Noise Impact Assessment of the installation of an AC Unit

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Site Address:	4, Lambolle Road, London, NW3 4HP
Date:	15/01/2021

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Executive summary

An environmental noise survey and noise impact assessment have been undertaken at 4, Lambolle Road, London, NW3 4HP to assess the potential increase in noise levels from the installation of the proposed AC Unit on the surrounding Noise Sensitive Receptors. The measured background sound levels have allowed a BS4142:2014 noise assessment to be carried out.

The BS4142:2014 assessment indicates that the rating level is below the lowest statistically most repeated background sound level at the most exposed noise sensitive receptor by 6.0 dB during the day and 1.0 dB during the night. This indicates that 'Low Impact, dependant on the context' on the surrounding residential Noise Sensitive Receptors according to BS4142.

As mentioned in 'Context – COVID 19' section of this report, the acoustic profile of the area under assessment has been clearly affected by the current restrictions and as such the measured noise levels are deemed to be quitter that under normal circumstances. Therefore, it is understood that if the rating value has fallen below the background measured during the lockdown, the rating level will fall further below the background level under normal conditions.

However, in order to achieve Camden Councils Local Plan 2017 noise criteria, a further 14 dB of attenuation is required an acoustic enclosure has been specified to achieve this.

An overview of the recommendations can be found below:

Recommendations and Mitigation Measure Overview

- The proposed AC unit should be installed at least 18m away from the closes NSR's window.
- The unit should be fitted within an acoustic enclosure providing a minimum of 14 dB of attenuation this could be achieved using the following specification:
  o 1mm steel enclosure – 25 dB R_w sound reduction
  o Caice Acoustic Louvre SS300 - 17 dB R_w sound reduction
- The proposed unit should be fitted on appropriate anti-vibrational mounts.
- The make, model and location of the external unit should not be altered. If alterations to the specification and location of the units are required further assessment should be undertaken.

The findings of this report will require written approval from the Local Authority prior to work commencing.

1. Introduction

Overview

NOVA Acoustics Ltd has been commissioned to prepare a noise assessment for the installation of the proposed AC Unit (the Proposed Development') at the rear garden at 4, Lambolle Road, London NW3 4HP ('the Site').

The applicant has submitted a planning application, 2020/3292/P - Erection of single storey outbuilding in rear garden to replace existing play equipment, for use ancillary to lower ground floor flat ('the Application) to Camden City Council. The Local Authority have requested additional supporting documentation in order to approve the application.

The following technical noise assessment has been prepared to support the planning application to Camden City Council. This report details the existing background sound climate at the nearest receptors, as well as the sound emissions associated with the Proposed Development.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

Scope & Objectives

The scope of the noise assessment can be summarized as follows:

- Baseline sound monitoring survey to evaluate the prevailing background sound levels at the nearest sensitive receptor ('NSR') to Site;
- Detailed sound modelling, acoustic calculation and analysis in accordance with; ISO9613 – 1 ISO 9613-2 - Attenuation of sound during propagation outdoors prediction methodology, to predict sound levels at the NSR;
- A detailed assessment of the suitability of the Site, in accordance with relevant standards in respect of sound from the proposed sources; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of the National Planning Policy Framework (2019), Noise Policy Statement for England (2010) and British Standard BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound. Further information on the legislation can be found in Appendix B.

2. Environmental Noise Survey

Measurement Methodology

In order to characterise the sound profile of the area at the closest sensitive receptor (NSR), an environmental sound survey has been carried out from the 10/11/2020 to 12/11/2020. The monitoring position was chosen in order to collect representative sound levels at the Noise Sensitive Receptors (NSR) during the typical operational periods of the proposed development. The monitoring location is shown in Figure 1.0.

Figure 1.0 - Indicative Site Layout

The proposed site is surrounded by residential dwellings, which are deemed to be the NSRs due to its proximity. The figure below shows the NSRs' location.

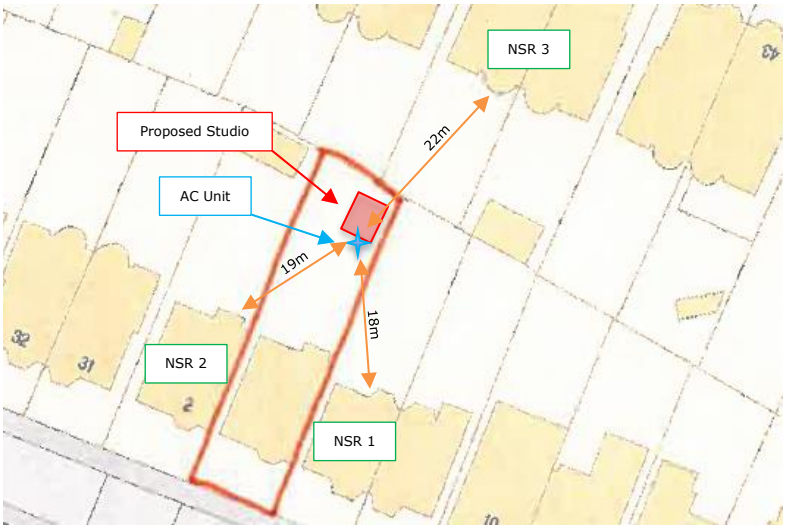


Figure 2.0 – NSR's Location

Context & Subjective Impression

The area surrounding site is primarily residential in nature. The noise profile of the area is dominated by traffic noise from Lambolle Road, Belsize Park Gardens and their surrounding network roads.

