

Railway Group Standard

GM/RT2131

Issue One

Date December 2015

Audibility and Visibility of Trains

Synopsis

This document mandates requirements for audible and visible warning devices such that an approaching train is clearly audible and visible to members of the public and trackside staff.

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Issue record

Issue	Date	Comments
One	December 2015	Original document. Supersedes GM/RT2483 and GM/RT2484 to align with the Locomotives and Passenger Rolling Stock (LOC & PAS) Technical Specification for Interoperability (TSI).

Superseded documents

The following Railway Group documents are superseded, either in whole or in part as indicated:

Superseded documents	Sections superseded	Date when sections are superseded
GM/RT2483, issue one, Visibility Requirements for Trains.	All	05 March 2016
GM/RT2484, issue two, Audibility Requirements for Trains.	All	05 March 2016

GM/RT2483 issue one and GM/RT2484 issue two cease to be in force and are withdrawn as of 05 March 2016.

Supply

The authoritative version of this document is available at <http://www.rssb.co.uk/railway-group-standards>. Enquiries on this document can be forwarded to enquirydesk@rssb.co.uk.

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Audibility and Visibility of Trains

Part 1 Purpose and Introduction

1.1 Purpose

- 1.1.1 This document mandates requirements for audible and visible warning devices such that an approaching train is clearly visible and audible to members of the public and trackside staff.

1.2 Introduction

1.2.1 General

- 1.2.1.1 This document sets out requirements for the audibility and visibility of trains to comply with the Locomotives and Passenger Technical Specifications for Interoperability (LOC & PAS TSI).
- 1.2.1.2 This document sets out National Technical Rules (NTRs) for the GB mainline railway. Compliance with NTRs is required under the Railways Interoperability Regulations 2011 (RIR 2011) (as amended).
- 1.2.1.3 This document sets out National Technical Rules (NTRs) associated with audibility and visibility of trains which are additionally needed to maintain compatibility with existing operating practices.
- 1.2.1.4 This document sets out the NTR supporting the specific case permitted by the LOC & PAS TSI, associated with the sound pressure levels of warning horns. These requirements are the minimum and maximum sound pressure levels that warning horns are to emit that are consistent with giving safe warning to members of the public and trackside staff.
- 1.2.1.5 This document sets out National Safety Rules (NSRs) to assess compatibility of a train, powered by a shunting or steam locomotive, with existing operating practice in terms of its visibility on the particular route where it is likely to be operated.

1.2.2 Background on audibility requirements

- 1.2.2.1 An approaching train needs to be clearly audible and recognisable as a train to members of the public and trackside staff.
- 1.2.2.2 The warning horn of an approaching train needs to be audible for a distance of at least 400 m along the track. This condition is considered adequately fulfilled if the warning horn sound pressure levels specified further in this document are achieved when measured using the method specified in this document.

1.2.3 Background on visibility requirements

- 1.2.3.1 An approaching train needs to be clearly visible and recognisable as a train to members of the public and trackside staff.
- 1.2.3.2 The head lamps must give sufficient warning of an approaching train running at its maximum permitted speed, to allow track workers or others on or near the line time to move to a position of safety.
- 1.2.3.3 For track workers working alone, at night, a warning time of 15 seconds is deemed to be adequate. For track workers, working during the day, under the protection of lookouts, 45 seconds warning time is deemed to be adequate. Head lamps meeting the requirements of the LOC & PAS TSI will achieve this up to the highest permissible speed of 200 km/h (125 mph).
- 1.2.3.4 The LOC & PAS TSI also sets out requirements for the positioning of head lamps, colour and intensity in order to give a sufficient and clearly distinguishable warning of the approach of a train.

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- 1.2.3.5 If a train is fitted with front end lamps (head lamps and marker lamps) which do not comply with the requirements set out in the LOC & PAS TSI, then yellow front ends need to be provided to assist the visibility of the train. This document sets out requirements for yellow front ends in such a scenario.
- 1.2.3.6 The rear end of a train needs to be visible for a distance of 400 m behind that train, this condition is considered adequately fulfilled by a tail lamp meeting the requirements of the LOC & PAS TSI, or a portable tail lamp meeting the requirements set out in Appendix B.
- 1.2.4 Structure of this document**
- 1.2.4.1 This document sets out a series of requirements that are sequentially numbered.
- 1.2.4.2 This document also sets out the rationale for the requirement. The rationale explains why the requirement is needed and its purpose. Where relevant, guidance supporting the requirement is also set out in this document. The rationale and the guidance are indicated by prefixing the clause number with the letter 'G'.
- 1.2.4.3 The national rules relating to relevant TSI parameters have been identified together with the relevant clauses from TSI(s).
- 1.2.5 Related requirements in other documents**
- 1.2.5.1 Requirements for warning horns fitted to on-track machines (OTMs) for use in running mode are set out in GM/RT2400.
- 1.3 Approval and authorisation of this document**
- 1.3.1 The content of this document will be / was approved by Rolling Stock Standards Committee on 28 August 2015.
- 1.3.2 This document will be / was authorised by RSSB on 08 October 2015.

