Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton on Thames
Surrey. KT12 2TP
t: 01932 230940
f: 01932 230941
e: info@eec.co.uk

Project:

23 Meadowbank, Primrose Hill

Title:

Plant Noise Impact Assessment

quietly moving forward

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton on Thames
Surrey. KT12 2TP
t: 01932 230940
f: 01932 230941
e: info@eec.co.uk

Report Title	23 Meadowbank, Primrose Hill Plant Noise Impact Assessment
Reference	TB/EC19388-3
Version	0
Issue Date	15 August 2022
Client	William Deakins Architect
Author	Thomas Buchan BA(Hons) Acoustic Consultant
Checked	Jon Mudd BEng(Hons) MIOA Director

Revision	Date	Author	Checked

CONTENTS:

1 INTRODUCTION

1.01 Environmental Equipment Corporation Limited has been commissioned by William Deakins Architect to undertake a noise assessment of two condensing units to serve a residential property at 23 Meadowbank, Primrose Hill.

1.02 This noise assessment has been conducted in accordance with the policies and requirements of Camden Council (CC) and is based on a noise survey carried out at the site over a typical weekday period.

1.03 This assessment includes:

- the setting of plant noise limits in accordance with the requirements of CC and national planning policy, standards and guidance; and
- the prediction of noise impacts at the worst affected noise sensitive receptors based on the proposed items of plant and their location.

1.04 This report is prepared solely for William Deakins Architect. Environmental Equipment Corporation Limited accepts no responsibility for its use by any third party. Note that the contents contained herein are produced for the purposes of review by relevant Planning Authority departments and do not constitute a detailed design or specification document to be used for the purposes of construction. Subsequent development of noise mitigation schemes shall engage EEC Ltd and William Deakins Architect so as to support the conclusions of this report.

1.05 Whilst every effort has been made to ensure that this report is easy to understand, it is necessarily technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in Appendix A.

2 SITE

2.01 23 Meadowbank is a four-storey residential property located in a predominantly residential area of Primrose Hill, London.

2.02 The property is bound by the following:

- Northeast – Meadowbank roadway with residential properties beyond;
- Southeast – Four-storey residential property at 24 Meadowbank;
- Southwest – Primrose Hill roadway with Primrose Hill public park beyond; and
- West – Four-storey residential property at 22 Meadowbank.

2.03 This application is for two Daikin condensing units, model RXYSCQ6TV1, which are to be located on the rooftop of 23 Meadowbank, as presented in Appendix B.

2.04 The closest noise sensitive receptors to the proposed plant items is the top-floor conservatory belonging to the residential property at 24 Meadowbank.

2.05 All other noise sensitive receptors are at a greater distance from the proposed location of the units or are protected by more screening by the intervening structures, and as such will be subject to lower levels of noise.

3 GUIDANCE

3.01 Local and National Planning Policy for the Camden Council (CC) is presented in Appendix C of this document.

3.02 The below extract is taken from CC supplementary planning guidance for protection of Amenity dated January 2021 and provides guidance on how the Local Authority will assess acoustic reports:

"*When assessing acoustic reports, the council will consider the reported measurements against the noise thresholds set out in Appendix 3 of the Local Plan. The thresholds are expressed as 'effect levels', which sets out a hierarchy of expected changes in behaviour and impact on health and wellbeing in response to increasing noise levels (measured in decibels – dB) The 'effect levels' are summarised below and explained in detail in National Planning Practice Guidance (NPPG).*

- *No observed effect level (NOEL) – the level below which no effect can be detected on health and quality of life.*
- *Lowest observable adverse effect level (LOAEL) – the level above which changes in behaviour (e.g. closing windows for periods of the day) and adverse effects on health (e.g. sleep disturbance) and quality of life can be detected.*
- *Significant observed adverse effect level (SOAEL) – the level above which adverse effects on health and quality of life occur. This could include psychological stress, regular sleep deprivation and loss of appetite."*

3.03 Camden Council's Local Plan outlines a framework within which the Authority assesses the acceptability of mechanical services noise as it affects existing residential amenity. Proposals are categorised using a traffic light system as follows:

- **Green** (LOAEL) Where noise is considered to be at an acceptable level (plant noise is -10dB with respect to the background noise level).

- **Amber** (LOAEL-SOAEL) A range over which the impact of the noise could be considered adverse to varying degrees though maybe acceptable when considered in context (plant noise ranges between -5dB to +5dB with respect to the background noise level).

- **Red** (SOAEL) Where noise is observed to have a significant adverse effect (plant noise is greater than 5dB above the background noise level)

3.04 Plant noise levels are assessed in accordance with *BS4142:2014: 'Methods for rating and assessing industrial and commercial sound'*.

