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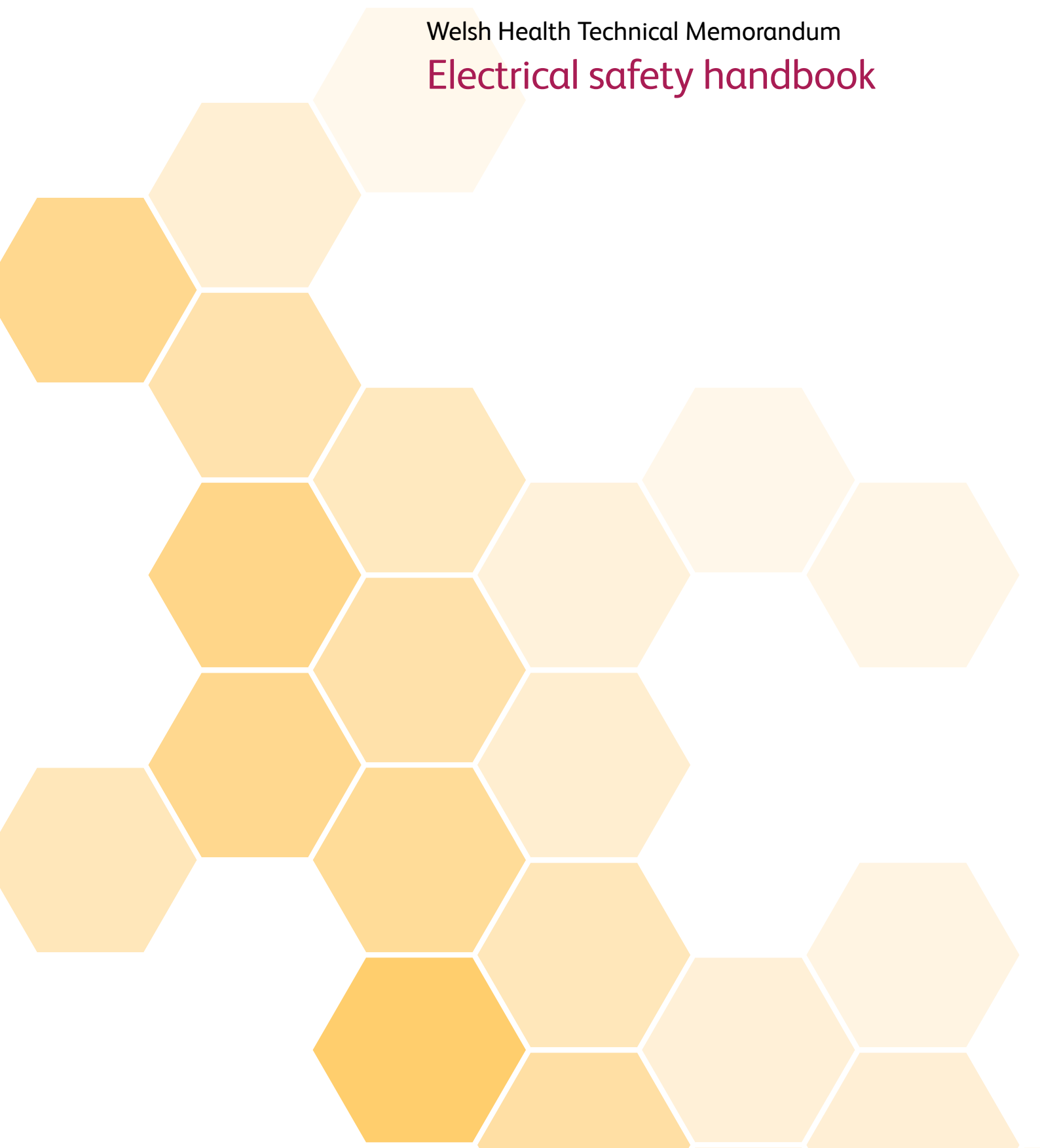


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WHTM 06-02

Welsh Health Technical Memorandum Electrical safety handbook



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Chapter 1

Definitions

1.1 With regard to this LV handbook, the following definitions apply.

Personnel

Designated Person

1.2 This WHTM 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.

Duty Holder

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

Management

1.4 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 in WHTM 06-02).