The existing building at the proposed site is a two-storey structure which is proposed to be demolish in order to erect a one-storey studio. The studio will be used as a gym with an AC unit associated. The client has stated that the gym is proposed to be used a maximum of 1 – 2 hours a day, although most of the times it will be used less and some days not at all.

Context – COVID-19

The current situation due to the COVID-19 pandemic has forced the Government to take extraordinary measures as is well known by everyone. The consequence of those measures is a potential decrease in traffic flow levels, leading to a quieter sound profile of the assessed area. Regarding the above, the IOA has raised that *"…We have, therefore, recommended below some changes in working practices in the production of such reports. In so doing, it is still important to minimize uncertainties in surveying and to select appropriate baseline conditions, in a clear and transparent way. Furthermore, by good communication between those preparing the reports and those that will be reviewing them, the planning process (and other relevant processes) will be able to continue as smoothly as possible, …*

Competence:

> *"Appropriate sound level surveying should always be designed to obtain data, which is representative of normal conditions, whilst taking account of variations in sound levels due to, for example, fluctuations in transportation traffic flows and industrial output. Acoustics professionals are skilled in understanding the effects of such variations and, therefore, check that results are representative and conclusions technically robust so that clients and decision-makers can come to well-informed judgements."*

Methodology:

> *"For some transport scheme, there may be a heavier reliance on predicted sound levels to describe the baseline conditions, with a corresponding need to source flow/activity data. There are now many sources of transport data available and these should be used, where possible, as an alternative to, or to augment direct site measurements to describe baseline conditions.*
>
> *Where sound from existing facilities is needed to uniform noise levels, or where it is the existing sound that is being assessed, enquiries will be needed to understand whether or not the facility is running as normal…*
>
> *The acoustics professional will need to consider whether alternative sources of information in respect of sound levels can reasonably be used. Where appropriate, a case should be made regarding why any alternative methods are suitable for a robust assessment."*

Taking the above and the subjective impression of the engineer who visit the site into consideration, it is understood that the current noise profile of the area under assessment has been affected by the lockdown restrictions and hence the measured noise levels represent a worst-case scenario and provide a robust an conservative assessment.

Environmental Noise Survey Results

The proposed plant can operate 24h, however due to its usage, it is understood is very unusual that it would be used during night time (23:00 – 07:00). The table below outlines the background sound levels, during the operational period of the plant, that will be used as the baseline for the noise assessment. Further summary results for the entire measurement period can be found in Appendix D.

Measurement Position MP1				
Measurement Period ('t')	**$L_{A90,15min}$**	***SMR $L_{A90,15min}$**	**Min. $L_{A90,15min}$**	**Max. $L_{A90,15min}$**
Day 1 – 10/11/2020	40.0	40.0	39.0	42.0
Night 1 – 10/11/2020	36.0	35.0	34.0	48.0

Table 1.0 – Background Sound Level Summary Results

**Statistically Most Repeated*

As can be seen in the table above, the lowest statistically most repeated $L_{A90,15min}$ values are 40.0 dB and 35.0 dB for day and night respectively. For the day time, the range of measured background sound levels is relatively low and ant the SMR falls close the bottom of the range hence, the statistically most repeated $L_{A90,15min}$ value is deemed 'Typical' and will be used in the following assessment. For the night time, the range is relatively high however the SRM falls also close to the bottom and hence it is deemed 'Typical' and will be used in the following assessment.

3. BS4142:2014 Noise Assessment

The following section of the report analyses the expected impact from the noise emissions associated with the AC Unit The following equipment is to be installed:

Plant Equipment	Specific Noise Level @ 1m	Distance to NSR	Specific Noise Level at NSR*	Acoustic Feature Correction **
LG / AM18BP.UL2, P18EN.UL2 or smaller units	57.0	18.0m	32.0	Tonality +2
Cumulative Rating Noise Level $L_{AR,TR}$ @ NSR			34.0	

Table 2.0 – Plant Noise Emissions

** The noise level at the NSR has been calculated using the following equation 20log(r1/r2).*

*** Acoustic Feature Discussion: a 2 dB penalty has been applied to have into consideration a possible tonal content of the proposed unit.*

The BS4142 Assessment of the proposed AC Unit is outlined in the table below.

