National Grid UK Electricity Transmission plc

Uncontrolled when printed

NATIONAL SAFETY INSTRUCTION

NSI 1
OPERATIONAL AND SAFETY SWITCHING

DOCUMENT HISTORY

Issue	Date	Summary of Changes / Reason	Author(s)	Approved By (Title)
1	01/01/95			A L Bennett
2	01/10/05	Existing NSI 1, WE1000, SN-SR37 and WE1001 incorporated together and reformatted to UK BP standard.	N Lilley	SEPAG
3	01/12/05	Appendix 5 added to reflect 5.14 and requirements for quality of supply VT's in section 13.	N Lilley	SEPAG
4	05/10/09	New Guidance Document to follow 3rd edition Electricity Safety Rules layout. Safety bulletins, 22/2006, 32/2005, 26/2005, 155 incorporated.	NSI Working Group	Transmission SHE Manger Derek Bickers
5	29/03/10	Reviewed and amended in line with NSI 30.	NSI Review Group	Transmission SHE Manger Derek Bickers
6	04/04/11	Reviewed and amended – changes identified as shown in "Key Changes" and by yellow highlight.	NSI Review Group, SHE	Transmission SHE Manger Derek Bickers
7	02/04/12	Reviewed and amended – changes identified as shown in "Key Changes" and by yellow highlight.	NSI Review Group, SHE	Head of UK Safety Derek Bickers

KEY CHANGES

Section	Amendments
7.1	Removal of words "with Operational Authority OA1" from end of sentence.
Appendix B & Appendix C	Addition of Disconnecting Circuit Breaker and addition of instructions 19 and 20 for 3 position switches.
Appendix D	Removal of OHL Colours and Safety Record Card abbreviations. Addition of new abbreviations

OPERATIONAL AND SAFETY SWITCHING

CONTENTS

1 Purpose and Scope

This National Safety Instruction National applies the principles established by the Safety Rules, when carrying out operational and safety *Switching* operations on **Equipment**.

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

- The requirements of the **Control Person(s)** 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

The term isolator also includes disconnectors.

Switching for the purpose of site routines on **LV** and Mechanical **Equipment** is not subject to the requirements of this NSI and shall be covered by site specific RAMS.

Safety *Switching* associated with a 25-0-25 kV railway connection circuits shall be carried out by a **Senior Authorised Person** authorised to a G3 procedure until NSI 26 – 'Achieving Safety at Railway Connection Sites' is issued.

2 Definitions

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

Title	Definition	
Switching	Being one of the following:	
	Operational Switching	Operation of **Equipment** under the instructions of a **Control Person (Operation)** to ensure safe operation of the **System**.
	Safety Switching	Operation of **Equipment** under the instructions of a **Control Person (Safety)** to achieve **Safety from the System**.

3 Preparation for Switching

3.1 When *Switching* on **HV Equipment** the identification shall be as shown on the appropriate Operations Diagram.

3.2 All *Switching*, except for emergency, shall be carried out to the instructions of the appropriate **Control Person(s)**.

3.3 Before issuing *Switching* instructions, the **Control Person(s)** shall:

- Consult with the **Control Person(s)** of other **System(s)** that may be affected by the proposed *Switching*.
- Ensure **HV Equipment** is not showing "Do Not Believe Indication" status due to **Isolated** indication supplies

3.4 *Switching* instructions shall be given direct to an **Authorised Person**, except when:

a. Operating non interlocked **Equipment** from the local position
b. Defeating the function of interlocks
c. Application / removal of portable **Primary Earth(s)**

In these cases the *Switching* instruction shall be given direct to a **Senior Authorised Person.** When not in a zone created by **Point(s) of Isolation** the **Senior Authorised Person** shall be authorised to Operational Authority OA1.

3.5 The standard *Switching* Log Book shall where reasonably practicable be used. A new *Switching* sheet shall be used for each new set of instructions.

3.6 When *Switching* is carried out by a **Person** under training, he shall be under **Personal Supervision** of an **Authorised Person**.

3.7 When *Switching* instructions are issued by an individual under training, he shall be under **Personal Supervision** of a **Control Person**.

4 High Voltage Switching – Other than for Emergency Purposes

4.1 **HV** *Switching* instructions shall be recorded. All recorded entries shall be written legibly and indelibly. *Switching* Instructions involving **Point(s) of Isolation** and **Primary Earth(s)** shall not be given on the same instruction, except in special circumstances.

