
BEH INTERIORS LIMITED

NOISE IMPACT ASSESSMENT REPORT

42 FOUNTAIN STREET, MANCHESTER M2 2BE

Client: BEH Interiors Limited

Report Ref: P6437-R1-V1

Issue Date: 16th June 2023

Document Status: Version 1



DATE ISSUED: 16th JUNE 2023

REPORT REFERENCE P6437-R1-V1

BEH INTERIORS LIMITED

NOISE IMPACT ASSESSMENT REPORT

42 FOUNTAIN STREET, MANCHESTER, M2 2BE

REPORT VERSION CONTROL:

Document Reference	Date	Report Prepared by	Report Checked by	Report Authorised by
P6437-R1-V1	16/06/2023	Phil Lodge, BSc (Hons), PGDip, AMIOA	M. J. Malone, BSc (Hons), MIOA	M. J. Malone, BSc (Hons), MIOA
				

This report has been prepared by NoiseAir Limited with all reasonable skill, care and diligence, within the terms of the contract with the client. The report is confidential to the Client and NoiseAir Limited accept no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced without the prior written approval of NoiseAir Limited.

CONTENTS

1	INTRODUCTION	1
2	ASSESSMENT METHODOLOGY AND SCOPE OF WORKS	3
3	ACOUSTIC SURVEY	5
4	3D SOUND MODEL	10
5	SITE NOISE RISK ASSESSMENT	12
6	CONCLUSIONS	15

APPENDICES

APPENDIX A - REPORT LIMITATIONS

APPENDIX B – METER READINGS

APPENDIX C – MANUFACTURERS SOUND DATA

APPENDIX D - GLOSSARY

1 INTRODUCTION

1.1.1 By instruction from BEH Interiors Limited ('the client'), NoiseAir was commissioned to conduct a noise impact assessment (NIA) in support of an existing planning application for the proposed installation of 2 no. condenser units on the roof at: 42 Fountain Street, Manchester M2 2BE, herein referred to as the 'proposed development site'.

1.1.2 At the time of writing, the planning application is not registered on the Manchester City Council planning portal.

1.1.3 General limitations with respect to this NIA are presented in **Appendix A**.

1.2 Site Description and Proposal

1.2.1 The proposed development site is located in an urban area of Manchester city centre and is surrounded by buildings understood to accommodate commercial businesses.

1.2.2 **Figure 1** and **Figure 2** present an aerial image of the proposed development site with respect to the local area and its context and an existing roof plan including proposed condensers, respectively.

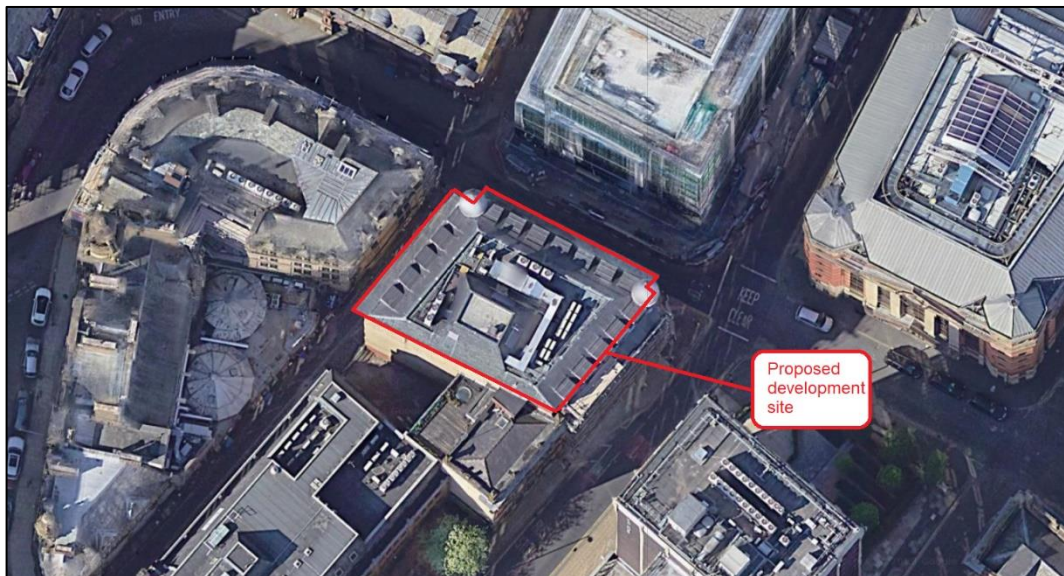


Figure 1: Site aerial photograph.



- Page | 2

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 Consultation and Scope of Works

- 2.1.1 This noise report has been prepared in support of an existing planning application and the installation of the proposed condensers have the potential to create adverse noise impact.
- 2.1.2 It is therefore considered that a detailed NIA is required to assess the likely impact on local NSRs with respect to noise breakout from the proposed condensers. The NIA presented in this report is based on site specific data collected at the development site and manufacturers technical data to assess the noise impact on existing local NSRs. Where site specific data may not be available, data is sought from other reputable sources.

2.2 Assessment Criteria

- 2.2.1 Given the operation of condensers is typically associated with commercial noise breakout, it is considered that an assessment in accordance with British Standard 4142:2014+A1:2019 (BS 4142:2014) is required. A summary of BS 4142:2014 is provided below.

British Standard 4142:2014 (BS 4142:2014)

- 2.2.2 British Standard 4142:2014 - Methods for rating and assessing industrial and commercial sound, sets the methodology for rating and assessing sound of an industrial and commercial nature, which includes sound from fixed installations such as mechanical and electrical plant and equipment.
- 2.2.3 In BS 4142:2014, a noise rating is determined and compared with the existing local background sound level based on several more cumulative acoustic feature corrections to apply where appropriate. For example, if the noise includes a distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristic, then additional cumulative penalties individually ranging from 0 to 9 dB may be applied depending on the type of noise.
- 2.2.4 BS 4142:2014 seeks to determine a “representative” background sound level, stating that “...the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”.
- 2.2.5 The assessment of the impact depends upon the margin by which the rating level of the specific sound source exceeds the background sound level but also promotes a consideration of the context in which the sound occurs when making an assessment. BS 4142:2014 states that an initial estimate of the impact of the specific sound is made by

subtracting the measured background sound level from the rating level, while considering the following points:

- Typically, the greater this difference, the greater the magnitude of the impact;
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,
- 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.

2.2.6 Therefore, a BS 4142:2014 assessment may deduce a low impact where the specific sound level is below the background sound level.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

3.1.1 The measurement at ML1 presented in **Figure 3** was predominantly unattended and was monitoring between the following times:

- 09:45 – 31st of May 2023; and,
- 09:15 – 1st of June 2023.

