

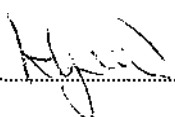
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Business Process Document

Earthing and bonding at North Pole International depot

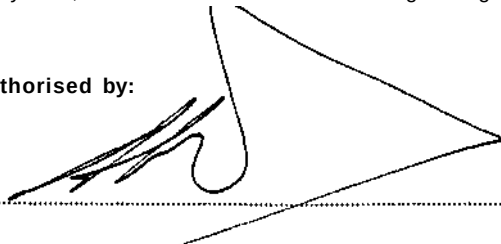
Endorsement & Authorisation

Endorsed by:



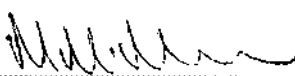
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2	February 2006	Re-issued as a SAF3 Business Process Document

Implementation

4 February 2006

Compliance

This Network Rail specification is mandatory and must be complied with by Network Rail and its contractors from 4 February 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).

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Contents

1	Purpose	5
1.1	Bonding areas	5
2	Scope	5
3	Reference documentation	5
4	Area "A"	5
4.1	Earth wires system	5
4.2	The servicing shed	6
4.2.1	Structural foundations	6
4.2.2	Earthing and bonding matrix	6
4.2.3	Electrical services	7
4.2.4	Other services	8
4.3	Test track (No.4 reception siding)	8
4.4	Mitre Tunnel	8
4.5	Mitre Bridge	8
4.6	Scrubs Lane Bridge	8
4.7	Lighting columns	9
4.8	C.c.t.v. supporting towers (not associated with signals and telecommunication equipment).	9
4.9	Computers (P.C.M) (control equipment) etc.	9
4.10	Fuel storage and vehicle fuelling sidings	10
4.11	Traction supplies	10
4.12	Non traction supplies	10
4.12.1	50kVA 240V (North Pole S.S)	10
4.12.2	2000kVA 850V (Servicing Shed) (East) S.S.)	10
4.12.3	75kVA 240V (West Side)	10
4.12.4	75kVA 240V (East Side)	11
4.12.5	2000kVA 850V and 500kVA 415V (Stabling Sidings)	11
4.13	11kV 415V. Ring Main and London Electricity Plc Incoming Supply	11
5	Area "B"	12
5.1	Toilet discharge sidings	12
5.2	Switch heating and buffer stops lighting	12
5.3	Repair shed	12

Ref:	NR/SP/ELP/27195
Issue:	2
Date:	February 2006

5.4	Wheel lathe and associated equipment	13
5.5	The Transfer Sidings	13
5.6	The Stabling Sidings (No.1 - 4)	13
5.7	The East Sidings	13
5.8	Radio aerial, c.c.t.v. tower etc.	13
5.9	The train washing facilities	13
5.9.1	Electrical services	13
5.9.2	Other services	14
5.9.3	Support steelwork	14
6	General Section	14
6.1	Perimeter fence	14
6.2	Ground level services	14
7	Signal and telecommunication equipment	14
7.1	General signalling requirements	14
7.2	Ground position light signal	14
Appendix A	Bonding areas	15
Appendix B	Earth wire to traction rail connections	16
Appendix C	Servicing shed bonding matrices	17
Appendix D	D.C. potential monitoring locations	18
Appendix E	Bonds for collecting stray current from 11 kV and 22 kV cables	19

Ref:	NR/SP/ELP/27195
Issue:	2
Date:	February 2006

I Purpose

This Earthing and Bonding specification is unique to the North Pole Depot area and the section of the West London Lines between West Way and Mitre Bridge Junction, it should be read in conjunction with [NR/SP/ELP/21085](#) which contains general information regarding standard bonding practices, cable sizes, use of spider plates etc.

There are 3 different types of electrification within the North Pole International Depot complex :

25kV 50Hz a.c. Overhead Line Conductor System

660V d.c. 3rd Rail Conductor System

3,000V d.c. Overhead Line Conductor System

I.1 Bonding areas

There are, in vary degrees, both a.c. and d.c. traction return current circulating around the depot complex, and to identify the special earthing and bonding requirements for various parts of the complex, the depot has been sub-divided into the following areas :-

The area where the connections between the traction earth return system and the running rails have been specifically located to minimise the possible effects of the d.c. circulating current in the earth conductors.

