

# SVENSK STANDARD

## SS-EN ISO 717-1:2013



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### **Byggakustik – Värdering av ljudisolering i byggnader och hos byggdelar – Del 1: Luftljudsisolering (ISO 717-1:2013)**

### **Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation (ISO 717-1:2013)**



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Europastandarden EN ISO 717-1:2013 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 717-1:2013.

Denna standard ersätter SS-EN ISO 717-1, utgåva 1 och SS-EN ISO 717-1/A1:2006, utgåva 1.

The European Standard EN ISO 717-1:2013 has the status of a Swedish Standard. This document contains the official version of EN ISO 717-1:2013.

This standard supersedes the Swedish Standard SS-EN ISO 717-1, edition 1 and SS-EN ISO 717-1/A1:2006, edition 1.

**Förhållandet till övriga delar under samma huvudtitel - Utdrag ur Förord i ISO 717-1:2013/  
Relations to other parts under the same general title - Extract from the Foreword of  
ISO 717-1:2013**

ISO 717 consists of the following parts, under the general title *Acoustics — Rating of sound insulation in buildings and of building elements*:

- *Part 1: Airborne sound insulation*
- *Part 2: Impact sound insulation*

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EUROPEAN STANDARD

**EN ISO 717-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2013

ICS 91.120.20

Supersedes EN ISO 717-1:1996

English Version

**Acoustics - Rating of sound insulation in buildings and of  
building elements - Part 1: Airborne sound insulation (ISO 717-  
1:2013)**

Acoustique - Évaluation de l'isolement acoustique des  
immeubles et des éléments de construction - Partie 1:  
Isolation aux bruits aériens (ISO 717-1:2013)

Akustik - Bewertung der Schalldämmung in Gebäuden und  
von Bauteilen - Teil 1: Luftschalldämmung (ISO 717-  
1:2013)

This European Standard was approved by CEN on 5 January 2013.

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

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## Foreword

This document (EN ISO 717-1:2013) has been prepared by Technical Committee ISO/TC 43 “Acoustics” in collaboration with Technical Committee CEN/TC 126 “Acoustic properties of building elements and of buildings” the secretariat of which is held by AFNOR.

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 September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

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 supersedes EN ISO 717-1:1996.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO 717-1:2013 has been approved by CEN as EN ISO 717-1:2013 without any modification.

## Introduction

Methods of measurement of airborne sound insulation of building elements and in buildings have been standardized e.g. in ISO 10140-2, ISO 140-4, and ISO 140-5. The purpose of this part of ISO 717 is to standardize a method whereby the frequency-dependent values of airborne sound insulation can be converted into a single number characterizing the acoustical performance.

References to standards which provide data for single-number evaluation are meant to be examples and therefore are not complete.



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

## Part 1: Airborne sound insulation

### 1 Scope

This part of ISO 717:

- a) defines single-number quantities for airborne sound insulation in buildings and of building elements such as walls, floors, doors, and windows;
- b) takes into consideration the different sound level spectra of various noise sources such as noise sources inside a building and traffic outside a building;
- c) gives rules for determining these quantities from the results of measurements carried out in one-third-octave or octave bands in accordance with ISO 10140-2, ISO 140-4, and ISO 140-5.

The single-number quantities in accordance with this part of ISO 717 are intended for rating airborne sound insulation and for simplifying the formulation of acoustical requirements in building codes. An additional single-number evaluation in steps of 0,1 dB is indicated for the expression of uncertainty (except for spectrum adaptation terms). The required numerical values of the single-number quantities are specified according to varying needs. The single-number quantities are based on results of measurements in one-third-octave bands or octave bands.

For laboratory measurements made in accordance with ISO 10140, single-number quantities should be calculated using one-third-octave bands only.

The rating of results of measurements carried out over an enlarged frequency range is dealt with in [Annex B](#).

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 140-4:1998, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 4: Field measurements of airborne sound insulation between rooms*

ISO 140-5:1998, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 5: Field measurements of airborne sound insulation of façade elements and façades*

ISO 10140-2:2010, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 2: Measurement of airborne sound insulation*

ISO 10848-2:2006, *Acoustics — Laboratory measurement of the flanking transmission of airborne and impact sound between adjoining rooms — Part 2: Application to light elements when the junction has a small influence*

### 3 Terms and definitions

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

**3.1 single-number quantity for airborne sound insulation rating**

value, in decibels, of the reference curve at 500 Hz after shifting it in accordance with the method specified in this part of ISO 717

Note 1 to entry: Terms and symbols for the single-number quantity used depend on the type of measurement. Examples are listed in [Table 1](#) for airborne sound insulation properties of building elements and in [Table 2](#) for airborne sound insulation in buildings. In general, new single-number quantities are derived in a similar way.

