

Consultants in Noise and Vibration

REPORT TITLE: ACOUSTIC REPORT IN SUPPORT OF PLANNING APPLICATION FOR
NEW EXTERNAL AIR CONDITIONING UNIT AT 7 STONE BUILDINGS,
LINCOLN'S INN, LONDON WC2A 3SZ

REPORT REF: 12207-002

ISSUED TO: Aura Consulting (UK) Ltd
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ISSUED BY: David R Philip BEng (Hons) MIOA

DATE: October 2012

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SUMMARY

- Philip Acoustics has been commissioned to assess noise from a new external air conditioning condenser unit proposed to be installed within a basement lightwell at the front of 7 Stone Buildings, Lincoln's Inn, London WC2A 3SZ. The assessment considers London Borough of Camden's planning consent noise conditions for mechanical services equipment.
- As part of the assessment, a noise survey has been carried out at the site over at least a 24 hour period to establish lowest existing background noise levels during the entire range of operational times of the proposed external air conditioning condenser unit outside nearest noise sensitive properties. For this site nearest noise sensitive properties are Chambers / offices and also residential properties on upper floor levels of the building itself.
- Based on results of the background noise survey and acoustic calculations using equipment manufacturer's noise data, the overall noise level due to the proposed external air conditioning condenser unit is calculated to comply with London Borough of Camden's noise requirements. No additional noise attenuation measures are required to the unit to reduce noise levels.
- The location for the proposed external air conditioning condenser unit is structurally linked, albeit indirectly, to Chambers, offices and residential properties on upper floor levels of the building itself and therefore it is possible that equipment vibration could transmit into the properties. Although this is considered very unlikely as vibration from this type of small modern condenser unit is generally low, as good practice it is recommended that the unit be installed using vibration isolators. Specification details for suitable vibration isolators are provided in Section 5 of the report.

1. INTRODUCTION

A new external air conditioning condenser unit is proposed to be installed within a basement lightwell at the front of 7 Stone Buildings, Lincoln's Inn, London WC2A 3SZ.

As part of a planning application for the equipment, the Planning Department of London Borough of Camden requires information in the form of an acoustic report regarding noise 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 acoustic requirements;
- Measurement of existing background noise levels;
- Calculation of equipment noise levels;
- Consideration of vibration from the equipment;
- Review of noise/vibration control treatments necessary to comply with London Borough of Camden's planning consent acoustic requirements.

2. LONDON BOROUGH OF CAMDEN NOISE CONDITIONS

Policy DP28 – Noise and Vibration of Section 3 of Camden Development Policies 2010-2025 covers in detail noise issues relating to a wide range of planning and noise pollution scenarios, including mechanical services equipment.

Policy DP28 includes the statement “*The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds*”. Camden's noise limit thresholds for plant and machinery are listed in Table E of Policy DP28. A copy of page 133 from Camden Development Policies 2010-2025 Policy DP28 showing Table E is included in Appendix A.

In summary, London Borough of Camden's noise conditions are:

- i. That overall dBA noise from equipment shall be designed to at least 5dB below the existing L90 dBA background noise level;
- ii. That, where it is anticipated any equipment will have a noise that has a distinguishable discrete note (whine, hiss, screech or hum) and/or there are distinct impulses (bangs, clicks, clatters and thumps) then the overall dBA noise from equipment shall be designed to at least 10dB below the existing L90 dBA background noise level. *Note it is the author's experience and observation based on octave band noise data and on-site noise measurements of similar small and modern air conditioning condenser units, that the type of proposed Daikin external air conditioning condenser unit subject to this assessment generates a typically broadband type of noise (i.e. without any strong tonal or intermittent characteristics sufficient to attract attention) and therefore the more onerous noise limit as item (ii) of London Borough of Camden's planning consent noise conditions is not considered applicable in this instance.*

- iii. That for each octave band (63Hz to 8KHz) noise from equipment shall be designed to not add more than 1dB to the existing L90 dB octave band background noise level.

All of the above (i to iii) are applicable over a period of 60 minutes and measured at 1m external to noise sensitive facades. For this site, noise sensitive facades are nearest windows of Chambers, offices and residential properties on upper floor levels within 7 Stone Buildings itself.

3. BACKGROUND NOISE SURVEY

In order to assess noise from the proposed new equipment it is necessary to establish representative background noise levels external to the nearest noise sensitive facade. Details of the background noise survey carried out by Philip Acoustics are provided in Sections 3.1 to 3.3.

3.1 Instrumentation

Details of the noise survey instrumentation used are provided in Appendix B. The sound level meters were calibrated before and after the survey measurements using the UKAS certified calibrator.

3.2 Measurement Procedure

Although the client has advised that the new air conditioning condenser unit will only operate during normal daytime office periods (nominally 8am to 7pm) the survey was carried out over at least a full 24 hour period to obtain background noise levels during the entire range of unit operational times.

The noise survey was carried out from 01 to 02 October 2012; the weather included dry and calm conditions during the day, evening and also night-time periods. In accordance with London Borough of Camden's noise conditions item 1c, the sound level meter was set up to record background noise levels over 60 minute periods (split into 12 x 5 minute periods to enable more accurate analysis of results as required).