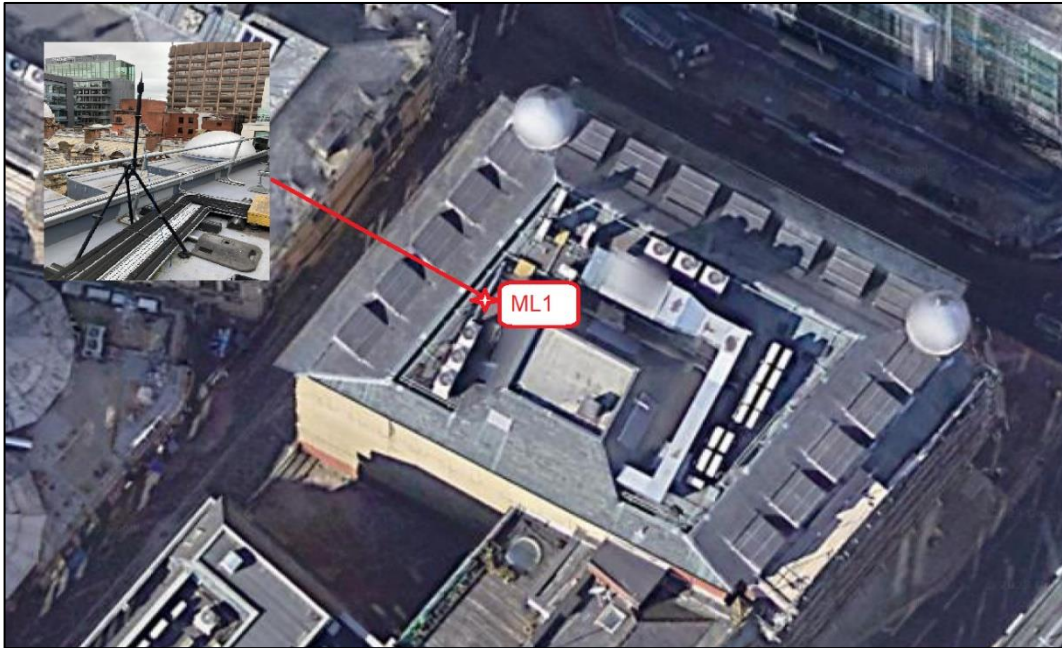


Figure 3: Site layout plan and noise monitoring location – ML1.

- 3.1.2 At the time of the site survey the location of the closest NSRs was not known, however it is reasoned that ML1 was positioned to be representative of the background noise levels in the local area. ML1 is also considered a free field location in accordance with BS 4142:2014.
- 3.1.3 The noise measurements were made using a Class 1, integrating sound level meter (SLM).
- 3.1.4 The acoustic equipment was calibrated to comply with Section 4.2 of BS 7445-1:2003¹, before and after the noise monitoring periods.
- 3.1.5 Details of the SLM and associated field calibration are presented in **Table 1**.

¹ BS 7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

Table 1: Summary of the SLM used for survey and associated field calibration

SLM (Serial Number)	Preamp (Serial Number)	Microphone (Serial Number)	Start Calibration	End Calibration	Drift
NOR140 (1402826)	NOR1209 (15455)	NOR1225 (168289)	-25.6	-25.4	0.2

- 3.1.6 The weather conditions were noted to be as presented in **Table 2** during the site visits at the start and end of the monitoring period.

Table 2: Summary of weather conditions noted at the start and end of the monitoring duration.

Parameter	31 st of May 2023	1st of June 2023
Roads (Wet / Dry)	Dry	Dry
Temperature (°C)	14	15
Wind speed (ms-1) / direction	4.4 ENE	3.3 ENE
Cloud Cover (Approx. %)	100	50
Humidity (%)	68	65

- 3.1.7 A-weighted² L_{90}^3 was measured to satisfy the requirements of BS 4142:2014. A-weighted⁴ L_{eq}^5 and L_{Fmax}^6 noise levels were measured at ML1 to provide further information. The measured noise levels are presented in full in **Appendix B**.

- 3.1.8 Attending the development site at the start and end of the survey monitoring period provided opportunity for observations and detailed notes to be made of the significant noise sources, which contribute to the measured levels.

ML1

Dominant noise was that from an existing extract termination point on the roof of the development site. Secondary noise included noise from other mechanical plant on the roof, road traffic, vehicle horns, vehicle break squeal, reversing tones.

² An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.

³ The noise level which is exceeded for 90% of the measurement period.

⁴ An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.

⁵ Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.

⁶ The instantaneous maximum noise level recorded for a measurement period.

3.2 Measured Sound Levels

3.2.1 Data presented in **Figure 4** details a level vs time graph of the recorded $L_{Aeq,T}$, L_{AFMax} and $L_{AF90,T}$ sound levels over 15-minute time periods for the entire monitoring duration at ML1.

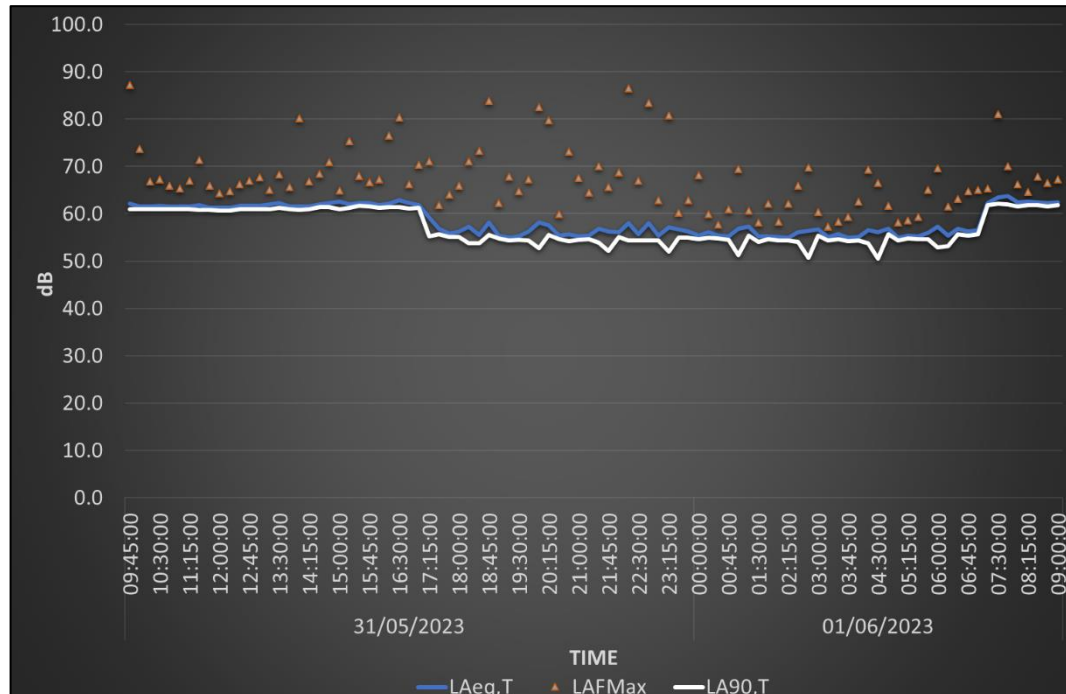


Figure 4: Level vs. time graph presenting $L_{Aeq,T}$, L_{AFMax} and $L_{AF90,T}$ sound levels – ML1.

