

## 1. SCOPE

This Safety Instruction sets down the procedures to be adopted when carrying out **High Voltage (HV) Switching** operations on **The Company's System** and other **System(s)** operated by the **Company** other than under the terms of a **Sanction for Test**.

## 2. ISSUE RECORD

This is a **Reference** document. The current version is held on the EN Document Library.

**It is your responsibility to ensure you work to the current version.**

Issue Date	Issue No.	Author	Amendment Details
September 2015	7	Phil Currie	General review and update. 9.4 / 9.6: Establishment/removal of isolation and earthing on 11kV radial circuits permitted in a single group of instructions. 9.5: Procedure for isolating and earthing circuits supplied by two- or three-position disconnectors – moved from PSSI 3 and updated. 10.1: Hierarchy of <b>Switching</b> introduced. 10.2: Various changes. 10.8: Requirement for <b>Senior Authorised Person</b> to confirm to <b>Control Person</b> the electrical state of switchgear that has been worked on. 10.12: Re-worded to reflect use of <b>Switching</b> hierarchy. 10.16: Reference to single phase <b>Switching</b> in relation to ferroresonance and making/breaking a circuit parallel.
June 2016	8	John Geddes	Updates to allow issue and confirmation of <b>Switching</b> instructions by electronic means. 9.6 reference to 'Earth Selected' removed. 10.1 Hierarchy of <b>Switching</b> amended.

## 3. ISSUE AUTHORITY

Author	Owner	Issue Authority
Name: John Geddes Title: Operational Safety Engineer	Name: Gary Evans Title: Operational Assurance Manager	Name: Colin Taylor Title: Director, Engineering Services

## 4. REVIEW

This is a **Reference** document which has a 5 year retention period after which a reminder will be issued to review and extend retention or archive.

## 5. DISTRIBUTION

This Energy Networks' Safety Instruction is maintained by EN Document Control and is part of the ScottishPower Safety Rules which is published to the SP Energy Networks Internet site.

---

6. CONTENTS

1. SCOPE.....	1
2. ISSUE RECORD.....	1
3. ISSUE AUTHORITY .....	1
4. REVIEW .....	1
5. DISTRIBUTION.....	1
6. CONTENTS .....	2
7. DEFINITIONS .....	3
8. PLANT AND APPARATUS IDENTIFICATION .....	3
9. PREPARATION FOR SWITCHING.....	3
10. HIGH VOLTAGE SWITCHING – OTHER THAN FOR EMERGENCY .....	4
11. HIGH VOLTAGE SWITCHING – EMERGENCY CONDITIONS .....	6

## 7. DEFINITIONS

Terms printed in bold type are as defined in the ScottishPower Safety Rules (Electrical and Mechanical).

## 8. PLANT AND APPARATUS IDENTIFICATION

**Plant** and **Apparatus** shall be readily identifiable.

## 9. PREPARATION FOR SWITCHING

- 9.1 All **HV Switching**, except for emergency **Switching**, shall be carried out to the instructions of the appropriate **Control Person**.
- 9.2 The **Control Person** may issue instructions either orally or by an **Approved** electronic device.
- 9.3 Before issuing **HV Switching** instructions the **Control Person** shall consult with the **Control Person** of any adjacent **System(s)** which may be affected by the proposed **Switching**. This consultation shall include persons controlling other networks which may be affected. Details of the above consultation shall be recorded in the **Switching** log.
- 9.4 Before **Switching** instructions are issued by the **Control Person** they shall be recorded, giving the name of the **Location(s)** at which **Switching** is to be carried out, the identification and nomenclature of the **Apparatus** involved and the operation to be carried out.
- 9.5 Except as detailed in section 9.5.1 and 9.6, the sequence of **Switching** instructions shall, where practicable, be such that all **Switching** causing the **Apparatus** to be **Isolated** from all points of supply, including voltage and auxiliary transformers and common neutral earthing equipment from which the **Apparatus** may become **Live**, be completed before the **Control Person** issues any instructions for the application of earths.
- 9.5.1 On 11kV radial circuits where the precautions to achieve **Safety from the System** comprise a single **HV Point of Isolation** and a single **Primary Earth**, the **Switching** to achieve isolation and earthing may, at the discretion of the **Control Person**, be issued as a single group of instructions.
- 9.6 In some switchgear designs it is not practicable to create a **Point of Isolation** before moving a disconnector to the 'Earth' position. When using such switchgear to establish a **Point of Isolation** and, if required, to apply an earth:
- The **Apparatus** to be **Isolated** or **Earthed** shall be not **Live** before the disconnector/earth switch is moved to the 'Earth' position;
  - It is permissible to move the disconnector/earth switch to the 'Earth' position before the disconnector/earth switch is **Locked** to create a **Point of Isolation**.
- 9.7 Subject to section 9.7.1 below, prior to restoring **Isolated Apparatus** to service after work/testing has been completed, all **Earthing Devices** shall, where reasonably practicable, be confirmed as having been removed, before the **Control Person** issues any restoration **Switching** instructions.
- 9.7.1 On 11kV radial circuits where the precautions in place to achieve **Safety from the System** comprise a single **HV Point of Isolation** and a single **Primary Earth**, the **Switching** to remove the **Primary Earth** and re-energise the circuit may, at the discretion of the **Control Person**, be issued as a single group of instructions.

