Philip Acoustics Ltd.

Consultants in Noise and Vibration

REPORT TITLE: ACOUSTIC REPORT FOR PROPOSED AIR CONDITIONING EQUIPMENT AT 1 CHAMBERLAIN STREET, LONDON NW1 8XB

REPORT REF: 18211-002

ISSUED TO: Stephen Scanlan and Azadeh Nassiri
1 Chamberlain Street
London
NW1 8XB

ISSUED BY: Chris Swiejkowski MEng MIOA

DATE: November 2018

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CONTENTS

SUMMARY

- Philip Acoustics has been commissioned to assess noise and vibration from the air conditioning unit proposed to be installed to serve a residential property at 1 Chamberlain Street, London NW1 8XB. The air conditioning unit is to be located within a lightwell to the front of the building. The assessment considers London Borough of Camden's planning consent noise conditions for mechanical services equipment 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 five day period including sample weekdays and a full weekend to establish minimum existing background noise levels during operational times of the air conditioning unit at a position representative of outside nearest windows of non-associated neighbouring residential properties.

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

- The noise reduction treatment is to fit a proprietary acoustic enclosure to the proposed unit. Full specification details for the proposed noise reduction treatment are provided in Section 6.1 of the report.

- Proposed location of the air conditioning unit within the front lightwell is not directly structurally linked to any adjacent residential properties and therefore there will be no potential for any structure-borne vibration from the unit to transfer to adjacent residential properties. As good practice, to anyhow minimise any vibration from the unit to within the property 1 Chamberlain Street itself, it is recommended the air conditioning unit be installed on proprietary vibration isolators. Specification details for suitable vibration isolators are included in Section 6.2 of the report.

1. INTRODUCTION

A single new Daikin air conditioning unit is proposed to be installed to serve a residential property at 1 Chamberlain Street, London NW1 8XB. The air conditioning unit is to be located externally to the front lightwell of the building.

It is anticipated that as part of the planning process for the new air conditioning unit, the Local Planning Authority (London Borough of Camden) will require information in the form of an acoustic report regarding noise from the proposed new equipment in order to seek to protect the amenity of residents in the vicinity with regard to possible noise emissions from the equipment.

Philip Acoustics has therefore been commissioned to provide an acoustic assessment for the equipment. This report presents results of the assessment and includes:-

- Confirmation of London Borough of Camden's planning consent noise requirements;
- Measurement of existing background noise levels;
- Calculation of air conditioning unit noise levels;
- Consideration of vibration from the air conditioning unit;
- Review of noise/vibration control treatments necessary to comply with London Borough of Camden's planning consent requirements.

2. LONDON BOROUGH OF CAMDEN NOISE REQUIREMENTS

Policy A4 – *Noise and Vibration* of Section 6 – *Protecting amenity* of Camden Local Plan (adopted June 2017) covers in detail noise issues relating to a wide range of planning and noise pollution scenarios, including mechanical services equipment and has been copied 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 are listed in Table C of Appendix 3 which has been copied 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}

Section *Industrial and Commercial Noise Sources* of Appendix 3 includes the statements: "Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 '*Methods for rating and assessing industrial and commercial sound*' (BS 4142) will be used. For such cases a 'Rating Level' of 10dB below background (15dB if tonal components are present) should be considered as the design criterion".

It is the author's experience and professional opinion that the type of modern and physically small proposed domestic use Daikin air conditioning unit proposed at 1 Chamberlain Street as subject to this noise assessment (additionally fitted with recommended proprietary acoustic enclosure) generates a typically broadband type noise without any strong or clearly perceptible tonal element to the assessment position (outside nearest windows of non-associated neighbouring residential properties). Therefore the noise limit of 10dB below background of London Borough of Camden's planning consent noise conditions is applied in this instance.

The design criterion is applicable to gardens used as amenity spaces and/or to outside nearest residential windows. For this site the noise assessment is carried out to outside non-associated residential windows at ground floor level of adjacent property at 2 Chamberlain Street as being observed to be the nearest noise-sensitive location in relation to the proposed equipment location.

3. NOISE SURVEY

In order to assess noise from the proposed new air conditioning unit against London Borough of Camden's planning consent noise requirement it is necessary to establish representative minimum background noise levels at the assessment position to outside the nearest non-associated residential windows. Details of the background noise survey carried out by Philip Acoustics are provided in Sections 3.1 to 3.3.

3.1 Survey Instrumentation

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

3.2 Survey Details and Procedure

Although the proposed air conditioning unit would likely only tend to operate during the daytime and evening periods, as it will serve a residential property 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 possible time of operation for the unit.

The noise survey was carried out over a five day period from Friday 9 November 2018 through Tuesday 13 November 2018 to include sample weekdays and also a full weekend, and to obtain background noise levels during the entire range of operational times for the air conditioning unit. The weather included dry and calm conditions during the survey day and also night periods.

Measurements of background noise were recorded continually as overall L_{A90} dB values over 15 minute periods for the survey duration.

Proposed location for the air conditioning unit, direction to the nearest non-associated residential windows and position for the background noise survey are shown/indicated on the drawing in Appendix B.

The nearest non-associated residential windows in relation to the proposed air conditioning unit location are observed to be the ground floor windows to the front of the adjacent residential property at 2 Chamberlain Street.

Due to the security reasons, the background noise survey measurement position was at first floor level to the front façade of the building at 1 Chamberlain Street using an extension pole and microphone extension lead arrangement. This measurement position was selected as being best achievable/accessible and representative of the nearest non-associated residential windows at 2 Chamberlain Street.

3.3 Survey Results & Observations

Raw data results of the background noise survey are provided graphically in Appendix C.

