Assessment of Compatibility of Rolling Stock and Infrastructure – Gauging and Stepping Distances

Synopsis
This document mandates specific requirements and responsibilities for the assessment of gauging compatibility and stepping distances between rolling stock and infrastructure.
Issue record

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Superseded documents

The following Railway Group document is superseded, either in whole or in part as indicated:

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GE/RT8270 issue two, Appendix C, ceases to be in force and is withdrawn as of 05 March 2016.

Supply

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**Definitions**  

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Part 1  Purpose and Introduction

1.1  Purpose

1.1.1 Before any new or altered rolling stock or infrastructure is brought into use, it is essential that the change is assessed to ensure compatibility between assets is maintained.

1.1.2 GE/RT8270 mandates requirements and responsibilities for the assessment of compatibility between rolling stock and infrastructure and the arrangements by which the assessment of compatibility is undertaken. It also identifies those responsible for managing that assessment.

1.1.3 This document mandates requirements and responsibilities for the assessment of gauging compatibility between rolling stock and infrastructure, the arrangements by which the assessment of gauging compatibility is undertaken and identifies those responsible for managing that assessment.

1.1.4 Before any new or changed rolling stock or infrastructure is brought into use, it is essential that the change is assessed to ensure that:

a) Gauging compatibility between assets is maintained.

b) Platform stepping distances for passenger rolling stock are managed.

1.1.5 This document is also applicable when assessing gauging compatibility between rolling stock and rolling stock, or infrastructure and infrastructure, where the assets concerned are the responsibility of more than one Infrastructure Manager or Railway Undertaking.

1.2  Introduction

1.2.1  Background

1.2.1.1 This document has been developed to provide the processes for demonstrating gauging compatibility. It therefore aligns with the process mandated in GE/RT8270 to ensure system compatibility is maintained.

1.2.1.2 This document also provides a methodology for the assessment of platform stepping distances when either a change is made to the platform edge arrangements or when passenger rolling stock using the route is modified or passenger rolling stock is to be introduced onto a route.

1.2.1.3 GE/RT8270, sections 3.2.3 and 3.2.4 recognise that either side of an interface could be non-conforming with the Railway Group Standard (RGS) integrated suite of standards. For the platform / train interface and associated platform stepping distances this is the case, where:

a) Many platform edges are not at the nominal position set out in RGSs.

b) Many passenger rolling stock footsteps are not at the nominal footstep height as set out in GM/RT2173.
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Railway Group Standard
GE/RT8273
Issue One
Date December 2015

1.2.2 Related requirements in other documents
1.2.2.1 The following RGSSs contain requirements that are relevant to the scope of this document:

a) GE/RT8073 Requirements for the Application of Standard Vehicle Gauges – this document defines standard vehicle gauges and the associated application rules for rolling stock and for infrastructure. GE/RT8073 defines the lower sector vehicle gauge (LSVG).

b) GE/RT8270 Assessment of Compatibility of Vehicles and Infrastructure – this document mandates requirements and responsibilities for the assessment of compatibility of rolling stock and infrastructure.

c) GI/RT7016 Interface between Station Platforms, Track and Trains – this document sets out the target height for new, extended and altered platforms.

d) GI/RT7073 Requirements for the Position of Infrastructure and for Defining and Maintaining Clearances – this document sets out the target platform offset for new, extended and altered platforms. It also requires the Infrastructure Manager to keep, maintain and make available to Railway Undertakings and their suppliers, gauging capability information and generic track quality data.

e) GM/RT2173 Requirements for the Size of Vehicles and Position of Equipment – this document mandates the methods of determining, and the requirements for maintaining, the swept envelope of rail vehicles. It mandates the format of the prescribed parameters for defining the size of railway vehicles. It also provides requirements for passenger footstep position.

1.2.3 Supporting documents
1.2.3.1 The following Railway Group documents support this RGS:

a) GE/GN8573 Guidance on Gauging – this document provides information and advisory material in support of the application of the various RGSSs covering gauging. It also provides background material on the original derivation of the vehicle gauges in common use.

b) RIS-2773-RST Format for Vehicle Gauging Data – this document provides a standard format for defining the swept envelope of a vehicle for the purposes of compatibility assessment when undertaking absolute or comparative gauging. The data can also be used for the purposes of assessment against standard dynamic vehicle gauges.

