29 PROWSE PLACE, LONDON, NW1 9PN

BS4142 PLANT NOISE ASSESSMENT

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ARAN ACOUSTICS

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1.0 INTRODUCTION

Aran Acoustics in collaboration with Airtight Building Solutions have been appointed to carry out a noise impact assessment for the retention of 2 no. condenser units at 29 Prowse Place, London.

A noise survey and assessment has been requested to ensure that noise levels from the plant does not cause undue disturbance to nearby noise sensitive locations.

The purpose of this assessment is to determine the existing noise levels at the nearest noise sensitive location and establish the maximum permissible noise levels from the plant.

Such to establish suitable plant noise levels an assessment has been carried out to BS 4142: 2014 '*Method for rating and assessing industrial and commercial sound*'. This assessment has been benchmarked against an environmental noise survey carried out on 18 August 2022.

This report therefore describes the noise survey and its results. Figure 4.1 contains a graphical representation of the noise measurements taken on site. Section 5.0 provides the maximum permissible noise levels for the proposed plant. Section 6.0 provides an assessment of plant noise levels based on the proposed location.

2.0 SITE DESCRIPTION

The site is located at 29 Prowse Place, London. The site contains an existing 3-storey building for residential use. Proposals include the installation of 2 no. air condenser units associated with the air conditioning system within the first and second floor flat as shown on the site plan within Appendix A.

The nearest noise sensitive receptors to the location of the condenser units are the rear windows of the adjacent residential dwellings on Prowse Place.

A subjective assessment on site determined that the predominant noise sources in the area to impact nearby noise sensitive receptors is background noise from road traffic on surrounding roads.

Figure 2.1 below shows a location map and aerial photo of the site and surrounding area.

Table 2.1 – Location map and aerial photo of the site

3.0 ENVIRONMENTAL NOISE SURVEY

An environmental noise survey was carried out at the site between Thursday 18 and Friday 19 August 2022. The survey incorporated both day and night time measurements.

A single noise monitor was placed on to the rear elevation of the property at first floor level. The microphone was located approximately 2m distance from the nearest noise sensitive window. An existing condenser unit was located on the side wall next to the microphone however was switched off for the duration of the survey.

Noise levels measured at the microphone location are considered representative of the minimum environmental noise levels to impact nearby noise sensitive receptors.

A site plan showing the microphone location is provided in Appendix A. Site photos of the microphone position are provided in Appendix B.

3.1 Measurement Equipment

The following measurement equipment was used, which complies with the performance specifications for a Class 1 device in accordance with BS EN 61672-1, BS EN 61260 and BS EN 60942.

Name	Serial Number	Last Calibrated	Calibration Due
Norsonic Precision Sound Analyser Type 140	1404768	Oct 2020	Oct 2022
Norsonic Type 1209 Pre-amplifier	31313	Oct 2020	Oct 2022
Norsonic Type 1225 Microphone	157320	Oct 2020	Oct 2022
Rion Type NC-74 Acoustic Calibrator	35168026	Feb 2022	Feb 2023

Table 3.1 – Measurement equipment used on site

The meter was calibrated before and after testing - no deviations were found. The meter was set to measure consecutive 'A' weighted 15-minute samples.

3.2 Weather Conditions

The weather was mainly fine and dry for the duration of the survey. Wind speed remained below 5 m/s. The temperature was approximately 21 - 27 ^{o}C.

The weather conditions were seen as suitable for environmental noise surveying in accordance with BS 7445-1:2003 '*Description and measurement of environmental noise*'.

4.0 SURVEY RESULTS

The noise levels measured during the survey period are shown in Figure 4.1 below. The full set of acoustic data measured on site is available upon request.

