

REPORT TITLE: NOISE ASSESSMENT FOR A PROPOSED AIR SOURCE HEAT PUMP UNIT
AT 6 LAURIER ROAD, LONDON NW5 1SG



REPORT REF: 24084-002

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SUMMARY

- This report provides a noise assessment for a proposed new air source heat pump (ASHP) unit to serve a residential property 6 Laurier Road, London NW5 1SG. The ASHP unit is to be located externally at lower ground floor level to the rear of the property.
- The assessment is conducted with reference to London Borough of Camden's planning consent requirements for mechanical services plant / equipment (including items such as ASHP units) as contained in Policy A4: *Noise and Vibration* of Section 6: *Protecting Amenity* of Camden Local Plan (adopted June 2017), plus also with reference to the current edition of relevant British Standard BS4142:2014.
- As part of the assessment process, a noise survey has been conducted over several days including sample weekdays and a full weekend to establish representative existing background noise levels during the entire range of possible operational times for the ASHP unit. The noise survey was at a position directly representative of outside nearest neighbouring residential properties. Results of the noise survey are used to set a noise limit for the ASHP unit as per London Borough of Camden's requirements and with reference to BS4142:2014.
- Using manufacturer noise data, a noise model calculation has been used to determine noise from the ASHP unit to assessment positions at nearest neighbouring residential properties. Details for the ASHP unit manufacturer noise data and noise model calculation are provided in the report.
- The assessment demonstrates noise from the ASHP unit (with the specified noise reduction implemented) will be significantly below existing minimum background noise levels and compliant with the set noise limit. Noise from the ASHP unit would not be expected to be audible, cause disturbance or otherwise be of impact on the amenity of occupiers of neighbouring properties.
- The noise reduction comprises fitment of the ASHP unit within an acoustic louvre enclosure. Advised specification details for the acoustic enclosure are provided in sub-section 7.1 of the report.
- The report also considers vibration from the ASHP unit. Proposed location of the unit is not directly attached to / connected to, neighbouring properties. Thus, it is extremely unlikely that any vibration from the unit would transmit to neighbouring properties. Notwithstanding this, as good practice it is advised the ASHP unit is installed mounted on conventional proprietary vibration isolators. Specification details for typically suitable vibration isolators are provided in sub-section 7.2 of the report.

1. INTRODUCTION

An air source heat pump (ASHP) unit is proposed to be installed to serve a residential property 6 Laurier Road, London NW5 1SG.

The proposal is for a Vaillant aroTHERM plus 7kW ASHP unit, located externally at lower ground floor level to the rear of the property.

The Local Planning Authority (London Borough of Camden) planning application validation requirements include submission of a noise assessment for proposed new plant / equipment such as ASHP units and air conditioning units etc. This is for reason to enable London Borough of Camden to assess the potential noise impact of proposed new units upon occupiers of neighbouring noise sensitive (residential) properties.

This report provides a noise assessment for the proposed new ASHP unit and includes:

- Qualifications & experience;
- Criteria - London Borough of Camden planning consent requirements including with reference to the current edition of relevant British Standard BS4142:2014;
- Measurement survey of background noise levels;
- Details of the proposed ASHP unit including location & noise data;
- Calculation & assessment of noise from the ASHP unit;
- Consideration of vibration from the ASHP unit;
- Specification for noise reduction and vibration isolation measures.

2. QUALIFICATIONS & EXPERIENCE

This report is prepared and issued by David Philip. David Philip graduated in 1989 from The University of Salford Department of Applied Acoustics with a BEng Honours degree in Electroacoustics. David Philip has been since 1995, and continues to be, a fully elected Member of the Institute of Acoustics (MIOA).

David Philip has been the owner / managing director of Philip Acoustics since the firm was formed in 2002. Prior to the formation of Philip Acoustics, David Philip held senior acoustic consultant positions at Sound Research Laboratories (London office) and Spectrum Acoustic Consultants.

Philip Acoustics has held full membership of the Association of Noise Consultants (ANC) since 2003 and is also a full member of the ANC Registration Scheme of approved independent organisations to undertake Building Regulations Approved Document Part E pre-completion certification sound insulation testing.

David Philip has over 30 years' experience as an Acoustic Consultant both in the UK and internationally and has considerable experience undertaking noise surveys and noise assessments for a wide range of commercial uses and also residential developments.

This experience includes a substantial quantity of noise assessments specifically associated with air conditioning units, air source heat pump units and similar plant / equipment serving commercial / retail premises and also residential properties.

David Philip is fully familiar with London Borough of Camden's planning policy acoustic requirements, provisions of the current (and previous) editions of British Standard BS4142, as well as other acoustics related relevant standards and guidance documents.

The opinions expressed in this report are the true and professional opinions of David Philip. Neither David Philip nor Philip Acoustics is appointed on any incentive fee basis.

3. CRITERIA (*London Borough Of Camden Requirements*)

Policy A4: *Noise and Vibration* from Section 6 – *Protecting Amenity* of the Camden Local Plan (adopted June 2017) covers in detail noise issues relating to a wide range of planning and noise pollution scenarios, including of proposed new mechanical services plant / equipment such as ASHP units.

Policy A4: *Noise and Vibration* is reproduced below:

Policy A4 Noise and vibration

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:

- development likely to generate unacceptable noise and vibration impacts; or
- 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.

"Camden's Noise and Vibration Thresholds" referenced in Policy A4 as applicable for proposed new plant / equipment such as ASHP units are advised in Table C from section *Industrial and Commercial Noise Sources* of Appendix 3 to the Camden Local Plan document as reproduced below:

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}

Supporting notes to Table C and as relevant for the proposed ASHP unit include:

- A Rating Level (L_{A,T_r} dB) of 10dB below the background noise (15dB if tonal components are present) should be considered the design criterion, the Rating Level established as per the provisions of BS4142:2014;
- The periods in Table C correspond to 7am to 11pm for the day & 11pm to 7am for the night;
- For smaller equipment such as air source heat pumps where achievement of the Rating Level may not afford protection, the Council will generally also require NR35 or below. To be achieved (in terms of $L_{eq,5mins}$ dB octave band levels) 1m externally from the façade of premises located in a quiet background area.

Full title of the current edition of the referenced British Standard is BS4142:2014+A1:2019 "*Methods for rating and assessing industrial and commercial sound*". Reference throughout this report to BS4142:2014 relates to this current edition document.

Note that as an aid to clarity and to be consistent with wording / guidance of "*Camden's Noise and Vibration Thresholds*" referenced in Policy A4, this report retains use of the more familiar term "noise" throughout as opposed to the replacement term "sound" of BS4142:2014.

It is the author's experience of undertaking many surveys and assessments of noise from ASHP units and similar equipment in similar scenarios and contexts to that as at 6 Laurier Road, that compliance with London Borough of Camden's policy requirements, and as the clarification points below, would mean noise from the proposed new ASHP unit is not audible / disturbing or otherwise of impact to persons inside or outside neighbouring dwellings.

Additional clarification points relevant to the assessment and noise requirements are provided below:

a) ASHP Unit Operating Condition

The noise requirements are cautiously/robustly applied for the ASHP unit operating at full (100%) duty, potentially over a full 24-hour period, i.e. including during the middle of the night.

In practice it is expected the unit would operate at a reduced capacity (and thus with reduced noise output over full duty) for much of the time, including during the late evening and night period.

b) Rating Noise Level

The noise requirements are applied in terms of a noise Rating Level $L_{A,T}$ dB and thus with any correction for tonal characteristics noise applied as necessary to the ASHP unit noise at the assessment position as per the BS4142:2014 assessment methodology.

c) Assessment Position

The noise requirements are applicable to outside nearest residential windows (to living areas and/or bedrooms) and also to within residential gardens used as main amenity (external amenity space). As normal convention and practice the assessment position is with reference to nearest non-associated residential properties (i.e. not the application property itself).

Central garden areas of neighbouring properties are at comparable (or farther) distance from, plus equivalently and/or more screened from (by the property's boundary wall) the proposed ASHP unit location as compared with nearest neighbouring residential building. Compliance to outside nearest residential buildings will by default also ensure compliance to within gardens. Therefore, an assessment position to outside nearest windows of neighbouring residential properties is used.

d) Background Noise Level

The noise requirements are applied as "worse case", cautiously/robustly based on the measured minimum (lower) background noise level $L_{A90,T}$ dB ($T = 15$ mins), representative of at the assessment position over 24 hours (i.e. including during the night), based on results of a five-day noise survey including sample weekdays and a full weekend (see Section 4 of the report).

e) Very Low Background Noise Levels (for information only – item e not applied for assessment)

In accordance with the guidance and assessment provisions of BS4142, then for scenarios of very low background noise it is generally unreasonable / unnecessary to apply a Rating Level noise limit / criterion directly relative to the background level, in terms of ensuring amenity protection such that noise from plant (including such as ASHP units) does not cause disturbance or is otherwise of adverse / detrimental impact.

