



# **NHS Lothian Estates**

## **Operational Policy**

**for**

### **Safe Operation and Maintenance Of H.V. Sub-stations**

#### **In Compliance with Health & Safety at Work Act 1974**

Title: <b>OPERATIONAL POLICY FOR SAFE OPERATION AND MAINTENANCE OF HV SUB-STATIONS</b>	
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**All documents and test results are filled in the St Johns Operational Manual.**

## 1. LEGAL REQUIREMENTS

The legal requirements are dictated to users of electricity by two main documents.

- a) The Electricity at Work Regulations 1989.
- b) The Electricity at Work Regulations 1989 is the memorandum of guidance on the Electricity at Work Regulations 1989, Health and Safety series booklet HS(R)25 published by the HSE.

Management of Health & Safety at Work Regulations 1992.

A SUB-STATION means any premises, or that part of the premises, in which electrical energy is transformed or converted to or from pressure above low pressure except for the purposes of working instruments, relays, or similar auxiliary apparatus, if such premises or part of premises are large enough for a person to enter after the apparatus is in position.

### Voltage

Low voltage means not exceeding 1000V.	}	
High voltage means above 1000V.	}	AC. + DC. Ranges.

### Delegation Of Responsibility To Comply With The Regulations

It shall be the duty of the Authorised Persons to comply with these regulations. It shall also be the duty of all Competent Persons, Craftspersons, and persons employed to conduct their work in accordance with the regulations.

Further guidance is contained in Health Technical Memorandum 2021, Electrical Safety Code for High Voltage Systems (Escode - HV).

### Person In Charge Of A Sub-Station

All substations should be kept locked, the locks being 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.

### The Authorised Person

The Authorised Person means (a) the Estates Officer, or (b) a Contractor for the time being under contract with the Estates Officer, or (c) a person employed, appointed, or as aforesaid, to carry out certain duties incidental to the generation, transformation, distribution, or the use of electrical energy, such Estates Officer, Contractor, or person being a person who is competent for the purpose of the regulations in which the term is used.

## 2. DEFINITION OF AN AUTHORISED PERSON

An authorised person is by definition a person employed or appointed to carry out certain duties and who is competent to carry out the duty. The question of competence necessitates:-

- a. adequate knowledge of the technicalities of electricity
- b) adequate experience of work in connection with electricity
- c) adequate detailed knowledge of the system upon which work is being performed so that the person can avoid danger

Each of these requirements are equally important.

### Authority To Carry Out Work In A Sub-Station

No person except an authorised person or a competent person acting under his immediate supervision shall undertake any work where technical knowledge or experience is required in order to adequately avoid danger. No person shall work alone in any case in which the Secretary of State directs that he shall not.

No person except an authorised person or a competent person over 21 years of age acting under his immediate supervision shall undertake any repair alteration, extension, cleaning or such work where technical knowledge or experience is required in order to avoid danger and no one shall do such work unaccompanied.

### The Competent Person

A competent person is an assistant to the authorised person; he should be over 21 years of age and have adequate knowledge and experience to carry out defined duties. The competent person has no authority to grant permission to enter the high voltage switch-gear area of a sub-station.

### Posting Of The Regulations

The authorised person will be responsible for keeping posted in all sub-stations a copy of the electricity regulations.

A printed copy must also be supplied gratuitously by the senior authorised person to any worked affected by them on application.

### Authorisation

No person can authorise himself to be an Authorised Person. He must be Authorised by the Authorising Engineer appointed by Management.