Existing noise levels in the vicinity are predominantly due to traffic on surrounding roads and general activity in the local area. Noise levels remain broadly consistent during the day and then reduce during the evening and night; this profile is normal for this type of location where there is frequent traffic in the area during the day followed by a reduction in traffic volume during the evening and night. Summary of the representative minimum measured L_{A90} background noise level and corresponding noise requirement are shown in Table 1.

Description	**Proposed Air Conditioning Unit Operating Mode & Times**	**Representative Minimum Background Noise $L_{A90,\ 15min}$**	**London Borough of Camden Noise Limit**
Assessment to outside nearest residential windows	Unit operable over 24 hours in heating or cooling mode	36dB *(this value occurs at night circa 1am to 3am)*	≤ 26dBA

Table 1: Measured background noise and associated noise limit

4. NOISE FROM AIR CONDITIONING UNIT

The proposed new air conditioning condenser unit is Daikin model 4MXM80N.

Proposed location of the unit is described in Section 3.2 of the report and shown on drawing in Appendix B. Manufacturer noise data for the unit is provided in Appendix D.

The manufacturer noise data is in terms of free field overall dBA and linear octave band dB free field sound pressure levels at 1m. It is noted the proposed Daikin model 4MXM80N is a physically small domestic use air conditioning unit with relatively low noise output. Summary of noise from the air conditioning unit including octave band values is shown in Table 2.

The client has advised that the unit will have capability to operate in both heating and cooling modes.

Description	**Overall dBA**	**Octave Band Centre Frequency (Hz) (Linear dB)**							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Daikin air conditioning unit model 4MXM80N *(cooling mode)*	49	51	51	49	47	43	38	30	24
Daikin air conditioning unit model 4MXM80N *(heating mode)*	49	51	53	50	46	43	38	31	26

Table 2: Proposed air conditioning unit free-field sound pressure levels at 1m

To calculate the noise contribution from the air conditioning unit to the assessment position (outside nearest non-associated residential windows) a spreadsheet based noise model has been used. The model takes account of the distance between the air conditioning unit and assessment location, acoustic directivity, acoustic reflections and any natural line of sight acoustic screening.

The noise model calculation (details provided in Appendix E) also takes account of the noise reduction treatment applied to the air conditioning unit (acoustic enclosure) as specified in Section 6.1 of this report.

The model overall calculated noise level from the proposed air conditioning unit to outside nearest non-associated residential windows (as described in Section 3.2) compared with London Borough of Camden's noise limit requirements is shown in Table 3.

Description	Air Conditioning Units Overall Noise Level	Noise Level Limit	Comment
Assessment to outside nearest residential windows	25dBA	≤ 26dBA	Complies

Table 3: Noise from air conditioning unit to assessment position outside adjacent residential windows

Table 3 shows that noise from the proposed air conditioning unit with specified acoustic treatment applied (as detailed in Section 6.1) complies with London Borough of Camden's planning consent noise requirement. At this level, noise from the proposed air conditioning unit will be substantially below existing minimum background and would not be expected to be audible or of impact on the amenity of adjacent residential occupiers.

5. VIBRATION FROM AIR CONDITIONING UNIT

Proposed location of the air conditioning unit within front lightwell is not directly structurally linked to any adjacent residential properties and therefore there will be no potential for any structure-borne vibration from the air conditioning unit to transfer to adjacent residential properties.

Nevertheless it is recommended that appropriate vibration isolators be fitted to the new equipment as good practice to anyhow minimise any vibration from the unit to within the property 1 Chamberlain Street itself.

Specification details for suitable vibration isolators are provided in Section 6.2 of the report.

6. SPECIFICATIONS FOR NOISE & VIBRATION TREATMENTS

Whilst this report is based on the specific make and models of proposed Daikin air conditioning unit as detailed in Section 4, if during installation or as part of future equipment replacement, an alternative unit make and/or model is selected then it is important that noise level for the alternative equipment 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 requirements.

6.1 Noise

Note that Philip Acoustics can only advise on noise and vibration issues and therefore it is recommended that professional advice from others may need to be sought to confirm suitability of the specified noise control treatment with regard to non-acoustic issues such as airflow ventilation etc.

It is recommended that the most practicable way to reduce noise from the proposed air conditioning unit to comply with London Borough of Camden's noise requirement would be to install a proprietary acoustic enclosure to the unit.

It is recommended the acoustic enclosure is constructed incorporating:

- Acoustic louvre to the front of the enclosure to provide intake / exhaust airflow to the unit;
- Solid sides and roof - need not be acoustic panel; these could be formed by a normal plywood/timber and/or "lean to" pitched timber lid or roof with felt covering or similar, constructed from minimum 22mm ply or similar thickness / density material.

Alternatively, the front acoustic louvre can be a 'full width' of the lightwell (installed between two existing lightwell walls) complete with solid roof as described above.

The acoustic enclosure would typically be secured in place by brackets / channels and / or supported by suitably designed frame / support etc. A concept sketch drawing for the recommended acoustic enclosure is provided in Appendix F.

It is anticipated the enclosure may need to be demountable to enable maintenance access to the unit. This would be achieved typically by using easy release acoustic louvre access panels (as opposed to acoustic louvre doors which are much more costly).

The recommended minimum performance requirement for the acoustic louvre is shown in Table 4 below.

Description	Octave Band Centre Frequency (Hz)								Comments
	63	125	250	500	1k	2k	4k	8k	
Acoustic Louvre Insertion Loss dB	4	4	5	8	12	16	15	13	Suitable acoustic louvre would be typically 150mm depth

Table 4: Acoustic louvre performance specification *(typical for nominal 150mm depth acoustic louvres)*

The acoustic louvre in Table 4 is based on using a proprietary nominal 150mm depth type acoustic louvre as available from most acoustic hardware suppliers. Technical data sheet for example suitable 150mm depth acoustic louvres (supplied by Allaway Acoustics) is provided in Appendix F.

