HEALTH TECHNICAL MEMORANDUM 06-03

Authorised persons logbook

2006

STATUS IN WALES

APPLIES

This document should be read in conjunction with
HTM 00 Best practice guidance for healthcare engineering
and
HTM 06-03 - Electrical safety guidance for high voltage systems

GIG CYMRU NHS WALES
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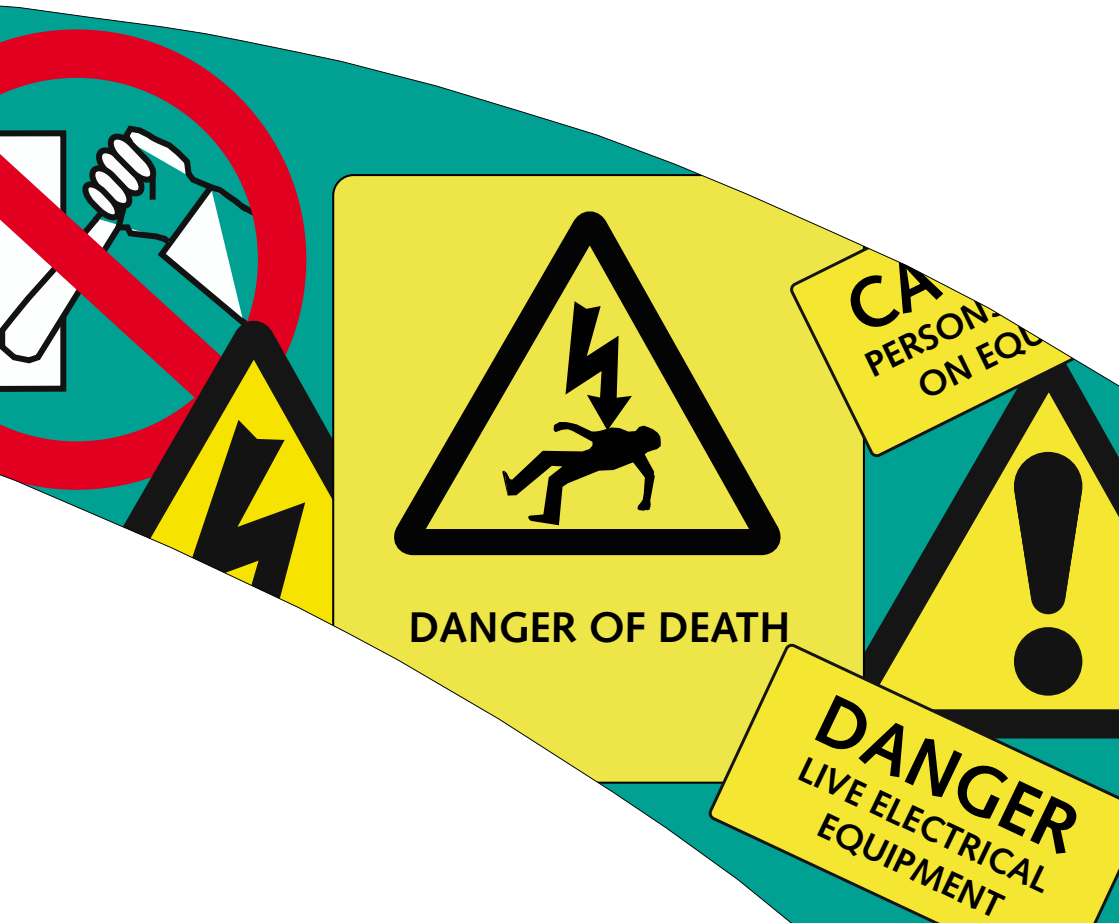
Electrical services
Health Technical Memorandum 06-03: Authorised Person's logbook



Electrical services

Health Technical Memorandum 06-03: Authorised Person's logbook

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Contents

Authorised Person's logbook for high voltage systems

This logbook should be read in conjunction with Health Technical Memorandum 06-03 – 'Electrical safety guidance for high voltage systems'.

This Authorised Person's logbook (HV) is the property of

and is issued to the Authorised Person (HV) identified below.

This logbook (HV) must not be transferred to any other person and should be returned to the Authorising Engineer on suspension or cancellation of the appointment.