**Authorising Engineer**  
**Authorised Person**  
**Competent Person**

### 3. SUB-STATION RULES

1. No person shall undertake any repairs, maintenance, cleaning, alteration or such work, on any part of a high voltage installation until an Authorised Person HV has ensured that, part of the installation complies with each of the following:-
  - a) That part of the installation has been isolate, made dead and efficiently connected to earth.
  - b) That part of the installation has been screened where necessary to prevent danger and all danger and cautionary notices posted.
  - c) A permit to work or Limitation of Access safety document has been issued.
2. All Authorised or Competent Persons HV requested to carry out any repair, maintenance, cleaning, alteration or such work in a high voltage sub-station must be fully conversant with that sub-station installation and the nature and extent of the work to be done.
3. A safety cabinet will be kept in the high voltage intake sub-station. The safety cabinet will contain the keys to the HV sub-station and all safety keys and padlocks for that installation.
4. Doors or barriers cutting off access to enclosures, chambers or cubicles containing live high voltage conductors shall be kept locked at all times when the system is energised.
5. All oriface shutters on high voltage switchgear which are not required for immediate work or operation shall be locked shut.
6. The operation of high voltage switchgear by persons other than an Authorised Person HV or persons acting under his immediate supervision and in his presence is forbidden, except tripping in emergency by remote control.
7. Instructions regarding the operation of high voltage switchgear must come directly from an Authorised Person HV they should never be passed or accepted through an intermediary.
8. Every telephone message relating to the operation of a high voltage switch shall be written down and every such message received shall be repeated in full to the sender that the message has been accurately received. All such messages will be recorded in the sub-station log book.
9. Making live or dead by signal or a pre-arranged understanding after an agreed interval of time is forbidden.
10. Switchgear showing signs of mal-function after or during an operation will be reported immediately before any further operation as it may be desirable to isolate the whole switchboard.

### 3./Cont'd

11. Safety padlocks, differing from standard locks of the system shall be used to lock off all switches and oriface shutters at points where the circuit on which work is to be carried out could be energised. The keys for such locks will be kept in a key safe for the duration of the work which will be located in the intake sub-station.
12. No person except an Authorised Person HV or a Competent Person HV acting under his immediate supervision shall undertake any repair, alteration, extension, cleaning or such work where technical knowledge or experience is required in order to avoid danger. No person shall do such work unaccompanied.

An Authorised Person HV must never carry out high voltage switching procedure alone he must always be accompanied by another Authorised or Competent Person HV.

13. A log-book will be provided for each HV sub-station in which the following information will be recorded:-
  - a) The names of all Authorised or Competent Persons HV.
  - b) All HV switching operations, isolating and re-energising, the time and date of the operations, the permit to work serial number and the operator's name.
  - c) All faults which occur in the sub-station affecting high voltage plant.
  - d) The names of all unauthorised or non-competent persons entering the sub-station, the reason for their entry and the name of the Authorised or Competent Person HV appointed to supervise such persons.
  - e) The date of all tool and test equipment inspections.
  - f) All telephone messages relating to the operations of the HV switchgear.
14. Outside every sub-station the following information will be posted:-
  - a) The normal location and telephone number of each Authorised Person HV.
15. All accidents which cause a person's death or prevent any person from doing his usual work for more than 3 days will be reported to the Local Authority's Inspector of Offices, Shops and Railway Premises.
16. The use of metal ladders within the sub-station is forbidden.
17. The use of a sub-station for storage is expressly forbidden.
18. Smoking in the vicinity of open cubicles or switchgear is forbidden.
19. In accordance with H.T.M.2021 an O.C.B. may only be re-closed once on to a fault after operation due to a fault. Before it can be re-used it must be fully maintained as per the manufacturer's recommended instruction manual.

#### 4. SAFETY PROCEDURES

Procedure for isolating and making High Voltage equipment and cables safe before carrying out work.

The procedure for isolating and making high voltage equipment and cables safe must be carried out by, an Authorised Person HV accompanied by another Authorised or Competent Person HV, by following the instructions detailed on a permit to work and the procedure as follows:-

1. Transfer the low voltage (LV) load to another supply.
2. Isolate the transformer LV winding from the load by switching "OFF" the transformer output fuse switch or circuit breaker.
3. Trip the voltage supply switch or breaker.
4. Check that the LV voltmeter reads zero volts on all three phases.
5. Check that the indicator on the particular high voltage switch reads "OFF". The high voltage switch may be racked out if appropriate.
6. Put on the gauntlets IR after checking that they have current test date, see schedule of maintenance routines.
7. Test the high voltage indicator using the high voltage proving unit.
8. Using the high voltage indicator check that each phase of the high voltage supply to the transformer has been disconnected. The assistant must verify the results.
9. Re-test the high voltage indicator using the high voltage proving unit.
10. Using the earthing stick, connected to the main earth bar, touch each of the high voltage connections in turn.
11. Connect the shorting and earthing leads to the main earth bar, then connect these leads to each of the high voltage connections.
12. Remove the gauntlets IR and demonstrate that the high voltage system is now safe by touching earth and each phase connections.
13. Post the danger or cautionary notices as detailed on the permit to work.
14. Additional earths may be applied at the high voltage switchgear by a variety of methods depending on the switchgear installed as these earths can be locked on it is recommended that the Authorised Person HV applied them.