4.2 **HV** *Switching* instructions shall be given to the appropriate recipient in two parts:-

a An informal pre-amble between the **Control Person** and the recipient of the *Switching* instruction

Followed by:

b Formal written instruction

4.3 The recipient of the *Switching* instruction shall fully understand the content of the instruction before proceeding. The *Switching* instruction shall then be carried out without delay.

4.4 On completion of the application of safety precautions under the instructions of a **Control Person (Safety)** the recipient of the **HV** *Switching* instruction shall secure the **Safety Key(s)** inside a **Key Safe**.

The **Key Safe** shall be **Locked** and a **Key Safe Key** secured in safe custody by being placed inside the Operational Key Cabinet.

On restoration of safety precautions under the instructions of a **Control Person (Safety)** the recipient of the **HV** *Switching* instruction shall return the **Key Safe Key** to the **Key Safe** and **Safety Key(s)** to the Operational Key Cabinet.

4.5 On completion of the **HV** *Switching* the recipient shall confirm to the appropriate **Control Person(s)** that the *Switching* instruction has been completed.

4.6 When safety precautions have **Point(s) of Isolation** dependent on SF_6 the **Control Person (Safety)** will identify the Gas Zone containing the **Point(s) of Isolation** and the associated gas zone monitoring alarms.

5 High Voltage Switching – Emergency and Fault Conditions

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

5.2 Where **HV** *Switching* has taken place under emergency conditions and without instruction from a **Control Person(s)**, the **Authorised Person** shall inform the appropriate **Control Person(s)** as soon as possible after the operation.

5.3 When **Equipment** trips under fault conditions the **Authorised Person** shall record all **Equipment** operations.

Before trip relays are reset by a **Control Person (Operation)** using telecommand a **Senior Authorised Person** shall be consulted.

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

6 Low Voltage and Mechanical Switching

6.1 Not withstanding the requirements of Section 6.2, *Switching* for **LV** and Mechanical **Equipment** shall be carried out in accordance with the principles specified in Section 4 and Section 5.

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

7 Defeating the Function of Interlocks

7.1 The **Control Person(s)** shall give a *Switching* instruction to render interlocks inoperative direct to a **Senior Authorised Person**.

7.2 When not within a zone established by **Point(s) of Isolation**, in addition to 7.1 above, the **Senior Authorised Person** shall be authorised to OA1 and a separate *Switching* instruction shall be given to an **Authorised Person** who has Operational Authority OA2 to accompany and check the OA1.

8 Operation of Non-Interlocked Equipment from the Local Control Point

8.1 The **Control Person(s)** shall give a *Switching* instruction to operate non-interlocked **Equipment** from the Local Control Point direct to a **Senior Authorised Person** with Operational Authority OA1.

8.2 When not in a zone created by **Point(s) of Isolation** the instruction shall be given to a **Senior Authorised Person** with Operational Authority OA1. A separate *Switching* instruction shall be given to an **Authorised Person** who has Operational Authority OA2 to accompany and check the OA1.

9 Operation of Non-Interlocked Equipment from the Substation or Remote Control Point

9.1 The **Control Person(s)** shall give a *Switching* instruction to operate non-interlocked **Equipment** from the Substation Control Point direct to an **Authorised Person** with Operational Authority OA2.

9.2 Prior to the operation of non-interlocked **Equipment**, via telecommand under the direct control of a **Control Person(s)**, the **Control Person(s)** shall confirm with a second **Control Person(s)** the correct configuration of the substation.

10 Point(s) of Isolation on HAM VTCT Units and Resistor Capacitor Dividers

10.1 Under normal conditions **Danger** will not arise and therefore safety precautions are not required.

11 Point(s) of Isolation on Metal Clad Withdrawable Voltage Transformers

11.1 **Point(s) of Isolation** shall be established on VTs by either:

a. VT spout shutters **Locked** shut and a **Caution Notice** attached.

or

b. A fully rated circuit breaker which is designed to earth the circuit via the VT spouts and can be **Locked** in the feeder earth position. A **Caution Notice** shall be attached to the circuit breaker locking bar or equivalent.