Measurements of background noise were recorded as overall LA90 dB values.

In addition to the overall LA90 dB values, several manual samples of linear L90 dB octave band background noise were also recorded using the Bruel & Kjaer 2260 sound level meter to establish typical background noise octave band spectra.

The new air conditioning condenser unit is to be located within the front basement light-well area of the property. Nearest windows of Chambers / offices and also nearest residential windows are on upper floor levels within 7 Stone Buildings itself at ground floor up to third floor levels.

Proposed location of the new air conditioning condenser unit and direction to these nearest windows are indicated on a drawing and photograph in Appendix C.

The background noise survey location was selected 1m outside the façade of the building adjacent to nearest residential windows at ground floor above the location for the new air conditioning condenser unit using an extension pole and microphone extension lead arrangement.

The noise survey location was selected well away from any existing installed mechanical equipment so as not to unduly influence the noise survey results.

3.3 Measurement Results

Existing background noise levels in the vicinity are low and due to existing mechanical services equipment as well as traffic and general activity in the vicinity.

The lowest background noise level during the operation time range for the proposed new equipment (nominally 8am to 7pm) in terms of overall LA90 dB and associated octave band values measured over 60 minutes during the survey is shown in Table 1. A graph showing the overall raw data LA90 dB measurements over the entire monitoring period is provided in Appendix D.

Description	Overall LA90 dB	Octave Band Centre Frequency (Hz) (linear L90 dB)							
		63	125	250	500	1k	2k	4k	8k
Lowest background noise level measured around 6pm to 7pm L ₉₀ (60 minutes)	49	61	55	49	47	43	39	33	26
London Borough of Camden noise limit	44	57	51	45	43	39	35	29	21

Table 1: Lowest measured background noise levels and London Borough of Camden's noise conditions (overall noise limit 5dBA below background level and octave band limit to not add more than 1dB to existing octave band noise levels)

The overall dBA noise limit to comply with London Borough of Camden's planning consent noise conditions is 5dB below the lowest existing background noise level during the proposed times of operation for the equipment. At this level, noise from the proposed equipment will be significantly below the existing lowest background noise outside nearest windows and would not be expected to be audible nor disturbing to occupants of the building.

4. NOISE FROM MECHANICAL SERVICES EQUIPMENT

The proposed equipment comprises a single external air conditioning condenser unit Daikin model RZQ100. Proposed location of the condenser is described in Section 3.2 of the report and indicated on a drawing and photograph in Appendix C. Manufacturer noise data for the condenser is provided in Appendix E.

The manufacturer noise data is in terms of overall sound power level and also overall free-field dBA sound pressure level at 1m. Summary of noise from the condenser model including indicative octave band values based on noise measurements by the author of this type of equipment is shown in Table 2.

It is noted that the Daikin model RZQ100 external air conditioning condenser unit has several different modes of operation; heating and cooling modes as well as a "night quiet" mode. The client has advised this unit will operate only in standard cooling mode during normal office hours.

Description	Overall dB(A)	Octave Band Centre Frequency (Hz) (Linear dB)							
		63	125	250	500	1k	2k	4k	8k
Daikin external condenser model RZQ100 (standard cooling mode)	50	52	50	48	46	44	43	37	30

Table 2: Condenser free-field sound pressure levels at 1m

To calculate the noise contribution from the new external air conditioning condenser unit to outside the nearest windows a spread sheet noise model has been used. The model takes account of distance between the condenser location and windows, acoustic directivity, acoustic reflections and any line of sight acoustic screening from windows to the equipment location due to building orientation and elevation differences.

Acoustic calculation details are provided in Appendix F. Summary overall calculated noise level from the condenser to outside the nearest windows compared with London Borough of Camden's noise condition limit is shown in Table 3. The acoustic calculation is considered extremely cautious and in practice noise levels from the equipment will be lower for the following reasons:

- The calculation assumes the equipment is operating constantly all of the time in any 60 minute period. In practice this type of unit operates "on demand" and even when providing significant cooling during the middle of a hot day tend to operate only 60 to 70% of the time. It is extremely unlikely that the unit would operate constantly for a full 60 minute period;
- The calculation does not allow any noise reduction correction for any screening and acoustic directivity for the equipment, whereas in practice it is likely the location of the unit in the front basement lightwell will mean there is some natural screening and directivity applicable;
- The noise limit used for the assessment is cautiously based on the lowest measured background noise level occurring during the range of operation times for the equipment (nominally 8am to 7pm). Background noise levels for most of the range of operational times are higher and correspondingly for these times any equipment noise would be even further below noise limits applicable to these times based on the background noise during these times.

Description	Overall equipment dBA noise level	London Borough of Camden Noise limit
Daikin external condenser model RZQ100 (standard cooling mode)	≤ 42dBA	44dBA

Table 3: Condenser noise at nearest windows compared with noise limit

Note that the equipment noise level value is expressed as ≤ (less than or equal to values) as the noise level is calculated based on assumption that the equipment is operating continually in any 60 minute period. In practice this is unlikely to be the case and therefore the actual noise level is expected to be lower than that in Table 3.

