SLOVENSKI STANDARD
SIST EN 15153-2:2007

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Železniške naprave - Zunanje vidne in zvočne opozorilne naprave vlakov za velike hitrosti - 2. del: Opozorilne sirene

Railway applications - External visible and audible warning devices for high speed trains - Part 2: Warning horns

Bahnanwendungen - Optische und akustische Warneinrichtungen für Hochgeschwindigkeitszüge - Teil 2: Signalhörner

Applications ferroviaires - Dispositifs externes d'avertissement optiques et acoustiques pour trains a grande vitesse - Partie 2: Avertisseurs sonores

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Railway applications - External visible and audible warning devices for high speed trains - Part 2: Warning horns

Applications ferroviaires - Dispositifs externes d'avertissement optiques et acoustiques pour trains à grande vitesse - Partie 2: Avertisseurs sonores

Bahnanwendungen - Optische und akustische Warneinrichtungen für Hochgeschwindigkeitszüge - Teil 2: Signalhörner

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 15153-2:2007) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2007, and conflicting national standards shall be withdrawn at the latest by October 2007.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This series of documents *Railway applications — External visible and audible warning devices for high speed trains* consists of the following parts:

— *Part 1: Head, marker and tail lamps*

— *Part 2: Warning horns*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard defines the functional, operational and technical requirements for warning horns for high speed trains, including the requirements for testing and conformity assessment.

2 Normative references

The following referenced document is indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications (IEC 61672-1:2002)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
high speed train
train which is designed to operate at speeds equal to or greater than 190 km/h

3.2
warning horn
device or assembly capable of producing the specified audible warning tones

3.3
vehicle front
leading surface or edge of the train

3.4
sound pressure level
$L_{pCeq,T}$

$$L_{pCeq,T} = 10\,lg\left(\frac{1}{T}\int_0^T \frac{p_C^2(t)}{p_0^2}\,dt\right)$$

where

$L_{pCeq,T}$ is the C weighted equivalent continuous sound pressure level, in dB;
p is the sound pressure, in Pa;
T is the measurement time interval, in s;
p_0 is the reference sound pressure, in Pa.

4 Requirements

4.1 General

Trains shall be fitted with a warning horn in the leading vehicle. It is permissible for trains to be fitted with additional audible warning devices.

The driver shall be able to operate the warning horn from all driving positions.

4.2 Location of warning horns

Warning horns, including any provisions arising from 4.6, shall be located in the leading vehicle such that together they meet the required acoustic requirements of 4.3.

4.3 Acoustic requirements

4.3.1 Frequency

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 acceptable warning horn notes shall be either:

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

high note: 370 Hz ± 20 Hz

low note: 311 Hz ± 20 Hz

or

b) two warning horns sounded together as a chord (for the high note). The fundamental frequencies of the chord notes shall be:

high note: 622 Hz ± 30 Hz

low note: 370 Hz ± 20 Hz

or

c) two warning horns sounded together as a chord (for the high note). The fundamental frequencies of the chord notes shall be:

high note: 470 Hz ± 25 Hz

low note: 370 Hz ± 20 Hz

or

d) three warning horns sounded together as a chord (for the high note). 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.

4.3.2 Sound pressure level

The C weighted sound pressure level $L_{pCeq,T}$ produced by each horn sounded separately (or in a group if designed to sound simultaneously as a chord) shall be between 115 dB and 123 dB when measured and verified in accordance with the method defined in Clause 5.

4.4 Operation

Warning horns shall be operated by a manual control or a pedal.

4.5 Energy supply

Warning horns shall be operated and sounded using an energy source that is readily available on the vehicle carrying the horn. The horn shall meet the technical requirements of this specification over the full range of energy levels allowable on the vehicle.

4.6 Impact protections

Warning horns and their control systems may be protected, so far as it is practicable, from impact and subsequent blockage by airborne objects such as debris, dust, snow, hail and birds. Where such protection features are used, the acoustic requirements shall apply with any protection features in place.

5 Test methods

5.1 Test conditions

The acoustic tests shall be conducted in open, flat country with a wind speed of less than 3,0 m/s.

The reference sound pressure level shall be 2×10^{-5} Pa.

The ambient temperature shall be + 20 °C ± 5 K.

For tests under snow conditions, see Annex A. This test is not mandatory and may be done only if required by the customer.

See also EN ISO 3095.

5.2 Test equipment

For the purposes of testing sound frequencies, a suitably calibrated spectrum analyser shall be used.

For the purposes of testing sound pressure levels, a suitably calibrated sound level meter shall be used.

The details and calibration of the test equipment shall be documented.

The measurement instrumentation shall be according to EN 61672-1.

See also EN ISO 3095.

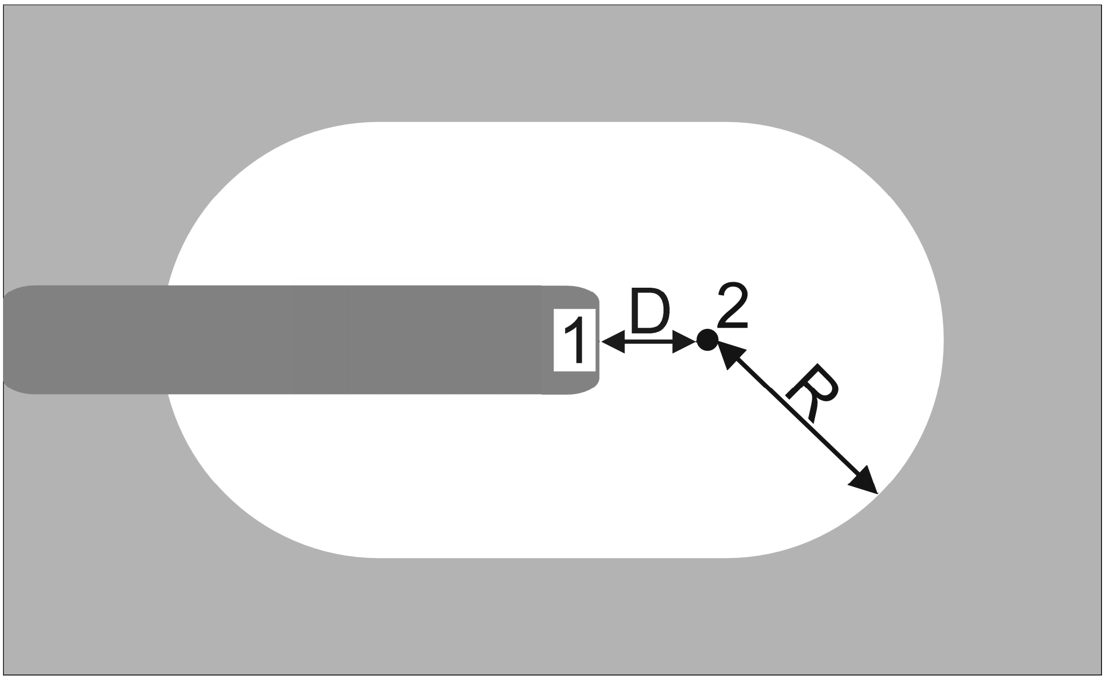
5.3 Test procedure

Sound pressure levels shall be measured at least at the limits of the energy levels allowable on the vehicle.

Sound pressure levels shall be measured from each horn sounded separately or together in a group (if designed to sound simultaneously as a chord).

Sound pressure levels shall be measured 5 m from the front of the train along the centre-line of track at the same height as the horn and over a ground covering of clean ballast.

Noise measurements of warning horns shall be carried out at an open site which generally meets the requirements of Figure 1.



Obstructions and reflecting surfaces are not allowed in the open area.

D = 5 m

R ≥ 3D

Key

1 front of train

2 microphone

Figure 1 — Open site for warning horn measurements

In order to minimise environmental impact it is advisable that the C weighted sound pressure level when measured 5 m from the side of the train, at the same height as the horn, in line with the front of the horn is at least 5 dB lower than the level measured in front of the train.

The measurement time interval T shall be at least 10 s. But if it is not possible to maintain the source of noise at its maximum level for 10 s, as in the case of loss of system air pressure, the measurement time interval T may be reduced to a minimum of 5 s. Where a measurement time interval less than 10 s is used, the system air pressure loss shall be demonstrated with the test results.

5.4 Reported results

The test arrangements, the wind speed, the ambient temperature, operating conditions of power supply (if applicable) and the test results shall be reported.