

Consultants in Noise & Vibration
Building Regulations Certification Sound Insulation Testing

REPORT TITLE: NOISE ASSESSMENT FOR PROPOSED AIR SOURCE HEAT PUMP UNITS TO
SERVE A RESIDENTIAL DWELLING AT 11 VIEW ROAD, LONDON N6 4DJ

REPORT REF: 22137-002

ISSUED TO: Charlton Brown Architects Ltd
The Belvedere
2 Back Lane
Hampstead
London
NW3 1HL

ISSUED BY: David R Philip BEng (Hons) MIOA

DATE: February 2023

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SUMMARY

- This report provides a noise assessment for two air source heat pump (ASHP) units proposed to be installed to serve a residential dwelling at 11 View Road, London N6 4DJ. The units are to be located externally at ground floor to the rear of the property.
- The assessment is in accordance with the Local Planning Authority (Haringey Council) planning application validation requirements and is conducted with reference to the Council's noise policy, typically imposed noise condition plus guidance of relevant British Standard BS4142:2014.
- As part of the assessment a background noise survey has been conducted over several days including sample weekdays and a full weekend. The survey establishes existing background noise levels during the full range of operational times of the ASHP units, at a position representative of outside neighbouring residential properties. Results of the noise survey are used to set a noise limit for the ASHP units.
- Using manufacturer noise data, a noise model calculation has been used to determine noise from the ASHP units to outside nearest noise sensitive premises; a neighbouring residential dwelling. Details for the ASHP unit manufacturer noise data and noise model calculation are provided in the report.
- Noise from the ASHP units will be substantially below existing minimum (lowest) background noise levels, readily complies with the noise limit and would not be expected to be audible, cause disturbance or otherwise be of impact on the amenity of neighbouring properties. The assessment demonstrates the proposed ASHP units as compliant with Haringey Council's noise requirements.
- The report also considers vibration from the proposed ASHP units. Location of the units is at distance from, and not structurally linked / connected to, any neighbouring properties. Thus, it is extremely unlikely that any vibration from the units would transmit to neighbouring properties. Notwithstanding this, as good practice it is advised the ASHP units are installed mounted on vibration isolators. Specification details for example typically suitable vibration isolators are provided in the report.

1. INTRODUCTION

Two outdoor air source heat pump (ASHP) units are proposed to be installed to serve a residential dwelling at 11 View Road, London N6 4DJ.

The proposed ASHP units are Samsung Electronics model AE080RXYDEG, to be located externally at ground floor to the rear of the property.

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

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

- Qualifications & experience;
- Noise assessment methodology & criterion; with reference to Haringey Council noise policy, typically imposed noise condition and relevant British Standard BS4142:2014;
- Measurement survey of existing background noise levels;
- Details of the proposed ASHP units, including location & manufacturer noise data;
- Calculation & assessment of noise from the ASHP units;
- Consideration of vibration from the ASHP units.

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 some 32+ 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, ASHP units and similar plant / equipment serving commercial/retail premises and also residential properties.

David Philip is fully familiar with the provisions of the current (and previous) editions of British Standard BS4142, as well as other acoustics related 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. NOISE ASSESSMENT METHODOLOGY & CRITERION

A review of Haringey Council's noise policy / planning consent noise requirements, details of relevant British Standard BS4142:2014 and appropriate noise criterion for the proposed ASHP units are provided in the following sub-sections.

3.1 Haringey Council Requirements

Policy DM1 and Policy DM23 of Haringey Council Development Management DPD (July 2017) include reference to noise (and vibration) as potentially applicable for planning applications relating to proposed outdoor ASHP units:

- **DM1: *Delivering High Quality Design;***
- **DN23: *Environmental Protection.***

Neither of these policies nor their supporting paragraphs provide specific technical guidance in terms of noise assessment methodology or noise limit criteria for proposed plant / equipment such as ASHP units.

In granting planning approval for the installation of outdoor ASHP units and/or air conditioning units to serve residential dwellings, Haringey Council typically impose a standard condition including with noise criterion limit for reason including reference to Policy DM1 as the two recent examples reproduced below:

4. The noise level from air source heat pump shall at all times remain 5dB(A) below background levels when measured at any nearby residential window or other noise sensitive receptor.

The plant/ equipment shall be serviced regularly in accordance with the manufacturer's instructions and as necessary to ensure that the requirements of the condition are maintained. If at any time the plant is determined by the local planning authority to be failing to comply with this condition, it shall be switched off upon written instruction from the local planning authority and not used again until it is able to comply.

Reason: In order to protect the amenities of nearby residential occupiers consistent with Policy D14 of the London Plan 2021 and Policy DM1 of The Development Management DPD 2017.

3. The design and installation of the air conditioning unit shall be such that when operating the cumulative noise level LAeq TR arising from the unit, measured or predicated at 1m from the facade of the nearest noise sensitive premises, shall be a rating level of at least 5dB(A) below the background noise level LAF90 Tbg. The measurement and/or predication of the noise should be carried out in accordance with the methodology contained within BS 4142:2014

Reason: To protect neighbouring resident's amenity.