Table 3 shows that the overall equipment noise level is at least 5dBA below the lowest background noise, therefore the proposed new external air conditioning condenser unit complies with London Borough of Camden's noise condition limit. In addition, the equipment octave band noise levels are calculated to also comply with London Borough of Camden's octave band noise condition limits.

It is not expected that noise from the proposed new external air conditioning condenser unit would be audible or disturbing to occupants of the site itself or of other nearby buildings and no noise reduction treatment is required to the equipment to comply with London Borough of Camden's noise condition limits.

5. VIBRATION FROM MECHANICAL SERVICES EQUIPMENT

The location for the new condenser unit is structurally linked, albeit indirectly, to 7 Stone Buildings which includes Chambers, offices and residential properties at top floor level and therefore it is possible that unit vibration could transmit into the properties. Although this is considered very unlikely as vibration from this type of modern condenser unit is generally very low, as good practice it is recommended that the unit be installed on vibration isolators. Specification details for suitable vibration isolators are provided below.

It is recommended the new condenser unit be mounted using high deflection proprietary rubber or neoprene turret mounting type vibration isolators. The mountings should have a static deflection not less than 3mm under operating weight of the units. Three suggested suppliers and their product details are provided below, the suppliers are not listed in any order of preference, a copy of each of the mounting supplier's data sheets is provided in Appendix G.

Suggested Supplier 1

Supplier: EMTEC
Telephone: 020 8848 3031
Website: www.emtecproducts.co.uk
Mount type: Neoprene mounting type R-1

The R-1 mounts are approximately 25mm high and are available in various load capacities. The mounts are colour coded to indicate the load capacity and 4 mounts are required. Recommended mounts for the Daikin condenser model RZQ100 based on the condenser being of weight up to 108kg are R-1 colour code red (max load per mount 31.7kg).

Suggested Supplier 2

Supplier: Allaway Acoustics Ltd
Telephone: 01992 550825
Website: www.allawayacoustics.co.uk
Mount type: Neoprene rubber AV mount type MRS1

The mounts are approximately 32mm high and are available in various load capacities. The mounts are colour coded to indicate the load capacity and 4 mounts are required. Recommended mounts for the Daikin condenser model RZQ100 based on the condenser being of weight up to 108kg are MRS1 colour code green (max load per mount 40kg).

Suggested Supplier 3

Supplier: Christie & Grey Ltd
Telephone: 01732 371100
Website: www.christiegrey.com
Mount type: Rubber turret mount type RM

The mounts are approximately 32mm high and are available in various load capacities. The mounts are colour coded to indicate the load capacity and 4 mounts are required. Recommended mounts for the Daikin condenser model RZQ100 based on the condenser being of weight up to 108kg are 19.100.B.F colour code blue (max load per mount 50kg).

A P P E N D I X A

London Borough Of Camden Noise Conditions For Mechanical Services Equipment

Table D: Noise levels from places of entertainment on adjoining residential sites at which planning permission will not be granted

Noise description and measurement location	Period	Time	Sites adjoining places of entertainment
Noise at 1 metre external to a sensitive façade	Day and evening	0700-2300	L _{Aeq} ' 5m shall not increase by more than 5dB*
Noise at 1 metre external to a sensitive façade	Night	2300-0700	L _{Aeq} ' 5m shall not increase by more than 3dB*
Noise inside any living room of any noise sensitive premises, with the windows open or closed	Night	2300-0700	L _{Aeq} ' 5m (in the 63Hz Octave band measured using the 'fast' time constant) should show no increase in dB*

* As compared to the same measure, from the same position, and over a comparable period, with no entertainment taking place

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL _{Aeq} '

Key evidence and references

- Camden's Noise Strategy, 2002
- The London Plan (Consolidated with Alterations since 2004), 2008
- Planning Policy Guidance 24: Planning and noise

APPENDIX B

Noise Survey Instrumentation

Site: 7 Stone Buildings, Lincoln's Inn, London WC2A 3SZ

Reference: 12207-02 Appendix B

Date: October 2012

NOISE SURVEY INSTRUMENTATION

24 Hour Background Noise Survey:

- Bruel & Kjaer sound level meter type 2238E serial number 2246376 plus microphone type 4188 serial number 2180061 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).

Noise Survey Samples Including Octave Band Levels:

- Bruel & Kjaer sound level meter type 2260 serial number 2627604 plus Bruel & Kjaer microphone type 4189 serial number 2625249 plus microphone extension lead and tripod or extension boom arrangement;
- Bruel & Kjaer calibrator type 4231 serial number 2642929 (UKAS certified).

