SLOVENSKI STANDARD
oSIST prEN 17285:2018

01-november-2018

Železniške naprave - Akustika - Merjenje zvočnih opozoril pri vratih

Railway applications - Acoustics - Measuring of door audible warnings

Bahnanwendung - Akustik - Messung akustischer Türsignale von Eisenbahnfahrzeugen

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Application ferroviaires - Acoustique - Mesurage des signaux audibles d'avertissement des portes

SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1e1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

Ta slovenski standard je istoveten z: **prEN 17285**

ICS:

17.140.30	Emisija hrupa transportnih sredstev	Noise emitted by means of transport
45.060.20	Železniški vagoni	Trailing stock

oSIST prEN 17285:2018 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 17285

August 2018

ICS 17.140.30; 45.060.20

English Version

Railway applications - Acoustics - Measuring of door audible warnings

Application ferroviaires - Acoustique - Mesurage des signaux audibles d'avertissement des portes

Bahnanwendung - Akustik - Messung akustischer Türsignale von Eisenbahnfahrzeugen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

SIST EN 17285:2020

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2018 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. prEN 17285:2018 E

oSIST prEN 17285:2018

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

oSIST prEN 17285:2018

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

oSIST prEN 17285:2018

European foreword

This document (prEN 17285:2018) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

oSIST prEN 17285:2018

1 Scope

This document describes the type test assessment method for acoustic signals at passenger external doors applying to rolling stock. The following applies to this standard:

— this document refers to acoustical passenger information indicating the release, opening and closing of passenger doors;

— this document is applicable to tonal signals with defined frequency components;

— this document is not applicable to spoken information.

NOTE 1 Acoustic door signals in terms of TSI compliance are defined in EN 16584-2 “Design for PRM use”.

NOTE 2 Acoustic doors signals in terms of door system function are described in EN 14752.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60942, *Electroacoustics — Sound calibrators*

IEC 61260, *Electroacoustics — Octave-band and fractional-octave-band filters*

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

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

ISO 1996-2:2007, *Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of sound pressure levels*

ISO 266, *Acoustics — Preferred frequencies*

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/...
/sist-en-17285-2020

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
sound pressure
p
root mean square (RMS) value of a fluctuating pressure superimposed on the static atmospheric pressure measured over a certain time-period, expressed in Pa

oSIST prEN 17285:2018

3.2
sound pressure level
L_p
level given by the equation:

$$L_p = 10 \lg \left(p / p_0 \right)^2 \text{ dB} \quad (1)$$

where

L_p is the sound pressure level in dB;

p is the RMS sound pressure in Pa;

p_0 is the reference sound pressure; p_0 = 20 µPa

3.3
A-weighted sound pressure level
L_{pA}
sound pressure level obtained by using the frequency weighting A, given by the following formula:

$$L_{pA} = 10 \lg \left(p_A / p_0 \right)^2 \text{ dB} \quad (2)$$

iTeh STANDARD PREVIEW
(standards.iteh.ai)

where

L_{pA} is the A-weighted sound pressure level in dB;

p_A is the RMS A-weighted sound pressure in Pa;

SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

p_0 is the reference sound pressure; p_0 = 20 µPa

Note 1 to entry: (see EN 61672-1 and EN 61672-2)

3.4
AF-weighted sound pressure level history
$L_{pAF}(t)$
A-weighted sound pressure level as a function of time with time weighting F (fast)

3.5
AF-weighted maximum sound pressure level
L_{pAFmax}
maximum value of the A-weighted sound pressure level determined during the measurement time interval T by using time weighting F (fast)