3.2.2 Following review of the weather data adopted from www.timeanddate.com, it was noted that some of the weather during the monitoring period potentially influenced the measurements. Given this data from the periods of influential weather has been removed from the dataset.

3.2.3 Following the removal of the aforementioned data, all data that follows is based on the reduced dataset.

3.2.4 The results for ML1 are presented in **Table 3**.

Table 3: Range of Average Measured Daytime / Night-time Noise Levels			
Monitoring Location	Time	Range of Measured Noise Level	
		dB $L_{Aeq,1hour}$ / $L_{Aeq,15mins}$	dB $L_{AF90,1hour}$ / $L_{AF90,15 mins}$
ML1	07:00-23:00	55.5 – 62.4	53.8 – 61.7
	23:00-07:00	54.9 – 57.3	50.5 – 55.7

3.3 Typical Measured Background Sound Levels

- 3.3.1 **Figure 4** indicates a reduction in the background noise levels between 17:15 on the 31st of May 2023 and 07:15 on the 1st of June 2023. It is assumed that the item of mechanical plant that provides the main contribution to the background has reduced in noise output. However, it is further assumed that some mechanical plant noise may still be contributing to the reduced level.
- 3.3.2 Given the aforementioned reduction background levels, to provide a conservative assessment a typical daytime background level has therefore been selected from data between 17:15 and 23:00
- 3.3.3 Histograms presenting the distribution of existing background sound levels for the daytime at ML1 is presented in **Figure 5**.

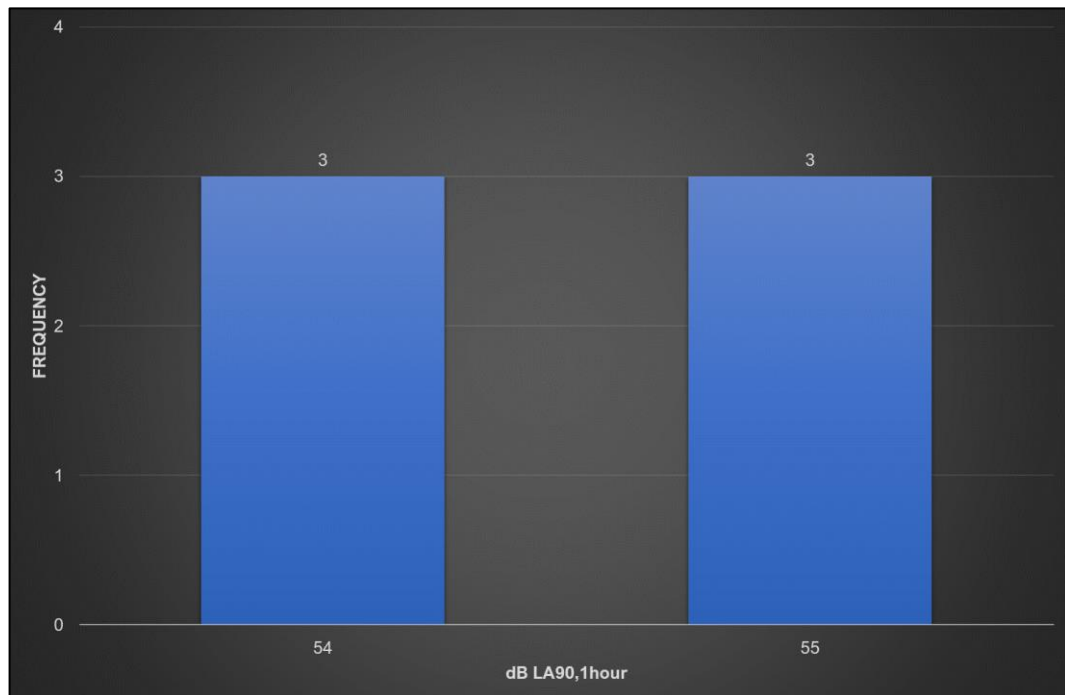


Figure 5: Histogram presenting frequency distribution of background noise readings at ML1 – Daytime.

- 3.3.4 The selected background levels to be adopted for the BS 4142:2014 assessment for the daytime at ML1 is 54 dB(A).

3.3.5 Histograms presenting the distribution of existing background sound levels for the night-time at ML1 is presented in **Figure 6**.

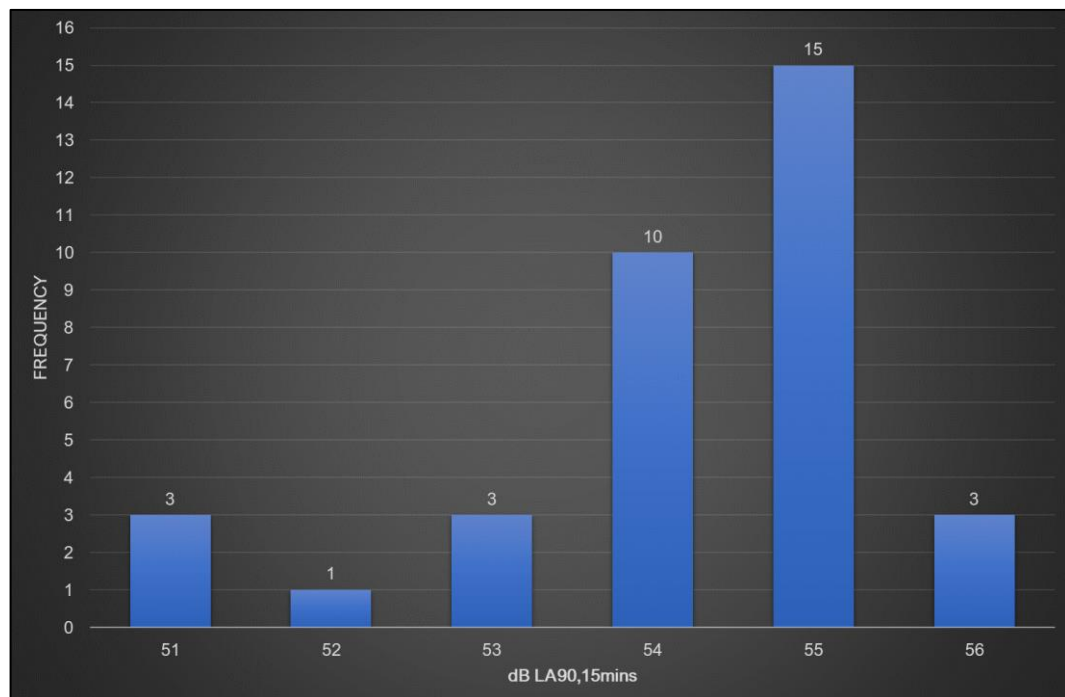


Figure 6: Histogram presenting frequency distribution of background noise readings at ML1 – Night-time.

