

Category 1 Standard

S1964

D.C. Track Feeder Protection

(formerly Powerlink Technical Specification SP81101 Rev 1)

Document Reference: S1964

Issue No.: A1

Issue date: August 2013

Review date: November 2017

MAYOR OF LONDON



Contents

1	Purpose	4
2	Scope	4
3	Requirements	4
4	Responsibilities	4
5	Supporting Information	5
5.1	Background	5
5.2	Safety, Environment and Customer Considerations	5
6	References	5
6.1	References and Abbreviations	5
6.2	Definitions	5
6.3	Person Accountable for the Document	6
6.4	Document History	6
7	Attachment - Technical Specification SP81101 Rev 1 (Ex Powerlink)	7
1	Application	7
2	Definitions and Abbreviations	7
2.1	Definitions	7
2.2	ABBREVIATIONS	7
3	References	7
3.1	Referenced within the Text	7
3.2	Associated Documents	8
4	Performance Requirements	8
4.1	Introduction	8
4.1.1	Protection System	8
4.1.2	Direct Acting Overload Protection	8
4.2	Essential Functions	8
4.2.1	Type of Faults	8
4.2.2	Speed of Operation	9
4.2.3	Reliability	9
4.2.4	Discrimination	9
4.2.5	Loss of Input Signals and Protection System Supply	9
4.3	Basis for Detection	9
4.3.1	Introduction	9
4.3.2	Inverse Time	9
4.3.3	Thermal Modelling	9
4.3.4	di/dt Protection.	10
4.3.5	Track Undervoltage Protection with Intertripping.	10
4.4	Operational Environment	10
4.4.1	Introduction	10
4.4.2	Harmonics	10
4.4.3	Regenerative Trains	10
4.4.4	Chopper Controlled Trains	11
4.4.5	Rheostatic Controlled Trains	11
4.4.6	Track Feeding Configuration	11
4.4.7	Track Parameters	11
4.4.8	Number and Type of Rectifiers	11
5	Constructional Requirements of the Protection System	11
5.1	Introduction	11
5.2	Mechanical Arrangement of Equipment.	11
5.2.1	Relays	11
5.2.2	Signal Sources	12
5.2.3	Wiring Routes	12
5.3	Electrical Arrangement of Equipment	12
5.3.1	Relays.	12
5.3.2	Signal Sources	14



	5.3.3 Intertipping	14
6	Testing	15
6.1	Type Testing	15
6.2	Routine Tests	15
Appendix 'A'	Information to Tenderer.	16
Appendix 'B'	Information Provided by Tenderer.	17





1 Purpose

- 1.1 The purpose of this LU Standard is to apply technical requirements for equipment and systems on the LU power system through the inclusion of a technical specification, previously owned and managed by the Power Service Contractor, UK Power Network Services (UKPNS) Powerlink, as an attachment to this standard.

2 Scope

- 2.1 This Standard applies to equipment and systems on the LU power system.

3 Requirements

- 3.1 The mandatory requirements of this standard are set out in Section 7 as an attachment to this document.
- 3.2 Where an attachment refers to the 'Contractor' it should be taken to mean LU and LU Suppliers following the termination of the Power Service Contract.
- 3.3 Where the attachment refers to the 'System' it should be taken to mean the LU power system including its associated SCADA system and the operational properties.

Note: It is the intention to fully re-work this LU standard into the standards format over a period of time. While the content of the ex-Powerlink specification should not conflict with the remainder of the LU standards suite, should any discrepancies occur, these should be brought to the attention of the LU technical authority.

4 Responsibilities

- 4.1 **The Head of Power Engineering** is responsible for the technical content of this standard. Concessions in relation to this standard shall be directed to the Head of Power Engineering who has overall accountability for compliance with this standard. The Head of Power Engineering may request support from the other technical authorities when reviewing concessions or queries arising from the application of this standard.
- 4.2 **LU and LU Suppliers** shall be responsible for compliance with the requirements of this standard.
- 4.3 **Heads of Profession** are the LU technical authorities for each asset group, and shall be responsible for auditing technical compliance with this standard in accordance with the engineering asset grouping of LU Standard S1041 and with respect to the assurance of assets to which they are accountable for. They shall provide support to the Head of Power Engineering, if requested, with regard to any technical issues arising from concession requests or other queries to this standard.



5 Supporting Information

5.1 Background

- 5.1.1 From the 16th August 1998 through to the 15th August 2013 the LU power system was operated, maintained, renewed and upgraded by UKPNS Powerlink under the Power Services Contract. The contract was a Private Finance Initiative contract where UKPNS Powerlink were responsible for setting the detailed technical requirements for the LU power system.
- 5.1.2 At the start of the Power Service Contract on 16th August 1998 LU transferred its detailed technical standards for the LU power system to UKPNS Powerlink. Powerlink has owned and managed these technical standards as Powerlink technical specifications for the duration of the Power Service Contract.
- 5.1.3 The Power Service Contract ceased on the 16th August 2013 and the UKPNS Powerlink technical specifications for the LU power system were transferred back into LU as Category 1 standards.

Note: At the time this standard was produced, it was deemed necessary to utilise a non-standard for standard format. This however, does not diminish the mandatory requirements contained within the attachments.

5.2 Safety, Environment and Customer Considerations

- 5.2.1 Safety, environment and customer considerations relevant to this engineering standard are covered within the text of the attachment.

6 References

6.1 References and Abbreviations

- 6.1.1 Where references and abbreviations are used in this engineering standard they are given within the text of the attachment.

6.2 Definitions

- 6.2.1 Where definitions are used in this engineering standard they are given within the text of the attachment.
- 6.2.2 The following topic specific definitions are created:
- a) Within London Underground's Glossary of Terms (1-622)
(a Category 1 Standard);

Term	Definition	Source
LU	London Underground is the operating company of the former London Underground Limited.	a
Supplier	Supplier to London Underground, the primary organisation or individual that is selected to deliver a product, service or facility to London Underground and contracting directly to London Underground. This includes Consultants, Contractors, Infracos and PFI Contractors and excludes organisations or individuals selected by and contracting directly to them.	a



6.3 Person Accountable for the Document

Person accountable for the document
Phil Carmichael - Head of Power Engineering

6.4 Document History

Issue no	Date	Changes	Author
A1	Aug 2013	Incorporation of UKPNS Powerlink technical specification SP81101 Rev 1 as Category 1 LU standard following the termination of the Power Services Contract as per DRACCT No. 01934. No technical requirements have been changed.	G Bloch