In overview terms, the Council's condition sets a criterion / limit that noise from proposed plant / equipment to serve residential dwellings such as ASHP units or air conditioning units shall be at least 5dBA lower than background noise levels, applicable to outside windows of nearest noise sensitive premises, with reference to the measurement and assessment provisions of BS4142:2014.

This is used as noise assessment methodology and criterion for the proposed ASHP units at 11 View Road.

Additional information and clarification details associated with the noise assessment methodology and criterion with reference BS4142 as applicable for the proposed ASHP units are provided in sub-sections 3.2 & 3.3.

3.2 BS4142:2014

Full title of the current edition of this 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.

As an aid to clarity and as consistent with wording of the Council's policy, this report retains use of the more commonly used term "*noise*" as opposed to the replacement term "*sound*" of BS4142:2014.

BS4142:2014 provides a well-established methodology to assess the likely effect (impact) to people regarding noise of an "industrial or commercial" nature including noise from mechanical services plant / equipment. Consequently, in requesting noise assessments for proposed air conditioning units or ASHP units and regardless of whether to serve an industrial, commercial or residential property, most Local Planning Authorities routinely refer to BS4142:2014.

In this scenario, the BS4142:2014 assessment method requires that source noise data for the proposed ASHP units is established, and pre-existing background noise levels be measured. The assessment is then carried out by comparing the ASHP units' noise Rating Level with background noise levels, at position outside nearest neighbouring residential properties.

The ASHP units' noise Rating Level is the Specific (actual) Noise Level of the units plus with any corrections applied to account for subjective characteristics of the noise at the assessment position that might mean it is more noticeable and potentially have more impact.

The BS4142:2014 assessment method then provides guidance on the likely noise impact (effect) to people depending on the magnitude of the excess of the ASHP units' noise Rating Level over the pre-existing background noise; the higher the excess the more likely there would be an adverse impact and correspondingly, the lower the excess (or no excess) the less likely there would be an adverse impact.

BS4142:2014 does not provide any specific guidance on suitable noise limits / criteria or standards including for proposed new plant / equipment such as air conditioning units or ASHP units, only guidance on how to determine the likelihood of adverse impact.

In terms of likelihood of adverse (noise) impact, BS4142:2014 advises the following, dependent upon context:

- i) **Where the (ASHP units) noise Rating Level is around +10dB or more above the background, this is likely to be an indication of significant adverse impact;**
- ii) **Where the (ASHP units) noise Rating Level is around +5dB above the background then this is likely to be an indication of adverse impact;**
- iii) **Where the (ASHP units) noise Rating Level does not exceed the background then this is an indication of low impact.**

It is important to note the BS4142:2014 assessment methodology does not have a "no impact" indication categorisation. "Indication of low impact" for where the noise Rating Level does not exceed the pre-existing background is the lowest / least likely noise impact categorisation of BS4142:2014.

Different Local Planning Authorities interpret and apply the guidance of BS4142:2014 differently, some require that the noise Rating Level of proposed new plant/equipment be not higher than +5dB above the existing background, some require not higher than the background, some require a certain amount below the background noise. Some do not have any set requirement and consider each situation / proposed development application individually.

As consistent with Haringey Council's noise condition, then for the purpose of this assessment a noise limit (criterion) is applied that the proposed ASHP units' noise Rating Level shall be at least 5dB below the existing background noise at neighbouring noise sensitive (residential) properties.

It is the author's experience of undertaking many noise surveys and assessments of noise from ASHP units and similar equipment, in similar scenarios and contexts to that as for 11 View Road, that at this level, noise from the proposed ASHP units would not be expected to be audible / disturbing or otherwise of impact detrimental to occupiers of neighbouring properties.

3.3 Application of ASHP Units' Noise Limit (Criterion)

Additional clarification points in respect to the assessment and application of the noise limit are provided below.

a) **ASHP Units Operating Condition**

The noise limit is cautiously/robustly applied for the ASHP units operating simultaneously (cumulatively) at standard (full 100%) duty in cooling or heating mode, potentially over a full 24-hour period, i.e. including during the middle of the night.

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

Manufacturer noise data for the ASHP units is provided in Section 4 of the report.

b) **Rating Noise Level**

The noise limit is applied in terms of a noise Rating Level ($L_{A,T}$ dB) and thus with any corrections (such as for tonal character noise) applied as necessary to the ASHP units' noise at the assessment position as per the BS4142:2014 assessment methodology.

c) **Assessment Position**

As per normal noise assessment procedures / convention, as Haringey Council's typical conditions, plus with reference to BS4142:2014, the noise limit is applied to an assessment position directly outside nearest windows of neighbouring residential properties.

d) **Background Noise Level**

The noise limit is applied as "worse case", cautiously / robustly based on the representative measured minimum (lowest) 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 an eight-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 – not applicable to the noise assessment)**

In accordance with the guidance and assessment provisions of BS4142, then for scenarios of very low background noise it is unreasonable / unnecessary to apply a Rating Level noise limit directly relative to the background level, in terms of ensuring amenity protection such that noise from plant (including such as ASHP units and/or air conditioning 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 $L_{A_{r,T_r}}$ 30dB at assessment positions. BS4142:1997 advised that noise Rating Levels of below 35dB be considered very low.