I hereby confirm that ..... understands this electrical safety guidance for high voltage systems and acknowledges receipt of this Authorised Person's logbook (HV).

Signed ..... Date .....
(Signature of Authorising Engineer (HV))

I hereby confirm that I understand this electrical safety guidance for high voltage systems and acknowledge receipt of this Authorised Person's logbook (HV).

Signed ..... Date .....
(Signature of Authorised Person (HV))

(This original page will be removed from the logbook (HV) following signature by both parties and will be retained by the Authorising Engineer.)

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(Signature of Authorising Engineer (HV))

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Signed ..... Date .....
(Signature of Authorised Person (HV))

Application of this guidance

1 The safety guidance (HV) as detailed in this document should be applied to:

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

b. the high voltage switchgear cables up to the first isolation point on the low voltage system;

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

2 Where operation of low voltage switchgear is associated with high voltage work, the requirement for safety documents as indicated in this Health Technical Memorandum does not apply, and reference should be made to Health Technical Memorandum 06-02 – 'Electrical safety guidance for low voltage systems'.

3 This guidance should be considered as representing best practice for all persons (whether or not directly employed by the management) working on, working near, testing or operating electrical equipment and systems for which management is in control of electrical danger, unless the Authorising Engineer (HV) has deemed in writing that other guidance is equal and equivalent.

Variation of safety guidance (HV)

4 In exceptional or special circumstances, this guidance may be varied to such an extent as is necessary and approved by the Authorising Engineer (HV). Such variation should always be in writing and should ensure that safety requirements are satisfied in some other way.

Objections

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

Definitions of personnel

Authorising Engineer (HV)

6 An Authorising Engineer (HV) is appointed in writing by the Designated Person to take responsibility for the effective management of this safety guidance (HV). The person appointed should possess the necessary degree of independence from local management to take action within this guidance.

Authorised Person (HV)

7 An Authorised Person (HV) is appointed in writing by the management on the recommendation of the Authorising Engineer (HV) in accordance with this safety guidance (HV) and is responsible for the implementation and operation of this guidance with regard to work on, or the testing of, defined electrical equipment.

Duty Authorised Person (HV)

8 An Authorised Person (HV) who has current responsibility for a system or installation as recorded in the site logbook, whose name is displayed at the mimic diagram and who personally holds or carries the Authorised Person's (HV) key.

Competent Person (HV)

9 A Competent Person (HV) is approved and appointed in writing by the Duty Authorised Person (HV) for defined work, possessing the necessary technical knowledge, skill and experience relevant to the nature of the work to be undertaken, who is able to prevent danger or, where appropriate, injury and who is able to accept a safety document from the Duty Authorised Person (HV).

Accompanying Safety Person (HV)

10 An Accompanying Safety Person is a person not involved in the work or test who has received 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 is to have been instructed on the action to be taken to safely rescue a person in the event of an accident.

Safety documents

Permit-to-work

11 A written authority issued by the Duty Authorised Person for work to be undertaken on electrical equipment.

Sanction-for-test

12 A written authority issued by the Duty Authorised Person for testing to be undertaken on electrical equipment.

Limitation-of-access

13 A written authority issued by the Duty Authorised Person for specified tasks to be undertaken in an area or location which is under the control of the Authorised Persons for electrical safety reasons, and for which a permit-to-work or sanction-for-test are not appropriate.

Isolation and earthing diagram

14 A diagram attached to a permit-to-work or sanction-for-test illustrating the safety measures taken.

Safety programme

15 A written programme issued by the Duty Authorised Person, setting out the sequence of operations to be followed before a permit-to-work or a sanction-for-test is issued.

Operational procedure manual

16 A ring-binder containing information relating to the control and operation of the high voltage system.

Site logbook

17 A book in which all matters relating to the electrical system should be recorded.

Substation logbook

18 A book held in each substation into which every entry to the room is recorded and the reason; this book is also used to record the Authorised Person's (HV) three-monthly inspections.

Safety signs

Caution sign

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

Danger sign

20 This sign is a temporary, non-metallic sign bearing the words "danger live equipment" and "do not touch" which should be used where there is adjacent live equipment at the place of work.

