71B Flask Walk, London, NW3 1ET

Background Noise Survey and Plant Impact Assessment

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1.0 Introduction

1.1 Holtz Acoustics has been commissioned to undertake a background noise survey and plant impact assessment for the proposed external air conditioning condenser at 71B Flask Walk, NW3 1ET

1.2 A background noise survey has been undertaken at a location representative of the noise environment at the most affected neighbouring residential windows.

1.3 A plant noise impact assessment has been undertaken in accordance with BS4142 as required by Camden Council.

1.4 The results of this background noise survey and plant noise assessment are presented in the following sections of this report together with supporting Appendices.

1.5 The author of this report, James Patterson, is a member of the Institute of Acoustics, the professional body for acoustic consultants in the UK and holds a Master's degree in Engineering Acoustics.

2.0 Site

2.1 71B Flask Walk is located near the corner of Flask Walk and Willow Road. The surrounding area comprises predominantly residential properties, New End Primary School is situated approximately 100m to the west of the property.

2.2 The local noise environment is primarily made up of distant road traffic noise and activity noise from the nearby primary school.

2.3 It is proposed that an air conditioning condenser unit is installed on the flat roof to the rear of the property in order to facilitate comfort cooling in the property.

2.4 The nearest identifiable noise sensitive windows to the proposed plant location are those rear windows of the neighbouring residential properties as indicated on the ariel view in Figure 1. There is also a window at high level set back from the rear of the property, it is understood that this building is commercial.

2.5 It is proposed that the condenser unit is housed in an acoustic enclosure in order to meet the Local Authority noise requirements and also to not adversely affect the use of the rear terrace of 71B Flask walk.

Figure 1. Aerial view of site (image from Bing Maps)

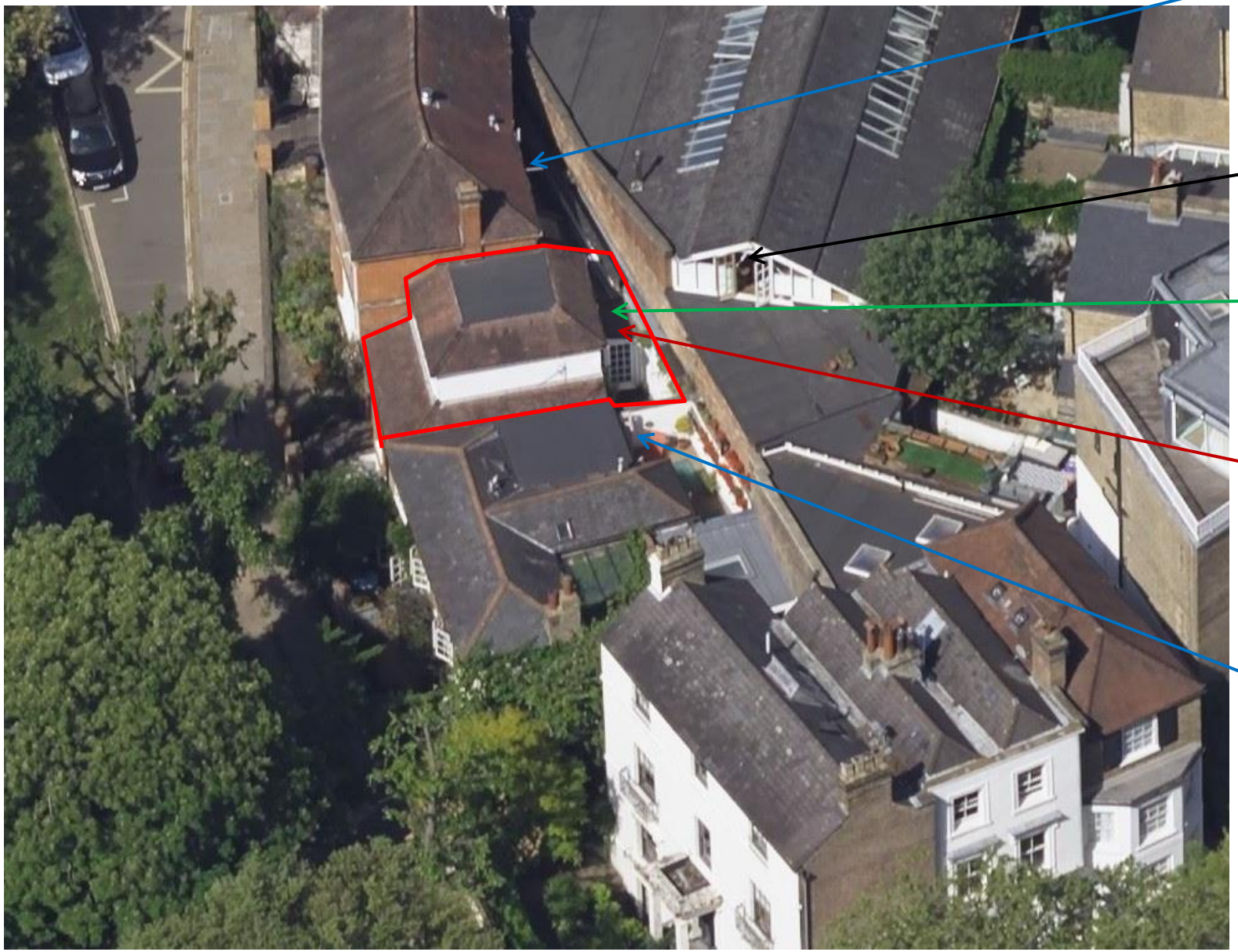


Figure 2. Site photograph

3.0 Assessment Criteria

3.1 National Planning Guidance

3.1.1 The National Planning Policy Framework (NPPF) states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development.

-Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions,

-Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land use since they were established.

-Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.1.2 The NPPF refers to an explanatory note, the Noise Policy Statement for England (NPSE). The NPSE sets out a Noise 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.

3.1.3 The NPSE states the long term vision is supported by the following aims.

-Avoid significant adverse impact 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.

3.1.4 The NPSE does not refer to specific noise criteria but sets out concept of a 'Significant Observed Adverse Effect Level' (SOAEL). This is the level above which significant adverse effects on health and quality of life occur.

3.1.5 The NPSE states 'It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptor and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provide the necessary policy flexibility until further evidence and suitable guidance is available.'

3.2 Camden Council Planning Guidance

3.2.1 Camden Council's list of Local Area Requirements July 2018 requires that in applications where any plant, ventilation, air extraction or conditioning equipment are proposed then an Acoustic Report is required to be submitted. The document states that the noise and vibration thresholds in Appendix 3 of the Camden Local Plan should be used as a starting point for acoustic reports.

3.2.2 Appendix 3 of the Camden Local Plan 2017 states that it is expected that British Standard 4142:2014' Methods for rating and assessing industrial and commercial sound' will be used.

3.2.3 The BS4142:2014+A1:2019 assessment methodology relies on comparing the existing background noise level at the existing receivers with the noise level produced by the new plant. Corrections are also used to account for the nature of the new noise source (tonality, impulsive etc.)

3.2.4 BS4142 assesses the impact of a new plant noise source on existing noise sensitive receivers by subtracting the measured background sound level from the rating 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 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.

3.2.5 The Camden Local Plan states that a 'Rating Level' 10dB below background (15dB if tonal components are present) should be considered as the design criterion.

3.2.6 It is unclear whether the text relates to the updated methodology included in the 2014 revision of BS4142. Given that the text refers only to 'background level' rather than 'representative level' and the old format 5dB tonal penalty is used it is assumed that the old methodology is to be used.

3.2.7 Therefore the plant should be designed to be 10dB below the lowest measured background noise level during the survey and 15dB below if the plant contains tonal elements.

3.2.6 The Local Plan does not give criteria for plant noise affecting commercial premises however having worked with Camden on similar projects before it is understood that an assessment demonstrating that the internal noise levels from BS8233:2014 are not exceeded would be acceptable.

4.0 Background Noise Survey

4.1 A background noise survey has been undertaken at a location representative of the noise environment at the most affected noise sensitive residential windows. The survey position is shown in Figure 1.

4.2 The survey was undertaken between 1148hrs Tuesday the 18th January 2022 and 1158hrs Wednesday the 19th of January 2022.

4.3 The local noise environment is primarily made up of distant road traffic noise and activity noise from the nearby primary school. There were no identifiable building works in the vicinity and no existing plant was operating during the survey.

4.4 The weather was calm and clear throughout with no precipitation overnight (see Appendix A for weather conditions recorded at a nearby weather station).

4.5 Information on the equipment used and the methodology for the survey is included in Appendix B.

4.6 A summary of the survey results is shown below in Table 1.

Table 1. Summary of survey results

Period	Lowest background noise level, $L_{A90,5min}$ (dB)
Daytime (0700-2300)	31
Night-time (2300-0700)	28

4.7 The lowest measure background noise level occurred at 0248 hrs on the 19th of January 2022.

4.8 It should be noted that the background noise levels were particular low on site due to the quiet nature of the neighbourhood and the secluded survey location at the rear of the property.

4.9 When applying Camden's required noise criteria, the cumulative level form plant noise should not exceed **21 dBA** in the day and **18dBA** at night (for non-tonal noise)

4.10 It should be noted that these criteria are extremely low and when allowing for losses across a partially open window would result in a noise levels near or below the threshold of human hearing.

4.11 A table of survey results is included in Appendix C.

4.12 A noise time history is included in Appendix D.

5.0 Plant Noise Impact Assessment

5.1 It is proposed that a single external condenser unit is installed on the flat roof at the rear of the property as shown in Figures 1 and 2.

5.2 The proposed condenser unit is a Daikin 3MXM68N9 horizontal discharge outdoor condenser unit. The manufacturer's published sound pressure level is 48 dBA at 1m. Technical data including octave band sound pressure levels are included in Appendix E.

5.3 It is required that the unit is installed in an acoustic enclosure in order to provide adequate attenuation to mee the Local Authority noise criteria.

5.4 Calculations shown in Table 2 demonstrate that the required attenuation can be met with the following enclosure design.

-Enclosure formed of 25mm thick steel sandwich panels.

-270mm deep single bank acoustic louvres to the inlet and discharge.

-50mm thick internal acoustic lining.

-Condenser installed on anti-vibration mounts.

5.5 There are multiple designs that can meet the attenuation requirement, the above outline design is given to demonstrate that the attenuation can be readily achieved.

5.6 In addition to an acoustic enclosure, the condenser must be limited to operating during daytime hours only (0700-2300hrs).

5.7 Based on the noise mitigation outlined above the daytime noise criteria can be met with the proposed scheme. A summary of the acoustic calculations demonstrating this is shown below in Table 2.

Table 2. Summary of Noise Calculations

Step	Level	Notes	Calculation Process
1 No Daikin 3MXM68N9	48 dB	Manufacturer's published sound pressure at 1m	-
Additional Reflective Surfaces	-	All internal surfaces of enclosure lined with 50mm acoustic wall lining	+10log(Q)
Attenuation from Acoustic Enclosure	-10 dB	Acoustic enclosure with 270mm deep acoustic louvres	Octave band calculation used to determine overall reduction as a single figure.
Propagation losses	- 17 dB	Hemispherical spreading over 7m to rear windows of neighbouring property	-20log(d)
Calculated level at residential windows	**21 dBA**		
Daytime design criterion	**21 dBA**	Meets criterion provided acoustic enclosure is used.	

5.8 The condenser should be installed on appropriately design anti vibration mounts to ensure there is no perceptible vibration nor re-radiated noise at the neighbouring residential premises.

5.9 It is not possible to determine the tonality of the proposed unit based on octave band data alone. The proposed condenser fan is designed to emit broadband noise and in my experience condenser fans are not particularly tonal in nature. Therefore, no 5 dB penalty has been applied.

5.10 An outline assessment to the commercial windows at high level has been undertaken, allowing for propagation over 4m and the effect of screening the calculated level is 21 dBA at the windows. Allowing for a typical 15dB loss across a partially open window the internal noise level would be 6 dBA far below any of the recommended internal noise levels for commercial premises in BS8233:2014.

6.0 Summary

6.1 A background noise survey has been undertaken at a location representative of the noise environment at the most affected noise sensitive windows.

6.2 A BS4142 assessment has been undertaken based on the survey results, as required by Camden Council planning policies.

