

# ESR Supporting Procedure 2

## Operational and Safety Switching

### SHEQ/HS/TCSESR/SP/002-2.0

#### DOCUMENT AUTHORISATION SHEET

Version 2.0 **Error! No text of specified style in document.**

Report Date 22/08/2014

Revised by:

Name: David White

Position: Senior Asset Manager

Date: 22/08/2014

Reviewed by:

Name: Douglas Ogram

Bill Mills

Position: ESR Consultant

HSE Consultant to TCS

Date: 21/02/2014

22/08/2014

Authorised by:

Name: Mike Lee

Position: Head of Asset Management

Date: 09/09/14

Version No.	Date	Comment	Author	Reviewed	Authorised
A	30/01/2014	First Draft	LB		
1.0	21/02/2014	First Issue	LB	DO/BM	
2.0	22/08/14	Review and Amendments	DW	BM	ML

## Contents

<b>1</b>	<b>Additional Abbreviations and Definitions .....</b>	<b>3</b>
<b>2</b>	<b>Purpose and Scope .....</b>	<b>3</b>
<b>3</b>	<b>Switching Preparation .....</b>	<b>4</b>
<b>4</b>	<b>HV Switching – Other Than for Emergency or Agreed Routine Purposes .....</b>	<b>5</b>
4.1	Receiving HV Switching Instructions.....	5
4.2	Undertaking HV Switching Instructions .....	6
4.3	Completion of HV Switching .....	7
<b>5</b>	<b>HV Switching – Emergency Conditions .....</b>	<b>8</b>
<b>6</b>	<b>Returning Equipment to Operational Service.....</b>	<b>9</b>
<b>7</b>	<b>Switching Instructions Carried Out Under a Permit For Work .....</b>	<b>9</b>
<b>8</b>	<b>Defeating of Interlocks .....</b>	<b>10</b>
<b>9</b>	<b>Operation of Non-Interlocked Equipment from the Local Position .....</b>	<b>10</b>
<b>10</b>	<b>Points of Isolation on HAM and VTCT .....</b>	<b>11</b>
<b>11</b>	<b>LV and Mechanical Switching.....</b>	<b>11</b>
<b>12</b>	<b>Retention of Documentation .....</b>	<b>11</b>
<b>13</b>	<b>Notes .....</b>	<b>12</b>

## Appendices

**Appendix 1 – Standard Operational Switching Instructions**

**Appendix 2 – Standard Safety Switching Instructions**

**Appendix 3 – Application of This Procedure**

## 1 ADDITIONAL ABBREVIATIONS AND DEFINITIONS

Terms printed in bold type are as defined in the **TCS** Electrical Safety Rules. For the purposes of this document the following definitions apply

- *Switching*, being one of the following:
  - *Operational Switching* - the operation of **Equipment** such as circuit breakers, isolators and **Isolating Devices**
  - *Safety Switching* – the operation of **Equipment** such as isolators, **Isolating Devices**, the application of **Primary Earths** and Shorting Switches, and the removal of fuses and links to achieve **Safety from the System**.

Where the term Isolator is used this also includes Disconnecter.

CCT	Circuit
IGDD	Isolation Gas Density Dependent
MCB	Miniature Circuit Breaker
NETSO	National Electricity Transmission System Operator
POI	<b>Point of Isolation</b>
RISSP	<b>Record of Inter System Safety Precautions</b>
ROMP	Restoration of Motive Power Supplies
SSC	System Status Certificate
TLR	Technical Limitation Record
TSC	Transmission Status Certificate

## 2 PURPOSE AND SCOPE

This document sets down the procedures to be adopted when carrying out *Switching* operations on **Equipment** to which the **TCS** Electricity Safety Rules (**TCS** ESRs) and Safety Rules Supporting Procedures (SRSP) apply.

These procedures have been developed to minimise human error incidents by ensuring that: -

- The requirements of the **Control Person** are accurately and unambiguously conveyed to the recipient of the *Switching* Instruction.
- The recipient executes the *Switching* instruction exactly as instructed, without distraction or undue delay.

### 3 SWITCHING PREPARATION

All *Switching*, except for emergency or agreed routine *Switching*, must be carried out to the instructions of the appropriate **Control Person**. Before issuing *Operational Switching* instructions, the **Control Person** shall consult with NETSO and in accordance with the STC-Procedures, who may in turn consult with the **Control Person(s)** of other **System(s)** that may be affected by the proposed *Switching*.

Planned *Switching* shall follow the issuing of a TSC by NETSO to the **Control Person**. Where appropriate, the *Switching* may be agreed with NETSO without the issuing of a TSC and by means of an agreed *Switching* instruction(s).

Before commencing any *Operational* or *Safety Switching* on site, the **Authorised Person** must ensure that the *Switching* operation does not affect the site supplies. Following the *Switching* operation the **Authorised Person** shall confirm, in liaison with the appropriate **Control Person(s)**, that there are no loss of indications.

*Switching* instructions must be given direct to an **Authorised Person** except when portable **Primary Earths** are to be applied, or removed, then the *Switching* instruction must be given direct to a **Senior Authorised Person**. The **Control Person** and the recipient of the *Switching* instruction are responsible for ensuring that they hold the necessary authorisations.