Warning sign

21 This sign is a permanent, non-metallic sign bearing the words "danger of death", or may be a combined warning sign and notice. The relevant voltage, if in excess of low voltage, should be displayed below the words "danger of death" in black letters and in the same letter size.

Roles and duties of the Authorised Persons (HV)

22 The Authorised Person (HV) should be solely responsible for:

- the practical implementation and operation of this guidance; and
- the systems and installations for which management is in control of danger and for which the Authorised Person (HV) has been appointed.

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

24 More than one Authorised Person (HV) may be appointed for a system or installation but, at any one time, only one Authorised Person (HV) should be on duty. Each transfer of responsibility between Authorised Persons

(HV) should be recorded in the HV logbook. The name of the Duty Authorised Person (HV) on duty should be readily available and should be displayed behind the glass of the mimic diagram or near the working key cabinet in a position that can only be altered by an Authorised Person (HV) using an Authorised Person (HV) key.

25 Where there is more than one Authorised Person (HV) appointed for a system or installation, the Authorising Engineer (HV) should be advised of any Authorised Person (HV) who is nominated as being in overall charge with responsibility for control of records etc.

26 The duties of Authorised Persons (HV) may be summarised as follows:

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

b. ensure that all records concerning high voltage systems are kept up-to-date;

c. record all high voltage switching operations;

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

e. cooperate with the Authorising Engineer (HV) in matters of policy concerning high voltage systems;

f. report in writing any dangerous and/or unusual occurrences to the Authorising Engineer (HV);

g. appoint in writing Competent Persons (HV), and maintain a register of all appointments;

h. define the duties of appointed Competent Persons (HV) on the "certificate of appointment";

j. ensure that the necessary safety posters are displayed in substations at all times;

k. issue and cancel safety documents;

m. routinely inspect and test substation earthing;

n. routinely inspect and test transformers and switchgear;

p. routinely inspect and test high voltage protection systems including batteries.

27 The Authorised Person (HV) should inform the Authorising Engineer (HV) of:

a. any defects found in electrical equipment;

b. any dangerous occurrence;

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

28 The Authorised Person (HV) also:

- arranges for, supervises or undertakes cable detection or location work within the geographical area of the Authorised Person (HV)'s appointment;
- appoints Competent Persons (HV) for defined work within the HV switchrooms and maintains a register of Competent Person (HV) appointments including dates of appointment, the date the appointment is due to expire, details of training and training dates. This register should be kept in the operational procedure manual with copies of all current Competent Person (HV) certificates;
- ensures that all records for the system for which the Authorised Person (HV) is appointed are completed and kept up-to-date.

29 Authorised Persons (HV) are to monitor the performance of all Competent Persons (HV) in carrying out their duties under this safety guidance. Monitoring should be carried out continuously and is to include:

a. visiting work sites and communicating on safety issues;

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

30 Authorised Persons (HV) are to take action to rectify and report in writing to the Authorising Engineer (HV) on any deficiencies found. A copy of this report should be placed in the operational procedure manual.

Security and admittance to substations

31 All access doors to each substation, switchroom and enclosure containing high voltage electrical equipment must be kept securely locked when unattended.

32 Locks should be identical so that a single key will enable access to be gained to any substation over which management has control or a degree of control on a site.

33 Each Authorised Person (HV) should be issued with a key and, where considered appropriate under local house rules, a certificated Competent Person (HV) may also be issued with a key.

34 No person other than an Authorised Person (HV) or Competent Person (HV) may enter a room containing high voltage equipment unless they are accompanied by an Authorised Person (HV) or have receipt of a permit-to-work, sanction-for-test or limitation-of-access issued by an Authorised Person (HV).

35 The exception to paragraph 34 is when the substation is provided with "automatically controlled fire protection", when the person must be trained for entry into such room.

