PR-NET-OSM-045

WORK ON HIGH VOLTAGE PLANT AND APPARATUS

OPERATIONAL SAFETY MANUAL - SECTION 6.3

Scottish & Southern Electricity Networks

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CONTENTS

1 Introduction

1.1 To secure the safety of persons working on **SSEN-D High Voltage Plant** and **Apparatus**, it is essential that all activities carried out on the **High Voltage System** are effectively planned, controlled and co-ordinated.

1.2 This **Approved** procedure provides guidance on working on **High Voltage Plant** and **Apparatus**.

2 Scope

2.1 This document considers the circumstances and **Approved** procedures for the management of zones of work meeting the requirements in Section 5 of the **OSR**, relating to isolation and earthing and also the requirements for **Personal Supervision** by the **Senior Authorised Person**. It includes situations for when those requirements for such work may be waived.

2.2 The procedures included have been developed to minimise incidents associated with human error by ensuring that:

- A safe zone of work is clearly established and is securely maintained whilst staff or contractors are operating within it
- A consistent approach is maintained for the control and operation of the **System**
- The circumstances and procedures under which normal requirements for isolation, earthing and **Personal Supervision** by the **Senior Authorised Person** may be waived, within a specific zone of work, are clearly established
- At all times consideration is given to the operating characteristics of the **System** and any operational limitation/restriction imposed

2.3 This document does not repeat associated requirements in the **OSR**. It elaborates on those aspects related to the scope where the **OSR** refer to an **Approved** procedure or which require more specific guidance and instructions.

2.4 This document does not cover zone of work or proving **Dead** on **Low Voltage** Networks.

2.5 This **Approved** procedure applies to all staff and contractors working for or on behalf of **SSEN-D.**

3 References

The documents detailed in Table 3.1 - Scottish and Southern Electricity Networks Documents, and Table 3.2 - External Documents, should be used in conjunction with this document.

Table 3.1 - Scottish and Southern Electricity Networks Documents

Reference	Title
PR-NET-OSM-006	SSEN Distribution Operational Safety Rules – Operational Safety Manual – Section 1.1
PR-NET-OSM-028	Switching Terminology and Approved Abbreviations - Operational Safety Manual - Section 4.4
PR-NET-OSM-011	Management and Demarcation of Work or Testing in Substations with Exposed Live Busbars or Gas Insulated Apparatus - Operational Safety Manual - Section 6.2
WI-NET-OPS-034	Nomenclature and Labelling of Networks Electrical Equipment
WI-NET-OSM-002	Personal Protective Equipment and Workwear for Live Environments
TG-NET-ENG-500	Asset Numbering and Nomenclature of Transmission Equipment Guide
N/A	SSEN SHE Handbook (Held in Safety, Health and Wellbeing SharePoint Site)

Table 3.2 - External Documents

Reference	Title
BS EN 62271 – 206 (as amended)	High-Voltage Switchgear and Controlgear - Voltage presence indicating systems for rated voltages above 1 kV and up to and including 52 kV
BS EN 61243 – 5 (as amended)	Live Working – Voltage Detectors – Voltage detecting systems (VDS)

4 Definitions

4.1 The words printed in bold text within this document are either headings or definitions. Definitions used within this **Approved** procedure are defined within the list presented immediately below, or within Section 2 of the **OSR**.

4.2 **Operational Safety Rules (OSR)**

The **SSEN-D** Distribution set of rules, as read with related documents and procedures, that provide generic safe systems of work on the **System** therefore ensuring the health and safety of all who are liable to be affected by any **Danger** that might arise from the **System**.

5 General Responsibilities

5.1 Persons who are required to operate and undertake work on the **System Shall** have a thorough understanding of the work and ensure on-site risks are suitably assessed and appropriate control measures put in place before, during and after all activities.

5.2 Persons must ensure that, at all times during the work (or associated testing), **General Safety** arrangements are maintained and that other work areas are not adversely affected by the activities for which they are responsible.

6 Authorisation

6.1 It **Shall** be the responsibility of the individual to ensure that any actions performed are within the bounds of their competency and authorisation level.

6.2 Competence and authorisation certificates **Shall** be retained personally and be made available upon request.

7 Personal Protective Equipment

7.1 Persons who are required to work on **High Voltage Plant** and **Apparatus Shall** wear suitably **Approved** Personal Protective Equipment (PPE). Furthermore, where warning labels or signs identify the existence of a particular hazard, additional and appropriate PPE **Shall** be worn.

7.2 In addition, when proving **Dead** with an **Approved** voltage testing device on **High Voltage Apparatus**, **Approved** insulating gloves (including outer wear protectors) **Shall** be worn.