[SOURCE: EN 61672-1]

oSIST prEN 17285:2018

3.6
A-weighted equivalent continuous sound pressure level
$L_{\mathrm{pAeq},T}$
A-weighted sound pressure level given by the following equation:

$$L_{\mathrm{pAeq,T}} = 10\lg\left(\frac{1}{T}\int_0^T \frac{p_{\mathrm{A}}^2(t)}{p_0^2}\mathrm{d}t\right)\mathrm{dB}\; L_{\mathrm{pAeq},T} = 10\lg\left(\frac{1}{T}\int_0^T \frac{p_{\mathrm{A}}^2(t)}{p_0^2}\right) \tag{3}$$

where

L_{pAeq},T	is the A-weighted equivalent continuous sound pressure level in dB;
T	is the measurement time interval in s;
$p_{\mathrm{A}}(t)$	is the A-weighted instantaneous sound pressure in Pa;
p_0	is the reference sound pressure; p_0 = 20 µPa

[SOURCE: ISO 1996-1]

3.7
RMS sum
The sum of the root mean squares of sound pressures

iTeh STANDARD PREVIEW
(standards.iteh.ai)

$$RMS\ sum = 10\lg\left(10^{L_{\mathrm{p1}}/10} + 10^{L_{\mathrm{p2}}/10} + .. + 10^{L_{\mathrm{p}i}/10}\right)\mathrm{dB} \tag{4}$$

SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

where

$Lp1, Lp2\ ..Lpi$ are a set of sound pressure levels

3.8
RMS average
average of the root mean square of sound pressures

$$RMS\ average = 10\lg\left(\frac{10^{L_{\mathrm{p1}}/10} + 10^{Lp2/10} + .. + 10^{LpN/10}}{N}\right)\mathrm{dB} \tag{5}$$

where

$L_{\mathrm{p1}}, L_{\mathrm{p2}}\ ..L_{\mathrm{p}N}$ are a set of sound pressure levels

oSIST prEN 17285:2018

4 Symbols and abbreviations

dB decibel

Hz Hertz, the SI unit of frequency

5 Instrumentation and calibration

5.1 Instrumentation

Each component of the instrumentation system shall meet the requirements for a class 1 instrument specified in IEC 61672-1.

The sound calibrator shall meet the requirements of class 1 according to IEC 60942.

Microphones with free-field characteristics shall be used.

NOTE A suitable microphone windscreen should be used.

Where one-third octave frequency band analysis is required, the filters shall meet the requirements of class 1, according to IEC 61260.

The compliance of the calibrator with the requirements of IEC 60942 shall be verified at least once a year. The compliance of the instrumentation system with the requirements of IEC 61672-1 and IEC 61672-2 shall be verified at least every 2 years. The date of the last verification of the compliance with the relevant European Standards shall be recorded.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

5.2 Calibration

Before and after each series of measurements a sound calibrator meeting the requirements of class 1 according to IEC 60942 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 in between shall be rejected.

SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/...
4976533d7ee1/sist-en-17285-2020

6 Interior tests

6.1 General

All the vestibules of a vehicle shall be classified into finite number of vestibule types. The list of vestibule types is to be determined before measurements. Vestibule types are to be differentiated on basis of the following distinctions:

a) whether the vestibule has single or double exterior doors;

b) whether there is a change in the number and type of partitions to the side of the vestibule area. That is, a vertical wall, partition or door between vestibule and another area of the vehicle. Such a partition may be partial or complete. A vestibule can have only 0, 1 or 2 such partitions, each of which can be full or partial (e.g. panels either side of an open aisle but not, when a gangway door is closed, forming a full partition of the vestibule from other parts of the train). No other property of the partition than 'full' or 'partial' shall be considered;

c) whether there is a change in the mounting of the sounder to the vehicle structure. If there is a difference in the mechanical impedance of the structure at the location of the mounting that would lead to a change of the sound power emitted, this also differentiates a vestibule type;

oSIST prEN 17285:2018

d) if there are differences in the sounder location such as:

— the height above the floor changes by more than 30 cm,

— the edge of the sounder is located within a distance of 4 cm from the junction of two or three approximately normal surfaces compared to an installation at the door panel.

No other criteria shall be used as they affect the sound pressure level less significantly.

A difference between vestibules in any of these features shall cause a new vestibule type to be added to the list of types.