When *Switching* is to be carried out by a **Person** under training as an **Authorised Person**, he/she must be under the **Personal Supervision** of the **Authorised Person** receiving the *Switching* Instruction, who will take full responsibility for the correct completion of the *Switching* instruction. The **Control Person** must be made aware and record both names.

Using the trainees' original instruction, the supervising **Authorised Person** must also receive the *Switching* instructions direct from the **Control Person**. Having checked and confirmed the instruction is correct, he/she must then countersign the trainees' instruction.

When *Switching* instructions are to be given by a **Person** under training as a **Control Person** he/she must be under the **Personal Supervision** of the appropriate **Control Person**, who will check and countersign the written instructions before they are issued, and take full responsibility for the accuracy of the *Switching* instructions. The recipient of the *Switching* instruction must be made aware and note both names on his instruction.

## 4 HV SWITCHING – OTHER THAN FOR EMERGENCY OR AGREED ROUTINE PURPOSES

Before HV *Switching* instructions are to be issued by the appropriate **Control Person**, they must be recorded giving the name of the **Location(s)** at which the instructions are to be carried out, the identification and nomenclature of the **Equipment** involved and the effect of the operations.

All recorded entries by the **Control Person** and the **Authorised Person** receiving the *Switching* instruction must be written legibly and indelibly. The preferred *Switching* terminology and abbreviations to be used in the *Switching* instruction are those shown in Appendices 1 and 2.

Guidance: where there is not a specific instruction, the general principles embodied in Appendices 1 and 2 should be applied and agreement reached between the **Control Person** issuing the *Switching* instruction and the **Authorised Person** carrying it out as to the wording.

### 4.1 Receiving HV Switching Instructions

**HV Switching** instructions must be given to the appropriate recipient in two parts as detailed below.

- An informal pre-amble between the **Control Person** and the recipient of the *Switching* instruction. This is an explanation of the objective of the subsequent operations including the identification and Location of the **Equipment** involved. It is not necessary to record this part of the instruction.
- The formal precise instruction, this begins when the **Control Person** states “time of message is” and must include with the following standard pattern:
  - name of the **Control Person** giving the instructions
  - recipient of the *Switching* Instruction
  - time and date of message
  - the **Location** and nominal Voltage at which the *Switching* is to take place
  - name and number of circuit
  - actual operational requirement, including nomenclature as appropriate
  - resultant situation of the *Switching* Instruction i.e. “to discharge circuit”

the **Control Person** should conclude the formal instruction with ‘end of message’

The **Control Person** must also record at this stage the name of the recipient of the *Switching* Instruction. The recipient of the **HV Switching** instructions must write them down (or confirm the instruction where a pre-agreed switching schedule is used) and read them back phrase by phrase, as received from the **Control Person**.

At the end of the message the complete *Switching* instruction must be read back in full to the **Control Person** to ensure that it has been accurately received.

The recipient of the *Switching* instruction must fully understand the content of the instruction before proceeding. The *Switching* instruction must then be carried out without delay subject to the recipients Objections on Safety Grounds.

Guidance: *Switching* instructions must not be carried out with pre-arranged time intervals. e.g. carry out at 16.50 when the time of issue is 16.00.

## 4.2 Undertaking HV Switching Instructions

When carrying out **HV Switching** instructions the recipient must observe the following requirements:

- a. Concentrate on the task - avoid distraction (i.e. silence mobile phone), be deliberate neither rushing nor causing undue delay, take nothing for granted, and be aware of the surroundings, activities, and any hazards, carry out the *Switching* instructions in the sequence given
- b. Be in continuous possession of the *Switching* Schedule, consulting it and checking the **Equipment** identification against the *Switching* Instruction before taking any action.
- c. Before taking any action, pause and recheck the proposed action against the *Switching* instruction before carrying it out.
- d. **Equipment** that is **Locked** must only be unlocked immediately before being operated and then re-locked immediately after it has been operated.
- e. Check, by all means readily available, that the *Switching* instruction has been satisfactorily completed.
- f. After carrying out each individual operation the written *Switching* instruction must be ticked off, the time logged, after that operation to indicate completion.
- g. If interrupted or distracted the **Authorised Person** must review the previous part of the *Switching* instruction to ensure that the next step is valid.
- h. If for any reason a *Switching* instruction cannot be completed, the recipient of the *Switching* instruction must attempt no further operations and *shall* inform the **Control Person** of the facts. The **Control Person** will then decide if the *Switching* instruction can continue.
- i. When a piece of **Equipment** shows any sign of distress, it must not be operated and the **Control Person** informed immediately. All personnel in the vicinity must be warned that a potential hazard exists and withdrawn from that area.
- j. When closing any earth switch the integrity of the connections to the substation earth mat must be visually checked before carrying the *Switching* instruction.
- k. The recipient must endorse his instruction with the time of the completion of the operation or sequence of operations.



### 4.3 Completion of HV Switching

Following the completion of **HV Switching** the recipient of the instruction must: -

- a. Record the time of completion of the operations in the Switching Schedule or site *Switching* log book.
- b. Report back to the **Control Person** the operations carried out, the time of completion and any **Circuit Identification** involved.
- c. Record the name of the **Control Person** and the time of confirmation given to them by the **Control Person** in the *Switching* Schedule or site *Switching* log book.