6.2 Vibration

It is recommended that the air conditioning unit be mounted using proprietary rubber or neoprene turret type vibration isolators. The isolators should be selected to each have a static deflection not less than 3mm under load of each unit. Details of possible acoustic hardware companies who could supply appropriate vibration isolators are provided in Appendix F.

Suitable turret type vibration isolators are approximately 30mm high and are available in various load capacities. The isolators are colour coded to indicate the load capacity and four isolators are required (one to each corner).

APPENDIX A

Noise Survey Instrumentation

Site: 1 Chamberlain Street, London NW1 8XB

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Date: November 2018

NOISE SURVEY INSTRUMENTATION

Five Day Noise Survey:

- Rion sound level meter type NL-31 Class 1 serial number 01193690 plus Rion microphone type UC-53A serial number 317534 complete with weatherproof and lockable outdoor environmental kit, microphone extension lead and extension boom arrangement;
- Bruel & Kjaer calibrator type 4231 serial number 2642929 (UKAS certified).

APPENDIX B

Drawing Indicating Units Location, Survey Position & Direction To Nearest Residential Windows

Site: 1 Chamberlain Street, London NW1 8XB

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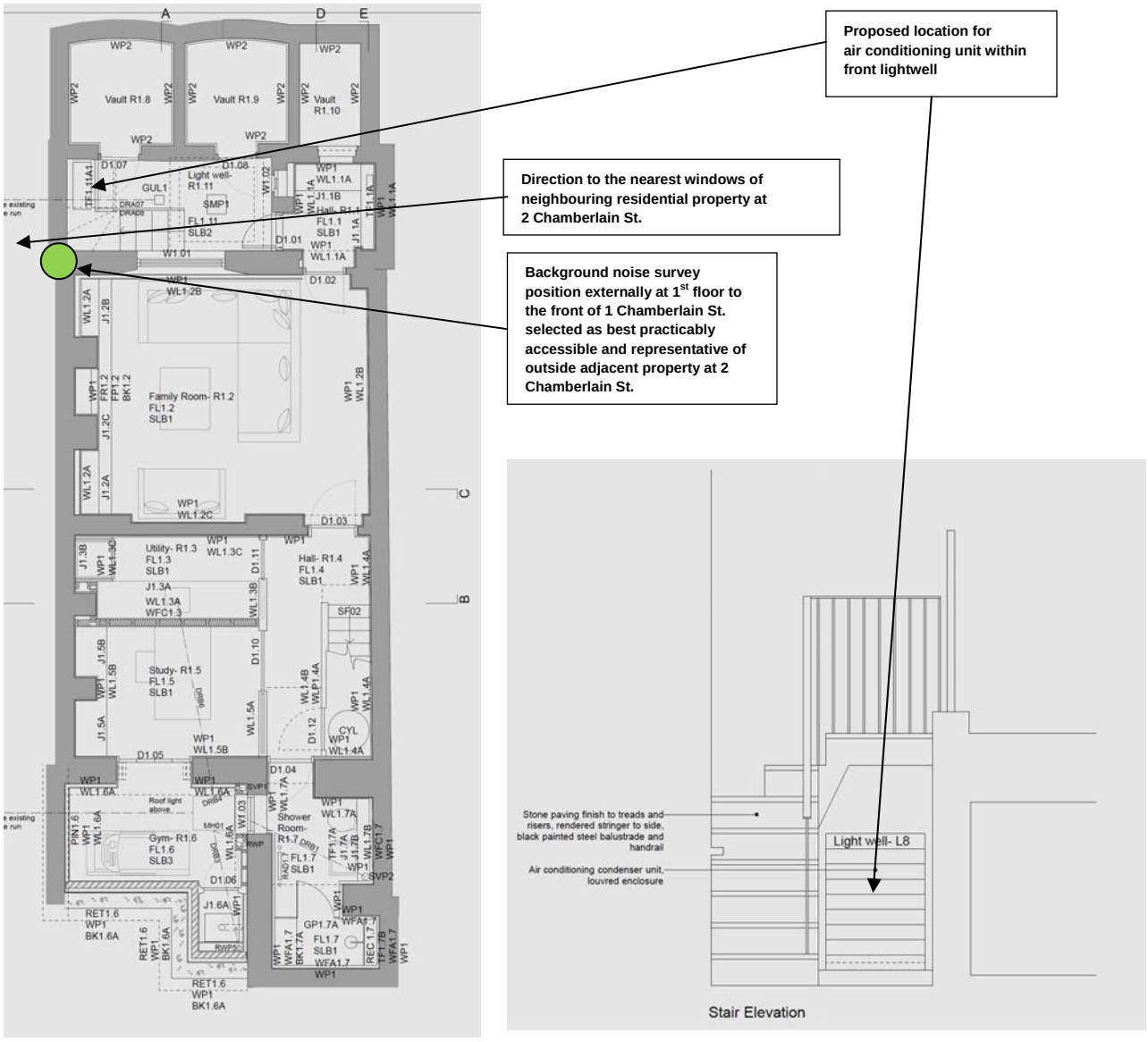
Date: November 2018

