

1. SCOPE

This Safety Instruction applies the principles established by the ScottishPower Safety Rules (Electrical and Mechanical) and **Company** Safety Instructions to achieve **Safety from the System** for personnel working on **High Voltage** metal-enclosed switchgear. It does not include pole mounted or exposed terminal substation switchgear. It also covers working on withdrawable **Apparatus** when removed from its service position.

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
October 1998	1		Initial Issue.
December 2007	2		Updated to accommodate new types of switchgear being supplied.
September 2015	3	Phil Currie	Document restructured extensively. Scope clarified. Additional Dangers identified. 10 (v) Change to requirement for Senior Authorised Person to identify and prove switchgear not Live . 11 (iii) Clarification of Ring Main Unit earthing. 11 (iv) and (viii) Changes to Supervision of work on spouts.

3. ISSUE AUTHORITY

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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.

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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** on which work or testing is to be carried out shall be readily identifiable or have fixed to it a means of identification which will remain effective throughout the work or testing.

9. DANGERS

The main **Dangers** to personnel working on metal-enclosed switchgear are electric shock, burns, poisoning, asphyxiation, injuries arising from the release of stored mechanical energy or release of pressure arising from:

- (i) The application of an **Earthing Device** to **Live Apparatus**;
- (ii) The incorrect sequence and method of application or removal of **Earthing Devices**;
- (iii) Gaining access to **Live** conductors;
- (iv) Wrongly identifying switchgear;
- (v) Inadequate precautions to suppress or safely discharge any induced or impressed voltages;
- (vi) Work on switchgear containing Sulphur Hexafluoride (SF₆);
- (vii) Confined space working;
- (viii) Dangerous contents left within chamber or tank;
- (ix) Remote operation of switchgear;
- (x) Exposed **Live Apparatus** adjacent to point of work;
- (xi) Inadequate precautions established to control the release of stored mechanical energy or pressurised gas.

10. GENERAL REQUIREMENTS FOR WORK ON METAL-ENCLOSED SWITCHGEAR

- (i) The configuration of metal-enclosed switchgear requires particular care from the **Senior Authorised Person** to avoid **Danger** from possible **Live** conductors in the same compartment as the **Earthed** conductors to be worked upon. The **Senior Authorised Person** shall familiarise himself with the layout and connectivity of metal-enclosed switchgear and also ensure he understands the implications of gas insulation zones and the importance of maintaining their integrity. Reference shall be made to PSSI 10.

Where work is to take place within a metal-enclosed compartment, all accessible **HV** conductors within that compartment shall be **Isolated** from all points of supply from which they can be made **Live**, including from any voltage transformer(s). Where reasonably practicable, **Primary Earths** shall be applied between all **Points of Isolation** and the point of work.

The **HV** conductors shall be released for work under a **Permit for Work**.

- (ii) Where it is not reasonably practicable to apply **Primary Earths** between all **HV Points of Isolation** and the point of work, they shall be placed in an alternative position to achieve a similar electrical effect. Such a position could be as indicated in PSSI 2 section 10.5. For SF₆ Gas Insulated Switchgear (GIS) the distance of 9m quoted in PSSI 2 can be extended to 30m provided the full intent of this section is met. Thus single point busbar earthing may be acceptable.

- (iii) For work on circuits connected to double busbar switchgear provided with circuit earthing options on only one of each pair of busbar disconnectors, the closure of this one earth switch to provide a **Primary Earth** between the pair of busbar disconnectors and the point of work is acceptable. Similarly when working on circuit busbar disconnectors, the **Primary Earth** on the busbar side may be provided by a single busbar earth switch.
- (iv) Where the busbars are to be broken and this will disconnect the **Apparatus** to be worked on from the single **Primary Earth** during the course of the work, a further **Primary Earth** shall, where reasonably practicable, be applied to earth the disconnected section of busbar. If this is not reasonably practicable, there shall be a **Primary Earth** applied between each **HV Point of Isolation** connected to the disconnected section of busbar or a job specific procedure, to specify the isolation and earthing requirements, shall be written and **Approved** prior to commencement of the work.
- (v) When it is necessary to gain access to **HV** conductors the **Senior Authorised Person** issuing the **Permit for Work** shall identify the point of access and provide **Personal Supervision** for the removal of covers and when initial access is made to all conductors to be worked upon. Where the whole switchboard to be worked on does not contain any **Live HV** conductors the requirement for a **Senior Authorised Person** to provide **Personal Supervision** may be relaxed.

The **Senior Authorised Person** shall, where practicable, prove the **HV** conductors not **Live** with an **Approved** voltage indicator immediately before they are worked upon unless it can be established that the **HV** conductors are or have been **Earthed** after the **Permit for Work** has been issued. The voltage indicator shall be tested immediately before and immediately after use.