Results	Day Assessment	Night Assessment	Notes
	Sound Level (dB)	Sound Level (dB)	
Rating Sound Level	34.0	34.0	Acoustic feature corrections as shown in Table 2.0.
Background Sound Level	40.0	35.0	As shown in Table 1.0
Excess of Rating over Background Sound Level	-6.0	-1.0	The assessment indicates; Negilgible Impact, Dependant on Context

Table 3.0 – BS4142:2014 Noise Assessment

Discussion

The assessment above indicates that the rating level is below the lowest statistically most repeated background sound level at the most exposed noise sensitive receptor by 6.0 dB during the day and 1.0 dB during the night. This indicates means that 'Low Impact, dependant on the context' on the surrounding residential Noise Sensitive Receptors in accordance with BS4142. Furthermore, when comparing with the lowest $L_{A90.15min}$, which represents the worst-case scenario, the rating level will fallow a minimum of 5 dB below during day time and 0 dB during night time.

As mentioned in 'Context – COVID 19' section of this report, the acoustic profile of the area under assessment has been clearly affected by the current restrictions and as such the measured noise levels are deemed to be quitter that under normal circumstances. Therefore, it is understood that if the rating value has fallen below the background measured during the lockdown, the rating level will fall further below the background level under normal conditions.

However, Camden Council Local Plan document 2017 states in section A4 and the noise criteria defined in Appendix 3 that noise emissions from fixed plant need to fall 10 – 15 dB below the background sound level to be deemed to have low impact. Given the unit may have tonal elements the council's noise criteria deems that noise emissions at the closest NSR should fall 15 dB below the background sound level. Given this, during the night time, an extra 14 dB of attenuation is required

3.1.1 Recommendations & Mitigation

The following section outlines the mitigation measures that are necessary to reduce the impact of the proposed AC unit.

- The proposed AC unit should be installed at least 18m away from the closes NSR's window.
- The unit should be fitted within an acoustic enclosure providing a minimum of 14 dB of attenuation this could be achieved using the following specification:
    - 1mm steel enclosure – 25 dB R_w sound reduction
    - Caice Acoustic Louvre SS300 - 17 dB R_w sound reduction
- Airflow requirements for the unit may need to be confirmed by an engineer and bespoke acoustic enclosers can be obtained from https://www.caice.co.uk and https://acousticenclosuresltd.co.uk/
- The proposed unit should be fitted on appropriate anti-vibrational mounts.
- The make, model and location of the external unit should not be altered. If alterations to the specification and location of the units are required further assessment should be undertaken.

Appendix A – Acoustic Terminology

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa (20x10-6 Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided. The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source. A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the

time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}.

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound. To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS4142:2014 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125ms

Appendix B – Legislation, Policy and Guidance

This report is to be primarily based on the following legislation, policy and guidance.

B.1 - National Planning Policy Framework (2019)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2019. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 170e, it states:

Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph 180 states:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) *Mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
b) *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
c) *Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

B.2 - Noise Policy Statement for England (2010)

Paragraph 180 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision to:

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

To achieve this vision the Statement identifies the following three aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life;*
- *Where possible, contribute to the improvement of health and quality of life.*

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that "significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development".

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. This can be related to the third aim above, which seeks: "where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 - British Standard BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound

Overview

BS4142:2014 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142:2014 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

Rating Penalty

Section 9 of BS4142:2014 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142:2014 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

a) subjective method;
b) objective method for tonality;
c) reference method."

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142:2014, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed. Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

a) Tonality

A rating penalty of +2 dB is applicable for a tone which is "just perceptible", +4 dB where a tone is "clearly perceptible", and +6 dB where a tone is "highly perceptible".

b) Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is "just perceptible", +6 dB where it is "clearly perceptible", and +9 dB where it is "highly perceptible".

c) Other Sound Characteristics

BS4142:2014 states that where "the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."

d) Intermittency

BS4142:2014 states that when the "specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time … if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied."

Background Sound Level

The background sound level is the underlying level of sound over a period, T, and is indicative of the relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

To ensure the background sound level values used within the assessment are reliable and suitably represent both the particular circumstance and periods of interest, efforts have been made to quantify a 'typical' background sound level for a given period. The purpose has not been to simply select the lowest measured value. Diurnal patterns have also been considered as they can have a major influence on background sound levels, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night time period for sleep purposes.

