

Category 1 Standard

S1111 DC Protection and Commissioning

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1 Purpose

- 1.1 The purpose of this Standard is to define the requirements for the determination of protection settings and for the commissioning of d.c. protection systems to ensure that protection systems will function correctly for the conditions specified in this Standard.

2 Scope

- 2.1 This Standard applies to all nominal 630V d.c. and 750V d.c. circuits derived from traction substations. The d.c. Traction Supply system nominal voltage shall be 630V or 750V as defined in LU Standard 1-122 for the various Underground Lines, which includes the range of operating voltages to be expected. For the purposes of this standard, 'd.c. circuits' and 'd.c. protection' systems refer to these nominal voltages throughout this standard.
- 2.2 Excluded from the scope of this Standard is the calibration and maintenance of protection equipment.
- 2.3 This Standard applies to all new installations in its entirety and to existing installations where the necessary hardware exists to enable full compliance.

Note: Since this standard will be used to effectively determine statutory compliance for protection circuits, it is necessary to include full compliance where existing hardware is available to enable such compliance.

3 Requirements

3.1 General

- 3.1.1 This Standard shall be used to determine and verify d.c. protection settings. This Standard shall be applied when:
- a) new or alterations to existing d.c. protection or equipment is proposed;
 - b) alterations to feeding or operational configuration are proposed;
 - c) d.c. protection equipment is to be replaced or refurbished;
 - d) significant ETE replacement or alterations to the circuit are proposed;
 - e) the train service or traction rolling stock is altered.
- 3.1.2 LU and/or LU suppliers shall have processes and appropriate safety management and quality management systems which must be in place to ensure that the technical deliverables and requirements as set out in this Standard are adhered to at all times.
- 3.1.3 LU and/or LU suppliers are required to create, edit, and maintain comprehensive and detailed records and archived material sufficient to satisfy the requirements of this Standard.
- 3.1.4 An auditable trail of documented evidence shall be provided for all d.c. protection systems and their settings.
- 3.1.5 No changes shall be made to a d.c. circuit until the requirements of this Standard have been fully complied with.

- 3.1.6 Written evidence of compliance shall be submitted to, and written confirmation received from the LU technical authority before any changes are implemented.

Note: Written confirmation is not required for emergency changes or where essential changes are identified at very short notice but shall be sought within one week of implementation of such a change.

- 3.1.7 The calculation and verification of d.c. protection settings shall be carried out by competent persons using approved processes and procedures.
- 3.1.8 The determination of circuit parameters and verification techniques by measurement and or test shall be carried out using approved processes and procedures issued by the body responsible for the activity.
- 3.1.9 LU and/or LU suppliers proposing a change to a d.c. circuit or protection system shall obtain written acceptance of the change from all LU suppliers with responsibility for the circuit, its operation, performance, or maintenance.
- 3.1.10 LU and/or LU suppliers, in accordance with approved procedures, shall exchange approved technical information with LU and/or LU suppliers as necessary to support this Standard.
- 3.1.11 Protection settings shall be re-determined where any protection device, circuit, substation characteristic, operational feeding arrangement, train service or traction rolling stock change beyond the parameters used to determine the settings.
- 3.1.12 Where sub-distribution equipment exists in a circuit, the extent and boundaries of d.c. protection shall be determined, recorded and accepted by LU and all LU suppliers with responsibility for any part of the d.c. circuit.
- 3.1.13 The protection settings and the co-ordination of the protection for the entire d.c. circuit shall be agreed by LU and all LU suppliers involved.

3.2 Protection system records

- 3.2.1 Comprehensive records shall be produced and maintained by LU and all LU suppliers. Records shall include:
- declaration of compliance with the requirements of this and other relevant standards by appropriate design submissions;
 - descriptions of the change proposals with a safety and operational risk assessment;
 - circuit description, location, designation, operational constraints and approved design drawings of the circuit arrangement;
 - the protection equipment, its characteristics and tolerances;
 - the circuit characteristics and tolerances;
 - details of the competent personnel used;
 - the approved calculated protection settings and relevant technical studies;
 - tests carried out and the test configurations used;
 - records to verify the protection settings applied on site are to the approved design settings;
 - records shall be kept of test fault traces and other key test records. Short circuit test data shall be electronically recorded in a digital format suitable for processing in spreadsheet applications;