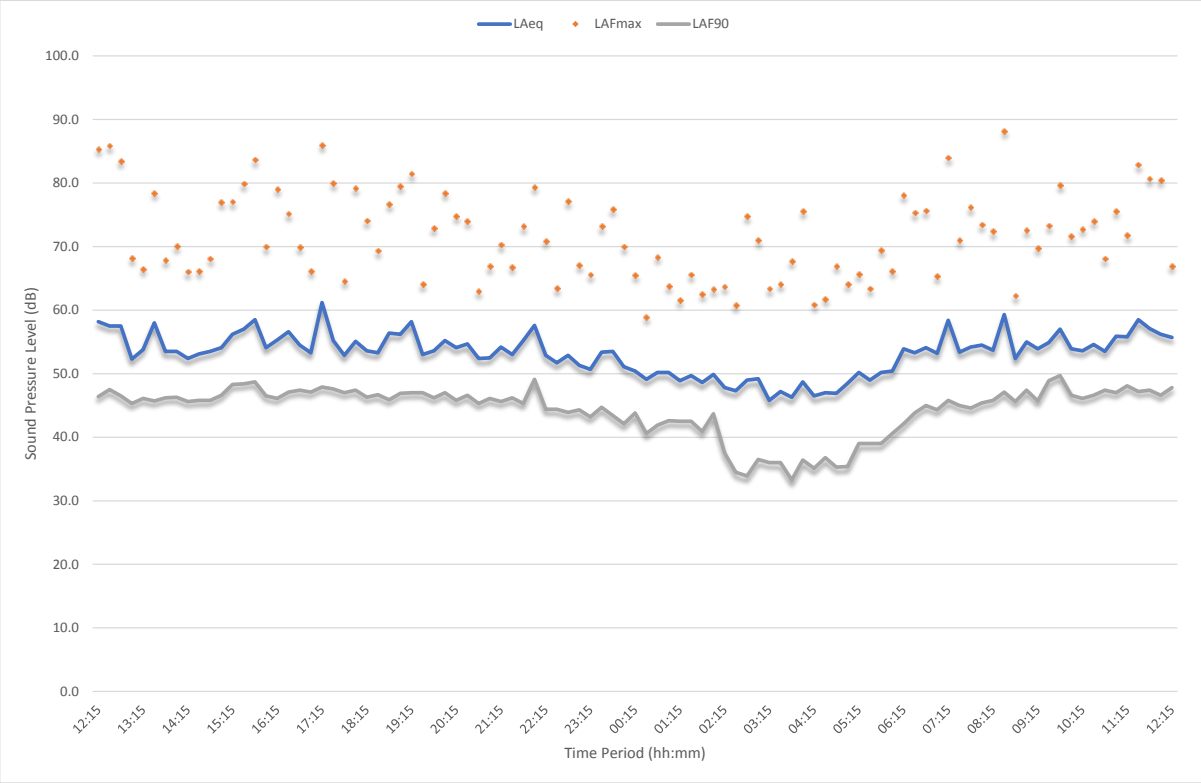


Figure 4.1 – Measured noise levels

The following table provides a summary of the noise levels measured on site at the fixed microphone position during the survey period including the equivalent continuous A-weighted sound pressure level; $L_{Aeq,T}$ and representative background noise level; $L_{A90,T}$.

Time Period	Average Noise Level L_{Aeq}, dB	Representative Background L_{A90}, dB
Day (07:00 – 23:00 hours)	56	47
Night (23:00 – 07:00 hours)	50	39

Table 4.1 - Summary of measured noise levels

5.0 ASSESSMENT CRITERIA

Section 4.0 above provides a summary of measured noise levels on site. The following section provides a summary of guidance documentation relevant to this development.

5.1 British Standard 4142

BS 4142:2014 describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

The likelihood of complaints in response to a specific noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level. BS 4142 states that:

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) 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 low impact, depending on the context.

This standard also allows for an appropriate correction for the acoustic features present in the noise using a number of methods. A correction should be applied if one or more of the following features (see the list below), are present within the noise sources in question.

- The noise is of a tonal nature, i.e. it contains a distinguishable, discreet, continuous note such as whine, hiss, screech, hum;
- The noise is impulsive, i.e. it contains distinct impulses such as bangs, clicks, clatters, or thumps;
- The noise contains other characteristics that are neither tonal nor impulsive but is irregular enough to attract attention.

It can be concluded from BS4142 guidance document that noise levels from plant and equipment associated with the development should not generally exceed the background noise level when measured at the nearest noise sensitive location. This is a positive indication of low noise impact.

5.2 Target Plant Noise Levels

It is understood that the condenser units operate over a 24-hour period and mainly in period of warm weather. Based on the proposed hours of operation, Aran Acoustics suggest a design target of -10 dB below the existing background noise levels. This is seen as a suitable design target where noise impact would be 'low' in accordance with BS 4142 and complaints from nearby noise sensitive receptors deemed unlikely.

Based on manufacturers noise level data, it is considered that the condenser units produce a broadband noise with no tonal features. The units are also inverter driven, meaning that it will gradually increase or decrease operating capacity depending on the level of duty required. This gives a positive indication that the noise produced is not immediate or distinguishable therefore no acoustic feature correction need be applied.