Operation of high voltage switchgear

36 The following points apply:

a. high voltage switching should be carried out by the Duty Authorised Person (HV) or by persons acting under his/her personal supervision, except when necessary to isolate in an emergency when a Competent Person (HV) will have access to substations in which emergency tripping facilities are available. That person, without delay and with some urgency, must advise the Duty Authorised Person of the action taken. These circuit breakers will be fitted with locks preventing unauthorised reclosure. The Authorised Person (HV) should be informed of all high voltage emergency switching;

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

c. oil circuit breakers (OCBs) should in general be reclosed a maximum of two times after opening under fault conditions. The equipment should be inspected at the first opportunity after opening under fault conditions;

d. when switchgear shows any sign of defect or malfunction after operating, its condition should be reported immediately to the Authorising Engineer (HV), and it should be examined before further operation;

e. no high voltage earthing switch should be operated or circuit main earth connection attached or removed except by an Authorised Person (HV);

f. making live or dead by visual signal, or by prearranged understanding after an agreed interval of time, is not an acceptable practice.

Action in an emergency

37 First, Authorised Persons (HV) should go to the mimic diagram cabinet. The first Authorised Person on site should display the "work on high voltage system in progress" and the "Authorised Person on site" notices in a prominent position.

38 Any other Authorised Person (HV) attending the site, on seeing either of these notices, should take no action until he/she has contacted the Authorised Person (HV) who displayed the notice.

Fire protection equipment

Automatic control

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

a. the automatic control must be rendered inoperative by the Authorised Person (HV) 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 (HV) immediately after the persons engaged on the work or inspections have withdrawn from the protected enclosure.

Safety precautions and procedures for working on and testing high voltage equipment

40 This guidance does not apply where equipment has been isolated, discharged, disconnected and removed from the system or installation.

41 Equipment that is considered by an Authorised Person (HV) to be in a dangerous condition should be isolated elsewhere and action taken to prevent it from being reconnected to the electricity supply.

42 All working on, or testing of, high voltage equipment connected to a system should be authorised by a permit-to-work or a sanction-for-test following the procedures set out in Tables 1 and 2.

43 No hand or tool (unless the tool has been designed for the purpose) must make contact with any high voltage conductor unless that conductor has been confirmed dead by an Authorised Person (HV) in the presence of the Competent Person (HV).

44 Where any work or test requires an Accompanying Safety Person (HV) to be present, he/she should be appointed before that work or testing can begin.

45 Voltage test indicators should be tested immediately before and after use against a test supply designed for the purpose.

46 Where the procedures involve the application of circuit main earths, the unauthorised removal of such earths should be prevented, wherever practicable, by the application of safety locks.

47 Where the procedures involve the removal of circuit main earths, that is, testing under a sanction-for-test, the earths will be secured with working locks. The keys to these locks will be retained by the Duty Authorised Person (HV), who will remove and replace the earths as requested.

Identification and spiking of HV cables

48 Before the conductors of a cable are cut or exposed, the cable and the point-of-work on the cable must be identified with certainty.

49 The identification may be regarded as clear and certain if the cable can be clearly seen between a point-of-isolation and the point-of-work or if a rope loop is passed along those parts which are not visible.

50 Where a cable cannot be identified with certainty, the cable route plans for the site should be consulted. The cable should then be identified by signal injection via the cable cores using a cable identifier. The cable should then be spiked at the point-of-work.

51 The spiking of cables must only be carried out by a person who has been specifically trained in the operation of the equipment in the presence of the Duty Authorised Person (HV).

Precaution prior to live voltage and phasing checks

52 Where live phasing is to be undertaken, the area containing exposed live conductors should be regarded as a high voltage test enclosure.

53 Approved equipment used for live voltage and phasing checking at high voltage should be tested immediately before and after use against a high voltage test supply.

54 Live voltage and phase checking on high voltage equipment may only be undertaken by a Duty Authorised Person (HV), with assistance if necessary from a Competent Person (HV) acting on verbal instructions from the Duty Authorised Person (HV). Neither a permit-to-work nor a sanction-for-test is required, but the Duty Authorised Person (HV) and any assistant should be accompanied by an Accompanying Safety Person (HV).

Testing at high voltage

55 Where high voltage tests are to be undertaken, a sanction-for-test should be issued to the Competent Person (HV) who is to be present throughout the duration of the tests.

56 The areas containing exposed live conductors, test equipment and any high voltage test connection should be regarded as high voltage enclosures.

