently displayed at all points-of-isolation referred to in (b) and (c)

g. to ensure a safe system of work, the permit-to-work procedures identified in paragraphs 7.13–7.16 should be applied.

7.33 When manual barring gear is to be used on generating plant, a permit-to-work should be issued.

7.34 Generating plant should not be allowed to operate with any part of its protective enclosures (mechanical or electrical) removed – unless for special test purposes when it should be the subject of a risk assessment by an Authorised Person (LV). The risk assessment should establish whether any additional precautions or procedures to those already being implemented are considered necessary to ensure a safe system of work, and these should be confirmed in writing.

Uninterruptible power supply systems

7.35 The Authorised Person (LV) in conjunction with the Authorising Engineer (LV), and where considered necessary the manufacturers of the equipment, should survey each fixed uninterruptible power supply (UPS) system and carry out a risk assessment to document the risks involved and to develop operating procedures to be applied before routine maintenance, minor repairs or major repairs can be carried out. In some instances this may involve live working or, in the longer term, modification to the equipment.

7.36 Where possible, any work or test undertaken on UPS systems should be carried out with the equipment completely isolated from all sources of supply in accordance with Table 4.

7.37 Equipment of this type may be supplied with an internal/external bypass designed to allow automatic changeover to the mains supply in the event of a UPS failure. In some instances, this bypass is arranged to provide a no-break changeover to the mains supply for maintenance, which will not allow the complete isolation of the UPS.

7.38 Where it is not possible for the work or testing to be undertaken dead or it is not possible to completely isolate a UPS system from all sources of supply, the guidance in Chapter 8 should be followed.

Dead working procedures flowchart

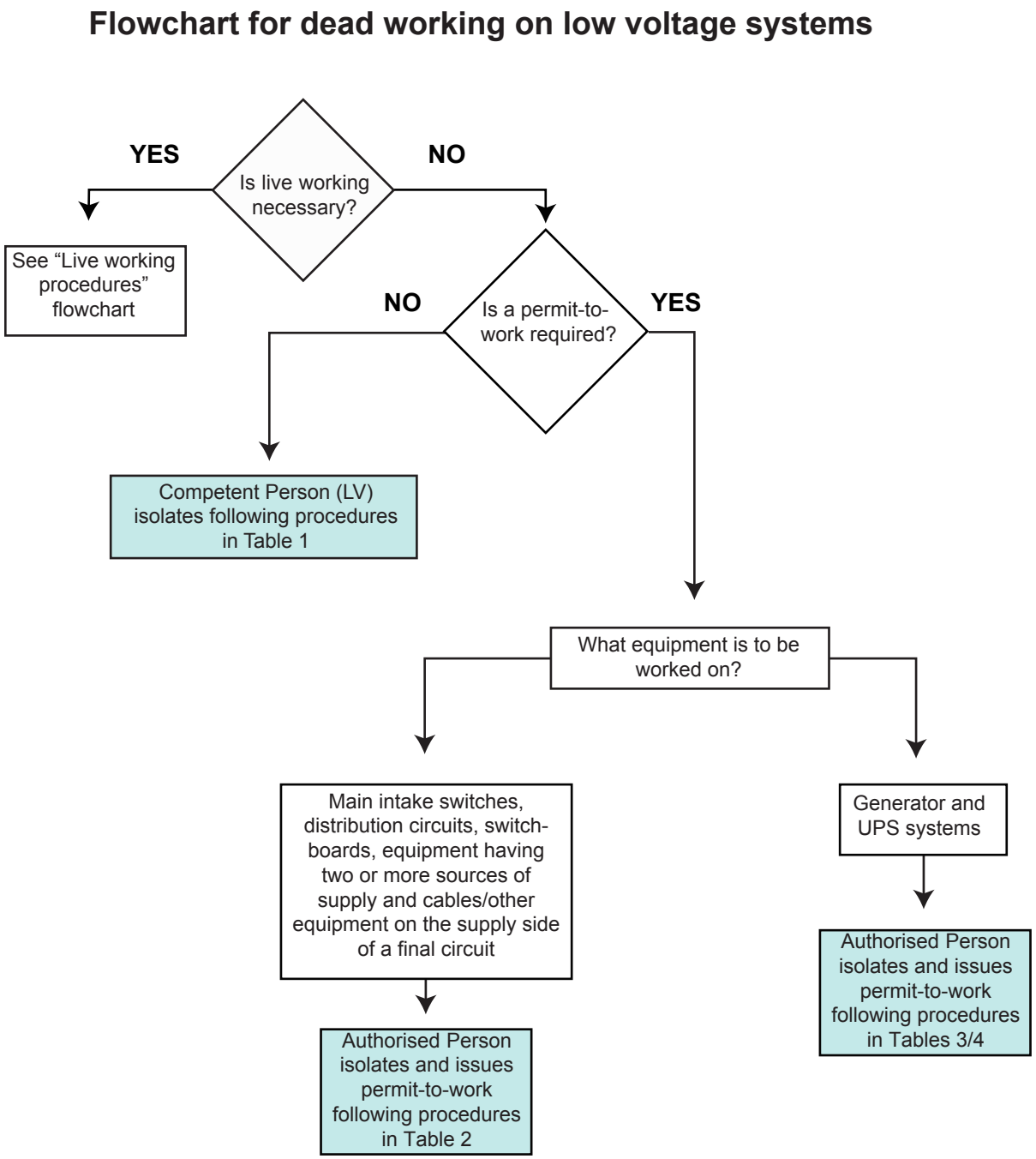


Table 1 Procedures for Competent Persons (LV) working on, or testing, cables and other equipment on the load side of a final circuit

Steps	Procedure
1 Identify and inform	Identify circuit to be worked on. Before any work or testing can begin, permission should be obtained from the person in charge of the area to be affected by the work or testing. See note 2.
2 Isolate and fix signs	(i) Isolate from all sources of supply. (ii) Make equipment safe to work on or test. (iii) Fix caution signs at points-of-isolation and where practicable prevent unauthorised connection or operation by fixing safety locks.
3 Prove dead	(i) Ensure that the equipment to be worked on or tested is the equipment that has been isolated. (ii) Where practicable, prove dead with a voltage test indicator at the places where the work or test is to be carried out.
4 Confirm dead	Where it was not practicable in Step 3 to prove the equipment dead, the Competent Person (LV), using appropriate tools and protective equipment where necessary, should confirm it dead at the point-of-work or test as soon as conductors have been made accessible to a voltage test indicator.
5 Undertake the work or test	Undertake or directly supervise the work or test.

Notes:

1 The Competent Person (LV) is responsible for all tasks.

2. Permission for disconnection to be obtained/confirmed and recorded prior to the commencement of the work.

3 For main intake switches, switchboards, equipment having two or more sources of supply, cables and other equipment on the supply side of a main intake switch, refer to the Authorised Person (LV) (see Table 2).

4 Except where a risk assessment indicates otherwise, equipment operating at extra low voltage is exempt from these procedures.

Table 2 Procedures to be carried out by an Authorised Person (LV) to enable planned work on main intake switches, distribution circuits, switchboards, equipment having two or more sources of supply, and cables and other equipment on the supply side of a final circuit

Steps	Procedure
1 Plan work and prepare safety documentation	(i) Determine the scope of works, prepare and review required risk assessments and any potential control measures and access arrangements that are required as part of the works, and agree potential dates and times with appropriate personnel.* (ii) Prepare a safety programme and an isolation and earthing diagram in duplicate and obtain countersignatures from another Authorised Person (LV) if required. (iii) Before any work can begin, permission should be obtained from the person in charge of the area to be affected by the work or test.
2 Isolate and fix signs	(i) Duty Authorised Person to confirm with the appropriate person(s) in the affected area that the work is authorised to take place. (ii) Isolate from all sources of supply. (iii) Fix caution signs at all the points-of-isolation and where practicable prevent unauthorised connection or operation by fixing safety locks. (iv) Fix danger signs on live equipment adjacent to the point of work or test.
3 Prove dead and earth	(i) Where practicable, prove dead with an approved voltage test indicator at all points of isolation and the point-of-work or test. (ii) If the manufacturer's earthing equipment is available, earth conductors at points-of-isolation and fix safety locks. (iii) Identify cables with certainty or spike underground cables at the point-of-work if the conductors are to be cut or exposed.
4 Issue the permit-to-work	(i) The Duty Authorised Person to clearly identify and/or mark the point-of-work/equipment to be worked on. (i) The Competent Person (LV)/Skilled Person (LV) should be shown the isolation and earthing diagram and the safety arrangements at all the points-of-isolation and at the point-of-work or test. (i) Issue the permit-to-work, isolation and earthing diagram and the Competent Person's (LV) key to the safety key-box to the Competent Person (LV). (i) Complete the LV site logbook as soon as practicable.
5 Confirm dead	Where it was not practicable in Step 3 to prove the equipment dead, the Authorised Person (LV), using appropriate tools and protective equipment where necessary, is to confirm dead at the point-of-work as soon as conductors have been made accessible to an approved voltage test indicator.
6 Undertake the work	The Competent Person (LV)/Skilled Person (LV) is to undertake or directly supervise the work and on completion, or when the work is stopped and made safe, is to return the original of the permit-to-work, the isolation and earthing diagram and the Competent Person's (LV) key to the safety key-box to the Duty Authorised Person (LV), and complete part 3 of the permit retained in the pad.
7 Restore to operational state	Carry out steps required for restoration of supplies. Confirm with person in charge of the area that power is restored back to normal. Complete site logbook and return keys, sign off as Duty Authorised Person. Retain all documents prepared in the OPM.
Notes: The Authorised Person (LV) is responsible for all tasks. * Some works may require approval by the ESG.	

Table 3 Procedures to be carried out by an Authorised Person (LV) to enable planned work on (LV) generators

Steps	Procedure
1 Plan work and prepare safety documentation	(i) Determine the scope of works, prepare and review required risk assessments and any potential control measures and access arrangements that are required as part of the works, and agree potential dates and times with appropriate personnel.* (ii) Prepare a safety programme and isolation and earthing diagram in duplicate and obtain countersignatures from another Authorised Person (LV). (iii) Before any work can begin, permission should be obtained from the person in charge of the area to be affected by the work.
2 Isolate and fix signs	(i) Duty Authorised Person to confirm with the appropriate person(s) in the affected area that the work is authorised to take place. (ii) Inhibit engine start and isolate generator. Where practicable, prevent unauthorised connection, operation or starting by fixing safety locks. (iii) Fix caution signs at all the points-of-isolation and, clearly visible, on the engine start panel. (iv) Where practicable isolate the generator neutral earthing resistor and fix caution sign and safety lock (v) Fix danger signs on live equipment adjacent to the point of work.
3 Prove dead and earth	(i) Where practicable, prove dead with an approved voltage test indicator at all points of isolation and the point-of-work. (ii) If the manufacturer's earthing equipment is available, earth conductors at points-of-isolation, and fix safety locks.
4 Issue the permit-to-work	(i) The Duty Authorised Person to clearly identify and/or mark the point of work/equipment to be worked on. (ii) The Competent Person (LV)/Skilled Person (LV) should be shown the isolation and earthing diagram and the safety arrangements at all the points-of-isolation and at the point-of-work. (iii) Issue the permit-to-work, isolation and earthing diagram and the Competent Person's (LV) key to the safety key-box to the Competent Person (LV). (iv) Complete the LV site logbook as soon as practicable.
5 Confirm dead	Where it was not practicable in Step 3 to prove the equipment dead, the Competent Person/ Skilled Person (LV), using appropriate tools and protective equipment where necessary, is to confirm dead at the point-of-work as soon as conductors have been made accessible to an approved voltage test indicator. Where practicable, earth the conductors after they have been confirmed dead.
6 Undertake the work	The Competent Person (LV)/Skilled Person (LV) is to undertake or directly supervise the work and on completion, or when the work is stopped and made safe, is to return the original of the permit-to-work, the isolation and earthing diagram and the Competent Person's (LV) key to the safety key-box to the Duty Authorised Person (LV), and complete part 3 of the permit retained in the pad.
7 Restore to operational state	(i) Carry out steps required for restoration of supplies. (ii) Confirm with person in charge of the area that power is restored back to normal. (iii) Complete site logbook and return keys, sign off as Duty Authorised Person. (iv) Retain all documents prepared in the OPM.

Notes:

1 Stand-by generating sets started by manual initiation or automatically on receipt of a signal.

2 The Authorised Person (LV) is responsible for all tasks.

* Some works may require approval by the ESG.

Table 4 Procedures to be carried out by an Authorised Person (LV) to enable planned work on UPS systems which can be totally isolated from all sources of supply (including batteries)

Steps	Procedure
1 Plan work and prepare safety documentation	(i) Determine the scope of works, prepare and review required risk assessments and any potential control measures and access arrangements that are required as part of the works, and agree potential dates and times with appropriate personnel. This may require the preparation of a task-specific planning document, which may require approval by the ESG. (ii) Prepare a safety programme and an isolation and earthing diagram in duplicate and obtain countersignatures from another Authorised Person (LV). (iii) Before any work can begin, permission should be obtained from the person in charge of the area to be affected by the work.
2 Isolate and fix signs	(i) Duty Authorised Person to confirm with the appropriate person(s) in the affected area that the work is authorised to take place. (ii) Isolate from all sources of supply. (iii) Isolate mains supply, battery supply, output supply and any standby generator supply. (iv) On parallel UPS systems and those having an external bypass, isolate the output supply terminals of the unit(s) to be worked on from all sources of supply. (v) If the battery installation is to be worked on, follow the rules applicable to work on live equipment, disconnect the battery from its charger and disconnect the battery earth. (vi) Prevent unauthorised connection or unauthorised operation by fixing safety locks and caution signs at points-of-isolation. (vii) Fix danger signs on adjacent live equipment to the point-of-work.
3 Prove dead and earth	(i) Where practicable, prove dead with an approved voltage test indicator at all points of isolation and at the point-of-work. (ii) If the manufacturer's earthing equipment is available, earth conductors at points-of-isolation and fix safety locks.
4 Issue the permit-to-work	(i) The Duty Authorised Person to clearly identify and/or mark the point of work/equipment to be worked on. (ii) The Competent Person (LV)/ Skilled Person (LV) should be shown the isolation and earthing diagram and the safety arrangements at all the points-of-isolation and at the point-of-work. (iii) Issue the permit-to-work, isolation and earthing diagram and the Competent Person's (LV) key to the safety key-box to the Competent Person (LV). (iv) Complete the LV site logbook as soon as practicable.
5 Confirm dead	Where it was not practicable in Step 3 to prove the equipment dead, the Competent Person/ Skilled Person (LV), using appropriate tools and protective equipment where necessary, is to confirm dead at the point-of-work as soon as conductors have been made accessible to an approved voltage test indicator. Where practicable, earth the conductors after they have been confirmed dead.
6 Undertake the work	The Competent Person (LV)/ Skilled Person (LV) is to undertake or directly supervise the work and on completion, or when the work is stopped and made safe, is to return the original of the permit-to-work, the isolation and earthing diagram and the Competent Person's (LV) key to the safety key-box to the Duty Authorised Person (LV), and complete part 3 of the permit retained in the pad.
7 Restore to operational state	(i) Carry out steps required for restoration of supplies. (ii) Confirm with person in charge of the area that power is restored back to normal. (iii) Complete site logbook and return keys, sign off as Duty Authorised Person. (iv) Retain all documents prepared in the OPM.
Notes: 1 Fixed uninterruptible power supply equipment (excluding portable self-contained "plug-in" units). 2 The Authorised Person (LV) is responsible for all tasks.	

8 Safety precautions and procedures for live working and testing low voltage equipment

Work on or near live equipment

8.1 Work or testing on (or near) live equipment which does not require the issue of a certificate of authorisation for live working includes:

a. all forms of testing, fault-finding, maintenance or adjustment where practicalities dictate live working is essential

b. the removal and replacement of fuse carriers in final circuits

c. the removal and replacement of plug-in components

d. servicing of electrical equipment which may include (but not be limited to) UPS, generators, Medical IT systems where practicalities dictate live working is essential

e. basic battery maintenance (cleaning/ topping up only)

f. work on battery systems if less than 25 V and 10 Ah (ampère-hours) (see paragraph 8.15).

8.2 When work of the type referred to in paragraph 8.1 is carried out:

- the extent of the work should be kept to a minimum
- if the equipment is not to IP2X or IPXXB standard, or this cannot be confirmed prior to the work or test being carried out an LW1 should be completed by the Competent Person (LV) carrying out the work or an LW2 issued by a Duty Authorised Person (LV) if the work is being carried out by a Skilled Person (LV)
- approved test equipment to the standard recommended in the HSE's Guidance Note 'GS38: Electrical test equipment for use on low voltage electrical systems' should be used, together with any additional approved safety equipment which significantly reduces the risk of injury.

8.3 Live working other than that specified in paragraph 8.1 should not normally be considered. The Electricity at Work Regulations make it illegal to work on or near live equipment, without first complying with Regulation 14:

"***Regulation 14***

No person shall be engaged in any work activity on or so near any live conductor (other than one suitably covered with

insulating material so as to prevent danger) that danger may arise unless:

it is unreasonable in all the circumstances for the conductors to be dead

and

it is reasonable in all the circumstances for the person to be at work on or near the conductor while it is live

and

suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury."

The above represents a very severe legal test on the need to work live. Dead working should always be the first choice and live working only the very last method chosen when all other possibilities of providing alternative supplies or arranging out-of-hours shut-downs of supply have been carefully evaluated.

8.4 If disconnection of terminals or connectors is required, the work should be carried out dead in accordance with Chapter 7. If the requirements of Regulation 14 are met, a certificate of authorisation for live working is required (see paragraph 8.6).

Note:

It is unlikely that situations will occur in healthcare premises which necessitate live working under the terms of a certificate of authorisation for live working (that is, removal and/or replacement of components with the circuit energised). Live testing, fault-finding or making adjustments are all forms of live working (which can only be undertaken by suitably authorised Competent Persons (LV) and/or Skilled Persons (LV) using appropriate safe methods) but they do not require the issue of a certificate of authorisation for live working, since components are not removed or replaced.

Work on the essential board or final circuits in a critical care area is often offered as an example of a situation which requires live working because of the need to maintain the electrical supply to critically ill patients. However, if careful planning is applied to finding a way of doing the job dead, a solution can be found.

