PR-NET-OSM-052

BATTERY SYSTEMS

OPERATIONAL SAFETY MANUAL - SECTION 6.10

Scottish & Southern Electricity Networks

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1 Introduction

1.1 This document defines the **Approved** procedure for work on **Battery Systems** located in Substations and Switching sites.

1.2 Compliance with the following procedure **Shall** enable staff to work safely and reduce the risk of injury to themselves and their colleagues.

2 Scope

2.1 The scope of this document **Shall** be limited to persons who hold the appropriate competence and authorisation to access Substations, Switching sites and **Apparatus** for work on **Battery Systems**.

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

- A consistent approach is maintained for the safe access to **Battery Systems** located in Substations and Switching sites
- At all times consideration is given to the operating characteristics of the **Battery System** and the **Dangers** imposed

2.3 This document does not cover sealed non-rechargeable batteries that may be in use in equipment.

3 References

The documents detailed in Table 3.1 - Scottish and Southern Electricity Networks 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-048	Restoration of Energy Sources - Operational Safety Manual – Section 6.6
WI-NET-OSM-002	Personal Protective Equipment and Workwear for Live Environments
N/A	SSEN SHE Handbook (Held in Safety, Health and Wellbeing 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 **OSR.**

4.2 **Battery System**

Batteries installed in Substations or Switching sites to supply power to control, protection, regulation, and signal circuits independently of the main power **System**.

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**.

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 **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 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 Records

7.1 The **Control Engineer Shall**, prior to work commencing, record an event log for persons carrying out work on **Battery Systems**. This is particularly important where the removal or replacement of links is required which may affect the operation of battery supplies to associated protection circuits.

7.2 The **Control Engineer Shall** record an event log of any **Battery Systems** that have been identified with signs of damage or distress. The **Control Engineer Shall** contact the local depot to initiate remedial actions.

8 Personal Protective Equipment

8.1 Persons who are required to work or carry out **Switching** on or near the **System 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. For work on Specific **Battery Systems**, additional PPE should include:

- Protective chemically resistant glasses or masks for eyes and face
- Protective chemically resistant gloves and aprons for skin protection

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

8.3 Clothing or footwear **Shall** not contribute to the build-up of electrostatic charges

9 General Requirements

9.1 Following an accident, it is essential that prompt action is taken to render appropriate first aid to all casualties. Prior to carrying out work on the **Battery System**, the person undertaking the work **Shall** ensure that appropriate first aid equipment is made available at the work location. Where required a source of water (tap or reservoir) **Shall** be provided in the vicinity of the battery for cleaning away splashed electrolyte. **Live** lone working on **Battery Systems Shall** not be permitted.

9.2 Any person working on the **Battery System** who is affected by chemical burns or continued skin irritation **Shall**, following initial treatment, seek professional medical attention.

9.3 To cater for accidental contact with eyes, sufficient sterile eye wash must be available to allow flushing of the eyes for an extended period of at least 15 minutes.

9.4 For skin contact large quantities of sterile water may be used to wash the affected area. The provision of neutralising solutions e.g. soapy water for sulphuric acid or a mild acidic solution for alkaline electrolyte **Shall** be considered.

9.5 Provisions against explosive hazards **Shall** be considered as part of any battery installation, including the requirement for adequate ventilation to remove emitted gases.

9.6 Ventilation requirements **Shall** be dependent on the type of battery installed. Ventilation **Shall** be achieved through natural or forced methods that keep the concentration of hydrogen level at a safe limit.

9.7 The floor area for a person standing within arm's reach of the **Battery System Shall** be electrostatic dissipative in order to prevent electrostatic charge generation. **Approved** rubber mats **Shall** be installed where appropriate.

9.8 The storage of materials, the use of naked flames and the eating of food etc. is prohibited in the vicinity of **Battery Systems**.

9.9 The use of warning labels and notices **Shall** be provided to identify a battery room or similar. Warning labels and notices **Shall** be durable and permanent. The following warning signs **Shall** be fixed in a prominent position outside the entry point to any battery room:

- Dangerous Voltage if the battery is > 60 Volts
- Prohibition sign - Fire, naked flames, smoking prohibited
- Warning sign – Accumulator, Battery Room

9.10 Although not a mandatory requirement, the use of warning labels that prevent the unauthorised removal of battery cell vent plugs except for maintenance activities is encouraged.

