



ACOUSTIC
CONSULTANTS LTD

Plant Noise Survey

**Marriott, Laystall St
Manchester**

Reference: 9393/PNS/BL

Client:

MY Construction

Document Control

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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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1. Introduction

MY Construction appointed Acoustic Consultants Limited to undertake a noise impact assessment for the proposed roof top plant. The report has been produced to address the requirements of Condition 4 of the planning consent, which states:

a) The externally mounted equipment hereby approved shall be acoustically treated in accordance with a scheme designed so as to achieve a rating level of 10dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to commencement of the use of the approved equipment the scheme shall be submitted to and approved in writing by the City Council as local planning authority prior to the installation of the plant in order to secure a reduction in the level of noise emanating from the site. The scheme shall be implemented in full before the use of the approved equipment commences.

b) A verification report shall be submitted to and approved in writing by the City Council as local planning authority within 1 months of the first operation of the equipment hereby approved to validate that the work undertaken in this development conforms to the recommendations and requirements in the approved acoustic report (a). The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria. Any non-conformity with the recommendations in the report shall be fully resolved within 3 months of the first operation of the generator hereby approved.

Reason - To safeguard the amenities of the occupiers of the building and occupiers of nearby properties, pursuant to policies SP1 and DM1 of the Core Strategy.

This report provides a noise survey and assessment of the installed plant on the nearby sensitive receivers around the site in accordance with the planning consent.

The author of this report is a Member of the Institute of Acoustics who has over 15 years' experience in the field of noise and is considered suitably qualified to undertake this noise impact assessment.

2. The Site & Proposals

The site is located at Laystall St, Manchester. The site is an existing Serviced Apartments which is being redeveloped into a Marriott Hotel of 155 Hotel Suites. The façade, concrete floors and concrete walls of the existing building will be retained.

The site is located 20m to the south of Gt Ancoats St (A665), to the south of Urban Exchange a retail area, with a light industrial area to the south. A665 is a busy main road, with road traffic determining the noise climate.

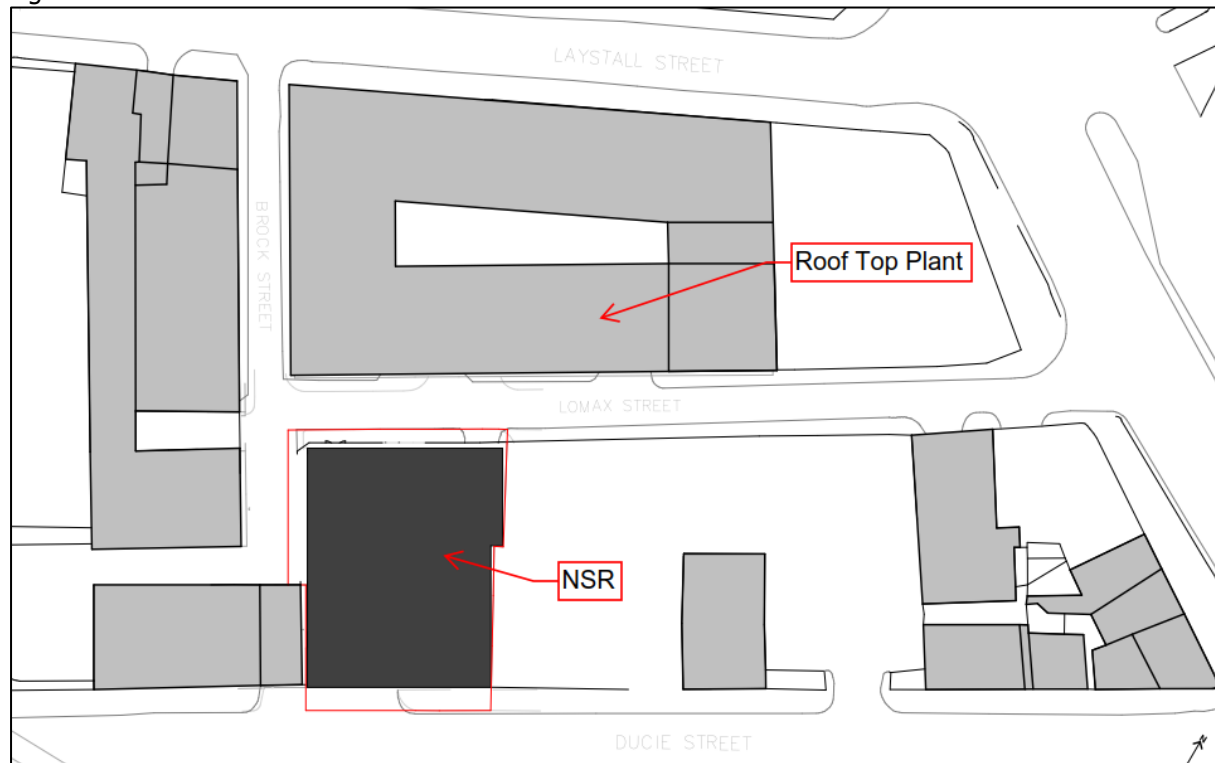
The site plan and google image of site location is shown in the figures below.