Based on the lowest background noise level during the proposed operating period and the suggested design targets including any tolerance or correction factors, the following table shows the maximum permissible noise level from the extract fan when measured at the window of the nearby noise sensitive receptors.

Lowest Background, L_{A90}	Tolerance Factor	Correction Factor	Max Noise Level at Residential
39 dBA	-0 dB	-10 dB	**29 dBA**

Table 5.1 - Plant Noise Level Target

6.0 PLANT NOISE LEVEL ASSESSMENT

Proposals are to install retain 2 no. Mitsubishi condenser units located on the second floor flat roof area towards the rear of the property as indicated on the site drawings within Appendix A.

The nearest noise sensitive receptors to the location of the units are the rear top floor windows of the adjoining residential dwelling on Prowse Place along with the rear top floor windows of the residential block on Camden Road. Based on the proposed location of the units, there is no direct line of sight to the adjacent residential windows.

At distance, the units of plant are considered a point source and noise levels will decay at a rate of 6dB per doubling of distance. Distance attenuation can be added to the attenuation provided by any barriers to give the overall attenuation.

The following table provides the calculated noise levels from the condenser units at the windows of nearby residential receptors.

	Octave Band Centre Frequency, dB							
Receptor Location	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1.0 K Hz**	**2.0 K Hz**	**4.0 K Hz**	**dBA**
27 Prowse Place	33.7	26.1	19.9	14.2	9.7	-0.3	-3.2	**17**
31 Prowse Place	39.2	32.4	26.7	21.2	16.9	7.0	4.2	**24**
172 Camden Street	30.1	26.5	25.6	22.8	21.3	14.3	14.4	**26**

Table 6.1 – Calculated Plant Noise Levels

Calculations show that the noise levels from the condenser units in operation does not exceed the target plant noise level of **29 dBA** at any nearby noise sensitive receptor which is a positive indication of low noise impact in accordance with BS 4142.

It is further noted that where the background sound levels and rating levels are low, the absolute sound level, the character of the sound, the sensitivity of the receptor and the existing acoustic environment should be considered when assessing the noise impact.

It is generally accepted that a partially open window provides 10 – 15 dB attenuation from external noise sources as per WHO Guidelines amongst other published literature. Allowing a minimum of 10 dB attenuation for an open window would result in an absolute internal noise level of 16 dB within worst case bedrooms at night. This is -14 dB below the recommended indoor ambient noise level in bedrooms at night in accordance with the guidance provided in BS8233:2014 and the WHO Guidelines for Community Noise (1999).

Plant noise calculation sheets are provided in Appendix C. Manufacturers noise level data sheets are provided in Appendix D.

7.0 SUMMARY AND CONCLUSION

A noise survey was carried out for the proposed location of 2 no. air condenser units to be installed at 27 Prowse Place, London on 18 August 2022.

From this survey the minimum representative background noise level at the nearest sensitive property was found to be 39 dB L_{A90}.

