

Safety in Railway Tunnels - Requirements for Lighting

Synopsis

This document mandates requirements for tunnel lighting systems. This document will eventually form part of a larger document having the same scope as the Safety in Railway Tunnels TSI.

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Issue record

Issue	Date	Comments
One	December 2007	Original document Supersedes section G9 of GI/RT7010, issue 1, Lighting of Railway Premises

Revisions have not been marked by a vertical black line in this issue because the document has been revised throughout.

Superseded documents

The following Railway Group documents are superseded, either in whole or in part as indicated:

Superseded documents	Sections superseded	Date when sections are superseded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/RT7010, issue 1, Lighting of Railway Premises	C9	02 February 2008

Other parts of GI/RT7010 issue 1 are superseded by GI/RT7016, issue 2, Interface between Station Platforms, Track and Trains and GI/GN7520, issue 1, Guidance on **Lighting** of Railway Premises.

GI/RT7010 ceases to be in force and is withdrawn as of 02 February 2008.

Supply

Controlled and uncontrolled copies of this Railway Group Standard may be obtained from the Corporate Communications Department, Rail Safety and Standards Board, Evergreen House, 160 Euston Road, London NW1 2DX, telephone 020 7904 7518 or e-mail enquiries@rssb.co.uk. Railway Group Standards and associated documents can also be viewed at www.rgsonline.co.uk.

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Part 1 Purpose and Introduction

1.1 Purpose

1.1.1 This document mandates requirements for tunnel **lighting** systems.

1.2 Introduction

1.2.1 Future intentions for this document

1.2.1.1 This Railway Group Standard mandates requirements for tunnel **lighting** systems. These requirements form one of two groups of requirements that are retained as mandatory from GI/RT7010, issue 1, **Lighting** of Railway Premises, following a review of GI/RT7010 in accordance with the Strategy for Standards Management (October 2005). The other group of requirements relate to station **lighting** and have been transferred to GI/RT7016, issue 2, Interface between Station Platforms, Track and Trains.

1.2.1.2 The title of this document, Safety in Railway **Tunnels** - Requirements for **Lighting**, reflects the intention of the Strategy for Standards Management that requirements in Railway Group Standards should be rationalised and collected into documents having the same scope as European Technical Specifications for Interoperability (TSIs). This document will eventually form part of a larger document having the same scope as the Safety in Railway **Tunnels** TSI, in so far as it deals with the infrastructure sub-system.

1.2.2 Related requirements in other documents

1.2.2.1 The following Railway Group Standards contain measures relevant to the safety of railway **tunnels**.

- a) GC/RT5203 Infrastructure Requirements for Personal Safety in Respect of Clearances and Access sets out the design, construction and maintenance requirements for means of access onto, along or across running lines that are provided for authorised people. It specifies the requirements for physical measures for control of risks to authorised people from moving rail vehicles and from tripping hazards.
- b) GE/RT8021 Facilities for Emergency Voice Communications with Control Rooms mandates the facilities to be provided for the communication of safety related voice messages to and from control rooms, including signalboxes, in connection with emergencies affecting the operation of the railway.
- c) GE/RT8080 Train Radio Systems for Voice and Related Messaging Communications mandates the minimum requirements for radio systems that provide the principle means of voice and related messaging radio communications between trains and shore-based locations
- d) GI/RT7033 Lineside Operational Safety Signs mandates the arrangements for the management and specification of lineside operational safety signs in order to provide consistency of form and presentation throughout the network.
- e) GO/RT3471 Incident Response Planning identifies requirements for ensuring a consistent, comprehensive and structured process for preparing, activating, maintaining, testing and using incident response plans.

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1.2.3 Supporting documents

- 1.2.3.1 GI/GN7520 Guidance on **Lighting** of Railway Premises sets out guidance on the **lighting** of railway premises and the design of **lighting** installations to take into account the special requirements of the railway environment.

