SLOVENSKI STANDARD
SIST EN 16205:2013/oprA1:2017

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Laboratorijsko merjenje hrupa pri hoji po podu

Laboratory measurement of walking noise on floors

Messung von Gehschall auf Fußböden im Prüfstand

Mesurage en laboratoire du bruit des pas sur les planchers

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Laboratory measurement of walking noise on floors

Mesurage en laboratoire du bruit des pas sur les planchers

Messung von Gehschall auf Fußböden im Prüfstand

This draft amendment is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 126.

This draft amendment A1, if approved, will modify the European Standard EN 16205:2013. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

This draft amendment 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.

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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.

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

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Contents

Page

European foreword

This document (EN 16205:2013/prA1:2017) has been prepared by Technical Committee CEN/TC 126 “Acoustic properties of building elements and of buildings”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

1 Modification to page 5, Clause 2, Normative references

Add the following reference:

"ISO 532, *Acoustics — Method for calculating loudness level*".

2 Modification to pages 16 and 17 (between Annex D and Bibliography)

Add the following new informative Annex E: "

Annex E
(informative)

Calculation of perceived walking loudness on floor coverings installed floating

E.1 General

This annex specifies a method for calculating the perceived acoustic properties of floor coverings installed floating regarding reflected walking sound. Reflected walking sound is the sound radiated in a room from walking in the same room. The method describes how to calculate the perceived loudness of the radiated sound whereby the frequency-dependent values of the drum sound from Clause 6 are converted into a single number of the loudness. It shows a positive correlation to the sound generated by a walking person with a hard heel.

E.2 Terms and definitions

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

E.2.1
Reflected Walking Sound (RWS)
subjective perceived loudness radiated from a floor when a person with hard heel is walking on it

E.2.2
joudness
perceived strength of steady-state sound calculated according to Zwicker. Its unit is sone.

NOTE 1 to entry: Loudness is a linear measure; hence a redoubling of the sone value results in a redoubling of the perceived loudness.

NOTE 2 to entry: Loudness is based on the concept of critical bands.

E2.3
critical band
human hearing system processes perceived sound in sub-bands called critical bands

NOTE 1 to entry: Critical bandwidth differs within the frequency range.

NOTE 2 to entry: The critical band produces the critical band scale. Its unit is Bark

E.3 Data processing

E.4 Data measured

The data used for the calculation consists of:

— individual 1/3 octave band spectra L_i, with (impact sound pressure level measured in the upper room, when a sufficiently large specimen is lying on the test floor).

E.5 Calculations

E.5.1 Sound spectrum $L_{i,\mathrm{loud}}$

The outcome of the data processing is one average 1/3 octave band spectrum (100 Hz to 5 000 Hz). This resulting spectrum will be used as input for the loudness calculation.

The sound spectrum $L'_{i,\mathrm{loud}}$ is the energetic average of the measured spectra:

$$L'_{i,\mathrm{loud}} = 10\lg\left[\frac{1}{n}\sum_{k=1}^{n} 10^{0{,}1\left(L'_{i,\mathrm{with},k}\right)}\right] \qquad \text{(E.1)}$$

with

k = 1...n (number of measurement);

i = 1/3 octave band number;

$L'_{i,\mathrm{with},k}$ individual sound spectrum of the k-th measurement.

E.5.2 Loudness RWS

The RWS value is calculated according to ISO 532 B (1975), using method B (Zwicker) for stationary signals and for diffuse field condition. The input is the one-third octave band spectrum $L'_{i,\mathrm{loud}}$. The conversion routine requires the full frequency range from 25 Hz to 12 500 Hz. The missing levels for frequencies below 100 Hz and above 3 150 Hz are set to −60 dB. The critical bands are listed in Table E.2.

NOTE 1 There exists a free downloadable Excel sheet which performs all the calculations of Annex E (scaling plus loudness calculation). The loudness algorithm is published as a Basic program in DIN 45631 [9] or Zwicker [10] and it is programmed as a Visual Basic Program within this Excel sheet.

