

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 13	Acoustic Performance	1	No

Aim

To ensure the acoustic performance of the building meets the appropriate standards for its purpose.

Assessment Criteria

The following demonstrates compliance:

1. Indoor ambient noise levels in *unoccupied* staff/office areas comply with the following:
 - a. $\leq 40\text{dB } L_{Aeq,T}$ in single occupancy offices
 - b. $40\text{-}50\text{dB } L_{Aeq,T}$ in multiple occupancy offices
 - c. $\leq 40 \text{ dB } L_{Aeq,T}$ general spaces (staffrooms, restrooms)
 - d. $\leq 35 \text{ dB } L_{Aeq,T}$ in spaces designed for speech e.g. seminar/lecture rooms
 - e. $\leq 50 \text{ dB } L_{Aeq,T}$ in informal café/canteen areas
2. **Fully fitted buildings only:** The sound insulation between *acoustically sensitive rooms* and other *occupied spaces* complies with section 7.6.3.1 of BS8233⁴², as follows:
 - a. $D_w + L_{Aeq,T} > 75$
 - D_w is the weighted sound level difference between the two spaces
 - $L_{Aeq,T}$ is the design (or measured) indoor ambient noise level in the space adjacent to the *acoustically sensitive room*.

The source and receive room sound pressure levels from which D_w is derived must be measured in accordance with BS EN ISO 140-4:1998⁴³ and the guidance in Annex B of Approved Document E⁴⁴. Measurements must be based on finished rooms, accounting for any carpets and acoustically absorbent ceilings specified. The measurements can be conducted in either furnished or unfurnished rooms.

3. Pre-completion acoustic testing is carried out by a *suitably qualified acoustician* to ensure that all relevant spaces (as built) achieve the performance standards required, and any required remedial works in spaces that do not meet the standards are completed prior to handover and occupation.

Compliance Notes	
New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to assessments of extensions to existing buildings.
Shell Only	Where it is not possible to define the type of office space due to the speculative nature of the development, it must be assumed that it will be open plan with an occupancy rate of 1 person per 10m ² . Assessments of buildings that are not fully fitted do not need to assess the criteria associated with sound insulation of <i>acoustically sensitive spaces</i> .

Fit Out Only	Fit out-only assessments of buildings with <i>acoustically sensitive spaces</i> must be assessed against the sound insulation criteria for this BREEAM issue.
Acoustically sensitive areas	Where the term ' <i>acoustically sensitive rooms</i> ' is referenced in this BREEAM issue, it refers to the following types of space/rooms (where specified) where privacy, and therefore appropriate sound insulation levels, are deemed important: <ul style="list-style-type: none"> • Cellular offices, meeting/interview rooms • Any other room/space the design team or client deems to be acoustically sensitive.
Unoccupied spaces	Where the term ' <i>unoccupied space</i> ' is referenced in this BREEAM issue, it refers to the nature of the space for the purpose of carrying acoustic calculations or measurements i.e. such measurements must be carried when the space is unoccupied and therefore devoid of sources of noise. Care should be taken to avoid confusing this term with the definition " <i>occupied space</i> " (see relevant definitions) as they have two different meanings within the context of this BREEAM issue.
Measurement procedures	The Additional Information section outlines the criteria for carrying out measurements and calculations to demonstrate compliance with this BREEAM issue. The appointed acoustician must confirm that the acoustic performance has been measured/calculated in accordance with these procedures. Where the acoustician has felt it necessary to deviate from these procedures, they must give justifiable reasons why they have done so.
Privacy	Where ranges of noise levels are specified where privacy is not deemed by the final occupier to be an issue, it is acceptable to disregard the lower limit of the range and consider the noise levels to be lower or equal to the upper limit of the range.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
1-2	<p>A copy of the design plan for each level of the building with each room/area clearly labelled.</p> <p>A copy of the specification clause or acousticians calculations confirming:</p> <ul style="list-style-type: none"> • Indoor ambient noise levels in each relevant room/area. • If relevant, sound insulation levels between each <i>acoustically sensitive room</i> and adjacent <i>occupied areas</i>. • The standards to which calculations/measurements have complied, or are required to comply with. 	<p>Copies of acoustic field test report/results confirming:</p> <ul style="list-style-type: none"> • The required performance levels have been achieved for each room/area of the completed building. • Where relevant, any remedial work/actions required to meet the performance standards. <p>Evidence, such as a formal letter from the acoustician or their test report confirming that they meet BREEAM's definition of a <i>suitably qualified acoustician</i>.</p> <p>A letter from the design team or main contractor confirming:</p>
3	<p>A copy of the specification clause or a formal letter from the project team confirming:</p> <ul style="list-style-type: none"> • A programme of pre-completion acoustic testing by a <i>suitably qualified acoustician</i> will be commissioned. • Where rooms/areas do not comply with the required levels, appropriate remedial works will be actioned and completed. 	<p>Any and all required remedial works have been carried out in accordance with the acoustician's recommendations.</p>