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Part 2 Requirements for tunnel **lighting** systems

2.1 Provision of tunnel **lighting** systems

- 2.1.1 For all new **tunnels**, and **tunnels** subject to alteration (as defined), greater than 500 m in length, the infrastructure manager shall have a documented assessment showing whether or not tunnel **lighting** is required for the following purposes:
- a) To provide sufficient illuminance to enable passengers and staff to detrain and to make their way safely out of the tunnel
 - b) To assist train crews in their orientation and improve their visibility of the track
- 2.1.2 A tunnel **lighting** system shall be provided where the assessment shows that a tunnel **lighting** system is required to satisfy the purposes set out in clause 2.1.1.
- 2.1.3 Additional guidance on assessment and the provision of tunnel **lighting** systems is given in Appendix A.

2.2 Design of tunnel **lighting** systems

- 2.2.1 Tunnel **lighting** systems shall achieve a maintained illuminance of:
- a) 10 lux average, 5 lux minimum, horizontally at track level
 - b) 2 lux minimum, vertically 1.0 m above rail level
- 2.2.2 Tunnel **lighting** systems shall be designed to satisfy the purposes set out in clause 2.1.1.
- 2.2.3 The design of the tunnel **lighting** system shall take full account of:
- a) Signal sighting issues (see clause 2.2.4)
 - b) The potential for subjecting passengers and drivers to stroboscopic effects
 - c) The need to maintain a high level of uniformity to aid adaptation
- 2.2.4 GE/RT8034 sets out the requirements necessary to ensure that the visibility and alignment of signals, and signs that perform the function of signals, are not adversely affected during the life of the equipment.
- 2.2.5 Additional guidance on the design of tunnel **lighting** systems is given in Appendix A.

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Part 3 Application of this document

3.1 Application – infrastructure managers

3.1.1 Scope

- 3.1.1.1 The requirements of section 2.1 of this document apply to all new **tunnels**, and **tunnels** subject to alteration (as defined), greater than 500 m in length.
- 3.1.1.2 The requirements of section 2.2 of this document apply to all new tunnel **lighting** systems.
- 3.1.1.3 Where it is known, or becomes known, that an existing tunnel **lighting** system does not comply with the requirements of section 2.2 of this document, action to bring it into compliance is required as follows:
- a) When the tunnel **lighting** system is modified.
 - b) When the tunnel **lighting** system is renewed as a whole.
 - c) When work affecting the tunnel requires removal of the existing tunnel **lighting** system.
- 3.1.1.4 It is permissible for the infrastructure manager to designate specific infrastructure projects, ongoing when this document comes into force, for which compliance with the requirements of this document applicable to the design, construction and commissioning of new or altered infrastructure is not mandatory. When designating such projects, the infrastructure manager shall consider:
- a) Its responsibilities under its current safety authorisation
 - b) The stage reached by the project at the time this document comes into force (for example, approval in principle)
 - c) Whether compliance is necessary to ensure compatibility with other parts of the infrastructure
 - d) Whether compliance is necessary to facilitate safe interworking having regard to changes to related requirements mandated on another Infrastructure Manager or Railway Undertaking
 - e) The economic impact of compliance, but subject to its current safety authorisation in relation to the infrastructure in question.

3.1.2 Exclusions from scope

- 3.1.2.1 There are no exclusions from the scope specified in sub-section 3.1.1 for infrastructure managers.

3.1.3 General compliance date for infrastructure managers

- 3.1.3.1 This Railway Group Standard comes into force and is to be complied with from 02 February 2008, except as specified in sub-section 3.1.4. Where the dates specified in sub-section 3.1.4 are later than the above date, this is to allow infrastructure managers sufficient time to achieve compliance with the specified exceptions.
- 3.1.3.2 After the compliance dates or the date by which compliance is achieved if earlier, infrastructure managers are to maintain compliance with the requirements set out in this Railway Group Standard. Where it is considered not reasonably practicable to comply with the requirements, authorisation not to comply should be sought in accordance with the Railway Group Standards Code.

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3.1.4 Exceptions to general compliance date

3.1.4.1 There are no exceptions to the general compliance date specified in section 3.1.3 of this document for infrastructure managers.

3.2 Application – railway undertakings

3.2.1 There are no requirements applicable to railway undertakings.

3.3 Health and safety responsibilities

3.3.1 Users of documents published by RSSB are reminded of the need to consider their own responsibilities to ensure health and safety at work and their own duties under health and safety legislation. RSSB does not warrant that compliance with all or any documents published by RSSB is sufficient in itself to ensure safe systems of work or operation or to satisfy such responsibilities or duties.

