PR-NET-OSM-055

TELECOMS WORK IN SUBSTATIONS AND SWITCHING SITES

OPERATIONAL SAFETY MANUAL - SECTION 6.13

Scottish & Southern Electricity Networks

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1 Introduction

1.1 The purpose of the document is to provide guidance and requirements for those who carry out telecoms work in Substations and Switching stations.

1.2 This **Approved** procedure sets out requirements for third parties who install, commission, and maintain telecoms equipment within Substations and Switching sites and also specific requirements applicable to **SSEN-D** employees.

2 Scope

2.1 The scope applies to:

- Telecoms work in Substations or outdoor Switching sites
- Work by third parties and internal telecoms providers
- Distribution, Primary and Grid Substations
- Operational safety requirements from work on various telecoms equipment (used for protection, control and traditional communications)

2.2 It does not apply to:

- Rise of earth potential from working on telecommunication cables and pilots (see PR-NET-OSM-063 Access and Work on High Voltage Underground Cable Ancillary Systems - Operational Safety Manual - Section 8.2).
- Telecoms work on overhead lines outside the Substation that are not Switching sites.

3 References

The documents detailed in Table 3.1 - Scottish and Southern Electricity Networks Documents, Table 3.2 - External Documents, and Table 3.3 - Miscellaneous 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-043	Access to Substations and Switching Sites - Operational Safety Manual – Section 6.1
PR-NET-OSM-011	Management of Work or Testing in Substations with Exposed Live Busbars and/or Gas Insulated Apparatus - Operational Safety Manual - Section 6.2
PR-NET-OSM-052	Battery Systems - Operational Safety Manual – Section 6.10
PR-NET-OSM-063	Access and Work on High Voltage Underground Cable Ancillary Systems - Operational Safety Manual – Section 8.2
PR-NET-OSM-026	High Voltage System Switching and Earthing - Operational Safety Manual – Section 4.2
WI-NET-OSM-002	Personal Protective equipment and Workwear for Live Environments
TG-NET-OHL-002	Exclusion Zones - Working at Height - Safety Instruction (dist only doc
N/A	SSEN SHE Handbook (Held in Safety, Health and Wellbeing SharePoint Site)

Table 3.2 - External Documents

Reference	Title
ESQCR	Electricity Safety Quality and Continuity Regulations 2002 (as amended)

Table 3.3 - Miscellaneous Documents

Reference	Title
Occupational Safety Manual	This can be found in the Safety, Health and Environmental Sharepoint site

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 **Operational Safety Rules**.

4.2 **External Sharers**

All External companies who **SSEN-D** enter into an agreement with, who either share on an existing **SSEN-D** telecoms mast or construct their own mast structure on **SSEN-D** property.

4.3 **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**.

4.4 **Telecommunication Activities**

All activities carried out by **Telecoms Operatives** to **SSEN-D** Property under which **SSEN-D** have a site management responsibility.

4.5 **Telecoms Operative**

Parties who access **SSEN-D** Property, under which **SSEN-D** have management responsibility, to carry out **Telecommunication Activities**. This **Shall** encompass both mobile phone operators, telecommunication owners and all the agents and contractors working on their behalf. This also includes **SSEN-D** staff and their contractors.

5 General Responsibilities

5.1 Persons who are required to operate and undertake work near 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 **Shall** 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 Personal Protective Equipment

6.1 Persons who are required to work near the **System Shall** wear suitable Personal Protective Equipment (PPE) as identified in their risk assessment. Furthermore, where warning labels or signs identify the existence of a particular hazard, additional and appropriate PPE **Shall** be worn.

