

BS 8233:2014



BSI Standards Publication

Guidance on sound insulation and noise reduction for buildings

bsi.

...making excellence a habit.™

Publishing and copyright information

The BSI copyright notice displayed in this document indicates when the document was last issued.

© The British Standards Institution 2014

Published by BSI Standards Limited 2014

ISBN 978 0 580 74378 8

ICS 91.120.20

The following BSI references relate to the work on this document:

Committee reference B/564

Draft for comment 12/30241578 DC

Publication history

First published 1948

Second edition 1960

Third edition 1987

Fourth edition 1999

Fifth (present) edition, February 2014

Amendments issued since publication

Date	Text affected
------	---------------

Currently in preview, click buy full version

Contents

Foreword *iii*

0	Introduction	1
1	Scope	1
2	Normative references	1
3	Terms, definitions and symbols	2
4	Measuring equipment and accuracy	8
5	Planning and design	9
5.1	Sequence of stages	9
5.2	Assessing the building or site	9
5.3	Design and noise criteria: noise levels	11
5.4	Noise control measures	11
5.5	Quality control and workmanship	14
6	External noise sources	14
6.1	Introduction	14
6.2	Noise from road traffic	15
6.3	Noise from aircraft	17
6.4	Noise from railways	18
6.5	Noise from industry	18
6.6	Noise from construction and open sites	19
6.7	Noise from wind farms	20
6.8	External noise sources: Meteorological effects	21
6.9	Other sources of noise	21
7	Specific types of building	21
7.1	General	21
7.2	Design considerations	21
7.3	Indoor ambient noise criteria	22
7.4	Noise indices	23
7.5	Internal sound insulation	23
7.6	Limits for reverberation time	23
7.7	Specific types of building	24
8	Sound insulation in a building	35
8.1	Factors affecting sound insulation	35
8.2	Flooring transmission	35
8.3	Sound insulation tests	35
8.4	Sound insulation characteristics of common building elements	36
	Noise from building services	41
9.1	General	41
9.2	Main components	41
9.3	Frequency characteristics of noise	42
9.4	Rating noise from services	42
9.5	Sound-absorbing treatment	42
9.6	Quality control and workmanship	43
	Annexes	
	Annex A (informative) Noise calculations	44
	Annex B (informative) Noise rating	46
	Annex C (informative) Specification of sound insulation	48
	Annex D (informative) Special problems requiring expert advice: Guidance for specific applications	51
	Annex E (informative) Airborne and impact sound insulation	53
	Annex F (informative) Legislative framework and guidance	63
	Annex G (informative) Typical design problem	64
	Annex H (informative) Examples of design criteria adopted by hotel groups	69

Bibliography 73

List of figures

- Figure 1 – Characteristics of sound-absorbing materials 33
 Figure A.1 – Sound insulation of non-uniform facades comprising windows and cladding 45
 Figure E.1 – Transmission paths (via the structure) of noise originating in Room 1 (diagrammatic) 54
 Figure E.2 – Indirect sound leakage paths 55
 Figure E.3 – Mass law curve 55

List of tables

- Table 1 – Typical traffic noise levels measured approximately 1 m from the facade 15
 Table 2 – Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important 22
 Table 3 – Example on-site sound insulation matrix (dB $D_{nT,w}$) 23
 Table 4 – Indoor ambient noise levels for dwellings 24
 Table 5 – Noise levels from lifts in living accommodation 26
 Table 6 – Typical noise levels in non-domestic buildings 28
 Table 7 – Maximum steady noise levels for reliable speech communication 30
 Table 8 – The sound insulation of roofs 41
 Table A.1 – Standard A-weighting values (dB) 46
 Table B.1 – Noise rating values 47
 Table B.2 – Values of a and b 48
 Table C.1 – Common indices used to describe laboratory airborne and impact sound insulation 51
 Table C.2 – Common indices used to describe field airborne and impact sound insulation 51
 Table E.1A – Laboratory airborne sound insulation of walls and partitions 58
 Table E.1B – Field airborne sound insulation of walls and partitions 60
 Table E.1C – Typical performance measured in the field of walls built to Robust Details generic systems 61
 Table E.2A – Laboratory airborne sound insulation of floor constructions 62
 Table E.2B – Typical performance measured in the field of floors built to Robust Details generic systems 62
 Table G.1 – Data used in the calculation of the noise level inside a room 67
 Table G.2 – The calculation of the noise level inside a room 68
 Table H.1 – Airborne sound insulation 69
 Table H.2 – Impact sound insulation for hotels 70
 Table H.3 – Indoor ambient noise level ranges for hotel bedrooms 70
 Table H.4 – Building services noise in hotels 71