3.3.6 The selected background levels to be adopted for the BS 4142:2014 assessment for the night-time at ML1 is 51 dB(A).

4 3D SOUND MODEL

4.1 Introduction

- 4.1.1 Commercial plant noise indicated as part of the proposed development was modelled within a 3D noise model of the site calibrated to the manufacturers technical data presented in **Appendix C**.

4.2 3D Sound Model

- 4.2.1 A 3D sound model has been constructed in SoundPLAN™ to calculate the predicted sound pressure levels at selected potential receiver facades. The model uses the calculation method from ISO 9613-2:1996⁷ to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings.
- 4.2.2 The 3D noise model specifically includes noise breakout from the following sources:
- **Noise from the 2 no. proposed condensers** – modelled as 2 no. point sources, each point source at 0.5 m from local roof level and calibrated to manufacturers sound power level octave spectrum during heating for a Mitsubishi PUZ-ZM71VHAR1 unit of 69 dB L_{WA} .
- 4.2.3 At the time of writing, the location of NSRs is not known however a window located directly opposite the proposed location of the condensers has been selected as the worst case NSR. While it is understood that this window is the window of an office, adopting this location as the NSR provides for a conservative assessment.
- 4.2.4 Noise contour plots illustrating the propagation of sound from source to receptor during the daytime and night-time ($L_{Aeq,1hour}$ / $L_{Aeq,15mins}$) condition is presented in **Figure 7**.

⁷ ISO9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

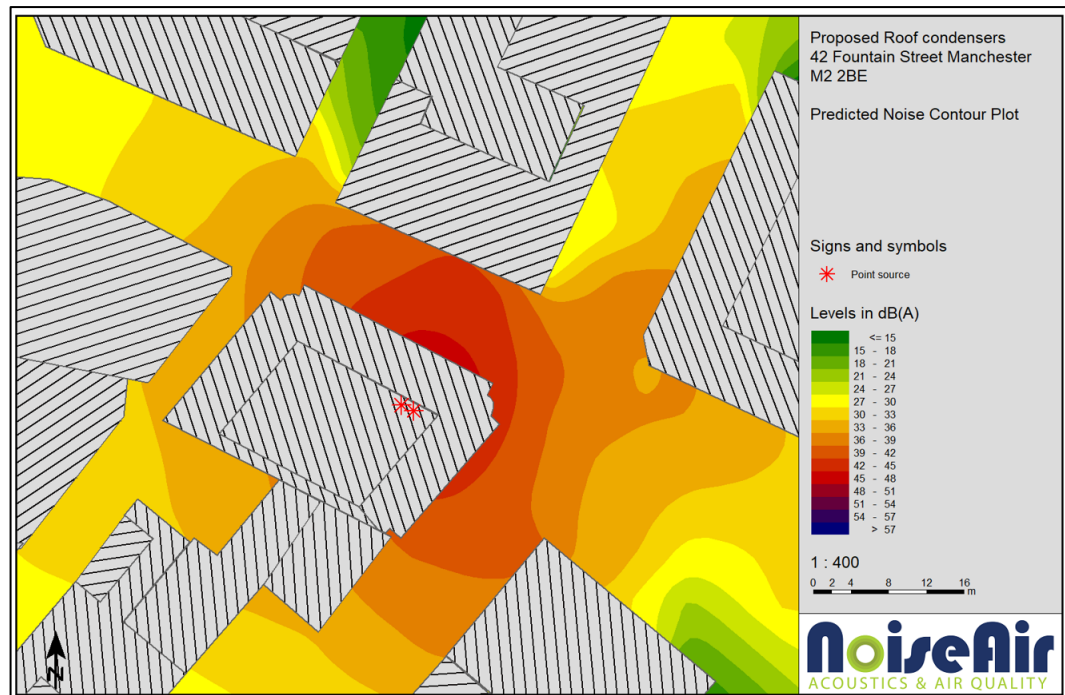


Figure 7: Noise contour plot illustration of the predicted propagation of sound from the development site.

4.2.5 Selected façade receptors sound pressure levels are presented in **Figure 8**.

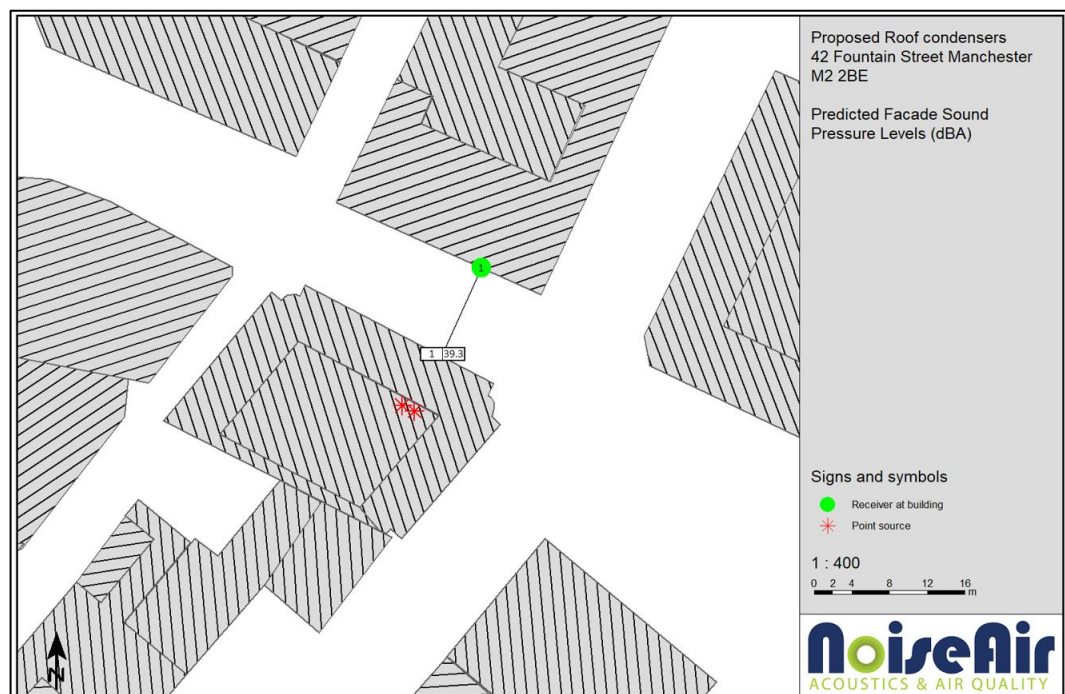


Figure 8: Illustration of the 3D sound model selected facades receptors.

