

87 Gower Street, London WC1E 6AF

Environmental Noise Survey and Noise Impact Assessment Report 1118.03

Prepared for

Institute of Measurement and Control

87 Gower Street
London
WC1E 6AF

16 August 2018

By

dba Acoustics
Acoustic Consultancy

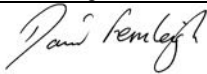
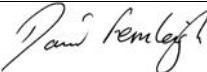
Railway Cottage
49 Arnold Road
WOKING
Surrey
GU21 5JX

01483 771282
david@dbaacoustics.co.uk
www.dbaacoustics.co.uk

CONTENTS	Page
1.0 INTRODUCTION.....	2
2.0 EXECUTIVE SUMMARY	2
3.0 SITE CONDITIONS.....	2
4.0 MEASUREMENT METHODOLOGY	4
5.0 MEASUREMENT RESULTS	5
6.0 CRITERIA	5
7.0 PLANT NOISE ASSESSMENT.....	6
8.0 CONCLUSION	7

APPENDICIES:

- Time History Graphs
- Plant Data
- Supplier Information
- Definition of Terms

Report	Signed	Name and Position	Relevant Qualification
Undertaken and Prepared By		David Fernleigh Principal	MIOA
Checked By		David Fernleigh Principal	MIOA

This report has been prepared with all reasonable skill and care by dBA Acoustics for the Client named. The information contained herein is the property of, and confidential to, the Client. Any third party information required and/or provided for the completion of this report should not be considered as verified by dBA Acoustics, unless otherwise stated.

1.0 INTRODUCTION

New air conditioning plant is proposed for installation at 87 Gower Street, London WC1E 6AF. Residential accommodation is located within the adjacent building.

The London Borough of Camden stipulates noise emission criteria to which new items of building services plant should comply.

dBA Acoustics have been commissioned to undertake an environmental noise survey and plant noise impact assessment in order to determine if the proposed plant meets the requirements of the Local Authority, and provide mitigation guidance, as/where necessary.

This report concerns the assessment and control of atmospheric noise emissions and vibration affecting neighbouring noise sensitive property for the purposes of planning. The assessment of noise affecting internal areas within the project site is outside the scope of this report. Detailed mechanical, structural, h&e and conservation considerations are beyond the expertise of this practice and should be dealt with by a relevant competent professional.

2.0 EXECUTIVE SUMMARY

An automated weekday environmental noise survey has been undertaken. The representative LA_{90} background noise level has been established for the operational times of the proposed plant.

The assessment undertaken indicates that, with the specified mitigation adopted, the plant noise emissions should comply with the requirements of the London Borough of Camden.

An acoustic enclosure and 2No. attenuator specifications have been provided.

3.0 THE SITE

87 Gower Street is located at the junction with Torrington Place. The map below indicates the site boundary in red:



Map data © Google 2018 (North to the top of the page)

The image below indicates the approximate automated noise monitoring location at the first floor window of 87 Gower Street. Also shown is the proposed location of the plant and the nearest residential receptor.



Imagery © Google 2018 (facing towards the northwest)

The monitoring location was within a few meters of the nearest noise sensitive receptor (located within flats directly adjacent) and was deemed suitable for establishing representative background sound levels.

4.0 MEASUREMENT METHODOLOGY

24hour environmental noise monitoring was undertaken commencing approximately noon on Tuesday 24 July to Wednesday 25 July 2018. The prevailing L_{A90} levels were logged at 15minute intervals throughout the survey period. The following sound level meters and calibrator was used:

	SLM	Preamplifier	Microphone	Calibrator
Manufacturer	Norsonic AS	Norsonic AS	Gras	B&K
Type	140	1209	40AF	4231
Serial No.	1403413	12821	207390	1839133
Latest Calibration	16/01/2017			20/11/2017
Certificate No.	U24457			U27132

The UKAS accredited calibration of the sound level meter used complies with IEC 61672-1:2003 class 1.

The sound level meter was installed at first floor level with the microphone attached to a pole and fixed approximately 1m from the façade and approximately 2m from the nearest noise sensitive receptor.

A proprietary windshield and extension cable was deployed. The entire signal path was checked for calibration pre and post survey. The calibrated meter readings pre and post survey indicated no calibration shift.