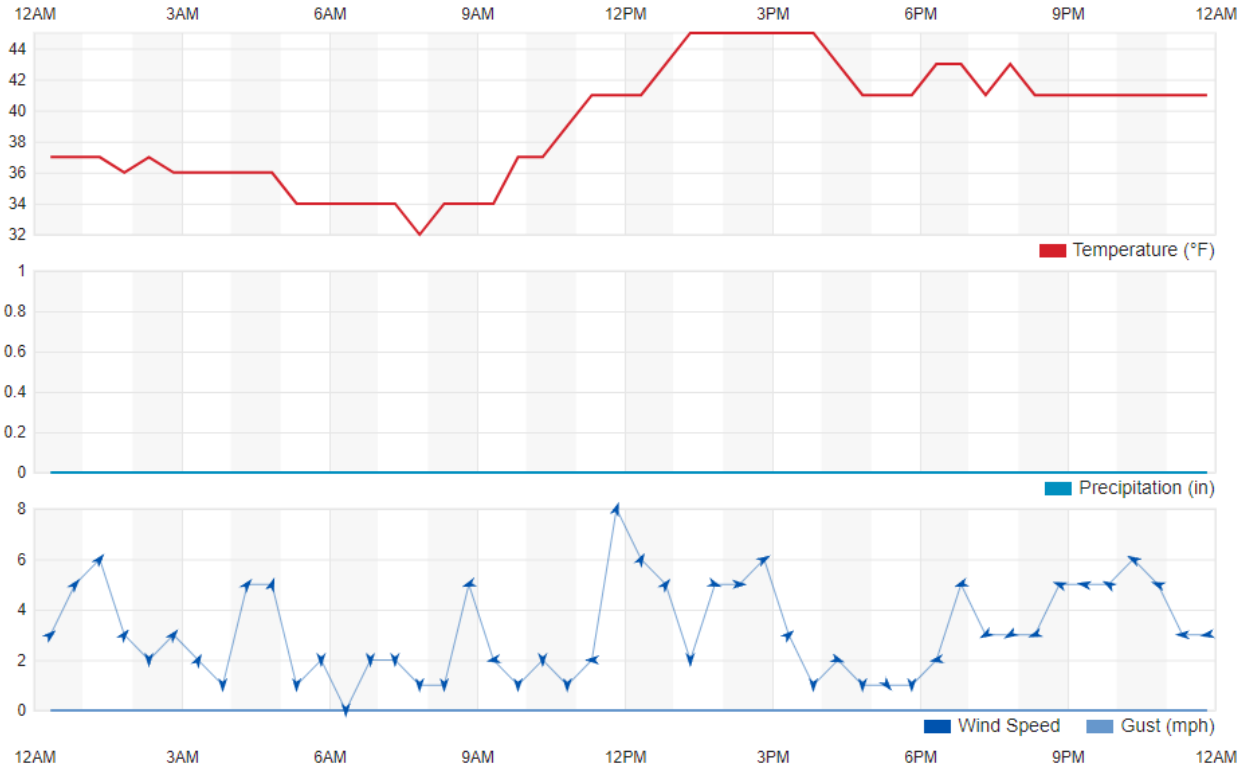
6.3 Provided that the condenser is installed in an acoustic enclosure giving an overall noise reduction of 10dBA and that the condenser is limited to operating during daytime hours only the Camden noise criteria can be met. The condenser should also be installed on anti vibration mounts.

6.3 With the above measures in place the calculated level at the most affected noise sensitive windows is 21 dBA. This is 10dB below the lowest measured daytime background noise level during the survey.

6.4 This meets the planning polices of Camden Council and is a strong indication that the proposed plant will have a low impact on the surrounding area. Therefore, noise should not be a determining factor in the planning judgment.

Appendix A: Weather Conditions

Wind speeds did not exceed 5m/s and there was no precipitation witnessed overnight. Data below taken from a nearby weather station for information.



Appendix B: Equipment

The following equipment was used for the survey

Item	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-52	00643058
Preamplifier	Rion	NH-25	43086
Microphone	Rion	UC-59	06838
Calibrator	Rion	NC-74	34546657
Windshield	Rion	WS-15	NA

Calibration certificates are available on request.

The sound level meter and associated cabling was calibrated before and after the survey and no significant drift from calibration was noted.

The sound level meter was setup up to integrate measurements over a 5 minute time period and recorded L_{eq}, L_{max}, L_{min} and $_{L90,50,10,1}$ statistics.

