

# Acceptance of Trams and Light Rail or Metro Vehicles for Shared Running on Railtrack Controlled Infrastructure

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## Synopsis

This Standard defines the mandatory requirements for trams, light rail or metro vehicles in a situation where they operate through services from other administrations onto Railtrack Controlled Infrastructure.

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# Acceptance of Trams and Light Rail or Metro Vehicles for Shared Running on Railtrack Controlled Infrastructure

Railway Group Standard

GM/RT2452

Issue One

Date February 1999

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# Acceptance of Trams and Light Rail or Metro Vehicles for Shared Running on Railtrack Controlled Infrastructure

## Part A

### Issue Record

This Standard 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	February 1999	Original Document

### 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 of this Railway Group Standard are to be complied with from 3<sup>rd</sup> April 1999.

### Health and Safety Responsibilities

In issuing this Standard, 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 Standard may be obtained from the Industry Safety Liaison Dept, Safety and Standards Directorate, Railtrack PLC, Railtrack House, DP01, Euston Square, London, NW1 2EE.

# Acceptance of Trams and Light Rail or Metro Vehicles for Shared Running on Railtrack Controlled Infrastructure

## Part B

### 1 Purpose

The purpose of this Railway Group Standard is to define the particular requirements which apply to acceptance of LVs under the process defined in GO/RT3270 "Route Acceptance of Rail Vehicles". It does not address the vehicle operator's obligation under the Railways and other Transport Systems (Approval of Works, Plant and Equipment) Regulations 1994, which should be dealt with directly between the vehicle operator and HMRI.

### 2 Scope

The contents of this Standard apply to the vehicle-related aspects of operations on Railtrack controlled infrastructure which involve through running of LVs from the infrastructure of another administration, and where such vehicles operate under a Train Operator's Railway Safety Case accepted by Railtrack. It does not address safety of operations on infrastructure for which Railtrack is not the infrastructure controller. It does however address risk imported onto Railtrack controlled infrastructure via vehicles (e.g. through inadequate maintenance).

General guidance on the reduction of risk in such operations (and in situations where such vehicles have very limited access to Railtrack controlled infrastructure and are not covered by a Train Operator's Railway Safety Case accepted by Railtrack) is given in Guidance Note GE/GN8502.

### 3 Definitions

#### Common Section of Route

One where LVs and HVs operate over the same tracks or over tracks which are so close together that the swept envelopes of the vehicles overlap or have insufficient clearances between them to meet the requirements of HSE Principles and Guidance.

#### Exclusive Running

Operation where, for nominated periods of time, the Common Section of Route is dedicated either to LVs or to HVs.

#### Heavy Vehicle (HV)

A rail vehicle which operates on Railtrack controlled infrastructure and which is not an LV.

#### Light Vehicle (LV)

A Tram, or a Metro or other Light Rail Vehicle or an associated service vehicle built to similar standards for which exemption from one or more of the Railway Group Standards requirements applicable to HVs has been claimed, as permitted by GM/RT2452.

#### Metro or other Light Rail Vehicle

A vehicle which operates on an railway network having different infrastructure characteristics and / or operating standards from those of Railtrack.

#### Mixed Running

Train operation where LVs and HVs are interspersed on the Common Section of Route.

#### Tram

A flange guided rail vehicle designed to operate wholly or partly on a street tramway.

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## 4 Introduction

### 4.1 The Route Acceptance Process

Where vehicles operate on Railtrack controlled infrastructure under a Train Operator's Railway Safety Case, one important element of that Railway Safety Case is Route Acceptance, as described in Railway Group Standard GO/RT3270 "Route Acceptance of Rail Vehicles". This requires a demonstration that all risks associated with the interaction of the vehicles and the infrastructure over which they will operate have, by suitable design and maintenance and an appropriate operating regime, been reduced to a level which is as low as reasonably practicable. This demonstration normally falls into two parts:

- A demonstration that the vehicle conforms with all the mandatory requirements in Railway Group Standards. These are intended to ensure that vehicles are soundly designed and constructed and that they meet the system-wide requirements for safe interworking within the infrastructure and with other vehicles. This demonstration is provided via the process of Engineering Acceptance in which a Vehicle Acceptance Body certifies compliance with all the relevant Railway Group Standards.
- A demonstration that all other vehicle associated risks have been reduced so far as is reasonably practicable. These include the effect of interaction with the specific infrastructure over which the vehicle will operate, including phenomena such as the generation of interference currents which may have an adverse effect on of the infrastructure performance.

