Philip Acoustics Ltd.

Consultants in Noise and Vibration

REPORT TITLE: ACOUSTIC REPORT FOR A PROPOSED AIR CONDITIONING UNIT TO SERVE A RESIDENTIAL PROPERTY AT 17 & 18 WELL ROAD, LONDON NW3 1LH

REPORT REF: 19075-002

ISSUED TO: F3 Architects
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DATE: October 2019

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SUMMARY

- Philip Acoustics has been commissioned to assess noise and vibration from an air conditioning unit proposed to be installed to serve an amalgamated residential property at 17 & 18 Well Road, London NW3 1LH.

- The assessment is undertaken with reference to London Borough of Camden's planning consent acoustic requirements for mechanical services equipment (including items such as air conditioning units) as contained in Policy A4: *Noise and Vibration* of Section 6: *Protecting Amenity* of Camden Local Plan (adopted June 2017).

- As part of the assessment a background noise survey has been carried out over a six day period including sample weekdays and a full weekend. The survey establishes existing background noise levels during operational times of the air conditioning unit, at a position representative of outside nearest neighbouring residential properties.

- Based on results of the background noise survey and noise model calculations using the proposed air conditioning unit manufacturer's noise data, the overall noise level from the air conditioning unit (with noise reduction treatment fitted) is calculated to comply with London Borough of Camden's planning consent acoustic requirements for mechanical services equipment.

- The noise reduction treatment comprises acoustic louvre enclosure of the unit. Specification details for the acoustic louvre enclosure are included in Section 6.1 of the report.

- Proposed location of the air conditioning unit is at distance from, and not structurally linked to, any neighbouring residential properties. Thus there will be no potential for any structure-borne vibration from the unit to transfer to neighbouring residential properties. Notwithstanding this, and as good practice it is advised the air conditioning unit be installed on conventional proprietary vibration isolators. Specification details for typically suitable vibration isolators are included in Section 6.2 of the report.

1. INTRODUCTION

An external air conditioning unit is proposed to be installed to serve an amalgamated residential property at 17 & 18 Well Road, London NW3 1LH.

The air conditioning unit is to be positioned within an acoustic louvre enclosure, alongside a refuse and recycle bins enclosure, located externally beyond the front garden area, at lower elevation directly adjacent to the property's off-street vehicle parking space. The proposed unit location is relatively distant from, and screened by boundary fencing/walls from, neighbouring residential properties.

As part of the planning application process for the proposed air conditioning unit, the Local Planning Authority (London Borough of Camden) requires information in the form of an acoustic (noise & vibration assessment) report, in order to protect the amenity of residents in the vicinity with regard to possible noise and vibration disturbance from the unit.

Philip Acoustics has therefore been commissioned to provide an acoustic assessment report for the proposed air conditioning unit. This report presents results of the assessment and includes:

- Noise criteria: London Borough of Camden planning consent acoustic requirements;
- Measurement survey of existing background noise levels;
- Calculation of air conditioning unit noise levels;
- Consideration of vibration from the air conditioning unit;
- Specification for noise reduction treatments and/or vibration isolation as necessary to ensure compliance with the planning consent requirements of London Borough of Camden.

2. NOISE CRITERIA *(London Borough Of Camden Acoustic 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 air conditioning 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:

a. development likely to generate unacceptable noise and vibration impacts; or
b. 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 air conditioning 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 air conditioning unit in this instance include:

- A Rating Level ($L_{Ar,Tr}$ 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 conditioning units 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 referenced British Standard is BS4142:2014 "*Methods for rating and assessing industrial and commercial sound".* 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 air conditioning units in similar scenarios and contexts to that as at 17 &18 Well Road, that compliance with London Borough of Camden's policy requirements would mean noise from the proposed new air conditioning unit is not generally audible / disturbing or of impact to people inside or outside neighbouring residential dwellings.

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

Air Conditioning Unit Operating Mode

The noise criteria are cautiously/robustly applied for the air conditioning unit operating at standard duty (i.e. full normal 100% capacity), potentially over a complete 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 including in Low noise mode (and thus with reduced noise output over standard duty) for much of the time including during the late evening and night period. Manufacturer noise data for the unit is provided in Section 4 of this report.

Rating Noise Level

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

Assessment Positions

As per Camden's policy requirements, day and night period (as relevant) noise criteria for the air conditioning unit are applied for two separate assessment positions; to directly outside nearest windows, also to within nearest garden areas (external amenity space), of neighbouring residential properties to location of the unit.

Background Noise Level

The noise criteria are applied as "worse case", cautiously/robustly based on the representative lowest existing background noise level for the times over 24 hours as relevant for the assessment position, based on results of a six day background noise survey including sample weekdays and a full weekend (see Section 3 of the report).

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 plant/machinery (so including such as air conditioning units), 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 air conditioning unit is at distance from, and not structurally linked/connected to, any neighbouring residential properties. Thus there is no potential for any structure-borne vibration from the unit to transfer to the neighbouring residential properties and by default Camden's vibration level thresholds will be complied with.

3. NOISE SURVEY

To assess noise from the air conditioning unit against London Borough Of Camden's planning consent noise requirements it is necessary to establish background noise levels representative of at the assessment positions. Details of the background noise survey carried out are provided in Sections 3.1 to 3.3.

3.1 Survey Instrumentation

Details of the noise survey instrumentation used are provided in Appendix A. The sound level meter was calibration verified before and after the survey measurements using the UKAS certified calibrator.

3.2 Survey Details & Procedure

Although the proposed air conditioning unit would likely only tend to operate 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 carried out over at least a full 24 hour period to obtain background noise levels during the entire range of possible times of operation for the unit.

The background noise survey was carried out over a six day period from Wednesday 04 September 2019 through Monday 09 September 2019 so as to include sample weekdays and also a full weekend. The weather included dry and calm / light wind (i.e. suitable survey conditions) during majority of the day and night periods of the survey.

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.

Proposed location of the air conditioning unit within an acoustic enclosure beyond the front garden area and adjacent to the property's vehicle parking space, plus nearest neighbouring residential properties, are indicated on a site location aerial image and layout plan drawing in Appendix B. A detail drawing for the proposed unit's enclosure is also included in Appendix B.

The nearest windows and garden areas (external amenity space) are of the neighbouring residential properties at 19 Well Road and 1 Cannon Lane. Straight line distance between the air conditioning unit's proposed location and nearest windows is circa 25m, and to the nearest external amenity space is circa 12m.

The background noise survey measurement position was externally at first floor window level to the front elevation of the property, achieved using a telescopic pole and microphone extension cable arrangement from a first floor flat roof area of the property.

The background noise survey position is indicated on the site location aerial image in Appendix B and was selected as best practicable representative of outside the neighbouring residential properties.

Note the noise survey was at an elevated position (equivalent first floor windows level) for reasons that the external ground floor area of the property is currently occupied by contractors temporary equipment/structures (shielding much of the external area so non-representative), plus positions at 1.2m to 1.5m above ground level and adjacent to the nearest neighbouring residential properties would be non-compliant with the guidance of BS4142 (being less than 3.5m from vertical reflecting surfaces – walls & structures), plus also because the main potential for adverse noise impact (disturbance) from the proposed air conditioning unit is considered to be during the late evening and night to upper floor level bedrooms of the neighbouring residential properties.

3.3 Survey Observations & Results

Background noise levels are relatively low and predominantly due to underlying noise from passing traffic on the adjacent East Heath Lane plus road traffic generally in the wider area. Well Road has only occasional passing vehicles.

Background noise fluctuates during the day and into the evening, then gradually reduces during the late 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 on surrounding roads.

A graph showing full raw data background noise level measurements over the six day survey period is provided in Appendix C.

Summary of the representative lowest measured $L_{A90,T}$ background noise levels and associated air conditioning unit noise limits based on London Borough of Camden's noise requirements (as detailed in Section 2 of this report) are shown in Table 1.

The background noise levels and limits are split into two separate time period values such that noise from the air conditioning unit to outside nearest windows and to garden areas (external amenity space) of the neighbouring residential properties is assessed using the representative lowest background noise during times as relevant for both assessment positions.

Air Conditioning Unit Operating Mode	**Assessment Position & Relevant Times**	**Measured Representative Lowest Background Noise Level $L_{A90,15min}$**	**Air Conditioning Unit Noise Limit *(Rating Level)***
Unit operating standard duty *(full 100% duty)*	To garden areas *(external amenity space)* of neighbouring properties *Assessment time range: 7am to 11pm*	38dB *(occurs during the late evening up to circa 11pm)*	$L_{Ar,Tr}$ ≤28dBA *(10dB below background)* $L_{Ar,Tr}$ ≤23dBA *(15dB below background, applicable if unit has tonal components)*
	To outside nearest windows of neighbouring properties *Assessment time range: Over 24 hours*	33dB *(occurs during middle of the night circa 1am to 4am, but not all nights)*	$L_{Ar,Tr}$ ≤23dBA *(10dB below background)* $L_{Ar,Tr}$ ≤18dBA *(15dB below background, applicable if unit has tonal components)*

Table 1: Measured representative lowest background noise and associated noise limits

4. NOISE FROM AIR CONDITIONING UNIT

The proposed air conditioning unit is a Mitsubishi model PURY-P350YNW-A. Manufacturer's noise data for the air conditioning unit is provided in Appendix D.