Appendix A – Standard Switching Log Book and Example Switching Instruction

Date	Message Sent by	Time of Message	Message		Message Received by	Time of Operation	98/119288
			At Location	Operation/Instruction			
10/06/08	MICK BROWN	15.30	Berkswell	On Bus Section 4			
			275 kV S/S	O.L.C. Isolator S48			
				OPEN Isolator S44			
				On Bus Section 3			
				O.L.C. Isolator S 34			
				OPEN Isolator S 38			
				ON MESH CORNER 4			
				OPEN Isolator S46			
				Isolate and Caution 275kV			
				C.V.T. Secondary Supplies.			
				Isolate and Caution 275kV			
				wound V.T. Secondary Supplies.	SIMON ATKIN		

Appendix B – 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.

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

* Delete as appropriate

** Delete "to charge" or "to discharge" when quoting an isolator

INSTRUCTION 1 ON (-----) CIRCUIT CHECK SYNC ON CIRCUIT BREAKER (-----)

ACTION Check all synchronising conditions and report back

INSTRUCTION 2 ON (-----) CIRCUIT CHECK SYNC AND CLOSE CIRCUIT BREAKER (-----) TO LOAD

ACTION Close circuit breaker using synchronising facilities and report action with load on circuit and amps on each phase if possible

INSTRUCTION 3 ON (-----) CIRCUIT CLOSE CIRCUIT BREAKER / ISOLATOR/DISCONNECTING CIRCUIT BREAKER* (-----) TO CHARGE**

ACTION Close circuit breaker/isolator using synchronising override if necessary and report back actions with charging current on each phase if appropriate

INSTRUCTION 4 ON (-----) CIRCUIT MANUALLY OVERRIDE SYNC AND CLOSE CIRCUIT BREAKER (-----) TO LOAD/CHARGE*

ACTION Use sync override facility and close circuit breaker, report back action with load on circuit and amps on each phase if possible

INSTRUCTION 5 ON (-----) CIRCUIT OPEN CIRCUIT BREAKER (-----) TO OFFLOAD

ACTION Open circuit breaker

INSTRUCTION 6 ON (-----) CIRCUIT CHECK LOAD

ACTION Check MW, MVAr and AMPS on each phase, if possible, and report back readings

INSTRUCTION 7 ON (-----) CIRCUIT CHECK NO LOAD AND OPEN CIRCUIT BREAKER/ISOLATOR/DISCONNECTING CIRCUIT BREAKER* (----) TO DISCHARGE**

ACTION 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.

INSTRUCTION 8 ON (-----) CIRCUIT OPEN CIRCUIT BREAKER/ISOLATOR /DISCONNECTING CIRCUIT BREAKER* (-----) TO DISCHARGE**

ACTION Open circuit breaker/isolator

INSTRUCTION 9 ON (-----) CIRCUIT OPEN CIRCUIT BREAKER (-----) TO OFFLOAD/DISCHARGE* AND CHECK (-----) OPENS SEQUENTIALLY

ACTION Open circuit breaker and check sequential isolator opens

INSTRUCTION 10 ON (-----) CIRCUIT SELECT TO TEST/SWITCH* IN/OUT* FIRST/SECOND* MAIN PROTECTION/INTERTRIPPING* DAR*

ACTION Select control switch to instructed position

INSTRUCTION 11 ON SGT (-----) TAP FROM POSITION (-----) TO (-----) TO RAISE/LOWER* VOLTS

ACTION Operate tap changer control to move tap position as instructed

INSTRUCTION 12 ON SGTs (-----) TAP TO MAINTAIN TARGET VOLTAGE OF (-----) kV

ACTION Maintain target volts

INSTRUCTION 13 ON (-----) CIRCUIT ON LOAD CHANGE OVER CLOSE ISOLATOR/DISCONNECTING CIRCUIT BREAKER (-----) OPEN ISOLATOR/DISCONNECTING CIRCUIT BREAKER (-----)

ACTION The **Control Person (Operation)** shall check that an electrical parallel path exists between the busbars on the circuit concerned. This information shall be conveyed to the **Authorised Person** in the pre-amble who shall where practicable, visually check that the electrical parallel path exists prior to carrying out the **HV** *Switching* instruction. At the end of the **HV** *Switching* Instruction the **Authorised Person** may also be requested to check and confirm that the busbar is clear of all circuits.