DRAWING INDICATING EQUIPMENT LOCATION, SURVEY POSITION & NEAREST RESIDENTIAL WINDOWS



1 Chamberlain Street

APPENDIX C

Noise Survey Results

Site: 1 Chamberlain Street, London NW1 8XB

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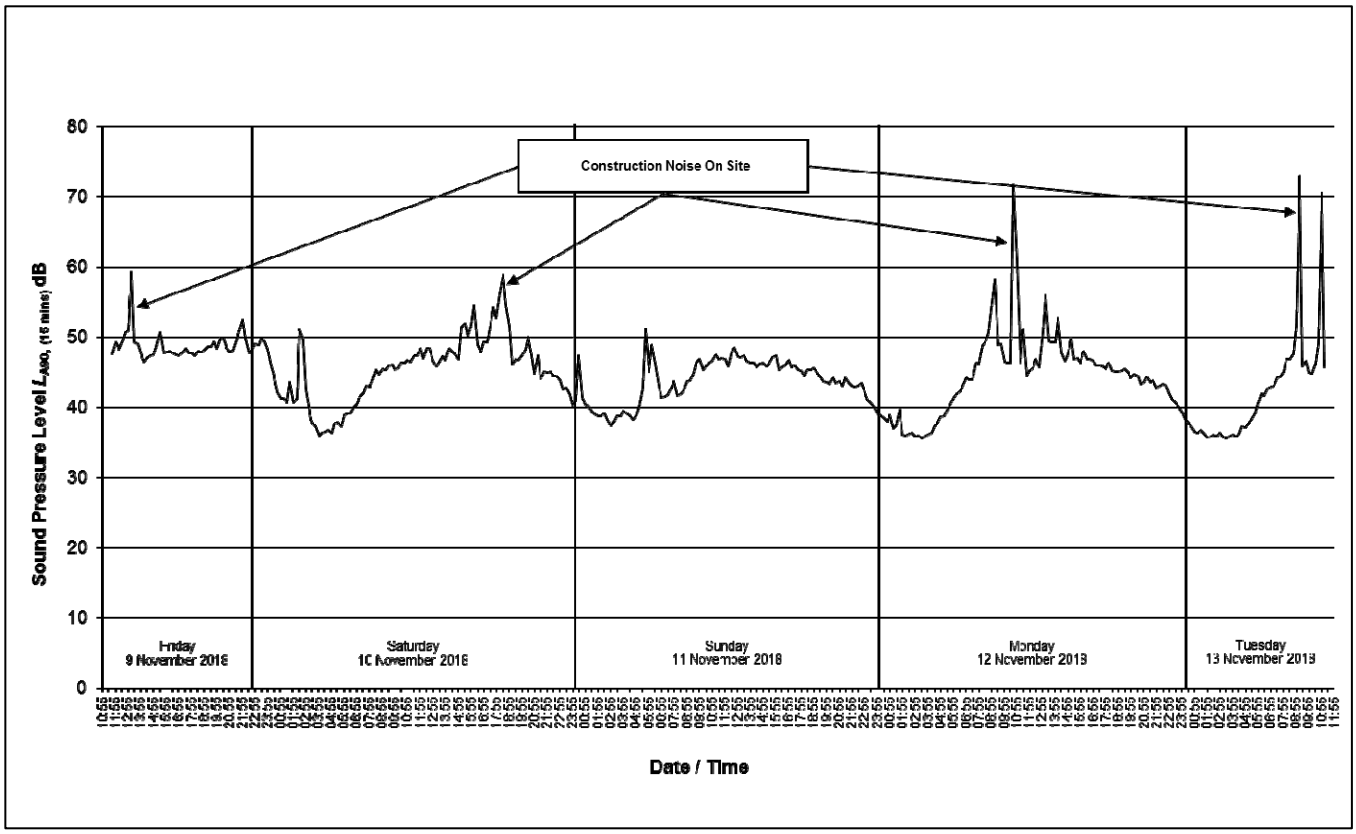
Date: November 2018

NOISE SURVEY RESULTS

Raw Data Background Noise Survey Results Representative Of Outside Neighbouring Residential Windows