This simply due to that there is a lower threshold level at which plant noise would become inaudible / not noticeable to occupiers of neighbouring properties and thus it being unreasonable and unnecessary to further reduce the plant noise below that level.

BS4142:2014 advises “Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

Where background levels are very low it is instead appropriate to apply a minimum (lower level) threshold cap plant Rating Level limit of L_{Ar,T_r} 30dB at assessment positions. Previous edition of the standard BS4142:1997 advises that noise Rating Levels of below 35dB be considered very low.

Thus a minimum threshold cap plant noise limit (Rating Level) set at L_{Ar,T_r} 30dB is significantly below (i.e. as 5dB betterment) to this guidance and for scenarios of very low background noise levels (i.e. regardless of the low background noise) will maintain surety of protection for from loss of amenity due to noise disturbance.

Notwithstanding the above, it is sometimes appropriate to apply a lower plant noise limit (i.e. below the threshold cap) in consideration to avoid “background noise creep”. This potentially occurs in scenarios where multiple plant items serving the same or different directly adjacent premises (multiple ASHP units and/or air conditioning units etc) are in turn installed in very close / immediate proximity to one another and as then cumulatively contributing a higher overall noise level to the same receptor (noise sensitive properties).

Table A from section *Vibration* of Appendix 3 to the Camden Local Plan document provides vibration level thresholds. The thresholds are applicable for a wide range of vibration sources such as railways, roads, leisure & entertainment premises as well as new plant/machinery (so including such as air source heat pumps), as affecting (i.e. occurring inside) various types of property including residential dwellings.

The vibration level thresholds are in terms of Vibration Dose Values (VDVs) and for dwellings with separate level thresholds applicable for the day and night period.

Proposed location for the ASHP unit is not directly attached to (structurally linked to) any neighbouring residential properties. Camden’s vibration level thresholds will be complied with by default.

Notwithstanding this, and as detailed in Section 6 & sub-section 7.2 of the report, it is advised as good practice the ASHP unit is installed mounted on conventional proprietary vibration isolators.

4. BACKGROUND NOISE SURVEY

To assess noise from the proposed new ASHP unit against London Borough Of Camden's planning consent noise requirement it is necessary to establish underlying background noise levels representative of at neighbouring residential properties. Details of the background noise survey are provided in sub-sections 4.1 to 4.3.

4.1 Survey Instrumentation

Details of the instrumentation used for the background noise survey are provided in Appendix A. The sound level meter was calibration verified before and after the survey.

4.2 Survey Details & Procedure

Although the ASHP unit would tend to operate principally during the daytime and evening periods, as it is to serve a residential property then it will potentially operate at any time over 24 hours. Therefore, the survey was conducted over at least a full 24-hour period to obtain background noise levels during the entire range of possible times of operation.

The survey was over a five-day period from Friday 25 October 2024 through Tuesday 29 October 2024 to include sample weekdays and also a full weekend.

Weather conditions were monitored and with the exception as described below, were suitable for the background noise survey in accordance with BS4142:2014; dry (nil precipitation) and with light wind.

There were light rainfall / drizzle conditions noted during the Saturday morning and Monday afternoon day periods of the survey. Results of the noise survey for these periods are disregarded from the assessment.

Measurements of background noise were recorded continually in terms of consecutive 15-minute samples of overall equivalent free-field $L_{A90,T}$ dB values ($T=15$ minutes) for the entire survey duration.

The survey measurement position was externally to the rear of the property, with the microphone set at upper floor level in equivalent free-field conditions facilitated by positioning the instrumentation microphone on a telescopic boom and extension cable arrangement from the second floor rear terrace. The position was selected as directly representative for outside the nearest neighbouring property.

Nearest neighbouring properties to the proposed ASHP unit are adjacent residential dwellings at 4 Laurier Road and 8 Laurier Road.

Other neighbouring properties including in either direction on Laurier Road and on Woodsome Road (beyond rear of 6 Laurier Road) are more distant from, and more naturally screened from, location of the proposed new ASHP unit than the neighbouring properties 4 & 8 Laurier Road.

Proposed location of the ASHP unit, nearest neighbouring property plus background noise survey measurement position are indicated on an aerial image and proposed ASHP unit location drawing in Appendix B.

4.3 Survey Results, Observations & ASHP Unit Noise Limit

Full raw data results of the five-day background noise survey are provided in Appendix C.

Background noise levels at the rear of 6 Laurier Road and as representative of outside neighbouring properties are low / very low, reasonably consistent from day to day and normal for this location predominantly due to underlying noise from road traffic generally in the wider area.

Underlying background noise fluctuates during the day, then gradually reduces during the evening and into the night (lowest between circa 1am to 4am), before then increasing again in the morning as traffic increases. This diurnal noise profile is normal for this location with underlying noise from traffic in the wider area.

Summary of the representative minimum (lowest) $L_{A90,T}$ background noise level and associated ASHP unit noise limit based on Camden's noise requirements and with reference to BS4142:2014 (detailed in Section 3 of the report) is shown in Table 1.

ASHP Unit Operating Condition	Assessment Position & Relevant Times	Representative Minimum Background Noise Level $L_{A90,15min}$	ASHP Unit Noise Limit (Rating Level)
ASHP unit operating full 100% duty potentially (as worse-case) over a 24-hour period	Outside nearest windows of neighbouring properties Assessment over 24 hour period	35dB <i>(minimum level occurs for a limited time during night period)</i>	$L_{A1,T1} \leq 25dBA$ (10dB below background) $L_{A1,T1} \leq 20dBA$ (15dB below background; applicable if unit noise has tonal components)

Table 1: Measured representative minimum background noise & associated ASHP unit noise limit

As indicated in Section 5 of the report, the proposed ASHP unit generates a nominally broadband type noise without strong or dominant tonal characteristics. London Borough of Camden's requirement 10dB below the minimum (lowest) background noise level is applied for the assessment.

5. NOISE FROM AIR SOURCE HEAT PUMP UNIT

Informative 1: Proposed Air Source Heat Pump Unit

This report is based on the proposed Vaillant ASHP unit as detailed below.

If an alternative make and/or model of unit is selected, including as part of future possible unit replacement, it is important that noise levels for the alternative unit be checked by Philip Acoustics or another Acoustic Consultant to ensure noise emissions of the alternative unit remain compliant with the noise limit.

The proposed ASHP unit is a Vaillant aroTHERM plus 7kW.

Manufacturer's noise data for the ASHP unit is provided in Appendix D. The noise data is for the unit operating at full (100%) duty in terms of overall dBA sound power level and also free-field overall dBA sound pressure levels at varying distance from the unit.

For purpose of the noise assessment, it is cautiously / robustly taken as "worse case" the ASHP unit is operating at full 100% duty, i.e. with no allowance the unit would likely operate at reduced duty / capacity (with consequent lower noise output), for much of the time including during the late evening and night period.

Summary of noise output from the ASHP unit in terms of sound power level data including indicative octave band values is shown in Table 2.

Description	Overall dBA	Octave Band Centre Frequency (Hz) Lin dB ⁽¹⁾							
		63	125	250	500	1k	2k	4k	8k
Vaillant aroTHERM plus 7kW ASHP unit <i>Unit operating full 100% duty</i>	55	60	58	55	53	48	45	43	40
Note ⁽¹⁾: No manufacturer octave band noise data available for Vaillant aroTHERM plus 7kW ASHP unit; the stated linear dB octave band sound power levels are based on octave band sound pressure level measurements undertaken by the author of this same make & model ASHP unit as installed at other properties.									

Table 2: ASHP unit noise data; sound power levels

Experience of the author in measuring noise levels from installed same and similar model / capacity residential use ASHP units, plus with reference to available octave band noise data for other manufacturer similar type and capacity residential use ASHP units indicates the Vaillant aroTHERM plus 7kW generates a broadband type noise without strong, identifiable or clearly perceptible tonal elements.

To calculate the noise contribution from the ASHP unit to outside nearest neighbouring residential properties (assessment positions) a spreadsheet noise calculation model has been used.

The model takes account of the distance between the unit and assessment position, acoustic directivity, acoustic reflections (i.e. non free-field conditions) and any natural / default line of sight acoustic screening due to orientation and intervening buildings / structures etc. where applicable.

The noise model calculation also takes account of the acoustic louvre enclosure (noise reduction treatment) applied to the ASHP unit as specified in sub-section 7.1 of this report.

Noise assessment positions and noise model calculation details are provided in Appendix E.