Alternatives may be time-consuming to organise and more expensive than live working, but the electrical risks from shock to those doing the work have been greatly reduced, and this is what the law requires.

Safety precautions and procedures for work on live low voltage electrical equipment and conductors

8.5 Other modes of live working other than those specified in paragraph 8.1 should not normally be considered except where all possible alternatives have been considered and eliminated.

8.6 Authorised Persons (LV) should consult their Authorising Engineer (LV) before undertaking any work (except for work on a battery) which will require them to issue a

certificate of authorisation for live working. Permission should be obtained if a decision is taken to go ahead.

8.7 When this condition applies and live working is deemed essential, it will require specific written authorisation in the form of a certificate of authorisation for live working issued by the Duty Authorised Person (LV) to a Competent Person (LV) or Skilled Person (LV) in accordance with the procedures detailed.

8.8 In all circumstances when work is to be carried out on live low voltage electrical equipment and conductors:

a. suitable precautions may be taken by the use of screening, insulated tools and other appropriate means to avoid danger from inadvertent contact with live circuit conductors or earthed metalwork

b. the persons carrying out the work should satisfy themselves by examination that the precautions taken are adequate and, before use, that the equipment to be used is suitable for the task

c. only approved instruments should be used for electrical, phase rotation or similar measurements

d. adequate means should be provided to prevent unauthorised access to the zone of work, particularly if working on distribution boards in corridors

e. an Accompanying Safety Person should be present who should have adequate knowledge and experience, be trained to recognise and avoid danger and, if necessary, render assistance in the event of an emergency.

8.9 Any person authorised for live working must be a Competent Person (LV) or a Skilled Person (LV) who is competent to carry out the work or task.

8.10 Form LW1 should be completed by the Duty Authorised Person (LV) before any live work or testing takes place where a certificate of authorisation for live working is to be issued. A copy of the LW1 form should be attached to the certificate of authorisation for live working.

Precautions for working on battery installations

8.11 The output from the battery should be isolated when working on the equipment it supplies unless for safety reasons the battery output needs to be instantly and permanently available. The battery charger should be isolated.

8.12 Where it is necessary to use tools for working on a battery, they should be of an approved insulated type.

8.13 The requirements to implement any or all of the precautions for work on live equipment as detailed in paragraphs 8.1–8.2 to control maintenance work on battery installations should be determined by an Authorised Person (LV).

8.14 All work and testing on batteries other than simple maintenance (for example, topping up electrolyte levels) should be carried out in full accordance with the precautions detailed in this HTM.

8.15 For work on batteries less than 25 V and 10 Ah, Authorised Persons (LV) should undertake a risk assessment of individual installations and issue local instructions if considered appropriate. When working on any battery system, care should be taken to prevent short-circuiting terminals.

8.16 For work on batteries/battery strings above 25 V and/or 10 Ah, the work should be completed under a certificate of authorisation for live working. Authorisation from the Authorising Engineer for the work to proceed is not required.

8.17 Work which may involve a source of ignition must never be undertaken near an enclosed cell or battery unless adequate precautions have been taken to eliminate any risk of danger or injury.

8.18 Where any work is to be carried out near, or directly over, a battery installation, specific precautions should be taken to prevent the potential risk of danger or injury which could result from any accidental short-circuiting of the battery terminals.

8.19 A supply of sterile water to allow flushing of the eyes should be available during the course of the work.

8.20 Personal protective equipment identified as being required on the risk assessment (for example, this may include face visor, acid-resistant gloves and apron) should be worn during the work.

8.21 In all cases of burns, medical attention should be obtained.

Live working safety documents

LW1 – Self-check safety precautions

8.22 An LW1 should be completed by a site-appointed Competent Person (LV) prior to carrying out any live work, testing or inspection on or near live equipment as described in paragraph 8.1. If a Skilled Person (LV) is to undertake the work or test, then an LW2 should be issued to the Skilled Person (LV) by a Duty Authorised Person (LV).

8.23 An LW1 should be completed by the Duty Authorised Person (LV) when a certificate of authorisation for live working is issued.

8.24 The LW1 should be attached to the certificate of authorisation for live working and retained in the OPM while the work is being carried out.

LW2 – Authorisation for inspection, testing and work on or adjacent to live electrical equipment at low voltage

8.25 The LW2 should be issued by the Duty Authorised Person (LV) to a Skilled Person (LV), competent to carry out the work or task. The recipient should immediately supervise all members of the working party so as to ensure that only work as detailed on the LW2 is undertaken and that this is done in a safe manner. An Accompanying Safety Person should be present while work is undertaken under an LW2.

8.26 The Duty Authorised Person (LV) should ensure that the person who is to receive the LW2 fully understands all details and safety precautions required to undertake the work/ testing safely as detailed on the LW2.

Certificate of authorisation for live working

8.27 A certificate of authorisation for live working should be issued for live work on or near live electrical equipment not included within paragraph 8.1 and where the requirements of Regulation 14 of the Electricity at Work Regulations are met, with authorisation from the Authorising Engineer (LV).

8.28 A certificate of authorisation for live working should be issued by a Duty Authorised Person (LV) to a named Authorised Person (LV) or a Competent Person (LV) or Skilled Person (LV). The recipient should only carry out work as detailed on the certificate of authorisation for live working.

8.29 The Duty Authorised Person (LV) should ensure that the person who is to receive the certificate of authorisation for live working understands all details and safety precautions required to undertake the work safely. The Duty Authorised Person (LV) should confirm

the recipient's understanding of the requirements by:

a. listening to the recipient read the certificate aloud (safety documents should be completed in capitals, that is, printed to aid clarity) and confirming accuracy

b. questioning the recipient by asking relevant questions (those which require more than a simple "yes" or "no" reply).

8.30 A certificate of authorisation for live working should only be issued after:

c. authorisation in writing from the Authorising Engineer (LV) has been given for the work

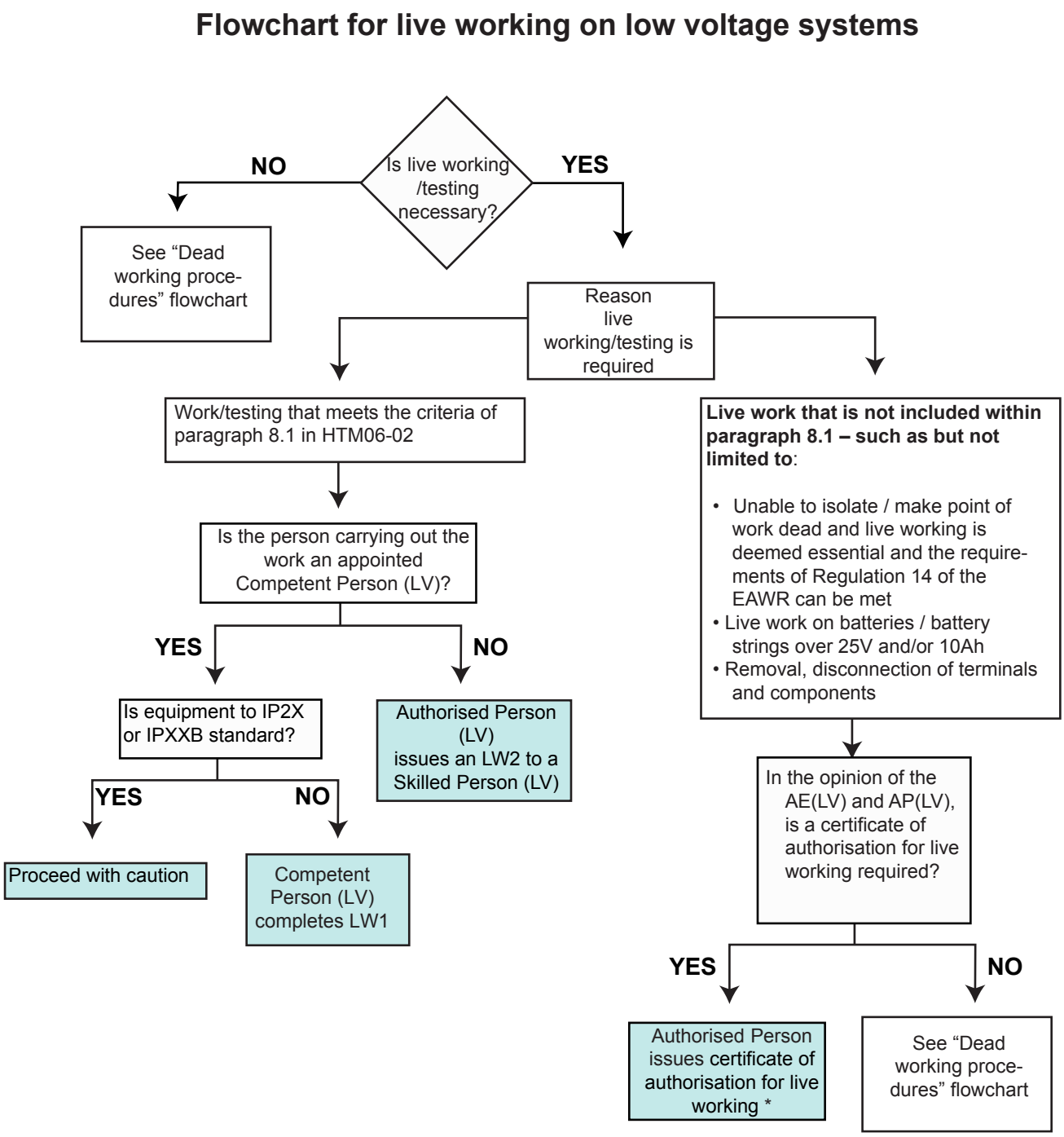
d. an LW1 has been completed by the Duty Authorised Person (LV)

e. the Duty Authorised Person (LV) is satisfied that the potential recipient fully understands all the necessary safety precautions to complete the task as detailed on the certificate

f. the Management have approved the issue of the contract to the contracting company and has ensured the capability and competence of the company and its employees

g. the Duty Authorised Person (LV) has been given confirmation that checks have been made to determine the satisfactory technical and safety competence of the company by taking into account the requirements of Chapter 4 and Appendix 6.

Live working procedures flowchart



* An LW1 should also be completed by the Duty Authorised Person and attached to a certificate of authorisation for live working when issued.

Live work/testing: scenarios when live/testing documents should be used

Regulation 4(2) of the Electricity at Work Regulations says:

"As may be necessary to prevent danger, all systems shall be maintained so as to prevent, so far as is reasonably practicable, such danger."

Inspection and, where necessary, testing of equipment is an essential part of any preventive maintenance programme. Practical experience of use may indicate an adjustment to the frequency at which preventive maintenance needs to be carried out. Ultimately under the Regulations it is the Duty Holder who is responsible for safety of the electrical installation at work.

This Duty Holder may be identified with specific responsibility within the organisation such as the Designated Person, SOM or Authorised Person (LV).

8.31 Live work/live testing may be required as part of maintenance and/or testing. Table 5 shows typical examples of these tasks and the documents that should be used in each case. It does not cover every eventuality that may be encountered, and where there is any doubt, the Authorised Person (LV) should consult with the Authorising Engineer (LV) to determine the appropriate action.

8.32 Live work or testing must only be carried out when the requirements of Regulation 14 of the Electricity at Work Regulations are met.

Table 5 Example scenarios of when to use LW1 and LW2

Live work/testing safety document	Examples of when document would be used
LW1: **Completed by a Competent Person (LV)**	• Live testing of final circuits (e.g. earth fault loop impedance, RCD/RCBO testing, fault-finding) when being carried out by a Competent Person (LV) and where live conductors are exposed and equipment is not to IP2X. • Live testing or inspection inside a final distribution board which requires the removal of covers when being carried out by a Competent Person (LV). • Thermal imaging survey (no contact with live parts by test equipment) when carried out by a Competent Person (LV).
LW1: **Completed by an Authorised Person (LV)**	• When an Authorised Person (LV) is carrying out the duties of a Competent Person (LV). • An LW1 should be completed by the Duty Authorised Person (LV) when a certificate of authorisation for live working is to be issued.
LW2: **Issued by a Duty Authorised Person (LV)**	• Live testing of final circuits (e.g. earth fault loop impedance, RCD/RCBO testing) when being carried out by a Skilled Person (LV) and where live conductors are exposed and equipment is not to IP2X. • Live testing or inspection inside a final distribution board which requires the removal of covers when being carried out by a Skilled Person (LV). • Thermal image survey (no contact with live parts by test equipment) when carried out by a Skilled Person (LV). • When a Skilled Person (LV) is to carry out service inspections, fault-finding or call-outs to equipment where it is not possible to isolate the supplies such as on UPS systems, generators or Medical IT systems.
Certificate of authorisation for live working: **Issued by a Duty Authorised Person (LV) with written consent from their Authorising Engineer (LV)**	• Should only be issued by a Duty Authorised Person (LV) for specified live work that is not included within paragraph 8.1, with written permission from the Authorising Engineer (LV). • Work on batteries/battery strings above 25 V and/or 10 Ah being carried out by a Competent Person (LV), Skilled Person (LV) or named Authorised Person (LV). • In circumstances where an Authorised Person (LV) with agreement from the Authorising Engineer (LV) agrees that a specific task does not fall within the list of live work or tests within paragraph 8.1 but the work needs to be carried out live and the requirements of Regulation 14 can be met.

9 Work on a low voltage system associated with a high voltage system

9.1 Where work on a low voltage system requires a high voltage system to be made dead to allow such work, the guidance given in HTM 06-03 – 'Electrical safety guidance for high voltage systems' should also be applied.

9.2 Where work on an LV system requires isolation of an HV system operated by a third party, the Authorised Person (LV) should apply his lock to the key-box and obtain a certificate of isolation from that party before issuing the LV permit-to-work. This should be recorded in the safety programme and logbook.

9.3 When work on a low voltage system requires a high voltage system to be made dead, isolated and earthed in order to allow such work, an LV permit-to-work should be issued for work on the low voltage system. This permit and associated safety documents should include the isolation and earthing that has been carried out on the HV system in order to make the equipment safe.

9.4 If work on any low voltage system is to be carried out concurrently with work on a high voltage system for which an HV permit-to-work has been issued, and the low voltage work can only be done while the high voltage system remains isolated, dead and earthed:

a. a separate permit-to-work should be issued for the low voltage work

b. the permit-to-work issued for the low voltage work should detail the equipment made safe for the work to proceed

c. cross-reference should be made on both permits to the existence of the other permit, quoting the relevant serial number together with the use of appropriate safety key-boxes and application of locks as deemed necessary.

10 Operating records

In order to support the NHS's commitment to digital transformation and transfer to a paperless NHS, electronic versions of the safety documents, operating records and filing systems referred to in this HTM should be considered. Where implemented, they should be of at least an equal standard to that outlined in this HTM.

General

10.1 For each site for which Authorised Persons (LV) have been appointed, records should be kept as listed in the following sections. These records should be accurate and kept up-to-date.

10.2 All documentation for the site should be kept within the folder as appropriate either permanently or for a period of three years as indicated. Thereafter, the documents should be archived.

LV site logbook

10.3 For each site for which Authorised Persons (LV) have been appointed, an LV site logbook should be available.

10.4 The logbook should be clearly and indelibly marked with the name of the site, the location and the system or installation to which it refers, and should be kept in the lockable document cabinet when not in use.

10.5 The logbook should be retained by, and all entries should be made by, the Duty Authorised Person (LV) appointed for the particular geographical area.

10.6 Entries should be made in chronological order, each entry being ruled off with a horizontal line across the page. Entries should show:

a. a record of the Authorising Engineer's (LV) annual audit visit signed by the Authorising Engineer (LV)

b. the acceptance and relinquishing of responsibility of Duty Authorised Persons' responsibilities between Authorised Persons (LV)

c. the removal, return and transfer of the Authorised Person's (LV) key from the Authorised Person's (LV) key-box

d. the issue and return of any switchroom key

e. the issue, cancellation, loss or withdrawal of a safety document

f. the receipt, termination and remedial action associated with a defect notification

g. the issue of the HTM 06-02 electrical safety handbook

h. a summary of the operation of any automatic switching sequence including unforeseen events/incidents which affect the receipt, transmission or supply of electrical power to the healthcare organisation

i. generator on-load testing and load-bank testing

j. the annual inspection of protective equipment, test equipment and the six-monthly inspection of portable earthing equipment

k. switching operations of low voltage switchgear and the reasons that are not included in a safety programme.

10.7 On relinquishing their duties, the Authorised Person (LV) should double-underline the final entry.

10.8 Completely filled logbooks should be retained in the lockable document cabinet for a period of three years after the date of the last entry.

Operational procedures manual (OPM)

10.9 For each site for which Authorised Persons (LV) have been appointed, a folder entitled "Operational procedures manual" (OPM) should be prepared. Note that this may constitute several files.

10.10 The folder should be clearly and indelibly marked/named with the name of the site, location, system or installation to which it refers and should be kept in the lockable document cabinet when not in use.

10.11 An electronic version of the OPM should constitute the same details as a hard-copy/folder OPM. This should be agreed with the ESG on recommendation of the Authorising Engineer (LV). A document should be available detailing the file location(s) for the digital information.

10.12 The OPM should contain, in separate sections, a copy of each of the following:

a. the healthcare organisation's letter of appointment and certificate of appointment issued to the Authorised Person (LV), or a contractor's Authorised Person (LV)

b. the healthcare organisation's letter of appointment issued to the Authorising Engineer (LV)

c. certificate of appointment issued to a Competent Person (LV), or – for the contractor's Competent Person (LV) – a register of Competent Persons (LV) including details and dates of training, issue dates and review dates of certificates

d. records of the Skilled Person's (LV) competence checks

e. RAMs for any maintenance and inspections on LV equipment

f. the site switchgear and transformer schedule detailing the manufacturer, type, serial numbers, protection settings, maintenance dates and frequency of maintenance completed/expected

g. the site discrimination/protection study and a log of actions taken as a result of alterations to the system

h. an index of the current as-installed drawings of the electrical system(s) indicating switchroom locations

i. a log of received and cancelled defect notifications and the actions taken

j. inspection report and details of any remedial work undertaken in connection with a defect notification

k. demarcation agreements with other organisations

l. demarcation agreements with contractors and/or a DNO

m. any operational agreements with a DNO (COMA)

n. the original copy of every approved and completed safety programme, isolation and earthing diagram, cancelled

permit-to-work and certificate of authorisation for live working (including copies of RAMS associated with the work) and any completed and subsequently not used. All should be clearly identified in date order within the OPM and recorded in the LV site logbook

o. details of protective equipment, test equipment and portable earthing equipment kept within the establishment, including specifications, operators' or users' instructions, maintenance instructions and, where appropriate, calibration records

p. audits carried out in accordance with this HTM and associated action plans

q. valid standard operating procedures and local house rules

r. current copy of the electrical safety policy

s. any other document deemed relevant by the Authorising Engineer (LV) and Authorised Person (LV).

