

## **Audibility**

# **Requirements for Trains**

### **Synopsis**

This document mandates the warning horn sound pressure levels necessary for all rail vehicles that have driving cabs.

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## Audibility Requirements for Trains

### Issue record

| Issue | Date       | Comments                                                                                                                                                                                                                                                                                                       |
|-------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| One   | April 2005 | Original document<br>Superseding section 11 and Appendix J of GM/RT2180 issue 3, and section 10 of GM/RC2680 issue 2.<br>Permits the use of revised lower limits of warning horn sound pressure levels than those previously set in GM/RT2180 and defines the method for measuring horn sound pressure levels. |
| Two   | April 2007 | Replaces issue one<br>Sets lower minimum sound pressure level for speed band 30 kph to 160 kph and new maximum sound pressure levels for all speed bands                                                                                                                                                       |

Technical amendments or new requirements have been marked by a vertical black line in the adjacent margin.

### Superseded documents

The following Railway Group documents are superseded, either in whole or in part as indicated:

| Superseded documents                                                        | Sections superseded | Date when sections are superseded |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/RT2484, issue 1, April 2005<br><b>Audibility</b> Requirements for Trains | All                 | 02 June 2007                      |

### Supply

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## Part 1 Purpose and Introduction

### 1.1 Purpose

1.1.1 This document mandates requirements for warning horns operated from the cabs of all rail vehicles. These requirements are the minimum and maximum sound pressure levels that warning horns are to emit that are consistent with giving safe warning and the method which shall be used to measure such sound pressure levels.

### 1.2 Introduction

#### 1.2.1 Supporting documents

1.2.1.1 There are no Railway Group documents supporting this Railway Group Standard.

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## Part 2 Requirements for Warning Horns

### 2.1 Audibility on approach

#### 2.1.1 Control

2.1.1.1 All driving positions shall be fitted with warning horn controls to operate warning horns facing the direction of travel.

#### 2.1.2 Distance

2.1.2.1 The warning horn of an approaching train shall be audible for a distance of at least 400 m along the track. This requirement is considered adequately fulfilled if the warning horn sound pressure levels specified further in this document are achieved when measured under the conditions and using the method specified in this document.

#### 2.1.3 Recognising a train

2.1.3.1 The notes of the audible warning horns are intended to be recognisable as being from a train and not be similar to warning devices used in road transport or as factory or other common warning devices. The operation of the warning horns shall comprise two separate soundings of signals with distinctly different characteristics denoted (sounding 1) and (sounding 2). These two soundings shall comprise of either option a) or b) below:

a) two separately sounded warning horns. The fundamental frequencies of the warning horn notes shall be:

|              |            |                |
|--------------|------------|----------------|
| (sounding 1) | high note: | 370 Hz ± 20 Hz |
| (sounding 2) | low note:  | 311 Hz ± 20 Hz |

or

b) (sounding 1) three warning horns sounded together as a chord. The fundamental frequencies of the chord notes shall be:

|              |                |
|--------------|----------------|
| high note:   | 622 Hz ± 30 Hz |
| middle note: | 470 Hz ± 25 Hz |
| low note:    | 370 Hz ± 20 Hz |

(sounding 2) the fundamental frequency of the separately sounded note shall be 370 Hz ± 20 Hz.

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### 2.1.4 Warning horn sound pressure levels

2.1.4.1 The minimum and maximum sound pressure levels for warning horns and corresponding speed ranges of trains shall conform to those set out in Table 1 below.

|                                                                                                            | Minimum C or A weighted sound pressure level ( $L_C$ or $L_A$ ) at 5 m | Maximum C or A weighted sound pressure level ( $L_C$ or $L_A$ ) at 5 m |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Trains with a speed of 30 km/h (approx 20 mile/h)                                                          | 95 dB                                                                  | 100 dB                                                                 |
| Trains with speeds of more than 30 km/h (approx 20 mile/h) but less than or equal to 160 km/h (100 mile/h) | 101 dB                                                                 | 106 dB                                                                 |
| Trains with speeds greater than 160 km/h (100 mile/h)                                                      | 115 dB                                                                 | 120 dB                                                                 |

**Table 1** Warning horn sound pressure levels

- 2.1.4.2 Warning horns shall achieve the minimum sound pressure levels set out in Table 1 relative to the maximum speed of the train (to give a suitably loud warning to persons on or about the track when approaching at their maximum speed).
- 2.1.4.3 It is desirable and permissible for warning horn noise levels to vary with the actual speed (in accordance with Table 1) so that environmental impact is minimised without safety being compromised. This may be achieved by automatic variation of the sound pressure level with actual speed and / or by ensuring that the maximum sound pressure level is not greater than that appropriate to the maximum permitted speed.
- 2.1.4.4 To reduce environmental impact and avoid the risk of hearing damage to personnel that could arise from the frequent use of the warning horn in depots and shunting sidings, it is permissible to provide an independent warning device for use in such locations with a lower sound pressure level output. Typically independent warning devices are 10 dB above the ambient background noise to be clearly audible, with a minimum sound pressure level of 80 dB.

