

PROTECTION AND AUTOMATIC SWITCHING SCHEDULES

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PURPOSE AND SCOPE

Protection & Automatic Switching Schedules are a set of documents, which summarise the Protection and Automatic Switching arrangements fitted on National Grid's electricity transmission circuits.

This procedure defines the process for the preparation, amendment and issue of all Protection & Automatic Switching Schedules. It also defines the data which must be submitted to Market Operation detailing Operational Tripping Schemes.

PART 1 – PROCEDURAL

The overall process is detailed in Appendix A.

1 REQUIREMENTS

- 1.1** Protection and Automatic Switching Schedules are required for circuits under National Grid Ownership or Control for which National Grid has Operational responsibility, including:
- a) 400 kV and 275 kV Circuits.
 - b) 132 kV and lower voltage circuits which are owned and/or controlled by National Grid.
- 1.2** Protection schedules are not normally required for Supergrid Transformers (SGTs). There is however, a requirement in the following cases:
- a) Where SGTs interact with circuits on the Main Interconnected System.

- b) Where SGTs are included within automatic switching schemes.
- c) Where SGT protection zones encompass co-ordinating gaps.
- d) Where complicated tripping schemes are necessary due to equipment being connected to the tertiary or LV windings of SGTs. For example reactive or capacitive compensation equipment.
- e) Where SGTs have LV connections/feeder protections requiring off-site communications (e.g. normally associated with feeder unit protection)

1.3 New or Updated Schedules

The need for new or updated Protection and Automatic Switching Schedules is identified within the Design Intent Document (DID) for any particular project by the Contractor and agreed to by National Grid Capital Delivery Technical Assurance.

The Commissioning Panel Chairman also records the requirement for new or modified schedules in Attachment C of the Commissioning Panel Meeting minutes.

Requests for ad hoc changes should be forwarded to the Engineering Assurance Manager (Substations), along with the preferred timescales for resolution.

1.4 Timescales

The required timescales as stated in Appendix P of UKBP/TP106 are as follows:

- a) After contract award, in NDP stage 4.4 Execute Project the P & C Design Engineer (Assurance) should send the masters for any Protection and Automatic Switching Schedules that have been identified in the DID as requiring to be modified to the Contractor Design Approval Engineer (P & C).
- b) 20 WEEKS in advance of ENERGISATION date the Contractor Design Approval Engineer (P & C) submits the draft schedule to the P & C Design Engineer (Assurance) for review.
- c) 16 WEEKS in advance of ENERGISATION date the P & C Design Engineer (Assurance) passes any comments on the schedule to the Contractor Design Approval Engineer (P & C).
- d) 12 WEEKS in advance of ENERGISATION date the Contractor Design Approval Engineer (P & C) submits final version of schedule to the P & C Design Engineer (Assurance) who issues the final version to required recipients.
- e) 6 WEEKS in advance of ENERGISATION date Capital Delivery Engineering Assurance post Schedule on the National Grid Electricity Transmission Asset Management (ETAM) SharePoint site.
- f) 2 WEEKS in advance of ENERGISATION date Capital Delivery Engineering Assurance receive final schedule from Vodafone with an embedded Telecommunication Routes diagram and post it on National Grid ETAM SharePoint site.

1.5 Distribution

The protection schedules are distributed, in electronic form to the following recipients:

- a) Market Operation, Control Support & Review Manager.
- b) Market Operation, Online Modelling Manager, Control Systems Support.
- c) Electricity Transmission Asset Management, TNCC Manager.
- d) Capital Delivery, Technical Assurance Manager.
- e) Vodafone.

On receipt of a new schedule Capital Delivery Technical Assurance post the document on the National Grid ETAM SharePoint site to make it available to all relevant users.

It should be noted that Market Operation personnel are sent copies of the Protection Schedules so that they can print them out for retention in the event the National Grid Intranet is offline or access is not available.

The distribution form is detailed in Appendix D.

1.6 Management of 'Active' Schedules

The date shown in the header of each Protection and Automatic Switching Schedule indicates when it is applicable from. This is usually the energisation or the commissioning date of the circuit which is being constructed or modified.

If the circuit energisation date is re-scheduled or an outage is cancelled the relevant Commissioning Officer must notify all recipients of a Protection and Automatic Switching Schedule of the change. If a circuit outage has been cancelled or construction work significantly delayed Capital Delivery, Technical Assurance must withdraw the new schedule and re-publish the previous one.