10.13 Each document added to a section of the OPM should be sequentially numbered.

10.14 Documents in the OPM should be retained for a period of three years after the date of their cancellation or termination and thereafter archived.

10.15 The OPM should also contain a reference copy of the current edition of HTM 06-02, Electricity at Work Regulations and any standards associated with the installation (or details of where the electronic version is accessible).

Operating and maintenance manuals

10.16 For each geographical area of responsibility for which Authorised Persons (LV) have been appointed, one or more folders/electronic files entitled "Operating and maintenance manual" should be prepared.

10.17 The folder should be clearly labelled with the name of the site, location, system, installation or equipment to which it refers, and kept in the lockable document cabinet when not in use.

10.18 The folder as a minimum should contain:

a. manufacturers' maintenance and operating instructions for each type of low voltage distribution switchgear installed in the system or installation, with test certificates and relevant records

b. a copy of any action taken to remediate equipment following the issue of any current defect notifications (NEDeRS, DIN or SOP) applicable to any equipment installed in the system or installation

c. a copy of the current "as-installed" drawings of the system(s)

d. details of the maximum system fault levels and any changes to them (informed by the DNO)

e. a switchgear schedule of all major switchgear including details of fuse-link types and ratings, relay settings and protection settings complete with maintenance records and frequencies

f. a schedule of all secondary and tertiary installations (UPS, batteries, generators, protection, control, etc.) with locations, dates of installation/ change.

10.19 An electronic version of the manual should include the same details as a hard-copy folder.

Maintenance records

10.20 All maintenance records are of value in establishing the frequency of maintenance.

Therefore, careful note should be taken of relevant items each time maintenance is performed.

10.21 Electronic records of all documentation should be recorded and maintained.

10.22 Maintenance records should be initiated when the equipment is installed and should contain at least the following information:

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

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

c. dates of last maintenance operation and note of the operation counter reading at that time (if fitted), or an estimate of the number of operations

d. the type of maintenance carried out and the date when the next expected maintenance is due

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

f. any special safety requirements, relating to the operation of installed equipment.

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

Safety documentation

10.24 Prior to any planned works or tests being carried out, the Duty Authorised Person (LV) should obtain all the necessary risk assessment method statements (RAMS) from contractors for review.

10.25 A permission for disconnection should be obtained and signed by the person in charge of the area to be affected prior to the execution of any planned work.

10.26 On completion of all works, all the associated documentation (for example, RAMS, permission for disconnection) should be retained in the OPM with the corresponding safety documentation.

10.27 In instances where it is deemed appropriate, the Authorising Engineer may, in the absence of a countersigning Authorised Person (LV), countersign safety documentation.

10.28 If electronic safety documents are used/to be used, then they should match the templates in Appendix 2. Authorisation should be given by the ESG and the Authorising Engineer (LV) if electronic safety documents are used/to be used.

Isolation and earthing diagram

10.29 All original copies of completed isolation and earthing diagrams should be retained in the OPM for three years following the date of implementation.

10.30 The duplicate of the isolation and earthing diagram should remain in the pad.

10.31 An isolation and earthing diagram should be prepared before a permit-to-work is issued. The isolation and earthing diagram should illustrate the safety arrangements that have been implemented at the points-of-isolation and the place/point of work to make the equipment safe for the execution of the work or test.

10.32 The isolation and earthing diagram will be printed in black on pale green paper. It will have an original and a duplicate of each page and each page of a diagram will bear the same pre-printed serial number. Pads of numbered forms must be used in sequence.

Content of isolation and earthing diagram

10.33 An isolation and earthing diagram should show:

a. the name, signature and date of the originating Authorised Person (LV)

b. the name, signature and date of the countersigning Authorised Person (LV)

c. the serial number and date of the safety programme and permit-to-work

d. the purpose of the proposed work or test

e. the equipment that the proposed sequence of operations will make safe for the work or test to be undertaken

f. a sketch including:

(i) the cables and equipment to be worked on or tested

(ii) the points-of-isolation where safety locks and caution signs are fitted

(iii) the points-of-earthing including additional earths

(iv) the points-of-work or test

(v) any danger signs fitted.

Implementing the isolation and earthing diagram

10.34 The Duty Authorised Person (LV) should note on the original copy of the isolation and earthing diagram the serial numbers of the safety programme and the permit-to-work to enable them to be cross-referenced.

10.35 The Duty Authorised Person (LV) should show the isolation and earthing diagram to the Competent Person (LV) indicating the safety arrangements at the points-of-isolation and earthing at the point(s) of the work or test. The Competent Person (LV) should initial the document to indicate an understanding of the safety arrangements in place.

10.36 The isolation and earthing diagram should then be attached to the permit-to-work before being issued.

On completion of the work or test

10.37 On completion, the original isolation and earthing diagram should be placed in the OPM, with the corresponding cancelled permit, safety programme and relevant documents.

10.38 If the Competent Person (LV) has lost the original of the isolation and earthing diagram, the loss should be recorded in the LV site logbook by the Duty Authorised Person (LV). The Competent Person (LV) should countersign the duplicate to confirm the loss of the original.

Safety programme

10.39 All original copies of completed safety programmes should be retained in the OPM for three years following the date of implementation.

10.40 The duplicate of the safety programme should remain in the pad.

10.41 Before any permit-to-work is issued, a safety programme, detailing the intended sequence of safety operations to be performed to make the equipment safe for the execution of the work or test, should be prepared.

10.42 A safety programme should be printed in black on pale-green paper. It should have an original and a duplicate of each page, and each page of the safety programme should bear the same pre-printed serial number of the first page. Subsequent serial numbers should be crossed out.

10.43 Pads of numbered forms should be used in sequence.

Content of the safety programme

10.44 The safety programme should be completed in duplicate by the Duty Authorised Person (LV) who will be responsible for issuing the permit-to-work and should indicate:

a. confirmation, where applicable, that prior notification has been given to persons and/or departments who will be affected by the proposed operations and that contingency plans, where required for critical care areas, can be implemented in an emergency

b. the name and signature of the originating Duty Authorised Person (LV)

c. the name and signature of the countersigning Authorised Person (LV)

d. the date the countersigned programme is to commence

e. the purpose of the proposed work or test

f. the equipment that the proposed sequence of operations will make safe for the work or test to be undertaken

g. the sequence of operations to be undertaken up to and including the issue of a permit-to-work

h. the location, including any name and identification code, at which each operation is to be performed

i. the identity of each item of equipment to be operated (this should be what is stated on the local label on the switchgear or alternatively the generic type, manufacturer's name and type reference)

j. the operation to be performed and the reason for the operation

k. any "items required" (for example, keys, locks, safety signs, protective equipment, handles, documents, etc.)

l. the requirement for an Accompanying Safety Person (LV) for a specific operation

m. any intended special instructions or safety measures to be included on the permit-to-work

n. issue of permit-to-work

o. the sequence of operations to be undertaken following the cancellation of the permit-to-work or certificate of isolation and earthing up to and including reinstatement of the system to normal operational status, including live voltage and phasing tests

p. acceptance and relinquishing of a certificate of isolation from a third party in control of the system, if applicable.

10.45 When a safety programme has been completed, if a countersignature is required, it should be countersigned by another Authorised Person (LV) who has a detailed working knowledge of the particular system involved.

Implementing the safety programme

10.46 Before commencing the sequence of operations detailed on the countersigned safety programme, the Duty Authorised Person (LV) should confirm that the person(s) responsible for the day-to-day operational management of the areas to be affected by the intended work or test are fully aware of the effect this will have on the electrical supplies to the affected area.

10.47 The Duty Authorised Person (LV) should refer to the original of the safety programme while carrying out the sequence of operations detailed on the programme. Subsequent pages of a safety programme should bear the serial number of the first page. Subsequent serial numbers should be crossed out.

10.48 The Duty Authorised Person (LV) should note on the original and duplicate copy of the

safety programme the date and time of each switching operation.

10.49 The serial number of the isolation and earthing diagram and permit-to-work should be entered on the safety programme.

Completion of the safety programme

10.50 On completion of the sequence of operations detailed on the safety programme, a summary should be entered in the LV site logbook. This summary should include the safety programme serial number, start and finish times, and reason.

10.51 On completion, the original safety programme should be retained in the OPM with the corresponding permit, isolation and earthing diagram and relevant documents and be retained for three years following the date of implementation.

Permit-to-work

10.52 A permit-to-work should be printed in black on pale-blue paper. It should have an original and a duplicate page for part 1 and a single page for parts 2, 3 and 4. Each page of a permit should bear the same serial number. Pads of numbered forms should be used in sequence.

10.53 Only one pad of permit-to-work forms should be used for the geographical area for which an Authorised Person (LV) has responsibility.

10.54 When not in use, the pads of permit-to-work forms should be kept in the lockable document cabinet in the Authorised Person's (LV) office.

Issue and acceptance of permits-to-work

10.55 A permit-to-work should not be issued for any item of equipment, installation or system for which an existing permit-to-work remains valid, nor for any installation which is within an area for which a limitation-of-access exists unless a risk assessment indicates that it is safe to do so.

10.56 A permit-to-work should only be issued to Competent Persons (LV) but may be issued to Skilled Persons (LV) at the discretion of the Duty Authorised Person (LV).

Note:

Issuing a permit-to-work to a Skilled Person (LV) involves the steps in paragraphs 10.56-10.70.

10.57 Duty Authorised Persons (LV) undertaking tasks requiring a permit-to-work to be issued should have the document issued by another site-certified Authorised Person (LV). The Authorised Person (LV) receiving the safety document then becomes the Competent Person (LV).

10.58 Permits-to-work with the isolation and earthing diagram attached should be issued at the location of the work to be undertaken. The issue and cancellation of every permit should be recorded in the LV site logbook.

10.59 Before offering a permit-to-work to a Competent Person (LV), the Authorised Person (LV) should:

a. physically identify by marking clearly to the Competent Person (LV) the equipment to be worked on

b. show the Competent Person (LV) the safety arrangements at the points of isolation and point of work indicated on the isolation and earthing diagram. The Competent Person (LV) should initial the isolation and earthing diagram to confirm their understanding

c. ensure the Competent Person (LV) is aware of the exact extent of the work to be undertaken

d. draw the attention of the Competent Person (LV) to any special instructions

or safety measures noted in part 1 of the permit

e. demonstrate to the satisfaction of the Competent Person (LV) that the equipment is dead and safe to work on.

10.60 For low voltage equipment, where it is not practical to prove the equipment dead before issuing a permit-to-work, the Duty Authorised Person (LV), having issued the permit, should remain with and supervise the Competent Person (LV) until conductors have been made accessible to a suitable low voltage potential indicator (or voltage test indicator for proving dead at the low voltage conductors of a transformer). The Duty Authorised Person (LV) is then, without any delay, to confirm the equipment dead by means of an approved voltage testing device, which should be checked for correct operation before and after use before allowing the Competent Person (LV) to assume control of the work.

10.61 Before the permit-to-work is accepted, the Competent Person (LV) – having understood the work to be undertaken and being prepared to carry it out – should sign to accept any special instructions or safety measures noted in the permit and should complete and sign parts 1 and 2.

10.62 The Duty Authorised Person (LV) retains the duplicate of part 1 with parts 2, 3 and 4 in the permit pad.

10.63 After accepting the permit-to-work and the Competent Person's (LV) key to the safety key-box, the Competent Person (LV) becomes responsible for personally supervising or undertaking the defined work.

10.64 The Competent Person (LV) should not leave the location of the work to undertake other work or tests while the defined work is in progress.

10.65 During any temporary absence of the Competent Person (LV) from the location of the work, the work should be suspended, the key to the safety key-box returned and adequate safety precautions taken until the work is resumed on the return of the Competent Person (LV).

Cancellation of the permit-to-work

10.66 Having completed the work, withdrawn all persons, materials, instruments and tools from the location of the work, and advised all persons associated with the work that it is no longer safe to work on the equipment, the Competent Person (LV) should complete and sign part 3 of the permit retained in the pad, and return the original of part 1 along with the key to the safety key box to the Authorised Person (LV).

10.67 Where the work has been suspended, the same procedures apply, but in addition the Competent Person (LV) confirms that the equipment has been made safe pending the issue of another permit-to-work from the Duty Authorised Person (LV).

10.68 Upon completion of the work, the Duty Authorised Person (LV) should check that the work has been satisfactorily completed and that the equipment is safe to return to an operational state.

10.69 The Duty Authorised Person (LV) should then cancel the permit by marking the original part 1 as "cancelled" and storing it in the OPM and completing and signing part 4 of the permit retained in the pad.

10.70 On completion, the original permit should be retained in the OPM with the corresponding safety programme, isolation and earthing diagram and relevant documents and be retained for three years following the date of implementation. The duplicate page should be retained in the pad.

10.71 If the Competent Person (LV) has lost the original of part 1 of the permit, the loss should be recorded by the Authorised Person (LV) in part 4 of the permit in the pad and in the LV site logbook.

10.72 The Competent Person (LV) should countersign part 4 to confirm the loss of the original. The loss of a permit should be reported to the Authorising Engineer (LV).

10.73 Completed pads of permit forms should be retained in the lockable document cabinet for three years after the date of cancellation of the last permit issued from the pad.

Limitation-of-access

10.74 In an area or location that is normally under the control of the Authorised Persons (LV) for electrical safety reasons, a limitation-of-access may be issued by the Authorised Person (LV) for any specified task other than one for which a permit-to-work is required.

10.75 A limitation-of-access should be printed in black on buff paper.

10.76 It should have an original and a duplicate page for part 1 and a single page for parts 2, 3 and 4. Each page of a limitation-of-access will bear the same serial number. Pads of numbered forms should be used in sequence.

10.77 Only one pad of limitation-of-access forms should be in use for each geographical area for which an Authorised Person (LV) has been appointed.

10.78 When not in use, the pads of limitation-of-access forms should be kept in the lockable document cabinet.

Issue and acceptance of limitations-of-access

10.79 A limitation-of-access may be offered to a person of any discipline or specialism who is competent to personally execute the work or to supervise the execution of the work by others.

10.80 Before issuing a limitation-of-access, the Duty Authorised Person (LV) should positively identify the scope and limits of the work to be carried out and the physical extent of the work at the location.

10.81 A limitation-of-access should be issued at the place where the work is to be undertaken. The issue and cancellation of every limitation-of-access should be recorded in the LV site logbook.

10.82 Before offering a limitation-of-access to the person carrying out the specified tasks, the Authorised Person (LV) should:

a. accompany and show that person the location where the work should be undertaken

b. confirm with that person who is carrying out the specified tasks in detail the exact extent of the work activities to be undertaken, including the scope and limits

c. indicate to the that person all items of live electrical equipment in or adjacent to the working area that are to be identified by danger signs

d. draw to the attention of that person any special instructions or safety measures noted in part 1 of the limitation-of-access, and indicate the safety measures that have been applied by the Authorised Person (LV).

10.83 Before accepting a limitation-of-access, the person carrying out the specified tasks – having understood the scope, extent and limits of the work to be undertaken, and being prepared to undertake it – should sign to accept any special instructions or safety measures noted in part 1 and should complete and sign parts 1 and 2. The Duty Authorised Person (LV) retains the duplicate pages of part 1 with parts 2, 3 and 4 in the limitation-of-access pad.

10.84 On accepting the limitation-of-access, that person (now the recepient) becomes responsible for undertaking or supervising the work for which the access is required.

10.85 The recipient of the limitation of access should not leave the location of the work or undertake any other activities while the work is in progress.

10.86 A limitation-of-access should be issued at the location of the work to be undertaken. The issue and cancellation of every limitation-of-access should be recorded in the LV site logbook.

10.87 Provided that a risk assessment indicates that it is safe, a limitation-of-access may be issued for work to be undertaken in an area or location containing an item of equipment for which a permit-to-work remains valid.

10.88 Where practicable, all items of live equipment at the location should be cordoned off from the working area covered by a limitation-of-access for the duration of the work. This should be achieved by temporary barriers comprising, as a minimum, no-entry warning tape or equivalent prominent markers.

10.89 Danger signs should be prominently displayed on all items of live electrical equipment at and adjacent to the location to which the limitation-of-access applies and while it remains valid.

10.90 During the period for which the limitation-of-access remains valid, the Authorised Person (LV) should arrange for the area involved to be inspected at the end of each working period or day to ensure that:

a. any flammable or hazardous materials introduced into the area during the work activity are removed when the activities cease at the end of each working period or day

b. emergency escape routes, emergency exits and access to essential electrical equipment has not been obstructed.

Cancellation of a limitation-of-access

10.91 Having completed the work, and having withdrawn all persons, materials, instruments and tools from the working place, the recipient should complete and sign part 3 of the limitation-of-access in the pad, and return the original of part 1 to the Authorised Person (LV).

10.92 When the work has been completed, the Duty Authorised Person (LV) should check that the location has been left in a clean and tidy condition and is secured against unauthorised access.

10.93 The Authorised Person (LV) should then cancel the limitation-of-access by marking the original of part 1 as “cancelled” and completing and signing part 4 retained in the pad. The duplicate pages of part 1 and the completed page of parts 2, 3 and 4 should be retained in the pad.

10.94 If the Authorised Person (LV) decides to stop the work, the limitation-of-access should be withdrawn and cancelled. The withdrawal should be noted in part 4 of the limitation-of-access retained in the pad, and the reasons for the withdrawal and the actions taken should be noted in the LV site logbook.

10.95 If the recipient has lost the original of part 1 of the limitation-of-access, the loss should be recorded by the Duty Authorised Person (LV) in part 4 of the limitation-of-access in the pad and in the LV site logbook.

10.96 The recipient should countersign part 4 to confirm the loss of the original. The loss of a limitation-of-access should be reported to the Authorising Engineer (LV).

10.97 Completed pads of limitation-of-access forms should be retained in the lockable document cabinet for three years after the date of cancellation of the last limitation-of-access issued from the pad.

