Bickerdike Allen Partners
Architecture
Acoustics
Technology

# COOPER HOUSE,

# MANCHESTER, M15 6DX

# FAÇADE ACOUSTIC ASSESSMENT

Report to

The Guinness Partnership Limited
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Institute of Acoustics sponsoring organisation

ANC

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**Architects:** Design and project management services which cover all stages of design, from feasibility and planning through to construction on site and completion.

**Acoustic Consultants:** Expertise in planning and noise, the control of noise and vibration and the sound insulation and acoustic treatment of buildings.

**Construction Technology Consultants:** Expertise in building cladding, technical appraisals and defect investigation and provision of construction expert witness services.

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## 1.0 INTRODUCTION

Bickerdike Allen Partners LLP (BAP) have been appointed by The Guinness Partnership (Guinness) to provide an acoustic assessment of the external wall constructions of The Cooper House, Camelford Close, Manchester M15 6DX.

For fire safety reasons, it is proposed to replace the existing cladding panels to localised external wall and soffit areas of the building, including to external columns, balcony dividing walls and soffits, access walkway soffits, lower ground floor soffits and entrance lobby walls. It is also proposed to replace existing insulated aluminium and PVCu spandrel panels to curtain walling and windows.

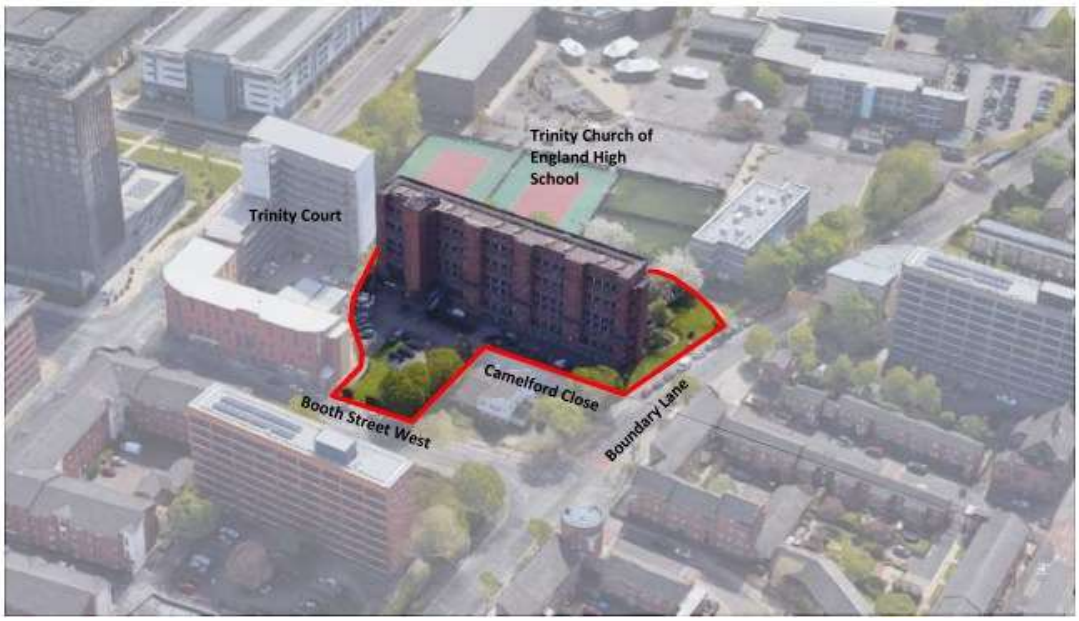
This report considers the acoustic performance of the external wall construction. This report is necessarily technical. A glossary of acoustic terminology is included in Appendix 1.

This report has been prepared specifically in response to instructions received from Guinness and is not intended for any other purpose.

## 2.0 THE SITE

Cooper House is a residential building 10 stories in height and contains approximately. 90no. one and two bed apartments on the upper nine floors. Storage units and ancillary facilities to the building, including a caretakers office, refuse stores and plant rooms are located on the lower ground floor. A marked-up scheme of the site is pictured in Figure 1.