The **Control Person** receiving the message must: -

- a. Record the time of completion of the **HV Switching** and any **Circuit Identification** involved and any other relevant additional information passed to him.
- b. Give the sender his name and confirmation of the time of receipt.
- c. Acknowledge, by repeating back to the sender the **Circuit Identification** if appropriate and any other relevant information passed to him.
- d. Check against the relevant records and displays the accuracy of the **Circuit Identification** involved.
- e. Dress any relevant diagrams or displays.

Once all **HV Switching** has been completed the **Authorised Person / Senior Authorised Person** should confirm with the **Control Person** that all safety critical information has been received and relevant displays on the SCADA screens are reading correctly.

On completion of the application of Safety Precautions under the instructions of a **Control Person** the **Authorised Person** *shall* secure the **Safety Keys** inside a **Key Safe** and the **Keys** be kept in safe custody according to the **TCS** Electrical Safety Rules. Where a Tee card system is in operation the appropriate Tee card *shall* be filled in with the appropriate details and placed in the **POI/Earthing/RISSP** section of the Substation Notice Board.

Once Safety Precautions have been completed details of what **Safety Keys** are secured in the **Key Safe** *shall* be recorded on the **Key Safe**. This can be by attaching a label to the **Key Safe**.

When Safety Precautions have been established by another company for use by **TCS** or by **TCS** for use by another company (across boundaries) and it is sensible and reasonably practical to exchange **Safety Keys** then this *shall* be done. Any keys received by **TCS** from other companies *shall* be secured in a **Key Safe**.

If an external company issues a proof of **Isolation** and **Earthing** certificate when they have completed Safety Precautions, this certificate is to be recorded on the **Switching Schedule**, and the document placed in the **Key Safe**.

#### 4.3.1. SF6/IGDD Dependant Points of Isolation

When the Safety Precautions have **Points of Isolation** dependent on SF6 the **Control Person** will identify the Gas Zone containing the **Point of Isolation** and the associated gas zone monitoring alarms. Where there is any doubt the **Authorised Person** will be asked to confirm the gas zone and alarm legend when establishing the **Point of Isolation**.

The **Authorised Person** *shall* confirm to the **Control Person** that the alarm system monitoring the gas pressure associated with any **Point(s) of Isolation** is in service. Where reasonably practical the alarm system monitoring the gas zone must be tested and proved to the **Control Person** display from the source of alarm or at a point close to the source e.g. shorting at gauge or terminal block.

On receipt of a gas zone pressure alarm the **Control Person** will inform site that an alarm has been received and a hazard exists. The site contact will ensure that relevant staff are warned that a potential hazard exists and will arrange for the gas pressure to be restored and appropriate **Safety Documents** to be cancelled.

When isolation is gas density dependent, (IGDD) *shall* be recorded in the **Point of Isolation** section of the **Safety Document** and the isolated/to be isolated sections of the SSC or RISSP as appropriate.

Where IGDD isolation is quoted on a **Safety Document** the telephone contact details for the issuing **Senior Authorised Person**, and **Competent Person** in charge of the work *shall* be recorded in the 'further safety precautions' section of the **Safety Document**. This is to ensure that the site can be contacted if remote alarms are received.

Where RISSP's are to be exchanged the **Control Person** will notify the Requesting Safety Co-ordinator that the **Point of Isolation** is IGDD. Where a gas alarm leads to the loss of integrity of a **Point of isolation**, the Implementing Safety Co-ordinator must inform the Requesting Safety Co-ordinator without delay.

## 5 HV SWITCHING – EMERGENCY CONDITIONS

Where HV *Switching* has taken place under emergency conditions (i.e. where there is a substantial risk to health) and without instruction from a **Control Person**, the **Authorised Person** must inform the appropriate **Control Person** as soon as possible after the operation. All relevant details must be recorded in the *Switching* log book. The **Control Person** *shall* inform NETSO as soon as reasonably practicable.

When **Equipment** trips under fault conditions, the **Authorised Person** must record all 'dropped flags' on tripping relays and any outputs displayed on electronic relays on the **Switching Schedule**. The SCADA archives any alarms and it is therefore not necessary to record events displayed on SCADA. This record will only be erased with the appropriate **Senior Authorised Person's** permission. These details must be recorded in the **Switching Schedule**.

The **Authorised Person** must then report, as soon as possible, to NETSO and the **Control Person** the time of the operation and details of the annunciation's together with any relay indications available in the Control Room.

With agreement from the **Control Person**, the **Authorised Person** can then reset any 'manually reset' relays and indications

A **Senior Authorised Person** must be consulted before trip relays, following from a fault, are reset by a **Control Person** using telecommand.

When the **Control Person** instructs action to restore **Equipment** which has tripped under fault conditions, the **Authorised Person** receiving the instruction must ensure that the trip relays are reset before attempting to close any circuit breaker.

When **Equipment** is showing signs of distress it must not be operated and all persons must be kept clear of such **Equipment**. *Operational Switching* must be carried out as soon as possible so that the **Equipment** concerned can be removed from service without it being subjected to further operations.



## 6 RETURNING EQUIPMENT TO OPERATIONAL SERVICE

On restoration of safety precautions under the instructions of a **Control Person** the **Authorised Person** must amend the **Key Safe** contents details, remove the Tee Card from Substation Status Board and return the **Key Safe Key**.