Capital Delivery, Technical Assurance must also, on a monthly basis review the schedules published on the National Grid ETAM SharePoint site and remove any superseded ones.

1.7 Operational Tripping Schemes

A schedule is required for every Operational Tripping scheme. The format of the Operational Tripping Schedules is outlined in section 9 and Appendix C. The schedule should include:

- a) The Vodafone communication service references and routes.
- b) Details of the circuits being monitored.
- c) Details of the Generation/Circuits being tripped.

The timescales for submission of the Operational Tripping Schedules are as follows:

- a) After contract award, in NDP stage 4.4 Execute Project the P & C Design Engineer (Assurance) should send the masters for any Operational Tripping Schedules that have been identified in the DID as requiring modification to the Contractor Design Approval Engineer (P & C).
- b) 20 WEEKS in advance of ENERGISATION date the Contractor Design Approval Engineer (P & C) submits the draft schedule to the P & C Design Engineer (Assurance) & Technical Assurance Telecomms Co-ordinator for review.

- Prior to the commissioning of the Operational Tripping scheme Market Operation, Control Support & Review must also prepare a scheme description for inclusion within NGUK/MO/BP1818, Substation Automation - Operational Tripping Schemes.

Responsible for producing any new protection schedules and updating any existing ones as required in the agreed Design Intent Document for each project they are working on for National Grid.

3 FORMS AND RECORDS

UKBP/TP 124.01 Appendix B - Protection & Automatic Switching Schedule.

Form UKBP/TP124.01 Protection & Automatic Switching Schedules Issue Form.

3.1 Records Storage

The master protection schedules are held by Capital Delivery, Technical Assurance. They shall be produced in Microsoft Word format with the diagrams in Microsoft Visio 2010 format.

3.2 Booked Out Schedules

A record shall be kept of the date schedules are issued to Contractors for modification and when the updated schedules are returned. If a master schedule has been sent out to a Contractor it should be locked so that it cannot be updated by another party.

3.3 Telecommunication Routes Diagrams

The Protection Communication Services Diagrams are produced by Vodafone for each circuit on the MIS. A copy of each protection schedule issued is sent to Vodafone. They then insert the relevant telecommunication routes diagram into the schedule and return the complete document to Capital Delivery Technical Assurance for publication on the National Grid ETAM SharePoint site.

PART 2 – DEFINITIONS AND DOCUMENT HISTORY

4 DEFINITIONS

4.1 MARS – ECM Livelink

Multi Access Relay Schedules. National Grid's database of relay settings which forms the basis for maintaining an auditable source for protection relay settings as defined in UKBP/TP107.

4.2 MIS

Main Interconnected System '400kV and 275kV Electrical Transmission System'

5 AMENDMENTS RECORD

Issue	Date	Summary of Changes / Reasons	Author(s)	Approved By (Inc. Job Title)
4	December 2007	Revised to incorporate new National Grid organisational structures.	Alasdair Chamberlain Construction	Dave Poulton Electricity Construction Manager
5	July 2010	Revised to combine TP124 & TP124(A).	Alasdair Chamberlain Construction	Dave Mercer Major Projects Manager
6	April 2013	Document updated due to organisational change.	Alasdair Chamberlain Capital Delivery	Stephen Johnson
7	May 2014	Document updated due to organisational change.	Alasdair Chamberlain Capital Delivery Technical Assurance	Stephen Johnson Head of Business Planning, Integrity & Change
8	September 2015	Typos corrected. Details of notes for single switch substations and teed arrangements included in section 8.11.	Alasdair Chamberlain Capital Delivery Technical Assurance	Shaun Hughes Technical Assurance Manager

6 IMPLEMENTATION

6.1 Audience Awareness

Audience	Purpose Compliance (C) / Awareness (A)	Notification Method Memo / letter / fax / email / team brief / other (specify)
Capital Delivery, Contractors	C	Engineering Bulletin

6.2 Training Requirements

Training Needs N/A / Informal / Workshop / Formal Course	Training Target Date	Implementation Manager
N/A	N/A	N/A

6.3 Compliance

Compliance is assured by the UK/BPTP106 Commissioning Panels held for each relevant Capital Delivery scheme.

6.4 Procedure Review Date

Five years from the publication date.