The manufacturer data is for the air conditioning unit operating at standard (i.e. full normal 100%) duty plus also in Low noise mode, in terms of free-field overall dBA and linear octave band dB sound pressure levels at 1m distance in front of the unit.

Summary of noise output from the air conditioning unit including octave band values is shown in Table 2.

Note that the noise assessment in this report is cautiously/robustly carried out with the air conditioning unit operating at standard (100%) duty as being "worse-case" with higher noise output.

Description	Overall dBA	Octave Band Centre Frequency (Hz) (Linear dB)							
		63	125	250	500	1k	2k	4k	8k
Mitsubishi PURY-P350YNW-A *(standard duty)*	62.5	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0
Mitsubishi PURY-P350YNW-A *(low noise mode)*	49.0	55.0	55.0	50.5	47.0	42.5	37.0	35.5	34.5

Table 2: Air conditioning unit noise data; free-field sound pressure levels at 1m

Manufacturer noise data for the Mitsubishi PURY-P350YNW-A indicates the air conditioning unit generates a typically broadband type noise without strong or clearly perceptible tonal elements. This correlates with experience of the author in measuring noise levels from as-installed same and similar type/size model Mitsubishi air conditioning units.

Notwithstanding this, with the acoustic enclosure noise reduction treatment applied (see Section 6.1 of the report), any residual tonal components will tend to be supressed and noise from the unit to neighbouring residential properties will be substantially below the lowest background noise. Therefore the noise criterion 10dB below background of London Borough of Camden's planning consent noise requirement is applied.

To calculate the noise contribution from the air conditioning unit to the assessment positions outside nearest windows and to garden areas (external amenity space) of the neighbouring residential properties a spreadsheet based noise model has been used. The model takes account of the distance between the unit and the assessment positions, acoustic directivity, acoustic reflections and natural line of sight acoustic screening.

The noise model calculation also takes account of acoustic louvre enclosure noise reduction treatment applied to the air conditioning unit as specified in Section 6.1 of this report.

Noise model calculation details are provided in Appendix E.

The overall calculated noise Rating Level from the proposed air conditioning unit to outside nearest windows and to garden areas (external amenity space) of the neighbouring residential properties compared with London Borough of Camden's noise requirement is shown in Table 3.

Noise from the air conditioning unit to outside windows of neighbouring properties and/or other external amenity spaces that are more distant from, or more significantly screened from, location of the air conditioning unit will be lower.

Air Conditioning Unit Operating Mode	**Assessment Position & Relevant Times**	**Air Conditioning Unit Overall Noise Level *(Rating Level)***	**Noise Limit**	**Comment**
Unit operating standard duty *(full 100% duty)*	To garden areas *(external amenity space)* of neighbouring properties *Assessment time range: 7am to 11pm*	23dB	$L_{Ar,Tr}$ ≤28dBA	Complies
	To outside nearest windows of neighbouring properties *Assessment time range: Over 24 hours*	22dB	$L_{Ar,Tr}$ ≤23dBA	Complies

Table 3: Noise from proposed air conditioning unit to assessment positions

Table 3 shows that noise from the air conditioning unit with the specified acoustic louvre enclosure noise reduction treatment (see Section 6.1), complies with the noise limit criteria as per London Borough of Camden's requirements.

At this level, noise from the proposed new air conditioning unit will be significantly below existing lowest background noise levels and be subjectively very low such that it would not be expected to give rise to any noise impact or disturbance affecting the amenity of residential neighbours.

Additionally, it is important to note the noise model calculation and associated assessment is cautious/robust and in practice noise from the proposed air conditioning unit will be further below the background noise and noise limit requirement to neighbouring residential properties for the following reasons:

- The calculation assumes the air conditioning unit operates at standard (100%) duty all of the time over 24 hours including throughout the night, this is extremely unlikely to occur for majority of the time;
- The calculation allows no acoustic directivity benefit; even though the air conditioning unit location does not face directly towards the neighbouring residential properties;
- The noise limit used for the windows assessment position is very cautiously based on the representative lowest measured background noise level over 24 hours (i.e. including middle of the night), over several days. Background noise for the majority of the time, including during the middle of the night on some days is higher than the lowest value used for the assessment, and correspondingly for these times air conditioning unit noise would be further below the background noise and associated noise limits applicable to these times based on the background noise occurring during these times.

In addition to the assessment as detailed on the previous page and in Table 3, noise from air conditioning unit to outside nearest windows of the neighbouring residential properties is also assessed against London Borough of Camden's NR value noise limit requirement (NR35) as detailed in Table 4:

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
Noise from air conditioning unit *(standard 100% duty)* Mitsubishi PURY-P350YNW-A *to outside nearest windows of neighbouring properties*	NR17	35	28	26	21	12	6	4	-
Excess of unit noise on NR limit *(no excess)*	-	-	-	-	-	-	-	-	-

Table 4: Noise from proposed air conditioning unit; NR value assessment

Table 4 shows that noise from the air conditioning unit with the specified acoustic louvre enclosure noise reduction treatment (see Section 6.1), readily complies with the NR value noise limit criterion as per London Borough of Camden's requirements.

This additional NR value limit assessment confirms noise from the proposed new air conditioning unit will be significantly / subjectively very low and not expected to give rise to any noise impact or disturbance affecting the amenity of residential neighbours.

5. VIBRATION FROM AIR CONDITIONING UNIT

Proposed location of the air conditioning unit is at distance from, and not structurally linked / attached to any neighbouring residential buildings. Thus, there will be no vibration from the unit transmitted to neighbouring properties. The unit need not be installed on vibration isolators specifically regarding compliance with London Borough of Camden's requirements.

However, and as good practice, it is advised the air conditioning unit be installed on normal proprietary vibration isolators. Specification details for typically suitable vibration isolators are provided in Section 6.2 of the report.

6. SPECIFICATIONS FOR NOISE & VIBRATION TREATMENTS

This report is based on the proposed air conditioning unit Mitsubishi model PURY-P350YNW-A as detailed in Section 4. If during installation or as part of future possible unit replacement, an alternative make and/or model of air conditioning 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 the treatments specified below remain valid and noise emissions remain compliant with London Borough Of Camden's noise requirements.

6.1 Noise

In order to comply with London Borough of Camden's noise requirements it is necessary to specify noise reduction treatment for the proposed air conditioning unit as included in the noise model calculations in Appendix E. The recommended noise reduction treatment comprises the use of acoustic louvres to the unit's enclosure (i.e. to form an acoustic louvre enclosure).

Specification details for the noise reduction treatment are provided below and the treatment is indicated on a marked up copy of the proposed enclosure arrangement layout drawing in Appendix F.

Note that Philip Acoustics can only advise on noise and vibration issues and therefore professional advice from others may need to be sought to confirm suitability of the specified noise control treatments and enclosure arrangement with regard to non-acoustic issues such as visual appearance, structural loading, maintenance access and airflow ventilation.

Use of an acoustic louvre enclosure is a normal / standard method of noise reduction treatment for singular or small quantity and domestic type external air conditioning units in this scenario, and in non-technical terms essentially forms a "sound proof" box over and around the unit. The acoustic louvre enclosure is required to reduce noise levels of the unit in overall terms by at least -10dBA.

Although outside of the scope for this acoustic (noise assessment) report, the use of acoustic louvres to enclosure the unit will also have the benefit of visually screening the unit.

The recommended minimum performance requirement for the enclosure acoustic louvres is shown in Table 5. 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 -10dBA.

Description	Octave Band Centre Frequency (Hz)								Comments
	63	125	250	500	1k	2k	4k	8k	
Acoustic Louvre Insertion Loss dB	4	6	8	11	15	16	13	12	Suitable acoustic louvre would be typically 300mm depth

Table 5: Acoustic louvre performance specification *(typical for nominal 300mm depth acoustic louvres)*

The Table 5 acoustic louvre specification is based on using a proprietary nominal 300mm depth type acoustic louvre as available from most acoustic hardware suppliers.

Technical data sheets for three example suitable 300mm depth acoustic louvres (suppliers Allaway Acoustics, Kingfisher and McKenzie Martin) are provided in Appendix F.

Note that different acoustic suppliers have slightly differing performance data for their 300mm depth acoustic louvres. Therefore some supplier data may indicate slight variation in performance as compared with the octave band specification data in Table 5, however this is recommended acceptable providing the acoustic louvres are 300mm depth type.

It is anticipated the front elevation acoustic louvres forming the enclosure will need to be demountable to enable maintenance access to the air conditioning unit. This would be achieved typically by using easy release acoustic louvered access panels (as opposed to acoustic louvre doors which are more costly and unnecessary for this relatively small size enclosure). All cable and pipe entry points into and out of the louvre enclosure to the unit should be sealed airtight.