Thus a minimum threshold cap plant noise limit (Rating Level) set at $L_{A_{r,T_r}}$ 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 close / immediate proximity to one another and as then cumulatively contributing a higher overall noise level to the same receptor (noise sensitive properties). This scenario does not occur for the proposed ASHP units at 11 View Road.

4. BACKGROUND NOISE SURVEY

To assess noise from the proposed ASHP units it is necessary to establish representative existing background noise levels outside nearest neighbouring residential properties. Details of the conducted background noise survey are provided in the sub-sections below.

4.1 Survey Instrumentation

Details of 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 units would tend to operate principally during the daytime and evening periods, as they are to serve a residential dwelling then they will potentially operate at any time over 24 hours. Therefore, the survey was conducted over at least a full 24-hour period to obtain representative samples of the background noise climate during the entire range of possible times of unit operation.

The background noise survey was conducted over an eight-day period from Wednesday 25 January 2023 through 01 February 2023 to include sample weekdays and also a full weekend. Weather conditions were monitored and were suitable; dry (nil precipitation) with light / calm wind through the survey period.

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

The survey measurement position was externally to the rear of the property, as representative of outside the nearest residential property to proposed location of the ASHP units, in accordance with the guidance of BS4142:2014 (free-field conditions 1.5m over ground level). The nearest residential property is a neighbouring detached dwelling 9 View Road.

A site plan and proposed ASHP units' location drawing are provided in Appendix B. These indicate the nearest neighbouring nearest residential property, background noise survey position and location for the proposed ASHP units to the rear of 11 View Road.

4.3 Survey Results, Observations & ASHP Units' Noise Limit

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

Background noise levels are moderate to low and as normal for this location relatively consistent from day to day (weekdays) albeit slightly lower over the weekend.

Background noise is predominantly due to road traffic, comprised of occasional vehicles on View Road, but principally with underlying noise from more distant traffic in the wider area, including vehicles on North Hill plus also the A1 Archway Road / A1 Aylmer Road which are circa 400m to 500m north to north-east from the property.

Background noise fluctuates during the day, then gradually reduces during the evening and into the night as traffic reduces, before increasing again in the morning as traffic locally and in the wider area increases. This diurnal noise climate profile is normal for this location with underlying noise from road traffic.

Summary of the representative minimum (lowest) $L_{A90,T}$ background noise level and associated ASHP units' noise limit requirement is shown in Table 1.

Description	Assessment Position & Relevant Times	Representative Minimum Background Noise $L_{A90,15min}$	ASHP Units' Noise Limit (Rating Level at least 5dB below background)
Both ASHP units operating standard (full 100%) duty potentially over a 24-hour period cooling or heating mode	Outside windows of nearest neighbouring property <i>Assessment over 24 hour period</i>	35dB <i>(representative minimum level occurs during the night)</i>	$L_{A,T} \leq 30dB$

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

5. NOISE FROM ASHP UNITS

Informative:

This report & noise assessment is based on the proposed Samsung Electronics ASHP units as detailed below. If as part of future unit replacement, an alternative make and/or model ASHP unit is selected, then it is important that noise levels for the alternative unit be checked by Philip Acoustics or another Acoustic Consultant to ensure noise emission from the alternative unit remains compliant with the noise limit criterion.

The proposed ASHP units are Samsung Electronics model AE080RXYDEG. This is a modern, efficient and compact (physically small) principally domestic use ASHP unit with low noise output.

Manufacturer noise data for the ASHP units is provided in Appendix D. The noise data is for the unit operating at full normal (100%) duty cooling or heating mode in terms of free-field overall dBA sound pressure level at 1m distance from the unit.

For purpose of the noise assessment, it is cautiously / robustly taken as “worse-case” the ASHP units are operating at full normal (100%) duty, i.e. with no allowance the units may likely operate at reduced duty (with consequent lower noise output), if at all, during the late evening and night period.

Summary of noise data for the ASHP units (per unit) including indicative octave band values is shown in Table 2.

It is the author's experience and professional opinion having measured noise output from similar make, model and capacity (size) domestic use units, that the proposed Samsung Electronics ASHP unit will generate a broadband type of noise without strong or dominant tonal characteristics.

Description	Overall dBA	Octave Band Centre Frequency Hz - Linear dB ⁽¹⁾							
		63	125	250	500	1k	2k	4k	8k
Samsung Electronics AE080RXYDEG ASHP unit Full 100% duty cooling or heating mode	48	52	51	48	46	42	39	34	30
Note ⁽¹⁾: No manufacturer octave band noise data available; linear dB octave band levels are indicative / expected based on data & sound pressure level noise measurements for similar make / model / capacity ASHP units serving other properties.									

