# INTERNATIONAL STANDARD

# ISO 717-1

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**AMENDMENT 1**
2006-08-15

# Acoustics — Rating of sound insulation in buildings and of building elements —

## Part 1: **Airborne sound insulation**

## AMENDMENT 1: Rounding rules related to single number ratings and single number quantities



*Acoustique — Évaluation de l'isolement acoustique des immeubles et des éléments de construction —*
*Partie 1: Isolement aux bruits aériens*

*AMENDEMENT 1: Règles d'arrondissement associées aux évaluations de numéro simple et aux quantités de numéro simple*



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## Foreword

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Amendment 1 to ISO 717-1:1996 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 126, *Acoustic properties of building products and of buildings* in collaboration with ISO Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

## Introduction

The existing texts on rounding of data in ISO 717-1 and ISO 717-2 are not very precise and lead to different interpretations, especially when implemented numerically in computer software.

This amendment to ISO 717-1:1996 gives more precise instructions through the following:

— modification of the first paragraph of 4.4, Method of comparison, and the addition of footnote 3;

— modification of both paragraphs of 4.5, Calculation of spectrum adaptation terms, and the renumbering of existing footnotes;

— modification of Tables C.1 and C.2.

— addition of a Bibliography.

# Acoustics — Rating of sound insulation in buildings and of building elements —

## Part 1: Airborne sound insulation

## AMENDMENT 1: Rounding rules related to single number ratings and single number quantities

*Page 1, Clause 2:*

Replace "ISO 140-4:—[1)]" with "ISO 140-4:1998". Delete footnote 1.

Replace "ISO 140-5:—[2)]" with "ISO 140-5:1998". Delete footnote 2.

*Page 7, 4.4, first sentence:*

Replace the first sentence with the following:

> To evaluate the results of a measurement made in accordance with ISO 140-3, ISO 140-4, ISO 140-5, ISO 140-9 and ISO 140-10 in one-third-octave bands (or octave bands), the measurement data shall be given to one decimal place[1)]. Shift the relevant reference curve in increments of 1 dB towards the measured curve until the sum of unfavourable deviations is as large as possible but not more than 32,0 dB (measurement in 16 one-third-octave bands) or 10,0 dB (measurement in 5 octave bands).



Insert new footnote 1 as follows:

> 1) The different parts of ISO 140 state that the results shall be reported "to one decimal place". However, if the octave or one-third-octave values have been reported with more than one decimal digit, the values shall be reduced to one decimal place before use in the calculation of the single number rating. This is done by taking the value in tenths of dB closest to the reported values: $XX,XYZZZ...$ is rounded to $XX,X$ if $Y$ is less than 5 and to $XX,X + 0{,}1$ if $Y$ is equal to or greater than 5. Software developers should ensure that this reduction applies to the true input values and not only to the displayed precision (as shown on the screen or printed on paper). Generally this can be implemented by the following sequence of instructions: multiply the (positive) number $XX,XYZZZ...$ by 10 and add 0,5, take the integer part and then divide the result by 10. For further details see ISO 31-0.

*Page 7, 4.5, following the equation:*

Replace the definition of $X_i$ with the following:

> $X_i$ the sound reduction index, $R_i$, or apparent sound reduction index, $R'_i$, or normalized sound level difference, $D_{n,i}$, or standardized sound level difference, $D_{nT,i}$, at the measuring frequency, $i$, given to one decimal place.

*Page 8, 4.5, second paragraph:*

Replace first sentence and the first part of the second sentence of the second paragraph with the following:

> Calculate the quantity, $X_{Aj}$, with sufficient accuracy and round the result to an integer [2)]. The resulting spectrum adaptation term is an integer by definition and shall be identified in accordance with the spectrum used, as follows:

In the first sentence of the second paragraph, renumber footnote 3) as footnote 2) and replace the text of the original footnote 3 with the following:

2) $XX,YZZZ\ldots$ is rounded to $XX$ if $Y$ is less than 5 and to $XX + 1$ if $Y$ is greater than or equal to 5. For further details see ISO 31-0. Software implementers should be aware that calculation of the spectrum adaptation terms involves floating-point calculations that are never exact and may incur rounding errors. In some rare cases this may lead to a difference of + 1 dB or – 1 dB in the final result. In order to avoid rounding errors, it is strongly recommended to use the highest possible machine accuracy available for floating-point representation and mathematical operations.

