

*Indian Standard*

# RATING OF SOUND INSULATION IN BUILDINGS AND OF BUILDING ELEMENTS



## PART 3 AIRBORNE SOUND INSULATION OF FACADE ELEMENTS AND FACADES

( ISO Title : Acoustics — Rating of Sound Insulation in  
Buildings and of Building Elements —  
Part 3 : Airborne Sound Insulation of Facade  
Elements and Facades )

### National Foreword

This Indian Standard (Part 3) which is identical with ISO 717/3-1982 'Acoustics — Rating of sound insulation in buildings and of building elements — Part 3 : Airborne sound insulation of facade elements and facades', issued by the International Organization for Standardization (ISO), was adopted by the Indian Standards Institution on the recommendation of the Acoustics Sectional Committee and approved by the Electronics and Telecommunication Division Council.

In the adopted standard certain terminology and conventions are not identical with those used in Indian Standards, attention is especially drawn to the following :

Comma ( , ) has been used as a decimal marker while in Indian Standards the current practice is to use a point ( . ) as the decimal marker.

### Cross Reference

In this Indian Standard, the following International Standards are referred to. Please read in their respective place the following Indian Standards :

<i>International Standard</i>	<i>Indian Standard</i>
ISO 140 Acoustics — Measurement of sound insulation in buildings and of building elements :	IS : 9901 Measurement of sound insulation in buildings and of building elements :
Part 3 : Laboratory measurements of airborne sound insulation of building elements	Part 3 Laboratory measurements of airborne sound insulation of building elements (Technically equivalent)
Part 5 : Field measurements of airborne sound insulation of facade elements and facades	Part 5 Field measurements of airborne sound insulation of facade elements and facades (Technically equivalent)
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	IS : 11050 (Part 1)-1984 Rating of sound Insulation in buildings and of building elements : Part 1 Airborne sound insulation in buildings and of interior building elements (Identical)

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## 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.

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  $R$ ,  $R_{tr}$ ,  $R_{\theta}$ ,  $R_{\theta,oc}$ ,  $R'$  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  $R_w$ ,  $R_{tr,w}$ ,  $R_{\theta,w}$ ,  $R_{\theta,oc,w}$ ,  $R'_w$  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)
	$R_{\theta,w}$		$R_{\theta}$	5	(5)
	$R_{\theta,oc,w}$		$R_{\theta,oc}$	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)

Table 3 — Reference values of airborne sound

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

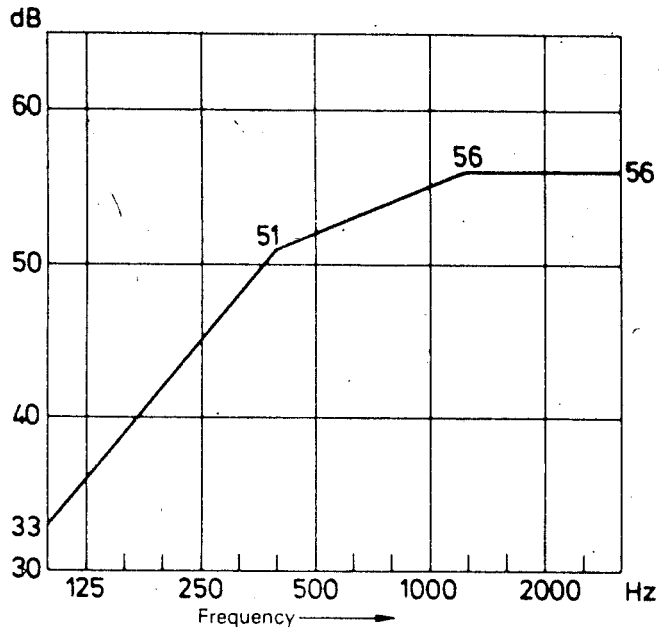


Figure — Curve of reference values for airborne sound