

Appendix 11.3

Standards and Guidance

British Standard (BS) 8233 Sound Insulation and Noise Reduction for Buildings, 2014

- 4.1 BS 8233 gives guidance for noise levels within residential properties. It discusses appropriate noise criteria for reasonable rest and sleep conditions, and details noise level limits which are considered to provide appropriate conditions, in accordance with World Health Organisation (WHO) guidelines.
- 4.2 Table 4 from BS 8233 is reproduced below:

Table A.11.3.1 Indoor ambient noise levels for dwellings

Activity	Location	07:00-23:00	23:00-07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

- 4.3 It should be noted that these levels represent the average noise level over the 16-hour day or 8-hour night period. This potentially means that higher noise levels may be experienced internally over a shorter period of time (e.g. individual passing trains). These equivalent noise levels over a period of time are the best representation of the average noise level, and are generally the main focus when it comes to evaluating noise exposure.
- 4.4 Under the updates to BS 8233 in 2014, for both day and night time cases, a relaxation of up to 5 dB can be considered to provide “*reasonable internal conditions*” where development is considered necessary or desirable.
- 4.5 There is no specific guidance in BS 8233 regarding maximum noise levels, and hence there are no specific planning conditions associated with maximum noise levels. However, controlling maximum noise levels is desirable, and suitable guidance is provided with the WHO document ‘Guidelines for Community Noise’ (1999), as outlined below.

WHO Guidelines for Community Noise, 1999

- 4.6 The limits set within BS 8233 are compatible with those recommended by the WHO guidelines for community noise.
- 4.7 Although maximum noise level limits (dBL_{Amax}) are no longer detailed within BS 8233, the WHO Night Noise Guidelines for Europe (2009) states that *‘for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dBL_{Amax} more than ten to fifteen times per night’*.

BS 4142 Methods for Rating and Assessing Industrial and Commercial Sound, 2014

- 4.8 This standard provides a methodology for rating and assessing sound of an industrial or commercial nature, including sound from industrial and manufacturing processes, fixed plant installations, loading and unloading of goods, and sound from mobile plant.

- 4.9 The standard can be used both to assess sound from proposed new industrial and commercial sources, and sound from these sources affecting proposed new dwellings, as well as to investigate complaints. It does not, however, determine whether noise amounts to a nuisance.
- 4.10 The standard leads to derivation of a 'rating level' for the industrial sound which is weighted for acoustically significant characteristics including tonality, impulsivity and intermittency. This is compared against the background noise level in the absence of the specific noise (the noise source arising from the industrial/commercial use), the difference between the two being used to give an indication of impact.
- 4.11 Typically, the greater the difference, the greater the magnitude of the impact:
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
 - The lower the rating level is relative to the measured background sound level, the less likely it is that the specific noise source will have an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- 4.12 It should be noted that not all adverse impacts will lead to complaints, and not every complaint is proof of an adverse impact.

BS 5228-1 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise, 2009

- 4.13 This document provides noise levels from typical construction activities, assessment methodologies for predicting noise levels and determining of significant effects, and provides best practice noise control/mitigation advice.

BS 5228-2 Code of practice for noise and vibration control on construction and open sites, Part 2: Vibration, 2009

- 4.14 This document provides noise levels from typical construction activities, assessment methodologies for the determining of significant effects and best practice vibration control/mitigation advice.

BS 6472 Guide to evaluation of human exposure to vibration in buildings, 2008

- 4.15 This document provides guideline limits for ground-borne vibration affecting people in buildings.
- 4.16 The threshold of perception depends on the frequency. The human body is most sensitive to vibration in the frequency range 1-80 Hz. The threshold of perception is typically taken to be 0.15 mms⁻¹ and 0.3 mms⁻¹ peak particle velocity at frequencies between 8 Hz and 80 Hz.

- 4.17 BS 6472:1992 contains guidance relating to human exposure to vibration. A methodology is presented for assessing the human response to vibration in terms of either the vibration dose value (VDV).
- 4.18 Experience shows that disturbance or annoyance from vibration in residential situations is likely to arise when the magnitude of vibration is only slightly in excess of the threshold of perception.
- 4.19 For building damage criteria, Table 1 of BS 7385: Part 2:1993: "Evaluation and Measurement for Vibration in Buildings - guide to damage levels from ground-borne vibration", sets out limits for primarily transient vibration above which cosmetic damage could occur.

**ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors
- Part 2: General method of calculation, 1993**

- 4.20 This document provides a calculation methodology for predicting external noise levels.

Calculation of Road Traffic Noise (CRTN), Department of Transport (Welsh Office), 1988

- 4.21 This document details a calculation procedure for the prediction of road traffic noise levels; and details methodology for measuring existing road traffic noise levels.

Design Manual for Roads and Bridges Volume 11, Part 3, Section 7, HMSO, 1994 (DMRB 11:3:7), 2011

- 4.22 This document provides a procedure for assessing the potential noise impact of proposed road transport schemes.

Acoustics, Ventilation and Overheating Residential Design Guide, Association of Noise Consultants, 2018.

- 4.23 This section relates to an assessment of acceptable noise levels during overheating conditions. Overheating is generally considered to be the point at which additional ventilation is required to control excess heat. Most if not all methods of ventilation involve an increase in noise levels, either by opening windows, providing additional natural ventilation opening, or by mechanical means.
- 4.24 The consideration of overheating is a relatively new phenomenon, and there is, at the time of writing, no accepted guidance as to acceptable noise levels when additional ventilation is required. It is a complex issue, which has equal implications from the acoustics, thermal design (glazing) and mechanical services industries, all of which have conflicting requirements.
- 4.25 The only available formal guidance of which dBx Acoustics are aware is the Acoustics Ventilation and Overheating – Residential Design Guide (AVO), published in February 2008 by the Association of Noise Consultants (ANC). However, this document has only been published as a "Draft for Consultation" to the acoustics industry. One of the main conclusions is that *"Appropriate research work is urgently needed to better inform the guidance for the overheating condition"*.
- 4.26 In the absence of any other guidance, Table 3-3 of the ANC document is reproduced below, which give a range of significances to various internal noise levels, which are based on the guidance

within BS 8233 for background ventilation (i.e. when the requirements of BS 8233 are met, the impact is neutral).

Table A.11.3.1 Guidance for Level 2 assessment of noise from transport noise sources relating to overheating condition

Internal ambient noise level		Examples of Outcomes	Risk Of Adverse Impact*
L _{Aeq,16hr} 07:00 – 23:00 (Day)	L _{Aeq,8h} 23:00 – 07:00 (Night)		
≤ 35 dB	≤ 30 dB	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	Negligible
> 35 dB and ≤ 40 dB	> 30 dB and ≤ 35 dB	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in the quality of life.	Low
> 40 dB and ≤ 50 dB	> 35 dB and ≤ 43 dB	Increasing risk of adverse effect due to impact on reliable speech communication during daytime or sleep disturbance at night. Although noise levels at the lower end of this category will cause changes in behaviour, they may still be considered suitable. Noise levels at the upper end of this category will result in more significant changes in behaviour and are only likely to be considered suitable if they occur for limited periods.	Medium
> 50 dB	> 43 dB	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	High

* The risk of an adverse effect occurring will also depend on how frequently and for what duration the mitigation of overheating is likely to result in increased internal noise levels.

CIBSE Technical Manual 59 Avoiding Overheating, 2017

- 4.1 Based on comments provided by the Local Authority, the noise limits detailed in Table A.11.3.1, above, can be increased by 5dB during overheating conditions. The exact definition of ‘overheating’ is not universally accepted, but the CIBSE Technical Memorandum 59 describes ‘overheating’ as being outside the following parameters for predominantly naturally ventilated homes;

“a) For living rooms, kitchens and bathrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours (CIBSE TM52 Criterion 1: Hours of exceedance).

b) For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 °C will be recorded as a fail.) Criteria 2 and 3 of CIBSE TM52 may fail to be met, but both a) and b) above must be passed for all relevant rooms.”

Institute of Environmental Management (IEMA) and Institute of Acoustics (IOA) Guidelines for Noise Impact Assessment

- 4.2 This draft documentation sets out key principles and advice on how to integrate noise impact effects into the consenting process of all types of development.