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 78, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 28 February 2014. It was prepared by Technical Committee B/564, *Noise control on building sites*, and Subcommittee EH/1/6, *Building acoustics*. A list of organizations represented on these committees can be obtained on request to their secretaries.

Supersession

This British Standard supersedes BS 8233:1999, which is withdrawn.

Information about this document

This British Standard draws on the results of research and experience to provide information on the design of buildings that have internal acoustic environments appropriate to their functions. It deals with control of noise from outside the building, noise from plant and services within it, and room acoustics for non-critical situations. This document is intended for use by non-specialist designers and constructors of buildings and those concerned with building control, planning and environmental health.

This is a full revision of the standard. The principal changes have been made to reflect:

- changes to the legislative framework since publication of the 1999 edition;
- revisions to Building Regulations Approved Document E [1];
- the publication of specialist documents for specific sectors, such as healthcare and education;
- the publication in England of the National Planning Policy Framework [2] in March 2012, with the concurrent withdrawal of numerous individual planning guidance and policy statement documents, including those specifically relating to noise;
- a reappraisal of the tabular content with respect to setting targets for various classes of living space in the light of research findings; and
- the need to transfer some of the more detailed information from the main text to annexes.

BS 8233:1999 was, like its predecessor CP3 Chapter III:1972, published as a code of practice. However, it was decided to publish this edition as a guide because the text largely comprises guidance that does not support claims of compliance.

Copyright is claimed on Figure E.2. Copyright holders are British Gypsum, Head Office, Gotham Road, East Leake, Loughborough, Leicestershire, LE12 6HX.

Use of this document

As a guide, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

Presentational conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Currently in preview, click buy full version

0 Introduction

Noise control in and around buildings is discussed in this British Standard guide on an objective and quantifiable basis as far as is currently possible. For many common situations, this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria for most people. However, it is necessary to remember that people vary widely in their sensitivity to noise, and the levels suggested might need to be adjusted to suit local circumstances. Moreover, noise levels refer only to the physical characteristics of sound and cannot differentiate between pleasant and unpleasant sounds. Important though psychological factors are, it is not practicable to consider them in this guide.

NOTE The standard is intended to be used routinely where noise sources are brought to existing noise-sensitive buildings.

Attention is drawn to the fact that measures taken to control sound might also impinge on fire precautions and other health and safety requirements. All such requirements need to be considered together at an early stage of the design.

1 Scope

This British Standard provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

This British Standard does not cover:

- a) specialist applications, such as auditoria and cinemas (for cinemas, see BS ISO 9568);
- b) vibration control, except where it is evident in the form of radiated sound; or
- c) noise that breaks out from the building that might affect external receptors.

NOTE Annex A describes some of the simpler types of noise calculation. A method of rating noise is described in Annex B. Methods of measurement of sound insulation are described in Annex C. Annex D outlines some special problems requiring expert advice. Annex E describes airborne and impact sound insulation. Annex F sets out the legislative framework applicable to noise producing developments. Annex G provides example calculations for resolving a typical design problem. Examples of design criteria adopted by various hotel groups are included for reference in Annex H.

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.

BS 4142, *Methods for rating and assessing industrial and commercial sound* ¹⁾

BS 5502-32, *Buildings and structures for agriculture – Part 32: Guide to noise attenuation*

BS EN 20354, *Acoustics – Measurement of sound absorption in a reverberation room*

¹⁾ Revision in preparation.