

Ref:	NR/L3/ELP/27406/MOD K
Issue:	1
Date:	3 December 2011
Compliance date:	3 March 2012

Engineering Deliverable Requirements for Electrical Power Asset Design

Module K: Protection (DC & 3 phase)

1 Typical Protection (DC & 3 phase) Requirements

Only the appropriate items described in clauses 2 to 4 should be specified in the PRS along with the requirements identified in Module A. Additional requirements may be specified for complex or unusual schemes.

2 Protection (DC & 3 phase) Form A

The required items may be incorporated into the associated GRIP 3 option selection report instead of providing standalone deliverables. The level of detail for each item should only be sufficient to satisfy the approval in principle of single option selection.

a) Major Feeding Diagram.

Required for schemes introducing a new electrification system or amending existing feeding arrangements. A major feeding diagram produced at GRIP 3 in order to obtain approval in principle of single option selection may require updating at a later GRIP stage to reflect any scheme alterations.

A major feeding diagram commentary will be required to identify any new or modified feeding arrangements shown on the diagram and the rationale for those arrangements.

b) Protection Scheme Philosophy.

An existing protection scheme philosophy may need to be further developed at AIP.

c) Single Line Diagram.

A substation single line diagram showing all controlled elements (HV and DC) including manually operated disconnectors, isolators and switches, current and voltage transformers, rectifier transformers, rectifiers and converters. It should also show the interface with the DNO where applicable.

d) Scheme Functional Diagrams.

A supplementary written explanation on how interlocking between the various elements of a HV and DC switchboard will be achieved for each panel with inclusion of a system architecture drawing.

e) DNO Interface Requirements.

Identification of the specific requirements for interlocking and intertripping.

f) Data Communications.

Arrangement for transfer of data to SCADA RTU and for remote engineering access.

3 Protection (DC & 3 phase) Form B

a) Equipment Layout Drawings.

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- A layout drawing will be required where protection and control devices are in discrete enclosures.
- b) General Arrangement Drawings.
 - Drawings showing protection and control devices when mounted on primary plant or in their own discrete enclosures.
- c) Equipment Schematics & Wiring Diagrams.
 - Detailed equipment diagrams including circuit diagrams, wiring diagrams, termination diagrams.
- d) Substation Operations Diagrams.
 - Substation Operation diagrams showing all controlled elements (HV and DC), manually operated disconnectors, isolators and switches, current and voltage transformers, rectifier transformers, rectifiers and converters. It should also include the interfaces with the incoming HV supply from the DNO and electric track equipment (ETE) as applicable.
- e) Electrical Control Room Instructions.
 - Drafted text for Network Rail to update electrical control room instructions where required.
- f) Operating Instructions (user application and technical manuals).
- g) Verification of the suitability and acceptability of the various protection system elements and components including CT and VT characteristics including appropriate supporting calculations.
- h) Serial Data Schedules (for interfacing to SCADA equipment).
- i) Protection Setting Calculations.
 - This should include a full schedule of all settings to be applied.
- j) Intelligent Electronic Device configuration files.

4 Protection (DC & 3 phase) Form E

The following information is required to support the Protection (DC & 3 phase) Form E submission:

Parts 1 - 3: Entry Into Service

- a) As Builts (draft) – Protection (DC & 3 Phase) Specific.
 - IED configuration software files
 - Serial Data schedules (including SCADA interface)

The level of detail required will be agreed between the PE and CRE prior to entry into service.
- b) Test results

The list below identifies typical test results that may be required: