



SLOVENSKI STANDARD

SIST EN 15892:2011

01-oktober-2011

Železniške naprave - Hrup - Meritev hrupa v voznikovi kabini

Railway applications - Noise Emission - Measurement of noise inside driver's cabs

Bahnanwendungen - Gerächemission - Geräuchmessung im Führerraum

Applications ferroviaires - Emission de bruit - Mesurage du bruit dans la cabine de conduite

(standards.iteh.ai)

Ta slovenski standard je istoveten z: **EN 15892:2011**

<https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-1c9dbc64009/sist-en-15892-2011>

ICS:

17.140.30	Emisija hrupa transportnih sredstev	Noise emitted by means of transport
45.060.10	Vlečna vozila	Tractive stock

SIST EN 15892:2011

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 15892:2011

<https://standards.iteh.ai/catalog/standards/sist/75ab6df5-10dd-4b59-ba13-1c9dbc6400f9/sist-en-15892-2011>

EUROPEAN STANDARD

EN 15892

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2011

ICS 17.140.30; 45.060.10

English Version

Railway applications - Noise Emission - Measurement of noise inside driver's cabs

Applications ferroviaires - Emission de bruit - Mesurage du
bruit dans la cabine de conduite

Bahnanwendungen - Geräuschemission -
Geräuschmessung im Führerraum

This European Standard was approved by CEN on 24 December 2010.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, 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.

[SIST EN 15892:2011](https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-1c9dbc6400f9/sist-en-15892-2011)

<https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-1c9dbc6400f9/sist-en-15892-2011>



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Measurement quantities.....	6
5 Instrumentation and calibration	6
5.1 Instrumentation.....	6
5.2 Calibration	6
6 Tests when sounding the external warning horn.....	6
6.1 Test conditions	6
6.1.1 Environmental conditions.....	6
6.1.2 Vehicle conditions	6
6.1.3 Track conditions	7
6.2 Test procedure.....	7
7 Tests with the vehicle at maximum speed	8
7.1 Test conditions	8
7.1.1 Environmental conditions.....	8
7.1.2 Vehicle conditions	8
7.1.3 Track conditions	9
7.2 Test procedure.....	9
8 Test report	10
Annex A (informative) Guidance on the quantification of track quality for maximum speed testing	11
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC	13
Bibliography	15

ITeH STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 15892:2011

<https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-1e9dbcc04009/sist-en-15892-2011>

Foreword

This document (EN 15892:2011) 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 August 2011, and conflicting national standards shall be withdrawn at the latest by August 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of the Directive 2008/57/EC.

For relationship with EC Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

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, Croatia, 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 the United Kingdom.

[SIST EN 15892:2011](https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-1c9dbc6400f9/sist-en-15892-2011)

<https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-1c9dbc6400f9/sist-en-15892-2011>

EN 15892:2011 (E)**1 Scope**

This European Standard specifies a type test method to measure noise levels inside the driver's cabs of railway vehicles for assessing compliance with the relevant European legislation.

NOTE The relevant European legislation includes Directive 2003/10/EC of 6 February 2003 and the Commission Decisions of 23 December 2005 (Technical specification for interoperability relating to the subsystem 'rolling stock — noise' of the trans-European conventional rail system) and of 21 February 2008 (Technical specification for interoperability relating to the 'rolling stock' sub-system of the trans-European high-speed rail system).

This method is applicable to:

- the measurement of noise inside driver's cab resulting from the sounding of external warning horns when the vehicle is stationary;
- the measurement of noise inside the driver cab while the vehicle is running.

The method is not applicable to:

- complementary measurements that can be requested for acceptance tests, but which are not required by the TSIs referred to in this standard;
- the measurement of the noise from internal and external audible devices other than external warning horns;
- routine monitoring of the noise exposure of train crew.

The test procedures specified in this European Standard are of engineering grade (grade 2) with a precision of ± 2 dB, which is the preferred method for noise declaration purposes, as defined in EN ISO 12001.

<https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-1c9dbc6400f9/sist-en-15892-2011>

2 Normative references

The following referenced documents are 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 15153-2, *Railway applications — External visible and audible warning devices for high speed trains — Part 2: Warning horns*

EN 60942:2003, *Electroacoustics — Sound calibrators (IEC 60942:2003)*

EN 61672-1:2003, *Electroacoustics — Sound level meters — Part 1: Specifications (IEC 61672-1:2002)*

EN 61672-2, *Electroacoustics — Sound level meters — Part 2: Pattern evaluation tests (IEC 61672-2:2003)*

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*

3 Terms and definitions

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

3.1 acoustic roughness

$r(x)$

variation of the height of the rail running surface associated with rolling noise excitation expressed as a function of distance x along the rail

[EN 15610:2009]

NOTE For information, see EN 15610.

3.2 acoustic roughness level

L_r

level expressed in decibels, related to $1,0 \mu\text{m}$, given by the following equation:

$$L_r = 10 \cdot \lg \left(\frac{r_{\text{RMS}}^2}{r_0^2} \right) \quad (1)$$

where

L_r is the acoustic roughness level in dB;

r_{RMS} is the root mean square roughness in μm ;

r_0 is the reference roughness; $r_0 = 1,0 \mu\text{m}$.

NOTE 1 Adapted from EN 15610:2009.

NOTE 2 For information, see EN 15610. [SIST EN 15892:2011](https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-100000000000/sist-en-15892-2011)

[https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-](https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-100000000000/sist-en-15892-2011)

NOTE 3 This definition applies to values measured either as a wavelength spectrum or in a particular wavelength band.

3.3 acoustic roughness spectrum

$\tilde{r}(\lambda)$

amplitude of the acoustic roughness level expressed as a function of the wavelength

NOTE Adapted from EN 15610:2009.