Senior Operational Manager (SOM)

1.5 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)

1.6 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 WHTM and to provide technical advice. The person appointed should possess the necessary degree of independence from local Management to take action within this WHTM.

Authorised Person (LV)

1.7 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 WHTM 06-02. See WHTM 00 for a recommended management structure.

Duty Authorised Person (LV)

1.8 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 of WHTM 06-02).

Competent Person (LV)

1.9 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 in WHTM 06-02).

Skilled Person (LV)

1.10 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)

1.11 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

Examples of safety documents are given in Appendix 1.

Permit-to-work (LV)

1.12 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

1.13 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

1.14 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 4.1 on live working procedures) or by an Authorised Person (LV) when issuing a certificate of authorisation for live working.

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

1.15 A form to be issued by a Duty Authorised Person (LV) to a Skilled Person (LV) to be able to carry out work, inspection or testing on (or near) live equipment as per the examples in paragraph 4.1.

Certificate of authorisation for live working

1.16 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

1.17 A form to be completed prior to work on electrical equipment under the control of endusers or designated staff.

Safety signs

Caution sign

1.18 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

1.19 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

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

Voltage range

1.21 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 in WHTM 06-02). (“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 WHTM 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 WHTM. This cabinet should not be used to store anything not associated with this WHTM.

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.

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 WHTM.

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 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.

Chapter 2

General precautions

Security and admittance to switchrooms

2.1 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).

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

2.3 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.

2.4 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.

2.5 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).

2.6 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

2.7 The Management should designate an appropriate room suitable for Authorised Persons to undertake their duties as specified in WHTM 06-02.

Security of electrical equipment

2.8 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

2.9 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

2.10 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

2.11 All documents specified in this WHTM 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

2.12 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

2.13 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.

2.14 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

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

2.16 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.

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

2.18 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).

2.19 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.

2.20 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

2.21 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.

2.22 A record of all defect notifications is available to NHS healthcare estates staff and the Management through NWSSP-SES intranet pages [https://nhs.wales365.sharepoint.com/sites/SSP_Intranet_SES/SitePages/High-Voltage-Hazard-Alerts-\(HVHAs\).aspx](https://nhs.wales365.sharepoint.com/sites/SSP_Intranet_SES/SitePages/High-Voltage-Hazard-Alerts-(HVHAs).aspx)

2.23 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 contact your Authorising Engineer for Low Voltage.

2.24 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

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

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

2.27 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

2.28 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

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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.

2.29 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.

2.30 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

2.31 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

2.32 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.

2.33 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.

2.34 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

2.35 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).

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

2.37 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

2.38 Before work or inspections are carried out in any enclosures protected by automatic fireextinguishing 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

2.39 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.

2.40 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.

2.41 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 WHTM 05-03 series – ‘Fire safety in the NHS: operational provisions’).

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

2.42 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

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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 WHTM 06-02 should be issued in addition to any safety documents for access to confined spaces.

Cable identification

2.43 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.

2.44 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

2.45 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.

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

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- 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.

Chapter 3

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

General

3.1 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.

3.2 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 4.

3.3 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.

3.4 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

3.5 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.

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3.6 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.

3.7 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.

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

3.9 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.

3.10 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).

3.11 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.

3.12 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 3.3 and 3.11 to be omitted providing they are satisfied that the measures taken are still adequate to prevent danger.

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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

3.13 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.

3.14 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.

3.15 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).

3.16 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

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- 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

3.17 A contractor's employee may be issued with a permit-to-work, providing the Authorised Person (LV) completes the actions required by this WHTM 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).

3.18 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.

3.19 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 of WHTM 06-02.

Safety programmes and isolation and earthing diagrams

3.20 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.

3.21 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.

3.22 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

3.23 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.

3.24 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.

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3.25 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 signal injection may be dispensed with if the Duty Authorised Person (LV) agrees.

3.26 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.

3.27 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.

3.28 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 4.

Additional precautions for dead work or testing on generating plant

3.29 When dead work or testing should be carried out on generating plant, paragraphs 3.1–3.12 apply.

3.30 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.

3.31 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 4 should be followed.

3.32 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 3.13–3.16 should be operated.

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

3.34 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

3.35 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.

3.36 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.

3.37 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.

3.38 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 4 should be followed.