Informative 2: Noise Assessment Positions

The noise model calculation uses multiple separate noise assessment positions for the neighbouring property 8 Laurier Road. This is to account for differing magnitude natural / default line of sight acoustic screening from the proposed ASHP unit location due to the intervening boundary brick wall between 6 & 8 Laurier Road.

The overall calculated noise Rating Level from the proposed ASHP unit to outside nearest neighbouring properties compared with the noise limit is shown in Table 3.

Noise from the ASHP unit to outside other neighbouring properties in the vicinity that are more distant from proposed location of the unit will be lower.

ASHP Unit Operating Condition	Assessment Position	ASHP Unit Overall Noise Level (Rating Level)	Noise Limit (Rating Level)	Comment
ASHP unit operating full (100%) duty potentially over a 24-hour period	A) Nearest lower ground floor windows of neighbouring property 8 Laurier Road	$L_{A,r,T,r}$ 22dB	$L_{A,r,T,r} \leq 25\text{dB}$	Noise from proposed ASHP unit significantly below minimum (lowest) background noise levels & complies with noise limit
	B) Nearest upper ground floor windows of neighbouring property 8 Laurier Road	$L_{A,r,T,r}$ 19dB		
	C) Nearest first floor windows of neighbouring property 8 Laurier Road	$L_{A,r,T,r}$ 18dB		
	D) Nearest second floor windows of neighbouring property 8 Laurier Road	$L_{A,r,T,r}$ 23dB		
	E) Nearest windows of neighbouring property 4 Laurier Road	$L_{A,r,T,r}$ 23dB		

Table 3: Assessment of noise from ASHP unit

The assessment as Table 3 demonstrates noise from the ASHP unit complies with the noise limit.

At this level, noise from the ASHP unit will be significantly below existing minimum (lowest) background levels as occur during the night period plus in absolute terms be very low and would not be expected to be audible, cause disturbance or otherwise be of impact detrimental to the amenity of neighbouring residential occupiers.

Consultants in Noise & Vibration
Building Regulations Certification Sound Insulation Testing

Additionally, it is important to note the noise model calculation and assessment is cautious / robust and in practice noise from the ASHP unit will be lower and further below the background noise and limit for the following reasons:

- The assessment is on the basis the ASHP unit is operating as “worse-case” at full 100% duty all the time over 24-hours including all through the late evening and night period. This is extremely unlikely to occur for majority of the time. It is likely the unit would operate at a reduced capacity with consequent lower noise output, if at all, during the night;
- The noise limit used for the assessment is based on the representative minimum background noise level over 24-hours (i.e. including late evening and middle of the night), as measured during a survey over several days including a weekend. Background noise for the majority of the time is higher than the value used for the assessment. Correspondingly, for these times the ASHP unit noise would be further below the background noise occurring during these times.

In addition to the assessment as detailed above and in Table 3, noise from proposed ASHP unit to nearest neighbouring properties is also assessed against London Borough of Camden’s NR value noise limit requirement (NR35) as detailed in Table 4.

Table 4 demonstrates noise from the ASHP unit additionally complies with (does not exceed) the NR35 noise limit criterion as per London Borough of Camden’s requirements.

Description	NR Value	Octave Band Centre Frequency (Hz) ($L_{eq,5mins}$ dB)							
		63	125	250	500	1k	2k	4k	8k
London Borough of Camden NR value limit	≤NR35	≤63	≤52	≤45	≤39	≤35	≤32	≤30	≤29
<u>Assessment Position A)</u> Nearest lower ground floor windows of neighbouring property 8 Laurier Road									
Noise from ASHP unit to assessment position	NR16	31	29	24	20	12	7	6	3
Excess of ASHP unit noise on NR limit	-	-	-	-	-	-	-	-	-
<u>Assessment Position B)</u> Nearest upper ground floor windows of neighbouring property 8 Laurier Road									
Noise from ASHP unit to assessment position	NR12	32	28	22	17	9	4	3	0
Excess of ASHP unit noise on NR limit	-	-	-	-	-	-	-	-	-
<u>Assessment Position C)</u> Nearest first floor windows of neighbouring property 8 Laurier Road									
Noise from ASHP unit to assessment position	NR12	29	27	21	17	7	1	-1	-4
Excess of ASHP unit noise on NR limit	-	-	-	-	-	-	-	-	-
<u>Assessment Position D)</u> Nearest second floor windows of neighbouring property 8 Laurier Road									
Noise from ASHP unit to assessment position	NR17	32	30	25	21	13	8	7	4
Excess of ASHP unit noise on NR limit	-	-	-	-	-	-	-	-	-
<u>Assessment Position E)</u> Nearest windows of neighbouring property 4 Laurier Road									
Noise from ASHP unit to assessment position	NR18	33	31	26	22	14	9	8	5
Excess of ASHP unit noise on NR limit	-	-	-	-	-	-	-	-	-

Table 4: Assessment of noise from ASHP unit (*NR value assessment*)

6. VIBRATION FROM AIR SOURCE HEAT PUMP UNIT

Location for the ASHP unit is separate from (i.e. not structurally attached or otherwise physically connected / fixed to) neighbouring properties.

It is not expected there would be any vibration transmission from the ASHP unit to neighbouring properties and it is not necessary to specify vibration isolator mountings to the ASHP unit specifically to protect neighbouring properties from potential vibration.

Notwithstanding this, as good practice it is advised the unit is installed mounted on conventional proprietary vibration isolators.

Specification details for example typically suitable proprietary vibration isolators are provided in sub-section 7.2 of the report.

7. NOISE REDUCTION & VIBRATION ISOLATION MEASURES

7.1 Noise Reduction

Informative 3: Other Considerations Associated With Noise Reduction

Philip Acoustics can only advise on noise & vibration (acoustic) issues and therefore professional advice from others may need to be sought to confirm aspects of the noise reduction treatment with regard to non-acoustic issues such as visual appearance, maintenance access and airflow ventilation to the ASHP unit.

To ensure compliance with the noise limit, the ASHP unit is proposed to be installed within an acoustic louvre enclosure as outline indicated on the annotated part copy layout drawing in Appendix F.

Use of an acoustic louvre enclosure is a normal / conventional method of noise reduction treatment for a domestic use external air conditioning unit in this scenario, and in non-technical lay terms essentially forms a “soundproof” outdoor box / housing around the unit.

In terms of noise reduction performance specification, the acoustic enclosure is required to reduce the overall noise output of the air conditioning unit by at least circa 6dBA.

A typical enclosure would have acoustic louvres to the front and sides to permit airflow to/from the unit and with the remaining non-acoustic louvre parts of the enclosure’s outer structure formed by normal/standard type proprietary 25mm to 50mm thick solid (i.e. non louvred) acoustic panels.

Normal/standard type proprietary acoustic panels are solid one side (minimum 20swg sheet steel) and perforated the other (typically perforated 22swg sheet steel) with 25mm to 50mm thick acoustic grade mineral wool absorptive lining. The perforated (absorptive) side of the enclosure panels face inwards towards the air conditioning unit.

Proprietary 25mm to 50mm thick acoustic panels as the specification details above are available as standard from most acoustic hardware suppliers.

Cable and pipework entry points into and out of the unit acoustic enclosure to be sealed airtight.

As commonly applied in domestic settings as visual screening; garden type timber trellising can be positioned externally to around an air conditioning unit enclosure, very often with climbing pot plants to the trellis.

Advised specification performance requirement for the enclosure acoustic louvres is shown in Table 5 on the following page.

As normal for noise reduction treatments, the performance specification is for different amounts in different frequency bands, but with requirement to achieve an overall noise reduction of at least 6dBA as applied to the ASHP unit noise spectrum (octave band levels).

Description	Octave Band Centre Frequency (Hz)								Comments
	63	125	250	500	1k	2k	4k	8k	
Acoustic Louvre Sound Reduction Index dB	4	4	6	8	11	13	12	12	Overall dBA noise reduction \geq 6dBA achieved using conventional minimum 150mm depth type acoustic louvres

Table 5: Acoustic louvre performance specification (nominal 150mm depth acoustic louvres)

The Table 5 acoustic louvre specification is based on using conventional proprietary nominal 150mm depth type acoustic louvres as available from many acoustic hardware suppliers. The technical data sheet for an example supplier's 150mm depth acoustic louvres is provided in Appendix F.

Informative 4: Acoustic Louvre Suppliers

Different acoustic hardware suppliers have slightly differing sound reduction performance data for their 150mm depth acoustic louvres. Therefore, some supplier data may indicate slight variation in performance as compared with the octave band specification data in Table 5. This is advised acceptable providing the acoustic louvres are minimum 150mm depth type.

7.2 Vibration Isolation

As detailed in Section 6, it is advised the ASHP unit is installed on vibration isolator mountings.

