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# NATIONAL SAFETY INSTRUCTION

## UK BP/SE/NSI 9 TESTING HIGH VOLTAGE EQUIPMENT

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TESTING HIGH VOLTAGE EQUIPMENT**

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## TESTING HIGH VOLTAGE EQUIPMENT

### 1. SCOPE

This National Safety Instruction applies the principles established by the Safety Rules to achieve **Safety from the System** for personnel carrying out tests on **High Voltage (HV) Equipment** using electrical test supplies at dangerous voltages or at dangerous energy levels as part of the work activity.

### 2. DEFINITIONS

For the purpose of this document the following definitions apply:

*Compartment* - An enclosure, chamber, cubicle or cell designed to prevent uncontrolled access to **Equipment** having exposed **HV** conductors. This term does not apply to metalclad switchgear spouts.

*Physical Separation* - A gap of sufficient distance to allow **HV Equipment** to be tested and exclude **Danger** to persons who would otherwise be affected by the test supplies whilst working on other **HV Equipment** within the same Isolated zone.

*Sanction for Work Written Procedure* - A form of document that will specify how **Safety from the System** is to be achieved throughout the course of the work that involves removal and re-application of **Primary Earths** and/or essential supplies.

*Structure* - A tower, gantry or other means of supporting or giving access to exposed **HV** conductors.

Terms printed in bold type are as defined in the Safety Rules.

### 3. EQUIPMENT IDENTIFICATION

**Equipment** to which test supplies are to be applied as part of the work activity must be readily identifiable. Where necessary a means of identification must be fixed to it which will remain effective throughout the course of the testing.

### 4. DANGERS

The main **Dangers** to personnel during the course of testing are electric shock, burns or other injuries arising from:

- contact with electrical test supplies at dangerous voltages or dangerous energy levels
- contact with the unearthed **System**
- contact with induced voltages

### 5. PREPARATION FOR TESTING

5.1 The following test activities are not subject to the requirements of this document:

- Testing using a ductor
- Use of circuit breaker timing test equipment under a **Permit for Work** issued with an **Approved** restoration of motive power (ROMP) procedure

- Testing using a megger when used on **Equipment** that does not require precautions to be taken away from the point of test.
- 5.2 Work that requires the application of test voltages from a test source must be carried out by a **Competent Person** or a **Person** under the **Personal Supervision** of a **Competent Person**.
- 5.3 Testing that does not require the removal of **Primary Earths** may be carried out under a **Permit for Work**
- 5.4 Testing that requires the removal of **Primary Earths** shall be carried out under a **Sanction for Work**.
- 5.5 When a **Sanction for Work** is in force there can be no other **Safety Documents** on **Equipment** which is within the zone established by the **Points of Isolation** on the **Sanction for Work**.
- 5.6 Where motive power supplies are to be restored this must be carried out in accordance with an **Approved** Restoration of Motive Power Procedure (ROMP).
- 5.7 Testing across control boundaries (as defined in the Site Responsibility Schedules) must be co-ordinated by the **Control Person(s)** **Safety** and can only be carried out under a **Sanction for Work**
- 5.8 Testing which takes place under a **Permit for Work** and does not go across control boundaries (as defined in the Site Responsibility Schedules) must be co-ordinated by the **Senior Authorised Person** preparing the **Permit for Work**. This co-ordination should use local control systems and satisfy the requirements laid down in 6.2 below.
- 5.9 The **Competent Person** in receipt of the **Safety Document** must ensure that there is effective control of the area where the test voltage is to be applied. If the area is small enough to allow effective surveillance this should be carried out under his **Personal Supervision**. Where the area is too large for this or where the nature of the testing means that the **Competent Person** is not continuously present, then effective control will need to be secured by other means. Examples of which are lockable enclosures or barriers, warning notices indicating the presence of test voltages, and if necessary the posting of sentries will be required.
- 5.10 If the **Equipment** being tested has remote end(s) which may become **Live** when the test voltage is applied and which is readily accessible from ground level, i.e. not within a **Locked Compartment** or on a **Structure**. It is the responsibility of the **Competent Person** in receipt of the **Safety Document** to ensure that the remote end is barriered off and under the control of a **Person** before a test voltage is applied. It is the responsibility of that **Person** to ensure that no one (including himself) approaches the **Equipment** unless instructed to do so by recipient of the **Safety Document**.
- 5.11 Connections used for test supplies must be of adequate strength and capability for the testing to be carried out. They must be easily visible when in the test position and be sufficiently protected to prevent injury if accidental contact is possible
- 5.12 Test connections may only be applied in a *Compartment* when all exposed conductors are **Isolated** from the **System** and **Points of Isolation** have been established.