3.05 It is noted that normally, where plant noise is 10 dB or more below the background noise, this is usually considered as the NOEL (no observed effect level) rather than LOAEL (lowest observed adverse effect level). In the context of the background noise the LOAEL is commonly adopted as the point at which the introduction of a new noise would lead to a background increase greater than 1 dB, however such incremental changes are not generally perceptible in the general population so the impact of such a change would be considered to be 'minor' in the short term and 'negligible' in the long term.

3.06 Further guidance on establishing the NOEL for noise impacts additional guidance is given in the WHO Night Noise Guidelines for Europe that publishes the following guidance for quantifying the effects on the population based on noise levels external to their property.

Average night noise level over a year $L_{night,outside}$	Health effects observed in the population
Up to 30 dB	Although individual sensitivities and circumstances may differ, it appears that up to this level no substantial biological effects are observed. $L_{night,outside}$ of 30 dB is equivalent to the no observed effect level (NOEL) for night noise.
30 to 40 dB	A number of effects on sleep are observed from this range: body movements, awakening, self-reported sleep disturbance, arousals. The intensity of the effect depends on the nature of the source and the number of events. Vulnerable groups (for example children, the chronically ill and the elderly) are more susceptible. However, even in the worst cases the effects seem modest. $L_{night,outside}$ of 40 dB is equivalent to the lowest observed adverse effect level (LOAEL) for night noise.
40 to 55 dB	Adverse health effects are observed among the exposed population. Many people have to adapt their lives to cope with the noise at night. Vulnerable groups are more severely affected.
Above 55 dB	The situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed. There is evidence that the risk of cardiovascular disease increases.

Table 3
Effects of different levels of night noise on the population's health

4 MEASUREMENTS

4.01 Environmental noise measurements were carried out over a weekday period, between 1145 hours on Wednesday 27th July 2022 and concluded 1045 hours the following day, to establish the existing noise levels at the site. The survey methodology and results are set out below.

4.02 Noise measurements have been carried out at the following position, as shown in Appendix B and described as:

- Position 1: located at a height of approximately 1.5 metres above the roof terrace. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.

4.03 This position is considered to be representative of the noise sensitive receptors closest to and most affected by the proposed rooftop condensing units.

5 EQUIPMENT

5.01 The equipment used for the survey was as follows:-

- 01dB Metravib Black Solo Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- 01dB Metravib MCE 212 Condenser Microphone, PRE 21 S Pre-amp and Connecting Leads;
- 01dB Outdoor Microphone Kit and a
- Tripod.

5.02 The equipment holds current UKAS or equivalent accreditation and serial numbers as follows:

Sound Level Meter 01dB Black Solo	Serial No.	65736
	Calibration Date	21st October 2021
	Cal Certificate No.	U32975
½" MCE 212 Condenser Mic.	Serial No.	175307
	Calibration Date	21st October 2021
	Cal Certificate No.	32974
Calibrator CAL 21	Serial No.	34634297
	Calibration Date	21st October 2021
	Cal. Certificate No.	U37247

N.B. Copies of calibration certificates are available upon request.

5.03 The equipment was calibrated both before and after the survey with no difference noted in the levels.

6 RESULTS

6.01 The weather during the survey was suitable for noise measurement, it being dry with little wind for the duration of the survey.

6.02 Noise sources at the site include local and distant road traffic. There were no other significant sources of noise during the survey.

6.03 A list of the levels measured is included in Appendix D and represented graphically in Appendix E.

6.04 A summary of the time averaged ambient levels and lowest measured background levels over the measurement periods are shown in Table 6.1. The minimum L_{A90} is the lowest fifteen-minute measurement in the specified period.

Position	Period	Average $L_{Aeq,T}$ – dB	Minimum L_{A90} – dB
1	Day time (0700-1900 hrs)	52	41
	Evening (1900-2300 hrs)	48	39
	Night-time (2300-0700 hrs)	43	33

Table 6.1: Free-Field Measured Ambient and Lowest Background Noise Levels

7 PLANT ASSESSMENT

7.01 This application is for the installation of two condensing units to be located on the rooftop of the residential property at 23 Meadowbank.

7.02 Table 7.1 sets out the recommended noise limits that the proposed items of plant should meet. Consideration has been given to the requirements of CC, BS4142:2014, BS8233:2014 and WHO Guidelines as well as the lowest measured background noise level in each time period when setting suitable design targets.

7.03 Table 5.4 in the World Health Organisation's 'Night Noise Guidelines for Europe – 2009' (see section 3.06) outlines the health effects associated with different external average, yearly night time (2300 – 0700hrs) noise levels based on levels outside of bedroom windows ($L_{night,outside}$). For external noise levels up to 30dBA, although individual sensitivities and circumstances may differ, no substantial biological effects are observed. Thus 30 dBA is equivalent to the NOEL for night noise.