It is advised the non-acoustic louvre parts of the enclosure's outer structure should be formed by normal/standard type proprietary 25mm to 50mm thick acoustic panels, being 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 need to 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.

The acoustic panel parts of the enclosure can be painted or over-clad externally to whatever specification / material as required for visual reasons, including such as timber cladding as indicated on the enclosure arrangement drawing in Appendix B.

6.2 Vibration

As detailed in Section 5, it is advised as good practice that the air conditioning unit be installed using proprietary vibration isolator mountings.

Appropriate proprietary vibration isolators for the air conditioning unit would be rubber or neoprene turret type, with static deflection not less than 3mm under the weight / loading of the unit. Normally four vibration isolators are required per unit, one to each corner mounting position.

Two example suppliers and details of their typically suitable vibration isolators are provided below, the suppliers are not listed in any order of preference and other suppliers will be able to provide equivalent vibration isolators. A copy of each of the supplier's relevant data sheets is provided in Appendix G.

EMTEC: www.emtecproducts.co.uk Vibration isolator type R-2

Typically suitable vibration isolators of this supplier for the Mitsubishi PURY-P350YNW-A air conditioning unit of nominal weight 273kg, are R-2 colour code Black (max load per isolator 77kg).

Christie & Grey: www.christiegrey.com Vibration isolator type RM

Typically suitable vibration isolators of this supplier for the Mitsubishi PURY-P350YNW-A air conditioning unit of nominal weight 273kg, are 19.100.R.F colour code Red (max load per isolator 80kg).

APPENDIX A

Noise Survey Instrumentation

Site: 17 & 18 Well Road, London NW3 1LH

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Date: October 2019

NOISE SURVEY INSTRUMENTATION

Six Day Background Noise Survey Wednesday 04 September 2019 – Monday 09 September 2019:

- Rion sound level meter type NL-31 Class 1 serial number 01193690 (in locked & tamperproof environmental case) plus Rion preamplifier type NH-21 serial number 31316 with Rion microphone type UC-53A serial number 317534 and Rion microphone extension cable type EC-04A, Rion outdoor microphone windshield type WS-10 and tripod / extension boom arrangement;
- Bruel & Kjaer calibrator type 4231 serial number 2454786 (UKAS certified);
- Speedtech Instruments Skymaster model SM-28 serial number 19370 (for sample weather conditions data during attended parts of survey).

APPENDIX B

Site Location Aerial Image & Proposed Layout Drawings

Site: 17 & 18 Well Road, London NW3 1LH

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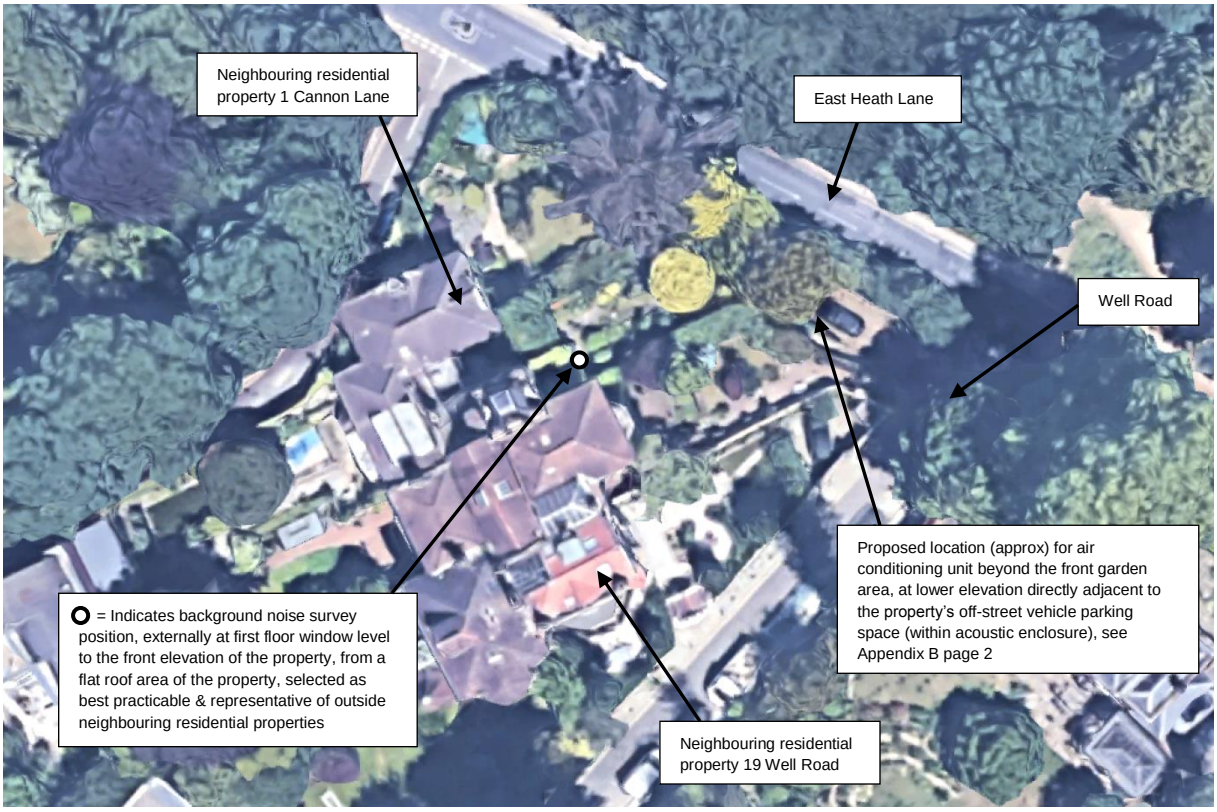
Date: October 2019

SITE LOCATION AERIAL IMAGE



Site: 17 & 18 Well Road, London NW3 1LH

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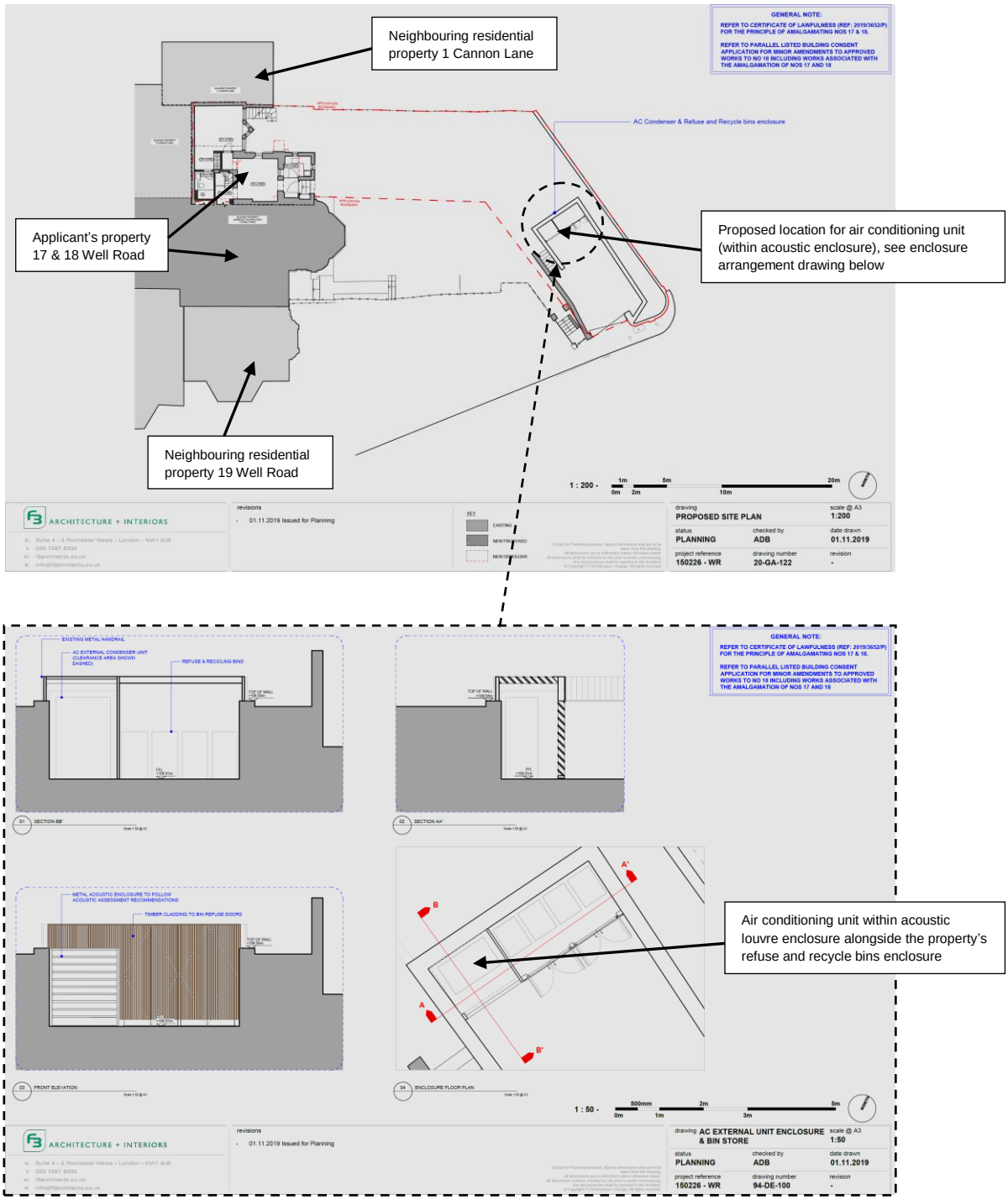
PROPOSED LAYOUT DRAWINGS SHOWING AIR CONDITIONING UNIT LOCATION *(in acoustic enclosure)*



