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Building Services Engineering | Sustainability | Acoustics

Premier Inn London Hayes, Heathrow (Hyde Park)

Whitbread

Noise Impact Assessment

Revision 00

28/06/2024

Scotch Partners LLP

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Project Particulars

Client Name: Whitbread

Project Name: Premier Inn London Hayes, Heathrow (Hyde Park)

Disclaimer

Revision History

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Contents

1 Introduction

1.1 Proposals are in place to convert the existing Beefeater Restaurant at Premier Inn London Hayes, Heathrow (Hyde Park) hotel into additional hotel bedrooms. This report presents an assessment of the noise emission from new building services plant associated with the extension. Noise intrusion into the newly formed hotel bedrooms has also been assessed within this report.

1.2 An external noise survey has been conducted at the site, and the measurement data have been used to establish the prevailing ambient and background noise levels affecting the site and neighbouring noise-sensitive properties. This data has then been used to assess the noise impact in accordance with expected requirements from the Local Authority.

1.3 Chapter 2 of this report presents the acoustic requirements, Chapter 3 describes the external noise survey, and the assessment of plant noise emission to neighbouring properties is presented in Chapter 4. External noise intrusion into hotel guestrooms is assessed in Chapter 5. Conclusions have been provided in Chapter 6.

1.4 The full measurement data are available on request. Definitions of some of the terminology used throughout the report have been included in an appendix.

2 Acoustic requirements

2.1 Overview

2.1.1 When assessing the impact of noise emission from new building services plant associated with the proposed development, and noise intrusion into the proposed development, consideration has been given to local planning policy, available good practice guidance, and the hotel operator's brand standards. The key documents that have been included within this report are as follows:

Local Policy

- London Borough of Hillingdon Local Plan: Part 1 – Strategic Policies (Adopted November 2012)

Good Practice Guidance

- British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*

Hotel Operator's Brand Standards

- Premier Inn Generic Specification for a Turnkey Development (January 2024 – Edition Rev. N)

2.1.2 Summaries of the guidance considered relevant to the proposals are presented within this Chapter.

2.2 London Borough of Hillingdon Local Plan

2.2.1 Noise is addressed in Strategic Objective SO10 and Policy EM8 of the *London Borough of Hillingdon Local Plan Part 1: Strategic Policies*, with explanatory text.

2.2.2 Strategic Objective SO10 (Under *Land, Water Air, and Noise*) is as follows:

> *"Improve and Protect air and water quality, reduce adverse impacts from* ***noise*** *including the safeguarding of quiet areas and reduce the impacts of contaminated land."*

2.2.3 Policy EM8 of the Local Plan is as follows:

> *"Noise*
>
> *"The Council will investigate Hillingdon's target areas identified in the Defra Noise Action Plans, promote the maximum possible reduction in noise levels and will minimise the number of people potentially affected.*
>
> *"The Council will seek to identify and protect Quiet Areas in accordance with Government Policy on sustainable development and other Local Plan policies.*
>
> *The Council will seek to ensure that noise sensitive development and noise generating development are only permitted if noise impacts can be adequately controlled and mitigated."*

2.2.4 The Local Plan also identifies *"…the need to control, reduce and mitigate noise, especially around Heathrow and the major road network."* as a Main Challenge relating to open spaces.

2.2.5 While the Local Authority are not believed to have objective standards relating to noise ingress to or noise emission from development, it is expected that the Local Authority will want to be reassured that the development will be in line with typical industry practice, with respect to noise.

2.3 British Standard 4142

2.3.1 British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*, presents a methodology for comparing the noise level of the new source (the *specific sound level*) with that of the existing background noise level in the area in the absence of the new source (the *background sound level*), and establishing the likely impact of the noise.

2.3.2 The methodology requires consideration to be given to all aspects of the assessment process, and accounts for unusual acoustic features such as tonal, impulsive, or intermittent characteristics of the noise by the addition of various corrections to the specific sound level. The corrected *specific sound level* is the *rating level*.

2.3.3 The *background sound level* is then arithmetically subtracted from the *rating level*. The greater the positive difference between the *rating level* and the *background sound level*, the greater the magnitude of the impact.