APPENDIX D

Manufacturers Noise Data For Proposed Air Conditioning Unit

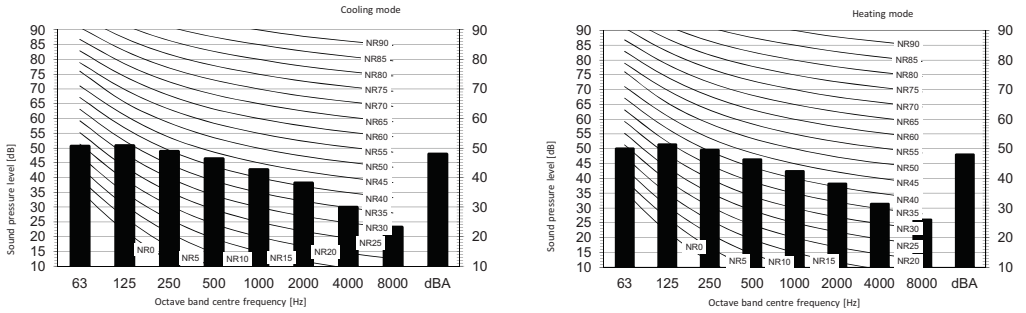
2 Specifications

2-1 Technical Specifications					4MXM68N	4MXM80N
Casing	Colour				Ivory white	
Dimensions	Unit	Height		mm	734	
		Width		mm	958	
		Depth		mm	340	
	Packed unit	Height		mm	820	
		Width		mm	1,050	
		Depth		mm	840	
Weight	Unit			kg	63	67
	Packed unit			kg	67	71
Packing	Weight			kg	4	
Heat exchanger	Length			mm	920	920 / 650
	Rows	Quantity			2	2 / 1
	Fin pitch			mm	1.4	1.4 / 1.8
	Stages	Quantity			32	32 / 12
	Tube type				ø8 Hi-XA	
	Fin	Type			WHS8 FIN-HYDROPHILIC	
		Treatment			Anti-corrosion treatment	
Compressor	Model				2YC71DXD#C	
	Type				Hermetically sealed swing compressor	
	Output			W	2,400.0	
Fan	Type				Propeller	
	Air flow rate	Cooling	High	m^3/min	46.5	49.1
				cfm	1,642	1,733
			Nom.	m^3/min	42.5	45.2
				cfm	1,501	1,596
			Super low	m^3/min	24.1	
				cfm	851	
		Heating	High	m^3/min	43.8	47.8
				cfm	1,547	1,688
			Nom.	m^3/min	43.8	43.9
				cfm	1,547	1,550
			Super low	m^3/min	24.1	
				cfm	851.0	
Fan motor	Model				D55F-31	DB90B-37
	Output			W	55	128
	Speed	Cooling	High	rpm	760	800
			Nom.	rpm	700	740
			Low	rpm	420	
			Super low	rpm	-	
		Heating	High	rpm	720	780
			Nom.	rpm	720	
			Low	rpm	420	
			Super low	rpm	-	
Sound power level	Cooling			dBA	61	
	Heating			dBA	61	
Sound pressure level	Cooling	Nom.		dBA	48	49
	Heating	Nom.		dBA	48	49
Operation range	Cooling	Ambient	Min.	°CDB	-10	
			Max.	°CDB	46	
	Heating	Ambient	Min.	°CWB	-15	
			Max.	°CWB	18	
Refrigerant	Type				R-32	
	Charge			kg	2.00	2.40
				TCO_2eq	1.4	1.6
	GWP				675	

9 Sound data

9 - 1 Sound Pressure Spectrum

4MXM68N



Legend

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

A Scale

High-tap

B

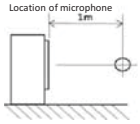
Cooling Total dB

A	B
dBA	48

Heating Total dB

A	B
dBA	49

Location of microphone

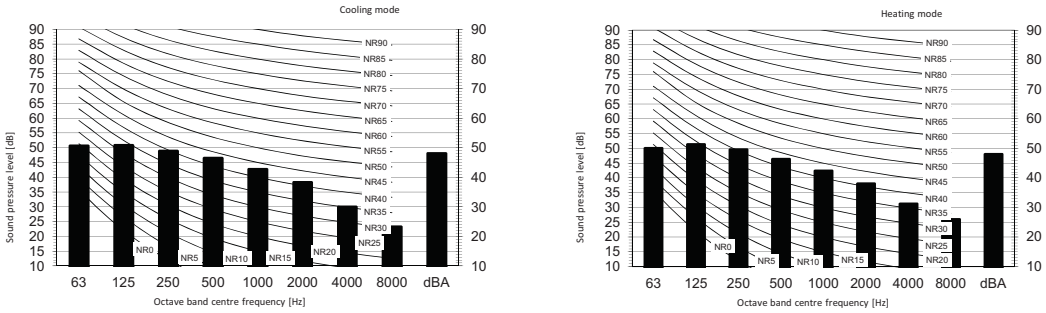


Notes

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

3D106224

4MXM80N



Legend

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

A Scale

High-tap

B

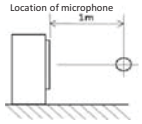
Cooling Total dB

A	B
dBA	48

Heating Total dB

A	B
dBA	49

Location of microphone



Notes

1. Operating conditions: power source 220-240 V/220 V 50/60 Hz; JIS standard
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3. Operating noise varies depending on operation and ambient conditions.
4. The operation noise measuring method is in accordance with JISC9612.
5. Measuring location: anechoic chamber
6. The values above are for connecting with the following indoor unit types: 1.5, 2.0, 2.5, 3.5, 4.2, 5.0, 6.0, 7.1 kW Class

3D106225

APPENDIX E

Noise Model Calculation For Proposed Air Conditioning Unit

Site: 1 Chamberlain Street, London NW1 8XB

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Date: November 2018

NOISE MODEL CALCULATION

ASSESSMENT POSITION: Outside nearest non-associated residential windows to air conditioning unit

NOISE CONDITION: Daikin A/C unit model 4MXM80N operating in cooling mode

NOISE MITIGATION: Acoustic enclosure to Daikin air conditioning unit

		Lin dB at Octave Band Centre Frequency Hz							
Equipment & Description	**Overall dBA**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Daikin Air Conditioning Unit 4MXM80N									
Sound pressure level Lp dB; *free-field level at 1m cooling mode* (note 1)	49	51	51	49	47	43	38	30	24
Noise reduction treatment; (note 2)		-4	-4	-5	-8	-12	-16	-15	-13
Distance; *≈5m from centre of unit to residential windows* (note 3)		-14	-14	-14	-14	-14	-14	-14	-14
Screening; cautiously *line of sight screening correction limited to -10dB* (note 4)		-10	-10	-10	-10	-10	-10	-10	-10
Directivity; *nil directivity correction applicable* (note 5)		0	0	0	0	0	0	0	0
Reflections; *correction applicable due to adjacent walls* (note 6)		9	9	9	9	9	9	9	9
Individual contribution at assessment location	25	32	32	29	24	16	7	0	-4
Cumulative contribution all sources at assessment position	**25**	**32**	**32**	**29**	**24**	**16**	**7**	**0**	**-4**

Notes:

Note 1: Free-field overall dBA sound pressure level at 1m based on manufacturer octave band noise data, Daikin air conditioning unit in cooling mode.

Note 2: Noise reduction treatment: acoustic enclosure to air conditioning unit (as specified in Section 6.1).