Cooper house is located in Manchester and is bounded to the west by Boundary Lane, to the east by Trinity Court, a mixed used development including apartments, and to the south by the playing fields of Trinity Church of England High School. The site entrance is from Camelford Close to the north of the site, which also provides access to a neighbouring low rise building.



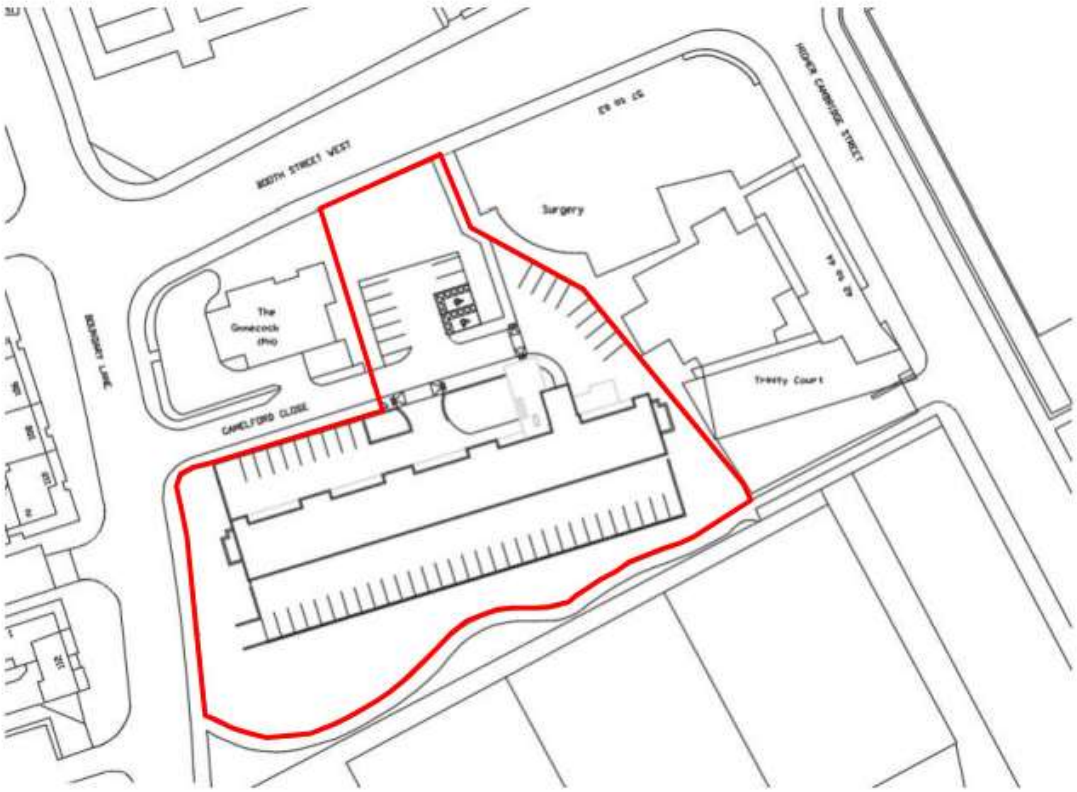




**Figure 1: Site plan, shown in red (Bickerdike Allen Partners report 10007 Design and Access Statement Cooper House, Manchester M15 6DX for The Guinness Partnership revision P2 of 13th June 2025)**

## 3.0 ACOUSTIC CRITERIA

The applicable acoustic criteria related are associated with external noise intrusion via the façade. The existing façade must have an as good or better sound insulation performance, both for external noise break-in through the façade and vertical sound insulation between rooms via the external façade, as the existing façade.

## 3.1 Building envelope

The building has a reinforced concrete frame construction, with uninsulated masonry cavity walls with a brickwork outer leaf and blockwork inner leaf.