Audibility and Visibility of Trains

Part 2 Requirements for Warning Horns

2.1 Audibility requirements

2.1.1 Except where otherwise required by this document, the requirements of the LOC & PAS TSI set out in section 4.2.7 covering 'audible warning devices' applicable to the audibility of trains shall apply as if they were requirements mandated by this document.

G 2.1.1.1 **Rationale for clause 2.1.1:** The LOC & PAS TSI requirements for audible warning devices are also applicable to vehicle modifications to 'audible warning devices' where the vehicle is deemed not to be new, renewed and upgraded as defined in RIR 2011 (as amended). These requirements together with any exceptions set out in this RGS, will help achieve compatibility with the TSI and the non-TSI compliant parts of the existing railway system.

G 2.1.1.2 This RGS includes additional requirements and guidance for audible warning devices on rail vehicles and is intended to be read in conjunction with the LOC & PAS TSI. The exceptions to the LOC & PAS TSI are set out in this document such as the sound pressure levels of warning horns, where a Great Britain (GB) Specific Case applies.

G 2.1.1.3 See Appendix A of this document for further guidance on audibility requirements.

2.2 Warning horn sound pressure levels

2.2.1 The minimum and maximum sound pressure levels for warning horns sounded separately, or in a group if designed to sound simultaneously as a chord, shall comply with Table 1 of this document.

	Minimum C weighted sound pressure level ($L_{pCeq,T}$) at 25 m	Maximum C weighted sound pressure level ($L_{pCeq,T}$) at 25 m
Trains with design speeds less than or equal to 160 km/h (100 mph)	86 dB ¹	94 dB ¹
Trains with design speeds greater than 160 km/h (100 mph)	101 dB ²	109 dB ²

Table 1 Warning horn sound pressure levels

G 2.2.1.1 **Rationale for clause 2.2.1:** This requirement supports the GB specific case for warning horn sound pressure levels, applicable to the GB mainline network, permitted by the LOC & PAS TSI (7.3.2.9).

G 2.2.1.2 Sound pressure levels are measured using the method described in BS EN 15153-2:2013 section 6.

¹ As specified in the GB A-deviation in BS EN 15153-2:2013 Annex D.

² As specified in BS EN 15153-2:2013

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G 2.2.1.3 Measurement of the sound pressure at the fixed distance of 25 m, as specified in BS EN 15153-2:2013, avoids the need to measure in a direct horizontal alignment with the horn position.

2.2.2 To minimise environmental impact it is permissible for the warning horn sound pressure levels to be able to switch with the actual train speed (in accordance with Table 1 of this document).

G 2.2.2.1 **Rationale for clause 2.2.2:** The close proximity of its neighbours to the rail system in GB justified the specific case for lower sound pressure levels than those mandated in the LOC & PAS TSI. Trains with a maximum speed of less than 160km/h (100 mph) require a horn meeting the sound pressure levels specified for that speed band. However, trains with a maximum speed of greater than 160 km/h (100 mph) could only have the louder horn as specified, or use a warning horn automatically switchable between the two sound pressure levels:

- a) One with the higher sound pressure levels, to be used when operating at speeds over 160 km/h (100 mph).
 - b) One with the lower sound pressure levels, to be used when operating at speeds up to 160 km/h (100 mph).
-

2.3 Control

2.3.1 The requirements of the LOC & PAS TSI associated with control of audible warning devices applicable to trains shall apply as if they were requirements mandated by this document.

G 2.3.1.1 **Rationale for clause 2.3.1:** The requirements of the LOC & PAS TSI are also applicable to vehicle modifications to the control of audible warning devices where the vehicle is deemed not to be new, renewed and upgraded as defined in RIR 2011 (as amended). These requirements will help achieve compatibility with the TSI and the non-TSI compliant parts of the existing railway system.

G 2.3.1.2 Compliance with this requirement will also achieve the requirements of the Operation and Traffic Management (OPE) TSI which requires that that trains are fitted with an audible warning device to indicate the approach of a train and the activation of the audible warning device is possible from all driving positions (i.e. from both active and non-active cabs).