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

Assessment of Impact

BS4142:2014 states: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

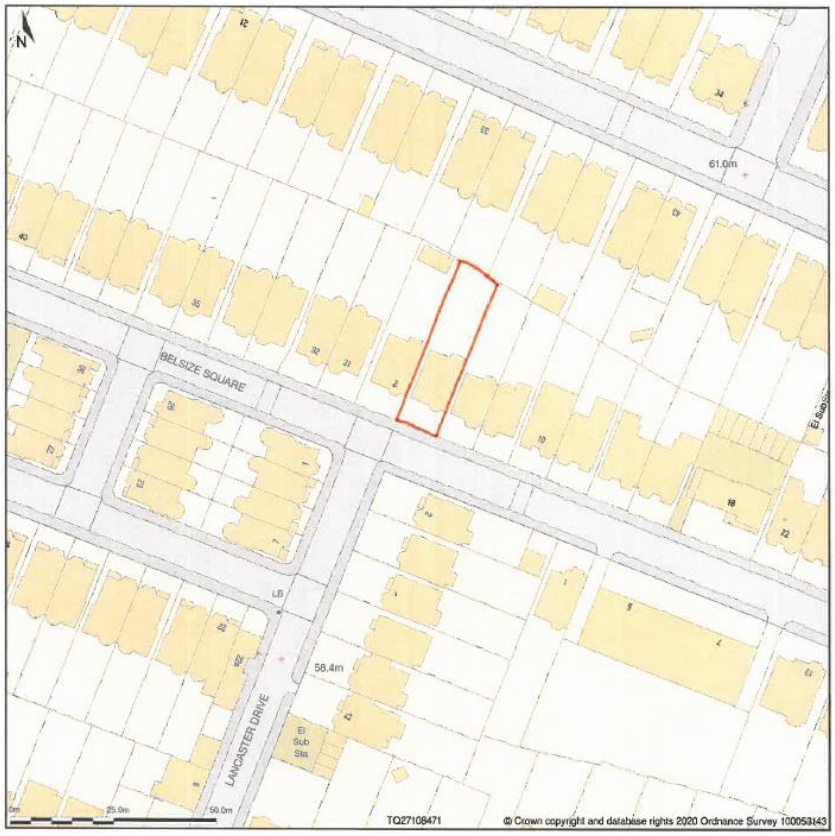
- "Typically, the greater this difference, the greater the magnitude of the impact."
- "A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."
- "A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."
- "The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a negligible impact, depending on the context."

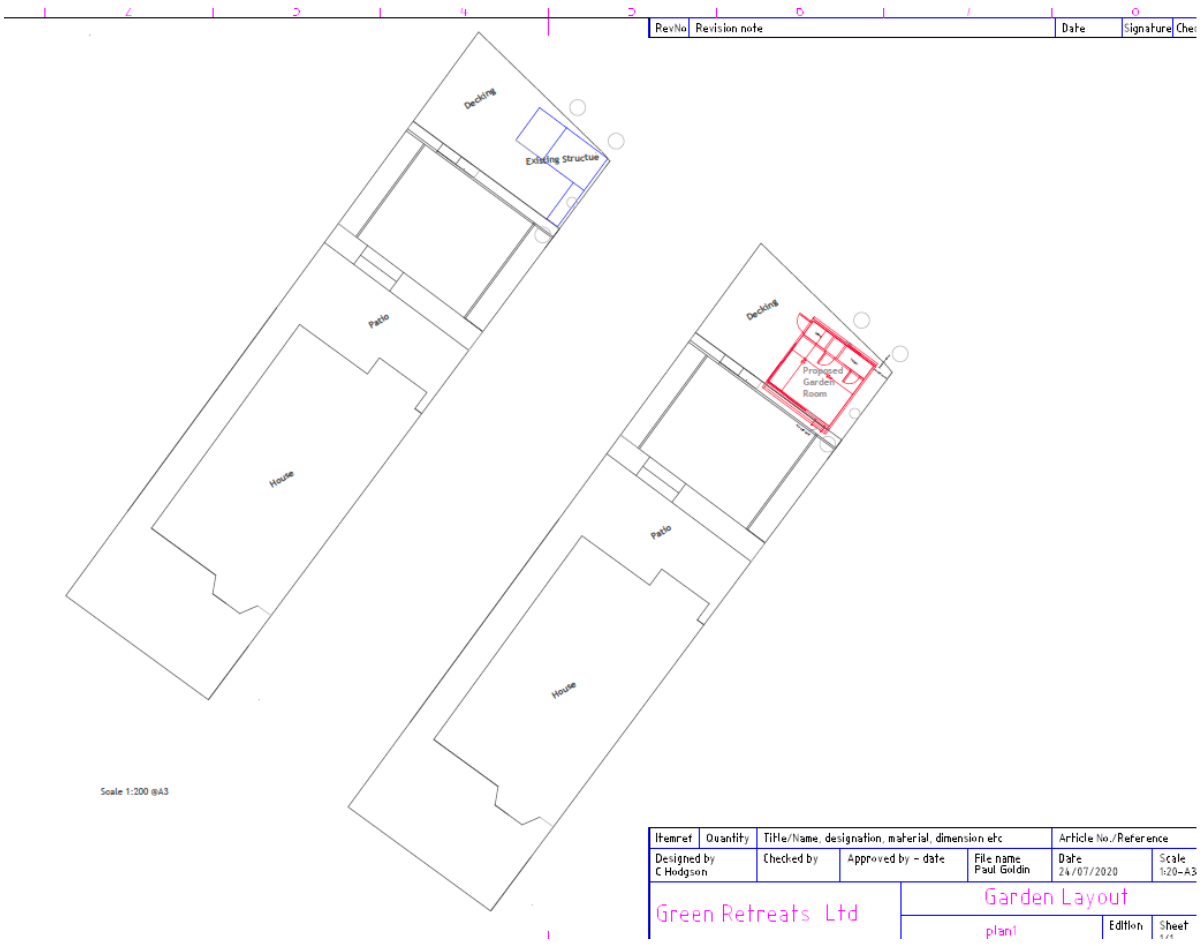
Interpreting the guidance given in BS4142:2014, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10 dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;
- A rating sound level that is +5 dB above the background sound level is likely to be an indication of a Lowest Observed Adverse Effect Level;
- The lower the rating sound level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating sound level does not exceed the background sound level, this is an indication of the specific sound source having a negligible impact and would therefore classified as a No Observed Adverse Effect Level.