INSTRUCTION 14 ON (-----) CIRCUIT OFF LOAD CHANGE OVER OPEN ISOLATOR/DISCONNECTING CIRCUIT BREAKER (-----) CLOSE ISOLATOR/DISCONNECTING CIRCUIT BREAKER (-----)

ACTION Check that the circuit breaker on the circuit concerned is open and then carry out the **HV** *Switching* instruction

INSTRUCTION 15 ON (-----) CIRCUIT CHECK DAR IS SWITCHED OUT OF SERVICE INHIBIT AND CAUTION

ACTION Check that the DAR is out of service and lock in/out switch in out position and caution (requirement for live line)

INSTRUCTION 16 ON **(-----)** CIRCUIT SWITCH OFF THE POWER LINE CARRIER INTERTRIPPING*/REL352*/TC-10B*/BLOCKING* EQUIPMENT

ACTION Equipment powered down

INSTRUCTION 17 ON (-----) CIRCUIT DISSIPATE TRAPPED CHARGE
CHECK OPEN ISOLATORS (-----)
CLOSE EARTH SWITCH (-----) TO DISSAPATE TRAPPED CHARGE
OPEN EARTH SWITCH (-----)

ACTION Where reasonably practicable physically check that all **Live** side isolators are open to confirm an **Isolated** zone has been established. Consideration shall also be given to any relevant Technical Limitations applicable to the fixed **Earthing Device(s)**. Close and then open earth switch.

INSTRUCTION 18 ON SGT (-----) CIRCUIT SELECT SUPERGRID (-----) CB TO MAINTENANCE POSITION, LOCK BUSBAR AND FEEDER SHUTTERS

ACTION Instruction to allow trip testing. There is no need to isolate the VT from the service position

INSTRUCTION 19 ON (-----) CIRCUIT OPERATE AS REQUIRED / TAKE OPERATIONAL CONTROL* (-----)

ACTION To allow any maintenance, fault investigation or commissioning etc. as required. When taking operational control the relevant **HV Equipment** shall be selected to either the substation control point or the local control point by the **Authorised Person**.

Appendix C – Safety Switching Instructions

To ensure all **HV** *Safety Switching* instructions are clear and unambiguous standard terminology shall be adopted.

Some transposition of words is permitted to achieve clear phraseology.

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

* Delete as appropriate

C1 FIXED ISOLATING DEVICES

INSTRUCTION 1	Open (or check open), lock and caution Isolator/Disconnecting Circuit Breaker* (-----)
ENTRY ON SAFETY DOCUMENT	(-----)
ENTRY ON RISSP	(-----) Open and **Locked** (**Caution Notice(s)** affixed where not pre-printed)

The **Authorised Person** should for:

(1) Manually Operated Isolators

After opening the isolator, return the handle to the inoperative position, 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) Manually Operated Soule Disconnectors

After opening the disconnector, remove the Lockout Key and place it inside the mechanism box. Secure the mechanism box door closed with a safety lock and attach a **Caution Notice**, identify the **Safety Key(s)** and place it in a **Key Safe**.

(3) Motorised Isolators or Disconnectors

(3.1) Where access to the compartment is not required after safety precautions have been established.

Remove motor supply fuses and links or place miniature circuit breakers (MCB's) into the open position. Fuses and links shall be placed within the compartment.

Where a lockout or equivalent key is provided remove the lockout or equivalent key and place it in the compartment.

If no lockout or equivalent key is provided then the magnetic bolt interlock fuses and links shall be removed or place MCB's into the open position. Fuses and links shall be placed in the compartment with the motor supply fuses and links.

All compartment doors containing removed fuses, links or open MCB's shall be secured with a unique lock and **Caution Notice(s)** attached. Where this action would trap any remaining interlock keys these keys shall be removed to safe custody before securing the compartment door(s).

Where an inner door can secure access to the removed motor supply fuses links or open MCB's, only the inner door needs to be **Locked** and **Caution Notice(s)** attached**.**

Where other doors permit the removed lockout key or motor supply fuses and links or open MCB's to be reached then these doors shall also be locked closed with a safety lock and **Caution Notice(s)** attached.

Identify the **Safety Key(s)** and place them in a **Key Safe**.

Note:- Where MCB's are not located within a compartment they shall be secured with a unique lock and **Caution Notice** attached. The **Safety Key(s)** shall be secured in a **Key Safe**.

(3.2) Where access to the compartment is required after safety precautions are applied.

Remove motor supply fuses and links from the holders or place MCB's into the open position and attach a **Caution Notice**.

Where a Lockout or equivalent key is provided remove the Lockout or equivalent key. If no Lockout or equivalent key is provided then the magnetic bolt interlock fuses and links shall be removed or MCB's opened and **Caution Notice(s)** attached.