1.3 Approval and authorisation of this document
1.3.1 The content of this document will be approved by Rolling Stock Standards Committee on 28 August 2015.

1.3.2 This document will be authorised by RSSB on 08 October 2015.
Part 2  Processes for the Assessment of Gauging Compatibility for Rolling Stock and Infrastructure

2.1  Introduction

2.1.1 The demonstration of gauging compatibility shall be carried out using one of the processes set out in section 2.2 of this document. These processes are:

a) Using standard vehicle gauges (section 2.2.1).

b) Absolute gauging (section 2.2.2).

c) Comparative gauging (section 2.2.3).

d) Hybrid gauging (section 2.2.4).

2.1.2 There are two areas of gauging compatibility which are to be considered. These are labelled as the lower sector and the upper sector. The lower sector is the area up to and including 1100 mm above the plane of the rails and the upper sector is the area above 1100 mm above the plane of the rails. The lower sector and upper sector have different associated clearance requirements, see GI/RT7073, and different particular requirements for equipment designed to be in contact or in close proximity, for example automatic warning system magnets and receivers or overhead line equipment and pantographs.

2.1.3 There are two fundamental scenarios for assessing gauging compatibility based on whether the asset already exists or is being designed:

a) Introducing or altering an asset to be compatible with existing assets, for example cascading a rolling stock fleet to a different route – the assessment will take the form of using the existing information on the asset. This may include the existing gauging information for the rolling stock and the national gauging database for the infrastructure. This situation provides limited opportunity to alter the rolling stock or infrastructure.

b) Building a new asset, for example building new rolling stock or a new platform – in this case the new asset shall be built to the relevant standards.

2.2  Gauging processes

2.2.1  Using standard vehicle gauges

2.2.1.1 GE/RT8073 defines standard vehicle gauges and the associated application rules for rolling stock and for infrastructure.

2.2.1.2 Where routes have been published by the Infrastructure Manager as compatible with a particular standard vehicle gauge, rolling stock conforming to that standard vehicle gauge shall be deemed to be compatible with the gauge of the infrastructure on the route.

2.2.1.3 Where the vehicle gauge does not include the whole vehicle, for example lower sector or upper sector, the compatibility applies to that portion of the vehicle only.

2.2.1.4 Using compatible lower sector and upper sector gauges is a way of demonstrating compatibility using the standard vehicle gauge process.
2.2.2 Absolute gauging

2.2.2.1 Absolute gauging shall be used when it is necessary to compare the vehicle swept envelope (see GM/RT2173) with the measured infrastructure and track position (see GI/RT7073).

2.2.3 Comparative gauging

2.2.3.1 Where comparative gauging using swept envelopes is to be used, the swept envelopes shall have been produced using consistent methodologies as set out in GM/RT2173 or, for vehicles already in service, GM/RT2149 issue two or three.

2.2.3.2 Vehicles chosen for comparison shall have been demonstrated to have gauging compatibility with a route(s). Such gauging compatibility shall be demonstrated by either:

a) Evidence of significant and regular traffic on the route(s) being considered.

b) Demonstration of gauging compatibility in accordance with GE/RT8270 issue two or in accordance with this document.

2.2.3.3 GE/GN8573 sets out guidance on comparative gauging and the factors determining significant and regular traffic.

2.2.3.4 An assessment shall be carried out to determine the suitability of the comparison and identify changes in the risk profile and necessary mitigations. When undertaking the assessment consideration shall be given to a number of factors, including:

a) Loading characteristics.

b) Service pattern.

c) Comparable failure conditions.

d) Relevant incident history.

2.2.3.5 The swept envelope of the candidate vehicle shall be compared with that of the comparator vehicle for conditions of vehicle loading, track curvature, speed and cant deficiency or excess representing the full range of operating conditions for the route. Where all swept envelopes of the rolling stock being gauged are within the swept envelopes of a comparator vehicle, or vehicles, having been assessed as having gauging compatibility with the section of track, then gauging compatibility shall be deemed to be achieved.