The following table details the weather conditions at the beginning and end of the survey period:

Condition	Start	End
Wind Speed ms^{-1}	<1.5	<1.0
Wind Direction (from)	southwest	southwest
Precipitation or Fog	none	none
Wet Ground	none	none
Frozen Ground or Snow	none	none
Temperature $^{\circ}\text{C}$	32	28
Cloud Cover %	20	30

It is understood the weather over the survey period was fine with no precipitation or high winds.

During the manned periods at the beginning and end of the survey the prevailing ambient sound was noted to be general traffic noise, Gower Street being a busy road.

The conditions measured or noted above were deemed acceptable for obtaining representative measurements.

5.0 MEASUREMENT RESULTS

Time history graphs showing the $L_{A90,15\text{min}}$ measurements for the entire survey period are provided in the appendix.

The proposed operational hours of the plant are 07:00-18:00 weekdays.

The following table presents the lowest measured $L_{A90,15\text{min}}$ over the survey period during the operational times of the proposed plant:

Lowest measured $L_{A90,15\text{min}}$ sound Level dB (ref : $20\mu\text{Pa}$)	
Tuesday afternoon	62.3
Wednesday morning	62.0
Lowest $L_{A90,15\text{min}}$ corrected for façade reflections	59.0

6.0 CRITERIA

The London Borough of Camden have recently confirmed the following maximum noise emission criteria for new items of building services plant:

“Policy A4 of Camden Local Plan (2017), requires plant noise (façade level) to be 10dB below the background noise level at the nearest residential receptor. This is considered to be the Lowest Observed Adverse Effect Level (LOAEL).”

Based on the survey results and the Local Authority requirements detailed above the following table presents the maximum allowable plant noise emissions at the residential receptors:

Plant noise emission limit $L_{Aeq,T}$ sound Level dB (ref : $20\mu\text{Pa}$)	
Maximum plant noise emissions at nearest noise sensitive receptor facade	49.0

7.0 PLANT NOISE ASSESSMENT

7.1 Proposed Plant Arrangement

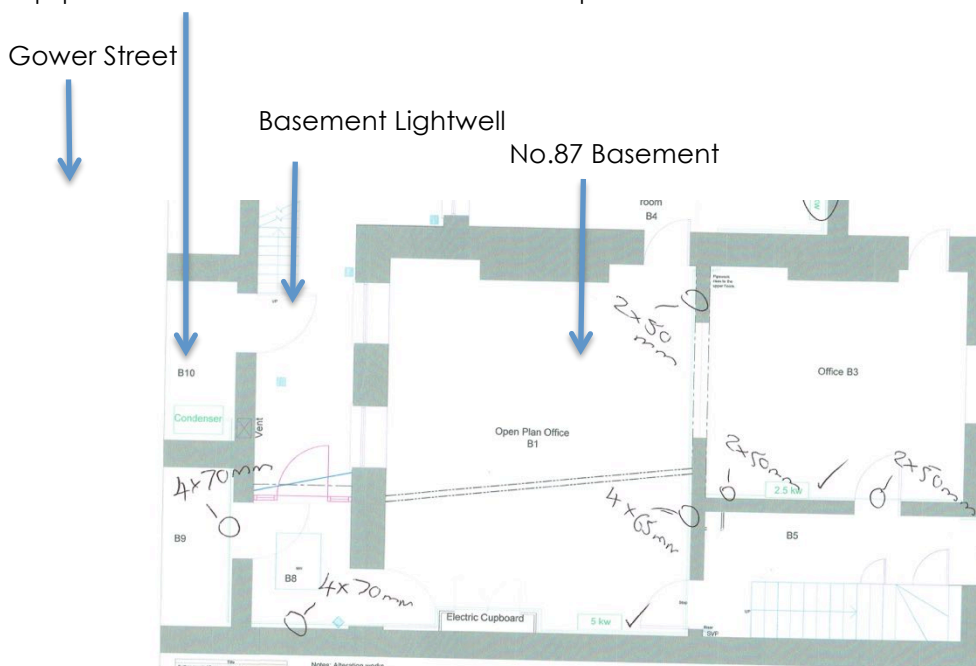
The proposals include installation of the following equipment:

- 1No. Fujitsu Airstage J-III AJY108LELAH air conditioning outdoor unit to be located at basement floor level in the undercroft below the pavement at the front of the property.
- 1No. Fujitsu AOYG12 LMCA air conditioning outdoor unit to be located within the same basement floor level undercroft.
- 1No. Ventaxia VSP 71038 ventilation fan to be located within the same basement floor level undercroft with atmospheric outlet grille by entrance.