6.2 Environmental conditions

The door opening of the vehicle shall be at least 5 m away from reflecting walls or roof of any building. There are no requirements on the external ground conditions or ground height.

Care shall be taken to ensure that noise from other sources, e.g. other vehicles or industrial plants and due to external wind, does not influence the measurements significantly.

For fixed sounders, the background noise level $L_{\mathrm{pAeq},T}$ measured over T = 20 s of each measurement position shall be at least 10 dB below the final result (L_{pAF}, L_{pAFmax} and, possibly, $\mathrm{L}_{\mathrm{pAeq},T}$, see 6.4).

For adaptive sounders, the effective background noise is controlled by the method itself – see Annex B.

6.3 Vehicle conditions

iTeh STANDARD PREVIEW
(standards.iteh.ai)

The unit shall be stationary.

Surfaces shall present their normal operational acoustic properties.

As long as the background noise level requirement in 6.2 is fulfilled, any operational condition of auxiliary equipment shall be accepted.

SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

6.4 Measured quantities

The measured acoustic quantities are L_{pAF}, L_{pAFmax} and, possibly, $L_{\mathrm{pAeq},T}$, with T as time of the sounder event duration. For the assessment of spectral content narrow band frequency analysis shall be applied.

6.5 Measurement procedure

6.5.1 General

Separate procedures are defined below for estimating the sound pressure level of the signal in the vehicle, for the duration of the signal, for determining the pulse rate and for determining the frequency content. The first of these procedures, described in 6.5.3, shall be carried out *in situ* in the vehicle. The pulse rate (6.5.4) and frequency content (6.5.5) may alternatively be determined from measurements made of the door sounder component separately – see Annex C.

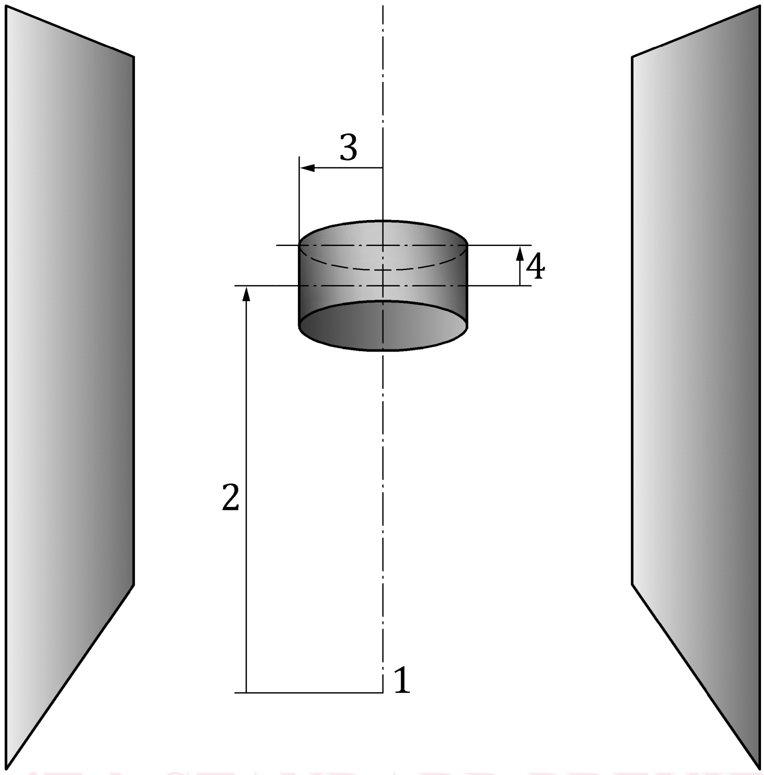
If an adaptive sounder system is present in the train, the background noise within the vestibule has to be controlled using a sound source (see Annex B).

6.5.2 Microphone positions for measurements in the vehicle

For the interior tests two alternative microphone arrangements are allowed.