APPENDIX C

Background Noise Survey Results

Site: 17 & 18 Well Road, London NW3 1LH

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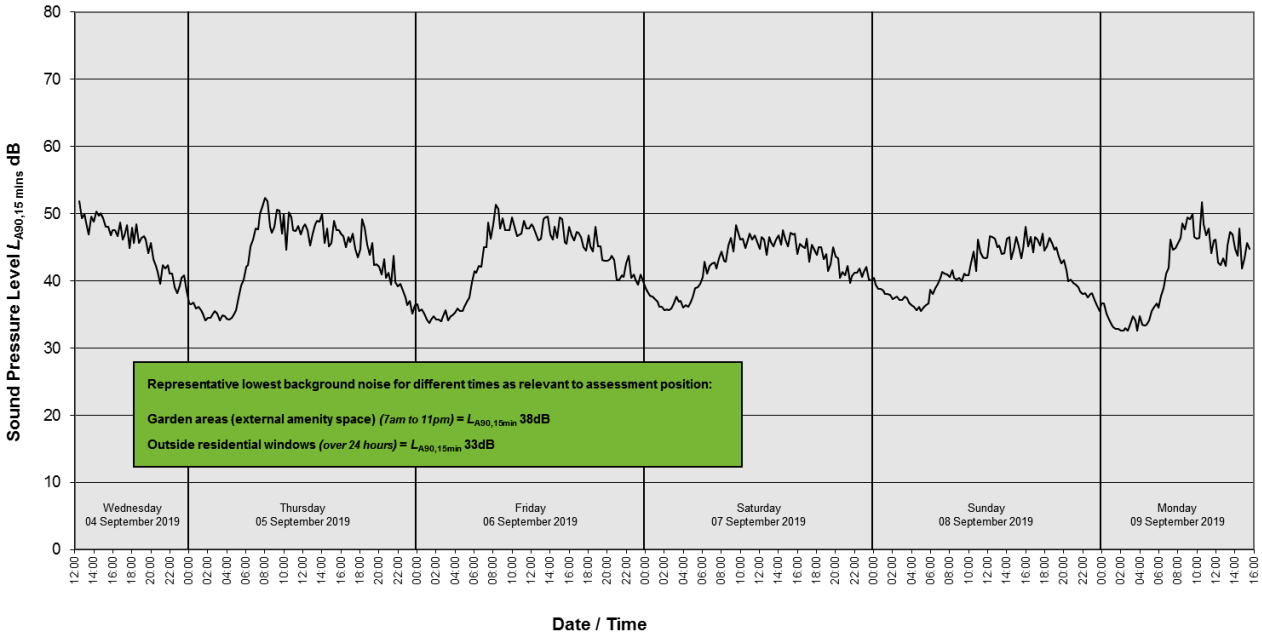
Date: October 2019

BACKGROUND NOISE SURVEY RESULTS

Raw Data Six Day Background Noise Survey Results



APPENDIX D

Manufacturer Noise Data For Air Conditioning Unit

Site: 17 & 18 Well Road, London NW3 1LH

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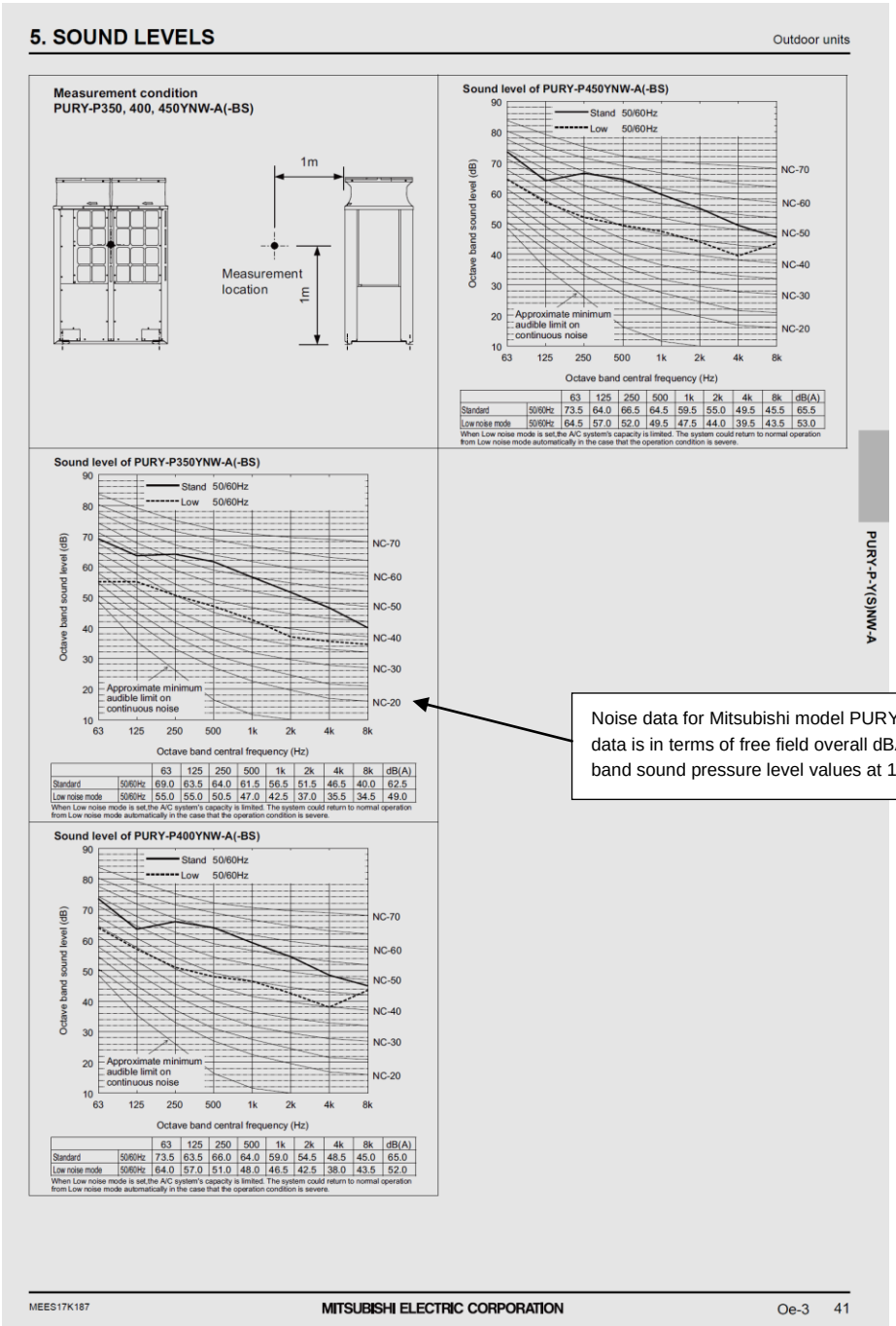
Date: October 2019

MANUFACTURER NOISE DATA FOR AIR CONDITIONING UNIT

Mitsubishi model PURY-P350YNW-A



5. SOUND LEVELS Outdoor units

Measurement condition
PURY-P350, 400, 450YNW-A(-BS)

Sound level of PURY-P450YNW-A(-BS)

		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard	50/60Hz	73.5	64.0	66.5	64.5	59.5	55.0	49.5	45.5	65.5
Low noise mode	50/60Hz	64.5	57.0	52.0	49.5	47.5	44.0	39.5	43.5	53.0

When Low noise mode is set,the A/C system's capacity is limited. The system could return to normal operation from Low noise mode automatically in the case that the operation condition is severe.

Sound level of PURY-P350YNW-A(-BS)

		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard	50/60Hz	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0	62.5
Low noise mode	50/60Hz	55.0	55.0	50.5	47.0	42.5	37.0	35.5	34.5	49.0

When Low noise mode is set,the A/C system's capacity is limited. The system could return to normal operation from Low noise mode automatically in the case that the operation condition is severe.

Sound level of PURY-P400YNW-A(-BS)

		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard	50/60Hz	73.5	63.5	66.0	64.0	59.0	54.5	48.5	45.0	65.0
Low noise mode	50/60Hz	64.0	57.0	51.0	48.0	46.5	42.5	38.0	43.5	52.0

When Low noise mode is set,the A/C system's capacity is limited. The system could return to normal operation from Low noise mode automatically in the case that the operation condition is severe.

