



BS8233 Update Review

Technical Note

Land, Planning and Development Federation (LPDF)

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BS8233 Update Review - Technical Note

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1 Introduction

1.1 Technical Note Introduction

- 1.1.1 The following technical note aims to offer an early review of the potential impact of the proposed updates to BS8233 on noise-related development requirements.
- 1.1.2 The following sections will provide an overview of the updates, motivations, impact on façade and ventilation design, and noise pollution from infrastructure such as air source heat pumps.

1.2 BS8233 Introduction and Proposed Update

- 1.2.1 BS8233 'Sound insulation and noise reduction for buildings' is a British Standard widely used for its residential design guidance. The current version specifies guidelines for internal sound levels within dwellings with partially open or closed windows. However, the epidemiological evidence on the health effects of environmental noise is largely expressed in terms of external sound levels.
- 1.2.2 An update was proposed as part of the IOA Acoustics 2024 conference (Vol. 46. Pt. 2. 2024 - Updating BS 8233: Aligning Residential Acoustic Design Guidance with the Health Evidence - J Harvie-Clark and B Fenech).
- 1.2.3 The update proposes a change to a two-step approach. First the external sound levels are used as the primary design driver for good environmental acoustic design, to align with the noise and health evidence. Good environmental acoustic design is a process that can minimise external sound impact through appropriate measures such as site layout, building orientation, massing, landscaping, and noise barriers. The impact of environmental sound is quantified in terms of its health effect (DALYs) and monetary social cost (GBP) to define categories of adverse effect that can help inform decision-making. Once external levels are minimised through good environmental acoustic design, the building envelope can provide mitigation to achieve a good internal environmental quality.
- 1.2.4 The proposed approach moves away from prescribing fixed internal targets in all cases. Instead, it considers ventilation needs for indoor air quality and provisions for mitigating overheating risks holistically alongside internal acoustic conditions.

1.3 Summary of Motivations for the Proposed Update

- 1.3.1 The below points are the main motivation for the update:
 - WHO 1999 Guidelines based on evidence from 1960s to early 1990s.
 - Evidence since early 2000s based on: larger, more diverse populations; more consistent study methodologies; much better noise exposure models; better control for confounders; more representative of today's sound environment.
 - WHO 2018 Guidelines consistent with WHO Handbook for guideline development (2nd ed. 2014) and underpinned by systematic reviews and meta-analyses.
 - New evidence shows higher levels of annoyance and sleep disturbance for the same long term averaged sound level, especially for railway and aircraft noise.

- Strengthening evidence of links between noise exposure and incidence and mortality from cardiovascular/metabolic diseases.
- Strengthening evidence on the relationship between noise annoyance and mental health.
- Most good quality evidence on long term health effects is currently expressed in terms of external sound levels.

2 Impact on Façade and Ventilation Design

2.1 Current Assessment Strategy

- 2.1.1 BS8233 provides acceptable internal noise levels for various locations (i.e. bedrooms) for the daytime (07:00-23:00) and night-time (23:00-07:00).
- 2.1.2 These requirements are also supplemented by advice from WHO regarding maximum night-time (peak) noise levels.
- 2.1.3 The current conventional assessment methodology is to model the resultant noise climate from sources surrounding a proposed development site, to predict façade noise during the day, and at night (average and maximum separately).
- 2.1.4 The reduction in noise levels from a typical openable window (15dB) is then subtracted from the predicted façade levels and then compared to the relevant assessment criteria to determine whether natural ventilation is suitable.
- 2.1.5 If internal noise levels exceed acceptable levels with unrestricted openable windows, additional mitigation requirements are calculated.

2.2 Proposed Assessment Strategy.

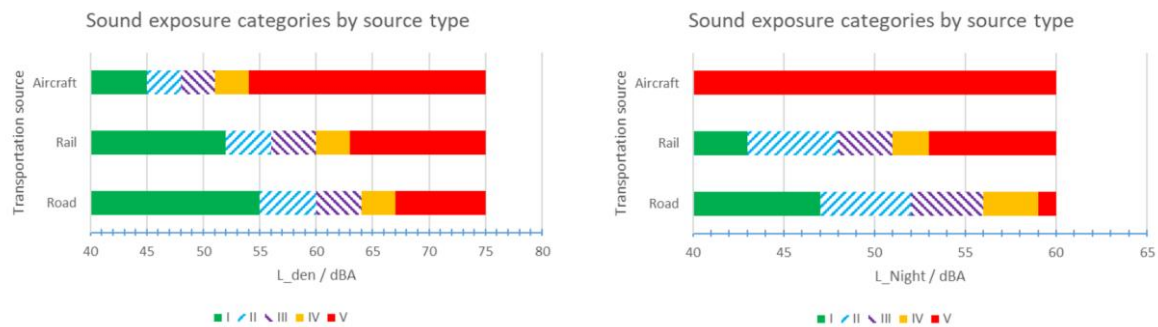
- 2.2.1 The new approach is based on two assessments of physiological effects, the percentage of Highly Annoyed (HA) and the percentage of Highly Sleep Disturbed (HSD).
- 2.2.2 'Sound Exposure Categories' (SEC) are defined to represent the magnitude of impact for the percentage HA and percentage HSD quantities.