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

7 Dangers

7.1 The main **Dangers** to personnel when undertaking **Telecommunications Activities** in proximity to the **High Voltage System** are electric shock, burns or falls arising from:

- Inadequate precautions taken to control induced voltages from other adjacent **Live Apparatus**
- Proximity of a lightning storm
- Incorrect use of climbing aids and associated PPE
- Inadvertent contact with **Live Apparatus** due to **Safety Distances** not being observed
- Exposure to Radio Frequency (RF) Radiation radiating from telecommunication equipment
- Damage to **Live High Voltage Apparatus** such as underground cables
- Exposure to large touch & step potentials arising from a Rise of **Earth** Potential (ROEP) event
- Infringing **Safety Distances** from exposed **Live High Voltage Conductors**

7.2 Distribution Substations:

The predominant **Danger** when working in a distribution Substation, is inadvertent contact with **Live** exposed busbars on **Low Voltage** distribution boards. Depending on the type of work being undertaken, temporary screening of the **Low Voltage** distribution board might be required, however this **Shall** not compromise the ability to safely access the board for normal operational activities such as fuse replacement or the installation of fault management equipment.

7.3 Grid or Primary Substations:

Within Grid or Primary Substations there are a number of **Dangers** to be considered:

- **Live** exposed **High Voltage** busbars – The risk of inadvertent contact with **Live** exposed **High Voltage** busbars is especially high when accessing or egressing with long objects such as ladders. **Approved** procedures to ensure that **Working and Access Clearances Shall** be maintained in accordance with the **OSR**, and PR-NET-OSM-026 **High Voltage Switching** and **Earthing** - Operational Safety Manual – Section 4.2 **Shall** be complied with
- Working at height on installations such as masts - A policy of allowing Telecoms Operatives to work at heights unsupervised by **SSEN-D** is employed on **SSEN-D** Radio Sites managed by **SSEN-D**, where this is deemed suitable. Working at height **Shall** only be allowed once a **Safety Document** is issued by a suitably authorised **SSEN-D** representative. The **Safety Document Shall** only be issued once all the relevant safety information has been provided so as to ensure that, as far as reasonably practicable, all the necessary safety precautions have been addressed.
- Battery systems – Substations may be equipped with Lead Acid batteries at various voltages which are utilised for protection, control, indication and telephony. In addition, battery chargers and DC busbar systems may be employed. **Approved** procedures to avoid contact with acid or **Live** DC busbars, **Shall** be complied with, see PR-NET-OSM-052 Battery Systems - Operational Safety Manual – Section 6.10.
- Fire suppressant systems – Inadvertent operation of a fire suppressant system such as CO2, can cause death or serious injury. On accessing a Substation equipped with

a fire suppressant system, it **Shall** be disabled in accordance with the requirements of the **Operational Safety Rules**.

- **Live** relay panels, protection, and controls – There is a risk of unintentionally activating the protection relays on **Live** protection and control panels adjacent to those which are released for work, tripping circuit breakers and causing loss of supplies. This can be caused by physical contact with the panel which will activate the relays. An assessment **Shall** be made to implement prevention strategies using **Approved** procedures, which may include installing **Approved** notices on **Live** relay/control panels adjacent to those being worked on or screening the adjacent panels to prevent accidental contact.
- Cable trenches – When installing telecoms/fibre optic cables in existing Substation infrastructure, there is a risk associated with the proximity of **Live** adjacent cables which may be operating at both **High** and **Low Voltages**. **Approved** procedures for identifying and avoiding **Danger**, **Shall** be complied with.

8 Site Access

8.1 Detailed requirements for all **Telecoms Operatives** accessing **SSEN-D** premises for **Telecommunication Activities Shall** be in accordance with the **SSEN-D** Access Policy and associated **Approved** procedures. (PR-NET-OSM-043 Access to Substations and Switching Sites - Operational Safety Manual – Section 6.1 & PR-NET-OSM-011 Management of Work or Testing in Substations with Exposed Live Busbars and or Gas Insulated Apparatus – Operational Safety manual 6.2).

8.2 A number of **SSEN-D** radio sites are co-located with **SSEN-D** substation sites. On these sites, providing a risk assessment has been undertaken and all substation operational equipment is separately fenced or housed within secure buildings and housings complying with the Electricity Safety Quality and Continuity Regulations (ESQCR) 2002 (as amended), unaccompanied independent access may be granted to radio site for **Telecoms Operatives** to carry out certain approved types of work.