The nearest residential receptor with line of sight to the entrance of the undercroft is located at a distance of approximately 7m at the first floor level at neighbouring 89 Gower Street.

The proposed plant location is shown in the preliminary basement level ducting layout sketch below:

Equipment located within undercroft below pavement



It is understood the undercroft is approximately 4m x 3m x 2m.

The condenser manufacturers have provided the condenser equipment sound power levels as a single figure dBA, together with sound pressure level noise spectra for the proposed plant. The sound pressure spectra have been shifted to the stated sound power levels, and added to the estimated ventilation fan casing breakout and manufacturers inlet sound power levels, as shown in the table below:

Sound Power Level at Octave Band Centre Frequency Hz dB									
Equipment	63	125	250	500	1k	2k	4k	8k	dBA
AJY108 LELAH	82	79	76	74	70	66	61	51	76
AOYG12 LMCA	61	59	59	60	54	52	49	40	61
VSP 71038 Inlet	66	63	63	65	62	59	50	44	67 ¹
VSP 71038 outlet	66	63	63	65	62	59	50	44	67 ¹
VSP 71038 casing breakout ²	64	59	58	58	52	47	38	32	58
Combined Total Lw (excluding vent fan outlet)	82	79	76	74	75	71	62	52	76

¹ includes grille end reflection loss correction

² estimated assuming average single skin fan casing losses

7.2 Plant Noise Assessment (without mitigation)

The following table details the summary calculation of the plant noise emissions expected from the proposed installation:

Estimated plant noise level at nearest noise sensitive windows	
Combined internal (within undercroft) sound power level Lw	76
Lw to Lp at 1m correction for room volume and reverberation	+3
Combined sound pressure level in undercroft Lp	79
Inside to outside	-6
10logS of undercroft entrance opening (1.6m ²)	+2
Estimated sound power level at undercroft open doorway Lw	75
Estimated sound power level at atmospheric vent fan grille Lw	67
Combined sound power level to atmosphere Lw	76
Q8 eight spherical propagation (7m, Lw to Lp)	-19
Estimated rating level at receptor	57
Criteria L _{Aeq,T}	49
Excess over Criteria	+8

From the above table it can be seen that without mitigation the proposals would exceed the requirements of the London Borough of Camden by approximately 8 dB and are therefore not considered to be compliant.

7.3 Mitigation Recommendations

Calculations indicate that noise emissions should be sufficiently reduced provided the following measures are taken:

- the larger of the two condensers (AJY108 LELAH) is fully enclosed, and
- the ventilation fan (VSP 71038) is fitted with suitable inlet and outlet attenuators

7.4 Recommended Acoustic Specifications

The proposed condenser AJY108 LELAH should be fully enclosed such that, with the equipment inside operational at maximum duty, the sound pressure level at 1m in any direction from the enclosure is no more than 57dB. This is equivalent to a minimum noise reduction of 11dB. (Based on the manufacturer's sound power level of 76dB and hemispherical mounting conditions.)

The proposed ventilation fan (VSP 71038) should be fitted with inlet and outlet attenuators as detailed in the following schedule:

Attenuator Schedule												
Attenuator	W and H mm	L mm	Vol m ³ /s	Max PD Pa	Minimum Insertion Loss at Octave Band Centre Frequency Hz dB							
					63	125	250	500	1k	2k	4k	8k
Vent fan inlet	Limit face velocity to 8m/s	600	3.3	60	1	2	7	10	11	9	8	7
Vent fan outlet		600	3.3	60	1	2	7	10	11	9	8	7

If the equipment and mitigation is correctly installed then tonal, distinguishing or impulsive sound characteristics are not anticipated.