7.04 To this end, ensuring that the plant noise does not exceed 30dB(A) at adjacent residential facades or bedroom windows during the night-time (2300 and 0700) should adequately prevent adverse impact and would typically be expected to satisfy Local Authority Planning policy that no 'unacceptable noise' is produced.

Location	Period	Measured Existing $L_{A90,T}$	Proposed Noise Limit L_{Ar}
Top-floor Conservatory of 24 Meadowbank	Day	41 dB	31 dB
	Evening	39 dB	29 dB
	Night	33 dB	30 dB

Table 7.1: Suggested Plant Noise Emission Limits Based on Lowest Measured L_{A90}, Free-field dB

7.05 Note that the limits suggested above are rating levels and as such any design should consider the acoustic characteristics of the plant. In this instance the proposed units display none of the characteristics whereby the acoustic correction should be applied.

7.06 Assuming the proposed items meet the noise limits set out in Table 7.1 noise will be below the NOEL with respect to the NPPF and a green rating during the daytime and evening in line with Camden Council's requirements and no worse than an amber rating at night although this is expected to be mitigated due to the resultant noise level being no more than 30dB(A0 that could be expected to be an indicator of no actual adverse impact.

7.07 The proposed units have a stated manufacturers sound power level of 70 dB(A). Copies of the manufacturer's plant data sheets are included in Appendix F.

7.08 It is proposed to install both proposed condensing units within bespoke high-performance acoustic enclosures that will provide a minimum reduction of 20 dB.

7.09 It is proposed to install both proposed condensing units on suitable anti-vibration mounts to limit levels of structure borne noise into the below demise.

7.10 Predicted noise levels have been calculated at the closest noise sensitive premises; the top-floor conservatory of the residential property at 24 Meadowbank.

7.11 Other residential receptors located further from the site will be subject to lower noise levels than those predicted at the above locations.

7.12 Tables 7.2 -7.3 present the results of worst-case plant noise predictions at the worst-case locations.

Item	Noise Level Unit 1	Noise Level Unit 2	Notes
2 No. Daikin RXYSCQ6TV1	70 dB(A)	70 dB(A)	Sound power level
Noise Control	- 20 dB	- 20 dB	Bespoke high-performance acoustic enclosure
Conformal area Losses over X metres	- 24 dB X = 4m	- 25 dB X = 5m	Distance to closest window
Total Noise Level	26 dB(A)	25 dB(A)	Top-floor Conservatory of 24 Meadowbank
Total Cumulative Noise Level	29 dB(A)		Top-floor Conservatory of 24 Meadowbank

Table 7.2: Top-floor Conservatory of 24 Meadowbank Plant Noise Calculation

Property	Period	Proposed Noise Limit L_{Ar}	Predicted $L_{Aeq,T}$	Exceedance of noise limit	Camden Council Rating
Top-floor Conservatory of 24 Meadowbank	Daytime	31 dB	29 dB	- 2 dB	Green
	Evening	29 dB	29 dB	0 dB	Green
	Night-time	30 dB	29 dB	- 1 dB	Amber/Green

Table 7.3: Assessment of Predicted Noise Levels Based on Proposed Noise Limit, Free-field dB(A)

7.13 It can be seen from the above tables that the noise limits are met during all periods at the top-floor conservatory belonging to the residential property at 24 Meadowbank.

7.14 Assuming that the proposed plant and high-performance acoustic enclosures are included in the installation, predicted noise levels will meet the requirements of the Local Authority during all periods of operation and at the closest noise sensitive receptors.

7.15 The proposed scheme of vibration isolation will also mitigate the transfer of vibration to the supporting and connecting structures and ensure that the airborne sound mitigation design is not compromised.

7.16 With respect to the NPPF, achieving the noise limits would be classified as being below the NOEL and a green rating in line with the requirements of Camden Council.

8 CONCLUSIONS

8.01 William Deakins Architect has appointed Environmental Equipment Corporation Limited to undertake a noise assessment for two proposed rooftop condensing units to serve a residential property at 23 Meadowbank, Primrose Hill.

8.02 The assessment has been carried out in accordance with national planning guidance and the requirements of the Camden Council and is based on an environmental noise survey conducted at the site over a mid-week period.

8.03 A noise assessment has been undertaken to evaluate the potential noise impact of the proposed condensers at the closest and most affected existing residential receptors.

8.04 Plant noise limits have been set based on the methodology contained in BS4142 and World Health Organisation guidance, the results of a background noise survey and the requirements of Camden Council, to control the noise from the proposed condenser units. Based on our review of the relevant guidance, noise limits during the daytime and evening have been set 10 dB below the measured background noise levels and has been set at 30 dB(A) during the night-time.