APPENDIX C

Drawing & Photograph Showing Proposed Equipment Location

- [illegible]

SITE MAP
(NTS)

Drawing Status	TENDER		

100 **Journal of Management Inquiry**



Building Services Consultants
Tel: 01273 501100

THE HONOURABLE SOCIETY OF
LINCOLN'S INN

Doc No:	Rev:
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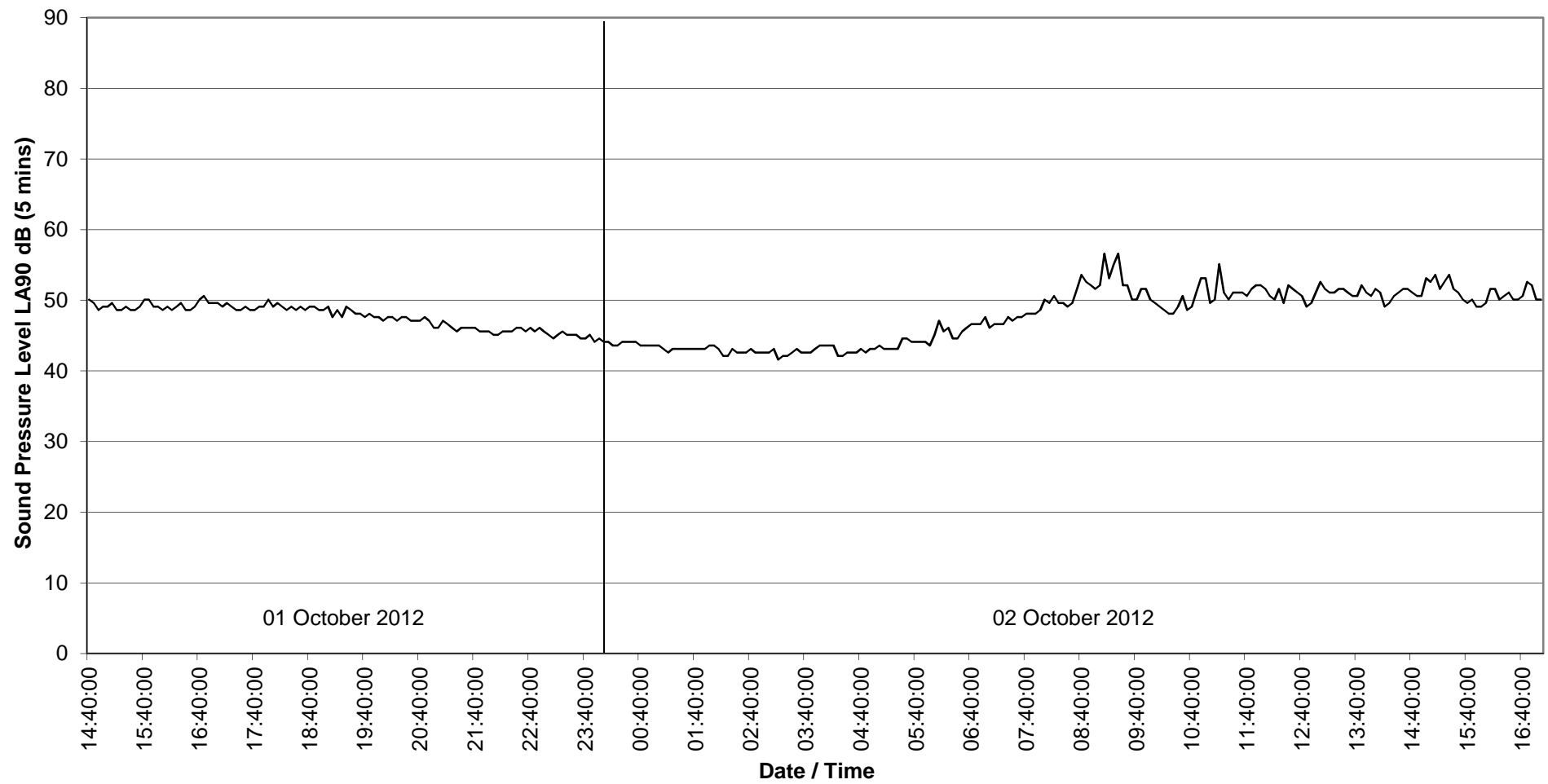
Condenser to be
Located in Front
Basement
Lightwell

Windows of Chambers &
offices (residential on 3rd
floor at top of building)

APPENDIX D

Graphs Of Noise Survey Results

BACKGROUND NOISE SURVEY RESULTS AT POSITION OUTSIDE WINDOWS IN NEAREST NOISE SENSITIVE FACADE AT
7 STONE BUILDINGS, LINCOLN'S INN, LONDON WC2A 3SZ



APPENDIX E

Manufacturer Noise Data For Equipment



Seasonal Inverter

INVERTER

FAQ-B / RZQ-D/B9W1

Wall Mounted Unit



BRC1E51A



BRC1D52



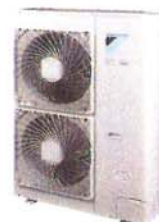
BRC7E618
BRC7C510



FAQ71B



RZQ71D



RZQ100D

- **Seasonal Inverter Technology:** first Sky Air range in the market optimized for seasonal efficiency.
- **Wired remote controller** provides a 7-day schedule timer, enabling the user to program the air conditioning daily or weekly, with up to 5 different actions per day possible (BRC1D52 standard / BRC1E51A optional).
- **BRC1E51A – New optional wired controller** allows easy navigation through menu items, via a personalised display and minimal number of buttons.
- **Home Leave operation:** in case of extended absence, this function helps to save energy and protects from frost. The function automatically keeps the room temperature at a specified favourite comfort level by switching to heating when it reaches the minimum level and to cooling when it reaches the maximum level.
- **User Access:** different levels of user access can be selected.
- Ideal for shops, restaurants or offices requiring maximum floor space for furniture, decorations and fittings
- Auto-swing function ensures efficient air distribution via louvers that close automatically when the unit is switched off
- Automatic movable louver can be fixed at any desired angle
- All maintenance operations can be carried out from the front of the unit
- Suitable for Twin, Triple and Double Twin applications
- Comms, computer and server room cooling possible with EDP setting.
- Re-use of existing R22 and R407C piping possible. (See R22 Replacement leaflet)