Place the fuses, links, Lockout Key and **Safety Key(s)** (including MCB **Safety Key(s)**) in a **Key Safe**.

If the design of the isolator is such that they are electronically interlocked e.g. SF_6 GIS **Equipment** then the **Equipment** should be **Isolated** in line with the 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 **Point(s) of Isolation** shall be applied.

INSTRUCTION 2 Render Operative Isolator/Disconnecting Circuit Breaker* (-----)

The **Authorised Person** should 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.

C2 VOLTAGE TRANSFORMERS (Excluding Metal-Clad)

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 NOC shall be contacted prior to the work being started to establish and agree an **LV** RISSP between both parties.

INSTRUCTION 3	Isolate and Caution (-----) VT Secondary Supplies
ENTRY ON SAFETY DOCUMENT	(-----) VT Secondary Supplies
ENTRY OF RISSP	(-----) VT Secondary Supplies **Isolated** (**Caution Notice(s)** affixed where not pre-printed)

Normal Isolation

The **Authorised Person** shall take one of the following actions:

(a) Where the VT Isolation link can be clearly identified.

- Remove the VT **LV** fuses and links from the holders within the VT fuse box as indicated on the label of the box cover or door
- Miniature circuit breakers (MCB's) shall be left in the closed position
- Retain fuses and links within the box, lock the appropriate cover or door and affix a **Caution Notice**

  or if the box can't be **Locked**

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

(b) Where there is no VT Isolation link or it cannot be clearly identified.

- Remove the VT **LV** fuses and links from the holders within the VT fuse box as indicated on the label of the box cover or door
- Miniature circuit breakers (MCB's) shall be placed into the open position
- Retain fuses and links within the box, lock the appropriate cover or door and affix a **Caution Notice**

  or if the box can't be **Locked**

  Affix caution tape to the fuse and link holders, lock off MCB's with a suitable locking device and remove the fuses and links to a **Key Safe**.

VT Isolation Where Work is Required in the VT Fuse Box

A **Senior Authorised Person** shall take the following action:

- Disconnect relevant VT **LV** wiring, fuse, links, MCB's, to create the same situation as removal of VT **LV** fuses, links, MCB's in the VT fuse box

- Affix caution tape to wiring, fuse and link holders and remove any fuse and links to a **Key Safe**, lock off any MCB's with a suitable locking device and affix a **Caution Notice**.

  Note: Disconnection of **LV** wiring to carried out in accordance with NSI 12

INSTRUCTION 4 Restore (-----) VT Secondary Supplies

The **Authorised Person** or **Senior Authorised Person** should reverse the precautions taken to isolate and caution (-----) VT Secondary Supplies, as detailed above.

C3 EARTHING AND/OR AUXILIARY TRANSFORMERS (Transformers providing supplies at **LV**)

INSTRUCTION 5	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 Notice(s)** affixed where not pre-printed)

The **Authorised Person** should 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 / open the **LV** isolating fuses at the transformer and lock the fuse box and affix a **Caution Notice**

INSTRUCTION 6 Restore (-----) Earthing and/or Auxiliary* Transformer Secondary Supplies

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

C4 METAL CLAD SWITCHGEAR

INSTRUCTION 7	Isolate (-----) Lock and Caution Busbar/Feeder/Cable/Transformer/VT/etc.* Shutters/Isolators etc.*
ENTRY ON SAFETY DOCUMENT	(-----) Busbar / Feeder / Cable / Transformer / VT / etc* Shutters/isolators
ENTRY ON RISSP	(-----) Busbar/Feeder/Cable/ Transformer/VT/etc* Shutters/Isolators* **Locked Closed and cautioned**

The **Authorised Person** should where possible:

(a) Rack out the circuit breaker/VT from the service position
(b) Check the busbar/feeder/VT shutters are shut and **Locked** in position
(b) Affix a **Caution Notice**

INSTRUCTION 8	Restore (-----) to service position on Main Busbar / Front Busbar etc.*

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

C5 FIXED EARTHING DEVICES

INSTRUCTION 9	Close/Apply and Lock* Earth Switch/Maintenance Earth/Fixed **Earthing Device*** (-----)
ENTRY ON SAFETY DOCUMENT	(-----)
ENTRY ON RISSP	(-----) Closed/Applied* and **Locked***

The **Authorised Person** should:

(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 and place key in a **Key Safe**