8.05 Predictions have shown that the noise criterion is met at all assessment locations during all periods of the condenser's proposed operation, assuming, they are installed within high-performance acoustic enclosures that meet with the minimum noise reduction specified in Table 7.2.

8.06 Assessing the site in accordance with the principles of the National Planning Policy Framework has shown that predicted noise levels would be below the level at which no effects are observed to occur, the NOEL.

8.07 On the basis of this assessment, it is considered that noise does not pose a material constraint to the operation of the condenser units.

APPENDIX A

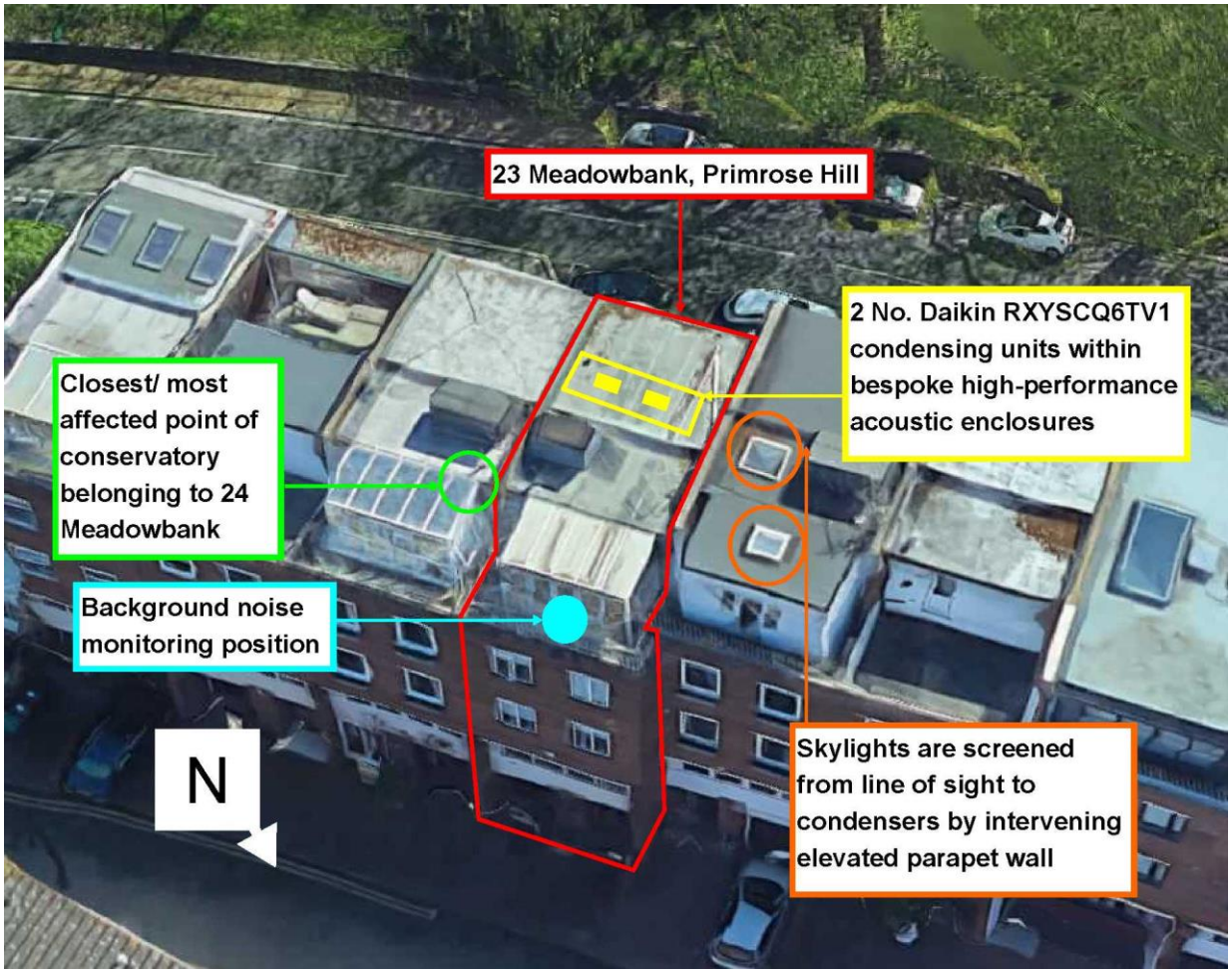
GLOSSARY OF TECHNICAL TERMS

ACOUSTIC TERMINOLOGY

Absorption Classes	The sound absorption of a material is rated from Class A to Class E, where Class A materials provide the highest level of sound absorption.
Ambient Noise Levels	Noise levels measured in the absence of noise requiring control, frequently measured to determine the situation prior to the additional of a new noise source.
dB	Decibel. The logarithmic unit of sound level.
dBA	A-weighted decibel. The A-weighting approximates the response of the human ear.
$D_{nT,w}$	Weighted standardized level difference. A single number quantity of the sound level difference between two rooms. $D_{nT,w}$ is typically used to measure the on-site sound insulation performance of a building element such as a wall, floor or ceiling. Measured in accordance with BS EN ISO 16283-1 and weighted in accordance with BS EN ISO 717-1.
$D_{n,e,w}$	The weighted element-normalized level difference. A single number rating of the sound reduction provided by a sound passing through an individual element. $D_{n,e,w}$ is typically used to define the sound insulation provided by ventilators. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4kHz, roughly equal to the range of frequencies on a piano.
Impact Sound	Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.
$L_{Aeq,t}$	The equivalent continuous sound level measured in dBA. This is commonly referred to as the average noise level. 't' is the interval time for the measurement. Typically 't' of 16hrs and 8hrs is used for day and night time ambient noise respectively or 't' is defined by the period of interest in BS4142 assessments.
$L_{A90,t}$	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
$L'_{nT,w}$	Weighted, standardized impact sound pressure level. A single number rating of the impact sound insulation of a floor/ceiling when impacted on by a standard "tapper" machine. The lower the $L'_{nT,w}$, the better the acoustic performance. Measured in accordance with BBS EN ISO 140-7 and rated in accordance with BS EN ISO 717-2.
NR	Noise Rating. A single number rating which is based on the sound level in the octave bands 31.5Hz – 8kHz inclusive, generally used to assess noise from mechanical services in buildings.
Octave Band	Frequencies are often grouped together into octaves for analysis. Octave bands are labelled by their centre frequency which are: 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.