PURY-P-Y(S)NW-A

MEES17K187 MITSUBISHI ELECTRIC CORPORATION Oe-3 41

Noise data for Mitsubishi model PURY-P350YNW-A. Noise data is in terms of free field overall dBA & linear dB octave band sound pressure level values at 1m in front of the unit.

APPENDIX E

Noise Model Calculation For Air Conditioning Unit

Site: 17 & 18 Well Road, London NW3 1LH

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NOISE MODEL CALCULATION FOR AIR CONDITIONING UNIT

Assessment Position: Garden areas (external amenity space) of neighbouring residential properties

Noise Condition: Mitsubishi air conditioning unit model PURY-P350YNW-A operating standard (100%) duty

Noise Mitigation: Air conditioning unit in acoustic louvre enclosure (see Section 6.1 Report 19075-002)

		Lin dB at Octave Band Centre Frequency Hz							
Equipment & Description	**Overall dBA**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
AIR CONDITIONING UNIT: 1 X Mitsubishi model PURY-P350YNW-A									
Sound pressure level data at 1m (free-field); *Lp dB for unit operating standard (100%) duty*	62.5	69	64	64	62	57	52	47	40
Quantity; *0dB unit quantity correction applicable for 1 x air conditioning unit*		0	0	0	0	0	0	0	0
Noise Mitigation; *unit positioned within acoustic enclosure (300mm type acoustic louvres)*		-4	-6	-8	-11	-15	-16	-13	-12
Distance; *≈12 m from unit to garden areas (external amenity space) assessment position*		-22	-22	-22	-22	-22	-22	-22	-22
Screening; *complete line of sight screening correction applicable, cautiously limit screening to -10dB*		-10	-10	-10	-10	-10	-10	-10	-10
Directivity; *cautiously nil directivity correction applied*		0	0	0	0	0	0	0	0
Reflections; *+3dB correction applied for enclosed unit adjacent to wall (non free-field)*		3	3	3	3	3	3	3	3
Contribution at assessment position	23	36	29	27	22	13	7	5	-1
Cumulative contribution all sources at assessment position	**23**	**36**	**29**	**27**	**22**	**13**	**7**	**5**	**-1**

The overall noise level at the assessment position from the air conditioning unit operating is 23dBA.

Noise generated by the air conditioning unit at the assessment position is comfortably below the representative lowest background noise, plus the proposed Mitsubishi unit model PURY-P350YNW-A generates a broadband characteristic noise (i.e. no dominant or otherwise prevailing tonal components), and notwithstanding this the specified acoustic louvre enclosure noise reduction treatment will tend to supress any residual (albeit non-expected) tonal or other noise characteristics of the unit.

Therefore, and as per the assessment provisions of British Standard BS4142:2014, no tonal character correction is applied and the air conditioning unit noise Rating Level to the assessment position = $L_{Ar,Tr}$ 23dB.

Site: 17 & 18 Well Road, London NW3 1LH

Report: 19075-002 Appendix E *(page 2 of 2)*

Date: October 2019

NOISE MODEL CALCULATION FOR AIR CONDITIONING UNIT

Assessment Position: Outside nearest windows of the neighbouring residential properties

Noise Condition: Mitsubishi air conditioning unit model PURY-P350YNW-A operating standard (100%) duty

Noise Mitigation: Air conditioning unit in acoustic louvre enclosure (see Section 6.1 Report 19075-002)

		Lin dB at Octave Band Centre Frequency Hz							
Equipment & Description	**Overall dBA**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
AIR CONDITIONING UNIT: 1 X Mitsubishi model PURY-P350YNW-A									
Sound pressure level data at 1m (free-field); *Lp dB for unit operating standard (100%) duty*	62.5	69	64	64	62	57	52	47	40
Quantity; *0dB unit quantity correction applicable for 1 x air conditioning unit*		0	0	0	0	0	0	0	0
Noise Mitigation; *unit positioned within acoustic enclosure (300mm type acoustic louvres)*		-4	-6	-8	-11	-15	-16	-13	-12
Distance; *≈25 m from unit to nearest windows assessment position*		-28	-28	-28	-28	-28	-28	-28	-28
Screening; *partial line of sight screening correction applicable, cautiously limit screening to -5dB*		-5	-5	-5	-5	-5	-5	-5	-5
Directivity; *cautiously nil directivity correction applied*		0	0	0	0	0	0	0	0
Reflections; *+3dB correction applied for enclosed unit adjacent to wall (non free-field)*		3	3	3	3	3	3	3	3
Contribution at assessment position	22	35	28	26	21	12	6	4	-2
Cumulative contribution all sources at assessment position	**22**	**35**	**28**	**26**	**21**	**12**	**6**	**4**	**-2**

The overall noise level at the assessment position from the air conditioning unit operating is 22dBA.

Noise generated by the air conditioning unit at the assessment position is comfortably below the representative lowest background noise (including during the middle of the night), plus the proposed Mitsubishi unit model PURY-P350YNW-A generates a broadband characteristic noise (i.e. no dominant or otherwise prevailing tonal components), and notwithstanding this the specified acoustic louvre enclosure noise reduction treatment will tend to supress any residual (albeit non-expected) tonal or other noise characteristics of the unit.

Therefore, and as per the assessment provisions of British Standard BS4142:2014, no tonal character correction is applied and the air conditioning unit noise Rating Level to the assessment position = $L_{Ar,Tr}$ 22dB.

APPENDIX F

Details For Noise Reduction Treatment

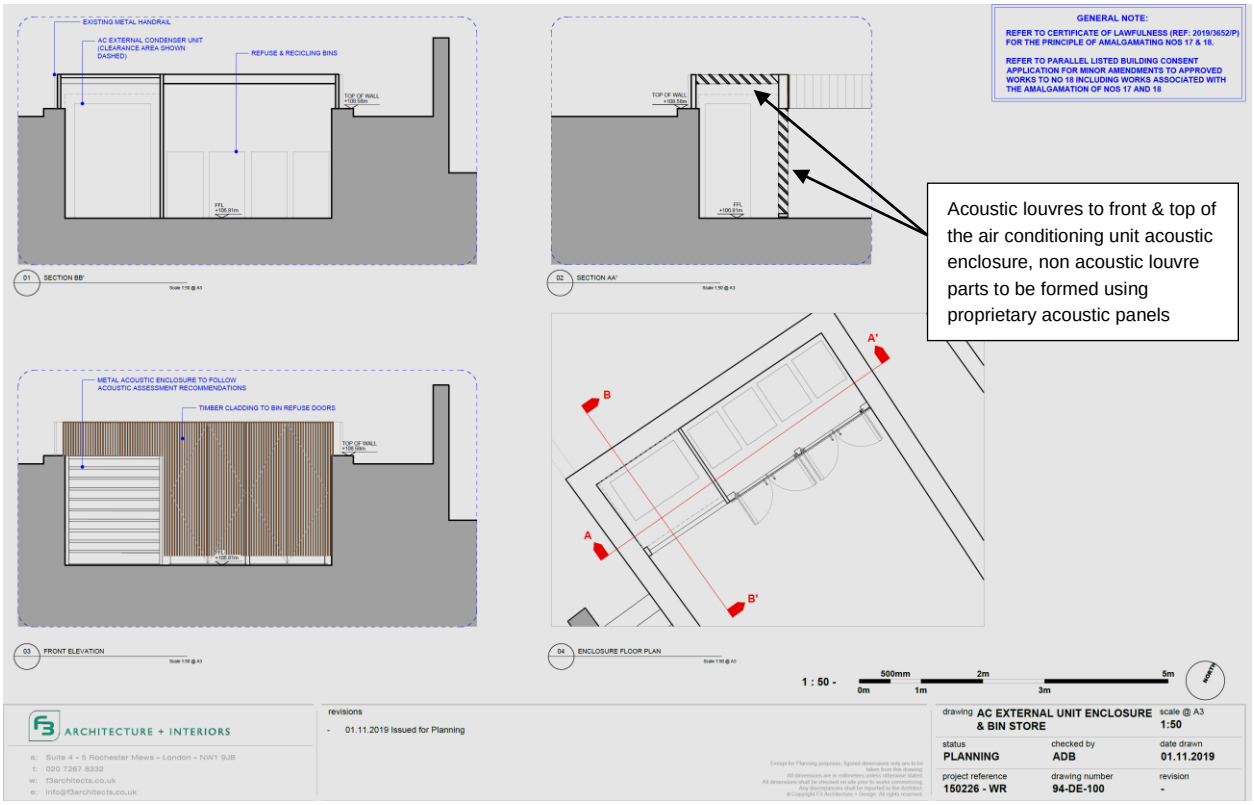
Site: 17 & 18 Well Road, London NW3 1LH

Report: 19075-002 Appendix F *(page 1 of 4)*

Date: October 2019

DETAILS FOR NOISE REDUCTION TREATMENT

Air Conditioning Unit Acoustic Enclosure Arrangement Drawing Indicating Noise Reduction Treatment