- A difference of around +10dB or more is likely to be an indication of a "significant adverse" impact, depending upon the context.
- A difference of around +5dB or more is likely to be an indication of an "adverse impact", depending upon the context.
- Where the *rating level* does not exceed the *background sound level*, this is an indication of a "low impact", depending upon the context.

2.3.4 It is proposed to target a BS 4142 *rating level* at or below the prevailing *background sound level* at all times the new plant is to be operating, in order to achieve a *low impact* at neighbouring noise-sensitive receivers. It is considered that by doing this, noise would be sufficiently controlled such that it is in line with expected planning requirements from the Local Authority.

2.4 Landlord requirements

2.4.1 All new Premier Inn developments and extensions are to be constructed so as to control noise intrusion in line with the requirements of the Premier Inn Generic Specification for a Turnkey Development, hereinafter referred to as the "PI Spec". Revision N (January 2024) of the PI Spec contains internal background noise limits for hotel bedrooms owing to external sources, as presented in Table 2-1, below:

Period	Noise level
Daytime (07:00-23:00 hrs)	$L_{Aeq,1hour} \leq 35$ dB
Night-time (23:00-07:00 hrs)	$L_{Aeq,1hour} \leq 30$ dB $L_{AFmax} \leq 42$ dB (*)

(*) The maximum criterion applies to all vehicles and railway train passbys and all aircraft flyovers. It also applies to the noise from all street activities including those associated with patrons attending and leaving adjacent, neighbouring or connected entertainment venues; noise associated with commercial and industrial neighbouring premises including delivery activities and process equipment; seagulls and church bells. Genuinely infrequent and unpredictable sources such as sirens or car alarms occurring no more than twice a night are excluded.

Table 2-1: Premier Inn internal background noise level requirements

2.4.2 The standards have been chosen to complement the Good Night Guarantee offered by Premier Inn, which refunds guests if they have been disturbed by noise while trying to sleep. These standards are more onerous than those recommended in British Standard 8233, the usual guidance adopted for controlling noise intrusion into residential accommodation. It is therefore intended to control noise intrusion into the hotel in line with the requirements of the PI Spec. Complying with these requirements can also be expected to satisfy any reasonable Planning requirements for noise intrusion into the hotel.

2.4.3 The PI Spec also requires that noise emission from all plant associated with the hotel be designed to be at least 5dB below the lowest measured background sound level at night with all plant operating simultaneously, when assessed at the boundary (assumed to be any normally occupied position) of the nearest noise sensitive property.

3 External noise survey

3.1 Site description

3.1.1 The site is located at Millington Rd, Hayes UB3 4AZ, close to Station Road. As a result, road traffic is the dominant noise source affecting the site. Traffic on A437 was observed to be intermittent and free flowing, with regular buses stopping outside the hotel on both sides. The existing Beefeater restaurant adjoins the west of the Premier Inn hotel, on the ground floor.

3.1.2 The nearest residential properties are understood to be those across A437. The site and measurement location are shown in Figure 3-1 (overleaf).

3.1.3 Part of the existing hotel has a line of sight to large building services plant serving the nearby supermarket to the east of the site. Despite this, building services noise was observed to be imperceptible against the road traffic noise, although may become more audible during lulls in traffic flows.

3.2 Measurement methodology

3.2.1 Continuous, unattended noise level measurements were conducted at a single position, to the west of the site. A secure location was selected that was exposed to road traffic noise propagating form the main roads. The microphone is considered to have been placed in a reasonable approximation of free-field conditions; extended around 3m above ground and approximately 2m from the nearby building edge.

3.2.2 The measurement position is shown on a satellite image in Figure 3-1.

3.2.3 A Class 1 sound level meter (Norsonic 131, serial number 1313605) and associated microphone (Norsonic 1217, serial number 491292) were used for the noise measurements.

3.2.4 A portable sound calibrator (Brüel and Kjær 4231, serial number 2291098) was used to check the calibration of the sound level meter prior to and on completion of the measurement period in accordance with recommended practice. No significant drift in calibration occurred during the measurement period. The accuracy of the calibrator can be traced to National Physical Laboratory Standards.

3.2.5 Statistical and spectral data were recorded in 15-minute samples between 15:30 on 4th June and 11:30 on 7th June 2024. A “fast” (125ms) time constant was used.