2.2.3.6 Any reduced or special reduced clearances agreed for the comparator rolling stock shall be transferred to the rolling stock being gauged, subject to confirmation from the Infrastructure Manager that the associated measures remain in place.

2.2.4 Hybrid gauging

2.2.4.1 It is permitted to use hybrid gauging where it is necessary to achieve gauging compatibility through any combination of using standard vehicle gauges, absolute gauging or comparative gauging. When assessing a clearance using standard vehicle gauges, absolute gauging or comparative gauging, all of the rules associated with that process shall be applied to the respective part of the vehicle.
Part 3 Platform Stepping Distances

3.1 Assessment of platform stepping distances

3.1.1 Assessment of platform stepping distances shall be carried out when any of the following changes are proposed to infrastructure:

a) A change is made to the platform edge arrangements including:
   i) Building a new platform or extending an existing platform.
   ii) Altering the height or offset of platform copers.

b) For track adjacent to platforms, a design change is made to the track position relative to the platform edge.

3.1.2 Assessment of platform stepping distances shall be carried out when either of the following changes are proposed to rolling stock:

a) Different passenger rolling stock for revenue service is to be introduced onto a route.

b) A design change is made to the passenger rolling stock that affects stepping distances.

3.1.3 Assessment of platform stepping distances shall be carried out using the following stages:

a) Determine and gather relevant platform edge, track characteristics and footstep arrangement data.

b) Calculate stepping distances.

c) Assess stepping distances.

3.1.4 GE/GN8573 sets out guidance on platform stepping distances.
Part 4 Application of this Document

4.1 Application - Infrastructure Managers
4.1.1 Scope
4.1.1.1 The requirements of this document apply to Infrastructure Managers.

4.1.2 Exclusions from scope
4.1.2.1 There are no exclusions from the scope specified in 4.1.1 for Infrastructure Managers.

4.1.3 General compliance date for Infrastructure Managers
4.1.3.1 This RGS comes into force and is to be complied with from 05 March 2016, except as specified in 4.1.4. Where the dates specified in 4.1.4 are later than the above date, this is to allow Infrastructure Managers sufficient time to achieve compliance with the specified exceptions.

4.1.3.2 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 RGS. Where it is considered not reasonably practicable to comply with the requirements, permission to comply with a specified alternative should be sought in accordance with the RGS Code.

4.1.4 Exceptions to general compliance date
4.1.4.1 There are no exceptions to the general compliance date specified in 4.1.3 for Infrastructure Managers.

4.2 Application - Railway Undertakings
4.2.1 Scope
4.2.1.1 The requirements of this document apply to all Railway Undertakings.

4.2.2 Exclusions from scope
4.2.2.1 There are no exclusions from the scope specified in 4.2.1 for Railway Undertakings.

4.2.3 General compliance date for Railway Undertakings
4.2.3.1 This RGS comes into force and is to be complied with from 05 March 2016, except as specified in 4.2.4. Where the dates specified in 4.2.4 are later than the above date, this is to allow railway undertakings sufficient time to achieve compliance with the specified exceptions.

4.2.3.2 After the compliance dates, or the date by which compliance is achieved if earlier, Railway Undertakings are to maintain compliance with the requirements set out in this RGS. Where it is considered not reasonably practicable to comply with the requirements, permission to comply with a specified alternative should be sought in accordance with the RGS Code.

4.2.4 Exceptions to general compliance date
4.2.4.1 There are no exceptions to the general compliance date specified in 4.2.3 for Railway Undertakings.
4.3 Health and safety responsibilities

4.3.1 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.
Definitions

Absolute gauging
Absolute gauging of a vehicle is a full assessment of clearances on a section of track between the vehicle and fixed infrastructure, and between the vehicle and vehicles on adjacent tracks.

Clearance
The minimum calculated distance between the swept envelope of a vehicle and fixed infrastructure or between the swept envelopes of two vehicles on adjacent tracks.

Comparative gauging
The process of comparing the swept envelopes of a vehicle new to a route, with the swept envelopes of a vehicle or vehicles which have been demonstrated to be able to use the proposed route.

Gauge
Used to refer to a vehicle gauge or structure gauge where the context makes it clear which is meant. See ‘vehicle gauge’.