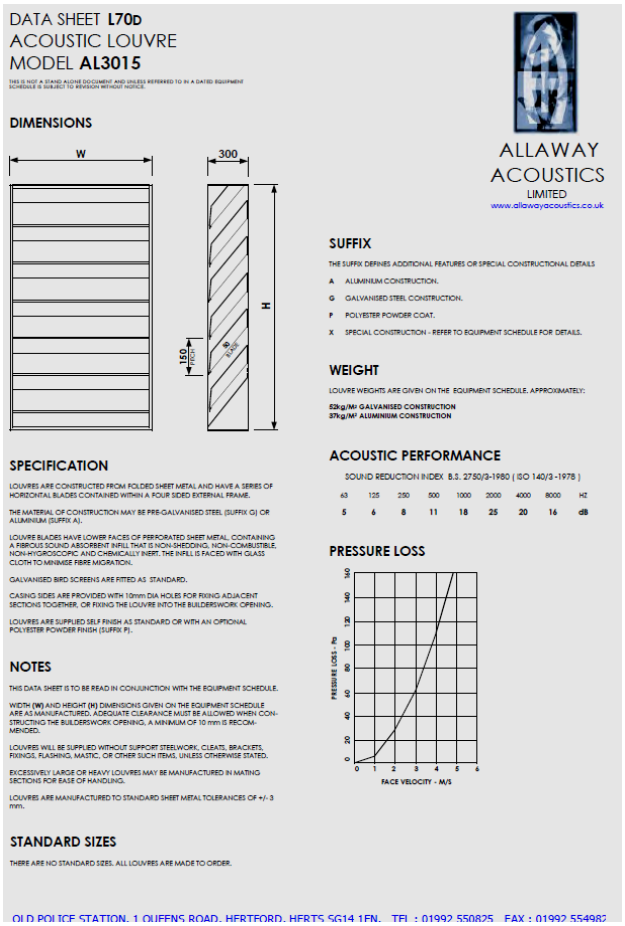
Site: 17 & 18 Well Road, London NW3 1LH

Report: 19075-002 Appendix F *(page 2 of 4)*

Date: October 2019

DETAILS FOR NOISE REDUCTION TREATMENT

Data Sheet For Example 300mm Acoustic Louvre: Allaway Acoustics



DATA SHEET **L70D**
ACOUSTIC LOUVRE
MODEL **AL3015**

THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A DATED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

DIMENSIONS

ALLAWAY ACOUSTICS LIMITED
www.allawayacoustics.co.uk

SUFFIX

THE SUFFIX DEFINES ADDITIONAL FEATURES OR SPECIAL CONSTRUCTIONAL DETAILS

A ALUMINIUM CONSTRUCTION.
G GALVANISED STEEL CONSTRUCTION.
P POLYESTER POWDER COAT.
X SPECIAL CONSTRUCTION - REFER TO EQUIPMENT SCHEDULE FOR DETAILS.

WEIGHT

LOUVRE WEIGHTS ARE GIVEN ON THE EQUIPMENT SCHEDULE. APPROXIMATELY:

52kg/M² GALVANISED CONSTRUCTION
37kg/M² ALUMINIUM CONSTRUCTION

ACOUSTIC PERFORMANCE

SOUND REDUCTION INDEX B.S. 2750/3-1980 (ISO 140/3-1978)

63	125	250	500	1000	2000	4000	8000	Hz
5	6	8	11	18	25	20	16	dB

SPECIFICATION

LOUVRES ARE CONSTRUCTED FROM FOLDED SHEET METAL AND HAVE A SERIES OF HORIZONTAL BLADES CONTAINED WITHIN A FOUR SIDED EXTERNAL FRAME.

THE MATERIAL OF CONSTRUCTION MAY BE PRE-GALVANISED STEEL (SUFFIX G) OR ALUMINIUM (SUFFIX A).

LOUVRE BLADES HAVE LOWER FACES OF PERFORATED SHEET METAL, CONTAINING A FIBROUS SOUND ABSORBENT INFILL THAT IS NON-SHEDDING, NON-COMBUSTIBLE, NON-HYGROSCOPIC AND CHEMICALLY INERT. THE INFILL IS FACED WITH GLASS CLOTH TO MINIMISE FIBRE MIGRATION.

GALVANISED BIRD SCREENS ARE FITTED AS STANDARD.

CASING SIDES ARE PROVIDED WITH 10mm DIA HOLES FOR FIXING ADJACENT SECTIONS TOGETHER, OR FIXING THE LOUVRE INTO THE BUILDERSWORK OPENING.

LOUVRES ARE SUPPLIED SELF FINISH AS STANDARD OR WITH AN OPTIONAL POLYESTER POWDER FINISH (SUFFIX P).

PRESSURE LOSS

NOTES

THIS DATA SHEET IS TO BE READ IN CONJUNCTION WITH THE EQUIPMENT SCHEDULE.

WIDTH (W) AND HEIGHT (H) DIMENSIONS GIVEN ON THE EQUIPMENT SCHEDULE ARE AS MANUFACTURED. ADEQUATE CLEARANCE MUST BE ALLOWED WHEN CONSTRUCTING THE BUILDERSWORK OPENING. A MINIMUM OF 10 mm IS RECOMMENDED.

LOUVRES WILL BE SUPPLIED WITHOUT SUPPORT STEELWORK, CLEATS, BRACKETS, FIXINGS, FLASHING, MASTIC, OR OTHER SUCH ITEMS, UNLESS OTHERWISE STATED.

EXCESSIVELY LARGE OR HEAVY LOUVRES MAY BE MANUFACTURED IN MATING SECTIONS FOR EASE OF HANDLING.

LOUVRES ARE MANUFACTURED TO STANDARD SHEET METAL TOLERANCES OF +/- 3 mm.

STANDARD SIZES

THERE ARE NO STANDARD SIZES. ALL LOUVRES ARE MADE TO ORDER.

OLD POLICE STATION, 1 QUEENS ROAD, HERTFORD, HERTS SG14 1EN. TEL : 01992 550825 FAX : 01992 554982

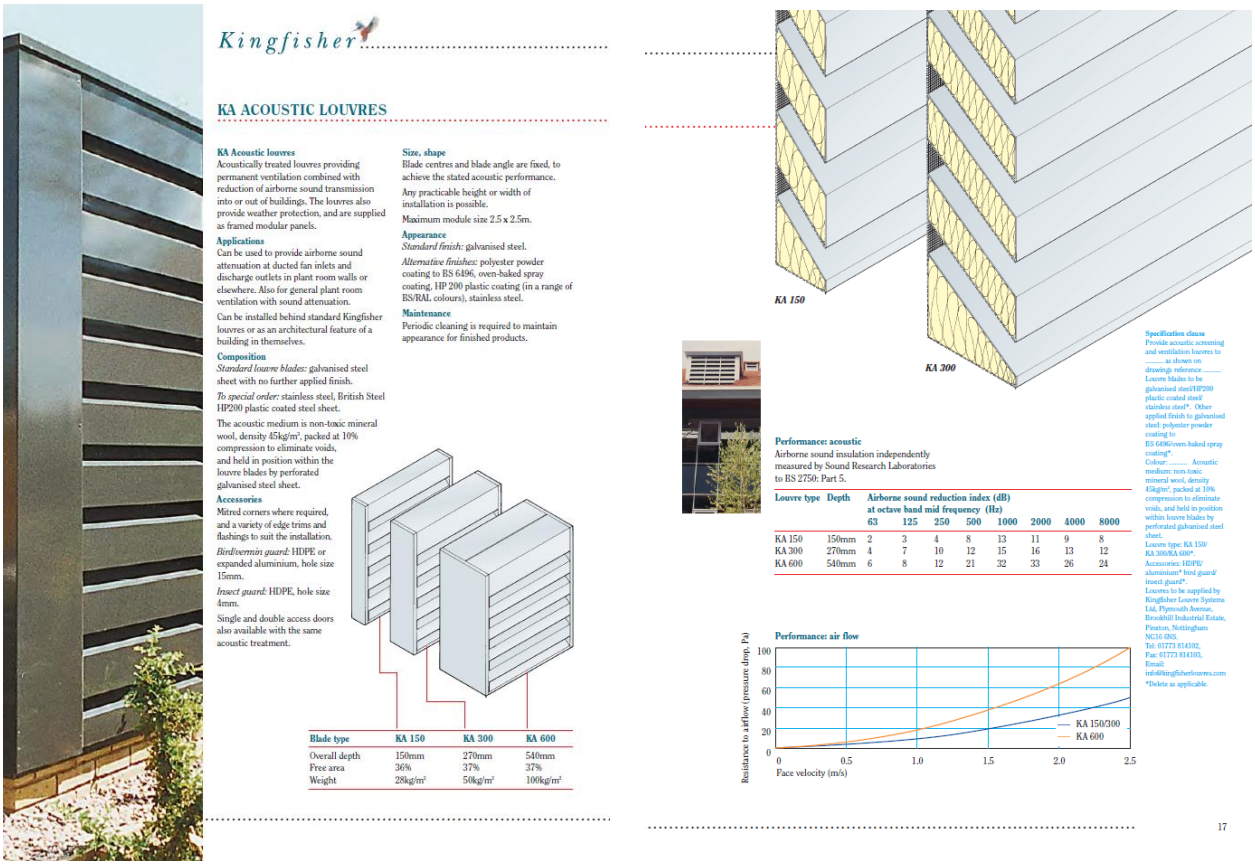
Site: 17 & 18 Well Road, London NW3 1LH

Report: 19075-002 Appendix F *(page 3 of 4)*

Date: October 2019

DETAILS FOR NOISE REDUCTION TREATMENT

Data Sheet For Example 300mm Acoustic Louvre: Kingfisher



Kingfisher

KA ACOUSTIC LOUVRES

KA Acoustic louvres
Acoustically treated louvres providing permanent ventilation combined with reduction of airborne sound transmission into or out of buildings. The louvres also provide weather protection, and are supplied as framed modular panels.

