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Model Switching Programme

Nationalgrid
Commissioning
Handbook
Procedure

CH 2
Issue 2
February 2011

Authorised for Issue by: K. Harker

Issue No	Author	Approved By	Details of Change	Date
1	K.Harker	H.Habibollahi	Original	August 1998
2	M.D.Tait	K.Harker	Modified in accordance with format change as per TP106 & TP106A combined	February 2011

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Purpose

- 1.1 The purpose of this document is to give guidance when producing Commissioning Switching Programmes (C.S.P.)
- 1.2 An example of a C.S.P is enclosed in Appendix 1 for reference.

General Guidance

2.1

A Commissioning Switching Programme (CSP) is an approved procedure which defines the strategy and methodology for Stage 2 energisation and commissioning of all new HV equipment, covered by TP106. All such programmes must be rigorously adhered to, without deviation, unless such deviations are jointly agreed by the Supplier Commissioning Engineer, National Grid Commissioning Engineer and Network Operations.

The CSP specifies the step by step process of how new **HV equipment** is to be energised and placed on load, and identifies the operational switching necessary to allow the required commissioning tests to be carried out. A CSP may make reference to a Commissioning Method Statement within it.

For all works not covered by TP106, it is good practice to have a CSP, or an approved method statement when energising new equipment for the first time, however simple, as this will ensure safe and secure commissioning. However, if it is deemed by the MDE responsible for such work that the above are not required, then the following criteria as a minimum should be addressed:

- The commissioning methodology must be risk assessed
- The new equipment is adequately protected by a fast acting protection
- All personnel must be clear of the new equipment prior to energisation
- All automatic switching equipment and automatic insulator washing equipment should be switched out of service

ENCC may request confirmation from the responsible MDE prior to energisation of new equipment, that the above criteria have been addressed.

2.2

In line with TP141 Authorisation Requirements the C.S.P author must have attended the two day C.S.P. course.

General guidance for authors of C.S.P is that they must be familiar with, and meet all the requirements, of the Commissioning strategy which has been agreed by the Commissioning Panel. They shall be familiar with the project/work including any Emergency Return To Service issues, and how the C.S.P impacts/interfaces on Site, and if there are any third party issues or interfaces, e.g. DNO's or GenCo's. It is recommended that attendance at Commission Panel meetings is essential where production of the C.S.P is being discussed, and also attendance at Site to ensure familiarisation is carried out.

The author shall refer to the Commissioning Programme as per CH1 and all technical aspects as described in the DID.

The following points shall be considered when producing the C.S.P

- Identify scope of works and any stage by stage commissioning requirements.
- Identify equipment to be energised for the first time.
- Identify any unproven equipment and/or protection.
- The step by step charging sequences.
- At all times all steps must be covered by a proven protection and CB.

- Risks of trip requirement and any other/additional outage requirements, including busbars and/or adjacent circuits.
- Circuit switching restrictions –refer to Network Operations Procedure NOBP 1826 (Switching Overvoltages).
- Phasing out requirement, and any risk of trip requirement to carry out those tests.
- Load level requirements for on load protection readings and metering – it is generally considered that load levels of 10% - 15% or as advised by the P and C Design Engineer.
- Identify and stipulate any live automatic switching tests.
- Identify the Substation normal running arrangements, and how the System requires setting up to carry out the switching as identified in the C.S.P.
- Third party considerations/involvement/signatory requirement – any DNO, Generator Companies or other third parties signatories will be advised by the Network Operations Commissioning Panel representative.
- Production of comments log – see example.

Comments Log For Commissioning Switching Programme			No:
Date	Comment	Action	Date Action Cleared

2.3

The Commissioning Engineer (Supplier) shall be responsible for producing the first draft of the C.S.P to the timescales as given in Appendix P of TP106, and shall circulate the C.S.P to Commissioning Engineer (National Grid), Network Operations Transmission Requirements Manager, and any third party as advised by the Network Ops Representative on the Commissioning Panel.