## 3.2 External cladding materials

The Bickerdike Allen Partners report *10007 Design and Access Statement Cooper House, Manchester M15 6DX* for The Guinness Partnership revision P2 of 13th June 2025 states:

Section 3.1 Cladding Materials – Entrance Lobby

The entrance lobbying areas to be replaced are not adjacent to residential flats, thus these areas do not have an applicable acoustic criteria.

Section 3.2 Cladding Materials –Access Walkways and Punch windows

The Access Walkways and Punch windows areas to be replaced are not adjacent to residential flats, thus these areas do not have an applicable acoustic criteria.

Section 3.4 Cladding Materials –Lower Ground Floor

These areas do not have an applicable acoustic criteria.

Section 3.3 Cladding Materials - Rear Balconies

1) Trespa Column Encasements - These do not have applicable acoustic criteria.
2) Trespa Balcony Dividers - These do not have applicable acoustic criteria.
3) Trespa Balcony Returns

   Existing cladding materials to be replaced - 6mm Trespa standard grade panel, rated D-s2,d0, installed on softwood timber framing (turquoise)

   Replacement Cladding Materials - 9mm Rockpanel rainscreen panels, rated A2-s1, d0. RAL colour 6034 (turquoise)
4) Trespa Soffits - These do not have applicable acoustic criteria.