HEAT PUMP				SEASONAL INVERTER			
Indoor Units				FAQ71B		FAQ100B	
Capacity	Cooling capacity	Standard	kW	7.1		10	
	Heating capacity	Standard	kW	8.0		11.2	
Nominal	EER / COP	Cooling / Heating		3.11 / 3.43		3.04 / 3.49	3.6 / 3.3
	Annual energy consumption		kWh	1141		1645	1390
	Energy Label	Cooling / Heating		B / B		A / C	
Seasonal **	SEER / SCOP	Cooling / Heating		3.48 / -		2.94 / -	3.42 / -
Dimensions	(Height x Width x Depth)		mm	290x1050x230		360x1570x200	
Weight			kg	13.0		26.0	
Air Flow Rate	Cooling	High/Low	m³/min	19.0 / 15.0		23.0 / 19.0	
	Heating	High/Low	m³/min	19.0 / 15.0		23.0 / 19.0	
Sound Power	Cooling	High/Low	dBA	59.0 / 53.0		61.0 / 57.0	
	Heating	High/Low	dBA	59.0 / 53.0		61.0 / 57.0	
Sound Pressure	Cooling	High/Low	dBA	43.0 / 37.0		45.0 / 41.0	
	Heating	High/Low	dBA	43.0 / 37.0		45.0 / 41.0	
Refrigerant			Type	R-410A			
Power Supply				1~/220-240V/50Hz			
Controller	Wired/Wireless			BRC1D52 (Standard) BRC1E51A (Optional) / BRC7E618 (Optional)		BRC1D52 (Standard) BRC1E51A (Optional) / BRC7C510 (Optional)	
Outdoor Unit				RZQ71D3V1		RZQ100D9V1	RZQ100B9W1
Dimensions	(Height x Width x Depth)		mm	770x900x320		1345x900x320	
Weight			kg	67		108	106
Operation Range	Cooling	Min~Max	°CDB	-15.0~50.0			
	Heating	Min~Max	°CWB	-20.0~15.5			
Sound Power	Cooling		dBA	64	65		
Sound Pressure (Standard)	Cooling		dBA	48	50		
	Heating		dBA	50	52		
Sound Level (Night quiet)	Sound Pressure		dBA	43	45		
Refrigerant			Type	R-410A			
Power Supply				1~/220-240V/50Hz			
Piping connections	Liquid (OD)/Gas/Drain		mm	9.52 / 15.9 / 26		3N~/400V/50Hz	
Piping Length (Maximum)			m	50		75	
Max. interunit level difference			m	0.5			
Max Installation Height Difference			m	30			

** Seasonal efficiencies are calculated based on draft PrEN 14825: 2009 (under inquiry stage). Data are subject to change.

Condenser Free-Field Sound Pressure Level Standard Cooling Mode = 50dBA at 1m

75B.

APPENDIX F

Acoustic Calculations

Site: 7 Stone Buildings, Lincoln's Inn, London WC2A 3SZ**Reference:** 12207-02 Appendix F**Date:** October 2012**ACOUSTIC CALCULATION SHEET**

ASSESSMENT POSITION: To outside nearest windows at ground floor level of Chambers / offices of the building itself directly above proposed lightwell position of the proposed new external air conditioning condenser unit (refer Section 3.2 of Report 12207-002)

NOISE CONDITION: New condenser unit operating continually

NOISE MITIGATION: None applied

Equipment	Sound Pressure Level at 1m Lp dBA (1)	Correction for noise mitigation dBA (2)	Distance to assesment position m (3)	Correction for distance to assessment position dBA (4)	Correction for line of sight screening dBA (5)	Correction for acoustic reflections dBA (6)	Individual Contributions dB
Basement Front Light-Well	50	0	5	-14	0	+6	42
Daikin unit RZQ100							
Overall SPL from sources at assessment position:	42.0 dB(A)						

Notes:

Note 1: Equipment Sound Pressure Levels (Lp dBA) are manufacturer's 1m free-field values.

Note 2: No noise mitigation applied.

Note 3: Distance is from noise source position (center of condenser unit) to receiver position (center of nearest window).

Note 4: Distance correction for sound radiation within hemispherical flat reflecting plane.

Note 5: No line of sight acoustic screening applied.

Note 6: Correction +6dB to account the condenser unit is not installed in free-field conditions and to allow for noise reflections off walls within the lightwell.