Figure 3-1: Satellite image of site showing the measurement position (source: Google Earth)

3.3 Weather

3.3.1 Weather conditions throughout the survey were observed to be generally calm and dry, and are understood to have included the occasional light spell of rain, based on local weather data. The measurement data are not believed to have been adversely affected by the weather in the context of this assessment.

3.4 Measurement results

3.4.1 Full measurement data are available in digital format upon request.

3.4.2 Figure 3-2 presents a noise level history graph.

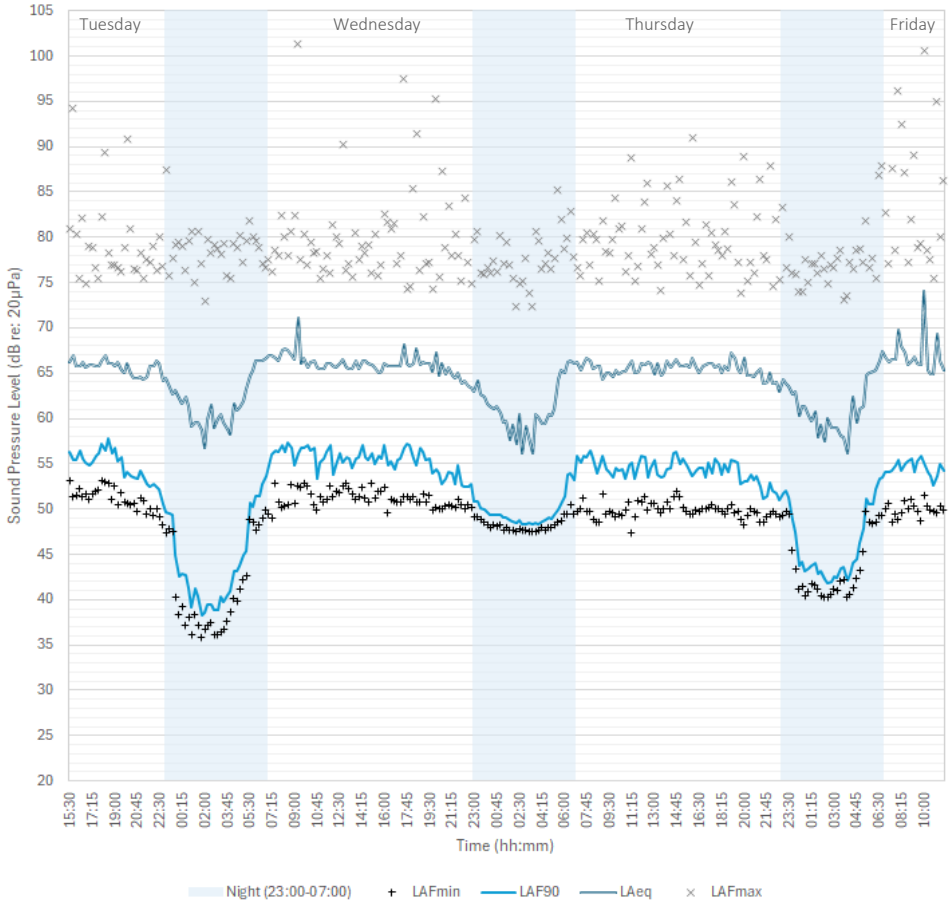

Figure 3-2: Measured noise level history

3.4.3 Noise levels are consistently higher during the daytime and evening periods, with a drop-off late at night (presumably as traffic flows reduce). There is variance in the amount of drop-off on each night, from around 15 dB to around 5 dB.

3.4.4 On the second night the ambient and background noise levels are considered to have been impacted by a continuous noise source such as local building services equipment, as only the L_{AFmin} and L_{AF90} indices are elevated. The other nights are considered better representative of typical overnight minimum and background sound levels.

3.4.5 Background noise levels reduce to a lowest point of about 38 dB $L_{A90,15mins}$ overnight. Noise levels start to increase from about 5am, presumably associated with the traffic flows starting to increase for the day.

4 Plant noise emission to neighbouring properties

4.1 Plant noise emission limits

4.1.1 In order to achieve a "low impact" according to a BS 4142 assessment, the rating level of the proposed building services plant needs to be no greater than the background sound level at the existing neighbouring properties. The background sound levels used should reflect the level that is typically expected to occur at different times during the day.