**3.2 spectrum adaptation term**

value, in decibels, to be added to the single-number rating (e.g.  $R_w$ ) to take account of the characteristics of particular sound spectra

Note 1 to entry: Two sound spectra are defined (in one-third-octave bands and in octave bands) in this part of ISO 717.

Note 2 to entry: [Annex A](#) gives information on the purpose of introducing these two spectrum adaptation terms.

**Table 1 — Single-number quantities of airborne sound insulation properties of building elements**

Derived from one-third-octave band values		Defined in	
Single-number quantity	Term and symbol		
Weighted sound reduction index, $R_w$	Sound reduction index, $R$	ISO 10140-2:2010	Formula (2)
Weighted normalized flanking level difference, $D_{n,f,w}$	Normalized flanking level difference, $D_{n,f}$	ISO 10848-2:2006	Formula (1)
Weighted element-normalized level difference, $D_{n,e,w}$	Element-normalized level difference, $D_{n,e}$	ISO 10140-2:2010	Formula (5)

**Table 2 — Single-number quantities of airborne sound insulation in buildings**

Derived from one-third-octave or octave band values		Defined in	
Single-number quantity	Term and symbol		
Weighted apparent sound reduction index, $R'_w$	Apparent sound reduction index, $R'$	ISO 140-4:1998	Formula (5)
Weighted apparent sound reduction index, $R'_{45^\circ,w}$	Apparent sound reduction index, $R'_{45^\circ}$	ISO 140-5:1998	Formula (3)
Weighted apparent sound reduction index, $R'_{tr,s,w}$	Apparent sound reduction index, $R'_{tr,s}$	ISO 140-5:1998	Formula (4)
Weighted normalized level difference, $D_{n,w}$	Normalized level difference, $D_n$	ISO 140-4:1998	Formula (3)
Weighted standardized level difference, $D_{nT,w}$	Standardized level difference, $D_{nT}$	ISO 140-4:1998	Formula (4)
Weighted standardized level difference, $D_{ls,2m,nT,w}$ or $D_{tr,2m,nT,w}$	Standardized level difference, $D_{ls,2m,nT}$ or $D_{tr,2m,nT}$	ISO 140-5:1998	Formula (7)

**4 Procedure for evaluating single-number quantities**

**4.1 General**

The values obtained in accordance with ISO 10140-2, ISO 140-4, and ISO 140-5 are compared with reference values (see [4.2](#)) at the frequencies of measurement within the range 100 Hz to 3 150 Hz for one-third-octave bands and 125 Hz to 2 000 Hz for octave bands.

The comparison shall be carried out as specified in 4.4.

Furthermore, two spectrum adaptation terms shall be calculated (see 4.5) based on two typical spectra within the frequency range as quoted above. These two terms may optionally be supplemented by additional spectrum adaptation terms covering (if need be and if measured data are available) a wider frequency range between 50 Hz and 5 000 Hz.

## 4.2 Reference values

The set of reference values used for comparison with measurement results shall be as given in Table 3. The reference curves are shown in Figure 1 and Figure 2.

**Table 3 — Reference values for airborne sound**

Frequency Hz	Reference values dB	
	One-third-octave bands	Octave bands
100	33	36
125	36	
160	39	
200	42	45
250	45	
315	48	
400	51	52
500	52	
630	53	
800	54	55
1 000	55	
1 250	56	
1 600	56	56
2 000	56	
2 500	56	
3 150	56	

## 4.3 Sound spectra

The set of sound spectra in one-third-octave bands and octave bands to calculate the spectrum adaptation terms shall be as given in Table 4 and shown in Figure 3 and Figure 4. The spectra are A-weighted and the overall spectrum level is normalized to 0 dB.

## 4.4 Method of comparison

To evaluate the results of a measurement made in accordance with ISO 10140-2, ISO 140-4, and ISO 140-5 in one-third-octave bands (or octave bands), the measurement data shall be given to one decimal place.<sup>1)</sup> Shift the relevant reference curve in increments of 1 dB (0,1 dB for the expression of uncertainty) 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).

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 a decibel closest to the reported values: XX,XYZ ZZ ... 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,XYZ ZZ ... by 10 and add 0,5, take the integer part and then divide the result by 10. For further details see ISO 80000-1.[1]