8.3 Where access is required by **SSEN-D** staff, they **Shall** be **Authorised** to a minimum of Category 1. Where non-SSE staff who do not hold a minimum Category 1 Authorisation require access, an alternative agreement **Shall** be in place.

8.4 All **Telecoms Operatives** to **SSEN-D** radio sites managed by **SSEN-D**, Shall notify **SSEN-D**. The following conditions are mandatory when dealing with access requests:

- All relevant information such as the nature of the intended work, the number of persons and vehicles attending site etc. **Shall** be obtained so that an assessment by an **SSEN-D** Project Manager can be made
- Method statements, risk assessments and any other relevant health and safety information **Shall** be provided to **SSEN-D** in order to assess, where reasonably practicable, whether adequate safety management procedures and precautions are in place
- Where climbing is necessary, proof of the climber's competency to climb **Shall** be provided
- Any special safety precautions or access arrangements relating to each individual site, **Shall** be relayed to the Telecoms Operatives by **SSEN-D**
- All **Telecoms Operatives Shall** log on and off the site by telephoning the **SSEN-D** access number that is located at the site entrance gates

8.5 The preferred methods for access are:

- Through an **External Sharer** gate off the public highway or private driveway.
- Shared access via an **SSEN-D** access gate.

8.6 Under exceptional circumstances, **External Sharer** equipment may be located in open terminal compounds. Where access is required, **Approved** arrangements **Shall** apply.

8.7 For any work which involves a third-party (such as BT) working on any fixed copper exchange lines entering the site, the status of the site should be confirmed on the Hot Sites register to ascertain the site status. Any site which is 'unclassified' should be treated as 'Hot' and the appropriate Line Isolating Links and Line Isolating Units **Shall** be in place. Any defects **Shall** be reported to the RTS Field Operations Group.

9 Operational Safety Rules and Associated Procedures

9.1 All works within Substations **Shall** comply with the relevant sections of the **Operational Safety Rules** and the **SSEN-D** Operational Safety Manual.

9.2 Particular attention **Shall** be given to the specific requirements associated with the use of access equipment and vehicles, the use of cranes and MEWPs, and the control of civil works within a Substation environment. The **SSEN-D Senior Authorised Person Shall** be responsible for on-site risk assessments and the provision of supervision required as necessary in order to comply with this document.

9.3 All associated civil works construction **Shall** comply with the relevant section of the Occupational Safety Manual.

9.4 Prior to entering the site, a risk assessment **Shall** be carried out to establish the risks associated with the site.

9.5 Before any work takes place within a **High Voltage** Substation or Switching site, (indoors or outside a Substation building but within a **High Voltage** compound), a risk assessment **Shall** be undertaken to establish the impact and potential risk of the work. In general, it is likely that **Telecommunications Activities** will be relatively low risk (for example working on an existing RTU, installing a radio or telecoms equipment). However, in some instances where there is potentially a higher than usual risk, e.g. taking ladders into a compound, or supervising a **Working Party** running cables or fibre through compound trenches or ducts etc., prior to any activity, a discussion **Shall** take place with an **SSEN-D Senior Authorised Person**, who is familiar with the site, concerning the precautions to be taken.

9.6 The **Senior Authorised Person Shall** confirm whether a **Safety Document** is required for the works. If a **Safety Document** is required, it **Shall** be issued by the **Senior Authorised Person.**

9.7 On occasion, a **Safety Document** may not be required, e.g. using a ladder to access an antenna mounted on the building well away from any **High Voltage Conductors.** If the **Senior Authorised Person** is satisfied that the work can proceed without a **Safety Document**, the agreed plan of work **Shall** be documented locally on the Risk Assessments / Method Statements (RAMS). This **Shall** include a record of the work method agreed and the name of the **Senior Authorised Person** who agreed it.

9.8 Where work takes place only inside a Substation building which does not contain **High Voltage** equipment or exposed **Low Voltage Conductors**, no **Safety Document** is required unless the risk assessment indicates otherwise.

9.9 Before starting work, the **Senior Authorised Person Shall** brief **Telecoms Operatives** on the boundaries of the work area, any other restrictions or limitations and any necessary safety precautions.