4.1.2 The noise level data at the measurement position are considered representative of the levels of background noise likely to be incident on facades of neighbouring noise-sensitive receivers.

4.1.3 In order to represent a worst-case scenario, the lowest typical background sound levels obtained during the survey have been used to establish the plant noise emission limits at the nearest noise-sensitive receivers (NNSRs). Setting limits equal to the background sound levels is expected to satisfy the requirements of the Local Authority:

Time	Lowest measured background sound level
Day (07:00-23:00)	50 dB $L_{A90,15min}$
Night (23:00-07:00)	38 dB $L_{A90,15min}$

Table 4-1: Background sound levels established for noise emission limits at NNSRs

4.2 Plant proposals

4.2.1 A single outdoor condenser unit (Mitsubishi PURY-EP200YNW-A2) is proposed to be installed at ground level in proximity to the hotel, serving newly formed guestrooms. The condenser is able to be controlled to 70% duty during the daytime (07:00 - 23:00) and to 50% duty overnight (23:00 - 07:00). The unit is to be enclosed by a hit-and-miss timber fence. The proposed location is shown in Figure 4-1.

4.2.2 The sound power (L_w) levels for the unit have been provided by the manufacturer for the differing operating capacities and are presented in Table 4-2. The equipment is noisier when operating in heating mode, rather than other modes, so only the data for heating mode has been used in the assessment.

Unit	Sound power levels (dB) / Octave-band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
PURY-EP200 70% duty	79	74	69	67	65	62	64	60	72
PURY-EP200 50% duty	75	68	60	59	56	53	57	55	63

Table 4-2: Manufacturer provided linear sound power levels (dB ref: 10^{-12} W)

4.3 Nearest noise-sensitive receivers

4.3.1 The nearest noise-sensitive receivers (NNSRs) are understood to be residential properties across North Hyde Road (A374). The location of the NNSRs are presented in Figure 4-1 in relation to the proposed new hotel extension.

Figure 4-1: Satellite image of site showing the nearest noise-sensitive receivers (source: Google Earth)

4.3.2 An assessment location of any normally occupied position within the boundary of these residential properties has been assumed, based on a theoretical free-field point.

4.3.3 The distance between the new external plant and the assessment location of the NNSRs is 38m. Attenuation owing to point-source distance propagation will therefore be 31 dB.

4.3.4 The plant will be shielded from residential properties by the existing hotel building. Calculations indicate that this is will result in a maximum additional attenuation of 20 dBA.

4.3.5 The levels of attenuation are summarised below, for clarity.

- Distance attenuation 31 dB
- Screening attenuation 20 dB
- Total: 51 dB

4.3.6 Controlling noise emission to suitable levels at the assessment location can be expected to result in suitable levels at other NNSRs not discussed in this report.

4.4 Specific sound level

4.4.1 The level of noise emission predicted at the residences across A437 from the new external equipment, when taking into account the respective amounts of propagation attenuation, and based on the manufacturer's data presented in Table 4-2, is as follows:

- Calculated daytime specific sound level 9 dB L_{Aeq}
- Calculated night-time specific sound level 1 dB L_{Aeq}

4.5 Rating level

4.5.1 The guidance in BS 4142 requires that decibel corrections be added to the *specific sound level* if the noise contains unusual acoustic characteristics. The corrected sound level is known as the *rating level*. The following characteristics have been considered:

- Tonality – Noise from the proposed air-conditioning units and water heater will typically be airflow noise at maximum duty, which is broadband in character (i.e. distributed over a wide frequency range), and therefore not expected to contain tonal qualities. However, a precautionary +2 dB correction has been included to allow for a "just" perceptible tonality.
- Impulsivity – When properly maintained, noise from the proposed new equipment is not expected to exhibit impulsive characteristics, therefore this correction has not been applied.
- Intermittency – The duty of each individual air-conditioning unit and water heater will adjust depending on the cooling/heating duty requested by the occupants. The equipment is, however, expected to operate with gradual stop/starts, so it is unlikely that an intermittent characteristic would be experienced at the neighbouring properties. However, a precautionary +3 dB correction has been included.
- Other – The units are not expected to emit any other characteristics that would be readily distinctive against the existing acoustic environment, therefore no correction has been applied.