Applications
Can be used to provide airborne sound attenuation at ducted fan inlets and discharge outlets in plant room walls or elsewhere. Also for general plant room ventilation with sound attenuation.

Can be installed behind standard Kingfisher louvres or as an architectural feature of a building in themselves.

Composition
Standard louvre blades: galvanised steel sheet with no further applied finish.

To special order: stainless steel, British Steel HP200 plastic coated steel sheet.

The acoustic medium is non-toxic mineral wool, density 45kg/m³, packed at 10% compression to eliminate voids, and held in position within the louvre blades by perforated galvanised steel sheet.

Accessories
Mitred corners where required, and a variety of edge trims and flashings to suit the installation.

Bird/vermin guard: HDPE or expanded aluminium, hole size 15mm.

Insect guard: HDPE, hole size 4mm.

Single and double access doors also available with the same acoustic treatment.

Size, shape
Blade centres and blade angle are fixed, to achieve the stated acoustic performance.

Any practicable height or width of installation is possible.

Maximum module size 2.5 x 2.5m.

Appearance
Standard finish: galvanised steel.

Alternative finishes: polyester powder coating to BS 6496, oven-baked spray coating, HP 200 plastic coating (in a range of BS/RAL colours), stainless steel.

Maintenance
Periodic cleaning is required to maintain appearance for finished products.

Blade type	KA 150	KA 300	KA 600
Overall depth	150mm	270mm	540mm
Free area	36%	37%	37%
Weight	28kg/m²	50kg/m²	100kg/m²

KA 150

KA 300

Performance: acoustic
Airborne sound insulation independently measured by Sound Research Laboratories to BS 2750: Part 5.

Louvre type	Depth	Airborne sound reduction index (dB) at octave band mid frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
KA 150	150mm	2	3	4	8	13	11	9	8
KA 300	270mm	4	7	10	12	15	16	13	12
KA 600	540mm	6	8	12	21	32	33	26	24

Performance: air flow

Specification clause
Provide acoustic screening and ventilation louvres to ..... as shown on drawings reference ..... Louvre blades to be galvanised steel/HP200 plastic coated steel/ stainless steel*. Other applied finish to galvanised steel: polyester powder coating to BS 6496/oven-baked spray coating*. Colour: ..... Acoustic medium: non-toxic mineral wool, density 45kg/m³, packed at 10% compression to eliminate voids, and held in position within louvre blades by perforated galvanised steel sheet. Louvre type: KA 150/ KA 300/KA 600*. Accessories: HDPE/ aluminium* bird guard/ insect guard*. Louvres to be supplied by Kingfisher Louvre Systems Ltd, Plymouth Avenue, Brookhill Industrial Estate, Pinxton, Nottingham NG16 6NS. Tel: 01773 814102. Fax: 01773 814103. Email: info@kingfisherlouvres.com *Delete as applicable.

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Site: 17 & 18 Well Road, London NW3 1LH

Report: 19075-002 Appendix F *(page 4 of 4)*

Date: October 2019

DETAILS FOR NOISE REDUCTION TREATMENT

Data Sheet For Example 300mm Acoustic Louvre: McKenzie Martin

McKenzie Martin Ltd

LOUVRE AND NATURAL VENTILATION SPECIALISTS

Acoustic Louvres

McKenzie Martin—Louvres and Natural Ventilation
Eton Hill Works, Eton Hill Road, Radcliffe, Manchester. M26 2US
Www.McKenzieMartin.co.uk Sales@McKenzieMartin.co.uk Tel: 0161 723 2234

Acoustic Louvres

Available Features

- Various Shapes to Suit Requirements
- Concealed Mullions
- Box Frames, Flanges, Cills, Flashing
- Bird/Fly Mesh
- Blanking Plates (Single Skin or Insulated)
- Integral Doors
- Turrets
- Double/Multiple Banks

Available Finishes

- Natural Mill Finish
- Polyester Powder Coated to your choice of RAL
- British Steel Plastisol in a standard RAL colour

The System

Designed as an effective means of reducing sound transmittance whilst allowing weathered ventilation, McKenzie Martin Acoustic Louvres are suitable for vertical mounting into sidewall cladding or brickwork and may be installed singly, in horizontal runs or vertical tiers. The units are available in pitches of 100mm, 150mm and 300mm to suit.

Each model of louvre blade incorporates sound absorption material which is contained within a double layer of perforated mesh and provides sound reduction per the table below. The units are simple to install and maintain and may be used in conjunction with roof ventilators to provide an overall system of natural and or fire ventilation. The louvres are made to measure and offered in a variety of materials and finishes to suit specific requirements

Acoustic Performance

All units have been subjected to a series of controlled sound transmission tests to the specification shown in BS EN ISO 10140-2:2010. The results are shown in the tables below.

100mm Unit		150mm Unit		300mm Unit	
Octave Band Centre Frequency (Hz)	Sound Reduction Index (dB)	Octave Band Centre Frequency (Hz)	Sound Reduction Index (dB)	Octave Band Centre Frequency (Hz)	Sound Reduction Index (dB)
63	-0.9	63	2.1	63	3.0
125	4.6	125	4.7	125	6.7
250	4.2	250	4.8	250	9.3
500	6.0	500	7.4	500	13.4
1000	8.4	1000	13.2	1000	17.7
2000	17.2	2000	23.4	2000	20.4
4000	15.9	4000	20.8	4000	17.0
8000	13.4	8000	16.4	8000	14.7

Manufacturing Options

Top, bottom and side flanges may be formed to whatever mounting detail is required. For additional information please consult the separate form entitled detail for manufacture.

With flanged louvres the box depth can be manufactured to fit inside or outside the building line as required

Where units are to be mounted in continuous horizontal runs joining plates are provided for weathering.

Nylon mesh or expanded aluminium mesh bird guards can be fitted internally if required.

McKenzie Martin—Louvres and Natural Ventilation
Eton Hill Works, Eton Hill Road, Radcliffe, Manchester. M26 2US
Tel: 0161 723 2234 Sales@McKenzieMartin.co.uk www.McKenzieMartin.co.uk

APPENDIX G

Details For Typically Suitable Vibration Isolators

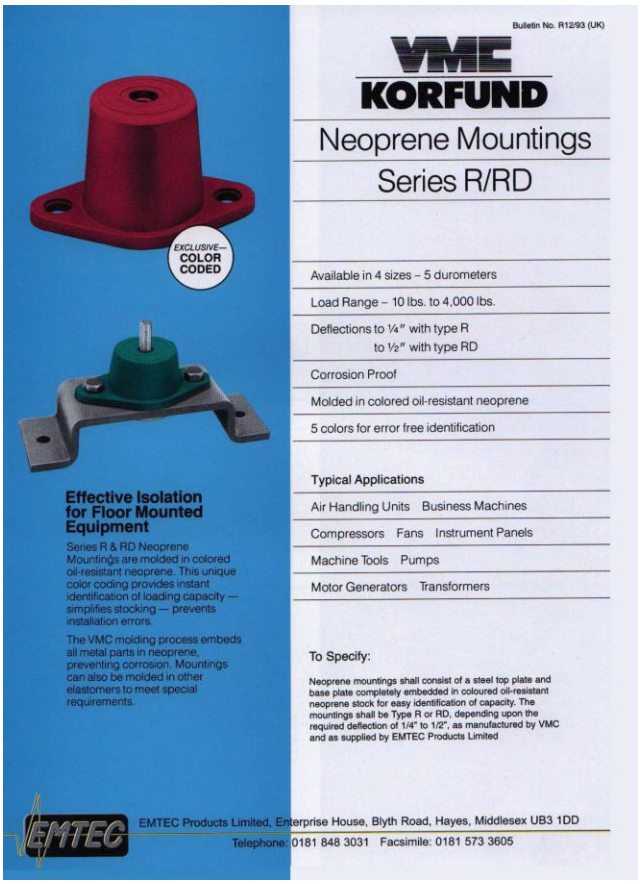
Site: 17 & 18 Well Road, London NW3 1LH

Report: 19075-002 Appendix G *(page 1 of 2)*

Date: October 2019

DETAILS FOR TYPICALLY SUITABLE VIBRATION ISOLATORS

Supplier: EMTEC



Bulletin No. R12/93 (UK)

VMC KORFUND

Neoprene Mountings
Series R/RD

EXCLUSIVE— COLOR CODED

Available in 4 sizes – 5 durometers

Load Range – 10 lbs. to 4,000 lbs.