- (vi) **Danger Notices** shall be attached on, or adjacent to, any **Live Apparatus** at the limits of the work area.
- (vii) **Drain Earths** shall be applied where induced voltage, impressed voltages or inadvertent backfeed may cause **Danger**.

11. WORK ON METAL-ENCLOSED SWITCHGEAR WITH SPOUTS: ACCESS TO SPOUTS OR COMPARTMENTS WHICH CONTAIN HV CONDUCTORS

In addition to the requirements of section 10 above, the following precautions shall be adhered to where applicable:

- (i) Where duplicate switches in one tank or on-load busbar selectors are installed and it is impossible to isolate them from all points of supply then all switches that can be closed onto the busbar on which work is to be carried out shall be **Isolated** by having their mechanisms **Locked** in the open position.
- (ii) The shutters of spouts which are, or may become, **Live** shall be **Locked** shut. Shutters of spouts on which work is not to be done shall also be **Locked** shut except for the spouts at which **Earthing Devices** are to be applied.
- (iii) For work on busbars of a multi-panel switchboard, an **Earthing Device** shall be applied, as detailed in the **Company** Safety Instructions, on the **Isolated** section of busbars at a panel other than that on which work is to be carried out. Inserting the hand or any tool into spouts for this purpose is strictly forbidden. All **Earthing Devices** shall, where reasonably practicable, be **Locked** in the **Earthed** position. For work on a ring main unit **Isolated** and **Earthed** at remote position(s) there is no requirement to apply an **Earthing Device** to the busbars.

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- (iv) For work on busbar spouts the **Senior Authorised Person** issuing the **Permit for Work** shall identify the spouts to be worked on. Two **Persons** shall be present during work on busbar spouts. The work shall be carried out by the recipient of the **Permit for Work** or under his **Personal Supervision**. The recipient of the **Permit for Work** shall prove each spout is not **Live** by means of an **Approved** voltage indicator immediately before the spout is worked on. The voltage indicator shall be tested immediately before and immediately after use.
- (v) When work is required on busbar spouts of a multi panel switchboard, an **Earthing Device** shall be applied to the busbar while work is carried out. If this **Earthing Device** is a **Primary Earth** and it is necessary to work on the panel where this **Earthing Device** has been applied then the associated **Safety Document(s)** shall be cancelled, the **Earthing Device** moved to an alternative position, and new **Safety Document(s)** issued.
- (vi) When work is to be carried out on circuit spouts, voltage transformer spouts or single panel busbar spouts, **Primary Earths** shall be applied as detailed in the **Company** Safety Instructions to the circuit between each **Point of Isolation** and the point of work except where such a **Point of Isolation** is on the **Low Voltage** side of a transformer. Inserting the hand or any tool into spouts for this purpose is strictly forbidden. All **Primary Earths** shall, where reasonably practicable, be **Locked** in the **Earthed** position.
- (vii) When work is to be carried out on circuit spouts, voltage transformer spouts or single panel busbar spouts and the work to be carried out will involve the removal of the **Primary Earths** at the point of work, then before a **Permit for Work** is issued, alternative **Primary Earths** shall, where reasonably practicable, be applied. However, if this is not reasonably practicable, then whilst this work is in progress no other work shall be carried out on the circuit connected to the spouts being worked on.
- (viii) Where **Primary Earths** are applied to the circuit spouts, voltage transformer spouts or single panel busbar spouts to be worked on, the **Primary Earths** shall be removed immediately prior to the work commencing. Work on the spouts shall then be carried out under the **Personal Supervision** of a **Senior Authorised Person**. Where the **Primary Earths** are not applied to the spouts to be worked on then work on the spouts shall be carried out by the recipient of the **Permit for Work** or under the **Personal Supervision** of the recipient of the **Permit for Work**. He shall prove each spout not **Live** by means of an **Approved** voltage indicator immediately before the spout is worked on. The voltage indicator shall be tested immediately before and immediately after use.

When there is a need to prove voltage transformer spouts not **Live** and the Safety Rules stipulate the use of an **Approved** voltage indicator, an acceptable means of proving not **Live** is to use an **Approved** voltage indicator at the voltage transformer secondary fuses with the fuses removed. A test to prove the circuit **Live** shall be made before the circuit is switched out and then a test made to prove not **Live** after the circuit is switched out. These tests shall be made on all output phases from the voltage transformer. The voltage indicator itself shall be proved against a known voltage source after the final test.

12. WORK ON WITHDRAWABLE APPARATUS

After withdrawable **Apparatus** has been removed from its service position and electrically and mechanically discharged, a **Safety Document** is unnecessary for the purpose of working on the withdrawn **Apparatus** unless the work is to be done whilst it is within the confines of a switchroom or similar place when a **Limited Work Certificate** shall be issued for the work. In such a case the **Senior Authorised Person** signing part 3 of the **Limited Work Certificate** shall, where reasonably practicable, ensure that the shutters of any available busbar, circuit or other spout in the switchroom which is, or is considered to be, **Live** has been **Locked** shut.