9.10 While work is being carried out, the suitably authorised person **Shall** provide **Personal Supervision** to the **Telecoms Operatives** at all times. If it becomes necessary for the **Senior Authorised Person** to leave the site before the work is completed, then the work **Shall** cease, and all non-**Authorised** Persons **Shall** be accompanied off the site by the **Senior Authorised Person**.

10 Avoidance of Danger from Radio Frequency Radiation Hazards

10.1 General Requirements

10.1.1 **SSEN-D** adopts a precautionary approach on exposure to Radio Frequency radiation, adopting industry codes of practice, recommendations and guidance.

10.1.2 There is a risk of exposure of Radio Frequency radiation to **SSEN-D** employees or their contractors and employees working on behalf of **External Sharers** who may come in close proximity to equipment positioned on **SSEN-D** owned site sharing masts or an **External Sharer** mast or rooftop Installations.

10.1.3 **External Sharers** have an obligation to ensure that the power and frequency levels emitted are maintained within their licensed levels and that they provide advice and information to those who are affected. They **Shall** consult with **SSEN-D** to provide Radio Frequency power levels and coverage information for all installations sited within **SSEN-D** premises, ensuring that personnel are not adversely affected by the emissions. All relevant information **Shall** be provided to **SSEN-D** for consideration.

10.1.4 Where reasonably practicable, the **SSEN-D** Project Manager **Shall** ensure that the location of the Radio Frequency source and its associated 'Exclusion Zones' **Shall** be outside the working areas entered by personnel working on behalf of **SSEN-D**. Personnel working at height on **High Voltage Plant**, may be in close proximity. In some circumstances such as rooftop installations, this cannot always be avoided, and adequate warning signage **Shall** then be displayed to warn of the **Danger.**

10.2 Working in Close Proximity to Radio Frequency Equipment

10.2.1 There are often circumstances where there is a requirement for **Telecoms Operatives** to work in close proximity to or within 'Exclusion Zones' to carry out activities on radio towers or rooftop installations on behalf of telecommunications operators. In all cases, a risk assessment **Shall** be undertaken, and appropriate control measures **Shall** be agreed with **SSEN-D** before work commences. Where necessary, as a primary control measure, appropriate equipment might need to be switched off for the duration of the work. The use of Radio Frequency monitors **Shall** be employed by all personnel.

10.2.2 Where external service providers are working on behalf of **SSEN-D** in proximity to antennae emitting radiation, a safe system of work **Shall** be employed incorporating primary and secondary control measures. Safe Access **Shall** be managed by **SSEN-D** and the following precautions **Shall** apply:

- Where necessary, documented recording of the **Switching** / isolation provided by the appropriate **External Sharers**
- Site Induction including the issue of **Safety Documents** and relevant information
- The issue and the application of Radio Frequency monitors
- Where relevant, the testing of area prior to work
- Monitoring of site radiation levels.

11 Revision History

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

Appendix A Risk Assessment for Work in Substations with Exposed High Voltage Conductors

This risk assessment **Shall** be completed before work is started on or near apparatus in substations with exposed busbars and / or connections.

Location	
Safety Document holder	
PERMIT-TO-WORK ref No	
SANCTION FOR TEST ref No	
LIMITATION-OF-ACCESS ref No	