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Appendix A Guidance on tunnel lighting systems

The content of this appendix is not mandatory and is provided for guidance only.

A1 Provision of tunnel lighting systems

- A1.1 The assessment required by sub-section 2.1.1 should consider whether it is reasonably practicable to provide lighting taking into account:
- a) Documented arrangements for responding to incidents in the tunnel concerned (see GO/RT3471).
 - b) Signage provided in the tunnel (see GC/RT5203).
 - c) Provisions for evacuation of passengers in the tunnel (for example walkways).
 - d) Any unusual features within the tunnel giving rise to particular hazards.
 - e) Availability of a suitable power supply.
 - f) Maintenance and renewal requirements for the lighting system.
- A1.2 Tunnel lighting may also be provided for other purposes, for example to enable maintenance staff on routine inspections to progress through the tunnel using the tunnel lighting as the main means of illumination.
- A1.3 The lighting levels specified in clause 2.2.1 are appropriate to illuminate a walking or escape route. Enhanced levels of lighting may be appropriate for other tasks.

A2 Design of tunnel lighting systems

- A2.1 Where the need for tunnel lighting is established, the design of the system should also:
- a) Take full account of the possible conditions of the tunnel following an emergency (for example, fire and smoke)
 - b) Consider when and how the lighting should function. Options include:
 - i) permanently switched on
 - ii) switched on automatically following an incident or condition
 - ii) manually controlled
 - c) Consider how the maintained illuminance will be provided in the event of failure of the normal power supply (see clause A2.2)
- A2.2 Where tunnel lighting has been provided for the purposes set out in clause 2.1.1 of this document, an alternative power supply should be available for that lighting. This may be via an alternative electrical supply, a standby generator or an emergency backup system of adequate duration. The alternative supply should be automatically selected and made available immediately following a failure of the normal supply.
- A2.3 The tunnel lighting installation should also be designed such that adjacent luminaires are on different circuits.
- A2.4 The tunnel lighting should ensure that emergency signage, emergency communications points, and walkways are suitably illuminated.

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Definitions

Adaptation

The process that takes place as the eye adjusts to the brightness or the colour of the visual field.

Alteration [of a tunnel]

For the purpose of this document, the alteration of a tunnel, or its associated infrastructure, in a way which provides a reasonable opportunity to provide **lighting** (assuming the assessment required by section 2.1 shows it to be required).

Horizontal illuminance

The illuminance falling on a horizontal plane.

Illuminance

The luminous flux density at a surface in a defined plane. The SI unit of illuminance is the lux, which is equal to one lumen per square metre (lm/m^2).

Luminaire

An apparatus which controls the distribution of light given by a lamp or lamps and which includes all the components necessary for fixing and protecting the lamps and connecting them to the supply circuit. 'Luminaire' has superseded the term '**lighting** fitting'.

Maintained illuminance

The average illuminance over the reference surface at the worst condition of maintenance.

Tunnel

An underground, enclosed structure provided to allow the railway to pass under higher land, buildings or water, significantly longer than it is wide.

Uniformity

The ratio of the minimum illuminance to the average illuminance over a specified surface.

Vertical Illuminance

The illuminance falling on a vertical plane.

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References

The Catalogue of Railway Group Standards and the Railway Group Standards CD-ROM give the current issue number and status of documents published by RSSB. This information is also available from www.rgsonline.co.uk.

Documents referenced in the text

RGSC 01 The Railway Group Standards Code

Railway Group Standards

GC/RT5203 Infrastructure Requirements for Personal Safety in Respect of Clearances and Access

GE/RT8021 Facilities for Emergency Voice Communications with Control Rooms

GE/RT8034 Maintenance of Signal Visibility

GE/RT8080 Train Radio Systems for Voice and Related Messaging Communications

GI/RT7033 Lineside Operational Safety Signs

GO/RT3471 Incident Response Planning

RSSB documents

GI/GN7520 Guidance on **Lighting** of Railway Premises