LW1 Self-check safety precautions for inspection, testing and work on/ adjacent live electrical equipment at low voltage

10.98 When work or testing on or adjacent to live equipment as described in paragraph 8.1 is carried out, the work or test should be carried out by a Competent Person (LV) who should then complete an LW1 self-check live-working form.

10.99 Before completing an LW1 and starting work on a system or equipment, the Competent Person (LV) responsible for completing it should be satisfied that:

a. it is unreasonable in all the circumstances for it to be made dead

b. it is reasonable in all circumstances for work to be carried out on or near it while it is live

c. the work to be carried out meets the criteria of paragraph 8.1

d. suitable precautions (including, where necessary, the provision of suitable protective equipment) are taken to prevent injury.

Completion of an LW1

10.100 The following applies to the completion of an LW1:

a. the person to carry out the work and complete the LW1 should be a Competent Person (LV)

b. the Competent Person (LV) should enter on the LW1 the details of the equipment to be worked on and the work to be carried out

c. the work/test to be carried out needs to be carried out live and meets the criteria set out within paragraph 8.1

d. there is a suitable RAMS for the proposed work or test

e. the Competent Person (LV) has all the equipment required to carry out the work or test as identified on the RAMS and that the equipment has been checked that it is suitable for use, in date and if necessary calibrated

f. if an Accompanying Safety Person is required, they are identified on the LW1

g. the Competent Person (LV) should retain possession of the LW1 at all times while the work detailed on the LW1 is carried out

h. an LW1 is not to be completed for work on any item of equipment which is already the subject of a current safety document.

10.101 When the work has been completed, the Competent Person (LV) should return the LW1 to the supervisor and retain it within the work records.

LW2 authorisation for inspection, testing and work on or adjacent to live electrical equipment at low voltage

10.102 When work or testing on or adjacent to live equipment as described in paragraph 8.1 is to be carried out by a Skilled Person (LV), an LW2 should be issued by a Duty Authorised Person (LV).

10.103 An LW2 should be issued to a Skilled Person (LV) who has been assessed as competent to carry out the work by an Authorised Person (LV).

10.104 Before issuing an LW2 at the place of work, the Duty Authorised Person (LV) should positively identify the scope and limits of the work to be carried out, and the physical extent of the work at the location and should confirm

that the Skilled Person (LV) understands the work to be carried out, the precautions to be taken and that they are familiar with the requirements of Chapter 8 of HTM 06-02.

10.105 The issue and cancellation of every LW2 should be recorded in the LV site logbook.

10.106 Before completing an LW2 and issuing to a Skilled Person (LV), the Duty Authorised Person (LV) responsible for issuing it should be satisfied that:

a. it is unreasonable in all the circumstances for the electrical installation to be made dead

b. it is reasonable in all circumstances for work to be carried out on or near the electrical installation while it is live

c. suitable precautions (including, where necessary, the provision of suitable protective equipment) are taken to prevent injury.

Completion of an LW2

10.107 The following procedures apply to the completion of an LW2:

a. the Duty Authorised Person (LV) should enter on the LW2 the details of the equipment to be worked on and the work to be carried out

b. the work/test to be carried out needs to be carried out live and meets the criteria set out within paragraph 8.1

c. there is a suitable RAMS for the proposed work or test

d. the Skilled Person (LV) has all the equipment required to carry out the work or test as identified on the RAMS and that the equipment has been checked that it is suitable for use, in date and if necessary calibrated

e. an Accompanying Safety Person is identified on the LW2 and understands the requirements of their role.

10.108 Before accepting the LW2, the Skilled Person (LV) in charge of carrying out the specified work – having understood the scope, extent and limits of the work to be undertaken, and being prepared to undertake it after reading its contents and signifying to the Duty Authorised Person (LV) that the instructions are fully understood – should sign the declaration on the LW2 form.

10.109 The Skilled Person (LV) should retain possession of the LW2 at all times while the work detailed on the LW2 is carried out.

10.110 An LW2 is not to be completed for work on any item of equipment which is already the subject of a safety document.

Cancellation of an LW2

10.111 When work for which an LW2 has been issued is suspended or completed, the Skilled Person (LV) should sign the clearance section of the LW2 and return the LW2 to the Duty Authorised Person.

10.112 The Duty Authorised Person (LV) should check that the location has been left in a clean and tidy condition and is secured against unauthorised access.

10.113 The Duty Authorised Person (LV) should sign the cancellation section of the LW2 and mark the document as cancelled.

10.114 The LW2 should be retained in the OPM.

Certificate of authorisation for live working

10.115 Where live work is required other than the type specified in paragraph 8.1, where an LW1 or LW2 would be used in an area or location that is normally under the control of the Authorised Persons (LV) for electrical

safety reasons, a certificate of authorisation for live working may be issued by the Authorised Person (LV) when written permission has been received from the Authorising Engineer (LV).

10.116 A certificate of authorisation for live working should be printed in black on pink paper.

10.117 It should have an original and a duplicate page for part 1 and a single page for parts 2, 3 and 4. Each page of a certificate of authorisation for live working will bear the same serial number. Pads of numbered forms should be used in sequence.

10.118 Only one pad of certificates of authorisation should be in use for each geographical area for which an Authorised Person (LV) has been appointed.

10.119 When not in use, the pads should be kept in the lockable document cabinet.

10.120 Before issuing a certificate of authorisation for live working and starting work on a system or equipment, the Authorised Person (LV) responsible for its issue should be satisfied that:

a. it is unreasonable in all the circumstances for it to be made dead

b. it is reasonable in all circumstances for work to be carried out on or near it while it is live

c. suitable precautions (including, where necessary, the provision of suitable protective equipment) are taken to prevent injury.

10.121 Before issuing a certificate of authorisation for live working, the Authorised Person (LV) should:

a. with cooperation from the Authorising Engineer (LV) determine the actions and precautions necessary to comply with the requirements of paragraphs 8.3–8.6, and document them on the certificate of authorisation for live working once written permission from the Authorising Engineer (LV) has been received

b. ensure that the Competent Person (LV) or Skilled Person (LV) to whom the certificate will be issued fully understands the details of the work to be done

c. complete an LW1 (which is to be attached to the certificate of authorisation for live working)

d. record in the logbook details of the precautions to be taken to comply with the requirements of paragraphs 8.3–8.6.

Issue of a certificate of authorisation for live working

10.122 The following procedures apply to the issue of a certificate of authorisation for live working:

a. The Duty Authorised Person (LV) should enter on the certificate of authorisation for live working details of the work to be done and precautions necessary. The accuracy and completeness of the certificate should be agreed with the Competent Person (LV)/Skilled Person (LV) responsible for carrying out the work.

b. The top copy of the certificate should be issued to the Competent Person (LV)/Skilled Person (LV) in charge of the work, who, after reading its contents and signifying to the Authorised Person (LV) that the instructions are fully understood, should acknowledge its receipt by signing the declaration on part 2.

c. The recipient of the certificate should retain possession of the top copy at all times while the work detailed on the certificate is carried out.

d. If, during the course of the work, it is found necessary to change the scope of the work, the existing certificate of authorisation for live working should be returned to the Authorised Person (LV) and cancelled. The need for live-working procedures should again be reviewed by the Duty Authorised Person (LV) and Authorising Engineer (LV) and, if still found appropriate, a new certificate of authorisation for live working should be issued clearly detailing the revised work.

e. A certificate of authorisation for live working should to be issued for work on any item of equipment which is already the subject of a current safety document.

f. Duplicates should not be removed from the certificate of authorisation for live working book.

Cancellation of a certificate of authorisation for live working

10.123 When work for which a certificate has been issued is suspended or completed, the Competent Person (LV)/Skilled Person (LV) to whom it was issued should sign the declaration on part 3 of the certificate and return the certificate to the Authorised Person (LV), who should cancel it by signing the declaration on part 4 and mark the original of part 1 as “cancelled” in the presence of the Competent Person (LV)/Skilled Person (LV).

10.124 The certificate of live working with any associated documents should be retained in the OPM.

11 Display of posters and safety signs

Display of posters

11.1 In each switchroom, the following information should be prominently displayed:

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

b. a schematic: a single line drawing of the low voltage system up to and including final circuit distribution boards under the control of the Authorised Person (LV) indicating major LV equipment in its normal functional state of operation (that is, switched on–off)

c. the Electricity at Work Regulations.

11.2 Where the Management has the responsibility for the danger, the Authorised Person (LV) should carry out an assessment to determine the requirement and location for the display of information in accordance with this HTM. Information should be displayed permanently in suitable and prominent positions. The areas to be considered for the display of information in connection with this HTM should include every workshop and each Authorised Person (LV)'s office.

11.3 Other information and posters to be displayed may include relevant health and safety information.

Signage: design specification

11.4 The design and colours of the signs should be to BS EN ISO 7010. Colours should be to BS 5252 as follows:

- yellow 08E51
- blue 18E53
- red 04E53.

11.5 Signs should be manufactured from laminated plastic or other similar non-metallic weather-resistant material (thickness appropriate to the intended location and application).

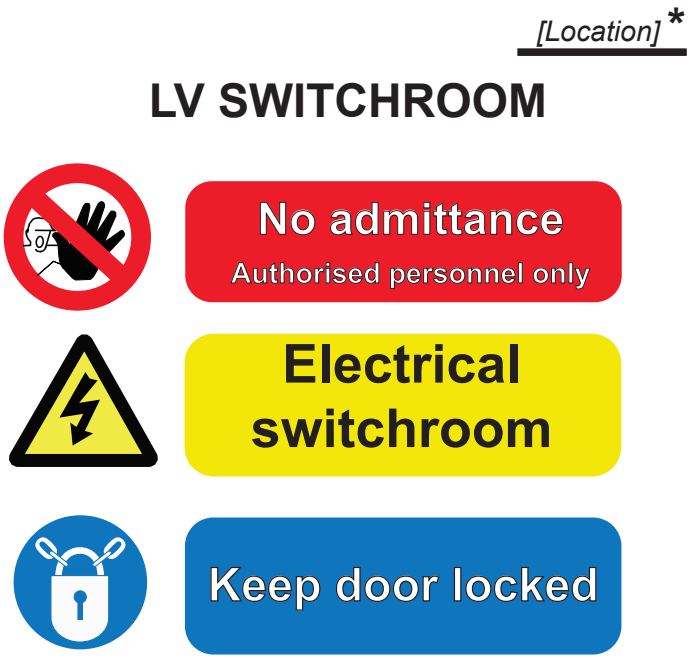
11.6 Non-corrosive materials should be used when fixing permanent safety signs. Permanent signs should not be fixed with adhesives.

11.7 Permanent safety signs should be securely and permanently fixed in accordance with the paragraphs in this section.

Display of permanent safety signs

11.8 In all LV switchrooms accommodating LV switchgear or distribution equipment, a safety sign should be fixed (see Figure 1 for a typical example, which can be adapted for local conditions).

Figure 1 Electrical switchroom safety sign (actual size: 200 x 100 x 1.5 mm white plastic)



(* Insert specific location and emergency telephone number)

11.9 Appropriate signs should be fixed where there are dangers and risks associated with auxiliary equipment such as (but not limited to) generators and PV installations

11.10 Where a fire suppression system is installed in a switchroom or accommodation where low voltage is present, a safety sign with appropriate text should be installed in a prominent position.

Display of temporary safety signs

11.11 All temporary signs should be provided with two 5 mm diameter holes for a suspension cord. The holes should be 10 mm from the top edge and 30 mm from each end for 150 mm wide signs, and 50 mm from each end for 200 mm wide signs.

Note:

Temporary signage can be sized to the installation with agreement of the Authorising Engineer (LV). The position, quantity and physical dimensions of the sign should be selected with regard to the circumstances in which it is used.

11.12 Temporary safety signs should be suspended from non-conducting cords and fixed and removed only by an Authorised Person (LV).

11.13 Caution signs (see Figure 2) should be prominently displayed and securely fixed at all points-of-isolation before the start of, and for the duration of, any work or testing, and before the issue of any permit-to-work.

11.14 Danger signs (see Figure 3) should be prominently displayed so that they are visible from every angle of approach to a low voltage enclosure before any testing at low voltage is carried out and before the issue of, and for the duration of, any work or testing, and before the issue of any permit-to-work.

11.15 Danger signs should be prominently displayed on any equipment which remains live and is adjacent to equipment to be worked on or tested before the start of, and for the duration of, the work or testing, and before the issue of any permit-to-work.

11.16 Where work or testing is to be undertaken on any part of a multi-cubicle switchboard, danger signs should be prominently displayed on the cubicles or compartments adjacent to the part being worked on or tested. If the board has rear access, danger signs should be similarly displayed at both the front and rear of the board. Reliance should not be placed on the switchboard labelling when identifying parts at the rear of the board. Any discrepancies found should be reported.

Figure 2 Caution sign (actual size: 200 x 100 x 1.5 mm white plastic)

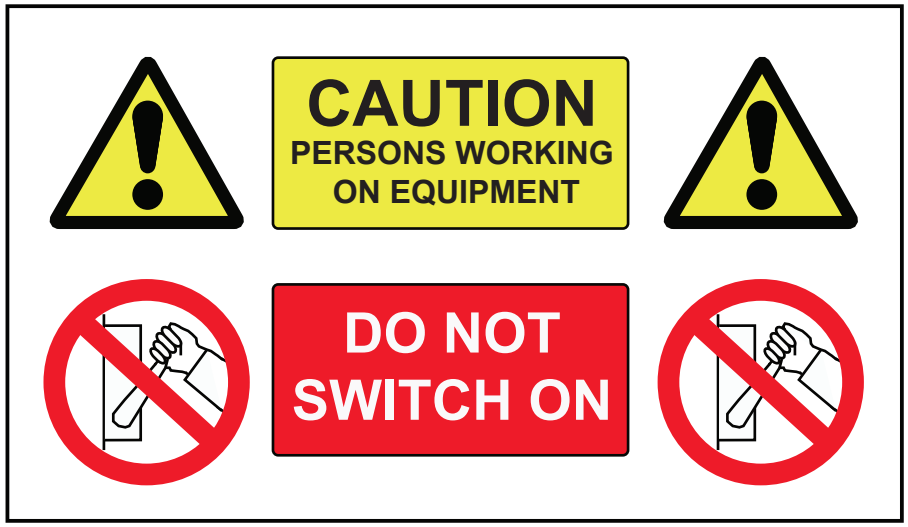


Figure 3 Danger sign (actual size: 200 x 100 x 1.5 mm white plastic)

11.17 Danger signs should be prominently displayed on any equipment which is accessible, both in or adjacent to the area which is the subject of the limitation-of-access, before the issue of and for the duration of any limitation-of-access.

Appendix 1 – Protective, test and earthing equipment

Introduction

1. The Electricity at Work Regulations, Regulation 4(4), states that “any equipment provided under these Regulations for the purpose of protecting persons at work on or near electrical equipment should 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 term “any equipment” has such a wide interpretation that it would be impossible, because of the extensive variation and complexity of electrical equipment employed within healthcare and personal social services premises, to identify the requirements for every location. The list of equipment recommended in this Appendix, therefore, can only be an indication of what is considered a minimum basic requirement, and is not exhaustive.

3 In some instances, expensive sophisticated proprietary equipment may be required or considered justified and the Management will need to consider the individual requirements within its own geographical area of control.

4 The quality of construction and maintenance of any equipment provided is as vital for personal safety as the training and practical skills in its use. Where possible, items of equipment should comply with an approved standard, for example British Standards or European equivalent or electricity supply industry standards

Personal protective equipment

Note:

PPE should be used as a last resort. Wherever there are risks to health and safety that cannot be adequately controlled in other ways, the Personal Protective Equipment at Work Regulations require PPE to be supplied.

5 Appropriate personal protective equipment should be provided by the Management for those person(s) under the direct appointment of the Management. Where contractors are being employed, the responsibility for providing appropriate protective equipment will be that of the contractor and take cognisance of any requirements identified in the safety documents. It should be readily available at all times to those who need it and have training in its use. It should be worn or used whenever necessary to avoid danger and injury.

6 A PPE risk assessment together with an arc-flash risk assessment survey should be completed to determine any protective equipment requirements. This should be recorded in the OPM.

7 Protective equipment should be suitable for the purpose and be provided by the Management and its contractors. Protective equipment provided by the Competent Person (LV) employed by a contractor may be used if the Duty Authorised Person (LV) agrees. Such use should be recorded in the safety documents.

8 Protective equipment should be inspected by the user for visible defects before and after use. Any suspect item is not to be used; suspect items should be reported to the Duty Authorised Person (LV) who should consider its withdrawal and its replacement.

9 Unless more frequent intervals are specified, a Duty Authorised Person (LV) should inspect each item of safety equipment provided by the Management at least once a year for defects and wear, and should take remedial action where necessary. These inspections should be recorded in the OPM and a register held of the equipment.

10 The sharing of PPE is not recommended. It is best practice for individuals to be equipped with suitable PPE.

Test equipment

11 The Duty Authorised Person (LV) should arrange for the necessary test equipment to be available when required.

12 Test equipment should be inspected by the user for visible defects and ensure it is calibrated if required by the user.

13 Unless more frequent intervals are specified, the Authorised Person (LV) should inspect each item of test equipment provided by the Management at least once a year for defects and should take remedial action where necessary. These inspections should be recorded in the OPM.

14 The Authorised Person (LV) should ensure test equipment is maintained and, where appropriate, recalibrated in accordance with the manufacturer's instructions.

15 Authorised Persons (LV) should maintain a register of in-house LV test equipment in the OPM which includes the dates of inspections/ calibrations (see paragraph 10.12(o)).

16 The location of protective equipment, test equipment and portable earthing equipment should be prominently displayed adjacent to the working key cabinet.

17 Test equipment should only be used by person(s) trained/qualified and competent in the use of the equipment and authorised to use it by means of a safety document.

Contractors' test equipment

18 The inspection of contractors' test equipment/calibration records should be provided to the Duty Authorised Person (LV) as part of the RAMS before work is carried out on site.

Protective equipment

19 Competent Persons and Authorised Persons should use appropriate protective equipment when the circumstances require it. Items of protective equipment held or used within a site should comply with any relevant British Standards and should be marked as CE or UKCA. (Some British Standards may not be available for some of the items of protective equipment recommended i.e. arc-flash clothing.)