9.11 No person **Shall** carry out work which involves, or is equivalent to, the manipulation of bare **Live Conductors** or the removal and disconnection of **Battery Systems** or part thereof, unless accompanied by another person who **Shall** be available to render or obtain assistance in an emergency.

9.12 Working on **Live Battery Systems** requires the adoption of appropriate working practices to reduce the risk of injury. To prevent the risk of short circuiting between terminals, where practicable, application of **Approved** screening and shrouding **Shall** be used to prevent **Danger**. Additional precautions to exclude **Danger** include the use of **Approved** insulated tools.

10 Procedure

10.1 General

Persons who are required to undertake work on **Battery Systems Shall** be aware of the **Dangers** that may arise. The main **Dangers** to persons include electric shock, burns and chemical injuries arising from:

- Persons working on wrongly identified equipment
- Electric shock from direct and indirect contact when a **Battery System** is permanently or temporarily (by fault) connected to **Earth**
- Corrosive burns from battery electrolyte
- Explosion hazards from hydrogen and oxygen gases emitted from battery cells
- Inadvertent and uncontrolled release of stored energy by short circuiting exposed battery terminals and **Conductors**

10.2 Access to Areas or Apparatus Containing Battery Systems

10.2.1 Persons accessing Battery rooms or **Apparatus** containing **Battery Systems Shall** carry out a visual inspection to identify signs of damage or distress. Where evidence is found, the following procedure **Shall** be implemented:

1. Check **Battery System** for alarms.
2. Vacate the area and secure it with a **Safety Lock** where reasonably practicable.
3. Apply a warning notice, for example ‘Access Restricted - Contact the Control Engineer’.
4. Inform the **Control Engineer** of findings and actions taken to secure the area.
5. Arrange for remedial action to be taken as soon as practicable.

10.2.2 Where the visual inspection proves satisfactory, the area containing the **Battery System Shall be** accessed accordingly.

10.3 Work on Battery Systems

10.3.1 Work on **Battery Systems Shall** be carried out by persons who have received appropriate training and authorisation.

10.3.2 The person in charge of the work **Shall** ensure the area containing the **Battery System** is adequately ventilated and that this condition is maintained throughout the duration of the work or testing.

10.3.3 Persons working on **Battery Systems Shall** ensure all personal metallic items are removed from hands, wrists and neck prior to starting work.

10.3.4 If a **Safety Document** has not been issued for the activity being undertaken, the **Control Engineer Shall** be informed prior to any work taking place on **Battery Systems** connected to a Substation or Switching site.

10.3.5 When informing the **Control Engineer** of the work to be carried out, the implications for **System** security **Shall** be discussed including the need for any temporary supplies.

10.3.6 **Low Voltage** charging supplies and battery supplies to any **Apparatus Shall** be **Isolated** to avoid **Danger** during work. The isolation of such **Shall** be the responsibility of the appropriately **Authorised Person** in charge of the work.

10.3.7 Where it is necessary to restore **Low Voltage** charger supplies or battery supplies to **Apparatus** released from the **System** under a **Safety Document**, the relevant safety precautions **Shall** be taken to avoid **Danger.** Safety precautions **Shall** be recorded in the site-specific risk assessment in accordance with PR-NET-OSM-048 Restoration of Energy Sources - Operational Safety Manual Section 6.6.

10.3.8 The **Control Engineer Shall** be notified upon completion of the work on the **Battery System**, including:

- Testing of protection, auxiliary wiring or other circuits associated with trip/close functions or supervisory equipment
- Resetting of battery alarms
- Confirmation of **Low Voltage** charger supplies being reinstated

10.3.9 Where reasonably practicable auxiliary and battery supplies **Shall** be made **Dead** or shrouded to prevent accidental contact.

10.3.10 Work **Shall** be carried out using **Approved** insulated tools and equipment.

10.3.11 Where the work requires the disposal of lead, nickel, lithium or cadmium compounds often found in batteries, consideration **Shall** be given to the harmful effect this may have on persons, animals and the environment. All battery waste **Shall** be segregated from normal waste and be disposed of via **Approved** means and in accordance with the Waste Management Standards applicable to the location. Further advice, if required may be obtained from the Distribution Environmental Safety Team. (Distribution.Safety.Team@sse.com)

11 Revision History

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