Table 2: ASHP unit noise data; free-field sound pressure level at 1m

To calculate the noise contribution from the ASHP units to outside the nearest neighbouring residential property (assessment position) a spreadsheet noise calculation model has been used.

The model takes account of the distance between the units and nearest neighbouring property, acoustic directivity, acoustic reflections (i.e. non free-field conditions) and natural / default line of sight acoustic screening (i.e. fences and intervening structures / buildings etc).

Noise model calculation details are provided in Appendix E.

The overall calculated noise level from the ASHP units to outside windows of nearest neighbouring residential property compared with the noise limit is shown in Table 3.

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

Description	Assessment Position	ASHP Units' Overall Noise Level (Rating Level)	Noise Limit (Rating Level)	Comment
2 x ASHP units Samsung Electronics AE080RXYDEG operating standard (full 100%) duty cooling or heating mode over 24-hour period	Outside rear elevation windows of nearest neighbouring property 9 View Road	$L_{A,r,Tf}$ 25dB	$L_{A,r,Tf} \leq 30$ dB	Complies

Table 3: Assessment of noise from ASHP units to outside windows of nearest neighbouring property

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

At this level, noise from the ASHP units will be substantially below existing minimum background noise levels as occur during the late evening and 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.

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

- The assessment is on the basis both ASHP units are operating simultaneously (cumulatively) as "worse-case" at standard (full 100%) duty all the time over 24-hours; including all through the late evening and night period when background noise levels are lowest. This is extremely unlikely to occur for majority of the time;
- In practice it is likely the units would operate at a reduced capacity with consequent lower noise output, if at all, during the late evening and night period;
- The noise limit used for the assessment is cautiously based on the representative lowest / minimum measured background noise level over 24 hours (i.e. including middle of the night), over an eight-day noise survey including sample weekdays and a full weekend. Background noise for the majority of the time, including during the night period on some days is higher than the measured minimum value used for the assessment. Correspondingly for these times noise from the ASHP units would be further below the background noise and associated noise limit applicable to these times based on the background noise occurring during these times.

6. VIBRATION FROM ASHP UNITS

Location of the proposed ASHP units is separate from (i.e. not structurally attached or otherwise physically connected / fixed to) any neighbouring properties. In addition, vibration generated by modern domestic use ASHP units is generally low.

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

Notwithstanding this, as good practice and to anyhow mitigate possible residual vibration from the ASHP units to the property 11 View Road itself, it is advised the units are installed on conventional proprietary vibration isolators.

Typically suitable / appropriate vibration isolators for the ASHP units are rubber or neoprene turret type mountings with static deflection nominally $\geq 3\text{mm}$ under the weight / loading of the units. 4 x isolators are required for each ASHP unit; one to each mounting corner position.

Details of 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 for the typically suitable proprietary isolators is provided in Appendix F. Other suppliers will also be able to offer similar suitable / equivalent vibration isolators.

Example Supplier 1:

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

Samsung AE080RXYDEG ASHP unit (net weight 76kg) = Isolator R-1 Black (max load per isolator 20.4kg)

Example Supplier 2:

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

Samsung AE080RXYDEG ASHP unit (net weight 76kg) = Isolator RM 19.100.Y.F Yellow (max load per mount 28kg)

Example Supplier 3:

Vibracoustics: www.vibracoustics.com Isolator type: Vi-Turret Mountings

Samsung AE080RXYDEG ASHP unit (net weight 76kg) = Isolator VS42000 Yellow (max load per mount 35kg)

A P P E N D I X A

Noise Survey Instrumentation

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NOISE SURVEY INSTRUMENTATION

Instrumentation Used:

- Rion sound level meter type NL-32 Class 1 serial number 01103430, Rion preamplifier type NH-21, Rion microphone type UC-53A serial number 317947, Rion microphone windshield type WS-10, Rion microphone extension cable type EC-04A and tripod / boom arrangement;
- Bruel & Kjaer calibrator type 4231 serial number 2642929.
- 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	18/02/2024	TCRT22/1132
Microphone s/n 317947	UC-53A			
Preamplifier s/n 34369	NH-21			
Calibrator s/n 2642929	4231	Bruel & Kjaer	18/02/2024	TCRT22/1131

Instrumentation On-Site Calibration Check:

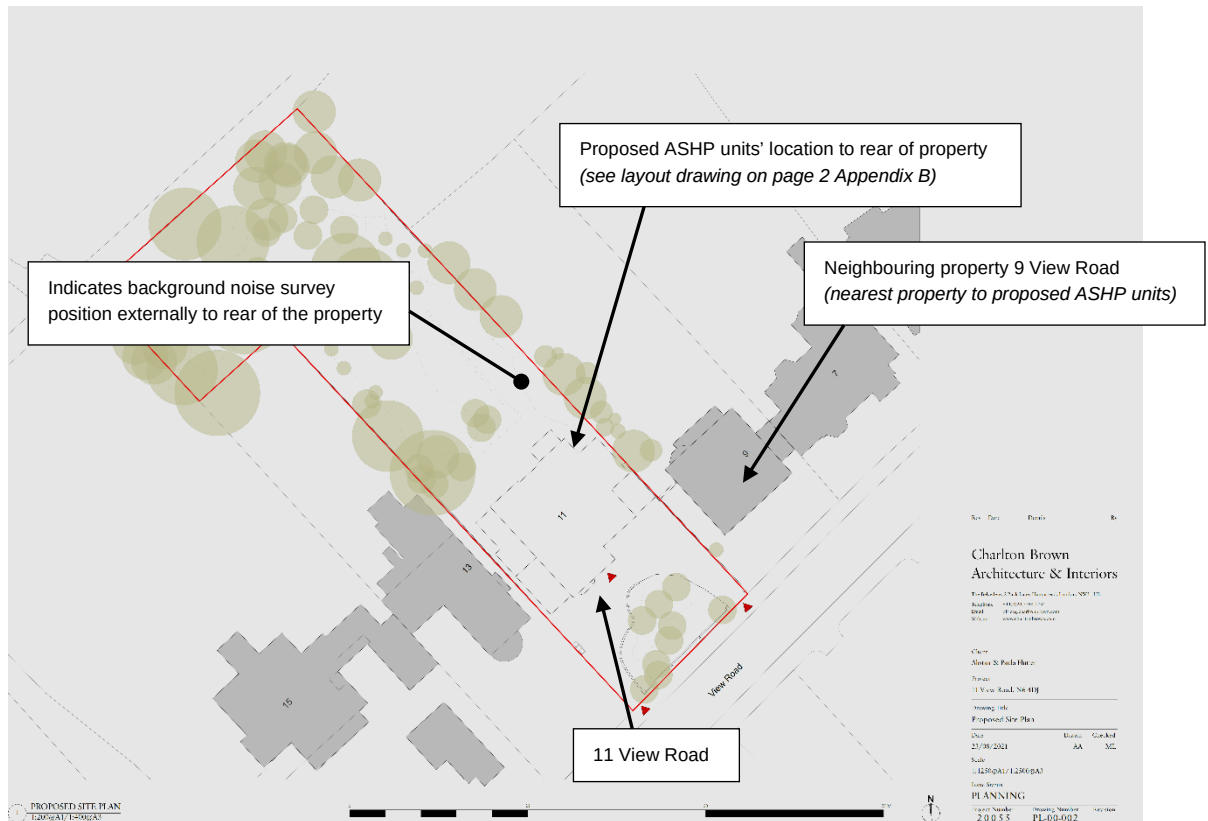
Description	Calibrator Reference Level	Measured Level	Comment
Before survey measurements	94.0dB	94.1dB	Pass
After survey measurements		94.1dB	Pass (nil significant drift)

A P P E N D I X B

Site Plan & Proposed ASHP Units Location Drawing

Site: 11 View Road, London N6 4DJ
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SITE LOCATION PLAN