During the daytime, the assessment is carried out over a reference time period of 1-hour. The periods associated with day or night, for the purposes of the Standard, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

Appendix C – Location & Site Plans

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Signature
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Patio
House
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Quantity
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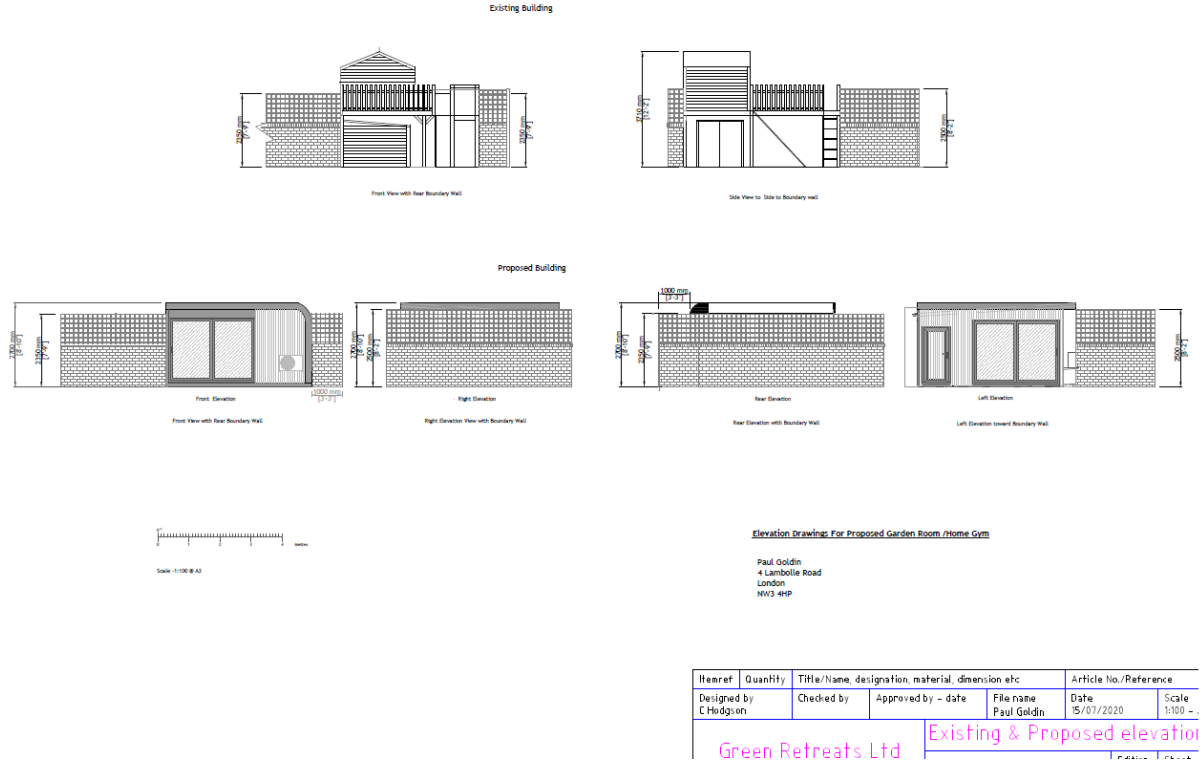
Article No./Reference
Designed by C Hodgson
Checked by
Approved by - date
File name Paul Goldin
Date 24/07/2020
Scale 1:20-A3
Green Retreats Ltd
Garden Layout
plan1
Edition
Sheet


Existing Building
Front View with Rear Boundary Wall
Side View to Side to Boundary wall
Proposed Building
Front Elevation
Front View with Rear Boundary Wall
Right Elevation
Right Elevation View with Boundary Wall
Rear Elevation
Rear Elevation with Boundary Wall
Left Elevation
Left Elevation toward Boundary Wall
Scale 1:100 @ A3
Elevation Drawing: For Proposed Garden Room /Home Gym
Paul Goldin
4 Lambolle Road
London
NW3 4HP
Itemref
Quantity
Title/Name, designation, material, dimension etc
Article No./Reference
Designed by C Hodgson
Checked by
Approved by - date
File name Paul Goldin
Date 15/07/2020
Scale 1:100 -
Green Retreats Ltd
Existing & Proposed elevatio

