

Mitigation of DC Stray Current Effects

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Synopsis

This document mandates the process requirements to control the risks to infrastructure arising from the import of DC **stray** currents.

Submitted by

Anne Blakeney
Standards Project Manager

Authorised by

Brian Alston
Controller, Railway Group Standards

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Part A

Issue Record

This document will be updated when necessary by distribution of a complete replacement.

Amended or additional parts of revised pages will be marked by a vertical black line in the adjacent margin.

Issue	Date	Comments
One	April 2000	This document supersedes GM/RT1018

Responsibilities

Railway Group Standards are mandatory on all members of the Railway Group * and apply to all relevant activities that fall into the scope of each individual's Railway Safety Case. If any of those activities are performed by a contractor, the contractor's obligation in respect of Railway Group Standards is determined by the terms of the contract between the respective parties. Where a contractor is a duty holder of a Railway Safety Case then Railway Group Standards apply directly to the activities described in the Safety Case.

* The Railway Group comprises Railtrack and the duty holders of the Railway Safety Cases accepted by Railtrack.

Compliance

The provisions in this document are to be complied with from 3 June 2000.

Health and Safety Responsibilities

In issuing this document, Railtrack PLC makes no warranties, express or implied, that compliance with all or any documents published by the Safety & Standards Directorate is sufficient on its own to ensure safe systems of work or operation. Each user is reminded of its own responsibilities to ensure health and safety at work and its individual duties under health and safety legislation.

Supply

Controlled and uncontrolled copies of this document may be obtained from the Industry Safety Liaison Dept, Safety and Standards Directorate, Railtrack PLC, Railtrack House, DP01, Euston Square, London, NW1 2EE.

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Part B

1 Purpose

The purpose of this document is to mandate the process requirements for the prevention of unacceptable interference to electrical equipment, damage to infrastructure assets, hazards to people, and other adverse effects on safety which may result from the import of **stray** currents originating from DC electric traction systems or from **cathodic** protection installations.

2 Scope

The overall scope of Railway Group Standards is as specified in Appendix A of [GA/RT6001](#).

Specifically the contents of this document apply to:

- **stray** currents originating from Railtrack DC electric traction systems;
- **cathodic** protection schemes installed by Railtrack or by outside parties on or near Railtrack Controlled Infrastructure; and
- **stray** currents originating from neighbouring DC railways, tramways and other electrical plant.

3 Definitions

Cathodic Protection (EN 50122-2)

A method to protect a metal from corrosive attack by causing direct current to flow from its electrolytic environment into the entire metal surface.

Stray Current (EN 50122-2)

The part of a current which follows paths other than the intended paths.

4 Evaluation Process

4.1

The Infrastructure Controller shall identify infrastructure elements which are:

- in a situation likely to be subject to imported dc **stray** currents; and
- vulnerable to adverse effects arising from such DC **stray** currents.

4.2

A risk assessment of the possible adverse effects which may be produced by DC **stray** currents, not necessarily originating from the infrastructure, shall be carried out on those infrastructure elements identified in 4.1.

4.3

Any planned new, extended or modified **cathodic** protection schemes on or near the infrastructure, notified by any third-party to the Infrastructure Controller under the provisions of BS 7361 Part 1 – 1991, shall be subject to a risk assessment. The risk assessment shall address all the potential hazards which shall include:

- interference with train control and communication systems;
- interference with existing railway **cathodic** protection systems;
- increased corrosion; and
- production by electrolysis of explosive, toxic and/or corrosive gases.

4.4

Any necessary control measures shall be determined by reference to a list of established criteria determined by the Infrastructure Controller. Consultation shall take place with third parties whose plant may influence DC **stray** currents, or be affected by them.

4.5

Where AC and DC electric traction systems are either installed on the same tracks, or installed on different tracks close to one another, then control measures shall be taken such that the effects of DC **stray** currents are restricted to a level as low as reasonably practicable.

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5 Implementation

5.1

Protective provisions against electric shock shall take precedence over provisions against the effects of **stray** current, and are contained in [GL/RT1254](#).

5.2

The implementation of any proposed DC **stray** current control measure, new or modified **cathodic** protection scheme, or remedial action following testing, shall not commence until the results of evaluations have been accepted by the Infrastructure Controller, taking into account the views of all the relevant parties. Once implemented, the effectiveness of any such action shall be subject to verification.

6 Testing and Maintenance

6.1

Tests shall be carried out to verify compliance with the established criteria. Remedial action shall if necessary be taken, followed by re-testing to verify the result of the action taken, and routine maintenance to ensure continued compliance.

6.2

Where the Infrastructure Controller is aware that DC **stray** current caused by plant belonging to third parties, or DC electrified lines of other administrations, may cause a hazard to people or the infrastructure or trains running on the infrastructure, then systems shall be in place for detecting excessive levels of DC **stray** current, and for reducing the risk to a level as low as is reasonably practicable.

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Appendix

This appendix is for information only

1 Effects of DC Stray Currents

1.1

DC traction systems may cause *stray* currents which could adversely affect both the railway and / or outside interests. The major effects of *stray* currents can be:

- corrosion and subsequent damage of metallic structure where DC *stray* currents leave the metallic structures;
- the risk of overheating, arcing and fire and subsequent danger to equipment and people not necessarily within the Infrastructure Controller's area of responsibility;
- influence on non-immunised train control and communications systems;
- influence on unrelated *cathodic* protection installations; and
- influence on unrelated AC and DC power supply systems.

1.2

The infrastructure elements which may be adversely affected by DC *stray* currents include all adjacent metallic structures both on and off the railway such as:

- pipelines;
- cable armouring and screening systems, towers and stanchions;
- tanks and vessels;
- earthing systems;
- reinforced concrete constructions;
- buried metallic structures;
- signalling systems; and
- other relevant safety critical on-track equipment.

1.3

There are three principal measures available to minimise *stray* current emission from a DC traction electrification system:

- insulation of the traction return circuit with respect to earth;
- improvement of the conductivity of the return circuits; and
- design of the traction power supply system.

For DC *stray* current emission controls, refer to [GL/RT1254](#).

1.4

Among the main safety systems which may be adversely affected and interfered with by *cathodic* protection installations are signalling track circuits.

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References

Railway Group Standards

- [GA/RT6001](#) Railway Group Standards Change Procedures
[GL/RT1254](#) Electrified Lines Traction Bonding

Other References

- EN 50122-2** Railway Applications – Fixed installations
Part 2. Protective provisions against the effects of **stray** currents caused by DC traction systems.
- BS 7361: Part 1 - 1991** **Cathodic** Protection. Part 1: Code of practice for land and marine applications.

The Catalogue of Railway Group Standards (or Railway Group Standards CD ROM) should be consulted for the current issue number and status of the documents that are published by the Safety & Standards Directorate.