Typically suitable / appropriate proprietary vibration isolators for the ASHP unit are rubber or neoprene turret type mountings. 4 x isolators are required; one to under each mounting corner position of the unit.

Details for three example suppliers and their typically suitable vibration isolators are provided below.

The example suppliers are not listed in any order of preference and copy of each of the supplier's data sheets is provided in Appendix G. Other suppliers will be able to offer similar suitable / equivalent vibration isolators.

Example Supplier 1:

EMTEC: www.emtecproducts.co.uk Isolator type: Neoprene Mountings Series R/RD

Vaillant aroTHERM plus 7kW (weight 128kg) = Isolator R-1 Green (max load per isolator 54.4kg)

Example Supplier 2:

Christie & Grey: www.christiegrey.co.uk Isolator type: Rubber Turret Mountings RM

Vaillant aroTHERM plus 7kW (weight 128kg) = Isolator RM 19.100.B.F Blue (max load per mount 50kg)

Example Supplier 3:

Fibet Group: www.fibet.co.uk Isolator type: SEM Light Duty Mounts

Vaillant aroTHERM plus 7kW (weight 128kg) = Isolator SEM-8525M (max load per mount 43kg)

APPENDIX A

Noise Survey Instrumentation

Site: 6 Laurier Road, London NW5 1SG

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Date: November 2024

NOISE SURVEY INSTRUMENTATION

Instrumentation Used:

- Rion sound level meter type NL-32 Class 1, Rion preamplifier type NH-21, Rion microphone type UC-53A, Rion microphone windshield type WS-10, Rion microphone extension cable type EC-04A and tripod / telescopic boom arrangement;
- Bruel & Kjaer calibrator type 4231;
- Speedtech Instruments Skymaster model SM-28 serial number 19370 (sample weather conditions data).

Instrumentation Calibration Certification:

Description	Type Number	Manufacturer	Date of Calibration Expiration	Calibration Certificate Number
Class 1 Sound Level Meter s/n 01103430	NL-32	Rion	22/03/2026	TCRT24/1258
Microphone s/n 317947	UC-53A			
Preamplifier s/n 34369	NH-21			
Calibrator s/n 2642929	4231	Bruel & Kjaer	22/03/2026	TCRT24/1156

Instrumentation On-Site Calibration Check:

Description	Calibrator Reference Level	Measured Level	Comment
Before survey measurements	94.0dB	94.1dB	Pass
After survey measurements		94.1dB	Pass (nil drift)

A P P E N D I X B

Aerial Image & Proposed ASHP Unit Location Drawing

Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix B (page 1 of 2)

Date: November 2024

AERIAL IMAGE

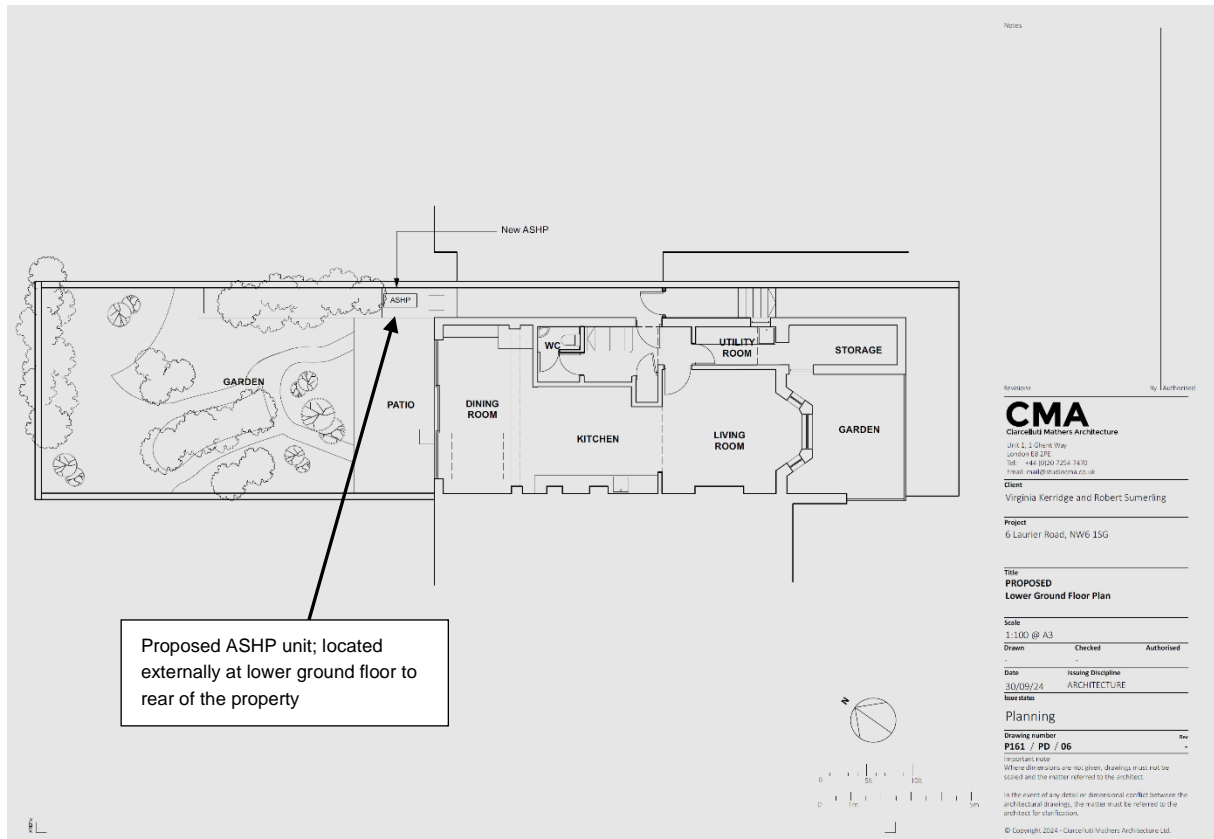


Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix B (page 2 of 2)

Date: November 2024

PROPOSED ASHP UNIT LOCATION DRAWING



A P P E N D I X C

Background Noise Survey Results

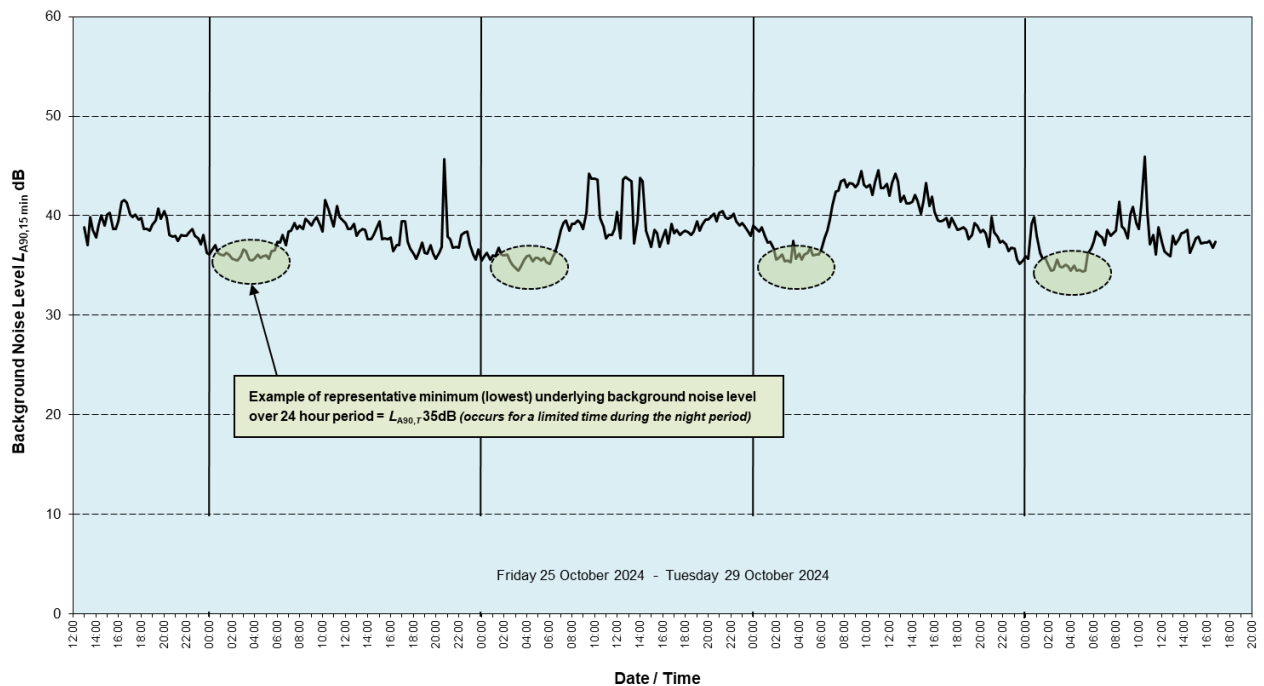
Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix C (page 1 of 1)