Arrangement 1: A single microphone is located between 1,4 and 1,6 m height above the vehicle floor and anywhere within a lateral distance of 0,25 m from a point on the mid-plane of the vestibule normal to the centre-line of the door opening. That is, within the cylindrical volume indicated in Figure 1.

oSIST prEN 17285:2018



Key

1 mid way between the doors

2 height: 1,5 m

3 lateral distance: 0,25 m

4 range: ± 0,1 m

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-

Figure 1 — Arrangement 1 with one microphone

Arrangement 2: Eight microphones equally distributed in a circle of radius 0,25 m about a point 1,5 m in height above the vehicle floor and in the mid-plane of the vestibule normal to the centre-line of the door opening shall be measured twice; (1) for the circle in the horizontal orientation and (2) for the circle in a vertical orientation.

6.5.3 Sound pressure level estimation and duration of the signal

In a case of an adaptive level device an alternative measurement shall be carried out to ensure that the sounder level is adapted to the ambient noise level. The measuring procedure for adaptive door sound devices is described in Annex B.

For non-adaptive systems, the following procedure shall be followed.

For at least one microphone position the following shall be produced:

1) The time history of L_{pAF} shall be produced for the whole door opening signal and for the whole door closing signal. This shall be used to determine the timing and duration of the signal in relation to the operation of the door.

For all microphone positions the following shall be produced while the door is stationary (fully open, fully closed). The noise of the operation of the door itself is thereby omitted from the following results:

2) L_{pAF} for the door opening signal taken from the part of the signal with the door closed;

oSIST prEN 17285:2018

3) L_{pAFmax} for the door closing signal taken from the part of the signal with the door open;

4) If required, the $L_{pAeq,T}$ shall also be evaluated, where T is several cycles of the sound modulation.

For arrangement 2, the results of 2, 3 and 4 at the microphone positions shall be the RMS average.

NOTE The requirements can involve testing the door for each of the cases in which the door is actuated and not actuated.

6.5.4 Pulse rate estimation

This test may be performed on sound pressure measurements made on the door sounder component in a suitable environment other than the vehicle (see Annex C).

To count the number of pulses per second a visual representation of the pulsing of the sounder noise shall be produced.

NOTE It has been found that a plot of $L_{pAeq,T}$ where T is 10 ms will present a clear pulse up to 10 pulses per second. A plot of L_{AF} will not. Alternatively, a spectrogram with a sufficient time resolution can be produced by many software packages. This has been found to provide a clear representation of pulse count.

6.5.5 Frequency analysis

This test may be performed on sound pressure measurements made on the door sounder component in a suitable environment other than the vehicle (see Annex C).

iTeh STANDARD PREVIEW

To determine the frequency of tones within the signal a narrow band power spectrum shall be produced that has a resolution no worse than 20 Hz.

(standards.iteh.ai)

NOTE The frequency can also be found in a spectrogram produced for the purpose of pulse rate estimation in 6.5.4.

SIST EN 17285:2020
https://standards.iteh.ai/catalog/standards/sist/e1c1ce05-37b0-4886-8039-4976533d7ee1/sist-en-17285-2020

6.5.6 Tonal prominence assessment

If required, an assessment of the relative audibility of different tones shall be carried out as described in Annex A.

7 Exterior tests

7.1 General

The test shall be carried out on one entrance door of the unit.

7.2 Environmental conditions

The door opening of the vehicle shall be at least 5 m away from reflecting walls or roof of any building. There are no requirements on the external ground conditions or ground height (with or without platform).

Care shall be taken to ensure that the noise from other sources, e.g. other vehicles or industrial plants and due to external wind, does not influence the measurements significantly.

For fixed sounders, the background noise level $L_{pAeq,T}$ measured over T = 20 s of each measurement position shall be at least 10 dB below the final result (L_{pAF}, L_{pAFmax} and, possibly, $L_{pAeq,T}$, see 7.4).

For adaptive sounders, the effective background noise is controlled by the method itself.