3.4 A-weighted equivalent continuous sound pressure level

$L_{p\text{Aeq,T}}$

A-weighted sound pressure level given by the following equation:

$$L_{p\text{Aeq,T}} = 10 \lg \left(\frac{1}{T} \int_0^T \frac{p_A^2(t)}{p_0^2} dt \right) \quad (2)$$

where

$L_{p\text{Aeq,T}}$ is the A-weighted equivalent continuous sound pressure level, in dB;

$p_A(t)$ is the A-weighted instantaneous sound pressure;

EN 15892:2011 (E)

p_0 is the reference sound pressure; $p_0 = 20 \mu\text{Pa}$;

T is the measurement time interval, in s

3.5 external warning horn
device or assembly capable of producing audible warning tones to warn of the train's presence, which covers pneumatic or electric horns, whistles and similar devices

4 Measurement quantities

All noise measurements shall be reported in terms of A-weighted equivalent continuous sound pressure level, $L_{pAeq,T}$, over a defined measurement time interval, T in seconds.

5 Instrumentation and calibration**5.1 Instrumentation**

Each component of the instrumentation system shall meet the requirements for a type 1 instrument specified in EN 61672-1:2003.

A suitable microphone windscreen shall always be used for external measurements and is recommended for in-cab measurement.

The compliance of the calibrator with the requirements of EN 60942 shall be verified at least once a year. The compliance of the instrumentation system with the requirements of EN 61672-1 and EN 61672-2 shall be verified at least every 2 years.

SIST EN 15892:2011

The date of the last verification of the compliance with the relevant European Standards shall be recorded.

5.2 Calibration

Before and after each series of measurements a sound calibrator meeting the requirements of Class 1 according to EN 60942:2003 shall be applied to the microphone(s) for verifying the calibration of the entire measuring system at one or more frequencies over the frequency range of interest. If the difference between the two calibrations is more than 0,5 dB, all the measurement results shall be rejected.

6 Tests when sounding the external warning horn**6.1 Test conditions****6.1.1 Environmental conditions**

The train shall be positioned in an open environment, and therefore not in a building or in a tunnel. Except for the ground, there shall not be any acoustically reflective (hard) surfaces comprising such materials as steel or concrete, including other trains and fixed structures, within 10 m of the external surfaces of the sides of the cab within which tests are being undertaken. Similarly, there shall not be any acoustically reflective surfaces within 25 m of the external surface of the front end of the cab.

6.1.2 Vehicle conditions

The vehicle shall be stationary.

Air management systems, including grilles, filters and fans, shall be clear of any obstruction. Windscreen wipers shall not be in operation during the measurements. During the measurements, the doors and windows of the vehicle shall be kept closed. The minimum number of people necessary to carry out the acoustic tests shall be present in the cab during the measurements. The cab shall be in the condition that will apply when in service.

The horns shall be inspected for debris, which shall be removed if found to be present.

NOTE The sound source that is to be measured, the external warning horn, is inherently of high sound level, and therefore typical internal background noise levels in the cab when stationary are unlikely to interfere with the measured results. Nevertheless, it is advisable to run only those systems on the train that are essential to allow the external warning horn to sound, and to avoid positioning the vehicle at locations where other high noise level sources are present.

6.1.3 Track conditions

No track condition.

6.2 Test procedure

The stationary measurements require the noise level in the vicinity of the driver's ears to be quantified when the external warning horn is sounded.

When the cab contains more than one set of complete driving controls, the test shall be carried out at each of these positions. This is not necessary at auxiliary driving positions where a full set of controls is not present. When the external warning horn has more than one operating control, the test shall be carried out using each of these controls.

If the vehicle or multiple unit has two cabs and is symmetrical about its longitudinal centre, it is only necessary to carry out the full test within one cab provided the horn configuration and installation is identical for both cabs. If this is not the case, the tests shall be carried out in both cabs and the higher resultant level shall be recorded.

<https://standards.iteh.ai/catalog/standards/sist/75ab6d5-10dd-4b59-ba13-1c9dbc6400f9/sist-en-15892-2011>

Sound pressure levels shall be measured at the normal operational energy level available on the vehicle. When the external warning horn has two or more tones or chords the following tests shall be carried out for both or all of these. When the acoustic warning has an option for a loud or quiet setting, the loud setting shall be used.

Measurement conditions shall comply with EN 15153-2 for the measurement of horn performances. If the value of $L_{pAeq,T}$ measured under these conditions is outside the range specified for this test within EN 15153-2, or if these measured levels before and after the stationary cab noise measurements differ by more than 3 dB, the cab noise results are invalid.

The background noise level within the cab shall be measured and recorded at the beginning and end of the stationary measurement, in terms of $L_{pAeq,T}$ over a measurement time interval, T, of 20 s. This measurement shall be obtained at the same position on both occasions, and that position is to be chosen from one of the available eight locations as defined below.

The measurement shall be carried out at eight evenly spaced microphone positions in a horizontal plane at the height of a seated driver's ears, at a radius of 25 cm, while the external warning horn is sounding. The position of the seated driver's ears, if not defined elsewhere, shall be taken at 0,80 m \pm 0,05 m vertically above the centroid of the unloaded seat surface. If the seat height is adjustable, this adjustment shall be set at midrange. The height of this nominal position for the driver's seat above the floor shall be recorded.

NOTE 1 In case a headrest present hindrance for mounting the microphones, it is permissible to remove the headrest or to use a measurement height as close as possible to the specified measurement height.

If not defined elsewhere, the level of the driver's ear for standing operation shall be taken as 1,6 m above the floor.