Reverberation Time (T_{mf})	Reverberation time is used for assessing the acoustic qualities of a space. It is defined as the time it takes for an impulse to decay by 60dB. T_{mf} is the arithmetic average of the reverberation time in the mid frequency bands (500Hz, 1kHz and 2kHz).
R_w	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory. R_w is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Sound Absorption	When sound hits a surface, some of the sound energy is absorbed by the surface material. Sound absorption refers to the ability of a material to absorb sound, rated from 0, complete reflection, to 1, complete absorption.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to the ability of a material to prevent the travel of sound.
Structure-borne transmission	Transmission of sound energy as vibrations via the structure of a building.

APPENDIX B

SITE PLAN
&
MEASUREMENT LOCATION



APPENDIX C

PLANNING POLICY AND GUIDANCE

PLANNING POLICY AND GUIDANCE

Planning Policy Camden Borough Council

London Borough of Camden's planning policy is set out in a range of documents that constitute its 'development plan'. This includes its Local Plan and Camden Planning Guidance (CPG) documents. The Local Plan was adopted on 3 July 2017 and has replaced the 'Core Strategy' and 'Camden Development Policy' documents; as the basis for planning decisions and future development in the borough. The CPG for amenity spaces has been adopted January 2021.

Policy A4 – *Noise and Vibration* outlines the following aims:

> *The Council will seek to ensure that noise and vibration is controlled and managed.*
>
> *Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:*
>
> *a. development likely to generate unacceptable noise and vibration impacts; or*
> *b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*
>
> *We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.*

Appendix 3 of the Local Plan outlines noise thresholds for both noise generating and noise sensitive developments and identifies three basic design criteria upon which the acceptability of any proposal is likely to be assessed:

- Green – where noise is considered to be at an acceptable level.
- Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- Red – where noise is observed to have a significant adverse effect.

In the context of National Planning Policy Framework and Noise Policy Statement for England, Camden Council consider the above criteria to fall into three associated categories in terms of their noise 'effects':

- LOAEL Green
- LOAEL to SOAEL Amber
- SOAEL Red

Table C of Appendix 3 defines the target noise levels for mechanical services plant and machinery:

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

National Planning Policy Framework and the Noise Policy Statement for England

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 (as amended on 20th July 2021) and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government's overarching planning policy on noise.