### 4.2 Route Acceptance of LVs

LVs are subject to the normal acceptance process. However, there may be a difficulty in meeting certain requirements of Railway Group Standards, which were written around HV applications, because of the need for compatibility with the infrastructure and operating practices of other administration(s) over which the LVs operate.

This Railway Group Standard provides a procedure by which such a situation can be regularised. It contains:

- a) A requirement that LVs meet the requirements of all vehicle-related Railway Group Standards except those which are specifically listed as being non-mandatory for these vehicles.
- b) Alternative risk control requirements for each of the areas covered by the Railway Group standards which are declared as non-mandatory for LVs.
- c) Details of how the Route Acceptance process is applied in the case of such vehicles.

### 4.3 The Procedure for Regularising Non-Compliance

Whilst this standard offers an alternative route to compliance with certain requirements of Railway Group Standards, it is recognised that these are unlikely to cover the full range of such issues which might arise as part of proposals to operate LVs on Railtrack controlled infrastructure. Where there are non-compliances which are not covered within this Standard, the procedures described in GA/RT6001 and GA/RT6006 are available in order to regularise the situation.

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## 5 Mandatory Requirements

### 5.1 Engineering Acceptance

The Engineering Acceptance process as defined in GM/RT2000 shall apply, for LVs, to the Railway Group Standards requirements which are not the subject of a specific exemption in this Standard. The corresponding Certificate of Engineering Acceptance and Certificates of Conformance shall be suitably annotated so that the basis of the certification is clear. Certificates of Conformance / Engineering Acceptance for LVs shall be issued by Conformance Certification Bodies / Vehicle Acceptance Bodies having an accreditation for multiple units.

### 5.2 Compliance with the Requirements of Railway Group Standards

LVs shall comply with all the applicable requirements of all Railway Group Standards except those which are listed under 'Exempted Sections' in Appendix A.

In respect of the 'Exempted Sections' LVs shall comply with:

either:

- the corresponding requirements listed under "Alternative Risk Controls" in Appendix A;

or

- the normal requirements of the exempted sections (despite these being non - mandatory). i.e. The option shall be available to assess LVs against the normal Railway Group Standard requirement.

Where compliance in any of the 'Exempted Sections' is judged against the normal requirement (i.e. where the Train Operator chooses to apply the requirement despite its being non - mandatory) this shall be part of the Engineering Acceptance process.

### 5.3 Demonstration of Compliance

The demonstration that requirements under "Alternative Risk Controls" have been met shall be endorsed by a suitably competent third party before submission to Railtrack as part of a Route Acceptance Safety Case. Where these requirements are specifically indicated in Appendix A as falling within the scope of Engineering Acceptance, this endorsement shall be via the appropriate Certificate(s) of Conformance and the Certificate of Engineering Acceptance.

Where these requirements do not fall within the scope of Engineering Acceptance (such as the measures to reduce the probability of collision for vehicles not meeting the full structural requirements of GM/RT2100) the appropriate Certificate(s) of Conformance and the Certificate of Engineering Acceptance shall be suitably annotated to indicate that these issues are not closed out and need to be addressed elsewhere within the Route Acceptance Safety Case.

### 5.4 Effective Procurement Date

Where LVs already exist at the time of the proposal to operate them on Railtrack controlled infrastructure, the effective procurement date (i.e. the date which will govern whether compliance with recently developed Railway Group Standards is required or not) shall be agreed between the Train Operator and the Controller, Railway Group Standards, Railtrack Safety and Standards Directorate.

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## Appendix A

### Sections of Railway Group Standards for which Compliance is Not Mandatory in the Case of LVs

#### A1.1 Railway Group Standard GM/RT2025 "Branding of Wheels, Tyres and Axles"

**Exempted Sections** 9.10 (In respect of the positioning of the branding only).

##### Alternative Risk Controls

Where the branding can be rendered more visible, or problems of interference with the drive system of underfloor wheel lathes can be avoided, by locating the branding on the opposite face of the wheel rim from that shown in Figure 2 or 3, this shall be admissible provided that the ability to meet the other requirements of the Standard is not compromised. Confirmation of the acceptability of alternative locations for branding shall be part of Engineering Acceptance.

#### A1.2 Railway Group Standard GM/RT2026 "Wheelsets: In Service Safety and Maintenance Attention"

**Exempted Sections** Appendix A

##### Alternative Risk Controls

Where non - standard wheelset geometry is proposed (see A1.3 below) the risk assessment shall include consideration of wear rates, and dimensional criteria shall be established as part of maintenance / overhaul arrangements such that safe limits are not exceeded in service. Confirmation of the appropriateness of these arrangements shall form part of Engineering Acceptance.