Dead working procedures flowchart

Flowchart for dead working on low voltage systems

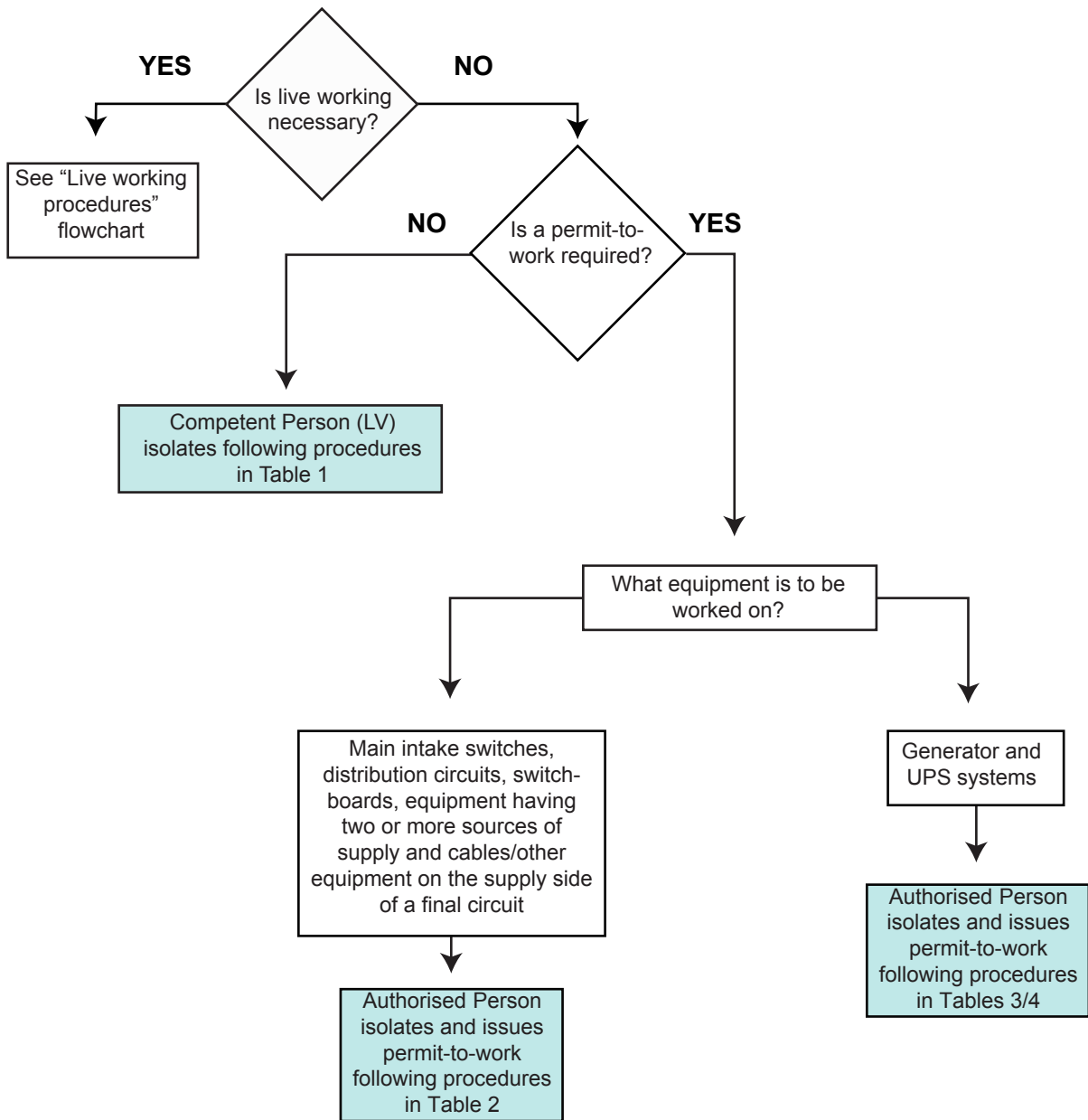


Table 1 Procedures for Competent Persons (LV) working on, or testing, cables and other equipment on the load side of a final circuit

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.	