APPENDIX G

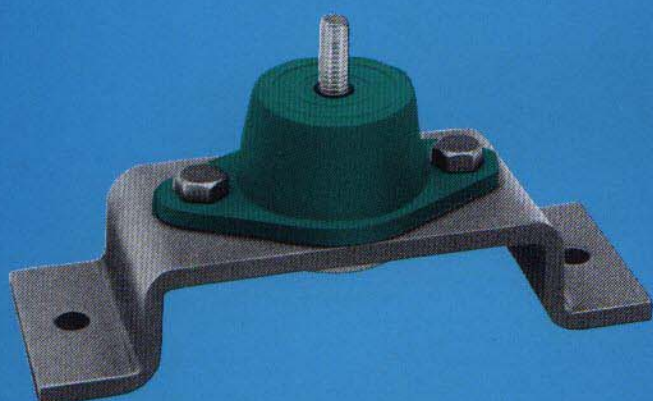
Suggested Details For Vibration Isolators

VME KORFUND

Neoprene Mountings Series R/RD



EXCLUSIVE—
COLOR
CODED



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.

Available in 4 sizes – 5 durometers

Load Range – 10 lbs. to 4,000 lbs.

Deflections to 1/4" with type R
to 1/2" with type RD

Corrosion Proof

Molded in colored oil-resistant neoprene

5 colors for error free identification

Typical Applications

Air Handling Units Business Machines

Compressors Fans Instrument Panels

Machine Tools Pumps

Motor Generators Transformers

To Specify:

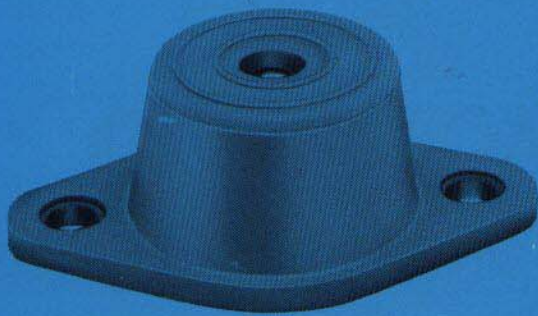
Neoprene mountings shall consist of a steel top plate and base plate completely embedded in coloured oil-resistant neoprene stock for easy identification of capacity. The mountings shall be Type R or RD, depending upon the required deflection of 1/4" to 1/2", as manufactured by VMC and as supplied by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



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

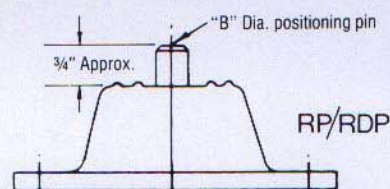
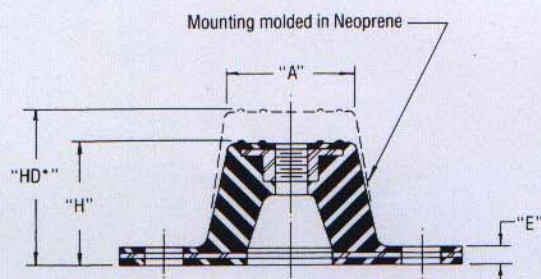
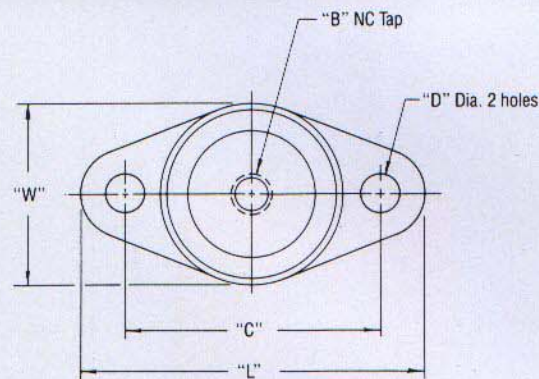
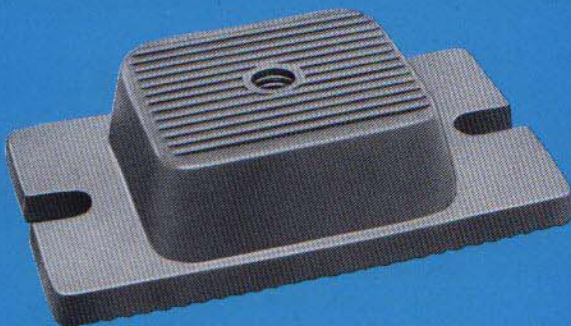


Dimensions: ins. (mm)

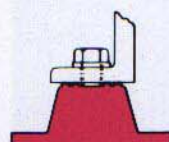
TYPE	L	W	H	*HD	A	B	C	D	E
R-1 or RD-1	3 1/8" (79.4)	1 3/4" (44.4)	1" (25.4)	1 1/4" (31.7)	1 1/4" (31.7)	5/16" (8.0)	2 3/8" (60.4)	1 1/32" (8.8)	3/16" (4.8)
R-2 or RD-2	3 7/8" (98.6)	2 3/8" (60.4)	1 1/4" (31.7)	1 3/4" (44.4)	1 3/4" (44.4)	3/8" (9.6)	3" (76.2)	1 1/32" (8.8)	7/32" (5.6)
R-3 or RD-3	5 1/2" (139.7)	3 3/8" (85.8)	1 3/4" (44.4)	2 7/8" (73.2)	2 1/2" (63.5)	1/2" (12.7)	4 1/8" (104.8)	5/16" (14.4)	1/4" (6.3)
R-4 or RD-4	6 1/4" (158.7)	4 5/8" (117.6)	1 5/8" (41.4)	2 3/4" (69.8)	3" (76.2)	1/2" (12.7)	5" (127.0)	5/16" (14.4)	3/8" (9.6)