Note 3: Distance is from centre of the sound source (air conditioning unit location) to outside the nearest non-associated residential windows at ground floor level of an adjacent property 2 Chamberlain Street.

Note 4: Natural line of sight acoustic screening between air conditioning unit and nearest residential windows (due to boundary wall and level difference); Cautiously screening correction limited to -10dB only.

Note 5: Cautiously nil acoustic directivity correction allowed for in the calculation (i.e. assumes noise from the unit radiates equally in all angular directions from the unit).

Note 6: Cautiously a +9dB correction is added to account for acoustic reflections off the adjacent lightwell walls) which means the air conditioning unit are not positioned in true free-field (hemi-spherical) conditions.

Site: 1 Chamberlain Street, London NW1 8XB

Report: 18211-002 Appendix E *(page 2 of 2)*

Date: November 2018

NOISE MODEL CALCULATION

ASSESSMENT POSITION: Outside nearest non-associated residential windows to air conditioning unit

NOISE CONDITION: Daikin A/C unit model 4MXM80N operating in heating mode

NOISE MITIGATION: Acoustic enclosure to Daikin air conditioning unit

		Lin dB at Octave Band Centre Frequency Hz							
Equipment & Description	**Overall dBA**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Daikin Air Conditioning Unit 4MXM80N									
Sound pressure level Lp dB; *free-field level at 1m heating mode* (note 1)	49	51	53	50	46	43	38	31	26
Noise reduction treatment; (note 2)		-4	-4	-5	-8	-12	-16	-15	-13
Distance; *≈5m from centre of unit to residential windows* (note 3)		-14	-14	-14	-14	-14	-14	-14	-14
Screening; cautiously *line of sight screening correction limited to -10dB* (note 4)		-10	-10	-10	-10	-10	-10	-10	-10
Directivity; *nil directivity correction applicable* (note 5)		0	0	0	0	0	0	0	0
Reflections; *correction applicable due to adjacent walls* (note 6)		9	9	9	9	9	9	9	9
Individual contribution at assessment location	25	32	34	30	23	16	7	1	-2
Cumulative contribution all sources at assessment position	**25**	**32**	**34**	**30**	**23**	**16**	**7**	**1**	**-2**

Notes:

Note 1: Free-field overall dBA sound pressure level at 1m based on manufacturer octave band noise data, Daikin air conditioning unit in heating mode.

Note 2: Noise reduction treatment: acoustic enclosure to air conditioning unit (as specified in Section 6.1).

Note 3: Distance is from centre of the sound source (air conditioning unit location) to outside the nearest non-associated residential windows at ground floor level of an adjacent property 2 Chamberlain Street.

Note 4: Natural line of sight acoustic screening between air conditioning unit and nearest residential windows (due to boundary wall and level difference); Cautiously screening correction limited to -10dB only.

Note 5: Cautiously nil acoustic directivity correction allowed for in the calculation (i.e. assumes noise from the unit radiates equally in all angular directions from the unit).

Note 6: Cautiously a +9dB correction is added to account for acoustic reflections off the adjacent lightwell walls) which means the air conditioning unit are not positioned in true free-field (hemi-spherical) conditions.

APPENDIX F

Noise & Vibration Reduction Treatments For Air Conditioning Unit

Site: 1 Chamberlain Street, London NW1 8XB

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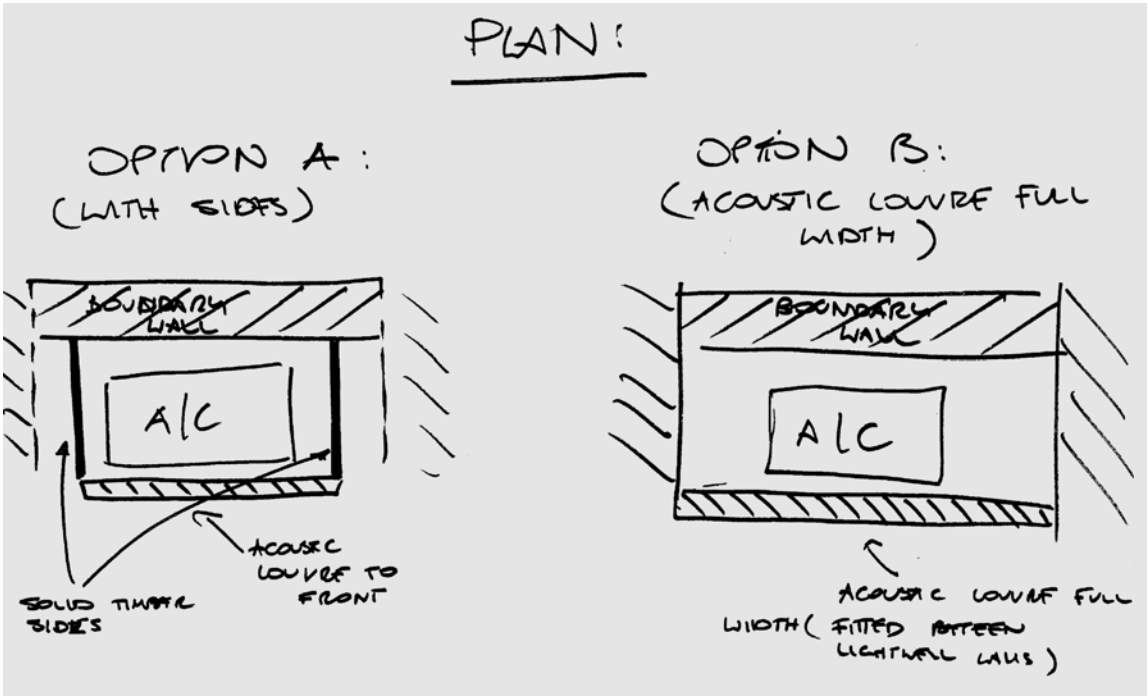
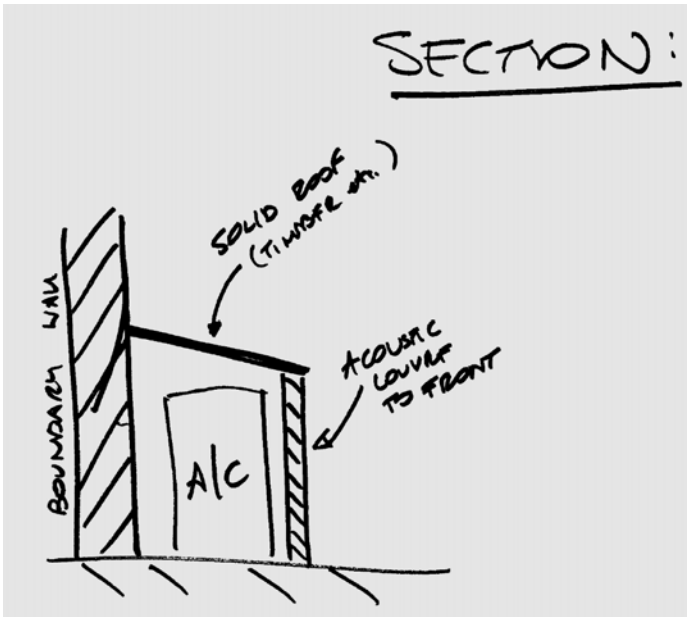
Date: November 2018