7.3 As a minimum, PPE **Shall** meet the requirements of WI-NET-OSM-002.

8 Zone of Work

8.1 Proving Dead

8.1.1 The requirements in this document require a section of the **System** larger than the zone of work to be Isolated and **Earthed**. In this case section 5 of the **OSR** relating to isolation and **Earthing** and the requirements for **Personal Supervision** by the **Senior Authorised Person** for work in the zone of work may be waived in the **Approved** circumstances specified below, provided that the requirements in section 5.1 of the **OSR** are met.

8.1.2 There is a requirement to prove **Dead** a **Conductor** at the point of work, for exposed **Conductors** this can be done using an **Approved** voltage testing device providing there is no risk of short-circuiting **Conductors** or electric shock from **Conductors**.

8.1.3 The **Approved** voltage testing device **Shall** be checked for correct function immediately before and after proving **Dead** the **Conductor**. An **Approved** proving unit for use with the voltage testing device should preferably be used to check for correct function. Where an **Approved** proving unit is not available then the correct function may be checked by testing a **Conductor** that is known to be **Live**.

8.1.4 All phase **Conductors** of a multi-phase **System Shall** be tested at the point of work using an **Approved** voltage testing device. This is irrespective of whether work is to be carried out on one phase only.

8.1.5 The **Approved** voltage testing device **Shall** be applied to **High Voltage Conductors** by either:

- A **Senior Authorised Person**, or
- A suitably **Authorised Person**, or
- A **Competent Person** under the **Personal Supervision** of a suitably **Authorised Person**

8.2 Screening

8.2.1 **Danger Notices Shall** be attached on or adjacent to **Apparatus** containing **Live Conductors** at the limits of the zone of work. The **Danger Notices Shall** be attached in manner that they remain effective for the duration of the work.

NOTE: **Danger Notices** with magnetic strips are **Approved** for fixing to metal covers of **Apparatus**.

8.2.2 The **Danger Notices Shall** be located so that there is no confusion between equipment in the zone of work and **Live Apparatus** nearby. Where necessary, **Danger Notices Shall** be attached to the outside of individual compartment covers behind which **Live Conductors** are housed, in particular compartment covers of multi-panel metal-enclosed switchgear including at the rear of **Live Apparatus**.

8.2.3 The limits of the zone of work may be defined by use of a physical barrier providing:

- The barrier is continuous
- The barrier is not attached to any **Plant** or **Apparatus**
- The barrier is non-conductive.
- **Danger Notices** are attached to **Apparatus** containing **Live Conductors** outside the barrier.

8.2.4 Danger Notices **Shall** not be attached to the barrier or to any **Apparatus** in the zone of work.

8.2.5 Requirements for demarcation, i.e. identifying the work area in substations and **Switching** stations with exposed **Live High Voltage Conductors** using an **Approved** barrier, **Shall** meet the requirements of PR-NET-OSM-011 Management and Demarcation of Work or Testing in Substations with Exposed Live Busbars or Gas Insulated Apparatus - Operational Safety Manual - Section 6.2.

8.3 Identification

8.3.1 **High Voltage Plant** and **Apparatus** numbering and nomenclature (circuit identification) **Shall** conform to WI-NET-OPS-034 or TG-NET-ENG-500, depending on business area.

8.3.2 Circuit labelling **Shall** be clear, unambiguous and fit for purpose. Labels **Shall** be securely fixed to the equipment at the manufactured anchor point/position, where practicable. Hand written temporary labels **Shall** not be used. The details for all circuit labelling **Shall** be specified by a **Senior Authorised Person**; once fitted the **Senior Authorised Person Shall** verify they are correct.

8.3.3 Circuit labels **Shall** state the full circuit name. The circuit designations in the **SSEN-D** asset data system and on the Network Management System **Shall** be, character for character, the same as the circuit designation.

8.3.4 If a circuit label is found to be misleading, inadequate or the wording on the circuit label is changed, before any work commences, the **Control Engineer Shall** be informed and the label replaced by a **Senior Authorised Person**.

8.3.5 Where an operational restriction exists that conveys an official instruction modifying the normal operating procedures associated with a particular type of **Plant** or **Apparatus**, labels signifying the enforcement of an operational restriction **Shall** be affixed to the normal access gates or doors of the area containing the **Plant** or **Apparatus** concerned.

8.4 Ring Main Units

8.4.1 The **Approved** means for proving **Dead** a **High Voltage** ring main unit or switchboard within the zone of work is to demonstrate that each **High Voltage** cable connected to the ring main unit is connected to **Earth** by virtue of its associated circuit **Earth** switch on the **Apparatus** being closed to **Earth**.

8.4.2 Closing the **Earth** switches to prove the ring main unit **Dead Shall** be carried in the presence of the **Authorised Person** in charge of the **Working Party**, and take place after issue of the **Safety Document**, but before receipt by the **Competent Person**.