20 Reliance should not be placed on any single item of protective equipment.

21 The range of protective equipment that may be required for compliance with this guidance at each site for which Authorised Persons (LV) have been appointed could include, but is not limited to, the following items:

- insulated hand-tools
- insulated rubber boots

- insulated rubber gloves
- insulating rubber mats
- face shields (visors)
- insulating materials for temporary screening
- safety-belts and harnesses
- cable-spiking equipment
- cable-tracing equipment
- arc flash clothing.

22 The user of any item of protective equipment is responsible for carrying out a visual inspection before and after use. If an item is found to be defective or unsafe it should be reported to the Authorised Person (LV) as soon as possible.

23 All protective, test and earthing equipment must be stored, inspected, tested and, where appropriate, recalibrated in accordance with manufacturers' recommendations.

24 All protective, test and earthing equipment should be inspected by an Authorised Person (LV) at intervals recommended by the manufacturer but not exceeding 12 months and the results entered into the OPM. Any item of protective equipment found to be defective should be destroyed and replaced.

Protective equipment covered by a British Standard

25 The following items of equipment are covered by the British Standards indicated:

- insulated screwdrivers – BS 2559-3
- insulated pliers – BS 3087-1
- rubber gloves for electrical purposes – BS EN 60903
- rubber mats for electrical purposes – BS EN 61111
- face shields and visors – BS EN ISO 16321-1, BS EN ISO 18526-1 and BS EN 168
- safety-belts and harnesses – BS EN 354; BS EN 355; BS EN 361; BS EN 362; BS EN 363; BS EN 364 and BS EN 365.

26 Face shields and visors should provide protection against electrical flash, impact and molten metal particles.

27 They should be available to persons who may be exposed to the effects of electric arcs, for example when withdrawing fuses in older types of distribution cubicle.

28 Many different types of safety-belts and harnesses are available, each intended for a particular purpose. Safety-belts and harnesses manufactured to the relevant British Standard, and of the correct type, should be available to persons working in insecure locations, for example on overhead lines.

Protective equipment not covered by a British Standard

29 Cable spiking equipment in the form of an explosive cartridge-type must be operated in accordance with manufacturers' instructions by a suitably trained person. When using cartridge-operated equipment on small cables, care must be taken where there is a danger of severing the cable.

30 Insulating material for temporary screening may be required when working on or near live equipment or to separate isolated equipment from adjacent live equipment. Flexible insulating material may be used to prevent breakdown between conductors during low voltage tests. The material used should be suitable for the purpose. The material should be cut and fixed, as necessary, to suit the particular task.

31 When using insulating rubber boots as part of a safety system, reliance is not to be placed upon insulating rubber boots alone. There is a danger of metallic objects becoming embedded in the soles without this becoming apparent during inspection.

Voltage test indicators

32 Authorised Persons and Competent Persons must prove equipment is dead by using a voltage test indicator.

33 Low voltage test indicators should comply with the recommendations of the HSE's Guidance Note 'GS38: Electrical test equipment for use on low voltage electrical systems' and BS EN 61243-3. Test indicators for use on 230/415 V systems should be suitable for use up to 500 V and should indicate a live supply down to 50 V. It should also be able to differentiate between ac and dc.

34 Test indicators should be checked before and after use with a low voltage proving unit.

Cable locating devices

35 When selecting a cable-locating device for a particular task or location, refer to the guidance given by the manufacturer or supplier of the cable-locating equipment.

36 Cable-locating devices should, as a minimum, be rugged and weatherproof to a minimum of IP54, comply with the Electromagnetic Compatibility Regulations and be produced by BS EN ISO 9001-accredited manufacturers.

37 A cable-locating device that combines all three principles of operation – hum detector (power), radio frequency detector (radio) and transmitter/ receiver locator (signal generator) – into one instrument should be selected.

38 No person should use cable-location and tracing devices unless they are competent to do so, have been specifically trained in their use, and hold a certificate issued by the instructor indicating that the training has been successfully completed. Training in the use of cable location and tracing devices should normally be given by the manufacturers of the equipment, but alternatively it may be given by a Competent Person (HV) person(s) who has been trained and certified by the manufacturers or an approved training provider as being capable of delivering training to others. Training certificates should be held in the OPM.

Earthing equipment

39 Low voltage cables and equipment may be earthed by using integral or portable proprietary earthing devices operating within the equipment enclosure on which the earth is to be applied. An earthing device must be suitable for the use for which it is provided, be maintained in a condition suitable for that use, and be properly used.

Switchroom earthing

40 All switchroom earthing conductors and connections should be inspected at 12-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.

41 The earthing systems should be tested annually in accordance with HTM 06-01 – 'Electrical services supply and distribution'.

Recommendations for the inspection, test and recalibration of protective, test equipment

42 Insulated hand tools should be supplied with a certificate stating that the tools have been electrically tested.

43 Rubber gloves should be kept in a dark place where they will not be subjected to

mechanical or chemical damage. A container that is clean and free from grease and oil should be provided solely for storing the gloves.

44 Before use, each glove should be examined inside and out by the user. Each finger of each glove should be stretched by hand to ascertain that its mechanical strength is adequate. If either of the gloves is damaged or defective, the pair should be destroyed and replaced.

45 After each use, the gloves should be inspected by the Authorised Person for surface defects or materials embedded in the surface. If any glove appears defective, the pair should be destroyed and replaced.

46 Gloves that are used frequently should be tested at intervals not exceeding six months. Gloves that are used infrequently should be retested after each use, or at intervals not exceeding 12 months, whichever is the more frequent.

47 Gloves should be retested by the manufacturer or locally on equipment described in, and in accordance with, the procedures set out in BS EN 60903.

48 Face shields should be examined by the user before and after use.

49 Belts and harnesses should be stored in a cool, dry place, not subjected to direct sunlight and not subjected to unnecessary strain, pressure, excessive heat or humidity. The equipment should also be kept free from contact with sharp implements, corrosive substances and other possible causes of damage.

50 Where necessary, test equipment should be inspected and recalibrated at the intervals recommended by the manufacturer. This should be a maximum of 12 months.

51 The schedule should incorporate:

- routine maintenance proposals, based on periodic inspections supplemented at more extended intervals with operational checks and examination as required
- post-fault maintenance, which should be determined by consulting the manufacturer's handbook and by past experience.

Fire extinguisher installation and equipment

52 Inspections and checks should be made in accordance with with BS 5306 and Firecode document HTM 05-03 Part K – 'General fire risk assessments''.

Appendix 2 – Safety documentation and model forms

Model form numbers

a. isolation and earthing diagram

b. safety programme

c. permit-to-work

d. limitation-of-access

e. certificate of authorisation for live working

f. permission for disconnection/ interruption of electrical services

g. logbook

h. LW1

i. LW2

j. certificate of boundary demarcation

k. transfer of control certificate.

Serial No 06/

Isolation and earthing diagram

(Complete precisely and legibly in BLOCK CAPITALS)

Safety programme no ..... Date .....

Permit-to-work/Sanction-for-test no ..... Date .....

Purpose of proposed work/test

Equipment which the proposed sequence of operations will make safe to work on/test

Sketch of isolation and earthing arrangements

Competent Person's initials

Authorised Person

Signed ..... Name ..... Date .....

Countersigning Authorised Person

Signed ..... Name ..... Date .....

Original (green) copy to
White copy to

HTM 06-02/03 IE1 Ver 1.0

Sheet of	**Serial No**	

Safety programme

Purpose of proposed work/test* (*Delete as appropriate)	**Equipment which the proposed sequence of operations will make safe to work on or test**

ITEM No	LOCATION	EQUIPMENT	OPERATION AND REASON	ITEMS REQUIRED	TIME & DATE

Date countersigned programme is required to commence .....

Authorised Person

Signed ..... Date .....

Countersigning Authorised Person

I hereby declare that I have checked the above Safety Programme, and I 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 HTM guidance. I have knowledge of, and have access to the current diagram of, the system and equipment concerned.

Signed ..... Date .....

Original (green) copy to
White copy to

Serial No 06/ **Location**

Front – original

Permit-to-work

(Complete precisely and legibly in BLOCK CAPITALS)

Part 1: Issue

Issued to .....

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

All other electrical equipment is dangerous to work on

The system is **isolated** and safety locks and **caution** signs fitted at	
The equipment is **earthed** and safety locks fitted at	
Danger signs are posted	
Other precautions taken are	
The following work shall be carried out	

Authorised Person	**Received by**
Signed..... Date.....	Signed.....

Original (blue) copy to
White copy to

HTM 06-02/03 PW1 Ver 1.0

Serial No 06/

Location

Front – copy

Permit-to-work

(Complete precisely and legibly in BLOCK CAPITALS)

Part 1: Issue

Issued to .....

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

All other electrical equipment is dangerous to work on

The system is **isolated** and safety locks and **caution** signs fitted at	
The equipment is **earthed** and safety locks fitted at	
Danger signs are posted	
Other precautions taken are	
The following work shall be carried out	

Authorised Person	**Received by**
Signed..... Date.....	Signed.....

Original (blue) copy to
White copy to

HTM 06-02/03 PW1 Ver 1.0

Back – copy

Part 2: Receipt

I hereby declare that I accept responsibility for carrying out work on the electrical equipment as detailed on this permit-to-work and that no attempt will be made by me or by persons under my control to work on any other electrical equipment I have been shown and have initialled arrangements on the isolation and earthing diagram.

Signed ..... Print name .....

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 ..... Print name .....

Time ..... Date .....

* *Delete as appropriate*

Part 4: Cancellation

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

Signed ..... Print name .....

Time ..... Date .....

Serial No 06/ **Location**

Front – original

Limitation-of-access

(Complete precisely and legibly in BLOCK CAPITALS)

1. **This form must not be used for work on electrical equipment for which an electrical permit-to-work or sanction-for-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 competent to carry out the specified tasks, is hereby given permission to carry out the work described below:

Location

Work

No other work shall be carried out

Remarks

Authorised Person	**Received by**
Signed..... Date.....	**Signed**.....

Original (buff) copy to
White copy to

HTM 06-02/03 LOA1 Ver 1.0

Serial No 06/ **Location**

Front – copy

Limitation-of-access

(Complete precisely and legibly in BLOCK CAPITALS)

1. **This form must not be used for work on electrical equipment for which an electrical permit-to-work or sanction-for-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 competent to carry out the specified tasks, is hereby given permission to carry out the work described below:

Location

Work

No other work shall be carried out

Remarks

Authorised Person	**Received by**
Signed..... Date.....	**Signed**.....

Original (buff) copy to
White copy to

HTM 06-02/03 LOA1 Ver 1.0

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 ..... Print name .....
(being the person to whom this form is issued)

Time ..... Date .....

Part 3: Clearance

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

Signed ..... Print name .....

Time ..... Date .....
* *Delete as appropriate*

Part 4: Cancellation

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

Signed ..... Print name .....

Time ..... Date .....

Serial No 06/

Location

Front – original

Certificate of authorisation for live working

(Complete precisely and legibly in BLOCK CAPITALS)

Part 1: Issue

Issued to .....

I hereby authorise the above named Competent Person or Skilled Person to work on the low voltage electrical equipment specified below whilst it is **live**, but only if accompanied by one or more members of the working party while the work is in progress. Form LW1 has been completed and is attached:

Working party members	
Location of equipment	
Details of equipment to be worked on	
Precautions to be taken, for example rubber gloves, mats, **insulated** tools, screening etc	
Details of work to be undertaken **live**	

No other work shall be carried out

Authorised Person	**Received by**
Signed..... Date.....	Signed.....

HTM 06-02/03 CALW1 Ver 1.0

Serial No 06/

Location

Front – copy

Certificate of authorisation for live working

(Complete precisely and legibly in BLOCK CAPITALS)

Part 1: Issue

Issued to .....

I hereby authorise the above named Competent Person or Skilled Person to work on the low voltage electrical equipment specified below whilst it is **live**, but only if accompanied by one or more members of the working party while the work is in progress. Form LW1 has been completed and is attached:

Working party members	
Location of equipment	
Details of equipment to be worked on	
Precautions to be taken, for example rubber gloves, mats, **insulated** tools, screening etc	
Details of work to be undertaken **live**	

No other work shall be carried out

Authorised Person	**Received by**
Signed..... Date.....	Signed.....

HTM 06-02/03 CALW1 Ver 1.0

Back – copy

Part 2: Receipt

I hereby declare that I accept responsibility for carrying out the defined work on the electrical equipment as detailed on this certificate of authorisation for live working, and fully understand the precautions to be taken.
On completion of the work, I will surrender this certificate of authorisation for live working as directed for cancellation, after which no work shall be done.

Signed ..... Print name .....
(being the person to whom this form is issued)

Time ..... Date .....

Part 3: Clearance

I hereby declare that the work for which this certificate of authorisation for live working was issued is now suspended/completed* and that all persons under my charge have been withdrawn, all gear, tools etc have been removed and the electricasl equipment has beeen left in a safe condition.

Signed ..... Print name .....

Time ..... Date .....
* *Delete as appropriate*

Reason for suspending work and action taken (if applicable)

Part 4: Cancellation

This certificate of authorisation for live working is hereby cancelled. The original has been returned to me and cancelled in the presence of the signatory to Part 3.

Signed ..... Print name .....

Time ..... Date .....

Serial No 06/

Permission for disconnection

(Complete precisely and legibly in BLOCK CAPITALS)

Description of work

Authorised/Competent Person requesting disconnection

Position/Title ..... Name .....

Signed ..... Date .....

Circuit to be disconnected

Area service or equipment affected by disconnection

Point of disconnection positively identified Yes ☐ No ☐

Duration of disconnection

from ___:___ hrs on the ___/___/___ to ___:___ hrs on the ___/___/___

Special instructions or safety measures (to be completed by person affected by work)

I confirm that permission for the intended work activity has been given. I have explained to the Authorised/Competent Person any special instructions or safety measures indicated above and understand that isolation of the system is now required and will ensure that all areas, services or equipment likely to be affected by the isolation have alternative provision/will not be put at risk.*

Position/Title ..... Name .....

Signed ..... Date .....

** Delete as applicable*

HTM 06-02/03 PD1 Ver 1.0

Logbook

Date	Time	Location	Circuit or switch concerned	Event or operation and reason	Safety programme and isolation and earthing diagram numbers	Safety document type and serial no	To whom issued	Signature of Authorised Person

LW1 – Self-check safety precautions

This LW1 should be completed by a site-appointed Competent Person (LV) prior to carrying out any live work, testing or inspection on or near live equipment as described in paragraph 8.1 of Health Technical Memorandum 06-02, or by the Duty Authorised Person (LV) when a certificate of authorisation for live working is issued.

Department:	**Location**:
Equipment to be worked on:	Work to be carried out:

Task		Delete as appropriate	If Answer *No*
1	Are you an appointed Competent Person (LV)?	Yes/No	Do not proceed. Consult Duty Authorised Person
2	Is live working necessary?	Yes/No	Follow dead working procedures
3	Is the reason (please tick): Testing/fault-finding not practical dead Removal and replacement of fuse carriers in final circuits Removal and replacement of plug-in components Basic battery maintenance (cleaning/topping up only) Work on battery systems less than 25 V and 10 Ah Other (please state)		☐ ☐ ☐ ☐ ☐ ☐
4	Has a risk assessment method statement (RAMS) been completed for this task, which is agreed as suitable for the work/test?	Yes/No	Do not proceed
5	What equipment is required to undertake the work safely? (please tick): Insulated gloves (1 kV) Face/eye protection Arc-flash/flameproof clothing Insulated tools Rubber mats Test gear/probes (fused) Screens/barriers Suitable clothing to wrist Safety shoes Head protection Other (please state)		☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
6	Do you have all the equipment required?	Yes/No	Do not proceed
7	Has the equipment been checked before use and/or is legal/dated/certified/calibrated?	Yes/No	Do not proceed
8	Do you have the information required to do the work/test safely?	Yes/No	Do not proceed
Note: If you have answered No to any of the above questions **LIVE WORK/TESTING CANNOT TAKE PLACE**			
9	Is an Accompanying Safety Person required for the work or test?	Yes/No	Proceed with work or test
Name of Accompanying Safety Person:			

I confirm that I have read Chapter 8 of Health Technical Memorandum 06-02 and I have carried out the above checks and I am satisfied it is safe to proceed

Signed: Print:

Date: Time:

(Authorised Person (LV)/Competent Person (LV))

Note:

1. If your tests indicate that removal of components from connections or terminals is required, this may only be done live following the issue of a certificate of authorisation for live working by an Authorised Person. The Management policy's is that such work will normally be done with equipment dead and isolated.
2. If completed by a Competent Person, this document should be returned to the supervisor/Authorised Person.
3. If completed by an Authorised Person, a copy of this document should be attached to the certificate of authorisation for live working.

LW2 – Authorisation for inspection, testing and work on or adjacent to live electrical equipment at low voltage

This LW2 form should be issued by a Duty Authorised Person (LV) to a Skilled Person (LV) where work or testing on or near live equipment is essential but no components are to be removed or replaced. This includes but is not limited to work on battery systems less than 25 V and 10 Ah, UPS systems, generators, Medical IT systems or secondary or tertiary electrical systems.

Department:		Location:	
Equipment to be worked on:		Work to be carried out:	
Partially Isolated or disconnected at:		Adjacent exposed live equipment/parts:	

Task		Delete as appropriate	If Answer *No*
1	Is the person carrying out the work/test competent for live LV work/testing?	Yes/No	Do not proceed
2	Is live working necessary?	Yes /No	Follow dead working Procedures
3	Is the reason (please tick): Testing/fault-finding not practical dead ☐ Removal and replacement of fuse carriers in final circuits ☐ Removal and replacement of plug-in components ☐ Basic battery maintenance (cleaning/topping up only) ☐ Work on battery systems less than 25 V and 10 Ah ☐ Equipment cannot be isolated (please state) ☐ Periodic inspection and testing ☐ Other (please state) ☐		
4	Has a risk assessment method statement (RAMS) been completed for this task, which is agreed as suitable for the work/test?	Yes/No	Do not proceed
5	What equipment is required to undertake the work safely? (please tick) Insulated gloves (1 kV) ☐ Face/eye protection ☐ Arc-flash/flameproof clothing ☐ Insulated tools ☐ Rubber mats ☐ Test gear/probes (fused) ☐ Screens/barriers ☐ Suitable clothing to wrist ☐ Safety shoes ☐ Head protection ☐ Other (please state) ☐		
6	Does the Skilled Person (LV) carrying out the work/test have all the equipment required?	Yes/No	Do not proceed
7	Has the equipment been checked before use and/or is legal/dated/certified/calibrated?	Yes/No	Do not proceed
8	Do you have the information required to do the work safely?	Yes/No	Do not proceed
Name of Accompanying Safety Person:			
Note: If you have answered No to any of the above questions **LIVE WORK/TESTING CANNOT TAKE PLACE**			

Issue:
I have carried out the above checks and I am satisfied it is safe to proceed following the RAMS for the task:

Signed: Print:

Date: Time:

(Duty Authorised Person (LV))

Receipt:
I confirm that I have read Chapter 8 of Health Technical Memorandum 06-02 and I hereby declare that I accept responsibility for carrying out the defined work on the electrical equipment as detailed on this LW2 and fully understand the precautions to be taken. On completion of the work, I will surrender this LW2, as directed for cancellation, after which no further work will be carried out.