NOISE & VIBRATION REDUCTION TREATMENTS FOR AIR CONDITIONING UNIT

Acoustic Enclosure Sketch:





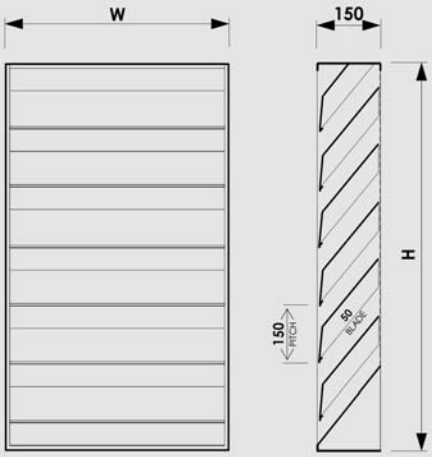
Acoustic Louvre - Supplier: Allaway Acousitcs www.allawayacoustics.co.uk

DATA SHEET **L60E**
ACOUSTIC LOUVRE
MODEL **AL1515**

allaway acoustics

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

DIMENSIONS



SUFFIX

THE SUFFIX DEFINES ADDITIONAL FEATURES OR SPECIAL CONSTRUCTIONAL DETAILS

G GALVANISED STEEL CONSTRUCTION.

A ALUMINIUM CONSTRUCTION.

P POLYESTER POWDER COAT.

X SPECIAL CONSTRUCTION - REFER TO EQUIPMENT SCHEDULE FOR DETAILS.

WEIGHT

LOUVRE WEIGHTS ARE GIVEN ON THE EQUIPMENT SCHEDULE. APPROXIMATELY:

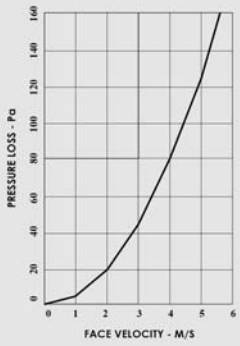
28kg/M² GALVANISED CONSTRUCTION
20kg/M² ALUMINIUM CONSTRUCTION

ACOUSTIC PERFORMANCE

SOUND REDUCTION INDEX: BS EN ISO 10140 - 2

63	125	250	500	1000	2000	4000	8000	HZ
4	**4**	**5**	**8**	**12**	**16**	**15**	**13**	**dB**

PRESSURE LOSS



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).

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).

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.

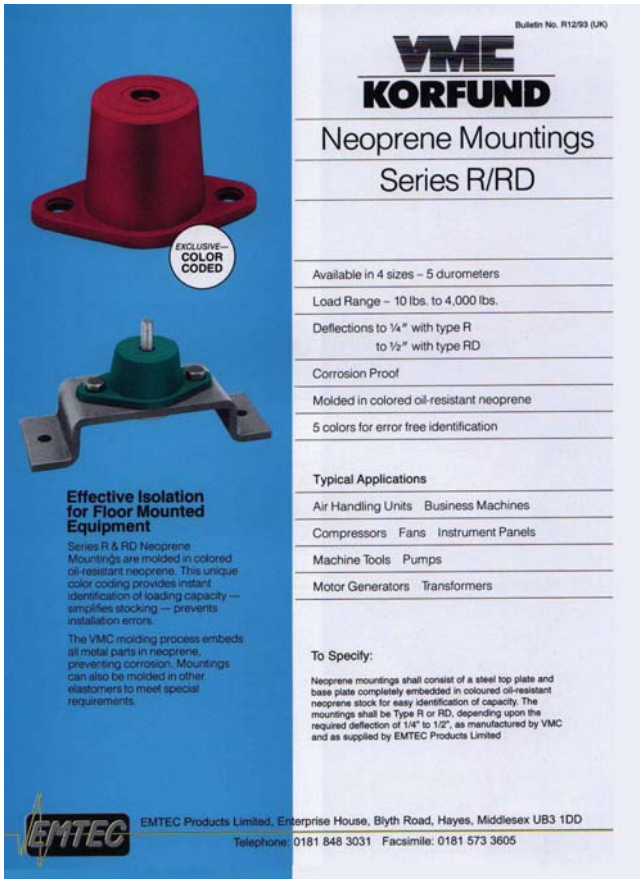
ALLAWAY ACOUSTICS LIMITED Old Police Station, 1 Queens Road, Hertford SG14 1EN
T | 01992 550825 E | enquiries@allawayacoustics.co.uk W | allawayacoustics.co.uk

Site: 1 Chamberlain Street, London NW1 8XB

Report: 18211-002 Appendix F *(page 3 of 4)*

Date: November 2018

Vibration Isolators - Supplier: EMTEC www.emtecproducts.co.uk



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.

