

Issue ID	Issue Title	No. of credits available	Minimum standards
Hea 13	Acoustic Performance	2 or 3 (dependant on building type)	No

Aim

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

Assessment Criteria

The following demonstrates compliance:

Pre-schools, schools and sixth form colleges only

First credit

1. The building meets the acoustic performance standards required by Building Bulletin 93⁵⁷.
2. Pre-completion acoustic testing is carried out by a *suitably qualified acoustician* as described in BB93 to ensure that all relevant spaces (as built) achieve the required performance standards. Any remedial works required in spaces that do not meet the standards (as identified via testing) are completed prior to handover and occupation.

Schools and sixth form colleges only

Second credit

3. *New build only*: For music accommodation (or multi-purpose halls in primary schools with no music accommodation) airborne sound insulation values are at least 5dB higher, and impact sound insulation values that are at least 5dB lower, than the performance standards required by BB 93.

Refurbishments: All relevant spaces achieve reverberation times compliant with table 1.5 of BB93.
4. Pre-completion acoustic testing is carried out by a *suitably qualified acoustician* as described in BB93 to ensure that all relevant spaces (as built) achieve the required performance standards. Any remedial works required in spaces that do not meet the standards (as identified via testing) are completed prior to handover and occupation.

Pre-schools, schools and sixth form colleges only

Third credit (or second credit for Pre-school building types)

5. For roofs with a mass per unit area less than 150kg/m² (lightweight roofs) or heavyweight roofs (≥150kg/m²) with glazing/rooflights:
 - a. Calculations (see compliance note) or measurements demonstrate that the reverberant sound pressure level in the relevant rooms are not more than 20dB_{L_{Aeq}, 30min} above the indoor ambient noise level for the equivalent type of room given in Table 1.1 of Building Bulletin 93.

For heavy weight roofs with a mass per unit area greater than 150kg/m² (including those with sedum planting) that do not have any glazing/rooflights, calculations are not required.

Further and Higher Education Colleges only

First credit

1. Indoor ambient noise levels in all non-teaching *unoccupied spaces*, i.e. spaces/rooms not covered in BB93, comply with the good practice levels of BS8233:1999, Tables 5 & 6⁵⁹. Typical, appropriate noise levels are given below, although the following list is not intended to be exhaustive:
 - a. ≤ 40 dB $L_{Aeq,T}$ General spaces (staffrooms, restrooms)
 - b. ≤ 40 dB $L_{Aeq,T}$ in single occupancy offices
 - c. 40-50 dB $L_{Aeq,T}$ in multiple occupancy offices
 - d. ≤ 50 dB $L_{Aeq,T}$ in catering kitchens
 - e. 40-55 dB $L_{Aeq,T}$ in restaurant areas
 - f. ≤ 45 dB $L_{Aeq,T}$ in informal café/canteen areas
 - g. ≤ 55 dB $L_{Aeq,T}$ in manual workshops
 - h. ≤ 35 dB $L_{Aeq,T}$ consulting/treatment rooms
 - i. ≤ 30 dB $L_{Aeq,T}$ in sound recording studios
 - j. 40-45 dB $L_{Aeq,T}$ in bars

In addition to the above, any rooms/spaces used for medical purposes i.e. treatment, should be designed to meet airborne and impact sound insulation criteria in accordance with Health Technical Memorandum 08-01⁵⁸.

2. All rooms/spaces used as teaching or lecture areas (including laboratory areas where present) achieve the Indoor ambient noise level criteria for secondary schools in Section 1 of Building Bulletin 93⁵⁷.
3. The sound insulation between *acoustically sensitive rooms* and other *occupied spaces* complies with section 7.6.3.1 of BS8233⁵⁹, 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 140-4:1998 and the guidance in Annex B of Approved Document E. Measurements must be based on finished but unfurnished rooms, accounting for any carpets and acoustically absorbent ceilings specified.

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.

Second credit

5. All areas used for teaching, training and educational purposes (such as classrooms, seminar rooms and lecture theatres) achieve reverberation times compliant with table 1.5 of BB93.
6. 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.
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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.
Calculations of rain noise in schools	For the purpose of assessing the third credit in pre-schools, schools and sixth form colleges, the reverberant sound pressure level should be calculated using laboratory test data from measurements conducted in accordance with BS EN ISO 140-18 ⁶⁰ 'Heavy' rain noise excitation.
Schools third credit – rain noise	The rain noise requirement is applicable to both roofing and rooflights. Parts of the building where a heavyweight roof is specified can be excluded from the assessment, e.g. sedum roof or some concrete roofs, where it is known that 'heavy' rain noise will not lead to indoor ambient noise levels exceeding the above requirements.
BB93 relaxation of requirements for schools in Northern Ireland	The Department for Education Northern Ireland (DENI) issued a note to designers in November 2006 detailing relaxations in compliance with BB93. The relaxations were made to facilitate the particular design requirements for new schools in Northern Ireland (as recommended in the various DENI Building Handbooks). Subsequently, where an assessed school in Northern Ireland has cited the note and applied the relaxation of BB93 requirements, they are not prevented from achieving the available BREEAM credits provided, in all other respects, the building complies with BB93 (and the above BREEAM requirements).
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.
Awarding credits	Each available credit can be awarded independently of the other available credits for this issue e.g. the second credit can be awarded without achieving the first credit.
Measurement procedures	For the assessment of pre-schools, schools and sixth form colleges the measurement procedures outlined in BB93 should be followed. For assessments of further and higher education buildings, the procedures outlined in BB93 can be followed if/where appropriate. Alternatively, the measurement procedures in the Additional Guidance section (below) can be followed. 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.
Reverberation times	Where the reverberation times stated above or in the referenced documents are not appropriate for the type of space/building assessed, the acoustician must confirm why this is the case. In addition the acoustician must set alternative appropriate reverberation times and provide these to demonstrate compliance.

Schedule of Evidence Required

Req.	Design Stage	Post Construction Stage
Pre-schools, schools and sixth form colleges		
1,3,5	<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 confirming:</p> <ul style="list-style-type: none"> The building will comply, and where relevant exceed the performance standards required by BB93. <p>OR</p> <p>A copy of the acousticians calculations confirming:</p> <ul style="list-style-type: none"> The specific performances standards achieved for each relevant room/area The standards comply, and where relevant exceed the levels required by BB93. 	<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 tested 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> <ul style="list-style-type: none"> Any and all required remedial works have been carried out in accordance with the acoustician's recommendations.
2&4	<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. 	As outlined above.

Further and Higher Education		
1-3	<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 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>
4&6	<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. 	<ul style="list-style-type: none"> Any and all required remedial works have been carried out in accordance with the acoustician's recommendations.
5	<p>A copy of the specification clause or acousticians calculations confirming:</p> <ul style="list-style-type: none"> The reverberation times in areas <i>used for speech</i>. The standards to which calculations/measurements have complied, or are required to comply with. 	As outlined above.

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 - Further & Higher Education buildings only

The measurement procedures defined in BB93 can be followed for further or higher education buildings if/where appropriate. Alternatively, the following procedures can be followed:

- 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.
- Where relevant, measurement of airborne sound insulation between teaching spaces should be conducted between one in four pairs of adjacent rooms (or teaching spaces).
- Where relevant, measurement of impact sound pressure level should be conducted in one in four teaching spaces (separated from rooms above).

For music rooms it may be possible to aid compliance with the above requirements by positioning and orientating such rooms away from more noise-sensitive areas such as libraries and classrooms.

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.