4.2.6 The predicted sound pressure level at the closest window to the specific noise source is 39.3 dB $L_{Aeq,T}$.

5 SITE NOISE RISK ASSESSMENT

5.1 BS 4142:2014 Assessment for the commercial noise impact from the proposed development site

- 5.1.1 It is considered necessary that a BS 4142:2014 assessment is conducted to account for the potential noise impact of the operation of the 2 no. proposed condensers.
- 5.1.2 The assessment is based on technical data received at the time of writing.

Background Sound Levels

- 5.1.3 The measured background sound levels are presented within Section 3 of this report.
- 5.1.4 The daytime and night-time background sound levels for ML1 of 54 dB(A) and 51 dB(A), respectively are adopted for this assessment.

Character Corrections

- 5.1.5 Given this acoustic report has been prepared in support of an existing planning application, the noise sources assessed are not operating at the time of writing and therefore a subjective assessment of the character of the noise breakout was not possible. However, NoiseAir have recently conducted a subjective assessment of noise character from similar commercial sources, this has therefore been adopted and corrections applied as follows:

- **Tonality:** +2 dB has been applied. Tonal noise would be associated with the operation of the condensers and is likely to be just perceptible.
- **Intermittency:** Given a condenser unit typically operates at varying speeds to facilitate energy a +3 dB has been applied.
- **Impulsivity:** Impulsive character is typically associated with crashes and bangs. Given condensers do not typically display impulsive noise character, it is reasoned that a correction for impulsivity is not applicable.

Initial Assessment

- 5.1.6 The preliminary BS 4142:2014 assessment presented in **Table 4** details the assessment at the worst affected NSR.

Table 4: Preliminary BS 4142:2014 Assessment of the Proposed Condenser Noise		
Quantity	Sound level dB	
	Daytime	Night-time
Background sound level, L_{AF90}	54	51
Worst case specific sound level $L_{Aeq,T}$	39	
Character corrections		
Tonality	+2	
Intermittency	+3	
Impulsivity	0	
Rating Level	44	
Excess Rating Level	-10	-7
Initial estimate of impact	Low Impact	Low Impact

BS 4142:2014 Assessment Context, Uncertainty and Outcome

- 5.1.7 **Table 4** indicates that based on the excess of the rating level above background sound level the initial estimate of impact is 'Low Impact' at the worst case NSR.
- 5.1.8 The proposal is to accommodate 2 nr new condenser units on a roof that has several existing condensers and other mechanical plant that contribute to the residual sound. Given the calculated absolute noise level of 39 dB(A) is more than 10 dB(A) less than the daytime and night-time background noise levels of 54 dB(A) and 51 dB(A), respectively noise from the new condensers is not likely to be readily perceptible at the NSR.
- 5.1.9 While it is assumed that some of the existing plant will be operating during the period from which the background level has been selected, it is reasoned that a predominant contribution to the background noise level at the NSR is from the existing plant. Therefore, given the difference between the specific sound and the background noise levels discussed above it is reasoned that the introduction of the 2 no. condensers is not likely to contribute to the background noise levels.
- 5.1.10 It is considered that the uncertainty with respect to this assessment is low based on the following:
- Background levels were monitored at representative free field locations;
 - Weather conditions were considered suitable for monitoring background sound levels;
 - The closest window to the source has been selected as the NSR and while this is understood to be an office, the assessment is considered conservative;

-
- Predicted source noise levels are based on reputable data; and,
 - The SLM used to conduct the monitoring is a class 1 device and generally recognised that these SLMs offer an uncertainty of ± 1.0 dB. All instrumentation used for the monitoring has been calibrated by UKAS approved laboratories.

5.1.11 Taking the context and uncertainty into consideration, the outcome of the assessment is
Low Impact.

6 CONCLUSIONS

- 6.1.1 NoiseAir has conducted a noise impact assessment with respect to the proposed installation of 2 no. new condenser units on the roof at the location: 42 Fountain Street, Manchester M2 2BE.
- 6.1.2 A BS 4142:2014 assessment has been conducted on the noise from the proposed condenser units with respect to noise impact on local noise sensitive receptors. The outcome of the assessment is reported as **Low Impact** and therefore planning permission should not be refused on the grounds of noise impact.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to BEH Interiors Limited may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is BEH Interiors Limited and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

This report has been prepared by NoiseAir Limited. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited has not been independently verified by NoiseAir Limited unless otherwise stated in the report and should be treated accordingly.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Where / if estimates and projects are made within this report, are made based on reasonable assumptions as of the date of this report, such statements however by their very nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. NoiseAir Limited specifically does not guarantee or warrant any estimates or projects contained in this report.

DISCLAIMER- This report was prepared by NoiseAir Limited. The material in it contains NoiseAir Limited best judgment in light of the information available at the time of preparation of this report. Any use which a third party makes of this report, or any reliance on, or decisions based on it are the responsibility of such third parties. NoiseAir Limited accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

