PR-NET-GOV-067

WORK ON DAMAGED OR FAULTY LOW VOLTAGE CABLES

OPERATIONAL SAFETY MANUAL - SECTION 10.2

Scottish & Southern Electricity Networks

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CONTENTS

1 Introduction 3
2 Scope 3
3 References 3
4 Definitions 3
5 General Responsibilities 4
6 Authorisation 4
7 Personal Protective Equipment 4
8 General Requirements 5
9 Location of Cables 5
10 Making Cables Dead 5
11 Dealing with a Faulty Cable 6
12 Cables in Ducts 7
13 Re-Energising 7
14 Damaged or Faulty Cut-outs 7
15 Revision History 8

1 Introduction

This **Approved** procedure sets out the precautions that **Shall** be implemented whenever work is undertaken on **Low Voltage** cables that have incurred **Damage** or a **Fault** and form part of the **SSEN-D Low Voltage System**.

2 Scope

2.1 This **Approved** procedure covers all work on all cables that have **Faulted** or incurred **Damage** and form part of the **SSEN-D** underground **Low Voltage System**.

2.2 This **Approved** procedure **Shall** be used by all persons authorised to work on the **SSEN-D** underground **Low Voltage System**.

3 References

The documents detailed in Table 3.1 - Scottish and Southern Electricity Networks Documents, and Table 3.2 - 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-066	General Requirements for Work on the Low Voltage System - Operational Safety Manual – Section 10.1
PR-NET-OSM-068	Identification of Low Voltage Cables - Operational Safety Manual – Section 10.3
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)

Table 3.2 - 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 **Active**

A **Low Voltage** cable with **Damage** or a **Fault** is considered to be **Active** when it is discharging electrical power in an unpredictable manner, e.g. flashing, arcing, buzzing, banging, etc.

4.3 **Damage**

Cable that is mechanically or electrically defective caused by external influence(s).

4.4 **Fault** / **Faulted**

Cable that is mechanically or electrically defective.

4.5 **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.

5.3 All persons who undertake work on **Low Voltage** cables that have incurred **Damage** or a **Fault**, or a suspected cable **Damage** or **Fault** are responsible for:

- Carrying out a risk assessment of the work and the work area before work or testing takes place
- Ensuring that the precautions identified within this **Approved** procedure are taken, and that they are maintained for as long as the risk assessment requires them
- Ensuring that the risk assessment is ongoing and continually updated until the work is completed

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.

6.3 All persons carrying out work on a **Damaged** or **Faulty** cable **Shall** be authorised in writing for this task.

6.4 In addition, the **Authorised Person Shall** have:

- Completed the training course associated with the procedures within this **Approved** Procedure
- Passed the related training course assessment(s)

7 Personal Protective Equipment

7.1 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.

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

NOTE: When excavating adjacent to any **Live Apparatus** WI-NET-OSM-002 requires Arc protective workwear, whole body (Class 2)

8 General Requirements

8.1 All work **Shall** be undertaken in accordance with PR-NET-OSM- 066 General Requirements for Work on the **Low Voltage System** - Operational Safety Manual – Section 10.1 and PR-NET-OSM-068 Identification of **Low Voltage** Cables - Operational Safety Manual – Section 10.3

8.2 Work at the point of **Fault** or **Damage** of a **Low Voltage** cable **Shall** be carried out with the cable **Dead** and **Isolated**.

8.3 The on-site pre-work risk assessment **Shall** be completed before work commences.

8.4 All work carried out on or near public roadways **Shall** be undertaken in accordance with the New Roads and Street Works Act (NRSWA).

8.5 All excavation work **Shall** be carried out in accordance with **SSEN-D**'s Safe Digging procedures and the requirements of the Occupational Safety Manual.

9 Location of Cables

9.1 Mains and service cable records (including **High Voltage** cable records where appropriate) **Shall** be used to identify the cables and where practicable, **Approved** cable detection equipment **Shall** also be used to confirm the location.

9.2 Allowances **Shall** be made when using cable records and detection equipment to accommodate potential inaccuracies. Changes to local geography and the possibility of movement of cable(s) by third parties must be appreciated during site assessments.

10 Making Cables Dead

10.1 Where a cable is to be made **Dead**, it **Shall** be achieved preferably by the removal of the controlling fuses / links or where necessary the **Live** cutting of cable cores, providing the **Fault** or **Damage** is not **Active**.

10.2 If the **Fault** or **Damage** is **Active**, the supply **Shall** be **Isolated** remotely. The **Authorised Person Shall** risk assess the specific situation and choose the most suitable means of achieving isolation. In such cases the circuit **Shall** be made **Dead** via a rated fault-breaking device, e.g. **Low Voltage** circuit-breaker or the **High Voltage** Switch Fuse or Circuit-Breaker, allowing the controlling fuses / links to be withdrawn under **Dead** conditions.

10.3 Additional precautions might be required where cables incorporate a fifth core controlling streetlights. These might be fed from a different location to the normal phase **Conductors** and could become **Live** through time switches or photocells.

10.4 The **Live** cutting of cable cores **Shall** only be carried out using an **Approved** procedure. The distance between the **Fault** or **Damage** and the point of work **Shall** be a minimum of 1.5m in buried ground or 3m in an open trench.

10.5 The cable **Shall** be confirmed **Dead** by using an **Approved** voltage testing device for proving **Dead** at each point of de-energising / isolation. The test instrument **Shall** be tested before and after use.

10.6 All points of Isolation **Shall** have a **Caution Notice** fitted and where practicable, be locked off.

10.7 **Live** working techniques **Shall** be used.