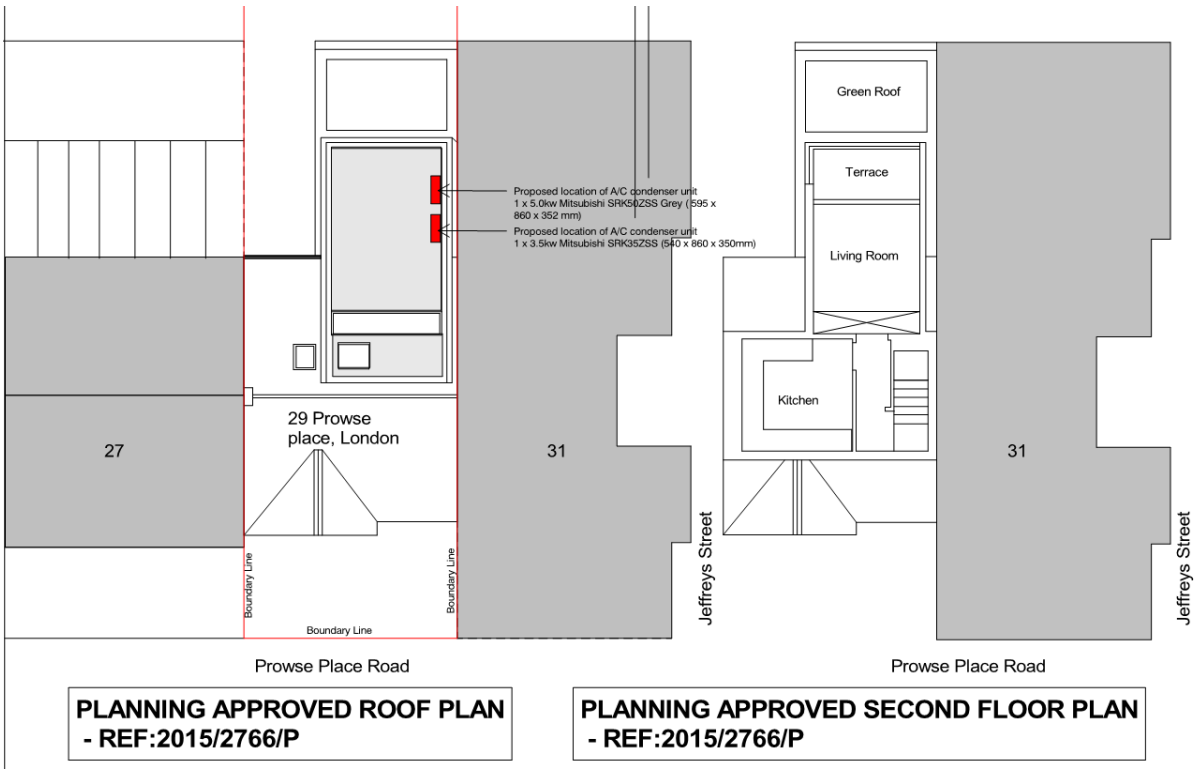
Based on the typical hours of operation and using guidance in BS 4142, the noise level from the condenser units should not generally exceed -10 dB below the background noise level at the window of the nearby noise sensitive receptors.

Based on manufacturer's noise level data for the proposed units, calculations show that plant noise levels at nearby noise sensitive receptors would be a worst case 26 dBA. This does not exceed the maximum permissible noise level target of 29 dBA at any noise sensitive receptor which is a positive indication of low noise impact in accordance with BS 4142 where complaints are deemed unlikely.

APPENDIX A – SITE PLAN

PLANNING APPROVED FIRST FLOOR PLAN - REF:2015/2766/P

PLANNING APPROVED GROUND FLOOR PLAN - REF:2015/2766/P



PLANNING APPROVED ROOF PLAN - REF:2015/2766/P

PLANNING APPROVED SECOND FLOOR PLAN - REF:2015/2766/P

APPENDIX B – SITE PHOTOS

APPENDIX C – PLANT NOISE CALCULATION SHEETS

27 Prowse Place	QTY	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	dBA
Mitsubishi SRC50ZS-W (Lp)	1	58	56	52	48	46	40	42	**51**
Mitsubishi SRC35ZS-W (Lp)	1	60	51	49	48	47	39	34	**50**
Combined SPL (Lp)	-	62.1	57.2	53.8	51.0	49.5	42.5	42.6	**54**
Reflection Factor (Q)	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Barrier Attenuation		-13.0	-15.6	-18.4	-21.4	-24.3	-27.3	-30.3	
Directivity Correction	-3	-3	-3	-3	-3	-3	-3	-3	
Distance Attenuation	4.2	-12.5	-12.5	-12.5	-12.5	-12.5	-12.5	-12.5	
SPL at Receiver (Lp)		33.7	26.1	19.9	14.2	9.7	-0.3	-3.2	**17**

29 Prowse Place	QTY	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	dBA
Mitsubishi SRC50ZS-W (Lp)	1	58	56	52	48	46	40	42	**51**
Mitsubishi SRC35ZS-W (Lp)	1	60	51	49	48	47	39	34	**50**
Combined SPL (Lp)	-	62.1	57.2	53.8	51.0	49.5	42.5	42.6	**54**
Reflection Factor (Q)	2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Barrier Attenuation		-8.4	-10.3	-12.6	-15.3	-18.1	-21.0	-24.0	
Directivity Correction	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	
Distance Attenuation	6.3	-16.0	-16.0	-16.0	-16.0	-16.0	-16.0	-16.0	
SPL at Receiver (Lp)		39.2	32.4	26.7	21.2	16.9	7.0	4.2	**24**