#### A1.3 Railway Group Standard GM/RT2028 "Wheelset Design"

**Exempted Sections** 5.5, 5.6, 6.3.3, 10.3

**Railway Group Standard** GM/TT0089 "Geometric Interfaces between Railway Wheelsets & Track"

**Exempted Sections** 5

##### Alternative Risk Controls

Where the requirements of correct guidance, safety against flange climbing derailment or the need to limit wheel / rail contact stresses on the infrastructure of other administrations dictates that the use of one of the approved wheel profiles is not appropriate and / or that the dimensional limits which normally apply are not appropriate, it shall be permissible to use alternative designs, provided that an appropriate risk assessment is carried out. That risk assessment shall take into account as a minimum:

- the wheelset / track geometric relationship in plain line and its influence on guidance in curves, on vehicle ride and dynamic stability, and on derailment propensity;
- guidance of the wheelsets in switches and crossings and the avoidance of undesirable impacts;
- the behaviour of the wheelsets in the presence of check rails;
- wheel / rail contact stresses.

Confirmation of the appropriateness of the proposed geometry shall be part of Engineering Acceptance.

It is recognised that it may not be practicable to make LVs compatible with the Hot Axlebox Detectors (HABD's) commonly used on Railtrack controlled

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infrastructure. This requirement is therefore waived in situations where the approved procedure for managing the risk from overheated bearings (see GM/RT2242) does not require detection by HABD's, though the requirement to ensure compatibility still remains in the sense of avoiding spurious detections from extraneous heat sources.

#### **A1.4 Railway Group Standard** GM/RT2044 "Braking System and Performance Requirements for Multiple Units"

**Exempted Sections** 5.1, 5.3, 5.4.1

##### Alternative Risk Controls

The LV Operator and Railtrack shall ensure that the vehicle braking performance and the signalling system design is such that, when using full service braking, the LV is able to stop within the permitted distance dictated by the design of the signalling system even when the nominal braking performance is degraded such as to give a 20% increase in stopping distance. The nominal performance shall be as defined in Section 5.2 of the Standard. Confirmation of the correctness of the declared braking characteristics shall form part of Engineering Acceptance.

The upper limit on emergency braking rate which is specified in 5.4.1 shall apply to the retardation rate produced by wheel - rail friction. However, it shall be permissible to enhance the overall retardation rate by the use of track brakes, provided that their use has been agreed with Railtrack following an assessment of potential effects on the track system.

#### **A1.5 Railway Group Standard** GM/RT2045 "Braking Principles for Rail Vehicles"

**Exempted Sections** 7.2.5

##### Alternative Risk Controls

Where the availability of traction power on demand by the driver is sufficiently rapid such that, taking into account the gradients over which it will operate, an LV is able to start without rolling back, then the requirement to be able to obtain traction power with a partial brake application is waived. Confirmation that the vehicle has appropriate traction / braking characteristics to avoid roll-back shall form part of Engineering Acceptance.

#### **A1.6 Railway Group Standard** GM/RT2100 "Structural Requirements for Railway Vehicles"

**Exempted Sections** 6.1, 9

##### Alternative Risk Controls

For vehicles not meeting the longitudinal strength and / or the structural collapse requirements of the Standard, the risk from collisions between LVs and HVs arising from a signal passed at danger shall be controlled by the provision of suitable SPAD protection measures.

For Mixed Running, the measures provided shall include systems for ensuring that all trains (i.e. both HVs and LVs) stop at a signal at danger (or within the overlap) by the automatic application of the brakes, with such systems being provided at all signals capable of displaying a danger aspect.

For Exclusive Running, the measures provided to control access to the Common Section of Route shall provide positive exclusion of the other mode (i.e. of HVs when the Common Section of Route is dedicated to LVs and vice - versa) via physical means such as the lie of points whenever the signal controlling access to the Common Section of Route is displaying a danger aspect. There shall also be a means, in both normal and degraded (equipment failure) conditions, of proving that the section is clear of all trains of one mode before admitting trains of the other mode.

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**A1.7 Railway Group Standard** GM/RT2162 "Traincrew Access to and Egress from Railway Vehicles"

**Exempted Sections** 6 and 7

**Alternative Risk Controls**

It is accepted that it may not be practicable, in tramway applications in particular, for there to be a place of safety behind the driving cab which is not accessible to the public. The Train Operator shall nevertheless ensure that there are arrangements in place to make passengers aware of the necessity to keep the driver's escape route clear. Confirmation of the adequacy of such arrangements shall form part of Engineering Acceptance.