2.4

It is good custom and practice when writing the CSP that copies of the relevant single line diagrams, or Operation Diagrams, are available such that as the switching sequence progresses the author can tick/record the position of HV equipment as necessary. These marked diagrams could then be attached, but not included, in the CSP for reference purposes.

3. Commissioning Switching Programme Front Sheet

NATIONAL GRID

Programme N° _____

Scheme Title :

Scheme Number :

TOGA Number :

Location :

Equipment :

Date of Tests :

Prepared by :

APPROVED BY: COMMISSIONING OFFICER (National Grid)

Signed: _____ Date: _____

APPROVED BY: COMMISSIONING ENGINEER (National Grid)

Signed: _____ Date: _____

APPROVED BY: COMMISSIONING ENGINEER (Supplier)

Signed: _____ Date: _____

APPROVED BY: TRANSMISSION REQUIREMENTS MANAGER – Network Operations

Signed: _____ Date: _____

PERSONNEL NOMINATED TO AGREE POST-APPROVAL CHANGES

Asset Management (Maintenance Delivery Electricity)	Network Operations (Transmission Despatch Engineer)	Supplier

Distribution: 1 Transmission Requirements Manager (ENCC) (FAO)
2 Commissioning Engineer (National Grid).....)
3 Commissioning Engineer (Supplier).....)
4 Other Parties (FAO.....)

4. COMMISSIONING SWITCHING PROGRAMME FORMAT

Commissioning switching programmes shall adhere to the following categories and format:

(NB: Some switching programmes may not require the full detail specified in each category).

F1 Purpose of the Switching Programme

- (a) Briefly describe the purpose of the project.
- (b) List the **Equipment** to be commissioned.
- (c) Briefly list the key stages of the Commissioning Switching Programme.
- (d) List any risk assessments carried out for addressing SHES hazards.

F2 Diagrams

List the Operations or other diagrams to be worked to whilst executing the Commissioning Switching Programme.

F3 Unproven Protection Equipment

- (a) List the protection **Equipment** to be commissioned and which may be required to operate whilst executing the Commissioning Switching Programme, but as a result of being unproven, cannot be relied upon to perform in the intended manner - and briefly state the corresponding zone that each respective item of **Equipment** protects.
- (b) Against each protection listed above, state the minimum load current to enable the on-load tests at the settings in use to be carried out. This should be provided by the Supplier at the first draft stage.

F4 Temporary Protection & Automatic Switching Arrangements

- (a) List the temporary protection, and any automatic switching arrangements which will be in force during the **Equipment** energisation and On-load test period.
- (b) State the temporary protection range of cover and fault clearance time(s). (To be obtained from the Commissioning Officer).
- (c) Identify points in the programme where there is unavoidable depletion of protection. Identify the back-up protection which may operate and the estimated fault clearance time.
- (d) Confirm that both Asset Management and Network Operations are in possession of any temporary protection setting sheets (including rating and protection schedules if, exceptionally, they are required). Confirm that settings have been applied, to the temporary protection: this may alternatively be carried out in Section 9 of the Switching programme.

F5 Personnel

List the names of personnel participating in the tests on the day with a brief statement of their respective roles and responsibilities including Users and Customers where applicable.

NB: Some names may be entered on the day.

F6 Communications

List pertinent telephone numbers

NB: These may be entered on the day.

F7 Documentation

Confirm to Network Operations that all commissioning certificates, and safety and testing documentation is complete.

F8 Initial Conditions

- (a) Confirm that the Stage 1 Settings Load Acceptance test has been satisfactorily completed.
- (b) The responsibilities for circuit has been handed over from Network Operation Centre (NOC) to Network Operations.
- (c) Confirm the status of disconnectors on indications board or SCP.
- (d) Confirm the status of all circuit breakers (check on indication board or SCP).
- (e) Confirm the status of all alarms. (Check on indication board or SCP).
- (f) Confirm the transformer tap position, and the position of any other **Equipment** which has a range selector. (Check on indication board or SCP).
- (g) Confirm the state of protection **Equipment**. A circuit is usually energised with all protection normal and in service.
- (h) Confirm that auto switching/reclose and Automatic Voltage Control (AVC) **Equipment** is switched out of service. A circuit is usually energised with these items out of service.
- (i) Confirm that all settings sheets have been signed and returned to the Construction Settings Administrator.
- (j) Confirm that all circuit Rating Schedules and protection and DAR schedules have been issued.