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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
<p>1 Plan work and prepare safety documentation</p>	<p>(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.*</p> <p>(ii) Prepare a safety programme and an isolation and earthing diagram in duplicate and obtain countersignatures from another Authorised Person (LV) if required.</p> <p>(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.</p>
<p>2 Isolate and fix signs</p>	<p>(i) Duty Authorised Person to confirm with the appropriate person(s) in the affected area that the work is authorised to take place.</p> <p>(ii) Isolate from all sources of supply.</p> <p>(iii) Fix caution signs at all the points-of-isolation and where practicable prevent unauthorised connection or operation by fixing safety locks.</p> <p>(iv) Fix danger signs on live equipment adjacent to the point of work or test.</p>
<p>3 Prove dead and earth</p>	<p>(i) Where practicable, prove dead with an approved voltage test indicator at all points of isolation and the point-of-work or test.</p> <p>(ii) If the manufacturer’s earthing equipment is available, earth conductors at points-of-isolation and fix safety locks.</p> <p>(iii) Identify cables with certainty or spike underground cables at the point-of-work if the conductors are to be cut or exposed.</p>
<p>4 Issue the permit-to-work</p>	<p>(i) The Duty Authorised Person to clearly identify and/or mark the point-of-work/equipment to be worked on.</p> <p>(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.</p> <p>(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).</p> <p>(i) Complete the LV site logbook as soon as practicable.</p>
<p>5 Confirm dead</p>	<p>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.</p>
<p>6 Undertake the work</p>	<p>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.</p>
<p>7 Restore to operational state</p>	<p>Carry out steps required for restoration of supplies.</p> <p>Confirm with person in charge of the area that power is restored back to normal.</p> <p>Complete site logbook and return keys, sign off as Duty Authorised Person.</p> <p>Retain all documents prepared in the OPM.</p>
<p>Notes:</p> <p>The Authorised Person (LV) is responsible for all tasks.</p> <p>* Some works may require approval by the ESG.</p>	

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	<ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> (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.

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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	<ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> (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	<ul style="list-style-type: none"> (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.

Chapter 4

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

Work on or near live equipment

4.1 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 4.15).

4.2 When work of the type referred to in paragraph 4.1 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.

4.3 Live working other than that specified in paragraph 4.1 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.

4.4 If disconnection of terminals or connectors is required, the work should be carried out dead in accordance with Chapter 3. If the requirements of Regulation 14 are met, a certificate of authorisation for live working is required (see paragraph 4.6).

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

4.5 Other modes of live working other than those specified in paragraph 4.1 should not normally be considered except where all possible alternatives have been considered and eliminated.

4.6 Authorised Persons (LV) should consult their Authorising Engineers (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.

4.7 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.

4.8 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 metal work
- 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.

4.9 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.

4.10 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

4.11 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.



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

4.13 The requirements to implement any or all of the precautions for work on live equipment as detailed in paragraphs 4.1–4.2 to control maintenance work on battery installations should be determined by an Authorised Person (LV).

4.14 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 WHTM.

4.15 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 shortcircuiting terminals.

4.16 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.

4.17 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.

4.18 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.

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

4.20 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.

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

Live working safety documents

LW1 – Self-check safety precautions

4.22 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 4.1. 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).

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

4.24 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

4.25 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.

4.26 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

4.27 A certificate of authorisation for live working should be issued for live work on or near live electrical equipment not included within paragraph 4.1 and where the requirements of Regulation 14 of the Electricity at Work Regulations are met, with authorisation from the Authorising Engineer (LV).

4.28 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.

4.29 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).