Appendix D – Environmental Survey

D.1 Tabulated Summary Noise Data

Measurement Position MP1			
Measurement Time Period ('t')	**$L_{Aeq,t}$**	**$L_{A90,t}$**	**$L_{A10,t}$**
Day 1 – 10/11/2020 – 15:45 – 23:00	44.0	40.0	47.0
Night 1 – 10/11/2020 – 23:00 – 07:00	40.0	36.0	41.0
Day 2 – 11/11/2020 – 07:00 – 23:00	47.0	44.0	49.0
Night 2 – 11/11/2020 – 23:00 – 07:00	45.0	39.0	48.0
Day 3 – 12/11/2020 – 07:00 – 13:15	49.0	47.0	49.0

LA90 Analysis				
Measurement Period ('t')	**$L_{A90,t}$**	**SMR $L_{A90,t}$**	**Min. $L_{A90,t}$**	**Max. $L_{A90,t}$**
Day 1 – 10/11/2020 – 15:45 – 23:00	40.0	40.0	39.0	42.0
Night 1 – 10/11/2020 – 23:00 – 07:00	36.0	35.0	34.0	48.0
Day 2 – 11/11/2020 – 07:00 – 23:00	44.0	43.0	42.0	47.0
Night 2 – 11/11/2020 – 23:00 – 07:00	39.0	38.0	36.0	47.0
Day 3 – 12/11/2020 – 07:00 – 13:15	47.0	47.0	43.0	48.0

Noise Survey Time History

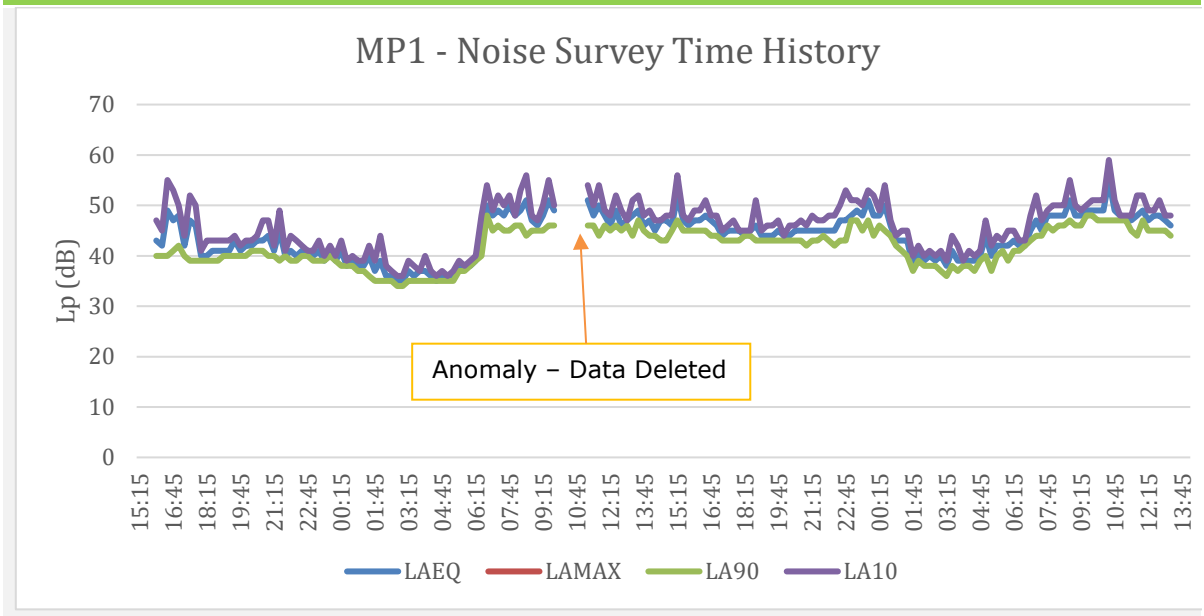


Table 4.0 – Sound Survey Summary Results

D.2 Surveying Equipment

Piece of Equipment	Serial No	Calibration Deviation
CESVA TA120 Class 1 Sound level meter	T248630	≤0.5
CESVA CB006 Class 1 Calibrator	901013	

Table 5.0 – Measurement Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.5 dB. All sound level meters are calibrated every 24 months and all calibrators are calibrated every 12 months, by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localized records of weather conditions were taken. However, during the set up and collection of the monitoring equipment the weather conditions have been documented in the following table. All measurements have been compared with met office weather data of the area, specifically the closest weather station, the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather conditions			
Time period	**Air temp (^{0}C)**	**Rainfall mm/h**	**Wind Speed (m/s)**
Day 1 – 10/11/2020 – 00:00 – 23:59	9.5 – 14.6	0.0 – 0.5	0.0 – 0.8
Day 2 – 11/11/2020 – 00:00 – 23:59	9.1 – 13.2	0.0 – 0.8	0.0 – 0.3
Day 3 – 12/11/2020 – 00:00 – 23:59	9.4 – 12.7	0.0 – 0.3	0.4 – 2.1

Table 6.0 – Weather Summary

Appendix E – Manufacturer's Data

SPECIFICATIONS LG Residential Air Conditioners 2017

ARTCOOL
Smart Inverter

9K
AM09BP
12K
AM12BP

18K
AM18BP

Embedded Wi-Fi | Smart Diagnosis | Active Energy Control | Energy Display | Plasmaster Ionizer+ | Dual Protection Filter | Auto Cleaning | Jet Cool | 4 Way Swing | Fast Heating | Gold Fin™ | Comfort Air | Low Noise 19dB (9k,12k) | Silence Mode | Quick & Easy Installation

