

1. SCOPE

This Safety Instruction applies the principles established by the ScottishPower Safety Rules (Electrical and Mechanical) and the **Company** Safety Instructions to achieve **Safety from the System** for personnel working on **Plant** and **Apparatus** which contains or has contained Dielectric Gas.

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	2	Phil Currie	Section 8: Identification requirements clarified. Section 9: Additional Danger identified. Section 10.4: Re-drafted. Section 10.5: Enhanced guidance for gas sampling and topping up. Section 10.6: Revised guidance on where to refer for guidance on working with SF ₆ .
June 2016	3	David Naylor	Section 10.5: Gas sampling and topping up amended
November 2017	4	Dave Naylor Brian Dunn	All sections: Revised to cover all Dielectric Gases rather than solely Sulphur Hexafluoride (SF ₆) only.

3. ISSUE AUTHORITY

Author	Owner	Issue Authority
Name: Dave Naylor 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. DANGERS	3
10. PREPARATION FOR WORK.....	3
10.1 Gas Pressure	3
10.2 Demarcation of Work Area	4
10.3 When Depressurisation is Not Required	4
10.4 When Depressurisation is Required	4
10.5 Gas Sampling or Topping-up.....	4
10.6 Working with Dielectric Gas	5

7. DEFINITIONS

For the purpose of this Safety Instruction the following definitions apply:

- (i) *Dielectric Gas* – Any gas, other than air, used for electrical insulation and/or arc interruption.
- (ii) *Gas Zones* – Separately identifiable sub-divisions of **Apparatus** which may be independently **Isolated** and drained of *Dielectric Gas*.
A *Gas Zone* may comprise:
 - (a) A single-phase enclosure;
 - (b) A single enclosure containing the three phases of an item of **Apparatus**;
 - (c) Three single-phase enclosures of a common item of **Apparatus** connected by inter-phase pipe work.
- (iii) *Point of Access Notice* – A notice in **Approved** form to identify points of entry to **Isolated** and drained **Apparatus**.
- (iv) *Gas Zone Pressurised Notice* – A notice in **Approved** form to identify *Gas Zones* under pressure. Such *Gas Zones* may, or may not, be electrically charged.

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

8. PLANT AND APPARATUS IDENTIFICATION

- 8.1 All **Plant** and **Apparatus** containing *Dielectric Gas* shall bear an **Approved** notice naming the actual *Dielectric Gas(es)* and **Approved** notices shall also be displayed at access points to buildings and compounds housing such **Plant** and **Apparatus**.
- 8.2 **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 course of the work or testing.
- 8.3 *Gas Zones* shall be clearly identified by fixed labelling or presence of fixed pressure gauges.
- 8.4 Cover plates giving access to portable earthing or testing positions shall be identified.

9. DANGERS

The main **Dangers** to personnel from **Plant** and **Apparatus** containing *Dielectric Gas* are:

- (i) Poisoning by toxic breakdown products that can be formed within the **Apparatus**;
- (ii) Electric shock;
- (iii) Burns;
- (iv) Asphyxiation;
- (v) The release of stored mechanical energy or pressure;
- (vi) Failure of a **Point of Isolation** due to loss of gas pressure.

10. PREPARATION FOR WORK

10.1 Gas Pressure

When the integrity of a **HV Point of Isolation** is dependent on the pressure of *Dielectric Gas*, the gas pressure shall be monitored throughout the period of work. This function may be performed by an automatic alarm system, care being taken to ensure that such a system is in service and, where reasonably practicable, has been tested to prove its operation at low gas pressure prior to the

establishment of a **HV Point of Isolation**. Any loss of gas pressure shall immediately be reported to the appropriate **Control Person**.

10.2 Demarcation of Work Area

The boundary of the **Plant** or **Apparatus** on which it is safe to work or test shall be clearly identified. *Gas Zone Pressurised Notices* or **Danger Notices** shall, as appropriate, be fixed to adjacent *Gas Zones*, **Plant** and/or **Apparatus**. These notices shall only be fixed or moved by a **Senior Authorised Person** or by an **Authorised Person** under the **Personal Supervision** of a **Senior Authorised Person**.

10.3 When Depressurisation is Not Required

If depressurisation is not required to allow work or testing to be done, precautions shall be taken to achieve **Safety from the System** by either:

- (i) Limiting the work or work area, and issuing a **Limited Work Certificate** if deemed necessary by the **Senior Authorised Person**; or
- (ii) Rendering the **Plant** and/or **Apparatus Isolated**, and, where appropriate, **Earthed** and stored energy contained or dissipated, followed by the issue of a **Safety Document**.

10.4 When Depressurisation is Required

10.4.1 The **Apparatus** shall be **Isolated** and **Earthed** and stored energy contained or dissipated.

10.4.2 The *Gas Zone* to be worked in shall be drained of *Dielectric Gas* in accordance with an **Approved** procedure and the **Senior Authorised Person** shall ascertain that the pressure inside the *Gas Zone* to be worked in is at atmospheric pressure. The **Senior Authorised Person** shall consider if it is necessary to reduce the pressure in the adjacent *Gas Zones* before the issue of a **Safety Document**.

10.4.3 When the **Apparatus** to be worked upon has more than one *Gas Zone* a *Point of Access Notice* shall be displayed at each entry point. These notices shall only be fixed or moved by a **Senior Authorised Person** or by a **Person** under the **Personal Supervision** of a **Senior Authorised Person**.

10.4.4 A **Permit for Work** shall be issued stating as necessary the further precautions to be taken to deal with any arc products, which may be present. The removal and disposal of any arc products shall be in accordance with an **Approved** procedure.

10.4.5 If a **Senior Authorised Person** requires a **Selected Person's** report, a **Permit for Work** shall be issued to allow the **Selected Person** access to the *Gas Zone*.

10.5 Gas Sampling or Topping-up

Gas sampling and topping-up shall, where reasonably practicable, be done with the **HV Apparatus** not **Live**. Where it is not reasonably practicable to make it not **Live**, a **Senior Authorised Person** shall agree to the work being undertaken after considering the switchgear design and network configuration.

10.5.1 Only entry points with either self-sealing valve(s) or a control valve between the *Gas Zone* and the entry point shall be used for connecting *Dielectric Gas* sampling or topping-up equipment if the **HV Apparatus** is **Live**.

10.5.2 Before taking a gas sample from a circuit breaker or topping-up gas levels in a circuit breaker, the circuit breaker shall, where reasonably practicable be in the open position or made not

Live. Where it is not reasonably practicable to open the circuit breaker or make it not **Live**, a **Senior Authorised Person** shall agree to the work being undertaken after considering the switchgear design and network configuration.

10.5.3 Before connecting *Dielectric Gas* sampling or topping-up equipment to the **HV Apparatus**, permission shall be obtained from the **Control Person** responsible for that **HV Apparatus**.

10.5.4 The entry point shall be tested for leaks immediately after the sampling/topping-up equipment is disconnected. If a leak is present the topping-up equipment shall be re-connected to the entry point and positive pressure applied. The **Control Person** shall then be notified.

10.5.5 *Dielectric Gas* filled circuit breakers or switches will contain toxic gas breakdown products produced during arc suppression and any gas sampling or topping-up shall be done in accordance with the manufacturer's recommended procedures to avoid any risk of exposure to these products.

10.6 Working with Dielectric Gas

See Energy Networks document SWG-14-003¹ and the information contained in the Health, Safety and Environmental Handbook.

¹ At the time of writing this document is entitled "Precautions when working with SF₆ Gas" but is to be updated to encompass other *Dielectric Gases*.