## 7 SWITCHING INSTRUCTIONS CARRIED OUT UNDER A PERMIT FOR WORK

Where a **Permit for Work** is required to allow a *Switching* instruction to be completed, the work identified on the **Permit for Work** shall be restricted to that necessary to carry out the *Switching* instruction.

Guidance: an example could be when applying a portable **Primary Earth** to high-level busbar in a substation.

When there is no requirement for both a formal *Switching* instruction and a **Permit for Work**, the **Permit for Work** shall be the record of the *Switching* instruction between the **Senior Authorised Person** and **Control Person**.

The **Senior Authorised Person** shall prepare and issue the **Permit for Work** to himself as a **Competent Person** to carry out the work. No work other than that necessary to carry out the *Switching* instruction should be included on the **Permit for Work**.

When the work is complete the **Permit for Work** must be cleared and cancelled immediately and this will be the confirmation that the *Switching* instruction has been completed.

## 8 DEFEATING OF INTERLOCKS

**Note:** - Defeating the function of interlocks is a potentially high risk *Switching* operation that removes the in-built safe guards that prevent the **Equipment** from being operated in an incorrect sequence. This may then give rise to **Danger** to those **Persons** carrying out the *Switching* operation.

These *Switching* operations require careful consideration and mutual agreement between the **Control Person** and a **Senior Authorised Person**.

The **Control Person** must then give the *Switching* instruction to render interlocks inoperative direct to the **Senior Authorised Person** (who must be specifically **Authorised** under Operational Authorisation 1 (OSA1)).

The **Control Person** must then give a separate *Switching* instruction to an **Authorised Person** (Who must be specifically Authorised under Operational Authorisation 2 (OA2)) “to accompany and check that the instructions to defeat the function of interlocks are implemented on the correct Equipment and in the correct sequence” by the aforementioned **Senior Authorised Person**.

The **Senior Authorised Person** must ensure on site that the substation running arrangements are those as agreed with the **Control Person** and that all staff, except for the accompanying **Authorised Person**, are clear of the area adjacent to the **Equipment** prior to it being operated.

The **Authorised Person** must also check on site that the substation running arrangements are those as agreed with the **Control Person** and then to confirm with the **Senior Authorised Person** that they are at the correct **Equipment** prior to carrying out the operation. This is not a passive role.

Both the **Senior Authorised Person** and the **Authorised Person** must be sure that the operation can be carried out without **Danger** before proceeding.

Where work is to be carried out on interlocks that are under a Permit-to-Work and all effected equipment is isolated, as long as a specific Method Statement is in place, no reference to a Control Engineer is required when disabling/altering interlocks. Steps should be taken to ensure the correct operation of this interlocking prior to cancelling the Safety document.

## 9 OPERATION OF NON-INTERLOCKED EQUIPMENT FROM THE LOCAL POSITION

**Note:** - Operation of non-interlocked **Equipment** from the local position is a potentially high risk *Switching* operation where there are no in built safeguards to prevent the **Equipment** being operated in an incorrect sequence. This may then give rise to **Danger** to those **Persons** carrying out the *Switching* operation.

These *Switching* operations require careful consideration and mutual agreement between the **Control Person** and a **Senior Authorised Person** “to operate non-interlocked **Equipment** from the local position”. An accompanying **Authorised Person** must also check and confirm both the running arrangements, **Equipment** identification and *Switching* Instructions.

The process and checks are as those defined in “Defeating The Function of Interlocks” given in section 9.

## 10 POINTS OF ISOLATION ON HAM AND VTCT

Some **System** users require HAM VTCT units to be **Isolated**, this will be carried out under instruction from the **Control Person**.

The VT secondary supplies should be **Isolated** as part of the test procedure if carrying out off load diagnostic testing.

## 11 LV AND MECHANICAL SWITCHING

*Switching* for **LV** and Mechanical **Equipment** must be carried out in accordance with the principles specified in Section 5.

Once **LV** and/or Mechanical Safety Precautions have been completed the **Authorised Person** shall enter details of the Safety Precautions taken on an apricot coloured Tee Card and place it in the POI/Earthing/RISSP Section of the Substation Status Board in line with associated circuit(s) see Appendix 4.

Where the **Senior Authorised Person** acts as an **Authorised Person** to establish Safety Precautions prior to preparation of a **Safety Document**, the detailing of Safety Precautions on the **Safety Document** will be the record of safety precautions established.

Where the **Senior Authorised Person** preparing a **Safety Document** is also the **Authorised Person** carrying out the *Switching* the **Safety Document** will form the record.

Safe Custody of **Keys** etc. for **LV** and Mechanical **Equipment** will be in line with the requirements for **HV equipment**.

## 12 RETENTION OF DOCUMENTATION

Documentation relating to *Switching* instructions will be retained at the **Location** of operation for the following periods:-

a) <u>Substations</u>	<u>Period</u>
Substation <i>Switching</i> Log Books	36 Months*
Substation General Log Books	36 Months*
<b>Switching Schedule</b> Sheets	6 Months*
b) Control Room	
Control Room Log Sheets	36 Months*

\**Switching* Log Books and Control Log Sheets should be clearly marked with the dates of the first and last entries and filed in chronological order. The retention period should start from the date of the last entry.