APPENDIX B – METER READINGS

ML1

Start Date	Start Time	Duration	L_{Aeq}	L_{AFmax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB		dB
31/05/2023	09:45:00	00:15:00	62.1	87.2	60.9
31/05/2023	10:00:00	00:15:00	61.6	73.7	60.9
31/05/2023	10:15:00	00:15:00	61.5	66.8	61.0
31/05/2023	10:30:00	00:15:00	61.7	67.2	61.0
31/05/2023	10:45:00	00:15:00	61.5	66.0	60.9
31/05/2023	11:00:00	00:15:00	61.5	65.4	60.9
31/05/2023	11:15:00	00:15:00	61.6	66.9	60.9
31/05/2023	11:30:00	00:15:00	61.8	71.3	60.8
31/05/2023	11:45:00	00:15:00	61.3	65.9	60.8
31/05/2023	12:00:00	00:15:00	61.3	64.4	60.7
31/05/2023	12:15:00	00:15:00	61.3	64.8	60.7
31/05/2023	12:30:00	00:15:00	61.7	66.2	61.0
31/05/2023	12:45:00	00:15:00	61.7	67.0	61.0
31/05/2023	13:00:00	00:15:00	61.7	67.7	61.0
31/05/2023	13:15:00	00:15:00	62.0	65.1	60.9
31/05/2023	13:30:00	00:15:00	62.3	68.3	61.2
31/05/2023	13:45:00	00:15:00	61.5	65.6	60.9
31/05/2023	14:00:00	00:15:00	61.6	80.2	60.8
31/05/2023	14:15:00	00:15:00	61.5	66.8	60.9
31/05/2023	14:30:00	00:15:00	62.0	68.4	61.4
31/05/2023	14:45:00	00:15:00	62.2	70.9	61.4
31/05/2023	15:00:00	00:15:00	62.6	64.9	61.0
31/05/2023	15:15:00	00:15:00	62.0	75.4	61.2
31/05/2023	15:30:00	00:15:00	62.2	68.0	61.7
31/05/2023	15:45:00	00:15:00	62.2	66.7	61.6
31/05/2023	16:00:00	00:15:00	61.9	67.3	61.3
31/05/2023	16:15:00	00:15:00	62.1	76.5	61.4
31/05/2023	16:30:00	00:15:00	62.8	80.4	61.4
31/05/2023	16:45:00	00:15:00	62.2	66.3	61.1
31/05/2023	17:00:00	00:15:00	61.8	70.4	61.3
31/05/2023	17:15:00	00:15:00	59.2	71.1	55.2
31/05/2023	17:30:00	00:15:00	56.9	61.9	55.7
31/05/2023	17:45:00	00:15:00	55.8	64.0	55.1
31/05/2023	18:00:00	00:15:00	56.3	65.9	55.1
31/05/2023	18:15:00	00:15:00	57.3	71.1	53.7
31/05/2023	18:30:00	00:15:00	55.5	73.3	53.7
31/05/2023	18:45:00	00:15:00	58.2	83.8	55.5
31/05/2023	19:00:00	00:15:00	55.4	62.2	54.8
31/05/2023	19:15:00	00:15:00	54.9	67.9	54.3
31/05/2023	19:30:00	00:15:00	55.2	64.8	54.5
31/05/2023	19:45:00	00:15:00	56.3	67.3	54.3
31/05/2023	20:00:00	00:15:00	58.1	82.6	52.8
31/05/2023	20:15:00	00:15:00	57.6	79.7	55.5
31/05/2023	20:30:00	00:15:00	55.3	59.9	54.6
31/05/2023	20:45:00	00:15:00	55.7	73.2	54.2
31/05/2023	21:00:00	00:15:00	55.2	67.6	54.5

Start Date	Start Time	Duration	L_{Aeq}	L_{AFmax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB		dB
31/05/2023	21:15:00	00:15:00	55.3	64.5	54.6
31/05/2023	21:30:00	00:15:00	56.9	70.1	53.9
31/05/2023	21:45:00	00:15:00	56.2	65.6	52.1
31/05/2023	22:00:00	00:15:00	56.1	68.8	55.1
31/05/2023	22:15:00	00:15:00	58.0	86.5	54.3
31/05/2023	22:30:00	00:15:00	55.6	66.9	54.4
31/05/2023	22:45:00	00:15:00	58.0	83.4	54.3
31/05/2023	23:00:00	00:15:00	55.3	62.8	54.3
31/05/2023	23:15:00	00:15:00	57.1	80.8	52.0
31/05/2023	23:30:00	00:15:00	56.7	60.2	54.9
31/05/2023	23:45:00	00:15:00	56.3	62.8	54.9
01/06/2023	00:00:00	00:15:00	55.4	68.2	54.7
01/06/2023	00:15:00	00:15:00	56.1	59.9	55.0
01/06/2023	00:30:00	00:15:00	55.4	57.7	54.8
01/06/2023	00:45:00	00:15:00	55.2	60.9	54.5
01/06/2023	01:00:00	00:15:00	56.8	69.4	51.3
01/06/2023	01:15:00	00:15:00	57.3	60.6	55.3
01/06/2023	01:30:00	00:15:00	55.2	58.2	54.1
01/06/2023	01:45:00	00:15:00	55.2	62.1	54.6
01/06/2023	02:00:00	00:15:00	55.1	58.3	54.4
01/06/2023	02:15:00	00:15:00	55.0	62.1	54.3
01/06/2023	02:30:00	00:15:00	56.1	66.0	54.0
01/06/2023	02:45:00	00:15:00	56.4	69.8	50.7
01/06/2023	03:00:00	00:15:00	56.7	60.4	55.4
01/06/2023	03:15:00	00:15:00	55.1	57.3	54.3
01/06/2023	03:30:00	00:15:00	55.7	58.3	54.7
01/06/2023	03:45:00	00:15:00	54.9	59.3	54.2
01/06/2023	04:00:00	00:15:00	55.1	62.5	54.3
01/06/2023	04:15:00	00:15:00	56.6	69.3	53.7
01/06/2023	04:30:00	00:15:00	56.1	66.5	50.5
01/06/2023	04:45:00	00:15:00	56.9	61.7	55.7
01/06/2023	05:00:00	00:15:00	54.9	58.2	54.4
01/06/2023	05:15:00	00:15:00	55.4	58.6	54.8
01/06/2023	05:30:00	00:15:00	55.2	59.3	54.6
01/06/2023	05:45:00	00:15:00	56.0	65.1	54.6
01/06/2023	06:00:00	00:15:00	57.3	69.6	52.9
01/06/2023	06:15:00	00:15:00	55.4	61.5	53.2
01/06/2023	06:30:00	00:15:00	56.9	63.2	55.7
01/06/2023	06:45:00	00:15:00	56.3	64.8	55.4
01/06/2023	07:00:00	00:15:00	56.6	65.0	55.7
01/06/2023	07:15:00	00:15:00	62.3	65.4	61.8
01/06/2023	07:30:00	00:15:00	63.5	81.1	62.1
01/06/2023	07:45:00	00:15:00	63.7	70.1	62.0
01/06/2023	08:00:00	00:15:00	62.4	66.2	61.6
01/06/2023	08:15:00	00:15:00	62.5	64.6	61.9
01/06/2023	08:30:00	00:15:00	62.4	67.8	61.9
01/06/2023	08:45:00	00:15:00	62.3	66.5	61.5
01/06/2023	09:00:00	00:15:00	62.4	67.3	61.9

APPENDIX C – MANUFACTURERS SOUND DATA

Air Conditioning Product Information

PEAD-M R32 Ceiling Concealed Ducted System Power Inverter Heat Pump (Single Phase)

