

Railway Group Standard

GL/RT1255

Issue One

Date February 2009

Low Voltage Power Supplies in Electrified Areas

Synopsis

This document mandates requirements for control of return and stray currents and the management of earthing for low voltage power supplies in electrified areas.

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Documents

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Issue record

Issue	Date	Comments
One	February 2009	Original document Supersedes GI/RT7007

The three new requirements have been marked by a vertical black line.

Superseded documents

The following Railway Group documents are superseded, either in whole or in part as indicated:

Superseded documents	Sections superseded	Date when sections are superseded
GI/RT7007, issue 1, June 2002 Low Voltage Electrical Installations	All	04 April 2009
GI/GN7607, issue 1, June 2002 Guidance for Low Voltage Electrical Installations	All	04 April 2009

Supply

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Part 1 Purpose

1.1 Purpose

- 1.1.1 This document mandates requirements for the management of earthing to avoid hazardous potentials, and for the management of segregation to control stray currents and minimise current transfer between different electrical power supply systems.
- 1.1.2 These requirements are additional to those normally required for low voltage (LV) power supplies (for example, compliance with BS 7671) and are needed to avoid hazardous touch potentials arising from differences in two independent power supply systems (LV power supplies and traction power supplies) while ensuring fault and stray currents are effectively controlled.
- 1.1.3 This document excludes power supplies to signalling and telecommunications (S&T) equipment, for which specific earthing arrangements are made.
- 1.1.4 This document excludes installations which do not form part of the main line railway, such as traction substations and depots.

1.2 Introduction

- 1.2.1 Infrastructure managers need to co-operate to design, install and maintain LV electrical installations such that the earthing and segregation arrangements are not compromised.

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Part 2 Earthing Requirements

2.1 General earthing requirements

2.1.1 Touch potentials

- 2.1.1.1 Where it is possible for a person to simultaneously touch exposed conductive parts that are connected to the equipotential bonding system of a LV electrical installation and the exposed conductive parts of the equipotential bonding system of another electrical system or rail mounted vehicle, the LV electrical installation shall be designed to ensure the touch voltage values do not exceed those specified in BS EN 50122-1.

2.1.2 Circuit protective conductor

- 2.1.2.1 Metallic conduit, trunking and cable trays shall not be used as a circuit protective conductor where high currents associated with other electrical systems could affect the integrity of the circuit protective conductor.

2.2 Earthing requirements for LV electrical installations in ac electrified lines areas

2.2.1 LV electrical equipment directly bonded to the traction return circuit

- 2.2.1.1 Where LV electrical equipment is either a) in contact with a conductive structure directly bonded to the traction return circuit, or b) is directly bonded to the traction return circuit, then the LV electrical equipment circuit protective conductor and any other earthed metallic conductor (for example screen wire or armouring) shall not be connected to the LV electrical equipment.

- 2.2.1.2 Guidance for 2.2.1 is set out in A.1.2 and Figure A.1.

2.2.2 LV electrical equipment indirectly bonded to the traction return circuit

- 2.2.2.1 Where LV electrical equipment is not directly bonded to traction return circuit as set out in 2.2.1, then the LV electrical equipment circuit protective conductor shall be connected to the LV electrical equipment.

- 2.2.2.2 The LV electrical equipment and circuit protective conductor shall be rated to carry the prospective traction fault current, unless the equipment is not at risk of carrying this current under fault conditions.

- 2.2.2.3 Where indirect bonding is used, a bond between the LV electrical installation supply main earth and the traction return circuit shall be provided.

- 2.2.2.4 Guidance for 2.2.2 is set out in A.1.3 and Figure A.2.

2.2.3 Utility services and LV electrical installation bonding

- 2.2.3.1 Where the LV electrical installation is bonded to another electrical system, the bonding and segregation arrangement of the utility services (for example gas, water etc) shall avoid hazards arising from touch voltages and the transfer of current between the systems and the utility services under operating and fault conditions.

2.3 Earthing requirements for LV electrical installations in dc electrified lines areas

2.3.1 Protection against dc leakage

- 2.3.1.1 Where a socket outlet is located such that an electrical appliance could be used on or near an object in contact with the running rail or other exposed conductive parts of the traction return circuit, then the design of the LV electrical installation shall prevent the adverse effects of dc leakage in the earth wire.

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2.3.1.2 The design of the LV electrical installation shall prevent adverse effects from dc leakage entering the neutral conductor of any other equipment or electrical distribution system because of earth faults between the earth conductor and neutral conductor.

2.3.1.3. The detection system of earth monitoring or earth proving devices shall be protected against the effects of dc leakage.

2.3.1.4 Guidance for 2.3.1 is set out in A.2.2.

2.4 Residual current devices providing additional protection against direct contact in dc electrified lines areas

2.4.1 In dc electrified lines areas dc leakage can affect the operation of the residual current devices (RCD) used to provide additional protection against direct contact. Therefore, Network Rail shall produce and maintain a list of approved RCDs that are immune up to declared levels of dc leakage and shall make this list available to others on request.

2.5 Guidance for Part 2

2.5.1 Guidance for Part 2 is set out in Appendix A.