Railway Group Standard
GE/RT8023
Issue One
Date October 2000

Compatibility Between Electric Trains and Electrification Systems

Synopsis
Process for managing change that affects the compatibility between electric trains and electrification systems

Submitted by

Signatures removed from electronic version

Anne Blakeney
Standards Project Manager

Authorised by

Signatures removed from electronic version

Brian Alston
Controller, Railway Group Standards

Published by
Safety & Standards Directorate,
Railtrack PLC,
Railtrack House DP01,
Euston Square
London NW1 2EE

This page has been left blank intentionally

Compatibility Between Electric Trains and Electrification Systems

Railway Group Standard
GE/RT8023
Issue One
Date October 2000
Page 1 of 7

Contents

Compatibility Between Electric Trains and Electrification Systems

Part A

Issue Record

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

Revisions in the reissued document will be marked by a vertical black line in the right hand margin adjacent to the revision.

Issue	Date	Comments
One	October 2000	This document supersedes GM/RT1000

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 Railway Group Standard are to be complied with from 2 December 2000.

Health and Safety Responsibilities

In issuing this document, Railtrack PLC makes no warranties, express or implied, that compliance with all or any Railway Group Standards 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.

Part B

1 Purpose

The purpose of this document is to mandate the management process to ensure the compatibility between electric trains and electrification systems.

The document mandates controls to minimise the risk of physical injury and electric shock resulting from unacceptable mechanical or electrical interactions.

2 Scope

The overall scope of Railway Group Standards is as specified in Appendix A of GA/RT6001.

Specifically the content of this document applies to the Infrastructure Controller's electrification systems and to electric trains that draw current from them.

This document contains requirements which are applicable to the duty holders of the following categories of Railway Safety Case:

- Infrastructure Controller
- Train Operator

The requirements for accepting rail vehicles to operate on Railtrack Controlled Infrastructure are set out in GO/RT3270.

3 Definitions

Electric trains
Electric locomotives or electric multiple units that draw current from an electrification system.

Electrification system
A system providing electrical energy to electric trains comprising the Electricity Supply Industry (ESI) generation, distribution and traction supply point equipment and the Infrastructure Controller's electrical distribution system, contact system and return current system.

Electrification statement
A documented record maintained by the Infrastructure Controller detailing the electric train services that the electrification system on a particular route can support.

4 Evaluation process

4.1
Any of the changes listed below, whether proposed by the Infrastructure Controller or by a train operator, shall have their significance for compatibility issues (see Appendix A) considered by the proposer and the conclusions recorded:

- introduction onto an electrified route of new or modified electric trains which are equipped with, or have been modified to incorporate, equipment not previously used on that route;
- modification of the working timetable or the speed, consist or formation of electric trains;
- modification of an existing electrification system, or the provision of a new electrification system.

For each route the Infrastructure Controller and the relevant train operators shall agree what level of changes are significant.

4.2
When the change proposed is significant an evaluation of the effect of the proposed change shall take place.

4.3
The evaluation shall address, but not be limited to, the relevant compatibility issues from the list in Appendix A. In certain cases detailed requirements are given in appropriate Railway Group Standards.

The evaluation shall be undertaken by a competent body appointed by the Railway Group member.

4.4
Where appropriate to the compatibility issue being considered, both the individual and collective effects of the proposed change shall be taken into account in the evaluation. The evaluation shall allow for both normal and credible fault conditions of operation (eg failure of pantograph anti-tilt device).

4.5
The proposer of the change shall ensure that an exchange of relevant information takes place between the Infrastructure Controller and train operators of electric trains that will be affected by the change. This exchange of information shall take place in a formal way and to timescales that allow an evaluation to take place. The information to be exchanged shall include a schedule of the compatibility issues to be addressed by each party. Where they exist, the results of previous evaluations and electrification statements shall be made available.

4.6
Taking into account the significance of the proposed change, the method, scope, acceptance criteria and verification requirements of the evaluation shall be agreed, prior to the evaluation taking place, between the Infrastructure Controller and relevant train operators.

4.7
Any mathematical model used to assess the effect of any change and to test any solutions proposed to address incompatibilities between trains and electrification systems resulting from the proposed change shall be acceptable to both the Infrastructure Controller and the relevant train operators.

4.8
The results of the evaluation shall be recorded with a concise summary and recommendations. The recommendations shall address whether the change can be implemented without any further action, or that it can be implemented with certain operational restrictions or limitations, or that the change cannot be implemented without appropriate remedial or mitigating measures being applied to either the infrastructure, the trains, or both.

The record of the evaluation results shall define the infrastructure and electric trains combination that have been found to be acceptable, and shall form the basis of an electrification statement for the route(s) concerned.

5 Implementation

5.1
The implementation of the proposed change shall not commence until the results of the evaluation have been accepted by both the Infrastructure Controller and the relevant train operators.

5.2
The implementation of the proposed change shall not commence until any recommendations identified in the evaluation have been undertaken to the satisfaction of all parties.

6 Verification

6.1
On completion of the proposed change:

- the proposer of the change shall submit evidence to the other parties that the effect of the change is consistent with that predicted in the evaluation;
- the relevant train operators shall submit evidence to the Infrastructure Controller that the information provided by them relating to electric trains for the purpose of the evaluation was consistent with that submitted to the vehicle acceptance process.

6.2
If there are any inconsistencies found during verification which are unacceptable to either party, the Infrastructure Controller and the relevant train operators shall agree what, if any, limitations shall be imposed until a satisfactory solution can be found.

Appendix A Compatibility Issues

a) Maximum and minimum electrification system voltages and their durations

b) Continuous and short term electrification equipment ratings

c) ESI supply point criteria

d) Contact system ratings

e) Accessible and touch voltages in traction return circuits and other lineside circuits and conductors

f) Thermal rating of contact system/current collector interface

g) System resonance and harmonic interference

h) Protection co-ordination

i) Electric train equipment's ability to withstand electrification system fault levels

j) Electrification system's ability to tolerate electric train regenerative braking

k) Ability of both electrification systems and electric trains to withstand the discharge of stored electrical energy from the other

l) Physical and electrical clearances between electric trains and infrastructure

m) Contact system to current collector geometry

n) Compatibility of contact surface materials of current collector and contact system

o) Co-ordination of resilience to damage of current collector and contact system components

p) Maximum and minimum contact forces and contact system dynamic displacement

q) Avoidance of electric trains being stationary with current collectors at prohibited locations, such as neutral sections or conductor rail gaps

r) Co-ordination of the positions of automatic power control magnets and receivers

s) Compatibility between neutral sections and on board current collection and power control equipment

References

GA/RT6001	Railway Group Standards - Change Procedures
GO/RT3270	Route Acceptance of Rail Vehicles

The Catalogue of Railway Group Standards and the Railway Group Standards CD-ROM give the current issue number and status of documents published by the Safety & Standards Directorate.