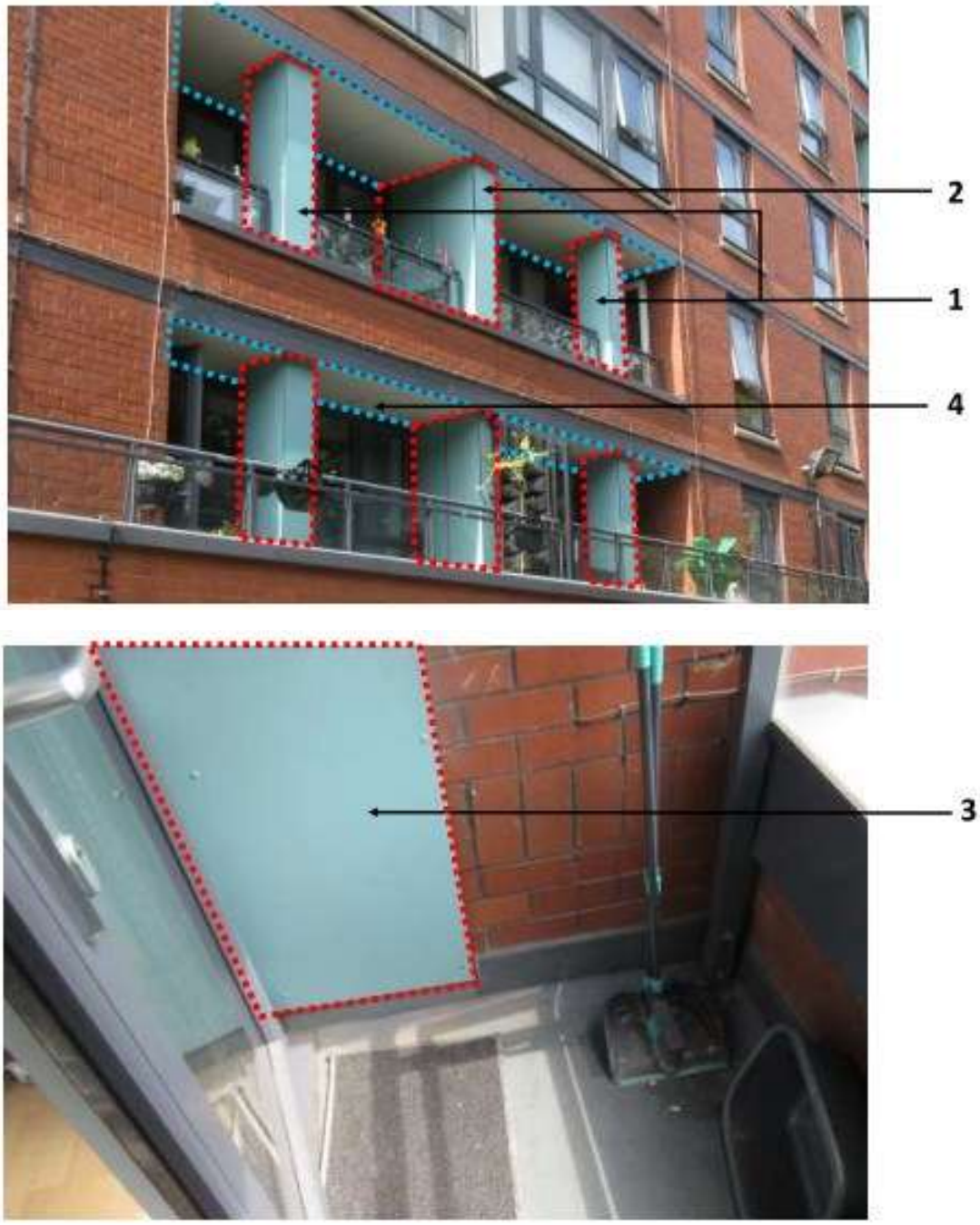



**Figure 2: South Elevation Balconies (Bickerdike Allen Partners report 10007 Design and Access Statement Cooper House, Manchester M15 6DX for The Guinness Partnership revision P2 of 13th June 2025)**

## 3.3 Client requirements

Manchester City Council has issued the following comments with regard to the planning application (ref: 143577/FO/2025) for the project:

*Following your recent planning application submission, I am unable to progress your proposal as the application is invalid or incomplete for the following reason(s):*

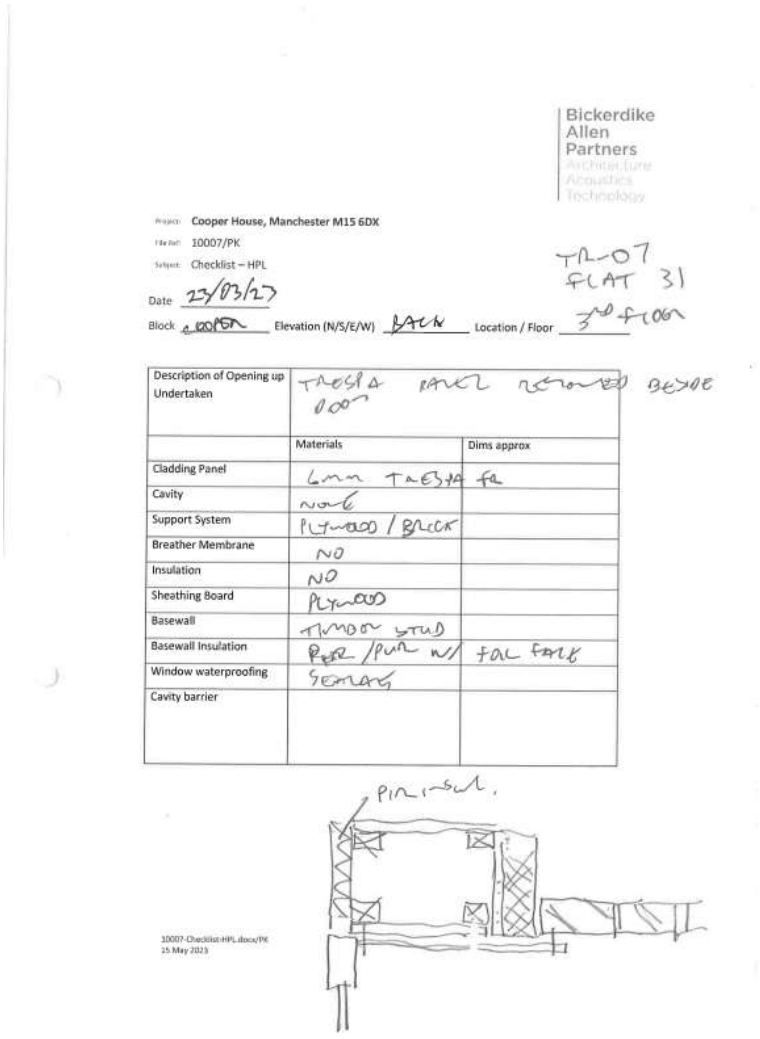
*1) We require more detail on the proposed materials. This should include product specifications and precedent images.*