High voltage test enclosures

57 Unauthorised access to a high voltage test enclosure should be prevented by, as a minimum, red and white striped tape not less than 25 mm wide, suspended on posts, and by the display of high voltage danger signs. An Accompanying Safety Person (HV) or the Duty Authorised Person (HV) should be present throughout the duration of the tests, and the area should be continually watched while testing is in progress.

Withdrawable equipment

58 Voltage transformers must not be removed or replaced if any of the windings are energised. If they need to be removed, the equipment supplying the voltage transformer must be isolated.

59 When withdrawable electrical equipment has been disconnected from all supplies and withdrawn from its normal live position, its conductors must be discharged to earth but need not remain connected to earth. The enclosure and any shutters should be locked off.

Work on remotely and automatically controlled electrical equipment

60 Before work is carried out on remotely or automatically controlled equipment such as circuit breakers, isolators, tap-changing gear or associated air compressors, all remote-control and automatic features should first be rendered inoperative. No work must be carried out on the controlling equipment, wiring or relays except by the Authorised Person (HV) or Competent Person (HV) working under the personal supervision of the Authorised Person (HV).

Electrical equipment which can be made live from a DNO's supply system

61 Except in an extreme emergency, any switching which may affect a DNO's network should be carried out with the full knowledge and agreement of the DNO's distribution control engineer concerned. The switching operation should be recorded by the Authorised Person (HV).

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

63 Where work is to be carried out on electrical equipment which is directly connected to a DNO's high voltage network, then switching, earthing, the depositing of safety keys in the key safes, and the issuing of any permit-to-work or sanction-for-test should be the responsibility of an Authorised Person (HV) appointed by the distribution network operation.

Table 1 Procedures to be carried out by an Authorised Person (HV) to enable work on high voltage equipment

Steps[1]	Procedure
1 Prepare a safety programme	(i) Prepare a safety programme plus an isolation and earthing diagram in duplicate, and obtain countersignatures from another Authorised Person (HV). (ii) Before any work can begin, obtain permission from the manager in charge of the area to be affected by the work. (iii) Sign on as the Duty Authorised Person (HV), and place notices in mimic.
2 Isolate and fix signs	(i) Isolate from all sources of supply. (ii) Prevent unauthorised connection by fixing safety locks and caution signs at points-of-isolation. (iii) Fix danger signs on live equipment adjacent to the point-of-work.
3 Prove dead	(i) Prove dead with a high voltage potential indicator at all accessible points-of-isolation. (ii) Where appropriate, prove dead on the low voltage side of a transformer, that is LV feed pillars, LV distribution boards etc.
4 Earth	(i) Earth conductors at all points-of-isolation and fix safety locks to earths. (ii) Identify with certainty or spike underground cables at the point/s of work if the conductors are to be cut or exposed. (iii) Earth overhead lines near the working places.
5 Issue the permit-to-work	(i) The Competent Person (HV) is to be shown the safety arrangements at all the point/s of isolation and at the locations of the work, and is to initial the isolation and earthing diagram. (ii) Mark the point-of-work. (iii) Issue the permit-to-work, isolation and earthing diagram, and the key to the safety key box to the Competent Person (HV). (iv) Adjust mimic diagram and complete the site logbook.

Steps[1]	Procedure
6 Undertake the work	The Competent Person (HV) 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 (HV) key to the safety key box to the Duty Authorised Person (HV), and complete part 3 of the permit retained in the pad.
7 Check the equipment	If the work has been completed, check to ensure it is safe to energise. If the work has been stopped, check the equipment has been made safe.
8 Cancel the permit-to-work	(i) Cancel the permit-to-work by signing part 4 and by destroying the permit in the presence of the Competent Person (HV). (ii) File the isolation and earthing diagram in the operational procedure manual. (iii) Return key to key safe.
9 Restore to operational state	(i) If the equipment requires testing, follow the procedure in Table 2. (ii) Remove safety locks and earths applied in step 4. (iii) Remove safety locks and signs applied in step 2. (iv) Restore equipment to an operational state. (v) Adjust mimic and complete site logbook

Notes:
1 The Authorised Person (HV) is responsible for all tasks.