4.5.2 The BS 4142 rating level will therefore be 5 dB higher than the specific sound level at the nearest noise-sensitive receivers.

4.5.3 The calculated BS 4142 rating levels are summarised below:

- Calculated daytime rating level 14 dB L_{Aeq}
- Calculated night-time rating level 6 dB L_{Aeq}

4.5.4 Comparing the above to the background sound levels (noise emission limits) given in Table 4-1, it can be seen that the BS 4142 rating levels are at least 32 dB below the background sound levels. This is an indication of a "low impact", according to BS 4142, depending on the context.

4.6 British Standard 4142 assessment

4.6.1 BS 4142 requires the context and uncertainty of the assessment to be considered. With regard to the context, the new noise source may be considered to have a differing character to the dominant noise source in the area. A +5 dB penalty has therefore been added to the assessment to account for any distinguishable character the noise emitted by the plant may have, when considered against the prevailing ambient noise climate. The corrections applied are considered precautionary, as any unusual acoustic features are unlikely to be perceptible at the assessment locations. So the inclusion of such corrections is considered to represent a worst-case scenario.

4.6.2 In regard to the uncertainty of the assessment, there is some uncertainty in using a simplified calculation model to predict noise emission, due to the complexity of noise propagation. In addition, it is not certain that the noise measurements captured during the survey will reflect the typical noise levels experienced in the surrounding area throughout the year. To account for this, the lowest measured background sound levels have been used. This conservative approach to the assessment is therefore considered to sufficiently account for any inherent uncertainty.

4.6.3 It should be noted that the background sound levels used in the assessment are the lowest levels measured during the noise survey, and only occur for short periods during the quietest times of the night. At all other times, the background sound levels are significantly higher than assumed for the assessment. The impact can therefore be expected to be reduced further at other times.

4.6.4 Taking the above into account, no adjustment for context is considered to be necessary. It is therefore concluded that noise from the new plant will have a "low impact" on the neighbouring properties, based on the guidance presented in BS 4142.

5 Noise intrusion assessment

5.1 Reference noise levels

5.1.1 The main sources of noise are the main roads, in particular buses serving the stop outside the existing restaurant. The measurement location was selected to obtain reliable measurements of these sources of noise, however the microphone was significantly further back from the exact location of passing buses than façade of the existing restaurant.

5.1.2 Consequently, the L_{AFmax} levels measured have been distance-corrected on this basis. The correction is calculated based on point-source propagation from the road to the measurement point, and then from the road to the window, as follows:

- Distance from traffic on A437 to microphone: 10m
- Distance from traffic on A437 to new windows: 3m
- Correction: **+ 5 dB**

5.1.3 This correction has been applied across every octave band to all L_{AFmax} survey data before use in noise break-in calculations. Noise intrusion into the new guestrooms has been assessed using all of the corrected data.

5.1.4 As well as external noise levels, the level of noise intrusion into a space is a function of the volume and surface finishes of the space, and the sound insulation performance provided by the façade.

5.2 Recommended façade constructions

5.2.1 As-built drawings for the hotel show triple glazed windows, with additional secondary glazing, comprising the following:

- 13mm glass
- 13mm airgap
- 7mm glass
- 12mm airgap
- 8mm glass
- 205mm airgap
- 10mm glass

5.2.2 This is expected to be sufficient for new guestroom windows. Alternatively, good double glazing formed of c.10mm glass panes or better could be used in place of the triple glazed unit, with acoustic laminate double glazing on the same 205mm airgap.

5.2.3 The recommended sound insulation performance of façade elements to achieve the criteria set out in Table 2-1 have been determined based on the ratio of glazing to solid façade and room sizes shown in the architectural drawings. The minimum recommended performance figures are set down in Table 5-1:

	Octave band centre frequency (Hz)					
	125	250	500	1k	2k	4k
Sound reduction	40	46	51	53	50	50

All values are sound reduction indices in dB R, measured in accordance with BS EN ISO 10140-2

Table 5-1: Recommended acoustic specification for the proposed façade

5.2.4 The sound insulation performance for external walls is expected to be achieved by typical masonry constructions, supplemented with internal plasterboard linings and insulation in the cavity. Alternatively, lightweight façade wall systems are considered viable, but may need some form of cementitious board within the build-up.