*2) Please can it be confirmed if there are any proposed works to the external walls of any apartments within the application site.* ***If this is the case, an acoustic study that shall demonstrate that the acoustic attenuation of the flats will remain in acceptable levels will be required to be submitted.***

BAP have been instructed to carry out the acoustic study. This acoustic report was written by Clara Cardoso, PhD in Sound and Vibration from the Institute of Sound and Vibration Research at the University of Southampton, corporate member of the Institute of Acoustics and with 18 years' acoustic consultancy experience and a "Suitably Qualified Acoustician" based on BRE definitions for BREEAM sustainability ratings. The report was checked by David Trew CEng BEng MIOA with 26 years' acoustic consultancy experience.

## 4.0 ACOUSTIC ASSESSMENT

BAP has carried out an assessment of the existing and proposed external wall constructions at the Balcony Returns to indicate if the sound insulation is similar. Details of the existing and proposed construction is provided below.



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Project: Cooper House, Manchester M15 6DX
File Ref: 10007/PK
Subject: Checklist – HPL

Date 23/03/23

TR-07
FLAT 31

Block COOPER Elevation (N/S/E/W) BACK Location / Floor 3RD FLOOR

| Description of Opening up Undertaken | TRESPA PANEL REMOVED BEHIND DOOR | |
|---|---|---|
| | Materials | Dims approx |
| Cladding Panel | 6mm TRESPA | FR |
| Cavity | NONE | |
| Support System | PLYWOOD / BLOCK | |
| Breather Membrane | NO | |
| Insulation | NO | |
| Sheathing Board | PLYWOOD | |
| Basewall | TIMBER STUD | |
| Basewall Insulation | PIR / PUR W/ FOIL FACE | |
| Window waterproofing | SEALANT | |
| Cavity barrier | | |

PIR-SUL.

10007-Checklist-HPL.docx/PK
15 May 2023

**Figure 3: Existing construction (Bickerdike Allen Partners report 10007 Design and Access Statement Cooper House, Manchester M15 6DX for The Guinness Partnership revision P2 of 13th June 2025)**