Paragraph 174 in Section 15 of the NPPF (2021), entitled Conserving and enhancing the natural environment, states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *e) 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…"*

Paragraph 185 in Section 15 also states that:

> "*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 impacts 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…"*

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

> *"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.*
>
> *LOAEL – Lowest Observed Adverse Effect Level*
>
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> *2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*
>
> *SOAEL – Significant Observed Adverse Effect Level*
>
> *This is the level above which significant adverse effects on health and quality of life occur."*

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

> *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:*
>
> *avoid significant adverse impacts on health and quality of life;*
>
> *mitigate and minimise adverse impacts on health and quality of life; and*
>
> *where possible, contribute to the improvement of health and quality of life."*

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

> *2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development (paragraph 1.8).*
>
> *2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It 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 (paragraph 1.8). This does not mean that such adverse effects cannot occur.*
>
> *2.25 This aim* (the third aim)*, 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 (paragraph 1.8), 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."*

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

British Standard 4142

To assess the acceptability of the resultant noise levels we have consulted the relevant standards. BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' has been used to assess the likelihood any adverse impacts based on the resultant noise level from the new plant item, including any corrections for the character of the noise against the existing background noise level.

BS4142 gives guidance on assessing the likelihood of adverse impacts by calculating a 'rating level' of the new noise source and comparing its magnitude at noise sensitive locations to the existing or underlying background noise level. The background noise level is subtracted from the 'rating level' to assess the likelihood of complaints:

- The greater the difference the greater the likelihood of complaints.
- A difference of around +10dB or more is an indication of a significant adverse impact, depending on the context.

- A difference of +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 noise level, the less likely it is that the specific sound source will have an adverse impact or 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 low sound impact, depending on the context.

This assessment is carried out over a one-hour period for the daytime and a fifteen-minute period for the night-time. For the purposes of the standard it states that daytime and night-time are typically 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

The 'rating level' of the noise source is obtained taking the following factors into consideration:

- The new plant noise (the specific noise) is measured or predicted in terms of L_{Aeq}.
- An additional correction shall be included if the noise contains a distinguishable, discrete continuous note, if the noise contains distinct impulses or if the noise is irregular enough to attract attention. The value for any tonal noise can be an addition of up to 6dB and for impulsive noise of up to 9dB.

BS 4142 goes onto state that:

'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 effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.'

BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

APPENDIX D

SURVEY RESULTS
(TABULAR)