Figure 1: Google Site Location



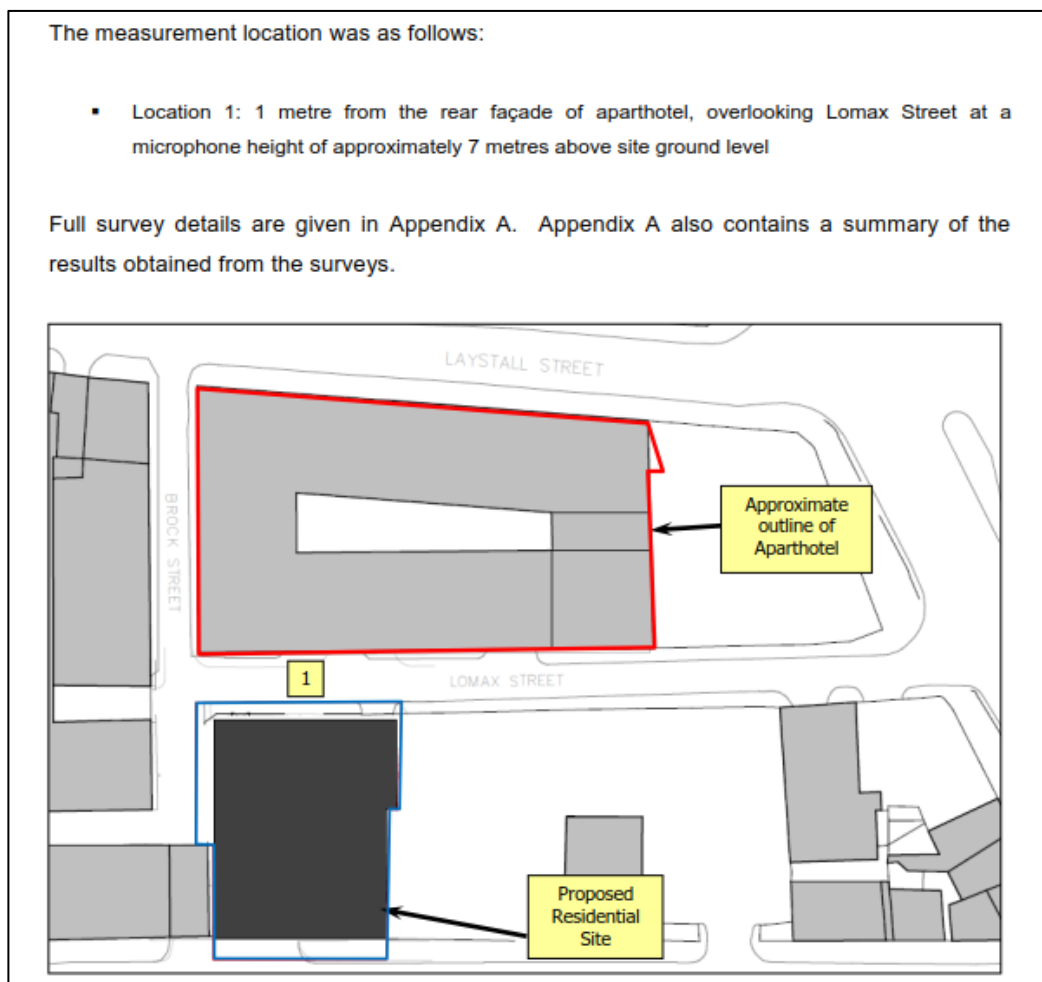
The most sensitive receivers are the flats permitted on the car park between Lomax St and Ducie St (NSR) to the south east of the site. The dwellings to the north at 32-34 Laystall St are further away and therefore less sensitive to noise from the plant:

Figure 2: NSR location



3. Baseline Noise Monitoring

A baseline noise survey was undertaken at the site to support the original planning application for the scheme by Fisher Acoustics, report reference PR0595-REP01B-MPF. The summary results are provided below:



The noise levels measured during the noise surveys are summarised in Table 2.

Measurement Location	Measured Noise Level					
	Daytime (Defined as 07:00 to 23:00)			Night time (Defined as 23:00 to 07:00)		
	dB, LAeq	dB, LAmax	dB LA90	dB, LAeq	dB, LAmax	dB LA90
1 (Wednesday)	59	64 to 84	57 to 59	59	62 to 75	58 to 59
1 (Thursday)	60	61 to 80	57 to 59	-	-	-

Table 2: Summary of measured environmental noise levels

As these levels were used for the original approved application, these noise levels have been reused for setting the plant limits.

4. Plant Noise Limits

Any plant associated with the proposed hotel is understood to operate 24 hours a day. We have provided the following plant noise limits at the nearest noise sensitive dwellings based on the monitoring data above and the planning consent:

Table 1: Free-field Plant Level limits

Location	Period	Plant Limits $L_{Aeq,15min}$ dB
Dwellings	Day (07:00 - 23:00)	47
	Night (23:00 - 07:00)	48

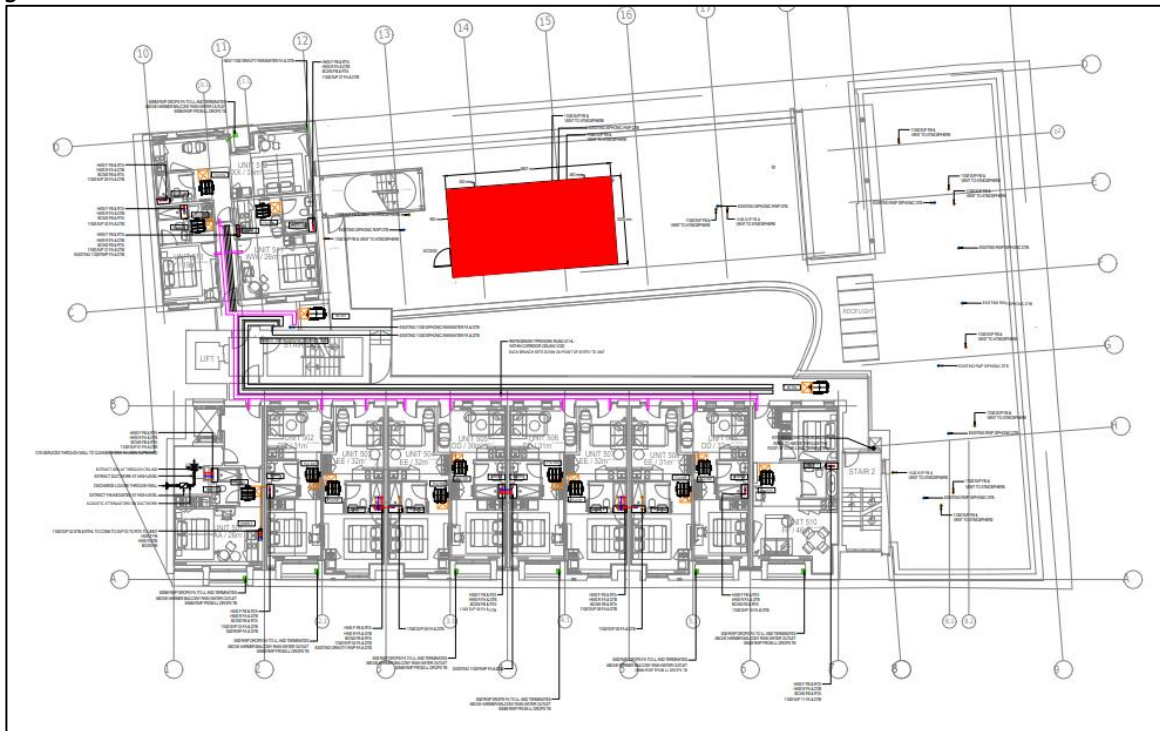
The plant should be selected to ensure any character (tonality, intermittency or other sound characteristics) are not readily distinguishable at the dwellings. If character is present, a character correction should be applied as per BS4142:2014.