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Part 3 Requirements for Visibility of Trains

3.1 Visibility requirements

- 3.1.1. Except where otherwise required by this document, the requirements of the LOC & PAS TSI set out in section 4.2.7 covering 'external lights and visible warning devices' applicable to visibility of trains shall apply as if they were requirements mandated by this document.

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- G 3.1.1.1 **Rationale for clause 3.1.1:** The LOC & PAS TSI requirements for external lights and visible warning devices are also applicable to vehicle modifications to 'external lights and visible warning devices' where the vehicle is deemed not to be new, renewed and upgraded as defined in RIR 2011 (as amended). These requirements together with any exceptions set out in this RGS, will help achieve compatibility with the TSI and the non-TSI compliant parts of the existing railway system.
- G 3.1.1.2 The provision of head lamps that meet the functionality of both 'Full beam' and 'Dimmed' enables compatibility with the GB operational requirements of 'Day time' (using 'Full beam') and 'Night time' (using 'Dimmed') arrangements as set out in GE/RT8000.
- G 3.1.1.3 This RGS includes additional requirements and guidance for external lights and visible warning devices on rail vehicles and is intended to be read in conjunction with the LOC & PAS TSI. The exceptions to the LOC & PAS TSI are set out in this document.
- G 3.1.1.4 To achieve the necessary visibility when installing headlamps it is useful to take into account any possible obstruction so that the visibility of the headlamp is not impeded.
- G 3.1.1.5 The visibility and recognisability of the train is achieved by the combination of headlamps and the top marker lamp.
- G 3.1.1.6 Front end lamp luminosities are measured using the method described in BS EN15153-1 Section 6.
- G 3.1.1.7 For existing vehicles fitted with fixed head lamps that do not conform to the requirements set out in the LOC & PAS TSI, Appendix F provides guidance on a methodology for establishing whether installation of LOC & PAS TSI compliant head lamps is the appropriate course of action.
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- 3.1.2 Head lamp glare shall be controlled through the use of head lamps complying with Clause 5.3.4 Table 3 of EN15153-1:2013

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- G 3.1.2.1 **Rational for clause 3.1.2** Headlamps that are adjusted using the 'alternative approach' to glare control will not achieve the necessary warning times.
- G 3.1.2.2 The 'alternative approach' for glare control is not permitted.
-

3.2 Lamp installation

- 3.2.1 Fixed lamps shall meet the environmental requirements set out in the LOC & PAS TSI such that they are capable of operating in the T1 ambient temperature range as defined in BS EN 50125-1:2014.

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- G 3.2.1.1 **Rationale for clause 3.2.1:** The LOC & PAS TSI requires equipment installed on a vehicle to meet the requirements of the TSI within one of several temperature ranges. The T1 temperature range aligns with those applicable to the GB mainline network.

3.3 Control, switching arrangements

3.3.1 Controls shall be provided that enable the switching of the lamps on and off, and between modes, as shown below, from the normal driving position. The modes are:

- a) Marker lamps only (white marker lamps at the front of the train and red tail lamps at the rear of the train).
- b) Day time running (1 or 2 'Full beam' head lamps, with a total of 3 white front end lights in a triangle arrangement as defined in the OPE TSI, the remainder being marker lamps).
- c) Night time running (2 'Dimmed' head lamps and one top marker lamp).
- d) Tail lamps only.

-
- G 3.3.1.2 **Rationale for clause 3.3.1:** The provision of a control to select the correct lamp configuration avoids the risk of an incorrect combination of lamps being displayed. This requirement is additional to requirements in the LOC & PAS TSI, in order to maintain compatibility with existing operating practice (GE/RT8000). It is permissible to provide separate switching to extinguish all lamps.

- G 3.3.1.3 A display in the cab showing the driver which lamps are illuminated can help the driver check they are running in the correct mode and also highlight to the driver when a lamp has failed.
-

3.4 Simultaneous lighting of tail and front end lamps at one end of the vehicle

3.4.1 It shall not be possible to light tail lamps and front end lamps simultaneously at the same end of the vehicle.

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- G 3.4.1.1 **Rationale for clause 3.4.1:** This requirement is additional to requirements in the LOC & PAS TSI and is in order to maintain compatibility with existing operating practice.
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3.5 Hazard warning

3.5.1 Controls shall be provided such that a driver is able to control either all front lamps or two head lamps to flash simultaneous at a frequency of 40 cycles per minute ($\pm 10\%$).

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- G 3.5.1.1 **Rationale for clause 3.5.1:** This requirement supplements the requirements in the LOC & PAS TSI and is in order to maintain compatibility with existing operating practice and to enable a driver to warn oncoming trains of a perceived hazard.
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