R32

POWER INVERTER



PEAD-M INDOOR UNITS		PEAD-M35JA	PEAD-M50JA	PEAD-M60JA	PEAD-M71JA	PEAD-M100JA	PEAD-M125JA	PEAD-M140JA
CAPACITY (kW)	Heating (nominal)	4.1 (1.6-5.2)	6.6 (2.5-7.3)	7.0 (2.8-8.2)	8.0 (3.5-10.2)	11.2 (4.5-14.0)	14.0 (5.0-16.0)	16.0 (5.7-18.0)
	Cooling (nominal)	3.6 (1.6-4.9)	5.9 (2.3-5.9)	6.1 (2.7-6.7)	7.1 (3.3-8.1)	9.5 (4.9-11.4)	12.5 (5.5-14.0)	13.4 (6.2-15.3)
	Cooling (JIS)	3.5 (1.35-4.4)	5.1 (2.15-6.2)	5.85 (2.4-6.95)	6.6 (3.0-8.05)	9.5 (3.85-11.9)	11.9 (4.25-13.6)	13.6 (4.85-15.3)
SEER (nominal)	Heating (JIS)	3.3 (1.45-4.15)	4.6 (2.1-5.15)	5.5 (2.5-6.15)	6.55 (3.05-7.45)	9.2 (4.5-10.9)	11.5 (5.05-12.9)	12.9 (5.7-14.1)
	Cooling (JIS)	0.85	0.84	0.83	0.83	0.82	0.84	0.84
	Cooling (JIS)	4.47 (1.4-3.0)	4.57 (1.4-3.0)	4.37 (1.4-3.0)	4.14 (1.3-3.0)	4.31 (1.4-3.0)	4.17 (1.3-3.0)	4.03 (1.3-3.0)
COP (SEER (nominal))		4.47 (1.4-3.0)	4.57 (1.4-3.0)	4.37 (1.4-3.0)	4.14 (1.3-3.0)	4.31 (1.4-3.0)	4.17 (1.3-3.0)	4.03 (1.3-3.0)
SCOP (JIS) / SEER (JIS) (EN14825)		3.9 / 3.8	4.3 / 4.2	4.0 / 3.9	3.9 / 3.8	4.1 / 4.0	3.9 / 3.8	3.8 / 3.7
EER ENERGY EFFICIENCY CLASS		A++	A++	A++	A++	A++	A++	A++
AIRFLOW (lit/s)		167-300-233	200-242-263	242-300-350	292-350-417	400-483-567	482-592-700	535-690-757
PIPE SIZE mm (in)	Lo-Mid-Hi	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")
	Gas	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")
	Liquid	6.35 (1/4")	6.35 (1/4")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")
EXTERNAL STATIC PRESSURE (Pa)		35-50-70-100-150	35-50-70-100-150	35-50-70-100-150	35-50-70-100-150	35-50-70-100-150	35-50-70-100-150	35-50-70-100-150
SOUND PRESSURE LEVEL (dBA)		25-27-30	26-31-35	25-29-33	26-30-34	29-34-38	32-36-40	34-38-43
SOUND POWER LEVEL (dBA)		54	59	55	58	62	66	67
DIMENSIONS (mm)		Width x Depth x Height	300 x 732 x 250	300 x 732 x 250	1100 x 732 x 250	1100 x 732 x 250	1400 x 732 x 250	1600 x 732 x 250
WEIGHT (kg)		25	27	30	30	40	44	44
ELECTRICAL SUPPLY		Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit
FUSE RATING (BS888) - HRC (A)		6	6	6	6	6	6	6
INTERCONNECTING CABLE No. CORES		4	4	4	4	4	4	4
WIRED REMOTE CONTROLLER REFERENCE		PRR-4000A	PRR-4000A	PRR-4000A	PRR-4000A	PRR-4000A	PRR-4000A	PRR-4000A

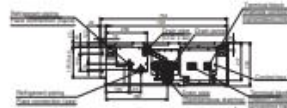
PUZ-ZM OUTDOOR UNITS		PUZ-ZM35VKA	PUZ-ZM50VKA	PUZ-ZM60VKA	PUZ-ZM71VHAR1	PUZ-ZM100VHAR1	PUZ-ZM125VHAR2	PUZ-ZM140VHAR2
SOUND PRESSURE LEVEL (dBA)	Heating/Cooling	48 / 44	48 / 44	49 / 47	49 / 47	51 / 49	52 / 50	52 / 50
	Cooling	65	65	67	67	69	70	70
	Cooling	48	48	50	50	52	53	53
DIMENSIONS (mm)		Width x Depth x Height	800 x 300 x 630	800 x 300 x 630	950 x 300 x 25 x 943	950 x 300 x 25 x 943	1090 x 330 x 40 x 1338	1090 x 330 x 40 x 1338
ELECTRICAL SUPPLY		220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz
PHASE		Single	Single	Single	Single	Single	Single	Single
SYSTEM POWER INPUT (kW)	Heating/Cooling (nominal)	0.91 / 0.637	1.312 / 1.201	1.616 / 1.509	1.832 / 1.859	2.588 / 2.272	3.349 / 3.333	3.870 / 3.631
	Heating/Cooling (JIS)	0.76 / 0.76	1.11 / 1.08	1.32 / 1.39	1.7 / 1.59	2.07 / 1.95	2.68 / 2.66	3.16 / 3.11
	Cooling (JIS)	0.76 / 0.76	1.11 / 1.08	1.32 / 1.39	1.7 / 1.59	2.07 / 1.95	2.68 / 2.66	3.16 / 3.11
STARTING CURRENT (A)		5.0	5.0	6.0	6.0	13.0	13.0	13.0
SYSTEM RUNNING CURRENT (A)		4.17 / 3.89 (4.1)	5.50 / 5.07 (4.4)	6.88 / 6.16 (20.5)	7.85 / 7.45 (21)	10.54 / 9.67 (29.2)	13.21 / 13.10 (29.3)	15.74 / 14.21 (30.8)
FUSE RATING (BS888) - HRC (A)		16	16	25	25	32	32	40
MAINS CABLE No. CORES		3	3	3	3	3	3	3
MAX PIPE LENGTH (m)		50	50	55	55	100	100	100
MAX HEIGHT DIFFERENCE (m)		30	30	30	30	30	30	30
CHARGE REFRIGERANT (kg) / CO ₂ EQUIVALENT (g) - R32 (GWP 675) - 30m		2.0 / 1.35	2.00 / 1.35	2.80 / 1.80	2.80 / 1.80	4.00 / 2.70	4.00 / 2.70	4.00 / 2.70
MAX ADDITIONAL REFRIGERANT (kg) / CO ₂ EQUIVALENT (g) - R32 (GWP 675)		0.30 / 0.20	0.30 / 0.20	0.80 / 0.54	0.80 / 0.54	2.80 / 1.80	2.80 / 1.80	2.80 / 1.80

PEAD-M35/50/60/71/100/125/140JA DIMENSIONS

FRONT VIEW

UPPER VIEW

SIDE VIEW



Model	A	B	C	D	E	F
PEAD-M35JA	900	954	1000	880	9	800
PEAD-M50JA	1100	1154	1200	1060	11	1000
PEAD-M60JA	1400	1454	1500	1360	14	1300
PEAD-M71JA	1600	1654	1700	1560	16	1500



Telephone: 01707 282880
email: air.conditioning@meuk.mee.com
les.mitsubishielectric.co.uk



Mitsubishi Electric Living
Environmental Systems UK



Mitsubishi Electric
Cooling and Heating UK



[mitsubishielectricuk_les](https://www.instagram.com/mitsubishielectricuk_les)



Mitsubishi Electric Living
Environmental Systems UK



thehub.mitsubishielectric.co.uk

UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travelers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881
IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890. International code: (003531)

Country of origin: United Kingdom - Japan - Thailand - Malaysia. Mitsubishi Electric Europe 2020. Mitsubishi and Mitsubishi Electric are trademarks of Mitsubishi Electric Europe B.V. The company reserves the right to make any variation in technical specification to the equipment described, or to withdraw or replace products without prior notification or public announcement. Mitsubishi Electric is constantly developing and improving its products. All descriptions, illustrations, drawings and specifications in this publication present only general particulars and shall not form part of any contract. All goods are supplied subject to the Company's General Conditions of Sale, a copy of which is available on request. Third-party product and brand names may be trademarks or registered trademarks of their respective owners.