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

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

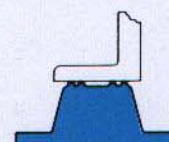


Type	Color Code	Max. Load		Deflection	
				ins. (mm)	
		lbs.	(kg)	R	RD
R-1 or RD-1	BLUE	35	(15.8)	0.20 (5.0)	0.40 (10.1)
	BLACK	45	(20.4)		
	RED	70	(31.7)		
	GREEN	120	(54.4)		
R-2 or RD-2	BLUE	135	(61.3)	0.25 (6.3)	0.50 (12.7)
	BLACK	170	(77.0)		
	RED	240	(109.0)		
	GREEN	380	(172.5)		
	GRAY	550	(249.7)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



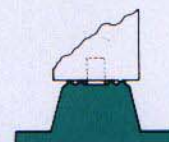
**Type R or RD
IF BOLTING IS
PREFERRED—**

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

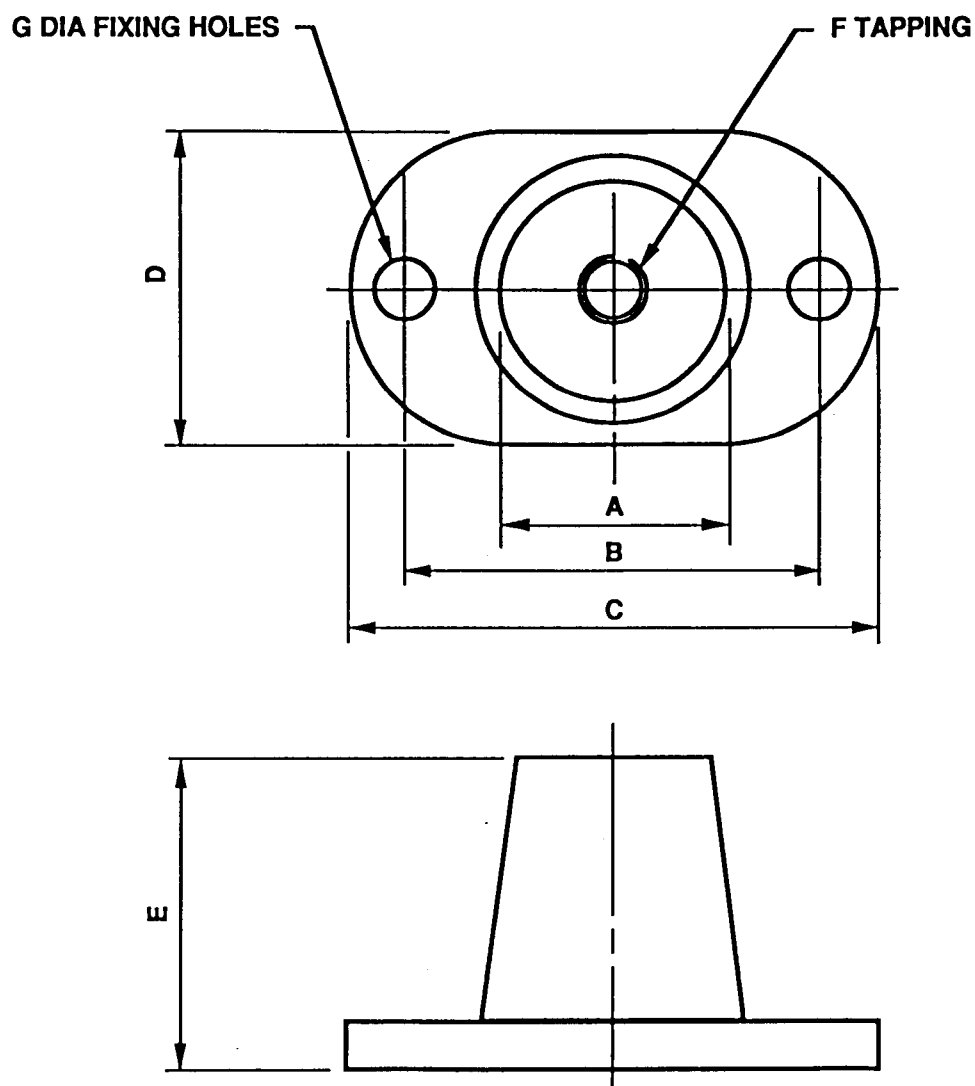
Telephone: 0181 848 3031 Facsimile: 0181 573 3605

DRAWING No.
A4-3407A



NEOPRENE RUBBER AV MOUNTS
RANGE MRS0 - MRS4

ALLAWAY ACOUSTICS LTD



DIMENSIONAL DATA

MOUNT TYPE	A	B	C	D	E	F	G
MRS 0	22	50	61	38	18	6	4
MRS 1	29	59	74	41	32	8	7
MRS 2	43	75	98	61	39	12	11
MRS 3	30	60	74	41	37	8	6
MRS 4	41	76	98	60	59	12	11