Unit				9K	12K	18K
Model Indoor Unit				AM09BP.NSJ	AM12BP.NSJ	AM18BP.NSK
Indoor Unit						
Capacity	Cooling	Min/Rated/Max	W	890/2500/3700	890/3500/4040	900/5000/5525
	Heating	Min/Rated/Max	W	890/3200/4100	890/3800/5100	900/5800/6438
	Heating -7°C	Rated	W	3000	3600	3800
Power Input	Cooling	Rated	W	670	1080	1587
	Heating +7°C	Rated	W	840	1000	1611
EER			W/W	3.73	3.24	3.15
S.E.E.R.				6.5	6.4	6.5
P design C			kW	2.5	3.5	5.0
COP			W/W	3.81	3.80	3.60
S.C.O.P.				4.0	4.0	4.0
P design H			kW	2.4	2.5	3.9
Energy Label	Cooling			A++	A++	A++
	Heating			A+	A+	A+
Annual Energy Consumption	Cooling		kWh	134	191	269
	Heating		kWh	840	875	1365
Sound Pressure	Cooling	S/L/M/H	dBA+1	19/27/35/41	19/27/35/41	31/34/39/44
	Heating	L/M/H	dBA+1	27/35/41	27/35/41	34/39/44
Sound Power	Cooling	High	dBA	59	59	60
Air Flow Rate	Cooling	S/L/M/H	m^3/min	3.0/4.2/7.5/10.0	3.0/4.2/7.5/10.0	8.0/10.5/13.0/14.5
		Max (Power)	m^3/min	11.5	12.5	15.5
	Heating	L/M/H	m^3/min	5.6/7.2/10.0	5.6/7.2/10.0	11.0/13.5/16.0
Dehumidification Rate			l/h	1.1	1.3	1.8
Running Current	Cooling	Rated/Max	A	3.0/6.0	4.7/6.0	6.9/9.0
	Heating	Rated/Max	A	3.7/7.0	4.5/7.0	7.1/9.5
Starting Current	Cooling	Rated	A	3.0	4.7	6.9
	Heating	Rated	A	3.7	4.5	7.1
Power Supply			Ø / V /Hz	1 / 220-240 / 50	1 / 220-240 / 50	1 / 220-240 / 50
Circuit Breaker			A	15	15	20
Power Supply Cable			N x mm^2	3*1.0	3*1.0	3 x 1.5
Power & Transmission Cable			N x mm^2	4*1.0 (Including Earth)	4*1.0 (Including Earth)	4 x 1.0 (Including Earth)
Dimension			mm	837*308*192	837*308*192	998*345*212
Net Weight			kg	9.9	9.9	13.2
Fan Motor Output			W	30	30	30
Outdoor Unit				AM09BP.UA3	AM12BP.UA3	AM18BP.UL2
Operation Range	Cooling	Min~Max	°CDB	-10~48	-10~48	-15~48
	Heating	Min~Max	°CDB	-10~24	-10~24	-10~24
Sound Pressure	Cooling	High	dBA+1	49	49	53
	Heating	High	dBA+1	50	50	55
Sound Power	Cooling	High	dBA	65	65	65
Air Flow Rate		High	m^3/min	27	27	35
Piping	Length (Odu/Idu)	Min	m	3	3	3
		Max	m	15	15	20
	Elevation (Odu/Idu)	Max	m	7	7	10
Piping Connection	Liquid	OD(Outside)	mm	6.35	6.35	6.35
		OD(Outside)	inch	(1/4)	(1/4)	(1/4)
	Gas	OD(Outside)	mm	9.52	9.52	12.7
		OD(Outside)	inch	(3/8)	(3/8)	(1/2)
	Drain	OD(Outside)	mm	21.5	21.5	21.5
		OD(Outside)	inch	0.85	0.85	0.85
Refrigerant	Type			R410A	R410A	R410A
	Charge at 7.5m		g	950	950	1200
			t-CO_2 eq	1.98	1.98	2.51
	Additional charge		g/m	20	20	20
	GWP			2087.5	2087.5	2087.5
Fan Motor Output			W	43	43	43
Compressor Type				1P Rotary	1P Rotary	Twin Rotary
Net Weight			kg	28.4	28.4	36.3
Dimension			mm	717*483*230	717*483*230	770*545*288

* S : Sleep / L : Low / M : Medium / H : High
** Specification, design and feature are subject to change without prior notice.
*** This product contains Fluorinated greenhouse gases (R410A)

New Libero-S
Smart Inverter

9K
P09EN
12K
P12EN

18K
P18EN
24K
P24EN

Optional

Active Energy Control | Energy Display | 2 Way Swing | Jet Cool | Fast Heating | Dual Protection Filter | Auto Cleaning | Comfort Air | Low Noise 19dB *9k,12k | Silence Mode 3dB | Quick & Easy Installation | Wi-Fi Ready | Smart Diagnosis