Signed: Print:

Date: Time:

(*Skilled Person (LV)*

Clearance:
I hereby declare that the work/test for which this LW2 was issued is now suspended/completed* and that all persons under my charge have been withdrawn, all equipment, tools, etc. have been removed and the electrical equipment has been left in a safe condition.

*Delete as appropriate

Signed: Print:

Date: Time:

(*Skilled Person (LV*)

Reason for suspending work and action taken (if applicable):

Cancellation:

This LW2 is hereby cancelled in the presence of the person responsible for the work/test.

Signed: Print:

Date: Time:

(Duty Authorised Person (LV))

If your tests indicate that removal of components from connections or terminals is required, this may only be done live following the issue of a certificate of authorisation for live working by an Authorised Person. The Management policy's is that such work will normally be done with equipment dead and isolated.

Certificate of boundary demarcation

NHS Foundation Trust	HV /LV Certificate of boundary demarcation No.

Project No.		Site name	

1 Confirmation of demarcation and authorisation

This certificate of boundary demarcation (HV/LV) should only be used to provide formal documentary evidence of demarcation across boundaries, where the operational responsibility of the system/equipment detailed below is passed to a second party (different company) who will be responsible for the control of electrical danger under an electrical safe system of work. This certificate must not be issued instead of a permit to work or any other safety document by either party. The point of demarcation should be as formally agreed between the Trust's Duty Authorised Persons and the Authorised Person of the contracting company and be detailed on the relevant jointly agreed demarcation diagram. Danger signs should be affixed to adjacent live equipment/enclosures not included in the demarcation but forming part of the equipment/system being handed over.

System or equipment to be handed over to the contracting company
……
……
……
……

Specific points of demarcation secured with demarcation caution signs at the following points
……
……
……
……
……

Danger signs posted at
……
……
……
……

As the Duty Authorised Person HV/LV responsible for the operation of the equipment described in Part 1 above, I confirm that the work being undertaken satisfies the need for this boundary of demarcation to be issued.

Name of Authorised Person (HV/LV) sanctioning this certificate	Signature	Time & date	Department	Contact tel. no.

2 Issue

As the Duty Authorised Person HV/LV responsible for the operation of the equipment descried in Part 1 above, I confirm that operational responsibility is passed to the contacting company and that the boundary of demarcation has been demonstrated to the Authorised Person HV/LV of the contracting company. I undertake to ensure that no alterations are made to the above arrangements until this certificate of boundary demarcation (HV/LV) is cancelled.

Name of Authorised Person (HV/LV) issuing this certifica	Signatur	Time & date	Departmen	Contact tel. No

3 RECEIPT AND DECLARATION

As the contracting Duty Authorised Person HV/LV responsible for the safe systems of work, I accept this certificate of boundary of demarcation (HV/LV) on the understanding that all work under my control will be carried out under an electrical safe system of work and that no work should be carried out beyond the boundary of demarcation on equipment/system not under my operational responsibility. I also fully understand and have signed the demarcation diagram.

Name of Authorised Person (HV/LV) receiving this certificate	Signature	Time & date	Department	Contact tel. no.

4 Clearance

As the contracting Duty Authorised Person HV/LV responsible for the electrical safe system of work, I declare that all safety documentation related to this certificate of boundary demarcation (HV/LV) has been cancelled, it is safe for this boundary demarcation (HV/LV) to be cancelled and that all persons under my charge have been withdrawn and warned that is it no longer safe to work on the system/equipment specified above.

Name of Authorised Person (HV/LV) clearing this certifica	Signatur	Time & date	Departmen	Contact tel. No

5 Cancellation

As the Duty Authorised Person (HV/LV) responsible for the operation of the equipment described in Part 1 above, I acknowledge that the above boundary of demarcation is no longer required and that any work on the above equipment/system is now covered by the Trust's electrical HV/LV policy and electrical safe system of work.

Name of Authorised Person (HV/LV) cancelling this certificate	Signature	Time & date	Department	Contact tel. No.

High voltage/Low voltage* electrical network
Transfer of control certificate

*Delete as appropriate

Part (a)_____ Authorised Person's details

Name: ……..……..……..……

Authorisation:…HV/LV*……..……

Site address:
……..……..……..……
……
……..

Part (b) Transfer of HV/LV system control from _____ to an appointed contractor

I being the above named _____ Authorised Person HV/LV* hereby declare that the control of part/all* of the HV/LV* system at the above-specified location and defined on the attached signed and dated HV/LV* system diagram (control boundary points specified in Part (c) of this transfer of control certificate) is now transferred to:

Print name ……..……..being the contractor's control person employed by:

Company name……..……..……..

I also declare that there are no safety documents in issue on the transferred system and that I have informed all relevant employees of ……. and other contractors of this control transfer.

No access to switching operation or work should take place on the transferred HV/LV system without the consent of the above-named contractor's control person. At all stages, the above-named contractor's competent person will liaise with the Trust's Authorised Person if other electrical systems will be affected.

Signed ……..……..……Trust's Authorised Person.

Time …….…… Date……..……..……

Receipt

I hereby declare that I accept responsibility for the control of the transferred HV/LV* system as the contractor's control person.

Signed ……..…… Contractor's competent person

Time ……..……..…… Date……..……

Part (c) Limits of control transfer substation/switchroom/equipment	Circuit	Item

Part (d) Transfer of control from the contractor to the trust

I hereby declare that I relinquish control of the transferred HV/LV* system. All persons employed by the contractor have been informed and all issued safety documents have been cancelled.

Signed …… Contractor's control person

TimeDate…..……

*Attach any modified system diagram (duly signed and dated) if there are any system alterations.

I hereby declare that I have resumed control of the above system and this transfer of control certificate is cancelled (and have noted and understood any relevant alterations to the modified system diagram provided above).

Signed ……..…….. Trust's Authorised Person HV/LV*

Time ……..…… Date…..……

* Delete as necessary

Appendix 3 – Model procedures and letters

Appointment procedure for an Authorising Engineer (LV)

1 It is the responsibility of the Designated Person to ensure that any person appointed as Authorising Engineer is suitably qualified and adequately experienced to satisfy the requirements of this HTM, which has been compiled to enable the Management to meet its statutory obligation – to comply with the requirements of the Electricity at Work Regulations for work on electrical equipment.

2 Before an Authorising Engineer is appointed, the Designated Person must be satisfied that the prospective Authorising Engineer meets all the criteria set out in paragraphs 4.9–4.13 of this HTM.

3 The appointment of an Authorising Engineer should be by an exchange of letters.

Model letter for appointing an Authorised Engineer (LV)

Dear _____ (*Name of prospective Authorising Engineer*)

OFFER OF APPOINTMENT AS AUTHORISING ENGINEER (LV)

Being satisfied that you are suitably qualified and meet the requirements of Health Technical Memorandum 06-02 –'Electrical safety guidance for low voltage systems', I hereby offer you the appointment of Authorising Engineer for _____ to undertake the duties set out in Health Technical Memorandum 06-02 –'Electrical safety guidance for low voltage systems' until further notice. However this appointment will be reviewed and reconfirmed at * yearly intervals.

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

Yours sincerely

_____

(*Designated Person*)

* Depending on contract

Model letter for accepting an appointment as an Authorised Engineer (LV)

Dear _____(*Name of Designated Person*)

ACCEPTANCE OF APPOINTMENT AS AUTHORISING ENGINEER (LV)

I acknowledge receipt of your letter dated _____ offering me appointment as an Authorising Engineer for _____

I confirm that, to the best of my knowledge, I satisfy the requirements for appointment as an Authorising Engineer indicated in Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems'

I accept the responsibilities of the Authorising Engineer and will, to the best of my ability, carry out the Authorising Engineer's duties set out in Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems'.

I note that I am required to attend an Authorising Engineer training course at intervals not exceeding five years, an Authorised Person refresher course at intervals not exceeding five years and a first-aid course at intervals not exceeding three years.

Yours sincerely,

_____

(*Authorising Engineer*)

Copies to: Operational Procedures Manual (OPM)

Certificate of Appointment Authorised Person (LV)

Healthcare organisation:

Certificate number:

Part 1 – Authorised Person details

Name: _____

Job Title: _____

Appointment type: new appointment/renewal/revised coverage*

**Delete as appropriate*

Technical qualifications:

Qualification title	Grade (if applicable)	Dates

Previous Authorised Person experience: Yes/No*

Location	Dates

Initial relevant training courses: (Authorised Person/first-aid/cable-tracing/cable-spiking)

Course	Location	Dates

Part 2 – Authorised Person nomination:

I wish to nominate _____ for appointment as an Authorised Person (LV) for the Low Voltage system(s), installation(s) at the location(s) listed below:

Location 1 (site)	
Location 2 (site)	
Location 3 (site)	
Location 4 (site)	
Location 5 (site)	

Nominated by: (Designated Person)

Name:

Signed:

Date:

Part 3 – Authorising Engineer recommendation

I am satisfied that _____ has the required qualifications, knowledge, skills and experience to carry out the duties of Authorised Person (LV) for the LV system(s), installation(s) and location(s) as per the nomination detailed in Part 2.

Voltage	Type of system or installation	Location (site)				
		1	2	3	4	5
LV	Ring distribution system					
	Radial distribution system					
	Single generating set installation					
	Multiple generating set installation					
	Other (give details of any other LV systems or installations):					

Name:

Signed:

Date:

Part 4 – Offer of appointment by Designated Person

Name of Authorised Person: _____

You are hereby offered appointment as an Authorised Person (LV) for the duties identified in Health Technical Memorandum 06-02 – 'Electrical safety guidance for Low Voltage systems' detailed in Part 2.

Please confirm your acceptance of the appointment by completing Part 5 of this certificate.

Name:

Signed:

Date:

Part 5 – Acceptance of appointment by Authorised Person

I accept the appointment of Authorised Person (LV) for the system(s), installation(s) and location(s) detailed in Part 2.

I acknowledge the receipt of this certificate as my authority to act whilst on duty as an Authorised Person (LV) for the system(s), installation(s) and location(s) detailed in Part 2.

I note that whilst on duty as an Authorised Person (LV) I will be responsible for the practical implementation and operation of Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems' for the systems and installations for which I have been appointed.

Name:

Signed:

Date:

Part 6 – Appointment scope

This is to certify that _____[name]_____ is appointed as an Authorised Person (LV) for the purposes of the duties identified in Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems'.

The appointment applies only to the locations and to the electrical systems and installations set out in Part 2.

Restrictions (if any)

This certificate is valid until the last expiry date indicated below.

	Issue date	Expiry date	Authorising Engineer signature
1st Issue			
1st Review			
2nd Review			
3rd Review			

Notes

Designated Person

Name:

Signed:

Date:

Authorised Person

Name:

Signed:

Date:

Part 7 – Refresher training record

Relevant refresher training courses attended: (Authorised Person/first-aid/cable-tracing/cable-spiking)

Course	Location	Dates

Appointment procedure for a Competent Person (LV)

Part 1 – Details of proposed Competent Person (LV)

Name:_____

Healthcare organisation/Company: _____

Job title:_____

Appointment type: new appointment/renewal/revised coverage*

**Delete as appropriate*

Technical qualifications:

Qualification title	Grade (if applicable)	Dates

Details of previous electrical experience:

Location	Dates

Relevant Training Courses: (e.g. Competent Person/first-aid/cable-tracing, City & Guilds)

Course	Location	Dates

Part 2 – Proposed appointment (to be completed by Authorised Person LV)

I am satisfied that _____

has the required qualifications, knowledge, skills and experience to carry out the duties of Competent Person (LV) for the LV systems for the location(s) detailed below:

1.

2.

3.

Systems and equipment:

a.

b.

c.

Duties:

To accompany any non-Competent Person when entering a low voltage switchroom or enclosure for any purpose, except where that person is a Competent Person in possession of a valid limitation-of-access safety document and to remain within the building until the work is complete.

To carry out maintenance tasks within the building as directed by the Authorised Person (LV) in accordance with HTM 06-02 but not on low voltage equipment unless issued with a permit-to-work.

To trip low voltage switchgear in case of emergency.

(Add specific duties/restrictions if required)

Note: The person carrying out the inspection and testing of any electrical installation must have, as appropriate to their function the required qualifications, knowledge and experience relevant to the nature of the installation being inspected and tested. The person should be fully versed in the inspection and testing procedures and employ suitable testing equipment during the inspection and testing process as required under BS 7671. Where testing of portable appliances is concerned, the person carrying out the inspection and testing must be competent to undertake the inspection and where appropriate testing of electrical equipment and appliances, having due regard to their own safety and that of others. To meet the requirements of the above, if the Competent Person (LV) is required to install, alter or test electrical circuits – they should have attained the relevant qualifications.

Part 3 – Offer of appointment by Authorised Person (LV)

Name of Competent Person: _____

You are hereby offered appointment as a Competent Person (LV) for the duties identified in accordance with Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems' for a maximum period of three years commencing on the date this appointment form is signed and dated.

Please note that the appointment covers only the duties, locations, system(s) and installation(s) detailed in Part 2 of this appointment form and on the certificate of appointment.

Please confirm your acceptance of the appointment by completing Part 4 of this appointment form.

Name:

Signed:

Date:

Part 4 – Acceptance of appointment of prospective Competent Person (LV)

I accept the appointment of Competent Person (LV) for the purposes of Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems' for a maximum period of three years commencing on the date this appointment form is signed and dated.

I note that the appointment covers only the duties, locations, system(s) and installation(s) detailed in Part 2 of this appointment form and on the certificate of appointment and that whilst on duty as a Competent Person (LV) I will, so far as is reasonably practical, ensure that I and any others working with me or supervised by me, avoid danger to ourselves and others and will not cause damage to electrical equipment.

I will not carry out any work beyond the limits of the appointment scope unless I am under the direct supervision of an Authorised Person (LV).

Name:

Signed:

Date:

Certificate of appointment as a Competent Person (LV)

Certificate of appointment as a Competent Person (LV)
Certificate No.
This is to certify that _____ is appointed as a Competent Person (LV) for the following locations until the expiry date shown. 1. 2. 3.
Expiry date:
Duties:
Signed _____Authorised Person (LV) Name _____ Date _____ Signed _____ Authorised Person (LV) Name _____ Date _____ Signed _____ Authorised Person (LV) Name _____ Date _____ (This certificate is to be stored in the Operational Procedures Manual (OPM))

Appointment record for a Competent Person (LV)

(To be completed by an Authorised Person (LV))

Name of Competent Person (LV) _____

This certificate is only valid until the last expiry date indicated below:

Issue:	Issue Date:	Expiry date:	Signature:
First issue			
First renewal/ review			
Second renewal/ review			
Third renewal/ review			

(This appointment record is to be stored in the Operational Procedures Manual (OPM))

Appendix 4 – Audit of safe system of work and safety procedures

General

1 This section details the audit and monitoring procedures to be carried out by the Designated Person, Authorising Engineers and Authorised Persons.

Performance audits by the Designated Person/SOM

2 The Designated Person/SOM should continuously monitor the performance and effectiveness of the Authorising Engineer.

Compliance audits by Authorising Engineers

3 Authorising Engineers should carry out a compliance audit at each establishment for which they are appointed at a maximum of 12 monthly intervals.

Compliance audits by Authorised Persons

4 Authorised Persons should carry out a compliance audit on each Competent Person for which they are responsible including contractors at a maximum of 12-monthly intervals.

Audit programme and progress reports

5 Authorising Engineers should prepare a programme of audits covering a period of 12 months. The programme should be prepared so that all significant installations for which they are appointed are seen over a maximum interval of three years. The programme should be distributed to the Designated Person, SOM and Authorised Persons at the establishment.

Compliance audits

6 The Authorising Engineer should review the action plan and progress of any outstanding recommendations from the previous audit.

7 The Authorising Engineer should examine the current and known future workload of the Authorised Person (LV) and should assess if sufficient Authorised Persons (LV) are appointed for the site in question, taking into account absences of incumbent Authorised Persons. The Authorising Engineer should also examine the register of appointed Competent Persons to ensure that sufficient persons are appointed.

Authorised person and documentation audit

8 The Authorising Engineer should review each Authorised Person to ascertain the quantity and quality of any safety documentation raised since the last audit. The Authorising Engineer should carry out a full audit trail of at least one activity carried out by each Authorised Person. This audit should review the activity from commencement to completion. In the case of low activity, the Authorising Engineer should look at all documents produced and to assess the Authorised Person against a hypothetical scenario.

9 The Authorising Engineer should examine the LV site logbook to ensure that safety documentation has been used for all LV work requiring a safety document.

10 The Authorising Engineer should examine a representative sample of the documentation raised by each Authorised Person.

11 The Authorising Engineer should also examine a representative sample of the support documentation from the OPM and maintenance manuals for accuracy and suitability.

12 The Authorising Engineer should examine the training records and ensure that each person has maintained their qualification for the application of this Health Technical Memorandum including emergency first-aid.

Safety equipment

13 The Authorising Engineer should inspect a sample of the safety equipment to ensure that:

- adequate equipment is available at the establishment
- it is suitable for the intended purpose
- it has been properly maintained, recorded and
- the Authorised Persons, and other users, have been trained to use it safely.

Switchrooms and other installations

14 The Authorising Engineer should examine a sample of electrical installations and switchrooms and should ensure that all installations are inspected at a maximum interval of three years.