8.4.3 The requirements of Clause 8.4.1 and 8.4.2 **Shall** apply to each **High Voltage** ring main unit or switchboard within the zone of work, irrespective of the distance between the ring main units.

8.5 Transformers

8.5.1 The **Approved** means for identifying and proving **Dead** a High Voltage transformer at the point of work **Shall** be by one or more of the following:

- Confirming the **High Voltage** switch controlling the transformer, which **Shall** be adjacent to the transformer and in the same location, is closed to **Earth**
- Proving **Dead** the **Low Voltage** exposed **Conductors** on the transformer using an **Approved** voltage testing device, where accessible

- Establishing that there can be no error in the identification of the transformer by physically tracing the **High Voltage** cable connected to the transformer over its whole length to an **Earthed** termination
- Proving **Dead** the **High Voltage** exposed **Conductors** on the transformer using an **Approved** voltage testing device.

8.5.2 In any case there **Shall** not be any audible or detectable sound emanating from the transformer, which otherwise would suggest it is **Live**.

8.5.3 Where the **High Voltage** switch controlling the transformer is not fitted with an **Earth** switch and no facility to provide an **Earth** is available, then it **Shall** be confirmed as being open and the transformer **Shall** be proved **Dead** using an **Approved** voltage testing device applied to **Conductors** connected to the **Low Voltage** side of the transformer.

9 Multi-Panel Switchboards

9.1 The following procedure **Shall** be followed in addition to the requirements of **OSR** Section 5.4.

9.2 Before removal of any cover of a multi-panel switchboard, the **Senior Authorised Person Shall** ensure they understand the connection and compartmentation of **Conductors**, so as to avoid **Danger**.

9.3 The **Senior Authorised Person Shall** provide **Personal Supervision** during removal of those covers necessary to carry out all work stated on the **Safety Document**.

9.4 At each point of work the **Senior Authorised Person Shall** prove **Dead** the **Conductors**, where practicable, using an **Approved** voltage testing device.

NOTE: An **Approved** proximity voltage indicator device may need to be used where there are no exposed **Conductors**.

9.5 Voltage Presence Indicator Systems (VPIS) fitted to compartments of **High Voltage Apparatus** are not **Approved** for proving **Dead**.

NOTE: BS EN 62271-206 states the use of VPIS alone is not a reliable means for proving **Dead Conductors** as the absence of an indication might not be solely due to the absence of voltage, e.g. failure of a lamp.

9.6 Voltage Detection Systems (VDS) in accordance with BS EN 61243-5 may be used to prove **Conductors** which they are connected to are **Dead**. Prior to use the VDS **Shall** be tested for correct function. Notwithstanding the use of VDS to prove **Dead**, where practicable, the procedure in clause 9.4 for proving **Dead** at the point of work **Shall** be followed.

9.7 If there is any doubt about the suitability of the VDS for proving **Dead** or whether it is operating correctly then it **Shall** not be used for proving **Dead**.

9.8 Where work is to be carried out on busbar spouts of multi-panel switchboards, the **Approved** method for proving **Dead** is by first connecting the busbars to **Earth** using a suitably rated busbar earthing device supplied for use with the switchboard. Where the **Earth** is subsequently removed to provide access to the work area, each busbar spout to be worked on **Shall** be confirmed **Dead** using an **Approved** voltage testing device under the **Personal Supervision** of the **Senior Authorised Person**.

9.9 When it is no longer necessary for the **Senior Authorised Person** to provide **Personal Supervision**, prior to leaving site they **Shall** ensure that all electrical hazards have been eliminated and the **Working Party** are fully conversant with the procedures they need to follow.

10 Exposed Conductors

Where the terminals of **High Voltage Apparatus** to be worked on are connected via exposed **Conductors** then each **Conductor** connected to the **Apparatus**, irrespective of whether it is to be worked on or not, **Shall** be proved **Dead** at all terminals of the **Apparatus** using an **Approved** voltage testing device. The voltage testing device **Shall** be tested for correct operation in an **Approved** manner before and after testing.

11 Compressed Air

11.1 For compressed air system working, including site specific requirements, refer to the relevant Risk Assessment and Method Statement requisites.

11.2 Additional guidance can be found in the **SSEN-D** Occupational SHE Management system.

11.3 Electrical isolation of compressor systems **Shall** follow the requirements of **OSR** 4.1.1 where reasonably practicable.

11.4 Mechanical isolation of compressed air systems **Shall** follow the principles of **OSR** 4.1.1 where practicable to achieve safety from the system.

12 Revision History

No	Overview of Amendments	Previous Document	Revision	Authorisation
01	New document created	TBC	1.00	Richard Gough
02				