

Letter of instruction

Information for users

The following document:

NR/SP/ELP/21032
Issue 2

has had changes made to it, most recently, with effect from **23 November 2006**.

Instructions for use

It is essential that you first read and understand each letter of instruction pertaining to the standard before proceeding to use the standard. You must then apply the requirements of each letter to the standard.

NR/SP/ELP/21032	Issue 2	01 April 2006	Proceed to standard ►
NR/BS/LI/060	Issue 1	23 November 2006	Proceed to letter ►

For further information, please contact:

IHS Customer Support

Please click here to proceed to the Network Rail Standards' 'Support Contacts' for their latest contact details.

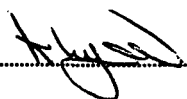
Ref	NR/SP/ELP/21032
Issue	2
Date	April 2006

Business Process Document

Earthing systems for d.c. traction substations, track paralleling huts and similar equipment locations

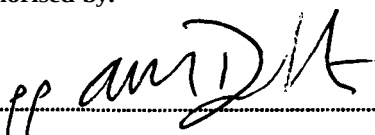
Endorsement & Authorisation

Endorsed by:



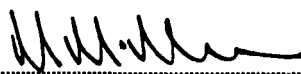
K. Lydford, Head of Electrification & Plant Engineering

Authorised by:



A. McNaughton, Chief Engineer

Accepted for issue by:



M. McManus, National Standards Manager

This document is the property of Network Rail. It shall not be reproduced in whole or part nor disclosed to a third party without the written permission of the Standard Owner.

© Copyright 2006 Network Rail

Uncontrolled copy once printed from its electronic source.

Published & Issued by: Network Rail 40 Melton Street, London NW1 2EE

Ref:	NR/SP/ELP/21032
Issue:	2
Date:	April 2006

Issue record

Issue	Date	Comments
2	April 2006	Re-issued as a SAF3 Business Process Document (<i>formerly RT/E/S/21032</i>)

Implementation

1 April 2006

Compliance

This Network Rail specification is mandatory and must be complied with by Network Rail and its contractors from 1 April 2006

When this specification is implemented, it is permissible for all projects, which have formally completed GRIP Level 4 to continue to comply with the Issue of any relevant Network Rail standards current when GRIP Level 4 was reached and not to comply with requirements contained herein unless the head of electrification and plant has stipulated otherwise in the accompanying briefing note.

Where the head of electrification and plant has specified that all projects will comply with the requirements, specific authority not to comply can be sought in the usual manner using the appropriate non-compliance authority processes described in Network Rail standard, [NR/SP/STP/045](#) *Managing the process for non-compliance authority* (formerly RT/LS/P/045).

Disclaimer

In issuing this document for its stated purpose, Network Rail makes no warranties, express or implied, that compliance with all or any documents it issues is sufficient on its own to ensure safe systems of work or operation. Users are reminded of their own duties under health and safety legislation.

Supply

Copies of documents are available electronically, within Network Rail's organisation. Hard copies of this document will be available to Network Rail employees on request to the document controller and to other organisations from IHS Technical Indexes (01344 404409)

Contents

1	Purpose	5
2	Scope	5
3	Reference documentation	5
4	Definitions	5
5	General clauses	6
5.1	Safety, legislation and regulations etc.	6
5.2	Design, manufacture and workmanship	6
5.3	Instruction manual	7
6	Compliance with standards	7
6.1	European, International and British Standards etc	7
6.2	Specific equipment standards	8
7	Performance requirements	8
7.1	General	8
7.2	Maintainability	8
7.3	Reliability and availability	8
7.4	Service life	8
7.5	Earthed equipotential zone(s)	8
7.6	Interchangeability	9
7.7	Finish and resistance to corrosion	9
8	Verification of performance and quality	9
8.1	Quality assurance	9
8.2	Inspection and testing	9
8.3	Test certificates	10
8.4	Drawings	10
9	Technical and construction requirements	11
9.1	Protective conductor for high voltage a.c. and 650/750 V d.c. equipment	11
9.2	Bonding conductors for other equipment	12
9.3	Protective conductor layout	12
9.4	Frame leakage protection system	12
9.5	Jointing copper strip	13

Ref:	NR/SP/ELP/21032
Issue:	2
Date:	April 2006

9.6	Earth electrode system configuration	13
9.7	Connections to the earth electrode system	13
9.8	Installation	13
9.9	Metallic fencing	14
Appendix A	Tests	15

I Purpose

This specification states the requirements for the design, manufacture, installation and testing of equipotential bonding of equipment and earth electrode systems for d.c. traction substations, track paralleling huts and similar equipment locations (except for metal enclosures around controlled track switches).

The document is to be read in conjunction with the relevant procurement specification.

2 Scope

This specification applies to all new earthing systems installed on the D.C. Electrified Lines.

3 Reference documentation

IEC 364	Requirements for electrical installations: IEE Wiring Regulations
BS 7671	
BS 7430	Earthing
BS 2874	Copper and copper alloys. Rods and sections (other than forging stock)
BS 951	Clamps for earthing and bonding purposes
BS 381C	Colour for identification, coding and special purposes

4 Definitions

For the purpose of this specification the following definitions shall apply:

British Standard	A standard published by the British Standards Institution. Its alphanumeric identity is prefixed by BS.
Earthed equipotential zone	A zone within which exposed-conductive-parts and extraneous-conductive-parts are maintained at substantially the same potential by bonding, such that, under fault conditions, the differences in potential between simultaneously accessible exposed and extraneous-conductive-parts will not cause electric shock.
Equipment	Equipment including all component parts and accessories.

European Standard	A standard published by the European Committee for Standardisation or by the European Committee for Electrotechnical Standardisation. Its alphanumeric identity is prefixed by EN.
International Standard	A standard published by the International Electrotechnical Commission. Its alphanumeric identity is prefixed by IEC.
Procurement Specification	The contract specific Network Rail documentation, such as, Invitation to Tender or Technical Work Scope.
Network Rail Line Standard	A collective term for a Network Rail Line Specification, Network Rail Line Procedure or a Network Rail Line Code of Practice, published by a directorate of Network Rail PLC. Its alphanumeric identity is prefixed by RT/, followed by a letter designating the directorate.

5 General clauses

5.1 Safety, legislation and regulations etc.

At all times the equipment shall be safe. Measures shall be taken to ensure the safety of persons concerned in its installation, operation, maintenance, repair and its eventual disposal. All apparatus and connections for the safe and satisfactory operation, control and protection of the equipment concerned, shall be provided whether or not specifically mentioned.

The equipment shall be adequately provided with interlocking and padlocking facilities, earthed, insulated, screened, enclosed etc. Safe and appropriate access shall be provided for operation and maintenance purposes.

The supplier shall provide recommendations for training in safe operation and maintenance of the equipment.

5.2 Design, manufacture and workmanship

The earthing system and components shall be designed, manufactured and installed in accordance with best practice, taking cognisance of the system in which it will operate. All material shall be of the quality and of the type most suitable for working under the conditions specified for the full service life of the equipment.

The supplier shall provide a safety case for equipment with novel or innovative features not previously used within the railway environment. The safety case shall quantify any additional risks and indicate how these risks are controlled.