Non-compliances

15 Where non-compliances are found, the Authorising Engineer should take the following action:

- For non-compliances on completed jobs not adversely affecting the safety, investigate the reason and raise a non-compliance comment in the audit report.
- For non-compliances on completed work that could have adversely affected the safety, investigate the reason and raise an Authorising Engineer's (LV) practice improvement notice.
- For non-compliances on work-in-progress that may adversely affect safety, suspend the work, investigate the reason and raise an Authorising Engineer's (LV) suspension notice.

Audit report

16 The Authorising Engineer should agree the factual findings with the Authorised Persons before preparing the report. The report should include compliant items, any non-compliant findings and recommendations. The report should be issued within 28 days of completion of the site visit.

17 Copies of the report should be distributed to the Designated Person, SOM and the Authorised Persons.

Action plan

18 The Authorised Person(s) in consultation with the Authorising Engineer should prepare an action plan to implement any recommendations from the report. The action plan should be prepared within 28 days of receipt of the audit report and should include the action to be taken, the name of the Authorised Person who will carry out the action and the target date for completion. The Authorised Person should copy the agreed action plan to the Designated Person or SOM.

Short-notice compliance monitoring by the Authorising Engineer

19 In addition to the above procedures, where appropriate, the Authorising Engineer may carry out short-notice visits. These visits should be timed to coincide with any work-in-progress if at all possible. The purpose of the visit is to monitor Authorised Persons and ensure they are working in accordance with this guidance at all times. The report of the findings should be distributed to the individual Authorised Person and the Designated Person or the SOM.

Compliance monitoring by Authorised Persons

20 Authorised Persons should monitor work-in-progress regularly and should keep a record of the findings and any remedial action initiated or required. Copies of the Authorised Persons reports should be made available to the Authorising Engineer.

Auditing aids

21 The following generic checklists can be used as a guide for auditing the safe system of work for electrical distribution systems. Authorising Engineers can modify these to suit the particular installation(s) for which they are appointed. Photographs may be included in the report where appropriate.

22 Refer to the relevant section in the current version of the NHS PAM model for electrical systems to include the completion of an assessment against the NHS PAM.

Authorising Engineer's audit checklist (not exhaustive)

Complete column 3 "Yes/No" to show state as found.

Tick column 4 only if action is required.

	Authorised Persons Authorised Person ……	Y/N	Action
1.	Is the Authorised Person currently certificated?		
2.	Is the Authorised Person due for refresher training within the next 12 months?		
3.	Is the Authorised Person due for emergency first-aid training within the next 12 months?		
4.	Is the Authorised Person due for training in use of cable tracing equipment?		
5.	Is the Authorised Person carrying out Authorised Person duties on a regular basis?		
6.	Is the Authorised Person carrying out monitoring of work-in-progress?		
7.	Are sufficient Authorised Persons appointed?		
8.	Are Authorised Person monitoring and auditing Competent Persons?		
	Audit trail PTW number …… Originating Authorised Person ……		
9.	Does the safety programme follow the procedures in Tables 2, 3 or 4?		
10.	Is the safety programme clear, legible and unambiguous?		
11.	Was the safety programme countersigned by an appropriate person?		
12.	Does the Authorised Person have sufficient items of safety equipment to carry out the actions on the safety programme?		
13.	Is the isolation and earthing diagram clear, legible and unambiguous?		
14.	Is the permit-to-work clear, legible and unambiguous?		
15.	Was the permit-to-work issued to a Competent Person/Skilled Person?		
16.	Was the permit-to-work cancelled correctly?		
17.	Were the site records updated on completion of the work?		
	Documentation		
18.	Are the documents kept in the lockable documents cabinet?		
19.	Does the Authorised Person have access to a controlled copy of HTM 06-02?		
20.	Are the single line network diagrams of the electrical distribution correct and up-to-date?		
21.	Is the switchgear and transformer schedule correct and up-to-date?		
22.	Are there protection studies available for protective devices?		
23.	Are the "as-laid" cable route drawings correct and up-to-date?		
24.	Are the "as-fitted" drawings correct and up-to-date?		
25.	Are copies of operation and maintenance manuals held for all equipment?		
26.	Are all events recorded in the LV site logbook?		
27.	Are defect notifications recorded in the LV site logbook?		
28.	Is all of the distribution system included in the planned maintenance programme?		
29.	Is the register of Competent Persons up-to-date?		
30.	Is the OPM current and up-to-date?		

Safety equipment

31.	Does the Authorised Person have sufficient safety locks, safety key boxes and multi-hasps for the likely number of concurrent jobs?		
32.	Does the Authorised Person have sufficient caution and danger signs for the likely number of concurrent jobs?		
33.	Are the potential indicator and proving unit satisfactory?		
34.	Is the other protective equipment inspected at annual intervals?		

Switchrooms

Switchroom externals

35.	Is there /are there suitable safety signs displayed at the entrances ?		
36.	Is the sign legible?		
37.	Is the name of the switchroom exactly the same as the switchgear schedule?		
38.	Is the sign securely fixed?		
39.	Is the correct contact telephone number shown?		

Switchroom security

40.	Is the door secure and sound?		
41.	Is there an emergency escape door?		
42.	If so, is it accessible and can it be opened from the inside?		
43.	Is there a clear escape route outside the switchroom?		
44.	Is there a 24-hour telephone point inside or other suitable means of communication in place?		
45.	Are any non-Authorised Person items stored in the switchroom?		
46.	Are the access arrangements correctly controlled?		

Switchroom structure

47.	Is the switchroom dry and clean?		
48.	Are duct covers fully in place?		
49.	Are there any signs of water ingress?		
50.	Are there any visible defects in the structure (such as damaged firebreaks)?		
51.	Are there any signs of rodents in the switchroom/substation?		
52.	Is the working space and lighting adequate?		
53.	Is emergency lighting installed?		
54.	If so, is it included in the planned maintenance programme?		

Switchroom posters and labels

55.	Are suitable, up-to-date and relevant posters and schematics displayed?		
	LV switchgear		
56.	Is each item of switchgear clearly labelled?		
57.	Do the labels agree exactly with the switchgear schedule?		

58.	Are warning labels displayed on the rear panels of the switchgear?		
59.	Are switchgear operating mechanisms locked?		
60.	Does the switchgear condition agree with the maintenance record?		
61.	Is there excessive noise or heat from the switchgear?		
62.	Are there any signs of leakage visible from compound-filled cable terminations?		
63.	Are there any defect notifications in place?		
64.	If so, are warning notices displayed?		

Fire precautions

65.	Are any rubbish or fire hazardous materials stored inside the switchroom?		
66.	Is a suitable fire extinguisher provided in the switchroom?		
67.	Has it been inspected?		
68.	Is there a “gas flooding” system installed?		
69.	If so, are there clear instructions displayed on how to inhibit the system when entering the switchroom/substation?		

I confirm that, where actions are required, a report has been submitted to the Designated Person	…… Signature of Authorising Engineer (LV)

Authorised Person annual on-site operational audit form

Complete column 3 'Yes/No' to show state as found.

Tick column 4 only if action is required.

Competent Person

Competent Person		Y/N	Action
	Is the Competent Person currently certificated?		
	Is the Competent Person trained to HTM 06-02?		
	Is the Competent Person due for training in emergency first-aid?		
	Does the Competent Person have a copy of the HTM06-02 electrical safety handbook?		

Audit trail dead working

Job number ..... Originating Authorised Person .....

	Description of work-in-progress _____ _____ _____ _____ _____ _____ _____ _____		
	Identification of the point of isolation		
1.	Were circuit drawings used?		
2.	Were the circuits labelled?		
3.	Other methods used to determine isolation, please give details below:		
	_____ _____ _____		
4.	In your view, are circuit drawings and/or labels up-to-date, accurate and sufficient? If no, give details:		
	_____ _____ _____		
	Isolation		
5.	Was the equipment energised prior to isolation?		
6.	Was permission to disconnect supplies obtained?		
7.	Is the disconnection of supply correctly established?		
8.	Are caution signs posted?		

9.	Have safety locks being applied at the point of isolation?		
10.	If applicable, have fuses being removed and retained by the Competent Person?		
11.	Does the isolation method used comply with HTM 06-02?		
	Proving dead		
12.	Are approved test lamps available at the place of work?		
13.	Is a functioning test lamp available at the point of work?		
14.	Was the test lamp proved to work prior to use?		
15.	Was the circuit proved dead at the point of work?		
16.	Was the test lamp proved to work after use?		
	Tests on completion of work		
17.	Was the equipment tested before re-energisation?		
	If yes, please list below:		
	_____ _____ _____ _____ _____ _____ _____ _____ _____		
	Certification on completion of work		
18.	Was a BS 7671 test certificate required for the work?		
	If yes, give details of certificate completed:		
	_____ _____		

Audit trail live working (not requiring a safety document)

Job number …… Competent Person ……

	Description of work		
19.	Testing		
20.	Fault-finding		
21.	Adjustments		
	Other. Please give details: _____ _____ _____ _____ _____		
22.	Do you agree that the work must be undertaken live?		

	If no, give reasons: _____ _____ _____		
	Safety precautions		
23.	Is the Competent Person trained and authorised?		
24.	Is authorisation less than three years old?		
25.	Was the form LW1 completed?		
	Which of the following safety precautions were adopted?		
26.	Accompanied		
27.	Rubber gloves worn		
28.	Rubber mats		
29.	Insulated tools used		
30.	Temporary insulation		
31.	Suitable clothing to the wrist worn		
32.	GS38 test leads used		
33.	Barriers erected to control work area		
34.	Do you consider the precautions taken as adequate? If no, please give reasons:		
	_____ _____ _____ _____		
35.	Does this work fully meet the HTM 06-02 live working policy?		
	If no, please give reasons: _____ _____ _____ _____		

Audit trail general

	Work instructions		
36.	Were written job instructions used for the work?		
37.	If written instructions were given, were they correct and sufficient?		
	If no, please give details: _____ _____ _____ _____		
38.	Were verbal instructions used for the work?		

39.	If verbal instructions were given, were they correct and sufficient?		
	If no, please give details: _____ _____ _____ _____		
	Tools and instruments		
40.	Are all tools and instruments on-site safe to use?		
	If no, please give details: _____ _____ _____ _____		
41.	Is the individual's tool-kit complete and fit for purpose?		
	If no, please give details: _____ _____ _____ _____		
	Note This section may need to be completed when the job is finished and access to the stored tools/instruments in the workshop is available		

I have been shown the completed entries on this form	…… Signature of Competent Person (LV)

I confirm where there are actions required a report has been submitted to the Designated Person	…… Signature of Authorised Person

Appendix 5 – Standard symbols for the isolation and earthing diagram

1 Figure A1 shows the standard symbols used in isolation and earthing diagrams.

Switchgear

2 The terminology used to describe a piece of switchgear on a system should state:

a. **where** the switchgear is located;

b. **what** type of switchgear is going to be operated;

c. **to where** does the switchgear connect.

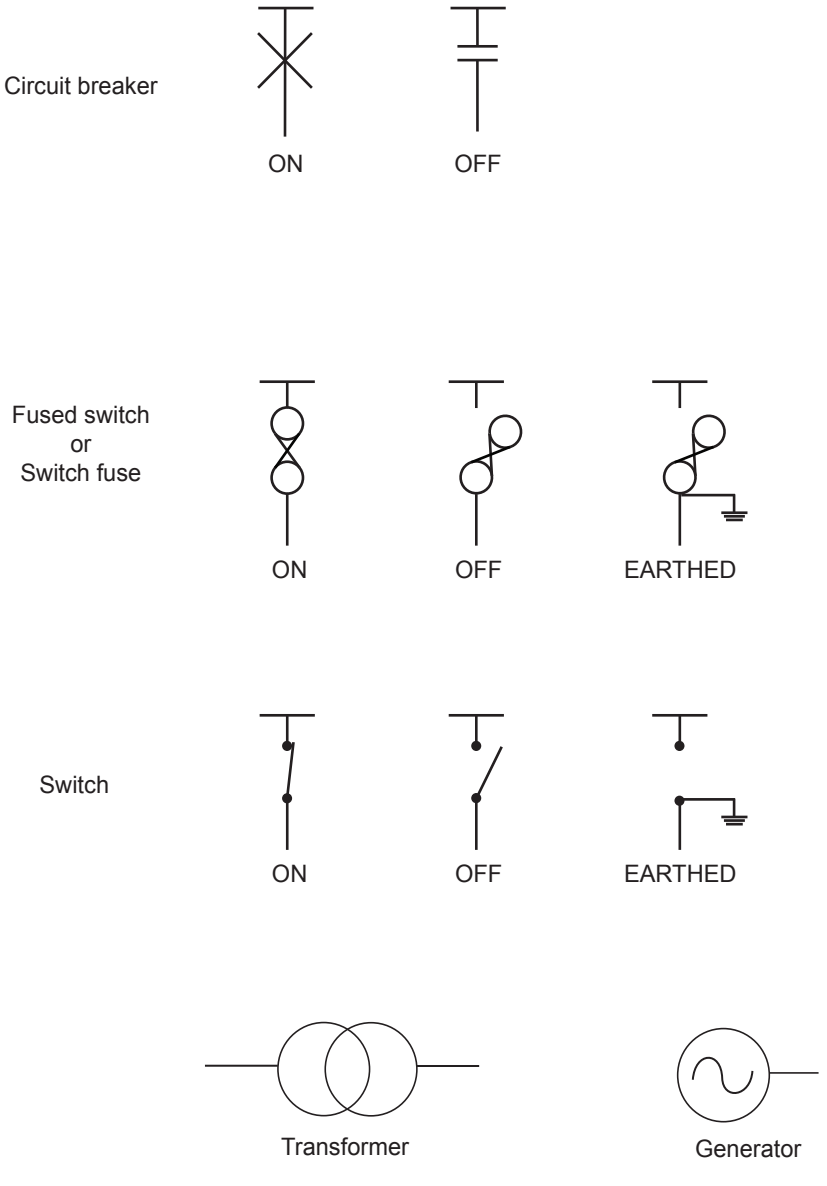
(See Figure A2)

Operation

3 The operation of the switchgear should be recorded as follows:

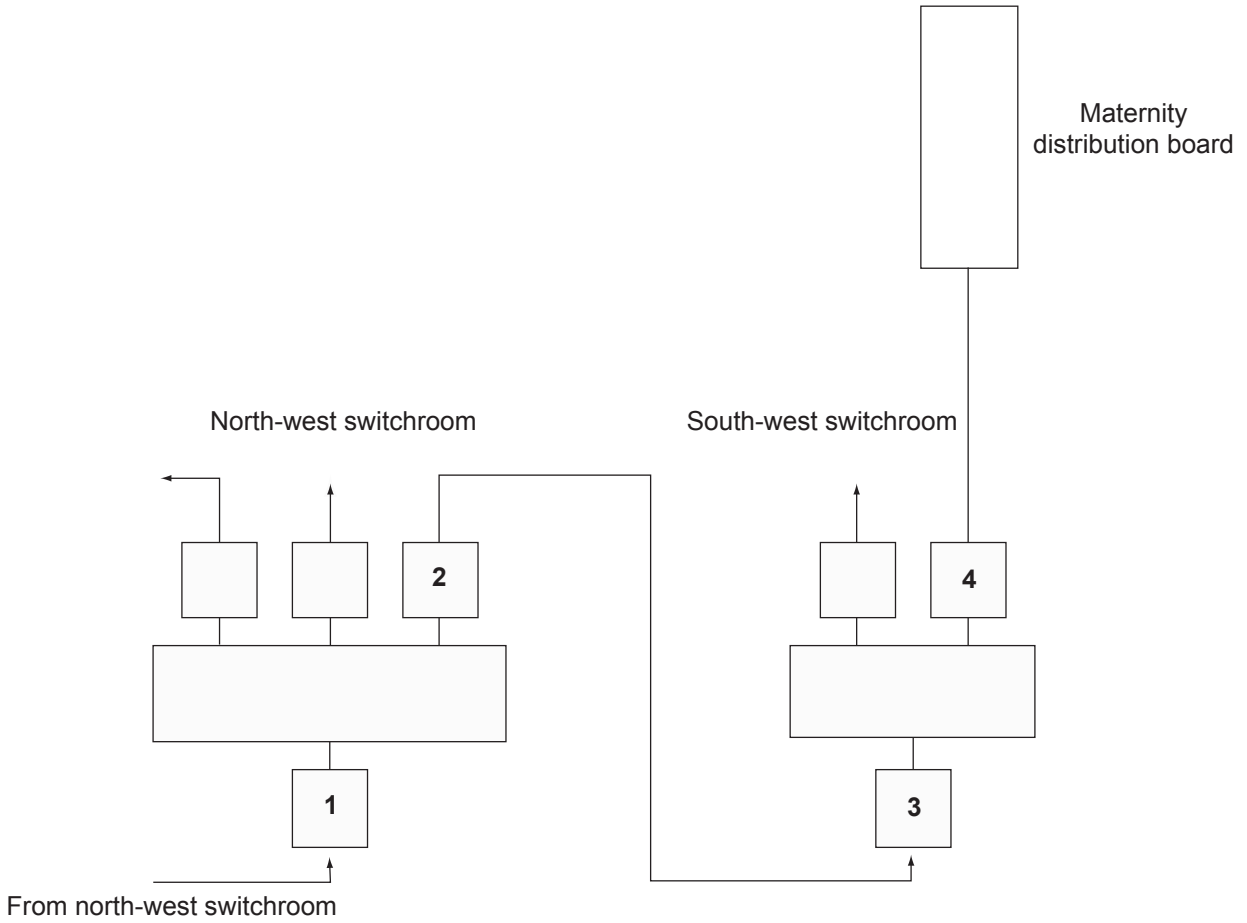
- switch/circuit breaker switch to on;
- switch/circuit breaker switch to off.

Figure A1 Standard symbols for isolation and earthing



IP2X disconnector type feeder pillars

Figure A2 Switchgear network diagram



	Where	What	To where
1	North-west switchroom	Switch disconnector	North-west switchroom
2	North-west switchroom	Circuit breaker	South-west switchroom
3	South-west switchroom	Switch disconnector	South-west switchroom
4	South-west switchroom	Fused switch	Maternity distribution board

Appendix 6 – Qualifications and training requirements

Qualifications of an Authorising Engineer

1 To be eligible for appointment, a prospective Authorising Engineer should:

a. be a chartered or an incorporated engineer with practical and relevant technical engineering experience of the types of systems and equipment relative to their appointment

b. have satisfactorily completed an approved Authorised Person initial training course in the last five years or within six months of a first-time nomination

c. have satisfactorily completed an approved Authorising Engineer training course in the last five years or within six months of a first-time nomination

d. be familiar with the different types of equipment, installations and systems in use within the area for which appointment is sought

e. have a basic knowledge of the systems and installations in use in the area for which they will become responsible, and become familiar with the more complex systems

f. be independent from the organisation which is important to exercise the duties of the post

g. be able to demonstrate their competency and suitability for the role by demonstrating a good understanding of the management tasks involved and knowledge of Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems' prior to appointment

h. have adequate knowledge of, and within the last three years successfully completed a training course on, emergency first-aid.

