International Standard

ISO 717/3

Acoustics — Rating of sound insulation in buildings and of building elements —
Part 3 : Airborne sound insulation of façade elements and façades

Acoustique — Évaluation de l'isolement acoustique des immeubles et des éléments de construction — Partie 3 : Isolement des éléments de façade et des façades aux bruits aériens

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 717/3 was developed by Technical Committee ISO/TC 43, *Acoustics*, and was circulated to the member bodies in January 1981.

It has been approved by the member bodies of the following countries :

Austria	Germany, F. R.	Norway
Belgium	Greece	Romania
Brazil	India	South Africa, Rep. of
Canada	Iraq	Spain
China	Ireland	Sweden
Czechoslovakia	Israel	Switzerland
Denmark	Italy	United Kingdom
Egypt, Arab Rep. of	New Zealand	USA

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
Finland
France
Hungary
Japan
USSR

Acoustics — Rating of sound insulation in buildings and of building elements —
Part 3 : Airborne sound insulation of façade elements and façades

0 Introduction

Methods of measurement of airborne sound insulation of façade elements and façades have been standardized in ISO 140/3 and ISO 140/5. These methods give values for airborne sound insulation which are frequency dependent.

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.

In the interest of uniformity of airborne sound insulation ratings for various types of building elements for both internal and external use, the reference curve of ISO 717/1 has been adopted also for the rating of façade elements and façades.

Investigations and calculations have shown that, mathematically, ratings according to this curve correlate well with ratings according to other reference curves proposed specifically for outside noise. These curves are generally more stringent in the low frequency range and would therefore lead to lower single-number ratings than the reference curve used in this part of ISO 717. However, equal protection against outside noise can be obtained by specifying the requirements in building codes accordingly.

1 Scope and field of application

This part of ISO 717

— defines single-number quantities for the airborne sound insulation of façades, façade elements, windows, doors, roofs, and

— gives rules for determining these quantities from the results of measurements carried out in one-third octave bands according to ISO 140/3 and ISO 140/5.

The single-number quantities according to this part of ISO 717 are intended for rating the airborne sound insulation and for simplifying the formulation of acoustical requirements in building codes. The required numerical values of the single-number quantities can be specified according to varying needs.

2 References

ISO 140, *Acoustics — Measurement of sound insulation in buildings and of building elements*

> *Part 3 : Laboratory measurements of airborne sound insulation of building elements.*

> *Part 5 : Field measurements of airborne sound insulation of façade elements and façades.*

ISO 717/1, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1 : Airborne sound insulation in buildings and of interior building elements.*

3 Definition

single-number quantity for airborne sound insulation rating : The value, in decibels, of the reference curve at 500 Hz after shifting it according to the method laid down in this part of ISO 717.

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Terms and symbols for the single-number quantity used depend on the type of measurement. They are listed in table 1 for airborne sound insulation properties of exterior building elements and in table 2 for airborne sound protection by façades.

NOTE — In order to distinguish clearly between values with and without flanking transmission, primed symbols (for example R') are used to denote values obtained with flanking transmission.

4 Procedure for evaluating single-number quantities

4.1 General

The values obtained according to ISO 140/3 and ISO 140/5 are compared with reference values (see 4.2) at the frequencies of measurement within the range of 100 to 3 150 Hz.

The comparison is carried out according to 4.3.

4.2 Reference values

The set of reference values used for comparison with measurement results is specified in table 3 and shown in the figure.

4.3 Method of comparison

To evaluate the results of a measurement of R, R_{tr}, R_ϑ, $R_{\vartheta,oc}$, R' or $D_{nT,tr}$ in one-third octave bands (preferably given to one decimal place), the reference curve is shifted in steps of 1 dB towards the measured curve until the mean unfavourable deviation, calculated by dividing the sum of the unfavourable deviations by the total number (i.e. 16) of measurement frequencies, is as large as possible but not more than 2,0 dB. An unfavourable deviation at a particular frequency occurs when the result of measurements is **less than** the reference value. Only the unfavourable deviations are taken into account.

The value, in decibels, of the reference curve at 500 Hz, after shifting it according to this procedure, is R_w, $R_{tr,w}$, $R_{\vartheta,w}$, $R_{\vartheta,oc,w}$, R'_w or $D_{nT,tr,w}$, respectively.

In addition, the maximum unfavourable deviation at any frequency shall be recorded, if it exceeds 8,0 dB.

5 Statement of results

The appropriate single-number quantity shall be given with reference to this part of ISO 717. Also, the maximum unfavourable deviation shall be reported, if it exceeds 8,0 dB.

The results of measurements shall also be given in the form of a diagram as specified in ISO 140/3 and ISO 140/5, and shall include the shifted reference curve exemplified in the figure.

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

| Single-number quantity | Symbol | Derived from one-third octave band values | | | |
| | | name | symbol | defined in ISO 140 | |
				part	formula
Weighted sound reduction index	R_w	sound reduction index	R	3	(3)
	$R_{tr,w}$		R_{tr}	5	(1)
	$R_{\vartheta,w}$		R_ϑ	5	(5)
	$R_{\vartheta,oc,w}$		$R_{\vartheta,oc}$	5	(6)
Weighted apparent sound reduction index	R'_w	apparent sound reduction index	R'	3	(5)

Table 2 — Single-number quantity of airborne sound protection by façades

| Single-number quantity | Symbol | Derived from one-third octave band values | | | |
| | | name | symbol | defined in ISO 140 | |
				part	formula
Weighted standardized level difference	$D_{nT,tr,w}$	standardized level difference	$D_{nT,tr}$	5	(2)