172 Camden St	QTY	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	dBA
Mitsubishi SRC50ZS-W (Lp)	1	58	56	52	48	46	40	42	**51**
Mitsubishi SRC35ZS-W (Lp)	1	60	51	49	48	47	39	34	**50**
Combined SPL (Lp)	-	62.1	57.2	53.8	51.0	49.5	42.5	42.6	**54**
Reflection Factor (Q)	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Barrier Attenuation		-3.8	-2.4	0.0	0.0	0.0	0.0	0.0	
Directivity Correction	-3	-3	-3	-3	-3	-3	-3	-3	
Distance Attenuation	18.3	-25.2	-25.2	-25.2	-25.2	-25.2	-25.2	-25.2	
SPL at Receiver (Lp)		30.1	26.5	25.6	22.8	21.3	14.3	14.4	**26**

APPENDIX D – TECHNICAL DATA SHEETS

MITSUBISHI HEAVY INDUSTRIES AIR CONDITIONING EUROPE

SRK35ZSP-W / SRC35ZSP-W

3.2(0.9~3.7)

Indoor Unit : SRK35ZSP-W

Outdoor Unit : SRC35ZSP-W

Specifications

R32

Indoor unit				SRK35ZSP-W
Outdoor unit				SRC35ZSP-W
Power source				1 Phase, 220 - 240V, 50Hz
Nominal cooling capacity (Min~Max)			kW	3.2(0.9~3.7)
Nominal heating capacity (Min~Max)			kW	3.6(1.0~4.6)
Power consumption		Cooling/Heating	kW	0.910 / 0.930
EER/COP		Cooling/Heating		3.52 / 3.87
Max. running current			A	9
Sound power level	Indoor	Cooling/Heating	dB(A)	58 / 58
	Outdoor	Cooling/Heating		59 / 60
Sound pressure level	Indoor	Cooling (Hi/Me/Lo/Ulo)		45 / 36 / 23
		Heating (Hi/Me/Lo/Ulo)		44 / 36 / 28
	Outdoor	Cooling/Heating		48 / 48
Air flow	Indoor	Cooling (Hi/Me/Lo/Ulo)	m3/min	9.5 / 6.8 / 4.2
		Heating (Hi/Me/Lo/Ulo)		9.6 / 7.4 / 5.5
	Outdoor	Cooling/Heating		22.8 / 22.0
Exterior Dimensions	Indoor	Height x Width x Depth	mm	267 x 783 x 210
	Outdoor			540 x 645(+57) x 275
Net weight	Indoor / Outdoor		kg	7.0 / 28.5
Refrigerant		Type/GWP		R32 / 675
Refrigerant		Charge	kg/TCO2Eq	0.68 / 0.459
Refrigerant piping size		Liquid/Gas	ø mm	6.35(1/4") / 9.52(3/8")
Refrigerant line (one way) length			m	Max. 15
Vertical height differences		Outdoor is higher/lower	m	Max. 10 / Max. 10
Outdoor operating temperature range		Cooling	°C	-15~46
		Heating		-15~24
Clean filter				-
Energy Class (Cooling/Heating)				A++/A+
SEER				7.30
SCOP (Average climate)				4.40
Pdesign (cooling/heating(@-10°C))			kW	3.20/3.00
Annual Electricity Consumption (cooling/heating)			kWh/a	155/955
Designated Heating Season				Average

• The data is measured under the following conditions(ISO-T1, H1). Cooling: Indoor temp. of 27°CDB, 19°CWB, and outdoor temp. of 35°CDB. Heating: Indoor temp. of 20°CDB, and outdoor temp. of 7°CDB, 6°CWB.
• Sound level indicates the value in an anechoic chamber. During operation these values are somewhat higher due to ambient conditions.
• 'tonne(s) of CO2 equivalent' means a quantity of greenhouse gases- expressed as the product of the weight of the greenhouse gases in metric tonnes and of their global warming potential.
*SEER/SCOP are based on EN14825:2016 and Commission regulation (EU) No.2016/2281

MITSUBISHI HEAVY INDUSTRIES
AIR CONDITIONING EUROPE

SRK50ZSP-W / SRC50ZSP-W

5.0 (1.3~5.2)