Additional Information

Relevant definitions

Suitably qualified acoustician: Those organisations or individuals having UKAS accreditation or accredited by a European equivalent of UKAS. The definition includes organisations or individuals registered to schemes that are UKAS accredited, or equivalent, to ensure consistency and technical competence in sound testing. At the time of writing the Association of Noise Consultants (ANC) Registration Scheme is in the process of obtaining UKAS accreditation and can be deemed to comply with this requirement until advised otherwise.

Single occupancy offices: cellular office space designed to accommodate one or two desk spaces/workstations (typically no greater than 10m²).

Multiple occupancy offices: Office space that is not cellular in nature i.e. it is open-planned, and designed to accommodate more than two desk spaces/workstations.

Occupied space: For the purpose of this BREEAM issue an occupied space is a room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user (see also description of 'unoccupied space' in the Compliance Notes table above).

Measurement/calculation procedures

The following procedures must be followed by the acoustician when measuring or calculating the levels required to demonstrate compliance with this BREEAM issue (see also compliance note above on measurement procedures):

- Noise from both internal sources (e.g. mechanical ventilation systems, plant noise) and external sources (e.g. traffic noise transmitted via the building façade) should be included, and, where windows are openable as part of the ventilation strategy, these should be assumed to be open for the purposes of calculations and open for measurements.
- Noise from occupants and office equipment (e.g. computers) should not be included in the measurements.
- Measurements should be made in at least four rooms in which noise levels can be expected to be greatest either because they are on the noisiest façade or because they are on a naturally ventilated façade.
- Where different ventilation strategies are used, measurements should be conducted in rooms utilising each strategy. Otherwise, measurements should be made in rooms on the noisiest façade.
- T in $L_{Aeq,T}$ is taken as the duration of the normal working day (typically 8 hours between 09.00 and 17.00).
- Measurements need not be made over a period of 8 hours if a shorter measurement period can be used. In this case, measurements should be made when external noise levels are representative of normal conditions throughout the day.
- Measurement periods less than 30 minutes may give representative values for indoor ambient noise levels and may be utilized where this is the case. However measurement periods shorter than 5 minutes should not be used.
- Measurements should be taken in a minimum of 3 locations in rooms at a height of 1.2 m above the floor level and at least 1 m away from any surface.

The above is intended as guidance for undertaking acoustic measurements to demonstrate compliance with the performance requirements in BREEAM. If the acoustician has felt it necessary to deviate from the above procedures, they should provide a justifiable reason for doing so and confirm that the alternative procedures are adequate for demonstrating that the building meets the acoustic performance requirements.

NR curves

Noise assessments based on NR curves are often used by building services consultants to predict internal noise levels due to mechanical ventilation systems. However, the BREEAM requirement uses the indoor ambient noise level, $L_{Aeq,T}$ which includes external noise transmitted via the façade as well as

internal noise such as that from mechanical ventilation systems. In the absence of strong low frequency noise, $L_{Aeq,T}$ can be estimated from the NR value using the following formula: $L_{Aeq,T} \approx NR + 6$ dB. Therefore, if the NR value is known, but not the sound pressure levels in the individual frequency bands, an estimate for the indoor ambient noise level $L_{Aeq,T}$ can still be determined from the NR value for the building services noise. The $L_{Aeq,T}$ for the external noise transmitted via the façade must then be combined with the $L_{Aeq,T}$ for the building services.