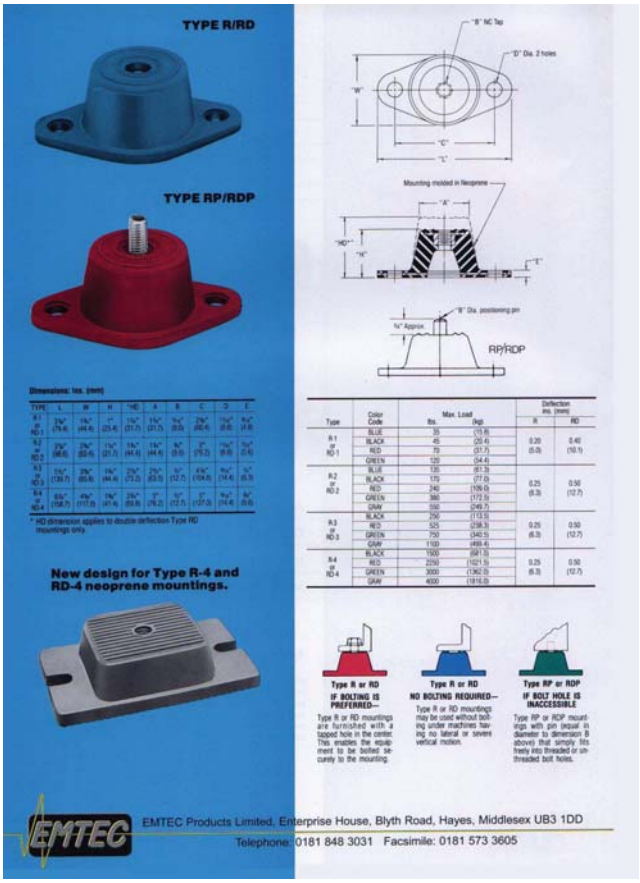
Typical Applications

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

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

Type R or RD
IF BOLTING IS PREFERRED—

Type R or RD
NO BOLTING REQUIRED—

Type RP or RDP
IF BOLT HOLE IS INACCESSIBLE

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

Site: 1 Chamberlain Street, London NW1 8XB

Report: 18211-002 Appendix F *(page 4 of 4)*

Date: November 2018

Vibration Isolators - Supplier: Christie & Grey www.christiegrey.com

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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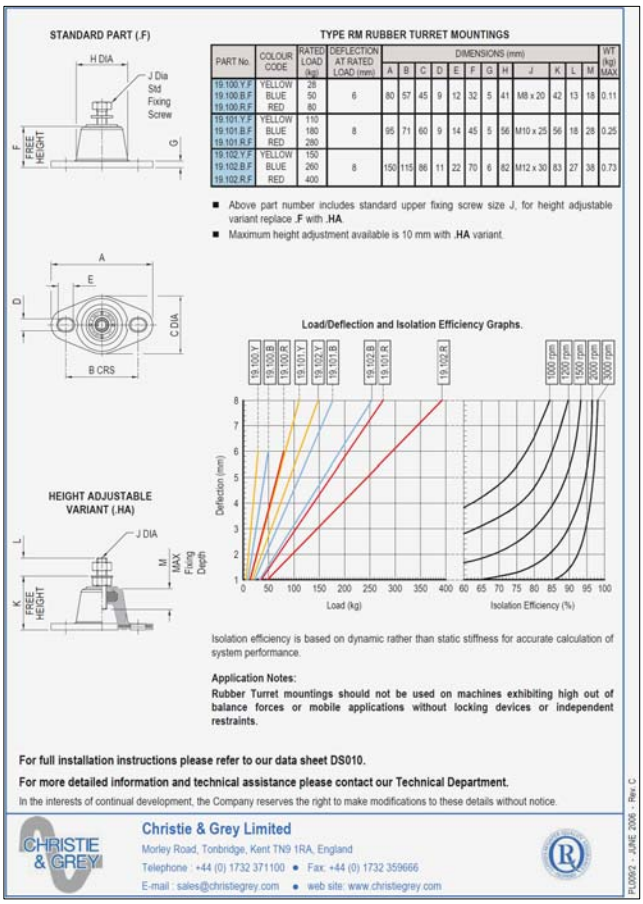

STANDARD PART (.F)

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														
19.100.B.F	BLUE	50	6	80	57	45	9	12	32	5	41	M8 x 20	42	13	18	0.11
19.100.R.F	RED	80														
19.101.Y.F	YELLOW	110														
19.101.B.F	BLUE	180	8	95	71	60	9	14	45	5	56	M10 x 25	56	18	28	0.25
19.101.R.F	RED	280														
19.102.Y.F	YELLOW	150														
19.102.B.F	BLUE	260	8	150	115	86	11	22	70	6	82	M12 x 30	83	27	38	0.73
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.

Load/Deflection and Isolation Efficiency Graphs.

HEIGHT ADJUSTABLE VARIANT (.HA)

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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