Does the proposed task involve using cranes, vehicles, mobile plant or scaffolding in the vicinity of, or that could possibly come in the vicinity of live conductors?		**Yes/No**
If yes, then	1. The route / access through to the work position and back out of the substation Shall be agreed with a **Senior Authorised Person**. 2. The crane and / or other equipment **Shall** only be moved on the agreed route under the **Personal Supervision** of an **Authorised Person** and **Shall** be connected to the substation **Earthing** system as soon as practicable.	
Does the proposed task involve transporting and / or use long objects and / or portable ladders in the substation?		**Yes/No**
If yes, then	1. The movement and use of such long objects must be agreed with the **Senior Authorised Person** and carried out under the **Personal Supervision** of the **Authorised Person**. These items **Shall** be moved in a horizontal position near to the ground.	
Does the proposed task involve employees working above ground level?		**Yes/No**
If yes, then	1. **Working and Access Clearances Shall** be maintained from the nearest exposed **Live High Voltage Conductors** at all times. The climbing of structures to gain access is forbidden. Portable ladders used to gain access to fixed ladders terminating above ground level **Shall** be locked in position or otherwise secured. 2. Adequate safety clearances must be maintained during the construction of any working platform as well as during the subsequent execution of the works from that platform. 3. Where limited space is available a “Caution Exclusion Zone Men working above” sign will be affixed to the Green or Red (test area) cone adjacent to the purple access cones. The yellow/ black chain will then have the dual purpose of acting as the “exclusion zone” as well as the delimiting area. If there is sufficient space available within the delimited area, section 3 of TG-NET-OHL-002 Exclusion Zones - Working at Height - Safety Instruction **Shall** be the **Approved** method of defining the “exclusion zone” for the structure being worked on.	
Does the proposed task involve working on, or disturbing, phase Conductors to which earths are connected?		**Yes/No**
If yes, then	1. Reconsider the proposed position of the **Circuit Main Earths** or **Additional Earths** so that they are not disturbed. 2. Agree temporary or permanent dismantlement of **Circuit Main Earths** with the **Control Engineer**, cancelling **PERMIT-TO-WORK** first if one is in force. 3. Use **Additional Earths** as required to connect all **Conductors** to **Earth**.	
Does the proposed task involve dismantling Apparatus to which Circuit Main Earths are connected?		**Yes/No**
If yes, then	1. Reconsider the proposed position of the **Circuit Main Earths** so that they are not disconnected from the **Apparatus** until the **PERMIT-TO-WORK** can be cancelled. 2. Leave dismantlement until after all other works finished. 3. Agree temporary or permanent dismantlement of **Circuit Main Earths** with the **Control Engineer**, cancelling **PERMIT-TO-WORK** first if one is in force.	
Will the proposed application of earths result in the earth end clamp connection being connected to an item of apparatus inside the zone of work?		**Yes / No**
If yes, then	1. Locate the **Earth** end clamp so that it is outside the zone of works wherever reasonably practicable.	

	2. Ensure a method statement is prepared to provide a safe approach and all employees are fully briefed on the precautions to be taken.
Does the proposed task involve the installation of overhead Conductors or busbars, which could require the application of Additional Earths?	**Yes / No**
If yes, then	1. Apply **Additional Earths** as soon as reasonably practicable.
Is the integrity of the substation earthing in any way defective? (Check for damage and omissions due to vandalism or theft?)	**Yes / No**
If yes, then	1. Carry out repairs before commencing work. 2. These repairs will be subject to their own risk assessment.
Does the proposed task involve any work on the substation earth system which involves breaking any connection with that system?	**Yes / No**
If yes, then	1. Consider whether the work can be completed in a manner that avoids this. 2. Install parallel **Earth** connections before disconnections are carried out.
Is there a risk from induced voltages being generated within the zone of work, or by overhead lines and cables outside the zone of work which are connected to the equipment to be worked on? (include standing voltages, faults and lightning)	**Yes / No**
If yes, then	1. Consider disconnecting incoming overhead line / cable at terminal position. 2. Consider **Switching** out circuit which is source of induction. 3. Erect more **Additional Earths**.
Does the work involve more than one working party?	**Yes / No**
If yes, then	1. Prepare a method statement describing what work is to be carried out at each stage of the job, what safety documentation will be applied and how a safe working environment will be maintained. 2. Arrange a site safety meeting for all employees who will be involved in the job at any stage.
With the demarcation arrangements in place, is there any risk that the proposed works could infringe the safety clearances of any live exposed conductors?	**Yes / No**
If yes, then	1. Redesign the work method to ensure that safety clearances are not infringed. 2 Where necessary, reconsider the points of isolation to extend the safe zone around the working area in order to provide and maintain adequate clearances.
Assessed by: **Date** / /	

Site Method Statements	