Note: The fuse rating is for guidance only. Please refer to the relevant data sheet for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas. R410A (GWP=2088), R32 (GWP=675), R407C (GWP=1776), R134a (GWP=1433), R1234ze (GWP=511), R404B (GWP=4068), R1234ze (GWP=7) or R1234yf (GWP=4). These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No 626/2011 from IPCC 3rd edition, these are as follows: R410A (GWP=1275), R32 (GWP=1303), R407C (GWP=1603) or R134a (GWP=1303).

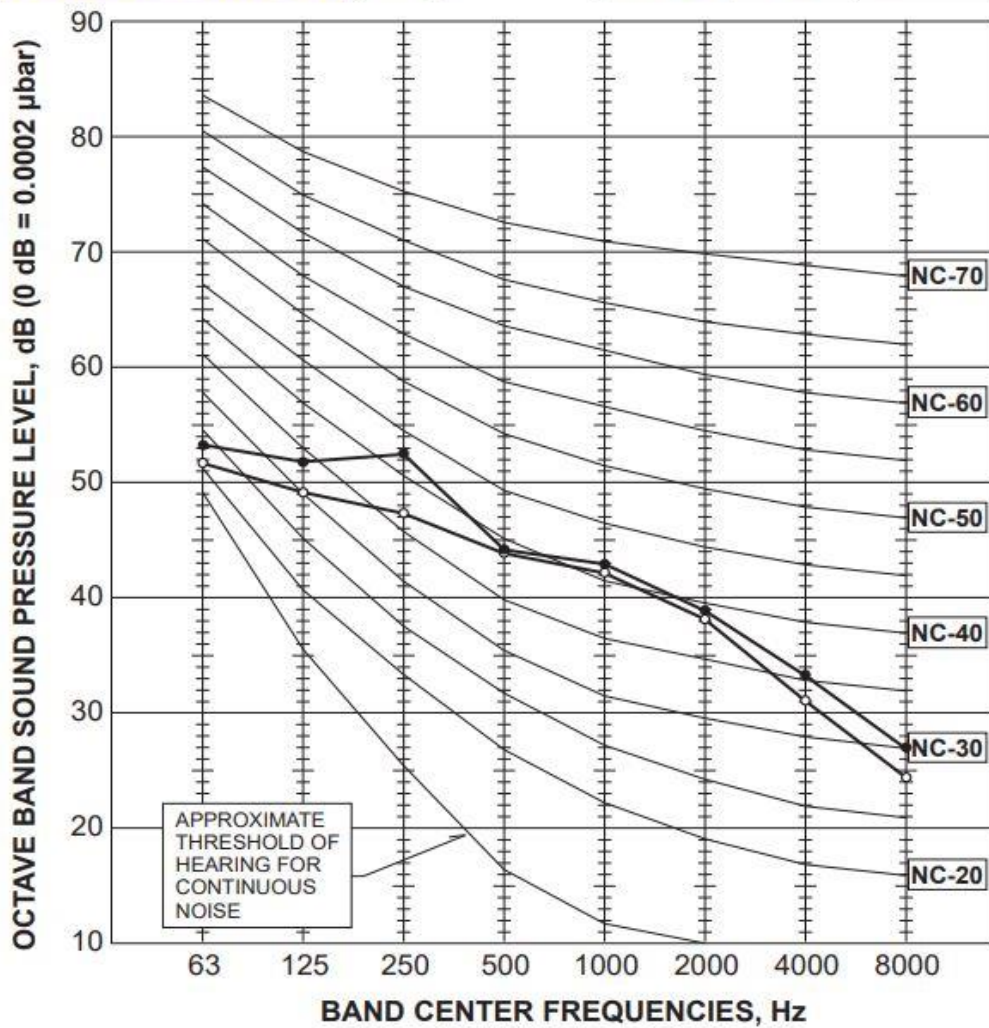
Effective as of May 2020



greengateway.mitsubishielectric.co.uk

PUZ-ZM60VHA(-ET/-ER)
PUZ-ZM71VHA(-ET/-ER)
PUZ-ZM71VHAR1(-ET)

MODE	SPL(dB)	LINE
COOLING	47	○—○
HEATING	49	●—●



APPENDIX D - GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. <i>NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.</i>
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. <i>NOTE: The ambient sound comprises the residual sound and the specific sound when present.</i>
Ambient sound level, $L_a = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T <i>NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.</i>
Background sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS 4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w , D_w , and $D_{nT,w}$) to provide a weighting against low frequency performance. <i>NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.</i>
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS 4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m ²), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. <i>NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.</i>
Free-field level	Sound pressure level away from reflecting surfaces. <i>NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e., not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.</i>

Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. <i>NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.</i>
Measurement time interval, T_m (BS 4142:2014)	Total time over which measurements are taken. <i>NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.</i>
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. <i>NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.</i>
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for $N\%$ of a specified time interval.
Reference time interval, T_r (BS 4142:2014)	Specified interval over which the specific sound level is determined. <i>NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.</i>
Residual sound (BS 4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T .
Rating level, L_{A,r,T_r}	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. <i>NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.</i>
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, L_{AE}	Level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.
Sound level difference, D	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, p	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).
Sound reduction index, R	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,T_r}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
Specific sound source (BS 4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L'_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Groundborne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. <i>NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.</i>
Structure-borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements. <i>NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.</i>
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. <i>NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).</i>
Weighted normalised impact sound pressure level, $L'_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L'_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
L_{Ar,T_r}	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

NoiseAir Limited

Specialist acoustic and air quality engineers providing a fast, professional, cost-effective service for all types of Acoustic Consultancy services across the UK.

Over 25 years of experience in the field.

Contact us now for a free, no obligation quote or to discuss your requirements.

NOISEAIR LIMITED, THE COUNTING HOUSE, HIGH STREET,
LUTTERWORTH. LE17 4AY

TEL. 0116 272 5908

EMAIL. INFO@NOISEAIR.CO.UK

WWW.NOISEAIR.CO.UK