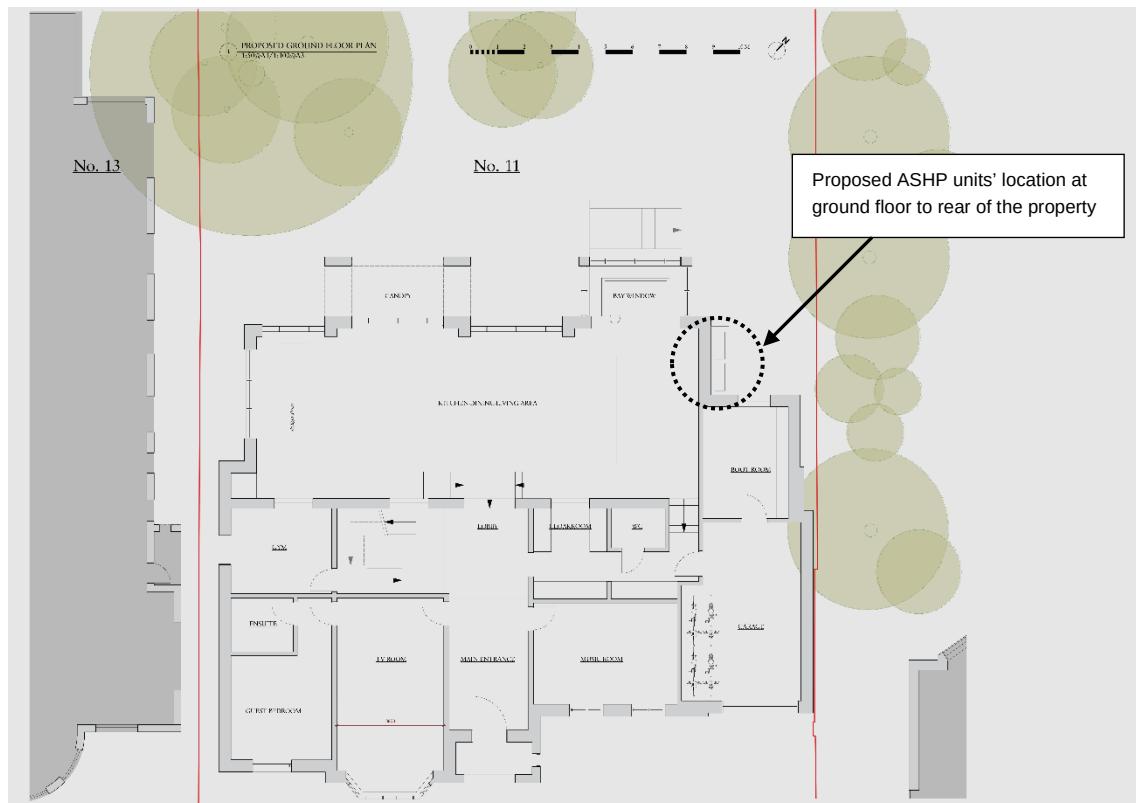


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PROPOSED ASHP UNITS' LOCATION DRAWING



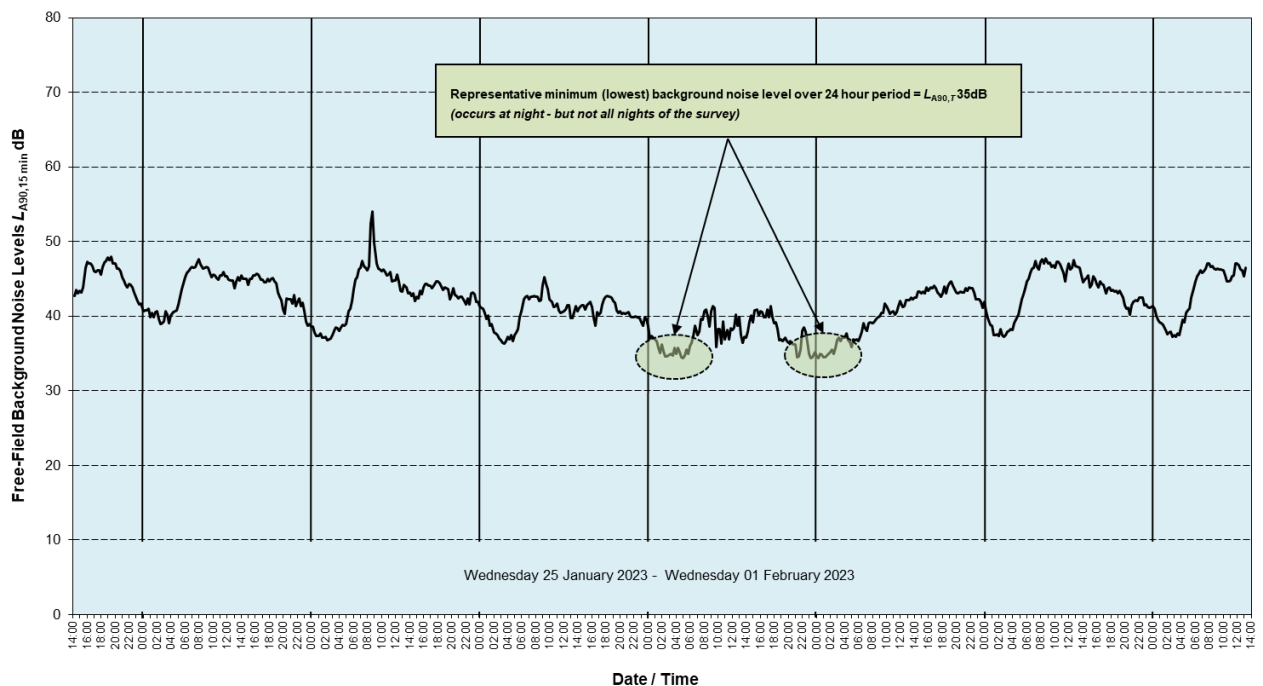
A P P E N D I X C

Background Noise Survey Results

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BACKGROUND NOISE SURVEY RESULTS

Raw Data Results For Eight Day Noise Survey Externally To Rear Of The Property:



A P P E N D I X D

Manufacturer Noise Data For ASHP Units

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MANUFACTURER NOISE DATA FOR ASHP UNITS

Samsung Electronics AE080RXYDEG

Outdoor unit specification

Type	Unit	AE080RXYDEG	AE120RXYDEG	AE160RXYDEG
Power source	-	1Φ, 220~240VAC 50Hz	1Φ, 220~240VAC 50Hz	1Φ, 220~240VAC 50Hz
Refrigerant	g	1,150 (R-32)	2,200 (R-32)	2,200 (R-32)
Noise (Heat/Cool, Pressure)	dB(A)	48/48	50/50	52/54
Water connection (In/Out)	Inch	1.0	1.0	1.0
Leaving water temperature	°C	Heating : 15~65 Cooling : 5~25	Heating : 15~65 Cooling : 5~25	Heating : 15~65 Cooling : 5~25
Operating range (Heat/Cool)	°C	-25~35/10~46	-25~35/10~46	-25~35/10~46
Weight (net/gross)	kg	76.0/84.5	110/119	110/119
Size (WxHxD, net)	mm	940 x 998 x 330	940 x 1,420 x 330	940 x 1,420 x 330