5.2.5 Calculations have shown that the L_{AFmax} levels are the main drivers of sound insulation requirements, and that controlling these results in the L_{Aeq} criteria being comfortably met.

5.2.6 Alternative constructions and glazing configurations may also be suitable, so long as they allow the criteria set out in Table 2-1 to be satisfied.

5.2.7 Noise ingress via the ventilation openings to bedrooms is expected to be adequately controlled using the standard Premier Inn detail, which incorporates a 1m length of acoustically-treated flexi-duct, located internally on the atmosphere-side terminations.

6 Conclusions

6.1 An external noise survey has been conducted at the site, and the measurement data have been used in conjunction with planning policies from the Local Authority and industry-standard guidance to establish noise emission limits at neighbouring residential properties.

6.2 A noise emission assessment has been undertaken of new building services equipment associated with the proposed extension, based on the equipment manufacturer's data and the findings of the noise survey.

6.3 The operating duty of the proposed air-conditioning equipment will be restricted to assist with satisfying the noise emission limits.

6.4 The noise emission assessment concludes that noise from the proposed plant is expected to have a "low impact" on neighbouring properties, according to British Standard 4142. Furthermore, noise emission from the proposed plant is expected to satisfy Strategic Objective SO10 and Policy EM8 outlined in the London Borough of Hillingdon's Local Plan.

6.5 External noise intrusion into bedrooms of the proposed new hotel extension has been assessed. External wall specifications and window configurations are recommended, which are expected to result in satisfying the Premier Inn Specification for hotel bedrooms. Note that the hotel operator's requirements are more onerous than those within British Standard 8233, which is the standard usually adopted for residential properties.

Appendix – Terminology

A-weighting **L_A or L_{pA}, L_{WA},**	Within its operating limits a precision measurement microphone measures all frequencies the same so the output it produces does not reflect what we would actually hear. The A-weighting is an electronic filter that matches the response of a sound level meter to that of the human ear. When A-weighted the Sound Pressure Level L_p becomes L_{pA} (or L_A) and the Sound Power Level L_W becomes L_{WA}.
L_p	*The instantaneous sound pressure level* (L_p)
L_{pA} (or L_A)	*The A-weighted instantaneous sound pressure level* (L_{pA} or L_A). This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125s (FAST time constant) or the previous 1s (SLOW time constant).
L_{AF}, L_{AS}	The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them.
L_{max}	*The maximum instantaneous sound pressure level* (L_{max}),
L_{Amax}	*The A-weighted maximum instantaneous sound pressure level (L_{Amax})*
L_{AFmax}	*The A-weighted maximum instantaneous sound pressure level with a FAST time constant (L_{AFmax}).*
$L_{N,T}$	*The percentage exceedance sound pressure level ($L_{N,T}$),*
$L_{AN,T}$ $L_{AFN,T}$ **$_N$ = %age value, 0-100** **$_T$ = measurement time** **eg. L_{A90}, L_{A10}, $L_{AF90,\ 5\ min}$**	*The A-weighted percentage exceedance sound pressure level ($L_{AN,T}$), the A-weighted percentage exceedance sound pressure level with a FAST time constant ($L_{AFN,T}$).* This is the sound pressure level exceeded for *N*% of time period *T*. e.g. If an A-weighted level of x dB is exceeded for a total of 6 minutes within one hour, the level will have been above x dB for 10% of the measurement period. This is written as $L_{A10,1hr}$ = x dB. L_{A0} (the level exceeded for 0 % of the time) is equivalent to the L_{Amax} and L_{A100} (the level exceeded for 100 % of the time) is equivalent to the L_{Amin}. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{eq,T}$	The *equivalent continuous sound pressure level over period T ($L_{eq,T}$),*
$L_{Aeq,T}$ **$_T$ = measurement time** **eg. $L_{Aeq,5min}$**	*The A-weighted equivalent continuous sound pressure level over period T ($L_{Aeq,T}$).* This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the L_{eq} is not a simple arithmetic mean value. The L_{eq} is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation.

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