- 9.8 **HV Switching** instructions shall be given directly to the **Authorised Person** who is to carry out the operation except for the application of **Portable Earths** when the operation may be carried out by the **Authorised Person** who has been given the instruction or by a **Person** acting under his **Personal Supervision**.
- 9.9 Where the **Switching** is to be carried out by an **Authorised Person** under training, he shall be under the **Personal Supervision** of an **Authorised Person** who has also received the **Switching** instructions direct from the **Control Person**. The **Control Person** shall record the name of the **Authorised Person** receiving the **Switching** instructions and also the name of the **Authorised Person** under training receiving the same **Switching** instructions.
- 9.10 If the **Authorised Person** has any objections or queries at any stage of the instructions or operation he shall raise them with the **Control Person** immediately.
- 9.11 The instructions shall where reasonably practicable be given in two parts as detailed below:
- 9.11.1 An explanation of the purpose of the proposed operations including the identity and **Location** of the **Apparatus** involved, to the **Authorised Person** who is about to carry out the instructions and also to any supervising **Authorised Person**. It is not necessary to record this part of the instruction.
- 9.11.2 The formal precise instructions shall follow a standard pattern and include:
- (i) The name of the **Control Person** giving the instructions;
  - (ii) The **Location** and identity of the **Apparatus** to be operated;
  - (iii) The actual operation requirement (including “check synchronism” where appropriate);
  - (iv) The time and date of the instructions.
- 9.12 The **Authorised Person** receiving the **Switching** instructions shall, unless in possession of a prepared paper **Switching** schedule or instruction(s) received on an **Approved** electronic device, write the instructions down in accordance with OPSAF-11-010 (MSP 1.8), reading the instructions back phrase by phrase as received. At the termination of the message the instructions shall be read back in full.

## 10. HIGH VOLTAGE SWITCHING – OTHER THAN FOR EMERGENCY

### 10.1 Hierarchy of **Switching**

All switchgear operations shall, where reasonably practicable, be planned and completed in accordance with the following hierarchy:

- (i) Remotely via remote control facilities or remotely on site via control panels in a different room to the switchgear being operated;
  - (ii) Remotely via an **Approved** umbilical device or delayed **Switching** device.
  - (iii) Remotely via a control panel, manual protection operation or similar in the same room as the switchgear being operated;
  - (iv) Via the operating facilities on the switchgear.
- 10.2 When carrying out the **Switching** instructions, the **Authorised Person** shall observe the following requirements:
- (i) He shall be deliberate, neither rushing nor causing undue delay and shall take nothing for granted;

- (ii) He shall visually inspect switchgear (including associated equipment) to confirm its condition is satisfactory before it is operated locally. He shall visually check the switch to ensure that it is in the expected position prior to operating;
  - (iii) He shall take with him the **Switching** instruction, consulting it and checking that he is on the correct **Apparatus** before taking any action;
  - (iv) He shall then pause and recheck his proposed action before carrying it out;
  - (v) After carrying out each operation he shall record that operation on the **Switching** log, schedule or device and check to ensure the anticipated operation has been achieved and that it has operated fully and correctly;
  - (vi) When a switch or similar piece of **Apparatus** shows any sign of distress its condition shall be reported immediately to the **Control Person**. All persons shall be kept clear of such **Apparatus** until a decision is made about further operation;
  - (vii) When operating pole-mounted air break switchgear by a low level handle, the operator shall wear **Approved** rubber gloves;
  - (viii) When an overhead line earth switch is closed the **Authorised Person** shall, where reasonably practicable, check the **Circuit Identification** and add this to the **Switching** instruction;
  - (ix) Where the operational features of a switch (including an earth switch), circuit breaker or isolator are **Locked** they shall only be unlocked immediately before being operated and shall be **Locked** in position immediately after it has been operated;
  - (x) The **Authorised Person** shall endorse his **Switching** instructions with the time of completion of each operation.
- 10.3 Following **HV Switching** the **Authorised Person** shall confirm to the **Control Person**, as soon as is reasonably practicable, the operations carried out and any **Circuit Identification** involved. The confirmation may be either oral or by an **Approved** electronic device
- 10.4 When switching has been recorded using a paper **Switching** schedule or log the **Control Person** shall record the time of completion of the **Switching** and any **Circuit Identification** and shall give the **Authorised Person** the time of receipt (confirmed time), which shall be recorded along with the name of the **Control Person**. He shall also acknowledge by repeating to the **Authorised Person**, the details of any completed **Switching** operations reported to him by the **Authorised Person** and any other relevant information. .
- 10.5 All recorded entries shall be legible and indelible. Records, together with copies of paper **Switching** instructions, shall be retained in accordance with OPSAF-11-010 (MSP 1.8).
- 10.6 Where isolation is effected by the opening of **Isolating Devices**, the integrity of which is dependent on the presence of gas at the design pressure, the pressure shall be monitored throughout the period of work to ensure that the integrity of the isolation is maintained. The relevant gas zones shall be quoted on the **Safety Document**. Any material change in pressure shall be reported immediately to the **Control Person** who shall take the following action:
- 10.6.1 Where a **Safety Document** has been issued, the recipient shall be informed by the **Control Person** and the work stopped until the change in pressure has been investigated by a **Senior Authorised Person**. Work shall not be resumed until normal conditions are re-established, or a **Senior Authorised Person** deems it safe. The **Control Person** shall, where reasonably practicable, also notify the **Senior Authorised Person** who issued the **Safety Document**.
  - 10.6.2 Where no **Safety Document** has been issued, any work or proposed work shall be stopped until normal conditions have been re-established as in 10.6.1 above.