Type	Unit	AE080RXYDGG	AE120RXYDGG	AE160RXYDGG
Power source	-	3Φ, 380~415VAC 50Hz	3Φ, 380~415VAC 50Hz	3Φ, 380~415VAC 50Hz
Refrigerant	g	1,150 (R-32)	2,200 (R-32)	2,200 (R-32)
Noise (Heat/Cool, Pressure)	dB(A)	48/48	50/50	52/54
Water connection (In/Out)	Inch	1.0	1.0	1.0
Leaving water temperature	°C	Heating : 15~65 Cooling : 5~25	Heating : 15~65 Cooling : 5~25	Heating : 15~65 Cooling : 5~25
Operating range (Heat/Cool)	°C	-25~35/10~46	-25~35/10~46	-25~35/10~46
Weight (net/gross)	kg	75.0/83.5	111/120	111/120
Size (WxHxD, net)	mm	940 x 998 x 330	940 x 1,420 x 330	940 x 1,420 x 330

* At the temperature -25 °C ~ -20 °C, operation is available but capacity cannot be guaranteed.

Manufacturer noise data for Samsung Electronics model AE080RXYDEG ASHP unit;
overall free-field sound pressure level at 1m from unit = 48dBA (cooling or heating mode)

APPENDIX E

Noise Model Calculation For ASHP Units

Site: 11 View Road, London N6 4DJ
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NOISE MODEL CALCULATION FOR ASHP UNITS

Assessment Position: Rear elevation windows of nearest neighbouring property 9 View Road

Noise Condition: 2 x Samsung Electronics AE080RXYDEG units operating full duty cooling or heating mode

Noise Mitigation: None applied

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
ASHP Units: 2 x Samsung Electronics AE080RXYDEG									
Noise Data: Sound pressure level at 1m (free-field); Lp dB per unit operating standard (full 100%) duty	48	52	51	48	46	42	39	34	30
Quantity; +3dB quantity correction applicable for 2 x ASHP units		3	3	3	3	3	3	3	3
Noise Mitigation; none applied		0	0	0	0	0	0	0	0
Distance; propagation ≈13m from units to nearest residential windows assessment position		-22	-22	-22	-22	-22	-22	-22	-22
Screening; complete line of sight screening correction applicable (edge of building), limit to -10dB		-7	-8	-10	-10	-10	-10	-10	-10
Directivity; nil propagation directivity correction applied (units radiate noise equally all directions)		0	0	0	0	0	0	0	0
Reflections / Non Free-Field Conditions; +6dB correction applied for units adjacent 2 x walls		6	6	6	6	6	6	6	6
Noise level contribution at assessment position	25	32	30	25	23	19	16	11	7
Cumulative Contribution All Plant At Assessment Position	25	32	30	25	23	19	16	11	7

The ASHP units' overall noise level (Specific Noise Level) at the assessment position is 25dBA.

The ASHP units generates a nominally broadband characteristic noise without tonal characteristic elements. In addition, noise from the units is substantially below the minimum (lowest) background noise at the assessment position and not expected to be subjectively noticeable / audible.

In accordance with the noise assessment guidance of BS4142:2014, overall noise from the ASHP units at the assessment position in terms of a noise Rating Level = $L_{Aeq,Tr}$ 25dBA.

APPENDIX F

Details For Example Vibration Isolators

Site: 11 View Road, London N6 4DJ
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Date: February 2023

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

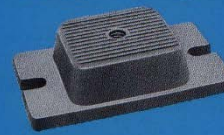


Dimensions: In. (mm)

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.

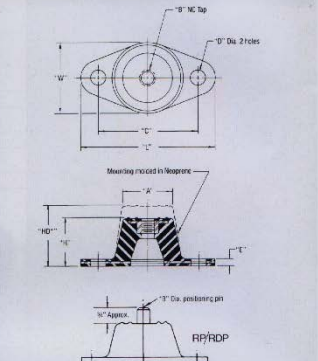




EMTEC Products Limited, Enterprise House, Blyth Road, Hayes, Middlesex UB3 1DD
Telephone: 0181 848 3031 Facsimile: 0181 573 3605



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Type	Color Code	Max. Load (lb)	Deflection (in. (mm))	
			R	RD
R1	BLACK	35	0.25	0.50
R2	RED	45	0.25	0.50
R3	RED	75	0.25	0.50
R4	RED	150	0.25	0.50
R1	BLUE	125	0.25	0.50
R2	BLUE	175	0.25	0.50
R3	RED	240	0.25	0.50
R4	RED	380	0.25	0.50
R1	BLACK	250	0.25	0.50
R2	RED	325	0.25	0.50
R3	RED	500	0.25	0.50
R4	RED	1000	0.25	0.50
R1	RED	2000	0.25	0.50
R2	RED	3000	0.25	0.50
R3	RED	4000	0.25	0.50
R4	RED	6000	0.25	0.50

Type R or RD IF BOLTING IS 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.