Unit				9K	12K	18K	24K
Model Indoor Unit				P09EN.NSB	P12EN.NSB	P18EN.NS2	P24EN.NS2
Model Outdoor Unit				P09EN.UA3	P12EN.UA3	P18EN.UL2	P24EN.UUE
Indoor Unit							
Capacity	Cooling	Min/Rated/Max	W	890/2500/3700	890/3500/4040	900/5000/5525	900/6600/7420
	Heating +7°C	Min/Rated/Max	W	890/3200/4100	890/3800/5100	900/5800/6438	900/7500/8640
	Heating -7°C	Rated	W	3000	3600	3800	4850
Power Input	Cooling	Rated	W	670	1080	1587	2275
	Heating +7°C	Rated	W	840	1000	1611	2308
EER			W/W	3.73	3.24	3.15	2.90
S.E.E.R.				6.5	6.4	6.5	6.2
P design C			kW	2.5	3.5	5.0	6.6
COP			W/W	3.81	3.80	3.60	3.25
S.C.O.P.				4.0	4.0	4.0	3.9
P design H			kW	2.4	2.5	3.9	5.0
Energy Label	Cooling			A++	A++	A++	A++
	Heating			A+	A+	A+	A
Annual Energy Consumption	Cooling		kWh	134	191	269	372
	Heating		kWh	840	875	1365	1794
Sound Pressure	Cooling	S/L/M/H	dBA	19/27/35/41	19/27/35/41	31/34/39/44	31/34/42/47
	Heating	L/M/H	dBA	27/35/41	27/35/41	34/39/44	34/42/47
Sound Power	Cooling	High	dBA	59	59	60	65
Air Flow Rate	Cooling	S/L/M/H	m³/min	3.0 /4.2 /7.5 /10.0	3.0 /4.2 /7.5 /10.0	8.0 /10.5 /13.0	8.0 /10.5 /13.1
		Max (Power)	m³/min	11.5	12.5	18.0	20.0
	Heating	L/M/H	m³/min	5.6 /7.2 /10.0	5.6 /7.2 /10.0	11.0 /13.5 /16.0	11.0 /15.0 /18.5
Dehumidification Rate			l/h	1.1	1.3	1.8	2.5
Running Current	Cooling	Rated/Max	A	3.0 /6.0	4.7 /6.0	6.9/9.0	10.1/14.0
	Heating	Rated/Max	A	3.7 /7.0	4.5 /7.0	7.1 /9.5	10.4 /14.0
Starting Current	Cooling	Rated	A	3.0	4.7	6.9	10.1
	Heating	Rated	A	3.7	4.5	7.1	10.4
Power Supply			Ø / V /Hz	1 / 220-240 / 50	1 / 220-240 / 50	1 / 220-240 / 50	1 / 220-240 / 50
Circuit Breaker			A	15	15	20	25
Power Supply Cable			N x mm²	3*1.0	3*1.0	3*1.5	3*2.5
Power & Transmission Cable			N x mm²	4*1.0 (Including Earth)	4*1.0 (Including Earth)	4*1.0 (Including Earth)	4*1.0 (Including Earth)
Dimension			mm	837*302*189	837*302*189	998*330*210	998*330*210
Net Weight			kg	8.5	8.5	11.6	12.5
Fan Motor Output			W	30	30	30	60
Outdoor Unit							
Operation Range	Cooling	Min-Max	°CDB	-10~48	-10~48	-15~48	-15~48
	Heating	Min-Max	°CDB	-10~24	-10~24	-10~24	-10~24
Sound Pressure	Cooling	High	dBA	49	49	53	56
	Heating	High	dBA	50	50	55	57
Sound Power	Cooling	High	dBA	65	65	65	70
Air Flow Rate		High	m³/min	27	27	35	50
Piping	Length (Odu/Idu)	Min	m	3	3	3	3
		Max	m	15	15	20	30
	Elevation (Odu/Idu)	Max	m	7	7	10	15
Piping Connection	Liquid	OD(Outside)	mm	6.35	6.35	6.35	6.35
		OD(Outside)	inch	(1/4)	(1/4)	(1/4)	(1/4)
	Gas	OD(Outside)	mm	9.52	9.52	12.7	15.88
		OD(Outside)	inch	(3/8)	(3/8)	(1/2)	(5/8)
	Drain	OD(Outside)	mm	21.5	21.5	21.5	21.5
		OD(Outside)	inch	0.85	0.85	0.85	0.85
Refrigerant	Type			R410A	R410A	R410A	R410A
	Charge at 7.5m		g	950	950	1200	1350
	Additional charge		g/m	20	20	20	30
Fan Motor Output			W	43	43	43	85
Compressor Type				1P Rotary	1P Rotary	Twin Rotary	Twin Rotary
Net Weight			kg	29	29	36.7	46
Dimension			mm	717*483*230	717*483*230	770*545*288	870*655*320

* S : Sleep / L : Low / M : Medium / H : High