### 2.1.5 Reliability

2.1.5.1 Warning horns and their control systems shall be protected, so far as is reasonably practicable, from impact and subsequent blockage by airborne objects, such as debris, dust, snow, hail or birds.

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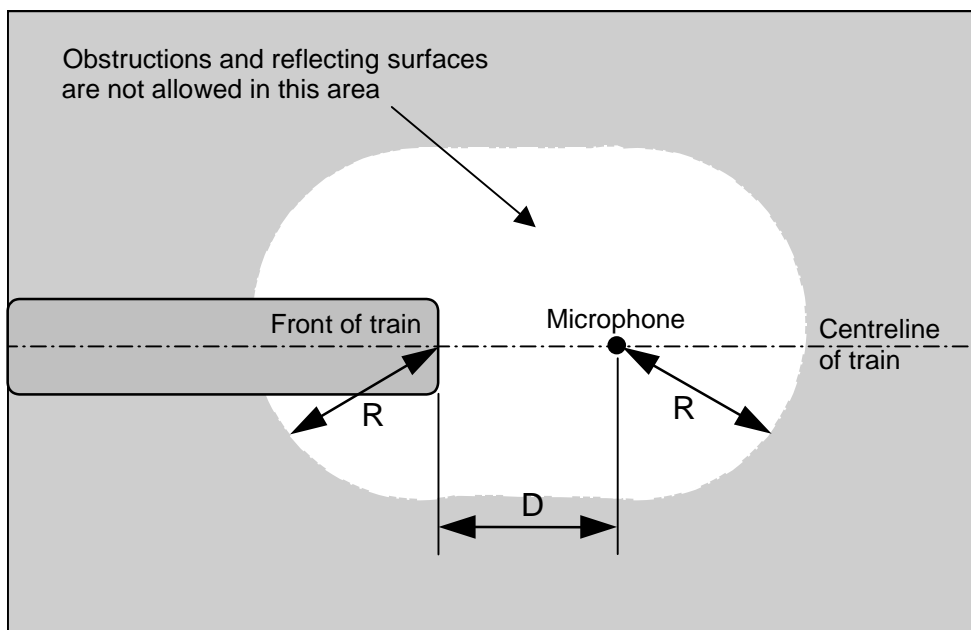
### 2.2 Measurement of sound pressure levels

2.2.1.1 Sound pressure levels shall be measured 5 m from the front of the train at the same height as the horn in line with the centre of the vehicle and over a ground covering of clean serviceable ballast.

2.2.1.2 Sound pressure level measurements of warning horns shall be carried out at an open site which generally meets the requirements of Figure 1, where:

$$D = 5 \text{ m}$$

$$R > 1.3 D \text{ (that is to say at least 6.5 m)}$$



**Figure 1** Open site for warning horn measurements

2.2.1.3 For pneumatic horns, noise measurements shall be carried out when the air pressure in the main reservoir is within its normal operating range.

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### Part 3 Application of this document

#### 3.1 Application - infrastructure managers

3.1.1 There are no requirements applicable to infrastructure managers.

#### 3.2 Application - railway undertakings

##### 3.2.1 Scope

3.2.1.1 The requirements of this document apply to all warning horns fitted to new rail vehicles.

3.2.1.2 The requirements of this document also apply to modifications to existing rail vehicles that provide an opportunity to bring the warning horns into conformity with the requirements of this document.

##### 3.2.2 Exclusions from scope

3.2.2.1 There are no exclusions from the scope specified in clause 3.2.1 for railway undertakings.

##### 3.2.3 General compliance date for railway undertakings

3.2.3.1 This Railway Group Standard comes into force and is to be complied with from 02 June 2007, except as specified in section 3.2.4.

3.2.3.2 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 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.

##### 3.2.4 Exceptions to general compliance date

3.2.4.1 There are no exceptions to the general compliance date specified in clause 3.2.3 for 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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## Definitions

### **Audibility**

The ability of an approaching train, through its warning device, to be heard at a predetermined distance by a person.

### **Warning horn**

A horn, whistle or other audible device operated by a member of the train crew to warn people on or near the line of the approach or movement of a train.

### **Weighted sound pressure level**

A numeric value of the sound pressure level after frequency weighting to simulate the frequency response of the human ear at low levels of sound ( $L_A$ ) or high levels of sound ( $L_C$ ).

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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](http://www.rgsonline.co.uk).

### **Documents referenced in the text**

RGSC 01

The Railway Group Standards Code