BRITISH STANDARD

BS 5821-3:
1984
ISO 717/3-1982

Methods for

Rating the sound insulation in buildings and of building elements —

Part 3: Method for rating the airborne sound insulation of façade elements and façades —

[ISO title: Acoustics — Rating of sound insulation in buildings and of building elements — Part 3: Airborne sound insulation of facade elements and façades]

UDC [699.844 + 692]:[534.83:534.6]

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Environment and Pollution Standards Committee (EPC/-) to Technical Committee EPC/1 upon which the following bodies were represented:

Association of Consulting Engineers
BEAMA Transmission and Distribution Association
British Broadcasting Corporation
British Occupational Hygiene Society
British Telecommunications
Department of Health and Social Security
Department of the Environment (Building Research Establishment)
Department of Trade and Industry (National Physical Laboratory)
Health and Safety Executive
Incorporated Association of Architects and Surveyors
Institute of Acoustics
Institute of Occupational Hygienists
Institute of Physics
Institute of Sound and Vibration Research
Institution of Electronic and Radio Engineers
Institution of Municipal Engineers
Petroleum Industry Association
Royal Institute of British Architects
Society of Environmental Engineers
Coopted members

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Aggregate Concrete Block Association
Association of Building Component Manufacturers Ltd.
Autoclaved Aerated Concrete Products Association
Brick Development Association
British Ceramic Research Association
Cement Makers' Federation
Concrete Society
Gypsum Products Development Association
Hevac Association
National Brassfoundry Association
Structural Insulation Association
Suspended Ceilings Association
Timber Research and Development Association

This British Standard, having been prepared under the direction of the Environment and Pollution Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 December 1984

The following BSI references relate to the work on this standard:
Committee reference EPC/1
Draft (ref 81/50102) announced in *BSI News* March 1981

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Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

National foreword

This Part of BS 5821 has been prepared under the direction of the Environment and Pollution Standards Committee and is identical with ISO 717/3-1982 "*Acoustics — Rating of sound insulation in buildings and of building elements — Part 3: Airborne sound insulation of façade elements and façades*" prepared by Technical Committee 43, Acoustics, with the active participation and approval of the UK and published by the International Organization for Standardization (ISO).

ISO 717/1 and ISO 717/2 are also being published as Parts of BS 5821, which now comprises the following Parts:

— *Part 1: Method for rating the airborne sound insulation in buildings and of interior building elements;*

— *Part 2: Method for rating the impact sound insulation;*

— *Part 3: Method for rating the airborne sound insulation of façade elements and façades.*

Terminology and conventions. The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words "this part of ISO 717" appear, referring to this standard, they should be read as "this Part of BS 5821".

Cross-references

International standard	Corresponding British Standard
	BS 2750 Methods of measurement of sound insulation in buildings and of building elements
ISO 140/3-1978	Part 3:1980 Laboratory measurements of airborne sound insulation of building elements (Identical)
ISO 140/5-1978	Part 5:1980 Field measurements of airborne sound insulation of façade elements and façades (Identical)
ISO 717/1-1982	BS 5821 Methods for rating the sound insulation in buildings and of building elements
	Part 1:1984 Method for rating the airborne sound insulation in buildings and of interior building elements (Identical)

Additional information. The use of the word "standardized" in Table 2 indicates values obtained from field measurements that have been corrected to a receiving room reverberation time of 0.5 s (see BS 2750-4:1980 "Field measurements of airborne sound insulation between rooms" and BS 2750-7:1980 "Field measurements of impact sound insulation of floors").

For guidance on the interpretation of differences between laboratory and field measurements, see CP 3 "Code of basic data for the design of buildings" Chapter III:1972 "Sound insulation and noise reduction"[1)].

[1)] In course of revision.

Although the term "single-number quantity" is used in this standard, the term "index" is more usual usage within the United Kingdom.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 4, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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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}, $R\vartheta$, $R\vartheta_{,oc}$, 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)
	$R\vartheta_{,w}$		$R\vartheta$	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)

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

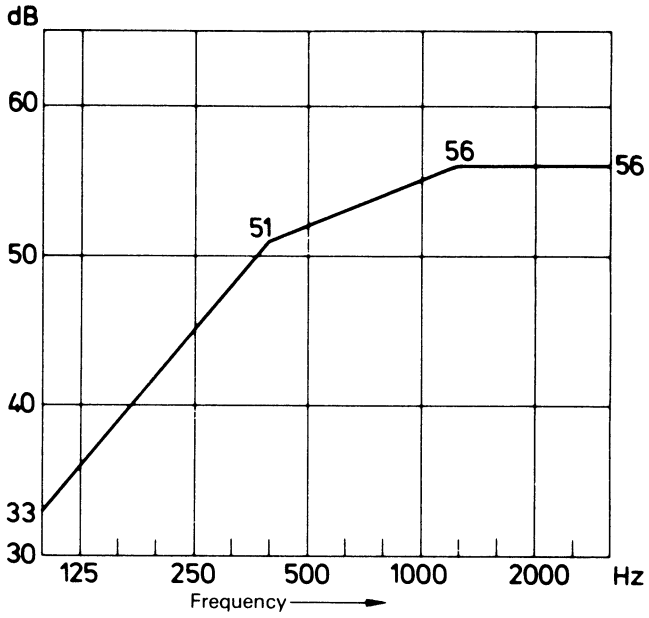

Figure — Curve of reference values for airborne sound

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Publications referred to

See national foreword.

BSI — British Standards Institution

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