Table 2-1: Sound Expose Categories

Sound Exposure Category (SEC)	I	II	III	IV	V
% highly annoyed (HA)	10%	15%	20%	25%	>25%
	≤1 in 10	1 in 7	1 in 5	1 in 4	>1 in 4
% Highly sleep disturbed (HSD)	3%	5%	7%	9%	>9%
	≤1 in 33	1 in 20	1 in 14	1 in 11	>1 in 11

- 2.2.3 The first assessment, the percentage of Highly Annoyed (HA), is assessed against a quantity L_{den} , which is a calculated representative 24-hr level which is a good indicator of likely annoyance. This quantity addresses the daytime, evening and night-time levels in one quantity (each period includes a correction).
- 2.2.4 The second assessment, the percentage of Highly Sleep Disturbed (HSD), is assessed against solely against the night-time L_{night} level.
- 2.2.5 The levels for L_{den} and L_{night} which result in various sound exposure categories are defined per source type (for road, rail and air traffic).

Figure 2-1: Sound Exposure Categories per Source Type



2.2.6 Once a SEC has been defined for the two assessments, this determines the required sound insulation performance of the façade, regardless of the ventilation strategy.

2.2.7 The SEC also determines the mitigating overheating/ventilation strategy directly.

2.3 Potential Impact

2.3.1 The new methodology is seen to be more procedural with less ambiguity and hence will likely result in increased consistency between noise assessments.

2.3.2 For developments where road traffic is the dominant source, the outcomes are predicted to be likely similar to that of the previous methodology.

2.3.3 For developments where rail and air traffic are the dominant noise sources, the new methodology has the potential to result in more restrictive outcomes.

2.3.4 Currently, maximum/peak noise level (L_{max}) assessment is often the most onerous and restrictive compared to the daytime and night-time assessments. The new update appears to lessen the importance of assessing maximum night-time levels in favour of averaged 24-hour equivalent levels. This may lessen restrictions and allow natural ventilation in more cases.

2.3.5 The new update will provide a required sound insulation performance of the façade for all cases, even when natural ventilation via simple openable windows is acceptable. This may result in the developer having to confirm sound insulation performance of the façade building elements to ensure these new requirements are achieved.

2.3.6 The acceptance of natural ventilation as a ventilation strategy compared to the current methodology is not possible to determine at this point without conducting assessments using the new sound exposure categories, as these are newly defined metrics.

3 Impact on Noise Pollution (ASHP)

3.1.1 The proposed draft update includes the following:

8.2.3 Heating: air source heat pumps (ASHPs) and ground source heat pumps (GSHPs)

Domestic installations of heat pumps are expected to rise, particularly air source heat pumps (ASHPs). A monobloc ASHP contains a fan and compressor in the outdoor unit, which can be significant sound sources. An ASHP split system or a ground source heat pump (GSHP) has the compressor located within the dwelling. The sound from this should be assessed to determine a suitable location and any sound insulation requirement.

3.1.2 BS8233 does not detail an assessment methodology, hence the assumed approach would be to conduct a BS4142 assessment, which is the current approach.

3.1.3 There is not seen to be any impact of the BS8233 on assessment of air source heat pumps or other heating or ventilation equipment.

4 Consultation Response (Concerns)

- 4.1.1 Enzygo is aware of concerns surrounding the proposed updates to B8233, relating to the potential impacts on development design.
- 4.1.2 For the purposes of this review and subsequent response to the consultation, the main concerns are as follows:
 - A) The updated assessment methodology, specifically regarding noise from roads will result in further restrictions on facades, more often requiring mechanical ventilation solutions in lieu of natural ventilation solutions.
 - B) Potential impact of restrictions resulting from the installation of Air Source Heat Pumps (ASHP), with consideration to their increasing prevalence.
- 4.1.3 Based on the contents of Sections 1 to 3 above, the following points provide an overview response to these concerns.

4.2 A) Impact on Ventilation Design

- 4.2.1 Indicatively, following professional assessment, the new methodology with respect from noise to roads is not seen to introduce notably more restrictive criteria that would lead to a significant reduction in natural and a greater reliance on mechanical ventilation.
- 4.2.2 Due to the proposed update adopting a significantly different methodology and quantities for criteria, at this stage it is not possible to offer a direct comparison of outcomes, as this will require further project experience using the updated standard.
- 4.2.3 There is therefore a risk that further restrictions on ventilation may be imposed resulting from the update, whilst this is not seen to be the objective of the update.

4.3 B) Impact on Installation of ASHP

- 4.3.1 There is not seen to be any changes in the approach to ASHPs due to the update to BS8233, therefore no further restrictions are expected (the relevant assessment standard, BS4142, remains unchanged).
- 4.3.2 Enzygo recognises that concerns regarding ASHP noise is becoming increasingly common amongst local authorities. However, this is seen to be likely due to the increased knowledge surrounding the subject, and the expected time-lag between the adoption of new technologies and the complaints arise from their use, resulting in increasing apprehension to proceed with approval without detailed assessment.



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