Deflections to ¼" with type R
to ½" with type RD

Corrosion Proof

Molded in colored oil-resistant neoprene

5 colors for error free identification

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.

Typical Applications

Air Handling Units Business Machines

Compressors Fans Instrument Panels

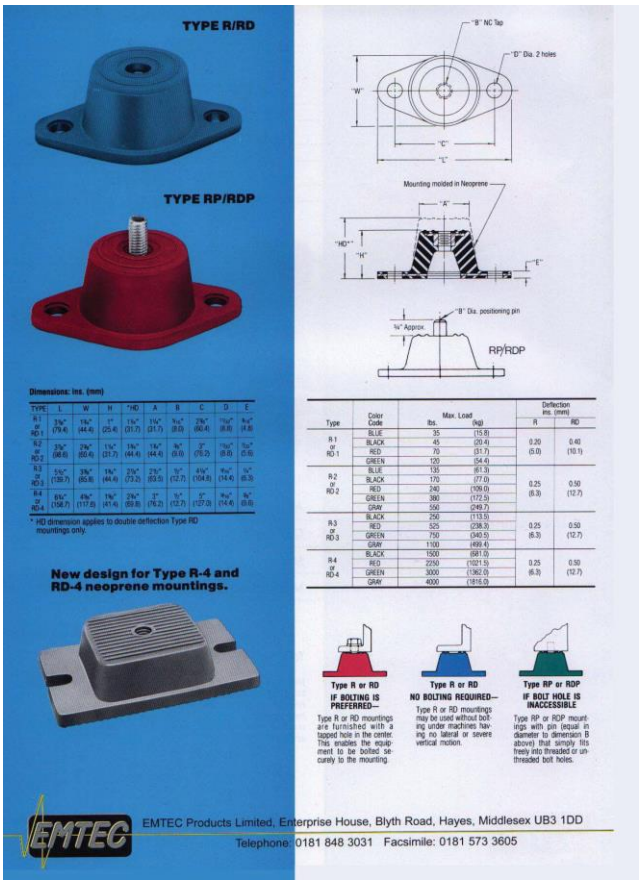
Machine Tools Pumps

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

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



TYPE R/RD

TYPE RP/RDP

Dimensions: ins. (mm)

TYPE	L	W	H	*HD	A	B	C	D	E
R-1 or RD-1	3⅛" (79.4)	1¾" (44.4)	1" (25.4)	1¼" (31.7)	1¼" (31.7)	⅜" (9.5)	2⅜" (60.4)	⅜" (9.5)	⅜" (9.5)
R-2 or RD-2	3⅝" (92.0)	2⅜" (60.4)	1¾" (37.7)	1¾" (44.4)	1¾" (44.4)	⅜" (9.5)	3" (76.2)	⅜" (9.5)	⅝" (15.9)
R-3 or RD-3	5½" (139.7)	3⅜" (85.8)	1⅝" (44.4)	2⅜" (73.2)	2⅜" (63.5)	½" (12.7)	4⅛" (104.8)	⅜" (14.4)	⅝" (15.9)
R-4 or RD-4	6½" (156.7)	4⅜" (117.5)	1⅝" (41.4)	2⅜" (69.8)	3" (76.2)	½" (12.7)	5" (127.0)	⅜" (14.4)	⅝" (15.9)

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

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

Type	Color Code	Max. Load lbs.	Max. Load (kg)	Deflection ins. (mm) R	Deflection ins. (mm) RD
R-1 or RD-1	BLUE	35	(15.8)		
	BLACK	45	(20.4)	0.20	0.40
	RED	70	(31.7)	(5.0)	(10.1)
	GREEN	120	(54.4)		
R-2 or RD-2	BLUE	135	(61.3)		
	BLACK	170	(77.0)	0.25	0.50
	RED	240	(109.0)	(6.3)	(12.7)
	GREEN	380	(172.5)		
	GRAY	550	(249.7)		
R-3 or RD-3	BLACK	250	(113.5)		
	RED	525	(238.3)	0.25	0.50
	GREEN	750	(340.5)	(6.3)	(12.7)
	GRAY	1100	(499.4)		
R-4 or RD-4	BLACK	1500	(681.0)		
	RED	2250	(1021.5)	0.25	0.50
	GREEN	3000	(1362.0)	(6.3)	(12.7)
	GRAY	4000	(1816.0)		

Type R or RD
IF BOLTING IS PREFERRED—
Type R or RD mountings are furnished with a tapped hole in the center. This enables the equipment to be bolted securely to the mounting.

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

Type RP or RDP
IF BOLT HOLE IS INACCESSIBLE
Type RP or RDP mountings with pin (equal in diameter to dimension B above) that simply fits freely into threaded or unthreaded bolt holes.

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

Site: 17 & 18 Well Road, London NW3 1LH

Report: 19075-002 Appendix G *(page 2 of 2)*

Date: October 2019

DETAILS FOR TYPICALLY SUITABLE 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.

CHRISTIE & GREY Vibration & Shock Control

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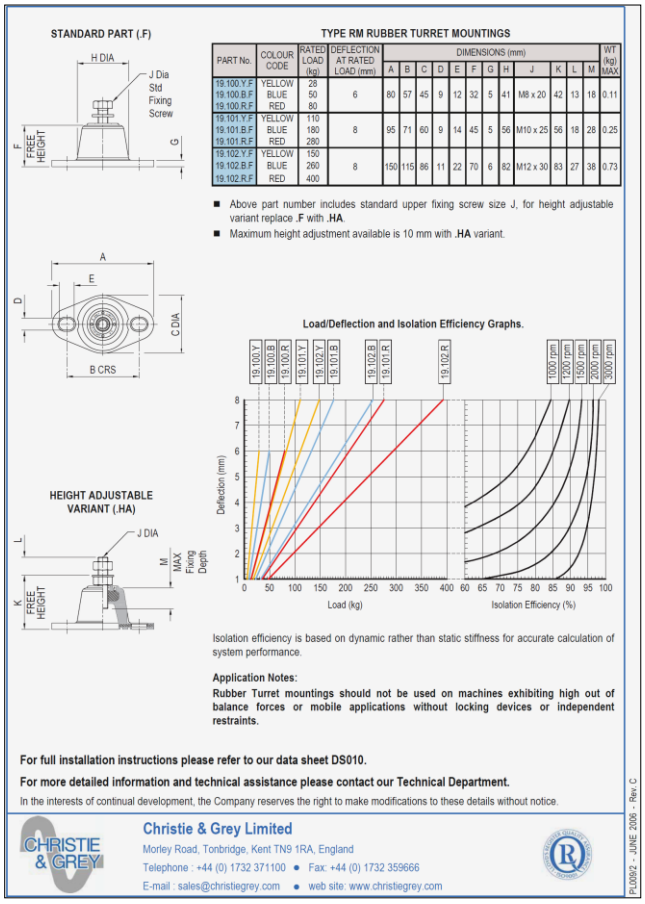

STANDARD PART (.F)

H DIA, J Dia Std Fixing Screw, FREE HEIGHT, G

TYPE RM RUBBER TURRET MOUNTINGS

PART No.	COLOUR CODE	RATED LOAD (kg)	DEFLECTION AT RATED LOAD (mm)	DIMENSIONS (mm) A	B	C	D	E	F	G	H	J	K	L	M	WT (kg) MAX
19.100.Y.F	YELLOW	28	6	80	57	45	9	12	32	5	41	M8 x 20	42	13	18	0.11
19.100.B.F	BLUE	50														
19.100.R.F	RED	80														
19.101.Y.F	YELLOW	110	8	95	71	60	9	14	45	5	56	M10 x 25	56	18	28	0.25
19.101.B.F	BLUE	180														
19.101.R.F	RED	280														
19.102.Y.F	YELLOW	150	8	150	115	86	11	22	70	6	82	M12 x 30	83	27	38	0.73
19.102.B.F	BLUE	260														
19.102.R.F	RED	400														

- Above part number includes standard upper fixing screw size J, for height adjustable variant replace **.F** with **.HA**.
- Maximum height adjustment available is 10 mm with **.HA** variant.

A, E, D, C DIA, B CRS

Load/Deflection and Isolation Efficiency Graphs.

HEIGHT ADJUSTABLE VARIANT (.HA)

L, J DIA, M MAX Fixing Depth, K FREE HEIGHT

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

Christie & Grey Limited

Morley Road, Tonbridge, Kent TN9 1RA, England

Telephone : +44 (0) 1732 371100 • Fax: +44 (0) 1732 359666

E-mail : sales@christiegrey.com • web site: www.christiegrey.com

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