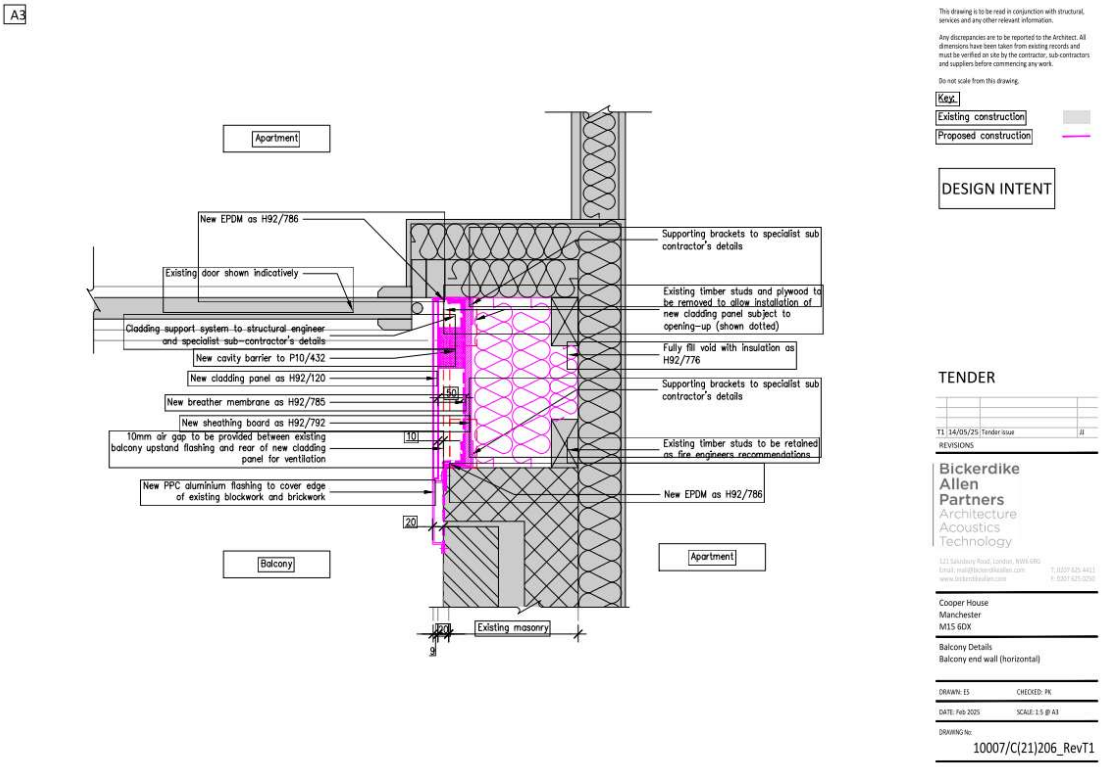



**Figure 4: Proposed construction (Bickerdike Allen Partners report 10007 Design and Access Statement Cooper House, Manchester M15 6DX for The Guinness Partnership revision P2 of 13th June 2025)**

Calculations have been carried out of the acoustic performance of these elements. using Industry standard proprietary software package Insul. Table 1 below, includes the calculated sound reduction performance of the proposed external wall constructions. They are as follows:

| External Wall Type | Detail | Estimated Sound Reduction, dB $R_w$ |
|---|---|---|
| Existing Construction (Figure 3) | 1 – 6mm Trespa Panel (Assumed $\rho \geq 1350kg/m^3$)<br>2 – 1 layer of 12mm plywood (assumed $\rho \geq 560kg/m^3$)<br>3 – 50mm timber stud<br>4 – 138mm cavity<br>5 – 50mm timber stud<br>6 - 1 layer of 12mm plywood (BAP assume $\rho \geq 560kg/m^3$) | The estimated sound reduction of the existing external wall construction is estimated to be: **$R_w$ = 37 (-5,-13) dB** |
| Proposed Construction (Figure 4) | 1 – 9mm Rockpanel rainscreen panel (BAP assume ρ ≥ 1250 kg/m3)<br>2 – Air space 50mm<br>3 - Breather membrane<br>4 – 12mm sheathing board (BAP assume $\rho \geq 600kg/m^3$)<br>5 – 198mm existing cavity<br>6 – Fully filled cavity with Rockwool Flexi Slab insulation (BAP assume $\rho \geq 40kg/m^3$)<br>7 – Existing 12mm layer of plywood (BAP assume $\rho \geq 560kg/m^3$) | The estimated sound reduction of the proposed external wall construction is estimated to be: **$R_w$ = 37 (-3,-9) dB** |

**Table 1: Estimated sound reduction performance of the existing and proposed external wall constructions**

| Element | Octave band frequency (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **63** | **125** | **250** | **500** | **1000** | **2000** | **4000** | **Overall $R_w$** |
| Existing External wall | 9 | 9 | 30 | 39 | 44 | 38 | 44 | **37** |
| Proposed External wall | 11 | 14 | 31 | 37 | 42 | 36 | 45 | **37** |

**Table 2: External sound reduction performance requirement**

The proposed external wall construction achieves a higher acoustic performance than the existing (as built) external wall.

**Clara Cardoso**
**for Bickerdike Allen Partners LLP**

**David Trew**
**Partner**

# APPENDIX 1
# GLOSSARY OF ACOUSTIC TERMINOLOGY

**The Decibel, dB**

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 2 x $10^{-5}$ Pascals) and the threshold of pain is around 120 dB.