(d) Immobilise electrical drives by removing fuse / links and / or open MCB's and lock. Secure fuse, links and MCB key in a **Key Safe**

INSTRUCTION 10 Open/Remove* Earth Switch/Maintenance Earth/Fixed **Earthing Device*** (-----)

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

C6 EARTHING VIA METAL CLAD SWITCHGEAR

INSTRUCTION 11	Select Circuit Breaker (-----) to Busbar / Feeder / Cable / Transformer etc.* earth position via Busbar/Feeder/Cable/VT spouts etc* and close to earth
ENTRY ON SAFETY DOCUMENT	(-----) in Busbar / Feeder / Cable / Transformer etc.* Earth Position via Busbar/Feeder/cable/VT spouts etc*
ENTRY ON RISSP	(-----) Closed and **Locked** in Busbar / Feeder / Cable / Transformer etc* Earth Position via Busbar/Feeder/Cable/VT spouts etc*

The **Authorised Person** should where possible:

(a) Remove the relevant lock **Caution Notice** from the Busbar/Feeder/Cable/VT etc* shutters
(b) Rack in the circuit breaker to the relevant earth position and close to earth
(c) Re-attach **Caution Notice** to the circuit breaker locking bar or equivalent

Note:
When the Circuit Breaker is selected to Feeder earth position via the VT Spouts it serves the purpose of both a **Primary earth** and a **Point of Isolation.** This shall be quoted on all **Safety Documents** when a **Point of Isolation** is required on the VT.

INSTRUCTION 12	Open and remove (-----) from the Busbar / Feeder/Cable/ Voltage Transformer etc.* Earth Position

The **Authorised Person** should where possible:

(a) Reverse the actions taken for the instruction to close Circuit Breaker (-----) to Busbar/Feeder/Cable/Voltage Transformer etc.* earth position and close to earth
(b) Re-attach the **Caution Notice** to the Busbar/Feeder/Cable/VT etc* shutters

C7 EARTHING VIA PORTABLE EARTHING DEVICES

INSTRUCTION 13	Apply (---) earths per phase/sub-conductor* (description of position)
ENTRY ON SAFETY DOCUMENT	Description of position
ENTRY ON RISSP	Earths applied (description of position)

The **Senior Authorised Person** shall ensure the portable earths are applied in accordance with National Safety Instruction No. 2.

INSTRUCTION 14	Remove earths (description of position)

The **Senior Authorised Person** shall ensure all portable earths are removed in accordance with National Safety Instruction No. 2.

C8 EARTHING VIA METAL CLAD SWITCHGEAR MOVEABLE EARTHS

INSTRUCTION 15	Apply Metal clad Switchgear Moveable Earths to (-----) Busbar/Feeder/Cable/VT spouts etc*
ENTRY ON SAFETY DOCUMENT	Description of position
ENTRY ON RISSP	Earths applied (description of position)

The **Senior Authorised Person** should where possible:

(a) Remove the relevant lock **Caution Notice** from the Busbar/Feeder/Cable/VT etc* shutters
(b) Confirm spouts are not **Live** by the use of a Potential Indicator. Refer to NSI 3.
(c) Apply Metal clad Switchgear Movable earths to the spouts

INSTRUCTION 16	Remove Metal clad Switchgear Moveable Earths from (-----) Busbar/Feeder/Cable/VT spouts etc*

The **Senior Authorised Person** should where possible:

(a) Remove Metal clad Switchgear Moveable Earths
(b) Reattach the lock and **Caution Notice** to the Busbar/Feeder/Cable/VT etc* shutters

C9 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.

Technical Guidance note TGN(E) 210 identifies the GIS disconnectors and earthing switches, for which the position indicating devices have been demonstrated to fulfil the requirements for reliable indication and those for which the contact position shall be checked by means of windows. The satisfactory completion of each switching operation shall be checked by all means readily available.

3 position GIS switchgear with telecommand functionality

INSTRUCTION 17	Check Isolator (----) open and earth switch (----) selected to earth position lock and caution
ENTRY ON SAFETY DOCUMENT	(-----)
ENTRY ON RISSP	(-----) Open and **Locked** (**Caution Notice(s)** affixed where not pre-printed) (-----) Closed and **Locked**

The **Authorised Person** shall follow any Local Procedure held on site due to site related differences.

INSTRUCTION 18	Render Operative Isolator (-----) and earth switch (----)

The **Authorised Person** should 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.