Table 2 Procedures to be carried out by an Authorised Person (HV) to enable testing on high voltage equipment

Steps[1]	Procedure
1 Prepare a safety programme	(i) Prepare a safety programme plus an isolation and earthing diagram in duplicate, and obtain countersignatures from another Authorised Person (HV). (ii) Before any test can begin, obtain permission from the manager in charge of the area to be affected by the test. (iii) Sign on as the Duty Authorised Person (HV), and place notices in mimic.
2 Isolate and fix signs	(i) Isolate from all sources of supply. (ii) Prevent unauthorised connection by fixing safety locks and caution signs at points-of-isolation. (iii) Fix danger signs on live equipment adjacent to the point of the test. (iv) If a high voltage enclosure is needed, set up barriers and fix danger signs.
3 Prove dead	(i) Prove dead with a high voltage potential indicator at all accessible points-of-isolation. (ii) Where appropriate, prove dead on the low voltage side of the transformer, that is LV feed pillars, LV distribution boards etc.
4 Earth	(i) Earth conductors at all points-of-isolation. (ii) Fix working locks to earths to enable their removal when required. (iii) Identify with certainty or spike underground cables at the point of test and at the distant end. (iv) Earth overhead lines near the point of test.

Steps[1]	Procedure
5 Issue the sanction-for-test	(i) The Competent Person (HV) is to be shown the safety arrangements at all the point/s of isolation and at the locations of the test, and is to initial the isolation and earthing diagram. (ii) Issue the sanction-for-test, isolation and earthing diagram, and the key to the safety key box to the Competent Person (HV). (iii) Retain working lock keys, and remove and replace earths as requested.
6 Undertake the test	The Competent Person (HV) is to undertake or directly supervise the test. On satisfactory completion of the test, or when the test is stopped and made safe, the conductors should be discharged and any earths restored. The Competent Person (HV) should return the original of the sanction-for-test and the key to the safety key box to the Duty Authorised Person (HV), and complete part 3 of the sanction retained in the pad.
7 Check the equipment	If the test has been completed, check to ensure it is safe to energise. If the test has been stopped, check the equipment has been made safe.
8 Cancel the sanction-for-test	(i) Cancel the sanction-for-test by signing part 4 and by destroying the sanction in the presence of the Competent Person (HV). (ii) File the isolation and earthing diagram in the operational procedure manual. (iii) Return key to key safe.
9 Restore to operational state	(i) Remove safety locks and earths applied in step 4. (ii) Remove safety locks and signs applied in step 2. (iii) Restore equipment to an operational state. (iv) Adjust mimic and complete site logbook

Notes:
1 The Authorised Person (HV) is responsible for all tasks.

Initial training and familiarisation logs

Date	Initial Authorised Person and emergency first-aid courses	Pass mark	Signature of trainer

Date	Site familiarisation training	Signature of AP

Refresher training log

Date	Authorised Person and emergency first-aid refresher courses	Pass mark	Signature of trainer

Authorised Person's (HV) switching and event diary

Date	Summary of personal switching or HV events attended	Signature of AP

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Date	Summary of personal switching or HV events attended	Signature of AP

11 kV/415 V Transformer rating information

kVA rating	HV current (A)	LV current (A)	Approximate LV fault current (assuming 5% impedance) (A)
100	5.25	133	2660
200	10.49	266	5320
315	16.53	420	8400
500	26.24	666	13,320
800	42	1066	21,300
1000	52.48	1333	26,660
1250	65.61	1667	33,340
1600	84	2133	42,660

11 kv/415 V transformer: oil fuse rating information

kVA rating	Brush HV fuse rating (A)	GEC HV fuse rating (A)	Bussmann HV fuse rating (A)	Maximum BS 88 LV fuse size
100	16	16	16	100
200	25	25	25	200
315	35.5	36	31.5	300
500	56	45	50	400
800	80	80	80	630
1000	90	90	90*	630

Note: Transformer fuse sizes greater than 80 A may cause problems on an open ring system due to the difficulty in grading against ring feeders.

11 kv/415 V transformer: time limit fuses (TLF) rating information

kVA rating	Current transformer (CT) ratio	TLF rating (A)	Maximum LV fuse size to grade with TLF (A)
200	50/5	3	200
315	50/5	5	300
500	50/5	10	400
800	100/5	7.5	630
1000	100/5	10	630
1250	100/5	10	630
1600	100/5	12.5	630