The sound energy radiated by a source can also be expressed in decibels. The sound power is a measure of the total sound energy radiated by a source per second, in watts. The sound power level, $L_w$ is expressed in decibels, referenced to $10^{-12}$ watts.

**Frequency, Hz**

Frequency is analogous to musical pitch. It depends upon the rate of vibration of the air molecules that transmit the sound and is measure as the number of cycles per second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz). For acoustic engineering purposes, the frequency range is normally divided up into discrete bands. The most commonly used bands are octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency, and one-third octave bands, in which each octave band is divided into three. The bands are described by their centre frequency value and the ranges which are typically used for building acoustics purposes are 63 Hz to 4 kHz (octave bands) and 100 Hz to 3150 Hz (one-third octave bands).

**A-weighting**

The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A).

**Environmental Noise Descriptors**

Where noise levels vary with time, it is necessary to express the results of a measurement over a period of time in statistical terms. Some commonly used descriptors follow.

| Statistical Term | Description |
|---|---|
| $L_{Aeq, T}$ | The most widely applicable unit is the equivalent continuous A-weighted sound pressure level (LAeq, T). It is an energy average and is defined as the level of a notional sound which (over a defined period of time, T) would deliver the same A-weighted sound energy as the actual fluctuating sound. |
| $L_{A90}$ | The level exceeded for 90% of the time is normally used to describe background noise. |
| $L_{Amax,T}$ | The maximum A-weighted sound pressure level, normally associated with a time weighting, F (fast), or S (slow) |

**Sound Transmission in Rooms**

Sound energy is reflected from the room surfaces and this gives rise to reverberation. At short distances from a sound source, the sound level will fall off at a rate of 6 dB per doubling of distance, as it would in the open air – this is known as the direct field. Beyond a certain distance, the effect of reverberation takes over and the level ceases to fall off significantly with distance from the source. This is known as the reverberant field. For receiver positions in this part of the room, sound levels can be reduced by applying sound absorbing finishes to the surfaces of the room. A 3 dB reduction can normally be obtained by doubling the absorption present, which corresponds to halving the reverberation time (see below).

**Sound Insulation - Airborne**

Voices, hi-fi systems, television and radio sound and musical instruments are all sources of airborne sound. They excite the air around them and the vibration in the air is transmitted to surrounding surfaces, such as walls, ceilings and floors. This sets these constructions into vibration and this vibration is radiated in neighbouring rooms as sound. Energy is lost in the transmission path and this is referred to as transmission loss or, more generally, sound insulation. The most simple measure of sound insulation is the sound level difference, D, which is the arithmetic difference between the sound level, in dB, in the source room and the sound level in the receiving room.

Other measures of sound insulation include the sound reduction index, R, which is a measure of the acoustical performance of a partition, obtained in a laboratory, and the standardised level difference, $D_{nT}$, which is used mainly in the sound insulation of domestic separating walls and separating floors. The relevant test procedures are laid down in BS EN ISO 140. A single figure "weighted" result can be obtained from one-third octave band test results by using a curve-fitting procedure laid down in BS EN ISO 717. The subscript "w" is added to the relevant descriptor (eg $D_{nT,w}$).

The sound reduction index, R, is used in the specification of components, such as partitions, doors and windows. It is important to bear in mind that the performance of components in the field is usually lower than can be obtained in a laboratory. The transmission of sound via other components common to both rooms ("flanking transmission") can reduce the apparent sound reduction index (R') significantly.

**Sound Insulation - Impact**

In the case of impact sound, the building construction is caused to vibrate as a result of a physical impact. Footsteps on floors are the most obvious example. The vibration is radiated as sound in neighbouring rooms. Impact insulation is measured using a standard tapping machine, which drops weights cyclically onto a floor. The sound pressure level is measured in the receiving room below and the result is known as the impact level, Li for laboratory tests and L'i for field tests.