5. Installed Plant

5.1.1. Plant Location

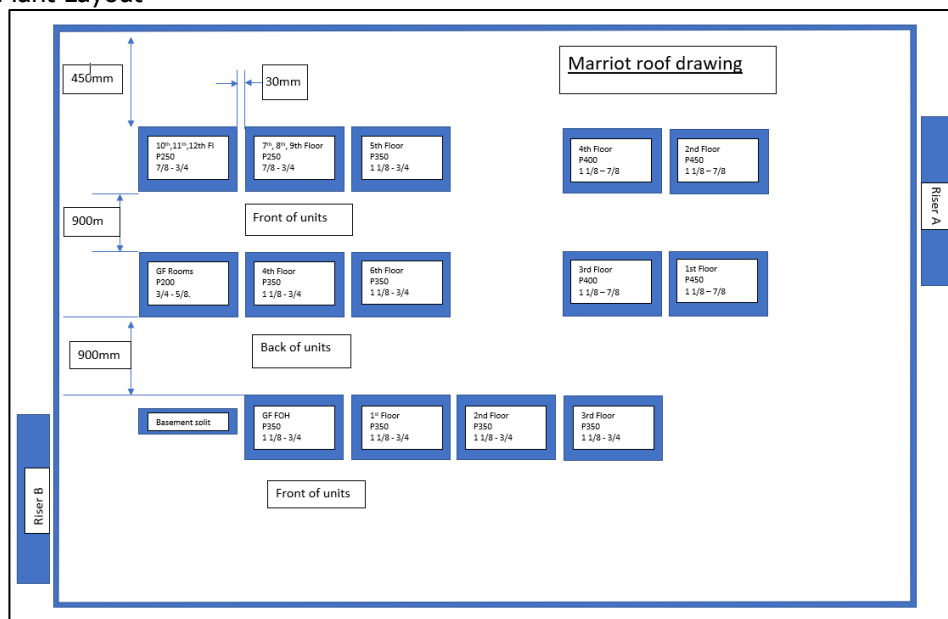
The installed plant is at 5th floor rooftop level to the south east facing elevation. The plant location is as follows:

Figure 3: 5th Floor Roof Plan with Plant Location in Red



We have been supplied the following plant layout drawing:

Figure 4: Plant Layout



5.2. Installed Units

We have been advised that the plant is as follows. It should be noted that any changes to the following schedule, or changes to the location or layout of the plant units will affect the predicted levels at the noted residential receivers and, as such, will require reassessment.