11 Dealing with a Faulty Cable

11.1 Where practicable and prior to excavating, the initial **Fault** location **Shall** be assessed for its accuracy by comparing it with cable records, no supply calls, the use of fault-finding equipment and the assessment of physical indications on-site.

11.2 The location of an excavation **Shall** be assessed to ensure that, as far as practicable, it is not carried out at the point of **Fault**.

11.3 Care **Shall** be taken when excavating to continually risk assess the conditions at the point of work. If conditions indicate the **Fault** is in close proximity, then all work **Shall** cease, and another excavation commenced at a new position.

11.4 Once a firm location has been established, the **Faulted** section of cable can be excavated, made **Dead** and the cable repaired in the sequence presented below:

NOTE: If the Fault is Active, the supply **Shall** be **Isolated** remotely, the **System** conditions tested and a **Caution Notice** fitted, prior to the cores being cut.

1. Excavate at a distance greater than 1.5m from the feed side of the **Fault** if the cable is buried or greater than 3m if the cable is exposed.

   Excavation within 3m of any identified fault position should be considered as **Live** work and the level of PPE required guided by the PPE Matrix within WI-NET-OSM-002.

2. If the **Fault** is identified as being in a duct, the end of the duct **Shall** be treated as the **Fault** position and the excavation carried out at the distances detailed above i.e. 1.5m if the end of the duct is buried and 3m if the end of the duct is exposed (also see section 12 of this document).

3. If the **Fault** is being fed from both sides, e.g. an open circuit **Fault** with a back-feed applied, an excavation **Shall** be required on both sides and the following steps completed at both locations:

4. Identify the correct cable.

5. Open the cable and test to identify **System** conditions.

6. Cut the cores using **Approved** methods and test.

7. Where supplies were **Isolated** remotely, these may be restored up to the cut ends following an on-site risk assessment.

8. Excavate from the cut through to the **Fault**.

9. Carry out the necessary repair using **Approved** methods.

11.5 Where there are other cables in the vicinity of the **Damage**, a risk assessment **Shall** be carried out to determine the likelihood of **Damage** to other cables and what additional actions may be required, e.g. making other cables **Dead**.

12 Cables in Ducts

12.1 All ducts containing cables **Shall** be opened in accordance with an **Approved** procedure.

12.2 A duct containing a **Low Voltage** mains cable or three-phase service cable that is believed to be **Faulted**, **Shall** not be opened with the cable Live.

12.3 Ducts containing **Live** single-phase service cables that are believed to be **Faulted** can be opened in accordance with an **Approved** procedure providing that the following conditions exist:

- The cable under **Fault** is the only service cable in the area
- The cable under **Fault** is a single-phase service cable
- The cable under **Fault** is no larger than 35mm
- The **Fault** is not **Active**
- The specified, **Approved** PPE is worn

12.4 If all the above conditions are in place, it is permissible to open a duct after a **Fault** location has been established. The position selected to open the duct **Shall** be at least 1.5m from the identified **Fault** position on the supply side.

13 Re-Energising

13.1 **Low Voltage** circuits **Shall** be re-energised in accordance with PR-NET-OSM-066 General Requirements for Work on the **Low Voltage** System - Operational Safety Manual – Section 10.1.

13.2 **Low Voltage** circuits that are suspected to be **Faulty** or following post **Fault** repairs **Shall**, where practicable, be re-energised using an **Approved Fault** Re-energising Device.

NOTE: Use of a re-energising device mitigates the **Dangers** associated with further faults downstream from any initial fault repair.

13.3 Additional precautions may need to be taken where large loads are to be reconnected at a joint position, e.g. reduce the load to be reconnected or remove supplies by the use of links or fuses prior to connecting cables at the joint position.

14 Damaged or Faulty Cut-outs

14.1 **Live** work and testing **Shall** cease immediately when a **Fault** or **Damage** is identified as being at, or immediately adjacent to the service cut-out (unless the **Damage** is of a minor nature, e.g. chipped fuse carrier, broken seal tags.

14.2 The affected cut-out **Shall** be changed under **Dead** conditions. A single-phase plastic cut out fitted on PVC insulated cable which has minor **Damage** as indicated above, may be changed **Live** but only in accordance with an **Approved** procedure.

14.3 The supply to the affected cut-out **Shall** be made **Dead** by cutting the service cable outside of the property in accordance with an **Approved** procedure.

14.4 Where it is not practicable to cut the service cable safely, e.g. the service cable is too short or totally inaccessible, it is permissible with site specific agreement from the Supply Restoration Team Manager / Standby Team Manager or the Standby **Senior Authorised Person** to remove the controlling fuses / links and test at the cut-out position (subject to a

risk assessment on the suitability of the cut-out for **Live** testing) to prove **Dead** before commencing work.

14.5 Where the controlling fuses are to be removed the following procedure **Shall** be followed:

1. Remove the controlling fuses using cable records to identify the correct cable.
2. Test at the cut-out to prove the cable **Dead** with an **Approved** voltage testing device for proving **Dead**.
3. Re-insert fuses and test at the cut-out to prove the cable **Live** (to ensure labelling is correct and there is not a second **Fault**).
4. Remove the fuses again and fit a **Caution Notice**.
5. Re-test at the cut-out and if **Dead** proceed with the work (**Live** working techniques **Shall** be used as far as practicable).

14.6 As an alternative, or if the risk assessment indicates it is not safe to test at the cut-out, the service joint **Shall** be excavated and visually traced to the supply side of the mains cable. Following **Approved** procedures, the mains cable **Shall** be cut and tested to confirm it is **Dead** towards the service joint before commencing work on the cut-out.

15 Revision History

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