*Page 14, Annex C:*

Replace Table C.1 with the following:

**Table C.1 — Measurements in the specified frequency range 100 Hz to 3 150 Hz**

| **Frequency** | $R_i$ | **Reference values shifted by – 22 dB** | **Unfavourable deviation** | **Spectrum No. 1** | $L_{i1} - R_i$ | $10^{(L_{i1} - R_i)/10}$ | **Spectrum No. 2** | $L_{i2} - R_i$ | $10^{(L_{i2} - R_i)/10}$ |
|---|---|---|---|---|---|---|---|---|---|
| Hz | dB | dB | dB | dB | dB | $\times 10^{-5}$ | dB | dB | $\times 10^{-5}$ |
| 100 | 20,4 | 11 | — | – 29 | – 49,4 | 1,148… | – 20 | – 40,4 | 9,120… |
| 125 | 16,3 | 14 | — | – 26 | – 42,3 | 5,888… | – 20 | – 36,3 | 23,442… |
| 160 | 17,7 | 17 | — | – 23 | – 40,7 | 8,511… | – 18 | – 35,7 | 26,915… |
| 200 | 22,6 | 20 | — | – 21 | – 43,6 | 4,365… | – 16 | – 38,6 | 13,803… |
| 250 | 22,4 | 23 | 0,6 | – 19 | – 41,4 | 7,244… | – 15 | – 37,4 | 18,197… |
| 315 | 22,7 | 26 | 3,3 | – 17 | – 39,7 | 10,715… | – 14 | – 36,7 | 21,379… |
| 400 | 24,8 | 29 | 4,2 | – 15 | – 39,8 | 10,471… | – 13 | – 37,8 | 16,595… |
| 500 | 26,6 | 30 | 3,4 | – 13 | – 39,6 | 10,964… | – 12 | – 38,6 | 13,803… |
| 630 | 28,0 | 31 | 3,0 | – 12 | – 40,0 | 10,000 | – 11 | – 39,0 | 12,589… |
| 800 | 30,5 | 32 | 1,5 | – 11 | – 41,5 | 7,079… | – 9 | – 39,5 | 11,220… |
| 1 000 | 31,8 | 33 | 1,2 | – 10 | – 41,8 | 6,606… | – 8 | – 39,8 | 10,471… |
| 1 250 | 32,5 | 34 | 1,5 | – 9 | – 41,5 | 7,079… | – 9 | – 41,5 | 7,079… |
| 1 600 | 33,4 | 34 | 0,6 | – 9 | – 42,4 | 5,754… | – 10 | – 43,4 | 4,570… |
| 2 000 | 33,0 | 34 | 1,0 | – 9 | – 42,0 | 6,309… | – 11 | – 44,0 | 3,981… |
| 2 500 | 31,0 | 34 | 3,0 | – 9 | – 40,0 | 10,000 | – 13 | – 44,0 | 3,981… |
| 3 150 | 25,5 | 34 | 8,5 | – 9 | – 34,5 | 35,481… | – 15 | – 40,5 | 8,912… |
| | sum = 31,8 < 32<br>$R_w$ = 52 – 22 dB = 30 dB | | | sum = 147,6199.... $\times 10^{-5}$<br>– 10 lg sum = 28,308...<br>$C$ = 28 – 30 dB = – 2 dB | | | sum = 206,0636.... $\times 10^{-5}$<br>– 10 lg sum = 26,859...<br>$C_{tr}$ = 27 – 30 dB = –3 dB | | |

*Page 15, Annex C:*

Replace Table C.2 with the following:

**Table C.2 — Measurements in the enlarged frequency range 50 Hz to 5 000 Hz**

| Frequency | $R_i$ | Reference values shifted by – 22 dB | Unfavourable deviation | Spectrum No. 1 | $L_{i1} - R_i$ | $10^{(L_{i1} - R_i)/10}$ | Spectrum No. 2 | $L_{i2} - R_i$ | $10^{(L_{i2} - R_i)/10}$ |
|---|---|---|---|---|---|---|---|---|---|
| Hz | dB | dB | dB | dB | dB | $10^{-5}$ | dB | dB | $10^{-5}$ |
| 50 | 18,7 | | | – 41 | – 59,7 | 0,107… | – 25 | – 43,7 | 4,265… |
| 63 | 19,2 | | | – 37 | – 56,2 | 0,239… | – 23 | – 42,2 | 6,025… |
| 80 | 20,0 | | | – 34 | – 54,0 | 0,398… | – 21 | – 41,0 | 7,943… |
| 100 | 20,4 | 11 | | – 30 | – 50,4 | 0,912… | – 20 | – 40,4 | 9,120… |
| 125 | 16,3 | 14 | | – 27 | – 43,3 | 4,677… | – 20 | – 36,3 | 23,442… |
| 160 | 17,7 | 17 | | – 24 | – 41,7 | 6,760… | – 18 | – 35,7 | 26,915… |
| 200 | 22,6 | 20 | | – 22 | – 44,6 | 3,467… | – 16 | – 38,6 | 13,803… |
| 250 | 22,4 | 23 | 0,6 | – 20 | – 42,4 | 5,754… | – 15 | – 37,4 | 18,197… |
| 315 | 22,7 | 26 | 3,3 | – 18 | – 40,7 | 8,511… | – 14 | – 36,7 | 21,379… |
| 400 | 24,8 | 29 | 4,2 | – 16 | – 40,8 | 8,317… | – 13 | – 37,8 | 16,595… |
| 500 | 26,6 | 30 | 3,4 | – 14 | – 40,6 | 8,709… | – 12 | – 38,6 | 13,803… |
| 630 | 28,0 | 31 | 3,0 | – 13 | – 41,0 | 7,943… | – 11 | – 39,0 | 12,589… |
| 800 | 30,5 | 32 | 1,5 | – 12 | – 42,5 | 5,623… | – 9 | – 39,5 | 11,220… |
| 1 000 | 31,8 | 33 | 1,2 | – 11 | – 42,8 | 5,248… | – 8 | – 39,8 | 10,471… |
| 1 250 | 32,5 | 34 | 1,5 | – 10 | – 42,5 | 5,623… | – 9 | – 41,5 | 7,079… |
| 1 600 | 33,4 | 34 | 0,6 | – 10 | – 43,4 | 4,570… | – 10 | – 43,4 | 4,570… |
| 2 000 | 33,0 | 34 | 1,0 | – 10 | – 43,0 | 5,011… | – 11 | – 44,0 | 3,981… |
| 2 500 | 31,0 | 34 | 3,0 | – 10 | – 41,0 | 7,943… | – 13 | – 44,0 | 3,981… |
| 3 150 | 25,5 | 34 | 8,5 | – 10 | – 35,5 | 28,183… | – 15 | – 40,5 | 8,912… |
| 4 000 | 26,8 | | | – 10 | – 36,8 | 20,893… | – 16 | – 42,8 | 5,248… |
| 5 000 | 29,2 | | | – 10 | – 39,2 | 12,022… | – 18 | – 47,2 | 1,905… |
| | sum = 31,8 < 32<br>$R_w$ = 52 – 22 dB = 30 dB | | | sum = 150,9194.... ×$10^{-5}$<br>– 10 lg sum = 28,212...<br>$C$ = 28 – 30 dB = – 2 dB | | | sum = 231,4518.... ×$10^{-5}$<br>– 10 lg sum = 26,355...<br>$C_{tr}$ = 26 – 30 dB = – 4 dB | | |



*Page 16, on a new page after Annex C:*

Add a Bibliography and the following reference:

## Bibliography

[1] ISO 31-0, *Quantities and units — Part 0: General principles*

**ICS 91.120.20**

Price based on 3 pages