EC 19388 - 23 Meadowbank Primrose Hill

Williams Deakin Architect

Tabulated Noise data

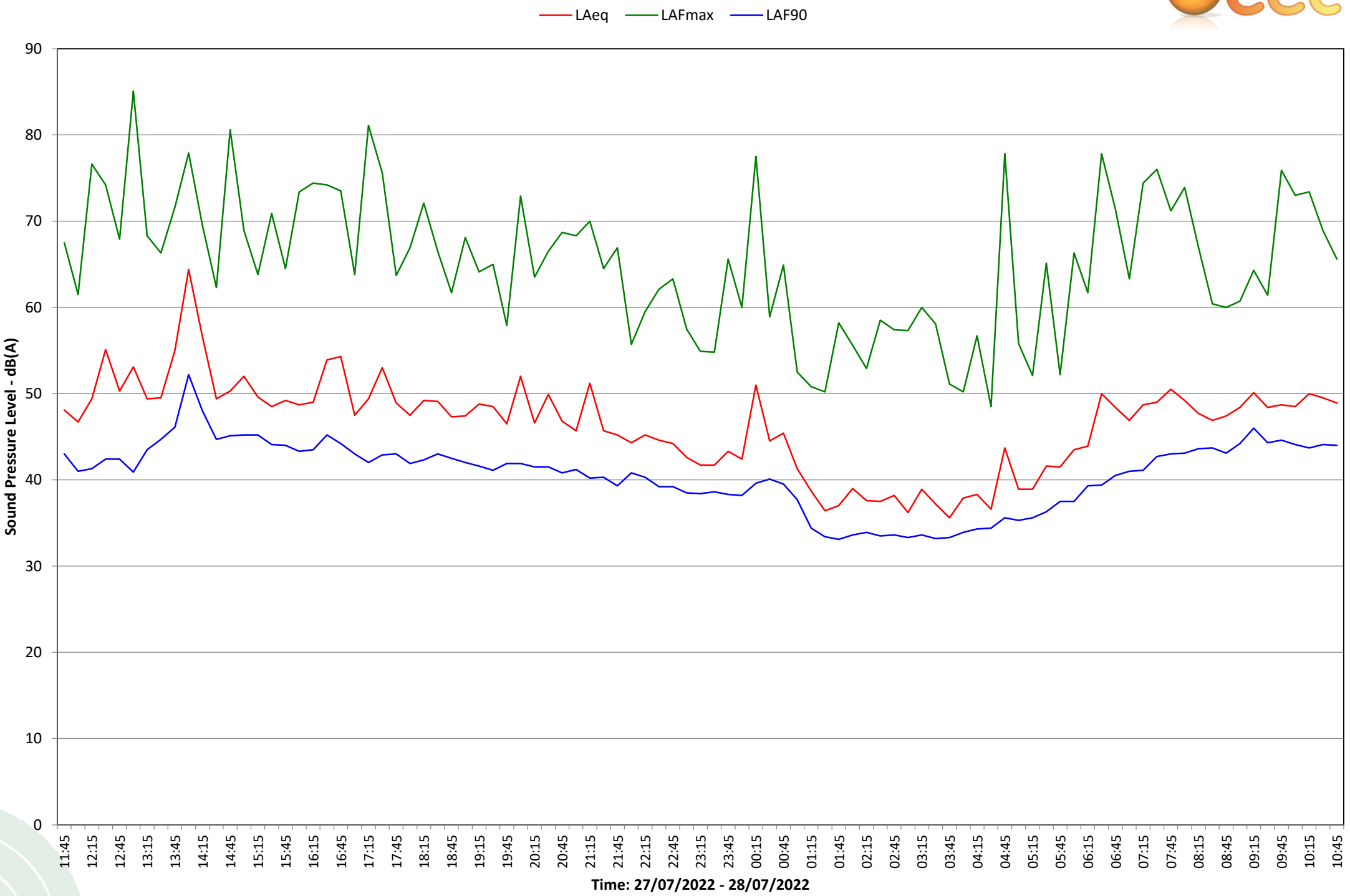
Time	L_{Aeq}	L_{AMax}	L_{A90}
11:45	48.1	67.5	43.0
12:00	46.7	61.5	41.0
12:15	49.4	76.6	41.3
12:30	55.1	74.2	42.4
12:45	50.3	67.9	42.4
13:00	53.1	85.1	40.9
13:15	49.4	68.3	43.5
13:30	49.5	66.3	44.7
13:45	55.0	71.6	46.1
14:00	64.4	77.9	52.2
14:15	56.6	69.5	48.0
14:30	49.4	62.3	44.7
14:45	50.3	80.6	45.1
15:00	52.0	68.9	45.2
15:15	49.6	63.8	45.2
15:30	48.5	70.9	44.1
15:45	49.2	64.5	44.0
16:00	48.7	73.4	43.3
16:15	49.0	74.4	43.5
16:30	53.9	74.2	45.2
16:45	54.3	73.5	44.2
17:00	47.5	63.8	43.0
17:15	49.4	81.1	42.0
17:30	53.0	75.6	42.9
17:45	48.9	63.7	43.0
18:00	47.5	66.9	41.9
18:15	49.2	72.1	42.3
18:30	49.1	66.5	43.0
18:45	47.3	61.7	42.5
19:00	47.4	68.1	42.0
19:15	48.8	64.1	41.6
19:30	48.5	65.0	41.1
19:45	46.5	57.9	41.9
20:00	52.0	72.9	41.9
20:15	46.6	63.5	41.5
20:30	49.9	66.5	41.5
20:45	46.8	68.7	40.8
21:00	45.7	68.3	41.2
21:15	51.2	70.0	40.2
21:30	45.7	64.5	40.3
21:45	45.2	66.9	39.3
22:00	44.3	55.7	40.8
22:15	45.2	59.5	40.3
22:30	44.6	62.1	39.2
22:45	44.2	63.3	39.2
23:00	42.6	57.5	38.5
23:15	41.7	54.9	38.4
23:30	41.7	54.8	38.6

Time	L_{Aeq}	L_{AMax}	L_{A90}
23:45	43.3	65.6	38.3
00:00	42.4	60.0	38.2
00:15	51.0	77.5	39.6
00:30	44.5	58.9	40.1
00:45	45.4	64.9	39.5
01:00	41.3	52.5	37.7
01:15	38.7	50.8	34.4
01:30	36.4	50.2	33.4
01:45	37.0	58.2	33.1
02:00	39.0	55.6	33.6
02:15	37.6	52.9	33.9
02:30	37.5	58.5	33.5
02:45	38.2	57.4	33.6
03:00	36.2	57.3	33.3
03:15	38.9	60.0	33.6
03:30	37.2	58.1	33.2
03:45	35.6	51.1	33.3
04:00	37.9	50.2	33.9
04:15	38.3	56.7	34.3
04:30	36.6	48.5	34.4
04:45	43.7	77.8	35.6
05:00	38.9	55.8	35.3
05:15	38.9	52.1	35.6
05:30	41.6	65.1	36.3
05:45	41.5	52.2	37.5
06:00	43.5	66.3	37.5
06:15	43.9	61.7	39.3
06:30	50.0	77.8	39.4
06:45	48.4	71.4	40.5
07:00	46.9	63.3	41.0
07:15	48.7	74.4	41.1
07:30	49.0	76.0	42.7
07:45	50.5	71.2	43.0
08:00	49.2	73.9	43.1
08:15	47.7	67.0	43.6
08:30	46.9	60.4	43.7
08:45	47.4	60.0	43.1
09:00	48.4	60.7	44.2
09:15	50.1	64.3	46.0
09:30	48.4	61.4	44.3
09:45	48.7	75.9	44.6
10:00	48.5	73.0	44.1
10:15	50.0	73.4	43.7
10:30	49.5	68.9	44.1
10:45	48.9	65.6	44.0