In some installations it will be necessary to rack-out the high voltage switchgear to apply these earths. A check, that all of these additional earths have been removed, should be made before re-energising the system.

## 5. ACCESS TO A SUB-STATION

### Key To The Sub-Station Area

A spare key cabinet adjacent to the main telephone exchange will hold the key to the sub-station area. A book containing the names of the Authorised or Competent Persons HV for that sub-station will be associated with the cabinet. Access to this key cabinet will be restricted to nominated officers in the Hospital. These officers will be at least Competent Persons HV. The key will only be issued to a named Authorised or Competent Persons HV who will sign the book on its receipt.

### Requests To Enter A Sub-Station

It is essential in the operation of a safety procedure to set up a defined method of dealing with requests to enter a sub-station area.

Reasons to enter can be classified into two categories as follows:-

**Category 1** -The following types of work will come into this Category.

Any type of work to be carried out on the HV equipment or cables.

Any addition, recovery or modification to the main HV distribution equipment within the sub-station area.

Any work to be carried out by contract which is related to the sub-station or sub-station area.

Any installation work to be carried out by persons not under the control of the Senior Authorised Person HV.

**Category 2** - All requests should be directed to the Senior Authorised Person HV, the Site Estates Officer. These requests may be any work on equipment indirectly related to the sub-station area, i.e. maintenance of lighting, ventilation equipment, engine/generator plant, inspection of records etc.

Any general maintenance in the sub-station accommodation, i.e. window cleaning, floor sweeping etc.

Any small building repair works, i.e. broken windows, damaged doors etc.

### Procedure For Dealing With Requests In Category 1

All requests to enter for any reasons in this category should be directed to the Senior Authorised Person HV, the Site Estates Officer.

The Senior Authorised Person HV will on receipt of any request satisfy himself that the following conditions of safety and security can be implemented.

1. That the equipment on which work is to be carried out can be made safe for the Staff during the work.
2. That the work to be carried out will in no way reduce the safety of the Staff or the security of the supplies to the building.



## 5./Cont'd

### Procedure On Agreement To The Request

On agreement to the request the Senior Authorised Person HV will be responsible for ensuring that:-

1. A permit to work/sanction for test is issued for work on high voltage equipment or cables as per detailed procedure HTM2021.
2. Supervision of all work in the sub-station is carried out by one of the Authorised Persons HV or Competent Persons HV for that sub-station.
3. The Authorised or Competent Person HV supervising the work has the necessary documentation on the work to be carried out prior to its commencement.

### Procedure On Rejection Of A Request

If for any reason the Senior Authorised Person HV considers that the safety of the Staff or the security of the supplies to the building have been reduced, he will have the right to reject the request until such steps as he deem necessary to maintain the safety of the Staff and the security of the supplies have been incorporated in the request.

### Procedure For Dealing With Requests In Category 2

All requests to enter for any reasons in this category should be directed to the Senior Authorised Person HV, the Site Estates Officer. These requests may be verbal requests on site.

When a request to enter the sub-station is made to the Senior Authorised Person HV he will firstly satisfy himself that the work to be performed on entry is not applicable to category 1.

If satisfied the Senior Authorised Person HV will allow access to the sub-station area and he will either supervise the work personally or arrange for an Authorised Person HV or a certified Competent Person HV to carry out the supervision, upon the completion of a Limitation of Access Safety Document.

## **6. LIMITATIONS OF ACCESS PERMIT**

Permits will be made out in duplicate. After the high voltage equipment is made safe by an Authorised Person HV the top copy of the permit will be given to the person in charge of the work (Competent Person).

The recipient of the permit will after reading it`s contents and signifying that he understands the instructions, acknowledge it`s receipt by signing the duplicate copy.

The person in charge of the work will retain the top copy in his possession at all times whilst the work detailed on the permit is being carried out.

Should the nature of the work change during the course of the work the existing permit will be returned to the Senior Authorised Person HV and be cancelled. A new permit will be issued detailing the revised work.

When more than one working party is required a permit will be issued to the person in charge of each working party and the fact that other permits are in use at the same time will be indicated on each permit giving each serial number.

The carbon copies of all permits will be retained by the Senior Authorised Person HV, only the top copies will be destroyed on completion of the work.