All **Safety Documents** and associated documents will be grouped together and retained at a suitable **Location** for 3 years after cancellation.

**Safety Document** booklets containing old copies of cancelled safety documents are to be retained at the suitable location for 3 years after the date of last document preparation and issue.

RISSPs will be retained at the suitable location for 3 years after date of last document preparation and issue.

**13 NOTES**


## APPENDIX 1 – STANDARD OPERATIONAL SWITCHING INSTRUCTIONS

To ensure all **HV Operational Switching** Instructions are clear and unambiguous standard terminology *shall* be adopted. Some transposition of words is permitted to achieve clear phraseology.

(-----) Indicate the inclusion of the appropriate terms

\* Delete as appropriate

\*\* Delete "to Charge/Discharge" when using an isolator

The preferred terms and actions are as follows:-

<b>INSTRUCTION 1</b>	ON (-----) CIRCUIT CLOSE CIRCUIT BREAKER/ISOLATOR* (-----) TO CHARGE**
<b>ACTION</b>	Close circuit breaker/isolator and report back actions with charging current on each phase if appropriate
<b>INSTRUCTION 2</b>	ON (-----) CIRCUIT OPEN CIRCUIT BREAKER (-----) OFFLOAD
<b>ACTION</b>	Open circuit breaker offloading any demand
<b>INSTRUCTION 3</b>	CHECK LOAD ON (-----) CIRCUIT
<b>ACTION</b>	Check MW, MVAR and AMPS on each phase, if possible, and report back readings
<b>INSTRUCTION 4</b>	ON (-----) CIRCUIT CHECK NO LOAD AND OPEN CIRCUIT
<b>ACTION</b>	The Operator may have been informed in the preamble that some charging current but no MW's should be indicated. If conditions are as expected, the circuit breaker is opened and the action reported back.
<b>INSTRUCTION 5</b>	ON (-----) CIRCUIT OPEN CIRCUIT BREAKER/ISOLATOR * (-----) TO DISCHARGE**
<b>ACTION</b>	Open circuit breaker/isolator, discharging <b>Equipment</b>
<b>INSTRUCTION 6</b>	ON (-----) CIRCUIT SELECT TO TEST/SWITCH* IN/OUT* FIRST/SECOND* MAIN PROTECTION/INTERTRIPPING* DAR*
<b>ACTION</b>	Select control switch to instructed position
<b>INSTRUCTION 7</b>	ON SGT (-----) TAP FROM POSITION (-----) TO (-----) TO RAISE/LOWER* VOLTS
<b>ACTION</b>	Operate tap changer control to move tap position as instructed
<b>INSTRUCTION 8</b>	ON SGTs (-----) TAP TO MAINTAIN TARGET VOLTAGE OF (-----) kV
<b>ACTION</b>	Maintain target volts

---

<b>INSTRUCTION 9</b>	ON LOAD CHANGE OVER ON CIRCUIT (-----) CLOSE ISOLATOR (-----) OPEN ISOLATOR (-----)
<b>ACTION</b>	The <b>Control Person</b> must check that an electrical parallel exists between the busbars on the circuit concerned. This information must be conveyed to the <b>Authorised Person</b> in the pre-amble who will then carry out the <b>HV Switching</b> Instruction. At the end of the <b>HV Switching</b> Instruction the <b>Authorised Person</b> may also be requested to check and confirm that the busbar is clear of all circuits.
<b>INSTRUCTION 10</b>	OFF LOAD CHANGE OVER ON CIRCUIT (-----) OPEN ISOLATOR (-----) CLOSE ISOLATOR (-----)
<b>ACTION</b>	Check that the circuit breaker on the circuit concerned is open and then carry out the <b>HV Switching</b> Instruction
<b>INSTRUCTION 11</b>	DISSIPATE TRAPPED CHARGE ON CIRCUIT (-----) CHECK OPEN ISOLATORS (--- --) CLOSE EARTH SWITCH (-----) TO DISSIPATE TRAPPED CHARGE OPEN EARTH SWITCH (-----)
<b>ACTION</b>	Where reasonably practicable physically check that all <b>Live</b> side isolators are open to confirm an <b>Isolated</b> zone has been established and then carry out the <b>HV Switching</b> Instruction



## APPENDIX 2 – STANDARD SAFETY SWITCHING INSTRUCTIONS

To ensure all **HV Safety Switching** Instructions are clear and unambiguous standard terminology should be adopted. Some transposition of words is permitted to achieve clear phraseology.

(-----) Indicate the inclusion of the appropriate terms  
 \* Delete as appropriate

The preferred terms and actions are as follows:-

### 2.1. FIXED ISOLATING DEVICES

<b>INSTRUCTION 1</b>	Open (or check open), lock and Caution Isolator (-----)
<b>ENTRY ON SAFETY DOCUMENT</b>	(-----)
<b>ENTRY ON RISSP</b>	(-----) Open and Locked (Caution Notices affixed where not pre-printed)

The **Authorised Person** must for:

#### 2.1.1. Manually Operated Isolators

After opening the isolator, return the handle to the inoperative position (if the handle is removable/storable), attach a Caution Notice and secure the isolator and the notice with a safety lock. Where present, remove the Lockout key and place in a **Key Safe** with the identified **Safety Key**.