Table 2: Installed plant and associated manufacturers noise data

Quantity	Model	Sound Pressure Level at 1m, dB							
		63	125	250	500	1k	2k	4k	8k
7	PURY-P350YNW-A1	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0
2	PURY-P450YNW-A1	73.5	64.0	66.5	64.5	59.5	55.0	49.5	45.5
2	PURY-P400YNW-A1	73.5	63.5	66.0	64.0	59.0	54.5	48.5	45.0
1	PURY-P200YNW-A1	77.0	61.0	60.5	57.5	51.0	46.5	44.0	41.5
2	PURY-P250YNW-A1	78.0	62.5	61.5	59.0	52.0	48.5	48.5	43.0

We understand that all plant units operates 24/7 according to demand.

5.3. Noise Control Measures

To control noise, primarily to the hotel itself, the units are enclosed on all sides and the roof with a Noico Acoustic Enclosure. Noico have advised *the enclosure comprises our high performance 300mm deep 30% free area acoustic louvres to form the 4 sides, whilst the roof is of a higher free area x 500mm deep acoustic louvred beam.*

The Insertion Loss of these units, as supplied by Noico, are as follows:

Table 3: Insertion Loss of Enclosure

Type	Insertion Loss, dB							
	63	125	250	500	1k	2k	4k	8k
300mm louvers	5	7	12	18	24	26	21	18
500mm beams	5	7	12	20	28	30	22	19

6. Plant Noise Survey

A noise survey to measure the noise generated by the installed plant equipment at the Hotel was undertaken on 7th July 2023.

6.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 sound level meter with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection.

Table 4: Equipment and Calibration Status

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, B & K, 2250-D	3007155	09/08/2022	2022-0751
Pre-Amplifier, B & K, ZC0032	10917	09/08/2022	2022-0752
Microphone, B&K 4189	2643143	09/08/2022	2022-0753

The measurement system was checked before and after use with the noted calibrator and no significant drift was detected.

6.2. Weather Conditions

During the measurement the weather was dry with an average temperature of approximately 18 degrees Celsius, with wind speeds not exceeding 5 metres per second.