Gauging
The process by which swept envelopes of a vehicle or a standard vehicle gauge are used to determine clearances on a section of track between the vehicle and fixed infrastructure and between the vehicle and vehicles on adjacent tracks.

Gauging compatibility
Compatibility of the swept envelopes of vehicles through the space limitations of track intervals and relative positions of adjacent structures. Also includes the compatibility of passenger foot step position with platform edge position and the consideration of the interface between power and signalling systems.

Hybrid gauging
A combination of standard vehicle gauges, comparative or absolute gauging.

Infrastructure
For the purpose of this document, track and structures in combination. Compare with ‘structure’.

Lower sector
The area up to and including 1100 mm above the plane of the rails. See also ‘upper sector’.

Normal clearance
A clearance between a structure and a vehicle or between passing vehicles which does not require specific controls on the position of the track, but which does require the relative locations of structures and adjacent tracks to be monitored and maintained.

Overthrow
A geometric projection of a vehicle when on curved track.

Plane of the rails
An imaginary surface coplanar with the top of both rails of a track.
Reduced clearance
A clearance, less than a normal clearance, which requires special measures to maintain tracks relative to adjacent tracks and structures.

Route
The physical path of a journey to be undertaken by a vehicle or a collection of vehicles, where the path is comprised of a number of track sections, each of which has individually defined characteristics.

Section of track
Track bounded by identified limits such as junctions, terminals or points at which there is a significant change in traffic flow or permissible speed.

Special reduced clearance
A clearance, less than a reduced clearance, which requires a specific risk assessment to be undertaken and the implementation of appropriate controls to demonstrate that risks have been reduced to as low as reasonably practicable (ALARP).

Standard vehicle gauge
An outline drawing or specification of a notional vehicle, which prescribes maximum permissible vehicle and loading dimensions, certain suspension displacements, and certain curve overthrow limitations, for example, W6a gauge.

Structure
An element of the infrastructure adjacent to, or crossing over, a railway track. So far as this document is concerned ‘structures’ include, but are not limited to the list below (compare with ‘infrastructure’):

a) Train control and communications equipment, for example, signals.

b) Station platforms.

c) Overhead line equipment supporting structures at earth potential, but excluding insulators.

d) Civil engineering structures such as retaining walls, tunnels and bridges.

e) Other isolated structures.

f) Temporary works.

Swept envelope
A cross-sectional profile, taken at right angles to the track, enclosing all dynamic movements, static deflections and overthrows of all points along the surface of the vehicle that can reasonably be expected to occur under the appropriate range of operating conditions as it sweeps past a theoretical track location. A family of swept envelopes is required to define a vehicle’s behaviour on a route.

The swept envelopes referred to within this document exclude the effects of track tolerance and rail sidewear previously included in kinematic envelopes developed under GM/RT2149 or earlier documents. A process for defining a swept envelope can be found in GM/RT2173.

Upper sector
The area above 1100 mm above the plane of the rails. See also ‘lower sector’.
Vehicle gauge
The maximum envelope that a vehicle conforming to the gauge is permitted to occupy statically and dynamically, which prescribes maximum permissible vehicle and loading dimensions, certain suspension displacements, and certain curve overthrow limitations, for example, W6a gauge.
Assessment of Compatibility of Rolling Stock and Infrastructure – Gauging and Stepping Distances

References

The Catalogue of Railway Group Standards gives the current issue number and status of documents published by RSSB. This information is also available from www.rgsone.co.uk.

RGSC 01 Railway Group Standards Code
RGSC 02 The Standards Manual

Documents referenced in the text

Railway Group Standards
GE/RT8073 Requirements for the Application of Standard Vehicle Gauges
GE/RT8270 Assessment of Compatibility of Vehicles and Infrastructure
GI/RT7016 Interface between Station Platforms, Track and Trains
GI/RT7073 Requirements for the size and position of infrastructure
GM/RT2149 Requirements for Defining and Maintaining the Size of Railway Vehicles
GM/RT2173 Requirements for the size of vehicles and position of equipment

RSSB documents
GE/GN8573 Guidance on Gauging
RIS-2773-RST Format for Vehicle Gauging Data