#### 2.1.2. Motorised Isolators / Disconnectors

Remove motor supply fuses (or Isolate motor supply MCB) and/or remove links and place them within the compartment. Where a Lockout or equivalent key is provided remove the Lockout or equivalent key and place it in the compartment with the motor supply fuses/links.

If the design of the isolators/disconnectors is such that they are electrically interlocked i.e. SF6 GIS equipment then the equipment should be **Isolated** in line with method intended for such equipment on a site by site basis e.g. fuses/links, locking pins etc.

Where newer **Equipment** is installed on the **System** and it is inappropriate to apply the above controls, the principles of locking and cautioning **Equipment** for **Points of Isolation** must be applied.

Attach a Caution Notice and secure the compartment door closed with a safety lock. Where this action would trap any remaining interlock keys these keys must be first removed to safe custody. Where an inner door can secure access to the motor supply fuses/links, only the inner door need be locked.

Where other isolator doors permit the removed Lockout key or motor supply links to be reached then these doors must also be **Locked** closed with a Safety Lock and a Caution Notice attached. Identify the **Safety Key(s)** and place them in a **Key Safe**.

The **Authorised Person** must reverse the actions as required to lock and caution the isolator and, on manually operated isolators, lock the manual operating handle so that it cannot be used.

## 2.2. VOLTAGE TRANSFORMERS

Where there is a requirement for work on the VT **LV** fuses e.g. disconnection of wiring, or the need to quote them, or other **HV Equipment** as a Safety Precaution for work on an **LV System**, the **Control Person** must be contacted prior to the work being started to establish and agree an **LV** RISSP between both parties.

**INSTRUCTION 2** Isolate and Caution (-----) VT Secondary Supplies

**ENTRY ON SAFETY DOCUMENT** (-----) VT Secondary Supplies

**ENTRY ON RISSP** (-----) VT Secondary Supplies Isolated (Caution Notices affixed where not pre-printed).

The **Authorised Person** must take one of the following actions:-

- a) Remove the VT **LV** fuses and links from the holders within the VT fuse box as indicated on the label on the box cover or door.

Or

- b) Remove the VT **LV** fuses and links from the holders within the appropriate circuit protection relay panel.

Then either:-

Retain the fuses and links within the box, lock the appropriate cover or door and affix a Caution Notice.

Or

Affix caution tape to the fuse and link holders and remove the fuses and links to an appropriate **Key Safe**.

Alternatively:-

- c) Place miniature circuit breaker (MCB) into open position and lock off with suitable locking device (where possible) and affix a Caution Notice.
- d) Disconnect relevant VT **LV** wiring to create same situation as removal of VT **LV** fuses and links and affix a **Caution Notice** (requires additional specific instruction from a **Senior Authorised Person** and/or supervisor).

**INSTRUCTION 3** Restore (-----) VT Secondary Supplies

The **Authorised Person** must reverse the precautions taken to isolate and Caution (-----) VT Secondary Supplies, as detailed above.

## 2.3. EARTHING AND/OR AUXILIARY TRANSFORMERS (Transformers providing supplies at LV)

**INSTRUCTION 4** Isolate and Caution (-----) Earthing and/or Auxiliary Transformer Secondary Supplies

**ENTRY ON SAFETY DOCUMENT** (-----) Earthing and/or Auxiliary\* Transformer Secondary Supplies

**ENTRY ON RISSP** (-----) Earthing and/or Auxiliary\* Transformer Secondary Supplies Isolated. (Caution Notices affixed where not pre-printed)

The **Authorised Person** must take one of the following actions:-

- a) Open the **LV** isolating switch at the transformer and lock it in the open position and affix a Caution Notice.
- b) Remove the **LV** isolating fuses at the transformer and lock the fuse box and affix a Caution Notice.
- c) Open the **LV** isolating fuses at the transformer and lock the fuse box and affix a Caution Notice.

**INSTRUCTION 5** Restore (-----) Earthing and/or Auxiliary\* Transformer Secondary Supplies

The **Authorised Person** must reverse the actions taken above for isolation of Earthing and/or Auxiliary\* Transformer Secondary Supplies.

## 2.4. METAL CLAD SWITCHGEAR

**INSTRUCTION 6** Isolate (-----) Lock and Caution Busbar / Feeder / Cable / Transformer / VT / etc\* Isolators)

**ENTRY ON SAFETY DOCUMENT** (-----) Busbar/Feeder/Cable/Transformer/VT/etc\* Isolators

**ENTRY ON RISSP (-----)** Busbar/Feeder/Cable/Transformer/VT/etc\* Isolators Locked (Caution Notices affixed where not pre-printed).

The **Authorised Person** must where possible affix a **Caution Notice**.

**INSTRUCTION 7** Restore (-----) to service position on Main Busbar/Front Busbar etc\*

The **Authorised Person** must reverse the actions taken to Isolate (-----) Lock and Caution Busbar / Feeder / Cable / Transformer / VT / etc\* Isolators)

## 2.5. FIXED EARTHING DEVICES

**INSTRUCTION 8** Close/Apply\* Earth Switch/Maintenance Earth/Fixed Earthing Device\* (-----) and lock\*

**ENTRY ON SAFETY DOCUMENT** (-----)

**ENTRY ON RISSP** (-----) Closed/Applied\* and Locked\*

The **Authorised Person** must:

- a) Unlock the fixed **Earthing Device**, if appropriate.
- b) Close (or apply) the fixed **Earthing Device** utilising the necessary interlock keys where necessary.
- c) Lock the fixed **Earthing Device**.