- 10.7 The operation of **HV** fuse access covers or fuse carriages on **HV Apparatus** is a **Switching** activity and shall only be carried out by appropriately **Authorised Persons**.
- 10.8 Before **HV** switchgear which has been worked on is returned to service, the **Authorised Person** responsible for carrying out the work shall confirm with the **Senior Authorised Person** cancelling the **Safety Document**, the operational condition of the switchgear. The **Senior Authorised Person** shall confirm the operational condition of the switchgear to the **Control Person**. This shall include a declaration of its electrical state, e.g. 'Open' or 'Closed'.
- 10.9 Following testing, the **Apparatus** which has been tested shall, where reasonably practicable, be energised from the point at which the testing was carried out.
- 10.10 Any failure of supply to or from any part of the **HV System** or operation of a switch under fault conditions shall be reported immediately to the **Control Person** together with any available relay indications and other relevant information. These details shall be recorded by the **Control Person**. Any relay or other visual indications shall be recorded in accordance with OPSAF-11-010 (MSP 1.8) before resetting the relays.
- 10.11 When the **Control Person** gives instructions to restore a circuit which has opened under fault conditions, the **Authorised Person** receiving the instruction shall ensure that the relays requiring manual resetting are reset before attempting to close any circuit breaker. The position of a fault thrower switch (where fitted) shall always be checked before re-energising a transformer which has been tripped on transformer protection.
- 10.12 When sectioning a network (22kV & below) for fault isolation, manual **Switching** in secondary substations shall, where reasonably practicable, be done with the **System** de-energised, providing disconnection and restoration can be achieved through remote operation of switchgear, by one of the methods listed above in 10.1 (i) – (iv) inclusive.
- 10.13 In the event that a **Switching** instruction issued by the **Control Person** cannot be completed, then all related uncompleted **Switching** instructions shall be cancelled before any remedial action is initiated. The time of withdrawal of the **Switching** instruction, together with the names of both the **Control Person** and **Authorised Person**, shall be recorded in the same manner as any other **Switching** instruction.
- 10.14 The **Control Person** shall at all times update and maintain the appropriate control diagram.
- 10.15 When the **Control Person** is aware that work or testing involves the rearrangement of conductors, he shall ensure that, when the **System** is being restored, sufficient checks are carried out to prove that the **System** phases out.
- 10.16 Single phase **HV Switching** (e.g. using **HV** Hot Stick or **HV** Rubber Glove techniques) shall not be used to make or break a circuit parallel. When using single phase **Switching** to make or break load on a radial circuit the causes of ferroresonance shall, where reasonably practicable, be eliminated.

## 11. HIGH VOLTAGE SWITCHING – EMERGENCY CONDITIONS

- 11.1 Where **HV Switching** has taken place under emergency conditions without an instruction from the **Control Person**, the **Authorised Person** shall inform the **Control Person** as soon as practicable after the operation. All relevant details shall be recorded by the **Control Person**.
- 11.2 When a switch or other piece of **Apparatus** in its normal operating mode is showing signs of distress it shall not be operated and all persons shall be kept clear of such **Apparatus**. **HV Switching** shall be carried out as soon as practicable such that the **Apparatus** concerned will be removed from service without it being subject to further operation.