Appendix C: Survey Results

Time	L_{Aeq}	L_{Amax}	L_{A90}	L90							
				63	125	250	500	1k	2k	4k	8k
18/01/2022 11:48:23	59	85	42	51	45	42	37	34	31	24	15
18/01/2022 11:53:23	58	83	39	50	46	40	37	33	28	20	14
18/01/2022 11:58:23	43	66	38	48	43	40	36	31	25	17	13
18/01/2022 12:03:23	40	56	38	47	43	39	36	31	25	17	13
18/01/2022 12:08:23	41	50	38	48	43	40	36	32	26	17	13
18/01/2022 12:13:23	49	58	42	49	44	41	38	36	31	23	14
18/01/2022 12:18:23	48	56	44	51	44	41	39	40	36	26	14
18/01/2022 12:23:23	47	55	43	50	44	40	38	39	35	25	14
18/01/2022 12:28:23	46	56	43	50	44	40	38	38	34	25	14
18/01/2022 12:33:23	47	54	43	50	45	41	38	39	35	26	14
18/01/2022 12:38:23	45	53	42	50	45	41	38	38	33	24	14
18/01/2022 12:43:23	44	54	41	50	45	41	37	35	30	21	13
18/01/2022 12:48:23	44	55	41	51	46	42	37	34	29	21	13
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18/01/2022 13:08:23	47	67	42	52	47	43	38	36	32	22	13
18/01/2022 13:13:23	50	69	41	51	46	42	38	36	32	21	13
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18/01/2022 14:08:23	53	59	38	51	45	41	35	30	25	17	13
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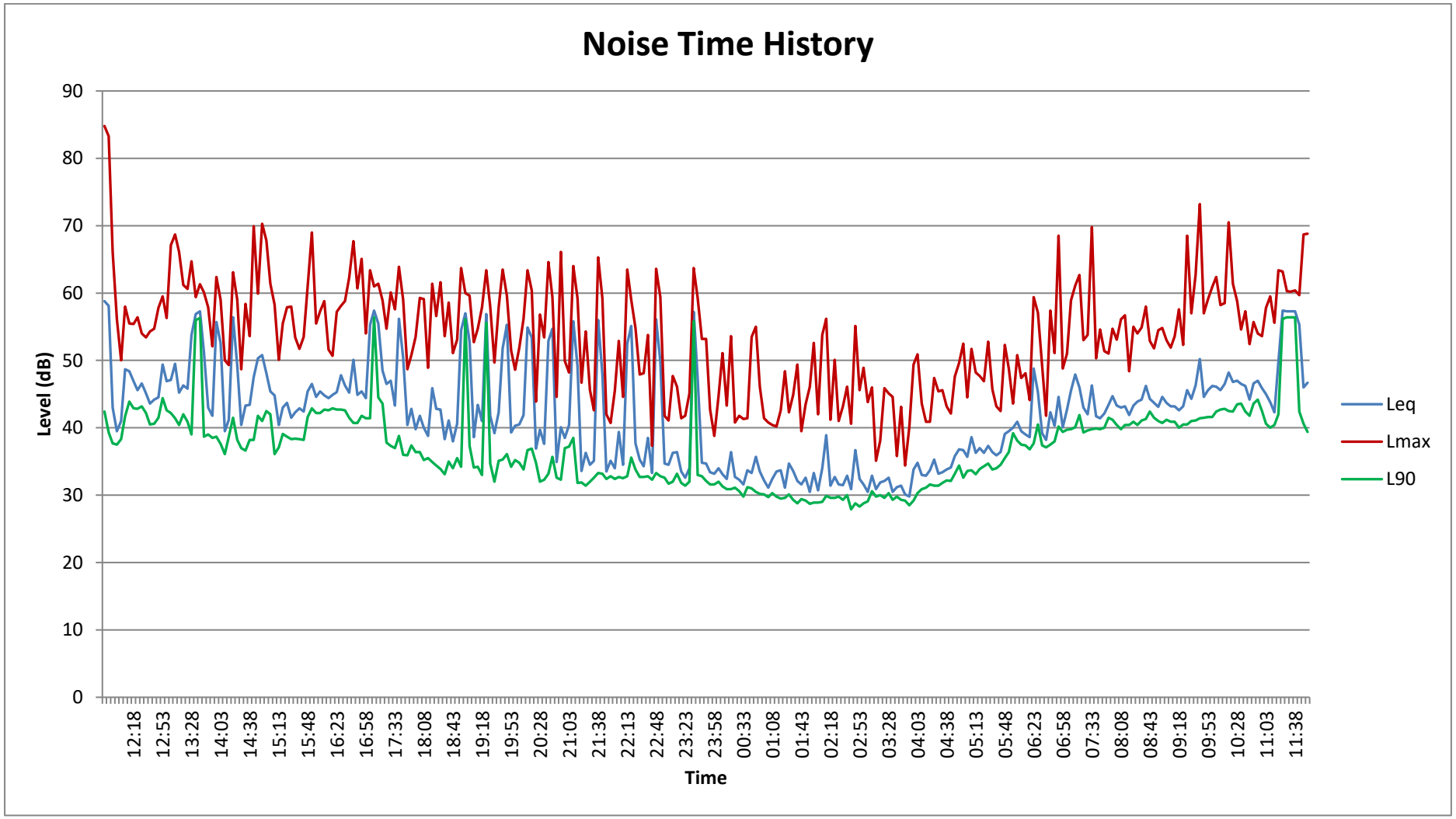
19/01/2022 11:58:23	47	69	39	49	42	40	37	35	28	18	13