**INSTRUCTION 9** Open/Remove\* Earth Switch/Maintenance Earth/Fixed Earthing Device\* (-----)

The **Authorised Person** must reverse the actions taken to Close/Apply\* Earth Switch/Maintenance Earth/Fixed **Earthing Device**\* (-----) and lock\*. The fixed **Earthing Device** must be independently **Locked** in the open/removed position, if it is not fully interlocked.

## 2.6. EARTHING VIA PORTABLE EARTHING DEVICES

**INSTRUCTION 10** Apply earths (description of position e.g. On Circuit 1, between X105 and X103, at X103)

**ENTRY ON SAFETY DOCUMENT** Description of position

**ENTRY ON RISSP** Earths applied (description of position)

The **Senior Authorised Person** must ensure the portable earths are applied in accordance with SHEQ-HS-TCSESR-SP-003-A ESR Supporting Procedure 2 - Earthing of **HV Equipment**.

**INSTRUCTION 13** Remove earths (description of position)

The **Senior Authorised Person** must ensure the portable earths are removed in accordance with SHEQ-HS-TCSESR-SP-003-A ESR Supporting Procedure 2 - Earthing of **HV Equipment**.

## 2.7. GIS EQUIPMENT

Wherever possible the principles above should be applied to GIS **Equipment**. However, due to the complexities of this type of **Equipment** this cannot always be achieved. These site related differences will be covered in **Authorised Person** site training or if deemed necessary a Local Procedure held on site.

## APPENDIX 3 – APPLICATION OF THIS PROCEDURE

3.

### 3.1. DEFINITIONS

#### 3.1.1. Tee Card

Colour coded tee shaped cards for recording information and placing in Substation Status Board.

#### 3.1.2. Substation Status Board

Board used to display relevant information appertaining to specific equipment or circuits.

#### 3.1.3. Document Wallet

A plastic wallet for securing **Safety Documents** and associated documents, items and **Keys** in safe custody.

### 3.2. APPLICATION OF TCS ELECTRICAL SAFETY RULES

3.2.1. The **TCS** Electrical Safety Rules applies to all **Equipment** on Operational Sites.

#### 3.2.2. Assessment of **Safety Distance**

When work is to be carried out in close proximity to the **Safety Distance** the **Senior Authorised Person** should consult scaled drawings or use an appropriate instrument to accurately measure the distance involved.

#### 3.2.3. Substation Status Board

- i. Most substation **Locations** will be provided with a wall mounted rack for the visual display of information. Information e.g. Safety Precautions, **Safety Documents**, etc. should be recorded and displayed on the Substation Status Board at the time they become effective and should remain displayed while they are in force.
- ii. Pre-printed colour coded Tee cards are provided and must be completed with the necessary information, Safety Precautions, **Equipment** status etc.

<b>Equipment</b>	Black on White
Protection	Black on Cream
TLR's	Black on Red
Risk Management Zones	Black on Deep Yellow
POI/Earthing/RISSP	Black on Apricot
<b>Permit for Work</b>	Black on Pink
<b>Sanction for Test</b>	Black on Green
<b>LV Permit For Work</b>	Red on White
<b>Limitation Of Access Certificate</b>	Black on Blue
Defects	Black on Deep Pink

- 3.2.4. The system is designed in order that the **Equipment**/circuit which is out of service is identified by a Tee Card in either the **Equipment** or the Protection column. All other associated Tee cards should be placed in a horizontal line in their appropriate slot and thus provide personnel with an accurate up-to-date picture of all associated work, Safety Precautions etc.
- 3.2.5. The **Equipment** and Protections can be identified as a circuit i.e. Supergrid Transformer 1 cct or as individual items i.e. Supergrid Transformer 1. The decision should be based on complicity of outage/work.

### 3.3. SAFETY DOCUMENTS

#### 3.3.1. Preparation of **Safety Documents**

- i. All **Safety Documents** should be prepared in compliance with **TCS** Electrical Safety Rules.
- ii. The **Senior Authorised Person** must before preparing any **Safety Document** check the Substation Status Board for any other **Safety Documents** issued which may prevent the issue of another **Safety Document** on the same piece of **HV Equipment** i.e. **Permit for Work** with associated ROMP, **Permit for Work** with associated electrical testing.
- iii. If during preparation of a **Safety Document** a mistake is made or identified then:-
  - a) If the mistake is in Section 1 then **Safety Document** must be destroyed and re-written. Alterations *shall* not be allowed.
  - b) If mistake is made in Section 2 or 3 then provided they are identified before the preparation section is completed, consent is given by **Control Person** and signed by **Senior Authorised Person**, minor mistakes can be crossed out and initialled by **Senior Authorised Person** if it does not make **Safety Document** illegible.
  - c) Where any mistake is identified after the **Safety Document** has been declared as prepared or issued then that **Safety Document** must be cleared and then cancelled with appropriate **Control Person** and a new **Safety Document** prepared again.
- iv. If a **Senior Authorised Person** is dealing directly with a **Control Person** of an external company which does not require a RISSP, and Safety Precautions have been carried out by the external company and a Proof of Isolation and Earthing Certificate is supplied, reference to this certificate may be made in Section 2 of the **Safety Document**. A copy of the certificate is to be attached to the **Safety Document** to enable the isolation and earthing to be identified by the **Senior Authorised Person / Competent Person**.
- v. After the **Senior Authorised Person** has prepared the **Safety Document** he/she will complete:-
  - a) The relevant **Safety Document** Tee Card and place it into the appropriate slot stating on the reverse in the recipient column the words "in safe custody" instead of current recipient if **Safety Document** is not to be issued immediately.
  - b) Record the **Safety Document** details on back of POI/Earthing/RISSP Tee Card quoting Safety Precautions to be maintained.