F9 Equipment Energisation and On-load Commissioning Test

The following should be stated in the Contents Sheet:

- (a) The stated switching sequence.
- (b) Clearly state when an item of **Equipment** is being energised for the first time.
- (c) Clearly state the locations at which phasing - tests will take place.
- (d) Clearly state the locations at which check synchronisation close of circuit breakers will take place.
- (e) Itemise any checks to be carried out on **High Voltage Equipment**.

- (f) Itemise On-load tests to be carried out.
 - (i) Verification of CT ratios and connection to appropriate **Equipment**;
 - (ii) Verification of metering direction and magnitude, and that all remote end values agree;
 - (iii) Verification of protection polarity/stability;
 - (iv) Verification VT connections to appropriate **Equipment**;
 - (g) State sequence of events required to disable any temporary protection.
- NB: (1) At the end of each On-load test it shall be confirmed that CT test links and relay settings are returned to normal.
- (2) The final statement of the Commissioning Switching Programme shall be confirmation that all CT test links and relay settings are returned to normal.

F10 Restoration

- (a) Reconfigure the Power **System** to Network Operations's requirements.
- (b) Confirm the status of all **Equipment** at the end of the tests.
 - (i) All protection switched into service;
 - (ii) Temporary protection **Systems** disabled;
 - (iii) All relay settings normal.

F11 On-load Auto Switching/Reclose Tests

- (a) These should be carried out in accordance with a schedule of such tests. The form should closely accord with that of the DAR schedule.
- (b) The schedule should specify:
 - (i) The starting conditions;
 - (ii) The type of test to be simulated;
 - (iii) The protection to be ;
 - (iv) The circuit breakers which trip and reclose; any disconnectors that open;
 - (v) Point at which trip relays reset;
 - (vi) Protection and DAR schedule (specifying the sequence timing).

F12 AVC or Other Automatic Equipment Tests

- (a) These should be carried out in accordance with a schedule of such tests.

Notes

- (1) If, to facilitate the On-load tests, the **Equipment** is required to be temporarily altered or changed in any way whatsoever, both the change and associated restoration shall be recorded.
- (2) Immediately prior to commencing the Commissioning Switching Programme the names or positions of those nominated to make essential modifications to the approved programme shall be entered on the front of the programme.

APPENDIX 1

COMMISSIONING SWITCHING PROGRAMME

SCHEME NUMBER AND TITLE : Heysham Ring Reinforcement 15398

TOPAM NO : 163137, 114996, 114995, 126006

TRANSMISSION AREA : Asset Management

LOCATION : Heysham 400kV Substation
Penwortham 400kV Substation
Hutton 400kV Substation

EQUIPMENT : Heysham – Hutton – Penwortham 1 circuit

DATE OF TESTS : 27th June 2008

PREPARED BY : S A Harrison

DATE : 6th May 2008

APPROVED BY: COMMISSIONING OFFICER (National Grid)

Signed: S.Terry Date: 23/05/08

APPROVED BY: COMMISSIONING ENGINEER (National Grid)

Signed: B.Jordan Date: 23/05/08
M.D.Tait 27/05/08
I.Mercer 03/06/08

APPROVED BY: COMMISSIONING ENGINEER (Alliance)

Signed: M..Calladine Date: 28/05/08

APPROVED BY: TRANSMISSION REQUIREMENTS MANAGER – Network Operations

Signed: K.Jones Date: 23/05/08

PERSONNEL NOMINATED TO AGREE POST-APPROVAL CHANGES:

Asset Management	Network Operations	SIEMENS STDL
Barry Jordan	Transmission Despatch/Control desk	Marc Calladine
Martyn Tait		

Distribution: 1 Transmission Requirements Manager (ENCC) FAO K.Jones
2 Commissioning Engineer (National Grid) Barry Jordan

Martyn Tait
Ian Mercer

Penwortham
Heysham
Hutton



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