Indoor Unit : SRK50ZSP-W

Outdoor Unit : SRC50ZSP-W

R32

Specifications

Indoor unit				SRK50ZSP-W
Outdoor unit				SRC50ZSP-W
Power source				1 Phase, 220 - 240V, 50Hz
Nominal cooling capacity (Min~Max)			kW	5.0 (1.3~5.2)
Nominal heating capacity (Min~Max)			kW	5.6 (1.2~5.8)
Power consumption		Cooling/Heating	kW	1.740 / 1.660
EER/COP		Cooling/Heating		2.87 / 3.37
Max. running current			A	14.5
Sound power level	Indoor	Cooling/Heating	dB(A)	59 / 63
	Outdoor	Cooling/Heating		65 / 66
Sound pressure level	Indoor	Cooling (Hi/Me/Lo/Ulo)		46 / 39 / 24 / -
		Heating (Hi/Me/Lo/Ulo)		48 / 41 / 30 / -
	Outdoor	Cooling/Heating		52 / 52
Air flow	Indoor	Cooling (Hi/Me/Lo/Ulo)	m3/min	9.9 / 7.2 / 3.8 / -
		Heating (Hi/Me/Lo/Ulo)		12.0 / 9.2 / 6.2 / -
	Outdoor	Cooling/Heating		37.7 / 35.6
Exterior Dimensions	Indoor	Height x Width x Depth	mm	267 x 783 x 210
	Outdoor			595 x 780(+62) x 290
Net weight	Indoor / Outdoor		kg	7.5 / 36.0
Refrigerant		Type/GWP		R32 / 675
Refrigerant		Charge	kg/TCO2Eq	1.10 / 0.743
Refrigerant piping size		Liquid/Gas	ø mm	6.35 (1/4") / 12.7 (1/2")
Refrigerant line (one way) length			m	Max. 25
Vertical height differences		Outdoor is higher/lower	m	Max. 15 / Max. 15
Outdoor operating temperature range		Cooling	°C	15~46
		Heating		-15~24
Clean filter				-
Energy Class (Cooling/Heating)				A++/A+
SEER				6.20
SCOP (Average climate)				4.20

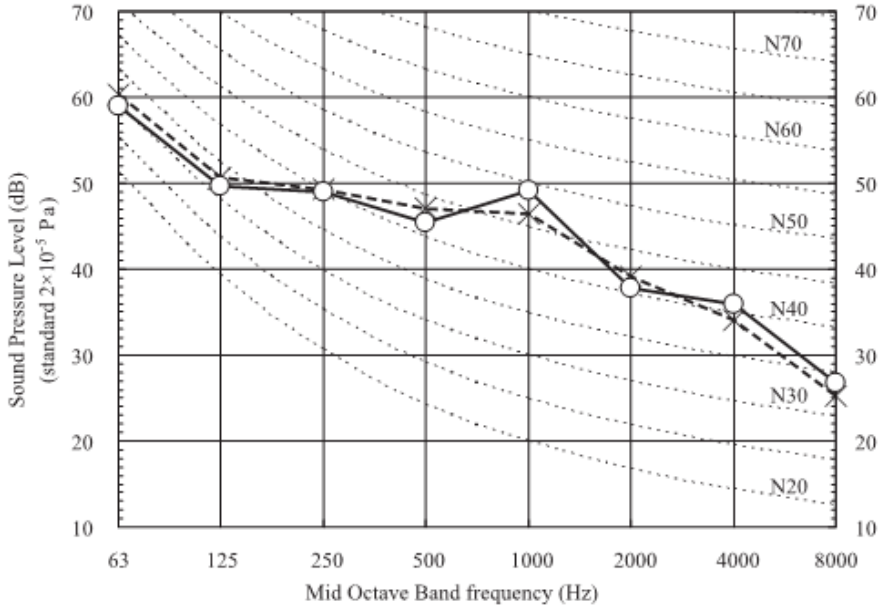
• The data is measured under the following conditions(ISO-T1, H1). Cooling: Indoor temp. of 27°CDB, 19°CWB, and outdoor temp. of 35°CDB. Heating: Indoor temp. of 20°CDB, and outdoor temp. of 7°CDB, 6°CWB.
• Sound level indicates the value in an anechoic chamber. During operation these values are somewhat higher due to ambient conditions.
• 'tonne(s) of CO2 equivalent' means a quantity of greenhouse gases- expressed as the product of the weight of the greenhouse gases in metric tonnes and of their global warming potential.
*SEER/SCOP are based on EN14825:2016 and Commission regulation (EU) No.2016/2281

(Outdoor Unit)

Model	SRC35ZM-S	
Noise Level	Cooling	50 dB(A)
	Heating	51 dB(A)

●Mike position: at highest noise level in position as mentioned below
Distance from front side 1m

× ····· Cooling ○ —— Heating



(Outdoor Unit)

Model	SRC50ZM-S	
Noise Level	Cooling	51 dB(A)
	Heating	53 dB(A)

●Mike position: at highest noise level in position as mentioned below
Distance from front side 1m

× ····· Cooling ○ —— Heating