Note: Details to record **Safety Documents** issued *shall* be written in the Substation *Switching* Log.

- vi. If the **Safety Document** is prepared but not to be issued immediately then the **Senior Authorised Person** *shall* keep the **Safety Document** in his/her safe custody until it is ready for issue.



- vii. When there is insufficient space on the **Safety Document** a **Safety Document** continuation sheet may be used. If it is used then its unique number and number of associated **Safety Document** must be cross reference and be recorded on each document.
- viii. When **Drain Earths** are to be used the unique pre-printed number on the Earthing Schedule will be cross-referenced to the associated **Safety Document** and vice-versa.

### 3.3.2. Issue of **Safety Documents**

- i. When **Safety Documents** are issued, the card copy and supplementary documentation *shall* be personally retained by the recipient in safe custody.
- ii. If the **Safety Document** is a **Permit for Work** with associated ROMP, or is associated with Testing **HV Equipment** then no other **Safety Document** must be issued on the same piece of **HV Equipment** or any other **HV Equipment** which could be affected by such testing.

The **Senior Authorised Person** must include words 'No other Safety Document to be issued on this or following equipment' on Tee Card and place it in appropriate slot.

- iii. The maximum number of **Safety Documents** that may be issued and held by a **Competent Person** at any time is four (at the issuing **Senior Authorised Person's** discretion).
- iv. The Safety Rules require in certain circumstances the use of **Approved** Procedures namely:-
  - 2.10 "Objections on Safety Grounds"
  - 2.11 "Exceptional Circumstances - Where safety rules cannot or should not apply".
  - 3.3 Approved **Sanction for Test** Written Procedures.

### 3.3.3. Receipt of a **Safety Document**

- i. The **Senior Authorised Person** responsible for issuing a **Safety Document** must hand over the top (written) copy of the **Safety Document**, and any associated documents to the recipient at the time of issue, except for a **Working Party** register. The **Senior Authorised Person** must record the details of the current recipients of **Safety Document** on the appropriate Tee Card which must then be placed in appropriate position in Substation Status Board. The bottom copy of the issued **Safety Document** is to remain on site in original book. The middle copy is to be sent to the Control Room for auditing on a periodic basis.

### 3.3.4. Members of the **Working Party**

Where members of the **Working Party** are set to work under a **Safety Document** the recipient of the **Safety Document** must ensure that their names are entered on the **Working Party Register** and they are instructed in details of work and relevant **Safety Document** and associated documents.

### 3.3.5. Clearance of **Safety Document**

- i. All **Safety Documents** should be cleared in compliance with **TCS** Electrical Safety Rules.

- ii. With the exception of a **Sanction for Test** when the **Senior Authorised Person** is not available, the cleared **Safety Document** and any associated items should be kept in the safe custody of the recipient.
- iii. When a **Sanction for Test** is to be cleared it must be handed direct to a **Senior Authorised Person** who must then immediately cancel it as per 3.3.6.

#### 3.3.6. Cancellation of **Safety Document**

- i. All **Safety Documents** *shall* be cancelled in compliance with **TCS** Electrical Safety Rules.
- ii. The **Senior Authorised Person** *shall*: -
  - a) remove the appropriate Tee Cards from the Substation Status Board and destroy it.
  - b) cross out reference to **Safety Document** on POI/Earthing/RISSP Tee Cards.

#### 3.3.7. When a **Safety Document** is cancelled with exceptions then the exceptions to returning **Equipment** can either:-

- a) Be recorded on Tee Card and placed in slot in TLR's, or
  - b) Be recorded on another **Safety Document** which is prepared and issued immediately (This *shall* be done if **Drain Earths** are still applied to the **Equipment**), or
  - c) Inform the **Control Person** of change of state i.e. earth switch 101ED open.
- iv. If there are not any exceptions when a **Safety Document** is cleared, the **Competent Person** *shall* state this on the **Safety Document**.
  - v. The completion of the Cancellation Section of a **Safety Document** by the **Senior Authorised Person** is the record that all items issued with the **Safety Document** have been returned.
  - vi. The cancelled **Safety Document** *shall* be stored for record purposes as per Section 13.

### 3.4. SAFE CUSTODY OF SAFETY DOCUMENTS AND ASSOCIATED ITEMS

Personnel in receipt of **Safety Documents** must retain all **Safety Documents** and associated items (Working Party Register, Earthing Schedule, Gas Zone Access Control Form, Key Safe Key, etc.) in safe custody. This must be by personal retention in plastic document wallets which are secured in such a way so that they cannot be access by anyone other than the recipient.