Type RP or RD IF NO BOLTING REQUIRED

Type RP or RD mountings may be used without bolting. Under mounting, having no lateral or severe vertical motion.

Type RP or RDP IF BOLT HOLE IS UNACCESSIBLE

Type RP or RDP mountings, with the tapped hole in the center (see dimension B above), that simply fit over the equipment or unthreaded bolt holes.

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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

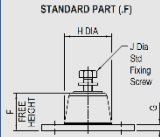
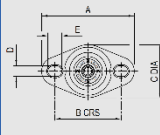
- Axial and Centrifugal Fans.
- Air Handling Units.
- Refrigeration Plant.
- Pumps.
- Rotary and Multi Cylinder Compressors.
- Floating Floors.
- Isolation of Sensitive Equipment.
- Test Rigs and Special Purpose Machines.

TYPE RM RUBBER TURRET MOUNTINGS

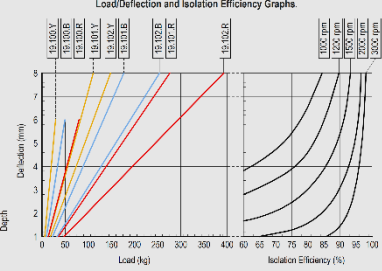
PART No.	COLOUR CODE	RATED LOAD (kg)	DEFLECTION AT RATED LOAD (mm)	DIMENSIONS (mm)												WT (kg)
				A	B	C	D	E	F	G	H	J	K	L	P	
15.100.Y.F	YELLOW	26	26	52	57	45	9	12	32	5	41	109 x 21	42	13	15	0.11
15.100.B.F	BLACK	50	50	6												
15.100.R.F	RED	80	80													
15.121.Y.F	YELLOW	150	150	6	95	71	50	9	14	45	5	95	1010 x 25	56	8	25
15.121.B.F	BLACK	280	280													
15.121.R.F	RED	420	420	8	115	88	11	22	10	6	62	1012 x 30	83	21	38	0.73
15.122.Y.F	YELLOW	150	150													
15.122.B.F	BLACK	280	280													
15.122.R.F	RED	420	420													

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

■ Maximum height adjustment available is 10 mm with JHA 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.

Christie & Grey Limited
Morley Road, Tonbridge, Kent TN9 1RA, England
Telephone : +44 (0) 1732 371100 • Fax: +44 (0) 1732 359686
E-mail : sales@christiegrey.com • web site: www.christiegrey.com

PL0201 - JUNE 2006 - Rev. C

PL0202 - JUNE 2010 - Rev. C

Consultants in Noise & Vibration
Building Regulations Certification Sound Insulation Testing

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DETAILS FOR EXAMPLE VIBRATION ISOLATORS

Supplier: Vibracoustics



Description:
Vibracoustics Ltd Vi-Turret Mountings are designed principally for the mounting of HVAC systems, with relatively high levels of deflection ideal for the effective attenuation of noise and vibration from rotating equipment with speeds of 1000rpm (16Hz) and above.

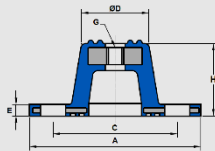
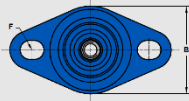
Efficient construction with fully rubber encapsulated metal components for environmental protection, threaded top and stable base fixings with non-skid mounting faces.

Available in a range of sizes and rubber hardness for load capacities 35Kg to 500Kg. Other non-standard sizes available, contact Vibracoustics Ltd technical department for more information.

Typical Applications Include:

- Fans.
- Pumps.
- HVAC.
- Generators.
- Electric motors.
- Compressors.
- General equipment.

PRODUCT GROUP	42
VI-TURRET MOUNTINGS	

Part No.	Dimensions (mm)								Max Load (Kg)	Max Static Deflection (mm)
	H	A	B	C	D	G	F	E		
VS42000 YELLOW	32	80	45	57	41	M8	9x12	5	35	8
VS42000 BLUE	32	80	45	57	41	M8	9x12	5	65	8
VS42000 RED	32	80	45	57	41	M8	9x12	5	100	8
VS42001 YELLOW	45	95	60	71	56	M10	9x14	5	130	10
VS42001 BLUE	45	95	60	71	56	M10	9x14	5	225	10
VS42001 RED	45	95	60	71	56	M10	9x14	5	350	10
VS42002 YELLOW	70	150	86	115	82	M12	11x22	6	185	10
VS42002 BLUE	70	150	86	115	82	M12	11x22	6	320	10
VS42002 RED	70	150	86	115	82	M12	11x22	6	500	10

Vibracoustics is not responsible for any products and services that are not designed and manufactured to the highest standards of quality and safety. For applications and technical assistance please contact Vibracoustics, see index Ref 00 A-01

E-mail: mail@vibracoustics.com Website: www.vibracoustics.com Cat Ref: 42-A-01 Iss:21B

PHILIP ACOUSTICS LTD

107 Bancroft, Hitchin, Hertfordshire SG5 1NB Tel: 01462 431877

Email: admin@philipacoustics.co.uk

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