Table E.1 — Critical bands according to Zwicker [10]

Critical Band (Bark)	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***
Centre frequency (Hz)	50	150	250	350	450	570	700	840
Bandwidth (Hz)	100	100	100	100	110	120	140	150
Critical Band (Bark)	***9***	***10***	***11***	***12***	***13***	***14***	***15***	***16***
Centre frequency (Hz)	1 000	1 170	1 370	1 600	1 850	2 150	2 500	2 900
Bandwidth (Hz)	160	190	210	240	280	320	380	450
Critical Band (Bark)	***17***	***18***	***19***	***20***	***21***	***22***	***23***	***24***
Centre frequency (Hz)	3 400	4 000	4 800	5 800	7 000	8 500	1 0500	1 3500
Bandwidth (Hz)	550	700	900	1 100	1 300	1 800	2 500	3 500

NOTE Example of Macro for Microsoft Excel Professional 2013 for calculation of RWS, see E.10.

E.6 Test report

The results in sone according to this annex can be expressed in addition to the result in dB(A).

The test report shall include at least the following information:

a) reference to this standard (i.e. EN 16205:2013/prA1:2016);

b) name and address of the testing laboratory;

c) manufacturer's name and product identification;

d) name and address of the person or the organization who ordered the test;

e) name and address of the person or the organization in charge of sampling, details of sampling, and name and the address of the person or the organization in charge of installing the test object;

f) date of taking of the test object or test material, date of installing the specimen;

g) date of the test;

h) date of the issue of the test report;

i) detailed description of the bare floor: dimensions, mass per unit area, material;

j) detailed description of the floor covering including size of the specimens, details of the fitting into the test facility and of the fixing to the bare floor;

k) description of the test facility: type of suppression of the flanking transmission, volumes of the test rooms;

l) air temperature, static air pressure and humidity in both rooms during the measurement;

m) short description of the measuring method and a list of measuring equipment;

n) Results: Sone over Bark (Range 1 Bark to 24 Bark) and RWS-value as described in E.4.

E.7 Example of Macro

Example of Macro for Microsoft Excel Professional 2013 for calculation of RWS:

```
Option Explicit
Option Base 1
Sub Loudness()
Dim N As Single
Dim NS(240) As Single
Dim i As Integer
Dim Res(28) As Single
On Error GoTo Fehler
For i = 1 To 28      '25 to 12500 Hz
Res(i) = −60
Next i
For i = 7 To 24
```

```
Res(i) = Cells(46 + i - 6, 9).Value     '!!!!! This is address for third octave band values
If Res(i) < −60 Then Res(i) = −60
Next i
Loudness_DIN45631 Res, N, NS
Cells(319, 3).Value = N              Loudness in C318
For i = 1 To UBound(NS)
Cells(76 + i, 3).Value = NS(i)        ' !!!!! this is address for  240 specific loudnesses
Next i
Error:
Exit Sub
End Sub
Function Loudness_Fct(spec As Range)
Dim NS(240) As Single
Dim N As Single
Dim i As Single
Dim Terzen(28) As Single
Dim Pegel As Variant
For i = 1 To 28      '25 bis 12500 Hz
Terzen(i) = −60
Next i
i = 6              ' read from 100 Hz
With spec
For Each Pegel In spec
i = i + 1
If Not IsEmpty(Pegel.Value) And IsNumeric(Pegel.Value) Then
Terzen(i) = Pegel.Value
Else
Terzen(i) = −99
End If
Next
End With
Loudness_DIN45631 Terzen, N, NS
If N < 1 Then Loudness_Fct = “" Else Loudness_Fct = N
End Function
Private Sub Loudness_DIN45631(LT() As Single, N As Single, NS() As Single)
Dim GI(3) As Single, LTQ(20) As Single, LE(21) As Single
```