4.30 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

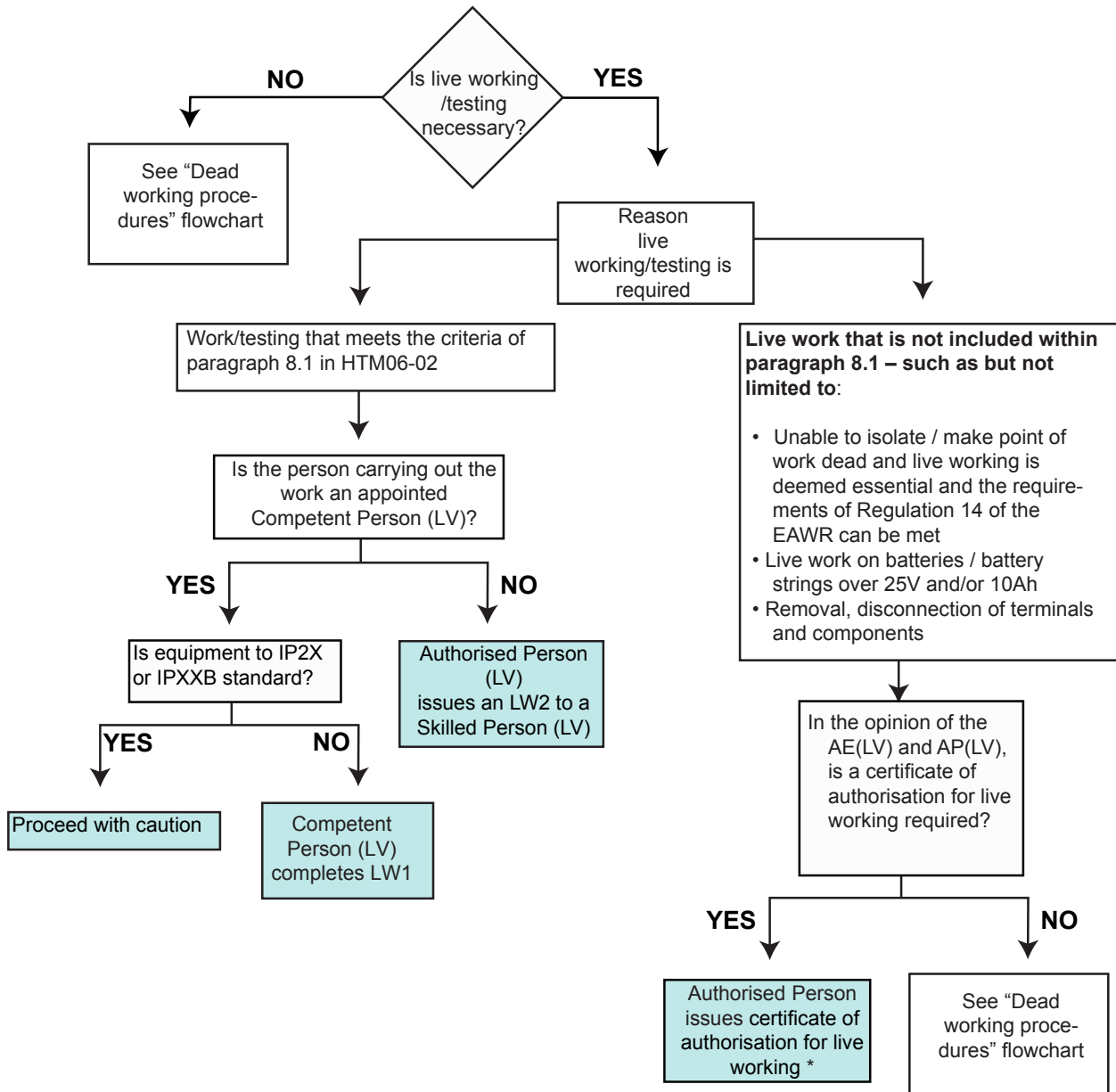


- d.** an LW1 has been completed by the Duty Authorised Person (LV)
- e.** the Duty Authorised Person (LV) is satisfied that the potential recipient fully understands all the necessary safety precautions to complete the task as detailed on the certificate
- f.** the Management have approved the issue 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 of WHTM 06-02.



Live working procedures flowchart

Flowchart for live working on low voltage systems



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



Table 5 Example scenarios of when to use LW1 and LW2

Live work/testing safety document	Examples of when document would be used
<p>LW1: Completed by a Competent Person (LV)</p>	<ul style="list-style-type: none"> • Live testing of final circuits (e.g. earth fault loop impedance, RCD/RCBO testing, faultfinding) 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).
<p>LW1: Completed by an Authorised Person (LV)</p>	<ul style="list-style-type: none"> • 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.
<p>LW2: Issued by a Duty Authorised Person (LV)</p>	<ul style="list-style-type: none"> • 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.
<p>Certificate of authorisation for live working: Issued by a Duty Authorised Person (LV) with written consent from their Authorising Engineer (LV)</p>	<ul style="list-style-type: none"> • Should only be issued by a Duty Authorised Person (LV) for specified live work that is not included within paragraph 4.1, 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 4.1 but the work needs to be carried out live and the requirements of Regulation 14 can be met.

Chapter 5

Display of posters and safety signs

Display of posters

5.1 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.

5.2 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 WHTM 06-02. Information should be displayed permanently in suitable and prominent positions. The areas to be considered for the display of information in connection with WHTM 06-02 should include every workshop and each Authorised Person (LV)'s office.