The area with no special provision for d.c. circulating currents and where the traction earthing requirements will be arranged in accordance with [NR/SP/ELP/21085](#).

Drawing No. I depicting these areas is appended (Appendix "A") to this specification.

2 Scope

Not used

3 Reference documentation

[NR/SP/ELP/21085](#) Design of Earthing and Bonding Systems for A.C. Electrified Lines
BS 7089

4 Area "A"

4.1 Earth wires system

An overhead line earth wire system will be installed throughout the area connecting together overhead line equipment supporting structures.

Ref:	NR/SP/ELP/27195
Issue:	2
Date:	February 2006

The earth wire system will be connected to the traction return rail at specific locations, designed to minimise the possible effects of d.c. traction circulating currents, these location are specified in (Appendix "B").

4.2 The servicing shed

4.2.1 Structural foundations

The presence of d.c. traction currents flowing in the Servicing Shed requires special monitoring of the d.c. voltage potential between the deep buried parts of the structural foundation reinforcement and a separate earth system.

In each bay, defined by the expansion joints, the reinforcement associated with the interior of a rail support post and the deep buried longitudinal bar under the rail supports post is to be brought out separately, with the large welded reinforcement bars into recessed boxes in the side of the service duct, leaving a 3" long stud from each bar in the boxes.

There are 7 bays in the shed, with a monitoring position per rail at each bay, affording a total of 84 monitoring positions throughout the servicing shed area.

The reference earth electrodes pits are to be located around the outside perimeter of the servicing shed i.e. one near each corner of the building and one at the halfway point along each side.

4.2.2 Earthing and bonding matrix

There will be by the nature of the various cross-bonding arrangements in the servicing shed the formation of 2 matrices, one at Low level and the other at High level.

The "Low Level" matrix are to be formed as follows .

25 mm x 3 mm copper earthing tapes, located in the service ducts, will run along each track, bonding together the rail support posts. These tapes are to be cross bonded between adjacent ducts at the ends and at distances of 1/3 and 2/3 along the length of the shed.

In addition to these bonding tapes, standard a.c. traction cross-track bonds are to be installed connecting together the 6 traction rails. The connections are to be in duplicate and located as follows, across each track outside the shed clear of the concrete apron, and also at distances of 1/3 and 2/3 inside of the shed.

The "High Level" matrix is formed as follows:-

Above each track there is to be a high level O.L.E. earth wire that will run the entire length of the shed and will be cross connected at each end of shed.

The earth wire is also to be connected to the 25 mm x 3 mm copper earthing tapes that are to be routed at high level along the length of shed. The earthing tapes are to be fixed at intervals of 750 mm, and connecting together the vertical and horizontal members of the structural steelwork.

The O.L.E. is to be attached to structural cross track members at 18m intervals and will form an electrical earth path to the earth wire system.

The 2 matrices are to be connected together with an earth wire installed midway along the length of the shed.

The earth wire is to be routed from the low level earth matrix on one side of the shed, up the adjacent wall, across the tracks above the O.L.E. (connecting together the earthing tapes and earth wires above each track) down the wall, to the low level earth matrix on the other side. To ensure the integrity of this earth wire route the rail connections are to be in duplicate.

The external O.L.E. earth wire system is terminated on the East and West faces of the shed and is to be connected to the internal copper earthing tapes, ensuring a continuous earth return system throughout the servicing shed.

To maintain the integrity of the traction return system within the depot, an addition external earthwire is to be provided connecting together the external earthwires at each end of the shed. The earthwire will be attached to the O.H.L. structures and routed along the southside of the servicing shed.

A diagrammatic representation of the bonding within the shed is shown as Appendix "C".

4.2.3 Electrical services

The L.V. electrical power supplies within the servicing shed are to be earthed via the star point of their relative supply transformer to the traction return system.

The bond from the star point of the transformer is to be connected to a "electrification spider plate".

Duplicate bonds will then run from this plate to the low level matrix. These bonds will form an important part of the protection system for the L.V. supply, their integrity therefore must remain intact. To assist in the identification these bonds are to be coloured yellow/green.