3 position GIS switchgear without telecommand functionality

INSTRUCTION 19	Close and Lock Earthing Device (----) and confirm open, lock and caution isolator (----)
ENTRY ON SAFETY DOCUMENT	(-----)
ENTRY ON RISSP	(-----) Open and **Locked** (**Caution Notice(s)** affixed where not pre-printed) (-----) Closed and **Locked**

The **Authorised Person** shall follow any Local Procedure held on site due to site related differences.

INSTRUCTION 20	Render Operative Isolator (-----) and open earthing device (----)

The **Authorised Person** should 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.

Appendix D – Standard Terminology for Switching Abreviations

Location names can be abbreviated to the 4 letter site code as per TP 169 on the *Switching* instruction.

ADJ	Adjacent
ABCB	Air Blast Circuit Breaker
AC	Alternating Current
AUX T	Auxiliary Transformer
AUX/ETX	Auxiliary and Earthing Transformer
BET	Between
BB	Busbar
BC	Bus Coupler
BS	Bus Section
CS	Check Sync
CNL	Check no Load
CSE	Cable Sealing Ends
CAP	Capacitor
CVT	Capacitor Voltage Transformer
C02	Carbon Dioxide
CLLVW	Certificate for Live LV Work
COLC	Check Open Lock and Caution
CCT	Circuit
CB	Circuit Breaker
CONN	Connections
CT	Current Transformer
COMP T	Compensator Transformer
DAR	Delayed Auto Reclose
DC	Direct Current
DCB	Disconnecting Circuit Breaker
DISC	Disconnector
DS	Disconnection
E SW	Earth Switch
ET	Earthing Transformer
ED	Earthing Device associated with isolator/disconnector
FED	Fixed Earthing Device
FME	Fixed Maintenance Earth
GCB	Gas Circuit Breaker
GIS	Gas Insulated Switchgear
GEN	Generator
GEN T	Generator Transformer
GRID T	Grid Transformer
HV	High Voltage
INST	Instantaneous
I/CON	Interconnector
IGDD	Isolation Gas Density Dependent
IND	Inductor
ISOL	Isolator
I/T	Intertrip
JUNC	Junction
KV	Kilo Volt
LAC	Limited Access Certificate
LLWC	Live Line Working Certificate
(L)NER	(Liquid) Neutral Earthing Resistor
LV	Low Voltage
MBB	Main Busbar
MC	Mesh Corner

MOS	Manual Override Sync
MPR	Multiple Permit Record
MSC	Mechanically Switched Capacitor
NCT	Neutral Current Transformer
No.	Number
OCB	Oil Circuit Breaker
OLC	Open Lock and Caution
OAR	Operate as Required
OOC	Out of Commission
OH	Overhead
OHL	Overhead Line
PFW	Permit for Work
PH	Phase
PMED	Portable Maintenance Earthing Device
PPE	Portable Primary Earths
PSI	Pounds per Square Inch
PE	Primary Earth
QB	Quadrature Booster
RISSP	Record of Inter-System Safety Precautions
RO	Render Operative
RES	Reserve
RBB	Reserve Busbar
RCT	Reactor
RSVC	Relocatable Static Var Compensator
SFW	Sanction for Work
SE	Sealing End
SS	Secondary Supplies
SECT	Section
SAP	Senior Authorised Person
SEQ	Sequential
S/BY	Standby
SVC	Static VAR Compensator
STN T	Station Transformer
S/S	Substation
SF6	Sulphur Hexafluoride
SGT	Super Grid Transformer
SW DISC	Switch Disconnector
SW ISOL	Switching Isolator
SCT	Synchronous Compensator Transformer
SYNCH COMP	Synchronous Compensator
T	Transformer
TL	Technical Limitation
TSC	Thyristor Switched Capacitor
TSR	Thyristor Switched Reactor
VT	Voltage Transformer
VT/CT	Combined Voltage/Current Transformer
WVT	Wound VT
1 MP	1st Main Protection
2 MP	2nd Main Protection

Appendix E – Safety Notices

Figure E1 – Caution Notice

Appendix F – Key Safe Contents Card

National Grid **KEY SAFE CONTENTS CARD** **KEY SAFE NUMBER:** _____ **CIRCUIT:** _____			
Key A …….....		**Key B** ……..	
Key C		**Key D**	
Key E …….		**Key F** ……...	
Key G …….		…….	
Key Safe Contents			
Signed ……..			
Print Name ……..		Date …….	