**A1.8 Railway Group Standard** GM/RT2180 "Visibility and Audibility of Trains on the Track"

**Exempted Sections** 5.1.3, 6.1.1

**Alternative Risk Controls**

In a situation where an LV must provide the driver with a large field of view for safe street running and this need conflicts with the requirement for a minimum frontal area of yellow of 1.0m<sup>2</sup>, the latter requirement shall be waived provided that the maximum speed of the vehicle is 80km/h or less and that the vehicle has an emergency braking capability of 2.0m/s<sup>2</sup> or more.

Where LVs are intended for street operation, there is a conflict between the Railway Group Standard requirement in Clause 6.1.1 and Railway Safety Principles and Guidance Part 2 Section G which cites the preferred headlamp height as between 500 and 1200mm above rail. For such vehicles operating on Railtrack controlled infrastructure the headlamp height shall be in the range 500 - 1200mm and shall be as close to 1200mm as is practicable.

Confirmation of compliance with the requirements shall form part of Engineering Acceptance.

**A1.9 Railway Group Standard** GM/RT2181 "Overhead Line Equipment (OLE) Warning Line on Railway Vehicles"

**Exempted Sections** 5.1.1, 5.1.2, 5.1.4

**Alternative Risk Controls**

The requirement for the height of the warning line above rail level is a function of the standard supply voltage (25kV) and the wire height of the Railtrack system. In a situation where the supply voltage / wire height is not to the Railtrack standard, the Train Operator shall ensure that the OLE warning line is as high as practicable, taking into account the following requirements:

- a) The OLE warning line shall be visible when standing at rail level.
- b) The clearance between the warning line and the nearest live exposed electrical equipment (either on the vehicle or the supply system itself) shall be sufficient to ensure the safety of personnel approaching not closer than the warning line.
- c) The warning line shall, as far as is practicable, be within the range reached by the vehicle washing system.

Confirmation of compliance with the above requirements shall form part of Engineering Acceptance. If the LV is authorised to operate only over routes where there is no overhead line equipment, the requirement for an OLE warning line shall be waived.

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## A1.10 Railway Group Standard GM/TT0122 "Structural Requirements for Windscreens and Windows on Railway Vehicles"

### Exempted Sections 4.1

#### Alternative Risk Controls

The requirement shall be as per Section 4.1 of GM/TT0122, except that for vehicles having a maximum operating speed below 130km/h, the relative impact velocity shall be the maximum operating speed + 90km/h. Confirmation of compliance shall form part of Engineering Acceptance.

## A1.11 Railway Group Standard GO/OTS300 "Power Operated External Doors on Passenger Carrying Rail Vehicles"

### Exempted Sections 6.3

#### Alternative Risk Controls

The train operator shall consider, by means of a risk assessment, whether it is desirable that the driver of an LV should be able to override an automatic brake application resulting from a door becoming unlocked when the vehicle is in motion.

In deciding whether the safety benefit of being able to bring the train to a controlled stop at a suitable location outweighs the potential delay in bringing the train to a stand, the train operator shall consider, as a minimum:

- the ease, or otherwise, of detraining passengers the vehicle is not at a platform;
- the topography of the route and the presence of platforms, tunnels, viaducts etc.

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## References

- GA/RT6001** Railway Group Standards Change Procedures
- GA/RT6006** Derogations from Railway Group Standards
- GE/GN8502** Operation of Trams and Light Rail or Metro Vehicles Over
- GM/TT0089** Geometric Interfaces between Railway Wheelsets & Track
- GM/TT0122** Structural Requirements for Windscreens and Windows on
- GM/RT2000** Engineering Acceptance of Rail Vehicles
- GM/RT2025** Branding of Wheels, Tyres and Axles
- GM/RT2026** Wheelsets: In Service Safety and Maintenance Attention
- GM/RT2028** Wheelset Design
- GM/RT2044** Braking System and Performance Requirements for Multiple
- GM/RT2045** Braking Principles for Rail Vehicles
- GM/RT2100** Structural Requirements for Railway Vehicles
- GM/RT2162** Traincrew Access to and Egress from Railway Vehicles
- GM/RT2180** Visibility and Audibility of Trains on the Track
- GM/RT2181** Overhead Line Equipment (OLE) Warning Line on Railway
- GM/RT2242** Risk Management of Rail Vehicles Axle Bearings
- GO/OTS300** Power Operated External Doors on Passenger Carrying Rail
- GO/RT3270** Route Acceptance of Rail Vehicles