Appendix D: Noise Time History

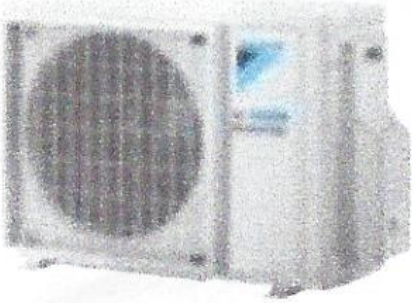


Appendix E: Manufacturer's Data Sheets

R-32 BLUEVOLUTION

MXM-M / M9 / N

Multi Series Inverters

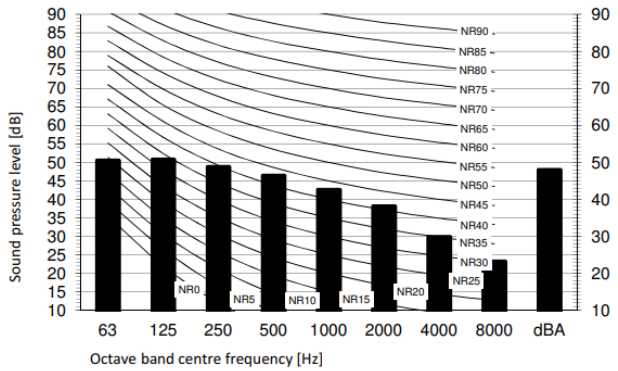


Replacement Technology

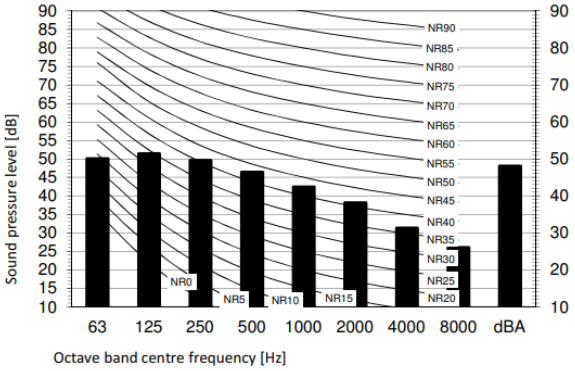
Outdoor Units			3MXM68N9
Capacity	Nominal Cooling	kW	6.8
	Nominal Heating	kW	8.6
Dimensions	Height x Width x Depth	mm	734 x 958 x 340
Weight		kg	62
Electrical Details	Power Supply	Phase	1ph
		Hz	50
		V	220-240
	Maximum Input Current (MCA)	A	17.19
	Max Fuse Size	A	20
Refrigerant Circuit	Refrigerant Type		R32
	Refrigerant Charge	kg	2.00
Sound Pressure (Cooling)	Nom	dBA	48
Sound Power (Cooling)		dBA	61
Piping Limits	Max. Length (OU- IU)	m	25
	Max. Level Difference (IU- IU)	m	7.5
	Max. Level Difference (IU- OU)	m	15
	Total piping length (Actual)	m	50
Piping Connections	Liquid	inches (mm)	3x 1/4 (6.4)
	Gas	inches (mm)	1x 3/8 (9.5)
			2x 1/2 (12.7)
Operating range (Cooling)	Min / Max	°CDB	-10 / 46
Operating range (Heating)	Min / Max	°CWB	-15 / 18
Number of Connected Indoor Units			3
Air Flow Rate (Cooling)	Nom	m^3/sec	0.708

3MXM68N

Cooling mode



Heating mode



Legend

dBA = A-weighted sound pressure level (A scale according to IEC).

A Scale

B High-tap

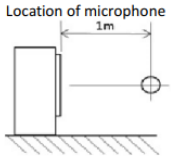
Cooling Total dB

A	B
dBA	48

Heating Total dB

A	B
dBA	49

Location of microphone



Notes

1. Operating conditions: power source 220-240 V/220 V 50/60 Hz; JIS standard
2. Background noise already taken into account.
3. Operating noise varies depending on operation and ambient conditions.
4. The operation noise measuring method is in accordance with JISC9612.
5. Measuring location: anechoic chamber
6. The values above are for connecting with the following indoor unit types: 1.5, 2.0, 2.5, 3.5, 4.2, 5.0, 6.0 kW Class