5.3 Other information and posters to be displayed may include relevant health and safety information.

Signage: design specification

5.4 The design and colours of the signs should be to BS EN ISO 7010. Colours should be to BS5252 as follows:

- yellow 08E51
- blue 18E53
- red 04E53.

5.5 Signs should be manufactured from laminated plastic or other similar non-metallic weatherresistant material (thickness appropriate to the intended location and application).

5.6 Non-corrosive materials should be used when fixing permanent safety signs. Permanent signs should not be fixed with adhesives.

5

5.7 Permanent safety signs should be securely and permanently fixed in accordance with the paragraphs in this section.

Display of permanent safety signs

5.8 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).

5.9 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

5.10 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

5.11 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.

Figure 1 Electrical switchroom safety sign (actual size: 200 x 100 x 1.5 mm white plastic)



(* Insert specific location and emergency telephone number)

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.

5.12 Temporary safety signs should be suspended from non-conducting cords and fixed and removed only by an Authorised Person (LV).

5.13 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.

5.14 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.

5.15 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.

5.16 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.

5.17 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.

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)



6

Chapter 6

BS 7671 inspection and testing

6.1 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.

6.2 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.

6.3 Inspection and testing must be carried out by a Skilled Person (LV) or Competent Person (LV) who is qualified to carry out inspection and testing to the current version of BS 7671.

6.4 Where inspection and testing is carried out by a site-appointed Competent Person (LV), they should complete an LW1 self-check live-working form.

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



Chapter 7

First-aid

Emergency first-aid training and equipment

7.1 All Competent Persons and Accompanying Safety Persons should successfully complete emergency first-aid training course at intervals not exceeding three years.

7.2 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.

7.3 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.

7.4 This training should be repeated, as a minimum, every three years.

7.5 Copies of the certificates issued by first-aid trainers for Competent Persons and Accompanying Safety Persons should be held in the OPM.

7.6 A current list of first-aiders for the appropriate locations, including, where appropriate, their telephone numbers, should be held in the OPM.

Contractors' staff

7.7 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.

7.8 Copies of the certificates issued by first-aid trainers for contractors' Competent Persons and Accompanying Safety Persons should be held in the OPM.



Appendix 1

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

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



Serial No

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

Signed..... Date.....

Received by

Signed.....



Serial No

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

<p>Authorised Person</p> <p>Signed..... Date.....</p>	<p>Received by</p> <p>Signed.....</p>
--	--



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

Location

Limitation-of-access
(Complete precisely and legibly in BLOCK CAPITALS)

Front – original

- 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

<p>Authorised Person</p> <p>Signed..... Date.....</p>	<p>Received by</p> <p>Signed.....</p>
--	--



Serial No

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	<input style="width: 100%; height: 100%;" type="text"/>
Work	<input style="width: 100%; height: 100%;" type="text"/>
No other work shall be carried out	
Remarks	<input style="width: 100%; height: 100%;" type="text"/>
Authorised Person Signed..... Date.....	Received by Signed.....

Original (buff) copy to
White copy to

WHTM 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

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

Signed..... Date.....

Received by

Signed.....



Serial No

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

<p>Authorised Person Signed..... Date.....</p>	<p>Received by Signed.....</p>
---	---



Serial No

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

<p>Authorised Person Signed..... Date.....</p>	<p>Received by Signed.....</p>
---	---



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 electrical equipment has been 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

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*



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

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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 Welsh Health Technical Memorandum 06-02, or by the Duty Authorised Person (LV) when a certificate of authorisation for live working is issued.

Department: Equipment to be worked on:	Location: 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)		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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)		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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 Welsh 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)		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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)		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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 Welsh 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.



NHS Organisation	HV/LV Certificate of boundary demarcation No.
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Project No.		Site name	
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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 NHS Organisation’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 described 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 certificate	Signature	Time & date	Department	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 it is no longer safe to work on the system/equipment specified above.

Name of Authorised Person (HV/LV) clearing this certificate	Signature	Time & date	Department	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 NHS Organisation'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 namebeing 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 NHS Organisation's Authorised Person if other electrical systems will be affected.

SignedNHS Organisation'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 NHS Organisation

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 NHS Organisation's Authorised Person HV/LV*

Time Date.....

* Delete as necessary