Authorising Engineer (LV) training

2 This HTM suggests that, in order to become eligible for appointment as an Authorising Engineer, candidates should have successfully completed an appropriate training course for Authorised Persons. The course profile is described in this Appendix.

3 This HTM suggests that, in order to become eligible for appointment as an Authorising Engineer, candidates should have successfully completed an appropriate training course for Authorising Engineers. The course profile is described in this Appendix.

4 This HTM suggests that an Authorising Engineer should attend an appropriate Authorised Persons' training course at intervals not exceeding five years.

5 This HTM suggests that that an Authorising Engineer should attend an appropriate Authorising Engineer refresher training course at intervals not exceeding five years.

Qualifications of Authorised Persons (LV)

6 Prospective Authorised Persons should be nominated by the Management and assessed, interviewed and recommended for appointment by the Authorising Engineer. The appointment should be for defined systems and installations and will be registered on a certificate of appointment signed by the Authorised Person, the Designated Person/ SOM and the Authorising Engineer.

7 To be eligible for appointment as an Authorised Person, the prospective Authorised Person should:

a. have suitable and sufficient skills, knowledge, experience and behaviour

b. be electrically qualified within the following range:

   (i) degree

   (ii) HND/HNC

   (iii) OND/ONC

   (iv) BTech 3 or above

   (v) NVQ at level III or above

c. have an adequate knowledge of this HTM and of those regulations that are applicable to the systems and installations for which the appointment is sought

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

e. be familiar with the equipment, systems or installations for which the appointment is sought

f. have successfully completed a suitably accredited Authorised Persons (LV) training course

g. before being appointed, be able to demonstrate competency and suitability for the role through a formal interview carried out by the Authorising Engineer

h. have adequate knowledge of, and within the last three years have successfully completed, an emergency first-aid training course.

Initial training for an Authorised Person (LV)

8 Prospective Authorised Persons (LV) should successfully complete an Authorised Persons' (LV) training course to be considered for appointment as an Authorised Person.

9 Prospective Authorised Persons (LV) should successfully complete an emergency first-aid training course in accordance with this guidance to be considered for appointment as an Authorised Person.

Refresher training for an Authorised Person (LV)

10 All Authorised Persons (LV) should successfully complete an Authorised Persons' (LV) refresher training course at intervals not exceeding three years. The training should last a minimum of three days and be designed to refresh and update the Authorised Person's (LV) knowledge of legislation, standards and the requirements contained within this HTM.

11 All Authorised Persons (LV) should successfully complete an emergency first-aid training course in accordance with this HTM at intervals not exceeding three years.

Familiarisation training

12 A suitable period of familiarisation training should be agreed with the prospective

Authorised Person and Authorising Engineer and the SOM or mentoring Authorised Person.

13 At the end of the familiarisation period, for the systems, installations and equipment for which the appointment is sought, the prospective Authorised Person should be able to demonstrate:

a. a good working knowledge of the procedures associated with the operation of this HTM, the role and duties of an Authorised Person and any agreed local variation

b. a good working knowledge of the layout of the electrical distribution, the location of the safety key-boxes, working key cabinet and how to gain access to them

c. a good working knowledge of the operation – under normal, failure and fault conditions – of all the principal components of the systems and installations for which authorisation is being sought, such as switchgear, distribution equipment, standby generating sets, photovoltaic equipment, UPS and Medical IT systems

d. practical experience, under the direct supervision of an experienced Authorised Person, of the operation of the electrical equipment forming part of the system or installation

e. knowledge of the location of, how to obtain access to, and the use of, all appropriate protective equipment, test indicators (including appropriate test supplies (proving units)), where applicable low voltage potential indicators (including appropriate test supplies (proving units)), and safety signs

f. a good understanding of all the necessary safety measures to be taken to prevent danger or, where appropriate, injury, and to prevent damage to equipment

g. knowledge of any necessary liaison with local managers, clinicians, Authorised Persons of other disciplines, electricity supply authorities, and contractors having operation, repair or maintenance contracts.

On-site training

14 On-site training should consist of putting into practice, under the supervision of an experienced Authorised Person, the knowledge gained during the familiarisation period. During this period, the prospective Authorised Person should keep a record of locations attended during the familiarisation period.

Qualifications of Competent Persons

15 Prospective Competent Persons should be assessed and appointed by the Authorised Persons. The appointment is to be for defined systems and installations and will be registered on a certificate of appointment signed by the Competent Person and the Authorised Person.

16 To be eligible for appointment as a Competent Person, the prospective Competent Person should:

a. be qualified within the following range: ONC, BTech 3, NVQ level III, or equivalent. It is recommended that the Competent Person remains up to date with current wiring regulations (BS 7671). Competent Persons required to install or alter electrical circuits should have attained the relevant City & Guilds qualifications in electrical installation, maintenance, repair, inspection and testing

b. be competent to undertake work on, and testing of, the types of systems and equipment for which the appointment is sought

c. be familiar with the types of installation and equipment that they will be required to work on or test

d. possess the necessary technical knowledge, skill and experience relevant to the nature of the work or tests to be undertaken to prevent danger and injury

e. have an adequate knowledge of the relevant parts of this HTM, any agreed local variations, and regulations which are applicable to the installations and equipment on which work or tests are to be undertaken

f. have an adequate knowledge of, and within the last three years have successfully completed, Competent Person's (LV) training

g. have an adequate knowledge of, and within the last three years have successfully completed, an emergency first-aid training course.

17 Appointment for up to three years will follow completion of necessary training, the passing of an examination (comprising practical exercises), and an interview with the Authorised Person.

Training for a Competent Person (LV)

18 Prospective Competent Persons (LV) should successfully complete a Competent Persons' (LV) training course to be considered for appointment as an Competent Person (LV).

19 Prospective Competent Persons (LV) should successfully complete emergency first-aid training course in accordance with this guidance to be considered for appointment as an Competent Person (LV).

Approved courses

20 The Management has a duty to ensure that their employees receive training necessary to allow them to safely perform their duties.

21 Appropriate training courses are formal courses of instruction appropriate to the duties expected to be performed by a prospective or practising Authorised Person or Competent Person, which have been approved for the purpose by the Management in consultation with the Authorising Engineer.

22 Training may take place at a training establishment and/or locally on site. On-site training is an important element; it ensures a better understanding of how the safety policy will be applied locally to the low voltage system.

23 Such courses should be designed to impart an adequate level of knowledge of these rules and of other matters necessary for the application of safe systems of work. In addition, they should include practical experience of applying safe working procedures on a range of typical low voltage equipment arranged to provide simulated circuits.

24 Students should be continually assessed in both written and practical exercises so that, on completion of the course, the training organisation can make an independent assessment of their suitability and technical competence for consideration by the Authorising Engineer or Authorised Person as appropriate. The students should also be informed directly of the results of the assessments.

25 Suitable training course profiles for this purpose are given in this Appendix. These are for general guidance only, and courses that are a composite of existing commercially run courses may be acceptable provided the Authorising Engineer has given approval.

Training course profiles

Training course profile for an Authorising Engineer (LV)

26 Approved training courses for an Authorising Engineer should provide the necessary training and background information to prepare candidates to safely discharge the duties of an Authorising Engineer in accordance with this HTM.

27 The training should ensure that:

a. the Management's policy towards electrical safety is applied universally across the areas of management responsibility

b. Authorised Persons are correctly selected and appointed, and their application of Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems' is properly audited

c. the roles and duties of an Authorising Engineer with regard to the selection of Authorised Persons is looked at in detail

d. the procedures to be adopted when work is undertaken are carried out in a controlled environment.

28 The course should have a minimum duration of two days, and the scope should include:

a. an introduction to safe systems of work

b. the roles and responsibilities of persons

c. practical and procedural aspects of safe working practices

d. nomination, evaluation, appointment and auditing of Authorised Persons

e. candidate interview techniques

f. training requirements for new and in-service Authorised Persons

g. termination procedures for Authorised Persons

h. accident/incident investigation and reporting.

Training course profile for Authorised Person's (LV) initial training

29 Approved training courses for low voltage electrical distribution systems should provide the necessary basic training and background information to prepare students to safely discharge the duties, in accordance with Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems', as an Authorised Person in respect of the defined distribution systems.

30 The training should provide:

a. an adequate knowledge of the reasoning and content of Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems'

b. a thorough knowledge of, and practical experience in, the duties and responsibilities of an Authorised Person (LV)

c. an introduction to the theory, application, operation and maintenance of components of typical low voltage distribution systems.

31 The background information should provide an understanding of the principles involved in the design, operation and maintenance of typical low voltage distribution systems and their associated protective devices.

32 The course should last about five days, and the scope should include:

a. statutory requirements relating to electrical safety

b. Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems'

c. role and duties of personnel

d. types and functions of common low voltage distribution switchgear including miniature circuit breakers (MCBs), relays, fuses and interlocks

e. testing of electrical installations to BS 7671

f. requirements of BS 7671 with reference to HTM 06-02

g. safe isolation procedures of standby power supplies and equipment

h. monitoring and control of work undertaken by contractors/staff

i. appointment and auditing procedures

j. practical exercises on the isolation of standby, UPS and battery systems including the issue of permits-to-work and certificates of authorisation for live working

k. practical exercises on the isolation of low voltage distribution systems including preparation, checking and use of safety programmes, and procedures pertaining to permits-to-work

l. completion of logbook and filing of documentation

m. cable detection, location and identification.

Training course profile for Competent Persons

33 Approved training courses should provide the necessary training and background information to prepare Competent Persons to safely discharge their duties in accordance with Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems'.

34 The course should last a minimum of one day, and the scope should include:

a. statutory requirements relating to electrical safety

b. the guidance given in Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems'

c. role and duties of personnel

d. procedures for working on equipment made dead

e. receipt of HTM 06-02 safety documentation

f. local procedures

g. procedures for working on live equipment (LW2)

h. use of approved tools and equipment and personal protective equipment

i. means/method of proving dead at the point of work

j. completion of live working self-check safety precautions (form LW1) before testing, fault-finding or making adjustments on live LV circuits

k. type of live working which requires the issue of a certificate of authorisation for live working by an Authorised Person (LW1)

l. inspection and testing of circuits prior to energisation.

Emergency first-aid training and equipment

35 All Authorised Persons, Competent Persons and Accompanying Safety Persons should successfully complete emergency first-aid training course at intervals not exceeding three years.

36 Training in emergency first-aid should be provided by organisations whose training and qualifications for first-aiders are approved by

the Health and Safety Executive for the purposes of the Health and Safety (First-Aid) Regulations.

37 Training courses should be of at least six hours' contact time, and should include the following subjects:

a. resuscitation (as appropriate for the treatment of electric shock)
b. treatment of burns
c. control of bleeding
d. treatment of the unconscious casualty
e. contents of first-aid box
f. communication.

38 This training should be repeated, as a minimum, every three years.

39 Copies of certificates issued to Authorised Persons should be held by the Authorising Engineer.

40 Copies of the certificates issued by first-aid trainers for Competent Persons and Accompanying Safety Persons should be held in the OPM.

41 A current list of first-aiders for the appropriate locations, including, where appropriate, their telephone numbers, should be held in the OPM.

Contractors' staff

42 All contractors' staff working on or testing electrical installations, systems and equipment for which the Management has control of the electrical danger should receive, as a minimum, the emergency first-aid training indicated above.

43 Copies of the certificates issued by first-aid trainers for contractors' Competent Persons and Accompanying Safety Persons should be held in the OPM.

Assessment of Authorised and Competent Persons

44 Examination of Authorised and Competent Persons to determine suitability for appointment should take the form of practical exercises and an interview.

45 Exercises and interview questions should cover topics to a level appropriate to the proposed duties and responsibilities of the appointment.

46 Practical exercises for an Authorised Person appointment should include:

a. preparation and issue (to Authorising Engineer acting as a Competent Person) a permit-to-work, limitation-of-access, LW1, LW2 and a certificate of authorisation for live working
b. preparation and use of a safety programme for work on a complex circuit which requires the issue of a permit-to-work, insulation-testing repair and phasing-out across an open switch before making a parallel
c. proving dead at the point of work.

Note:

Items (b) and (c) will be carried out using the local on-site LV network. If it is not practical to arrange isolation of the complex circuit (chosen for the safety programme), the candidate and Authorising Engineer should physically visit each switching location, and the candidate should describe to the satisfaction of the Authorising Engineer any actions they would take to ensure safety.

47 The Authorising Engineer should witness the candidate physically switching to achieve isolation, testing to prove dead and phasing-out using other circuits on the local network if the dispensation described in the note above is used.

48 Practical exercises for a Competent Person (LV) appointment should include:

a. issue (by the Authorised Person conducting the examination) to the candidate a permit-to-work including questioning to confirm the candidate's knowledge. The candidate should then explain how they will brief and supervise members of the working party working under their control. This exercise should be carried out in a switchroom with danger signs posted to simulate conditions described in the permit-to-work, but without the need to actually isolate the circuit

b. isolation of a non-complex circuit and proving dead at the point of work

c. completion of an LW1

d. receipt of an LW1 and certificate of authorisation for live working.

49 Interview questions and candidate (summary) replies should be recorded.

50 An assessment should be repeated prior to reappointment of individuals.

References

Note:

Standards and other specification documents are continually being updated. Readers should ensure that they consult the latest editions of such documents, including any amendments issued after publication, to keep abreast of changing requirements.

Acts and regulations

Confined Spaces Regulations. SI 1997 No 1713.
https://www.legislation.gov.uk/uksi/1997/1713/made

Electricity at Work Regulations. SI 1989 No 635.
https://www.legislation.gov.uk/uksi/1989/635/contents/made

Electromagnetic Compatibility Regulations. SI 2016 No 1091.
https://www.legislation.gov.uk/uksi/2016/1091/contents

Health and Safety (First-Aid) Regulations. SI 1981 No 917.
https://www.legislation.gov.uk/uksi/1981/917/regulation/3/made

Health and Safety at Work etc. Act 1974 (HSW Act 1974).
https://www.legislation.gov.uk/ukpga/1974/37/contents

Personal Protective Equipment at Work Regulations. SI 1992 No 2966.
https://www.legislation.gov.uk/uksi/1992/2966/contents/made

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). SI 2013 No 1471.
https://www.legislation.gov.uk/uksi/2013/1471/contents/made

Health Technical Memoranda and related guidance

Health Technical Memorandum 00. Policies and principles of healthcare engineering.
https://www.england.nhs.uk/publication/building-engineering-in-the-health-sector-htm-00/

Health Technical Memorandum 05-03. Fire safety in the NHS: operational provisions.
https://www.england.nhs.uk/publication/fire-safety-in-the-nhs-health-technical-memorandum-05-03/

Health Technical Memorandum 05-03. Part K – General fire risk assessments.
https://www.england.nhs.uk/publication/fire-safety-in-the-nhs-health-technical-memorandum-05-03/

Health Technical Memorandum 06-01. Electrical services supply and distribution.
https://www.england.nhs.uk/publication/electrical-services-supply-and-distribution-htm-06-01/

NHS Premises Assurance Model.
https://www.england.nhs.uk/estates/nhs-premises-assurance-model/

Health and Safety Executive guidance

GS38: Electrical test equipment for use on low voltage electrical systems. https://www.hse.gov.uk/pubns/books/gs38.htm

HSG47: Avoiding danger from underground services. https://www.hse.gov.uk/pubns/books/hsg47.htm

HSR25: Memorandum of guidance on the Electricity at Work Regulations 1989. https://www.hse.gov.uk/pubns/books/hsr25.htm

Safe work in confined spaces: Confined Spaces Regulations 1997. Approved Code of Practice and guidance L101. https://www.hse.gov.uk/pubns/books/l101.htm

British/European Standards

BS 2559-3. Specification for screwdrivers. Insulated screwdrivers. British Standards Institution.

BS 3087-1. Pliers and nippers. General introduction. British Standards Institution.

BS 5252. Framework for colour co-ordination for building purposes. British Standards Institution

BS 5306. Fire extinguishing installations and equipment on premises. British Standards Institution.

BS 7671:2018+A2:2022. Requirements for electrical installations. IET Wiring Regulations. Institution of Engineering and Technology/ British Standards Institution.

BS EN 168. Personal eye-protection. Non-optical test methods. British Standards Institution.

BS EN 354. Personal fall protection equipment. Lanyards. British Standards Institution.

BS EN 355. Personal protective equipment against falls from a height. Energy absorbers. British Standards Institution.

BS EN 361. Personal protective equipment against falls from a height. Full body harnesses. British Standards Institution.

BS EN 362. Personal protective equipment against falls from a height. Connectors. British Standards Institution.

BS EN 363. Personal fall protection equipment. Personal fall protection systems. British Standards Institution.

BS EN 364. Personal protective equipment against falls from a height. Test methods. British Standards Institution.

BS EN 365. Personal protective equipment against falls from a height. General requirements for instructions for use, maintenance, periodic examination, repair, marking and packaging. British Standards Institution.

BS EN 60903. Live working. Gloves of insulating material. British Standards Institution.

BS EN 61111. Live working. Electrical insulating matting. British Standards Institution.

BS EN 61243-3. Live working. Voltage detectors. Two-pole low-voltage type. British Standards Institution.

BS EN ISO 7010:2020+A6. Graphical symbols. Safety colours and safety signs. Registered safety signs. British Standards Institution.

BS EN ISO 16321-1. Eye and face protection for occupational use. General requirements. British Standards Institution.

BS EN ISO 18526-1. Eye and face protection. Test methods. Geometrical optical properties. British Standards Institution.

BS EN ISO 9001. Quality management systems. Requirements. British Standards Institution.Contents

NHS England
Wellington House
133–155 Waterloo Road
London
SE1 8UG

Publications approval reference: PRN00620