Date: November 2024

BACKGROUND NOISE SURVEY RESULTS

Raw Data Results For Five-Day Survey Friday 25 October 2024 – Tuesday 29 October 2024:



A P P E N D I X D

Manufacturer Noise Data For Air Source Heat Pump Unit

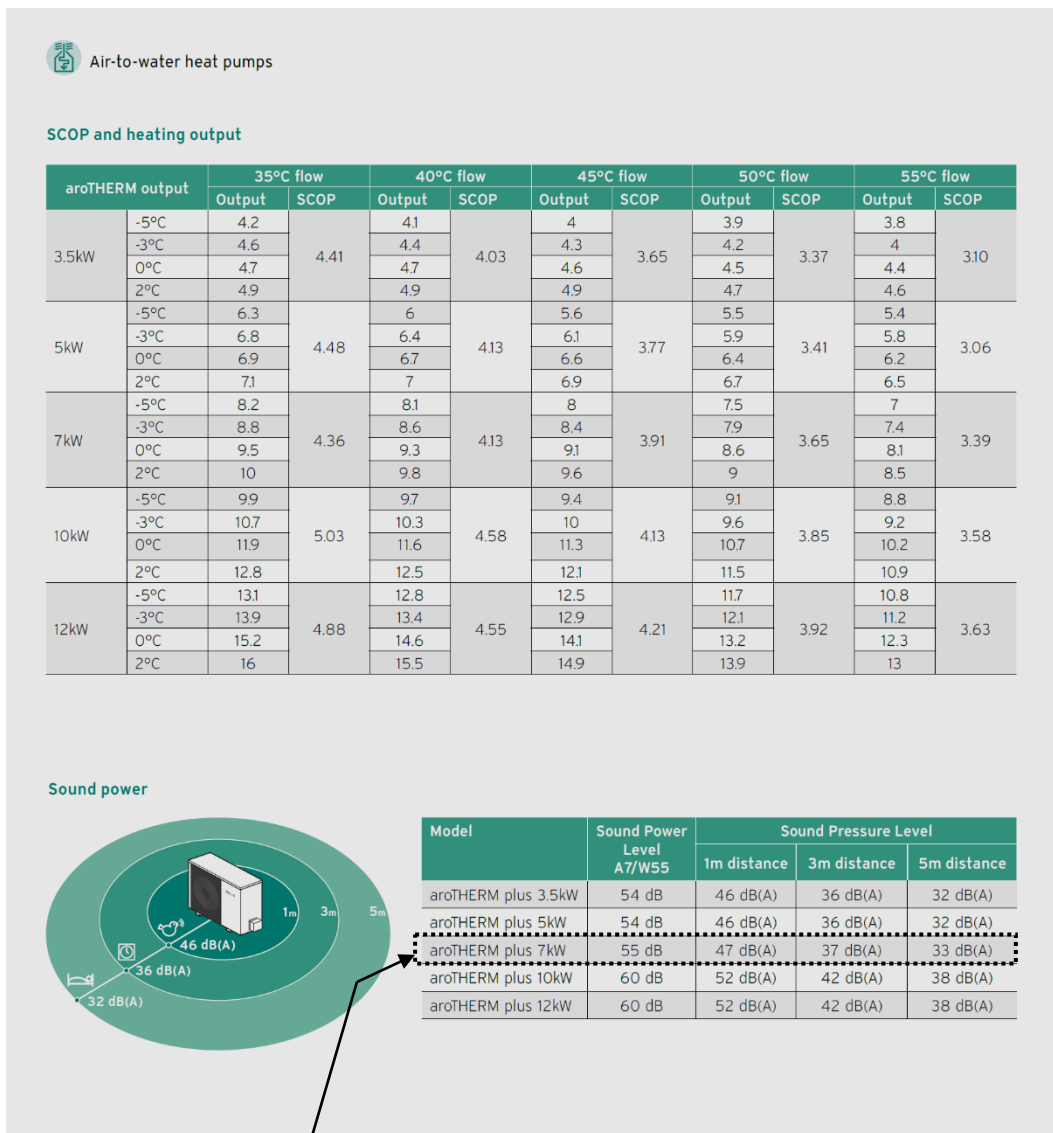
Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix D (page 1 of 1)

Date: November 2024

MANUFACTURER NOISE DATA FOR AIR SOURCE HEAT PUMP UNIT

Vaillant aroTHERM plus 7kW



Manufacturer noise data is in terms of overall dBA sound power level & free-field overall dBA sound pressure levels at varying distance from the unit

A P P E N D I X E

Noise Assessment Positions & Noise Model Calculation For Air Source Heat Pump Unit

Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix E (page 1 of 6)

Date: November 2024

NOISE ASSESSMENT POSITIONS



Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix E (page 2 of 6)

Date: November 2024

NOISE MODEL CALCULATION FOR AIR SOURCE HEAT PUMP UNIT

Assessment Position A: Nearest lower ground floor windows of neighbouring property 8 Laurier Road

Noise Condition: ASHP unit Vaillant aroTHERM plus 7kW operating full 100% duty

Noise Mitigation: ASHP unit within acoustic louvre enclosure (see sub-section 7.1 Report 24084-002)

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
ASHP Unit: Vaillant aroTHERM plus 7kW									
Noise Data: sound power level; L _w dB unit operating full 100% duty	55	60	58	55	53	48	45	43	40
Quantity; 0dB unit quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Noise Mitigation; unit within acoustic louvre enclosure (150mm depth type acoustic louvres)		-4	-4	-6	-8	-11	-13	-12	-12
Distance; free-field correction for ≈3m distance from unit to assessment position		-18	-18	-18	-18	-18	-18	-18	-18
Screening; screening correction applicable (intervening boundary wall), limit to -10dB		-10	-10	-10	-10	-10	-10	-10	-10
Directivity; nil propagation directivity correction applicable (unit radiates noise equally all directions)		0	0	0	0	0	0	0	0
Non Free-Field / Reflections; +3dB correction applied for unit positioned adjacent to wall		3	3	3	3	3	3	3	3
ASHP unit contribution at assessment position	22	31	29	24	20	12	7	6	3
Cumulative Contribution All Plant At Assessment Position	22	31	29	24	20	12	7	6	3

The ASHP unit overall sound pressure (Specific Noise) level at the assessment position = 22dBA.

The ASHP unit generates broadband characteristic noise without strong, identifiable or clearly perceptible tonal elements, and at the assessment position is significantly below the minimum (lowest) underlying background noise level.

As per BS4142:2014 assessment methodology, overall ASHP unit noise to the assessment position is a Rating Level $L_{A,r,Tr}$ 22dB.

Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix E (page 3 of 6)

Date: November 2024

NOISE MODEL CALCULATION FOR AIR SOURCE HEAT PUMP UNIT

Assessment Position B: Nearest upper ground floor windows of neighbouring property 8 Laurier Road

Noise Condition: ASHP unit Vaillant aroTHERM plus 7kW operating full 100% duty

Noise Mitigation: ASHP unit within acoustic louvre enclosure (see sub-section 7.1 Report 24084-002)

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
ASHP Unit: Vaillant aroTHERM plus 7kW									
Noise Data: sound power level; L _w dB unit operating full 100% duty	55	60	58	55	53	48	45	43	40
Quantity; 0dB unit quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Noise Mitigation; unit within acoustic louvre enclosure (150mm depth type acoustic louvres)		-4	-4	-6	-8	-11	-13	-12	-12
Distance; free-field correction for ≈4.5m distance from unit to assessment position		-21	-21	-21	-21	-21	-21	-21	-21
Screening; screening correction applicable (intervening boundary wall), limit to -10dB		-6	-8	-9	-10	-10	-10	-10	-10
Directivity; nil propagation directivity correction applicable (unit radiates noise equally all directions)		0	0	0	0	0	0	0	0
Non Free-Field / Reflections; +3dB correction applied for unit positioned adjacent to wall		3	3	3	3	3	3	3	3
ASHP unit contribution at assessment position	19	32	28	22	17	9	4	3	0
Cumulative Contribution All Plant At Assessment Position	19	32	28	22	17	9	4	3	0

The ASHP unit overall sound pressure (Specific Noise) level at the assessment position = 19dBA.

The ASHP unit generates broadband characteristic noise without strong, identifiable or clearly perceptible tonal elements, and at the assessment position is significantly below the minimum (lowest) underlying background noise level.

As per BS4142:2014 assessment methodology, overall ASHP unit noise to the assessment position is a Rating Level $L_{A,T,r}$ 19dB.

Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix E (page 4 of 6)

Date: November 2024

NOISE MODEL CALCULATION FOR AIR SOURCE HEAT PUMP UNIT

Assessment Position C: Nearest first floor windows of neighbouring property 8 Laurier Road

Noise Condition: ASHP unit Vaillant aroTHERM plus 7kW operating full 100% duty

Noise Mitigation: ASHP unit within acoustic louvre enclosure (see sub-section 7.1 Report 24084-002)

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
ASHP Unit: Vaillant aroTHERM plus 7kW									
Noise Data: sound power level; L _w dB unit operating full 100% duty	55	60	58	55	53	48	45	43	40
Quantity; 0dB unit quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Noise Mitigation; unit within acoustic louvre enclosure (150mm depth type acoustic louvres)		-4	-4	-6	-8	-11	-13	-12	-12
Distance; free-field correction for ≈7m distance from unit to assessment position		-25	-25	-25	-25	-25	-25	-25	-25
Screening; screening correction applicable (intervening boundary wall), limit to -10dB		-5	-5	-6	-6	-8	-9	-10	-10
Directivity; nil propagation directivity correction applicable (unit radiates noise equally all directions)		0	0	0	0	0	0	0	0
Non Free-Field / Reflections; +3dB correction applied for unit positioned adjacent to wall		3	3	3	3	3	3	3	3
ASHP unit contribution at assessment position	18	29	27	21	17	7	1	-1	-4
Cumulative Contribution All Plant At Assessment Position	18	29	27	21	17	7	1	-1	-4

The ASHP unit overall sound pressure (Specific Noise) level at the assessment position = 18dBA.

The ASHP unit generates broadband characteristic noise without strong, identifiable or clearly perceptible tonal elements, and at the assessment position is significantly below the minimum (lowest) underlying background noise level.

As per BS4142:2014 assessment methodology, overall ASHP unit noise to the assessment position is a Rating Level $L_{A,r,Tr}$ 18dB.

Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix E (page 5 of 6)

Date: November 2024

NOISE MODEL CALCULATION FOR AIR SOURCE HEAT PUMP UNIT

Assessment Position D: Nearest second floor windows of neighbouring property 8 Laurier Road

Noise Condition: ASHP unit Vaillant aroTHERM plus 7kW operating full 100% duty

Noise Mitigation: ASHP unit within acoustic louvre enclosure (see sub-section 7.1 Report 24084-002)

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
ASHP Unit: Vaillant aroTHERM plus 7kW									
Noise Data: sound power level; L _w dB unit operating full 100% duty	55	60	58	55	53	48	45	43	40
Quantity; 0dB unit quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Noise Mitigation; unit within acoustic louvre enclosure (150mm depth type acoustic louvres)		-4	-4	-6	-8	-11	-13	-12	-12
Distance; free-field correction for ≈8.5m distance from unit to assessment position		-27	-27	-27	-27	-27	-27	-27	-27
Screening; nil acoustic screening correction applicable to assessment position		0	0	0	0	0	0	0	0
Directivity; nil propagation directivity correction applicable (unit radiates noise equally all directions)		0	0	0	0	0	0	0	0
Non Free-Field / Reflections; +3dB correction applied for unit positioned adjacent to wall		3	3	3	3	3	3	3	3
ASHP unit contribution at assessment position	23	32	30	25	21	13	8	7	4
Cumulative Contribution All Plant At Assessment Position	23	32	30	25	21	13	8	7	4

The ASHP unit overall sound pressure (Specific Noise) level at the assessment position = 23dBA.

The ASHP unit generates broadband characteristic noise without strong, identifiable or clearly perceptible tonal elements, and at the assessment position is significantly below the minimum (lowest) underlying background noise level.

As per BS4142:2014 assessment methodology, overall ASHP unit noise to the assessment position is a Rating Level $L_{A,Tr}$ 23dB.

Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix E (page 6 of 6)

Date: November 2024

NOISE MODEL CALCULATION FOR AIR SOURCE HEAT PUMP UNIT

Assessment Position E: Nearest windows of neighbouring property 4 Laurier Road

Noise Condition: ASHP unit Vaillant aroTHERM plus 7kW operating full 100% duty

Noise Mitigation: ASHP unit within acoustic louvre enclosure (see sub-section 7.1 Report 24084-002)

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
ASHP Unit: Vaillant aroTHERM plus 7kW									
Noise Data: sound power level; L _w dB unit operating full 100% duty	55	60	58	55	53	48	45	43	40
Quantity; 0dB unit quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Noise Mitigation; unit within acoustic louvre enclosure (150mm depth type acoustic louvres)		-4	-4	-6	-8	-11	-13	-12	-12
Distance; free-field correction for ≈8.5m distance from unit to assessment position		-26	-26	-26	-26	-26	-26	-26	-26
Screening; nil acoustic screening correction applicable to assessment position		0	0	0	0	0	0	0	0
Directivity; nil propagation directivity correction applicable (unit radiates noise equally all directions)		0	0	0	0	0	0	0	0
Non Free-Field / Reflections; +3dB correction applied for unit positioned adjacent to wall		3	3	3	3	3	3	3	3
ASHP unit contribution at assessment position	23	33	31	26	22	14	9	8	5
Cumulative Contribution All Plant At Assessment Position	23	33	31	26	22	14	9	8	5

The ASHP unit overall sound pressure (Specific Noise) level at the assessment position = 23dBA.

The ASHP unit generates broadband characteristic noise without strong, identifiable or clearly perceptible tonal elements, and at the assessment position is significantly below the minimum (lowest) underlying background noise level.

As per BS4142:2014 assessment methodology, overall ASHP unit noise to the assessment position is a Rating Level $L_{A,Tr}$ 23dB.

A P P E N D I X F

Details For Noise Reduction

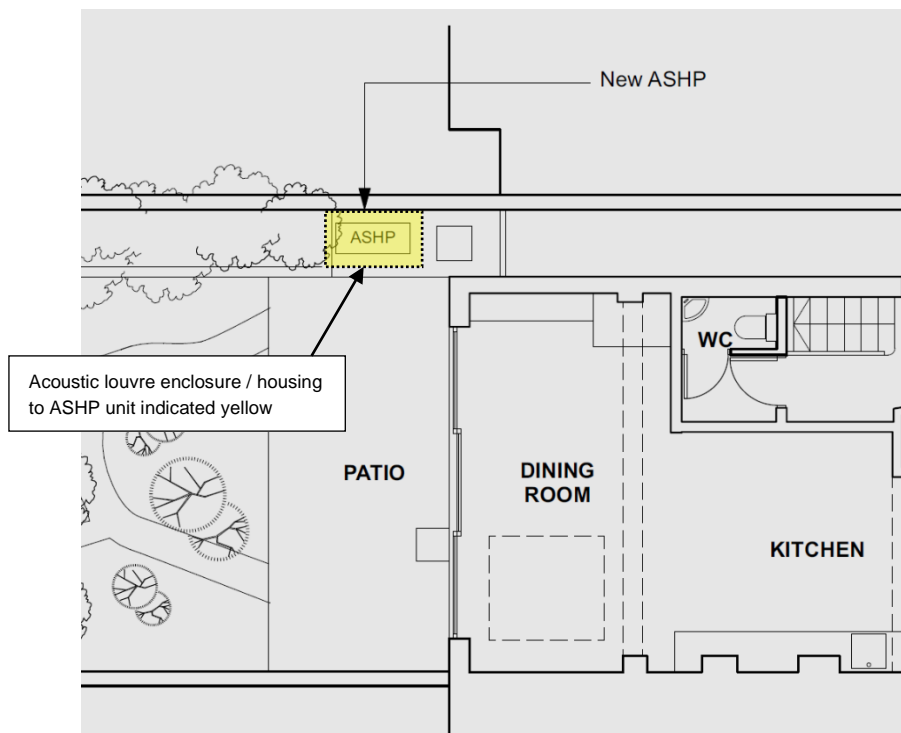
Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix F (page 1 of 2)

Date: November 2024

DETAILS FOR NOISE REDUCTION

Enlarged Part Copy Layout Drawing Indicating ASHP Unit Acoustic Louvre Enclosure



Photograph of a typical example acoustic louvre enclosure / housing around a domestic use air conditioning unit (similar type unit to an ASHP unit) serving a residential dwelling. *This example acoustic louvre & enclosure / housing is to a high elevation wall mounted unit required to be painted black for planning reasons.*