- 5.13 **Approved** voltage measuring devices or **Approved** devices for phasing out circuits may be applied in a *Compartment* in which there is exposed metal which may be **Live at High Voltage**.
- 5.14 **Approved** devices must only be applied by a **Senior Authorised Person** or a **Competent Person** under the **Personal Supervision** of a **Senior Authorised Person**
- 5.15 The test area and any **Equipment** affected by the electrical test supplies must be identified in accordance with UK BP/SE/NSI 6 'Work and Demarcation in Substations'.

## 6. TESTING CARRIED OUT UNDER A PERMIT FOR WORK

- 6.1 The **Competent Person** in receipt of the **Permit for Work** is responsible for all matters of safety concerned with the testing. This includes controlling the work to ensure that he does not endanger any member(s) of his and/or other **Working Parties**.
- 6.2 If another **Permit for Work** is in force on other **Equipment** within the same zone established by the **Points of Isolation**, additional precautions may be necessary. This shall be determined by a suitable and sufficient risk assessment carried by the **Senior Authorised Person** preparing the **Permit for Work** allowing the application of test voltages. This may include creating a *Physical Separation* between the **Equipment** to which the test supplies are to be applied and the other **Equipment** that would be affected.
- 6.3 The procedure for the application of test voltages to cables where there is more than one **Permit for Work** in force on the cable circuit is detailed in UK BP/SE/NSI 5 'Cable Systems'

## 7 TESTING CARRIED OUT UNDER A SANCTION FOR WORK

- 7.1 The **Competent Person** in receipt of the **Sanction for Work** is responsible for all matters of safety concerned with the testing. This includes controlling the work to ensure that he does not endanger any member(s) of his and/or other **Working Parties**
- 7.2 Where specified on a **Sanction for Work** the **Competent Person** may remove or replace **Primary Earths** or instruct another **Competent Person** to remove or replace **Primary Earths** at a site remote from the work location.
- 7.3 Testing under a **Sanction for Work** must only be carried out by a **Competent Person** in accordance with a **Sanction for Work Written Procedure**. This procedure must identify the safety precautions to be taken to prevent injury before and during the removal/reapplication of **Primary Earths** and/or restoration of essential supplies.
- 7.4 Generic **Sanction For Work written Procedures** may be used for approved work e.g. circuit breaker timing tests, pressure testing **HV** cables etc. These are shown in appendix 1
- 7.5 Where a generic **Sanction for Work Written Procedure** will not suffice, the **Senior Authorised Person** must ensure that one is produced in conjunction with the appropriate SHE Business Partner and. sanctioned for use by the Substations Manager
- 7.6 The procedure may include the commissioning programme, standard test sheets, test procedures or diagrams of test connections.

## 8. COMPLETION OF TESTING

When a **Safety Document** which includes testing as part of the work activity is to be cleared the **Competent Person** must ensure that any safety precautions that were varied for the testing and are not restored to the original state are listed as exceptions.

## APPENDIX 1

### GENERIC SANCTION FOR WORK WRITTEN PROCEDURES

The following generic *Sanction for Work Written Procedures* are available on the Intranet:

SFW/WP/1	HV Circuit Breaker(s) and Switch Disconnectors	Issue No 1	1 <sup>st</sup> May 1996
SFW/WP/2	High Voltage Cables	Issue No 2	10 <sup>th</sup> April 2001
SFW/WP/3	HV Equipment (Various)	Issue No 1	1 <sup>st</sup> May 1996
SFW/WP/4	HV Capacitor Banks	Issue No 1	1 <sup>st</sup> May 1996