APPENDIX E

SURVEY RESULTS
(GRAPHICAL)

Noise Level Time History at 23 Meadowbank Primrose Hill



APPENDIX F

PUBLISHED PLANT NOISE DATA

2 Specifications

1 - 1 RXYSCQ-TV1

Technical Specifications					RXYSCQ4TV1	RXYSCQ5TV1	RXYSCQ6TV1
Compressor	Quantity				1		
	Type				Hermetically sealed swing compressor		
	Crankcase heater			W	33		
Operation range	Cooling	Min.		°CDB	-5.0		
		Max.		°CDB	46.0		
	Heating	Min.		°CWB	-20.0		
		Max.		°CWB	15.5		
Sound power level	Cooling	Nom.		dBA	68.0 (4)	69.0 (4)	70.0 (4)
Sound pressure level	Cooling	Nom.		dBA	51.0 (5)	52.0 (5)	53.0 (5)
	Heating			dBA	53.0 (5)		54.0 (5)
Refrigerant	Type				R-410A		
	GWP				2,087.5		
	Charge			TCO2Eq	7.7		
	Charge			kg	3.7		
Refrigerant oil	Type				Synthetic (ether) oil FVC50K		
Piping connections	Liquid	Type			Flare connection		
		OD		mm	9.52		
	Gas	Type			Flare connection		
		OD		mm	15.9		19.1
	Total piping length	System	Actual	m	300 (6)		
Defrost method					Reversed cycle		
Capacity control	Method				Inverter controlled		
Indication if the heater is equipped with a supplementary heater					no		
Supplementary heater	Back-up capacity	Heating	elbu	kW	0.0		
Power consumption in other than active mode	Crankcase heater mode	Cooling	PCK	kW	0.000		
		Heating	PCK	kW	0.049		
	Off mode	Cooling	POFF	kW	0.039		
		Heating	POFF	kW	0.049		
	Standby mode	Cooling	PSB	kW	0.039		
		Heating	PSB	kW	0.049		
	Thermostat-off mode	Cooling	PTO	kW	0.000		
		Heating	PTO	kW	0.049		
Cooling	Cdc (Degradation cooling)				0.25		
Heating	Cdh (Degradation heating)				0.25		
Safety devices	Item	01			High pressure switch		
		02			Fan driver overload protector		
		03			Inverter overload protector		
		04			PC board fuse		

Standard accessories: Installation manual; Quantity: 1;

Standard accessories: Operation manual; Quantity: 1;

Standard accessories: Connection pipes; Quantity: 1;

Electrical Specifications				RXYSCQ4TV1	RXYSCQ5TV1	RXYSCQ6TV1
Power supply	Name			V1		
	Phase			1~		
	Frequency		Hz	50		
	Voltage		V	220-240		
Power supply intake				Both indoor and outdoor unit		
Voltage range	Min.		%	-10		
	Max.		%	10		
Current	Nominal running current (RLA)	Cooling	A	19.0 (7)		23.2 (7)
Current - 50Hz	Starting current (MSC) - remark			See note 11		
	Zmax	List		No requirements		
	Minimum Ssc value	Remark		Equipment complies with EN/IEC 61000-3-12		
	Minimum circuit amps (MCA)		A	29.1 (8)		
	Maximum fuse amps (MFA)		A	32 (9)		
	Total overcurrent amps (TOCA)		A	29.1 (10)		
	Full load amps (FLA)	Total	A	0.6 (11)		
Wiring connections - 50Hz	For power supply	Quantity		3G		
	For connection with indoor	Quantity		2		
		Remark		F1,F2		

(1)Cooling: indoor temp. 27°CDB, 19°CWB; outdoor temp. 35°CDB; equivalent piping length: 7.5m; level difference: 0m |
(2)Heating: indoor temp. 20°CDB; outdoor temp. 7°CDB, 6°CWB; equivalent refrigerant piping: 7.5m; level difference: 0m |
(3)Actual number of units depends on the indoor unit type (VRV DX indoor, RA DX indoor, etc.) and the connection ratio restriction for the system (being; 50% ≤ CR ≤130%). |
(4)Sound power level is an absolute value that a sound source generates. |
(5)Sound pressure level is a relative value, depending on the distance and acoustic environment. For more details, please refer to the sound level drawings. |