Site: 6 Laurier Road, London NW5 1SG

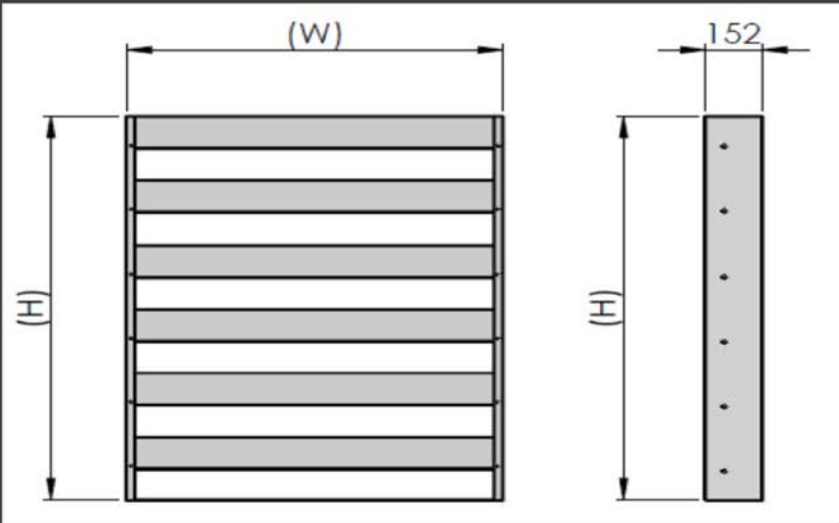
Report: 24084-002 Appendix F (page 2 of 2)

Date: November 2024

DETAILS FOR NOISE REDUCTION

Data Sheet For Example 150mm Depth Type Acoustic Louvre: Supplier BAS Ltd

BA SL150 SP Acoustic Louvre



Model	63	125	250	500	1k	2k	4k	8k	Rw
BASL	4	4	6	8	11	13	12	12	10
Face Velocity	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5
Pressure Drop	3	7	12	19	27	36	48	60	74
Weight	24kg/m2								
Visual Free Area*	50%								
Actual Free Area	34%								

Louvre acoustic performance;
sound reduction index dB at
octave bands 63Hz to 8kHz

Tel 0161 804 4440

A P P E N D I X G

Details For Example Vibration Isolators

Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix G (page 1 of 3)

Date: November 2024

DETAILS FOR EXAMPLE VIBRATION ISOLATORS

Supplier: EMTEC



Effective Isolation for Floor Mounted Equipment

Series R & RD Neoprene Mountings are molded in colored oil-resistant neoprene. This unique color coding provides instant identification of loading capacity — simplifies stocking — prevents installation errors.

The VMC molding process embeds all metal parts in neoprene, preventing corrosion. Mountings can also be molded in other elastomers to meet special requirements.

Bulletin No. R12/93 (UK)

VME KORFUND

Neoprene Mountings Series R/RD

Available in 4 sizes - 5 durometers
Load Range - 10 lbs. to 4,000 lbs.
Deflections to 1/4" with type R to 1/2" with type RD
Corrosion Proof
Molded in colored oil-resistant neoprene
5 colors for error free identification

Typical Applications

Air Handling Units Business Machines
Compressors Fans Instrument Panels
Machine Tools Pumps
Motor Generators Transformers

To Specify:

Neoprene mountings shall consist of a steel top plate and base plate completely embedded in coloured oil-resistant neoprene stock for easy identification of capacity. The mountings shall be Type R or RD, depending upon the required deflection of 1/4" to 1/2", as manufactured by VMC and as supplied by EMTEC Products Limited

TYPE R/RD



TYPE RP/RDP



Dimensions: In. (mm)

Type	L	W	H	A	B	C	D	E
R1	3 1/2"	3 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/2"	1 1/2"	1 1/2"
R1	(91.4)	(91.4)	(38.1)	(38.1)	(38.1)	(63.5)	(38.1)	(38.1)
R2	3 1/2"	3 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/2"	1 1/2"	1 1/2"
R2	(91.4)	(91.4)	(38.1)	(38.1)	(38.1)	(63.5)	(38.1)	(38.1)
R3	3 1/2"	3 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/2"	1 1/2"	1 1/2"
R3	(91.4)	(91.4)	(38.1)	(38.1)	(38.1)	(63.5)	(38.1)	(38.1)
R4	3 1/2"	3 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/2"	1 1/2"	1 1/2"
R4	(91.4)	(91.4)	(38.1)	(38.1)	(38.1)	(63.5)	(38.1)	(38.1)

* RD dimension applies to double deflection Type RD mountings only.

New design for Type R-4 and RD-4 neoprene mountings.





EMTEC Products Limited, Enterprise House, Blyth Road, Hayes, Middlesex UB3 1DD
Telephone: 0181 848 3031 Facsimile: 0181 573 3605



EMTEC Products Limited, Enterprise House, Blyth Road, Hayes, Middlesex UB3 1DD
Telephone: 0181 848 3031 Facsimile: 0181 573 3605



Type	Color Code	Bolt	Max. Load	Deflection in. (mm)	
				R	RD
R1	BLACK	3/8"	35	0.25	0.50
R2	RED	1/2"	45	0.25	0.50
R3	RED	3/4"	75	0.25	0.50
R4	RED	1"	125	0.25	0.50
R5	RED	1 1/4"	175	0.25	0.50
R6	RED	1 1/2"	240	0.25	0.50
R7	RED	1 3/4"	300	0.25	0.50
R8	RED	2"	350	0.25	0.50
R9	RED	2 1/4"	400	0.25	0.50
R10	RED	2 1/2"	450	0.25	0.50
R11	RED	2 3/4"	500	0.25	0.50
R12	RED	3"	550	0.25	0.50
R13	RED	3 1/4"	600	0.25	0.50
R14	RED	3 1/2"	650	0.25	0.50
R15	RED	3 3/4"	700	0.25	0.50
R16	RED	4"	750	0.25	0.50
R17	RED	4 1/4"	800	0.25	0.50
R18	RED	4 1/2"	850	0.25	0.50
R19	RED	4 3/4"	900	0.25	0.50
R20	RED	5"	950	0.25	0.50
R21	RED	5 1/4"	1000	0.25	0.50
R22	RED	5 1/2"	1050	0.25	0.50
R23	RED	5 3/4"	1100	0.25	0.50
R24	RED	6"	1150	0.25	0.50
R25	RED	6 1/4"	1200	0.25	0.50
R26	RED	6 1/2"	1250	0.25	0.50
R27	RED	6 3/4"	1300	0.25	0.50
R28	RED	7"	1350	0.25	0.50
R29	RED	7 1/4"	1400	0.25	0.50
R30	RED	7 1/2"	1450	0.25	0.50
R31	RED	7 3/4"	1500	0.25	0.50
R32	RED	8"	1550	0.25	0.50
R33	RED	8 1/4"	1600	0.25	0.50
R34	RED	8 1/2"	1650	0.25	0.50
R35	RED	8 3/4"	1700	0.25	0.50
R36	RED	9"	1750	0.25	0.50
R37	RED	9 1/4"	1800	0.25	0.50
R38	RED	9 1/2"	1850	0.25	0.50
R39	RED	9 3/4"	1900	0.25	0.50
R40	RED	10"	1950	0.25	0.50
R41	RED	10 1/4"	2000	0.25	0.50
R42	RED	10 1/2"	2050	0.25	0.50
R43	RED	10 3/4"	2100	0.25	0.50
R44	RED	11"	2150	0.25	0.50
R45	RED	11 1/4"	2200	0.25	0.50
R46	RED	11 1/2"	2250	0.25	0.50
R47	RED	11 3/4"	2300	0.25	0.50
R48	RED	12"	2350	0.25	0.50
R49	RED	12 1/4"	2400	0.25	0.50
R50	RED	12 1/2"	2450	0.25	0.50
R51	RED	12 3/4"	2500	0.25	0.50
R52	RED	13"	2550	0.25	0.50
R53	RED	13 1/4"	2600	0.25	0.50
R54	RED	13 1/2"	2650	0.25	0.50
R55	RED	13 3/4"	2700	0.25	0.50
R56	RED	14"	2750	0.25	0.50
R57	RED	14 1/4"	2800	0.25	0.50
R58	RED	14 1/2"	2850	0.25	0.50
R59	RED	14 3/4"	2900	0.25	0.50
R60	RED	15"	2950	0.25	0.50
R61	RED	15 1/4"	3000	0.25	0.50
R62	RED	15 1/2"	3050	0.25	0.50
R63	RED	15 3/4"	3100	0.25	0.50
R64	RED	16"	3150	0.25	0.50
R65	RED	16 1/4"	3200	0.25	0.50
R66	RED	16 1/2"	3250	0.25	0.50
R67	RED	16 3/4"	3300	0.25	0.50
R68	RED	17"	3350	0.25	0.50
R69	RED	17 1/4"	3400	0.25	0.50
R70	RED	17 1/2"	3450	0.25	0.50
R71	RED	17 3/4"	3500	0.25	0.50
R72	RED	18"	3550	0.25	0.50
R73	RED	18 1/4"	3600	0.25	0.50
R74	RED	18 1/2"	3650	0.25	0.50
R75	RED	18 3/4"	3700	0.25	0.50
R76	RED	19"	3750	0.25	0.50
R77	RED	19 1/4"	3800	0.25	0.50
R78	RED	19 1/2"	3850	0.25	0.50
R79	RED	19 3/4"	3900	0.25	0.50
R80	RED	20"	3950	0.25	0.50
R81	RED	20 1/4"	4000	0.25	0.50
R82	RED	20 1/2"	4050	0.25	0.50
R83	RED	20 3/4"	4100	0.25	0.50
R84	RED	21"	4150	0.25	0.50
R85	RED	21 1/4"	4200	0.25	0.50
R86	RED	21 1/2"	4250	0.25	0.50
R87	RED	21 3/4"	4300	0.25	0.50
R88	RED	22"	4350	0.25	0.50
R89	RED	22 1/4"	4400	0.25	0.50
R90	RED	22 1/2"	4450	0.25	0.50
R91	RED	22 3/4"	4500	0.25	0.50
R92	RED	23"	4550	0.25	0.50
R93	RED	23 1/4"	4600	0.25	0.50
R94	RED	23 1/2"	4650	0.25	0.50
R95	RED	23 3/4"	4700	0.25	0.50
R96	RED	24"	4750	0.25	0.50
R97	RED	24 1/4"	4800	0.25	0.50
R98	RED	24 1/2"	4850	0.25	0.50
R99	RED	24 3/4"	4900	0.25	0.50
R100	RED	25"	4950	0.25	0.50