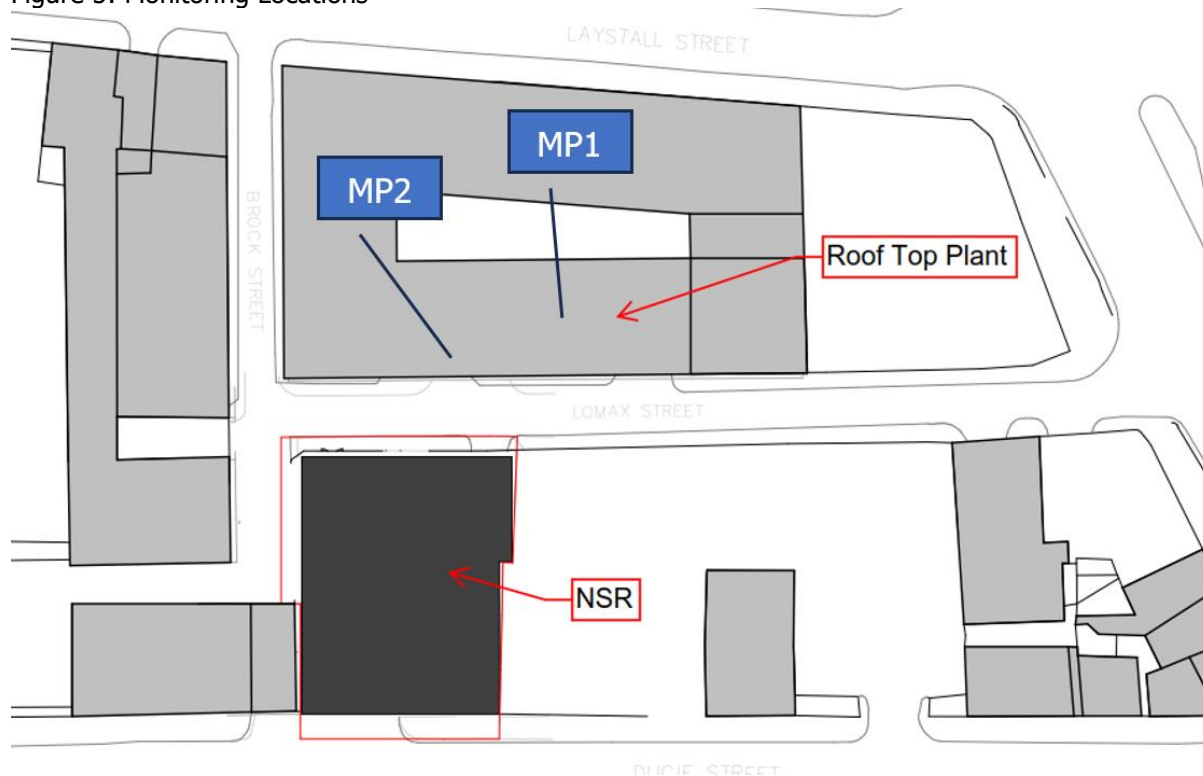
6.3. Monitoring Procedure

The survey was undertaken on 7th July 2023. Measurements were undertaken at roof level at the closest point to the nearest proposed NSR's as feasible as indicated on the figure below.

During the survey the plant was operating within the acoustic enclosure, measurements were completed within the enclosure. During the survey the plant was not audible or measurable outside the acoustic enclosure over the residual noise climate. The main source of noise was road traffic on the surrounding highways.

The monitoring locations are as follows:

Figure 5: Monitoring Locations



6.4. Measured Noise Levels

The measured data for the noise survey consists of the ambient sound level and residual sound level at the monitoring location. For all measurements at MP2 the plant was not clearly audible at the assessment location and the measurements consisted of local and distant road traffic. At MP1 the measurements consisted of plant only, within the acoustic enclosure. There was also not any audible character of the plant, this includes no tonality or intermittency.

The tabular data are as follows:

Table 5: Equipment and Calibration Status

Location	Start Time (hh:mm)	Duration (mm:ss)	$L_{Aeq(T)}$ dB	$L_{A90(T)}$ dB	Comments
MP1	16:06	00:35	62	60	Within enclosure. Plant clearly audible, no road traffic.
	16:07	00:33	65	58	
MP2	16:11	00:32	63	51	Outside of Enclosure. Plant not clearly audible, road traffic dominant.
	16:12	00:33	67	50	

7. Discussion on Results

The plant was not clearly audible at the assessment location and the measurements consisted of local and distant road traffic.

The noise limits based on the planning consent are no greater than 47 dB $L_{Aeq(T)}$. It is not feasible to determine if this limit was met due to the high noise climate from other sources such as road traffic.

However it is clear from the survey that the plant is not clearly audible, and the residential amenity of nearby residents will not be adversely affected by the installed plant. This has also been demonstrated via modelling in our former report.

Therefore the aim of the planning consent is met.

8. Summary & Conclusions

MY Construction appointed Acoustic Consultants Limited to undertake a noise impact assessment for the proposed roof top plant. The report has been produced to address the requirements of Condition 4 of the planning consent.

This report provides a noise assessment of plant on the nearby sensitive receivers around the site in accordance with the planning consent.

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However it is clear from the survey that the plant is not clearly audible, and the residential amenity of nearby residents will not be adversely affected by the installed plant. This has also been demonstrated via modelling in our former report.

Therefore the aim of the planning consent is met and the condition can be discharged.

9. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure p_A – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} – quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$$L_{pA} = 10 \log_{10} (p_A/p_0)^2$$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
 p_0 is the reference sound pressure (20 μ Pa)

Background sound level, $L_{A90,T}$ – A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{Aeq,T} = 10 \lg_{10} \left\{ (1/T) \int_{t_1}^{t_2} [p_A(t)^2/p_0^2] dt \right\} \quad (1)$$

where:

p_0 is the reference sound pressure (20 μ Pa); and

$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, $eVDV$ – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index, R_w – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).



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