ALLAWAY ACOUSTICS
LIMITED

Mount Type	Colour	Weight Range - Kg		Nominal Deflection
		From	To	
MRS0	Blue	2.5	5	3.0mm
MRS0	Yellow	4	8	3.0mm
MRS0	Green	7	14	3.0mm
MRS0	White	9	18	3.0mm
MRS1	Blue	9	18	4.0mm
MRS1	Yellow	14	28	4.0mm
MRS1	Green	20	40	4.0mm
MRS1	White	27	54	4.0mm
MRS1	Red	36	72	4.0mm
MRS2	Blue	18	60	5.0mm
MRS2	Green	54	108	5.0mm
MRS2	White	90	180	5.0mm
MRS2	Red	135	270	5.0mm
MRS2	Black	180	360	5.0mm
MRS3	Blue	9	18	9.0mm
MRS3	Yellow	14	28	9.0mm
MRS3	Green	20	40	9.0mm
MRS3	White	27	54	9.0mm
MRS3	Red	36	72	9.0mm
MRS4	Blue	18	60	10.0mm
MRS4	Green	54	108	10.0mm
MRS4	White	90	180	10.0mm
MRS4	Red	135	270	10.0mm
MRS4	Black	180	360	10.0mm



Head Office: Old Police Station, 1 Queens Road, Hertford, Hertfordshire, SG14 1EN. Tel: 01992 550825. Fax: 01992 554982. ☐
Northern Office: TradeForce Building, Cornwall Place, Bradford, West Yorkshire, BD8 7JT. Tel: 01274 306388. Fax: 01274 308305. ☐

Registered in England 958950 Registered Office: 1 Queens Road, Hertford, Herts, SG14 1EN

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.

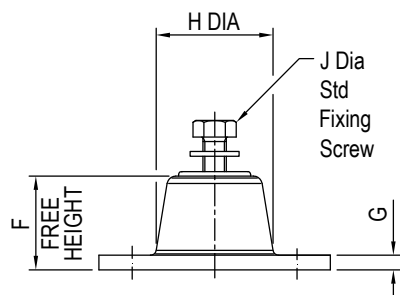
DESIGN FEATURES

- 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.

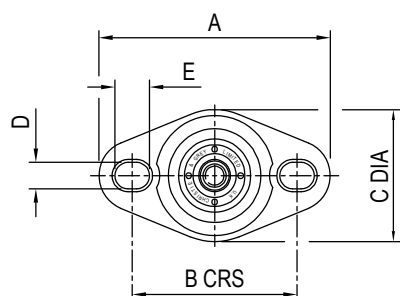
STANDARD PART (.F)



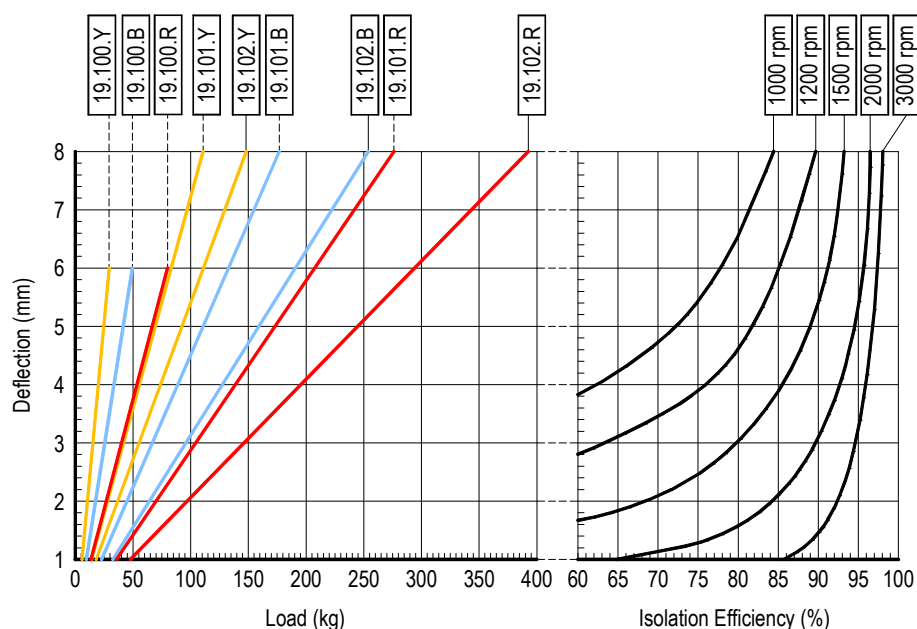
TYPE RM RUBBER TURRET MOUNTINGS

PART No.	COLOUR CODE	RATED LOAD (kg)	DEFLECTION AT RATED LOAD (mm)	DIMENSIONS (mm)												WT (kg) MAX
				A	B	C	D	E	F	G	H	J	K	L	M	
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.



Load/Deflection and Isolation Efficiency Graphs.



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

Application Notes:

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

For full installation instructions please refer to our data sheet DS010.

For more detailed information and technical assistance please contact our Technical Department.

In the interests of continual development, the Company reserves the right to make modifications to these details without notice.



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