NO BOLTING REQUIRED—
Type R or RD mountings are furnished with a tapped hole in the center. This enables the equipment to be bolted so close to the mounting.

NO BOLTING REQUIRED—
Type R or RD mountings may be used without bolting under conditions where no lateral or severe vertical motion.

NO BOLTING REQUIRED—
Type RP or RDP mountings have a tapped hole in the center (see dimension B above) that simply fits over the threaded or unthreaded bolt holes.

Site: 6 Laurier Road, London NW5 1SG

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Date: November 2024

DETAILS FOR EXAMPLE VIBRATION ISOLATORS

Supplier: Christie & Grey

Rubber Turret Mountings

Type RM



Type RM Rubber Turret mountings are designed to provide superior attenuation of medium to high frequency vibration and noise emanating from a wide range of motor driven machines particularly axial and centrifugal fans.

High resilience rubber with low dynamic to static stiffness ratio ensures maximum efficiency, good creep performance and long service life.

DESIGN FEATURES

- Moulded in first grade natural rubber with integral steel base and upper fixing boss.
- Manufactured in three sizes, each available in three rubber compounds identified by a colour spot.
- Static deflections of up to 8 mm with loads from 5 kg to 400 kg.
- Upper fixing screw supplied as standard with optional height adjusters also available.

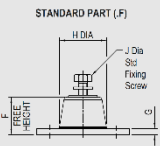
TYPICAL APPLICATIONS

- Axial and Centrifugal Fans.
- Air Handling Units.
- Refrigeration Plant.
- Pumps.
- Rotary and Multi Cylinder Compressors.
- Floating Floors.
- Isolation of Sensitive Equipment.
- Test Rigs and Special Purpose Machines.

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CHRISTIE & GREY Vibration & Shock Control

TYPE RM RUBBER TURRET MOUNTINGS

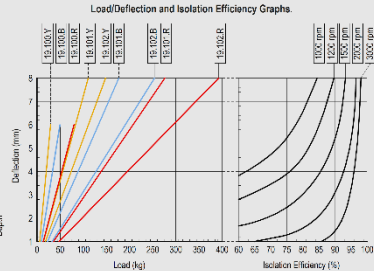


PART No.	CLOUR CODE	STATIC LOAD (kg)	DEFLECTION AT (STATIC) LOAD (mm)	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
15.100.Y.F	YELLOW	26	26	52	57	45	9	12	32	5	41	109 x 21	42	13	15	0.11												
15.100.B.F	BLUE	50	50	52	57	45	9	12	32	5	41	109 x 21	42	13	15	0.11												
15.100.R.F	RED	80	80	52	57	45	9	12	32	5	41	109 x 21	42	13	15	0.11												
15.121.Y.F	YELLOW	150	150	68	71	50	9	14	45	5	56	141 x 25	56	18	20	0.25												
15.121.B.F	BLUE	280	280	68	71	50	9	14	45	5	56	141 x 25	56	18	20	0.25												
15.121.R.F	RED	420	420	68	71	50	9	14	45	5	56	141 x 25	56	18	20	0.25												
15.122.Y.F	YELLOW	150	150	68	71	50	9	14	45	5	56	141 x 25	56	18	20	0.25												
15.122.B.F	BLUE	280	280	68	71	50	9	14	45	5	56	141 x 25	56	18	20	0.25												
15.122.R.F	RED	420	420	68	71	50	9	14	45	5	56	141 x 25	56	18	20	0.25												

■ Above part number includes standard upper fixing screw size J, for height adjustable variant replace J with HA.

■ Maximum height adjustment available is 10 mm with HA variant.

Load/Deflection and Isolation Efficiency Graphs.



Isolation efficiency is based on dynamic rather than static stiffness for accurate calculation of system performance.

Application Notes:
Rubber Turret mountings should not be used on machines exhibiting high out of balance forces or mobile applications without locking devices or independent restraints.

For full installation instructions please refer to our data sheet DS010.
For more detailed information and technical assistance please contact our Technical Department.
In the interests of continual development, the Company reserves the right to make modifications to these details without notice.

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PL0202 - JUNE 2010 - Rev. C

Site: 6 Laurier Road, London NW5 1SG

Report: 24084-002 Appendix G (page 3 of 3)

Date: November 2024

DETAILS FOR EXAMPLE VIBRATION ISOLATORS

Supplier: Fibet Group







LIGHT DUTY MOUNTS
Type SEM

Low frequency elastomeric noise and vibration isolators for industrial equipment and machinery. The Fibet SEM range of mounts are normally used to insulate the transmission of noise and vibration in vertically applied loads. Their applications can include generators, blowers, pumps, road machines or any equipment that by design is unbalanced. They can also be used for isolating instrumentation in mobile, military or road and can accommodate loads between 1.5daN (approx. 1.5kg) to 170daN's (approx. 173kg) per Mount.



APPLICATIONS

- Measurement equipment • Instruments • Small machinery
- Engines • Pumps • Radiators

STANDARD PRODUCTION


Plates: DD12 or DD13 steel (UNI EN 10111)
Nuts: Resistance class 4 Screws: Resistance class 4.8
Natural rubber NR
Zinc plated in accordance with CE standards CHROME VI free, white
Stiffness tolerance +/- 20%


OPTIONS & ADDITIONAL PARTS


Alternative elastomeric hardness and compounds available

ED 2015
SEM1

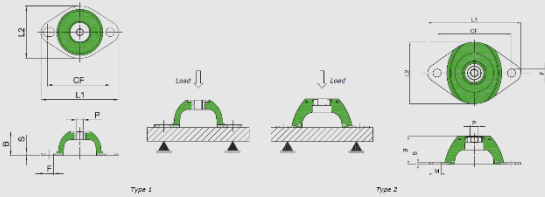
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LIGHT DUTY MOUNTS
Type SEM



Item	Hardness (PHZ)	S	L1	L2	P	CF	F(xM)	S	Average SPhmax (daN/mm)	Max Load (daN)	Max Deflec. (mm)	Type
SEM-6430W	45								1.5	4.5		
SEM-6420M	60	20	64	43	M8	50	7	2	3.0	9.0	3.0	1
SEM-6420H	70								5.5	16.5		
SEM-8525W	45								4.0	28.5		
SEM-8525M	60	25	88	59	M8	65	7.5	2.5	6.0	43.0	7.5	1
SEM-8525H	70								10.0	75.0		
SEM-85251W	45								4.0	28.5		
SEM-85251M	60	25	88	59	M10	65	7.5	2.5	6.0	43.0	7.5	1
SEM-85251H	70								12.0	75.0		
SEM-10027W	45								15.0	75.0		
SEM-10027M	60	27	100	70	M8	76	7	3	24.0	120.0	5.0	2
SEM-10027H	70								35.0	170.0		
SEM-100271W	45								15.0	75.0		
SEM-100271M	60	27	100	70	M8	76	10	3	24.0	120.0	5.0	2
SEM-100271H	70								35.0	170.0		
SEM-11435RW	45								7.0	40.0		
SEM-11435RM	60	35	115	76	M10	92	10	2	11.0	60.0	5.6	2
SEM-11435RH	70								24.0	125.0		

ED 2015
SEM2

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