7.5 Plant Noise Assessment (with mitigation)

Provided the above mitigation is incorporated the proposals should comply with the requirements of the London Borough of Camden for non-tonal, non-impulsive plant, as shown in the following summary calculation:

Estimated plant noise level at nearest noise sensitive windows	
Combined internal (within undercroft) plant noise L _w	67
L _w to L _p correction for volume and reverberation	+3
Combined sound pressure level in undercroft L _p	70
Inside to outside	-6
10logS of undercroft entrance opening (1.6m ²)	+2
Estimated sound power level at undercroft open doorway L _w	66
Estimated sound power level at attenuated vent fan atmospheric grille L _w	57
Combined sound power level to atmosphere L _w	67
Q8 eight spherical propagation (7m, L _w to L _p)	-19
Estimated rating level at receptor	48
Criteria L _{Aeq,T}	49
Excess over Criteria	0

From the table above it can be seen that with the recommended mitigation, noise emissions from the proposed installation are predicted to achieve the Local Authority criteria.

8.0 CONCLUSION

An automated 24hour environmental noise survey has been undertaken. The representative L_{A90} background noise level has been established.

The subsequent assessment undertaken indicates that, without mitigation, noise emissions from the proposed plant exceed the requirements of London Borough of Camden at the nearest noise sensitive receptor.

However, with the inclusion of the specified mitigation, noise emissions from the proposed plant should comply with the requirements of London Borough of Camden.

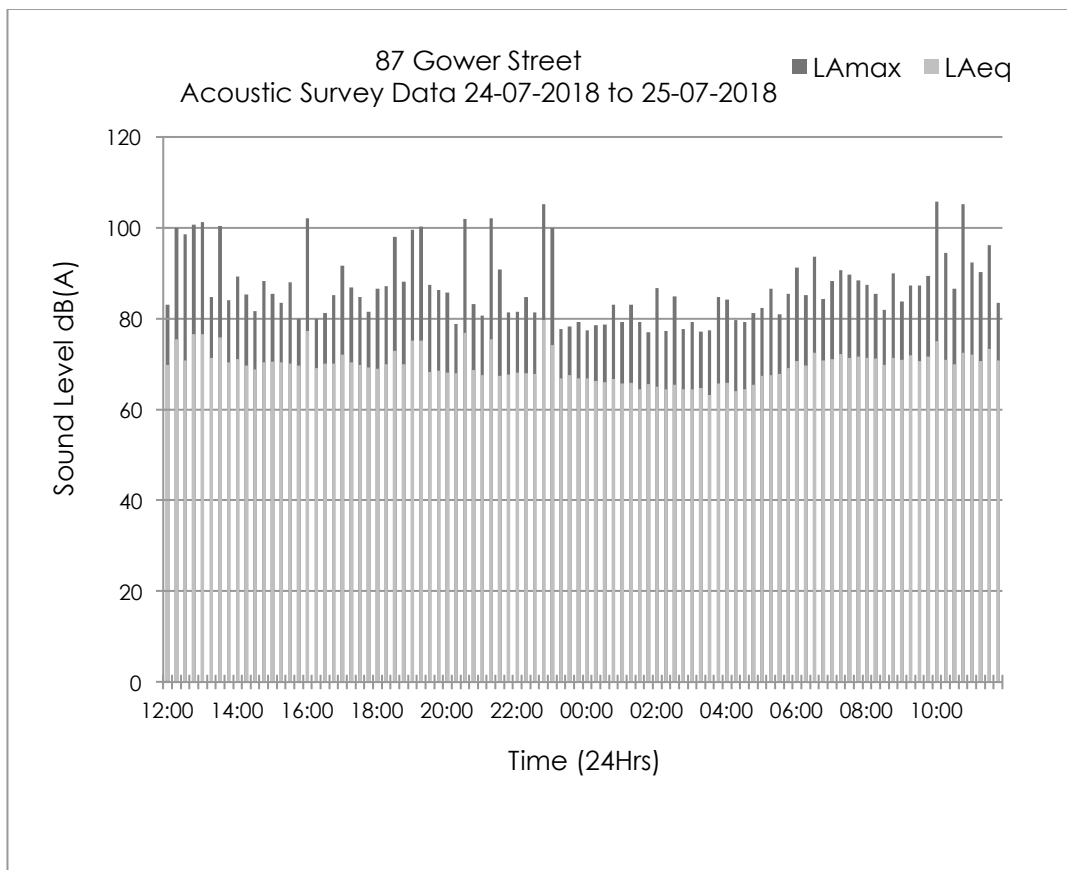
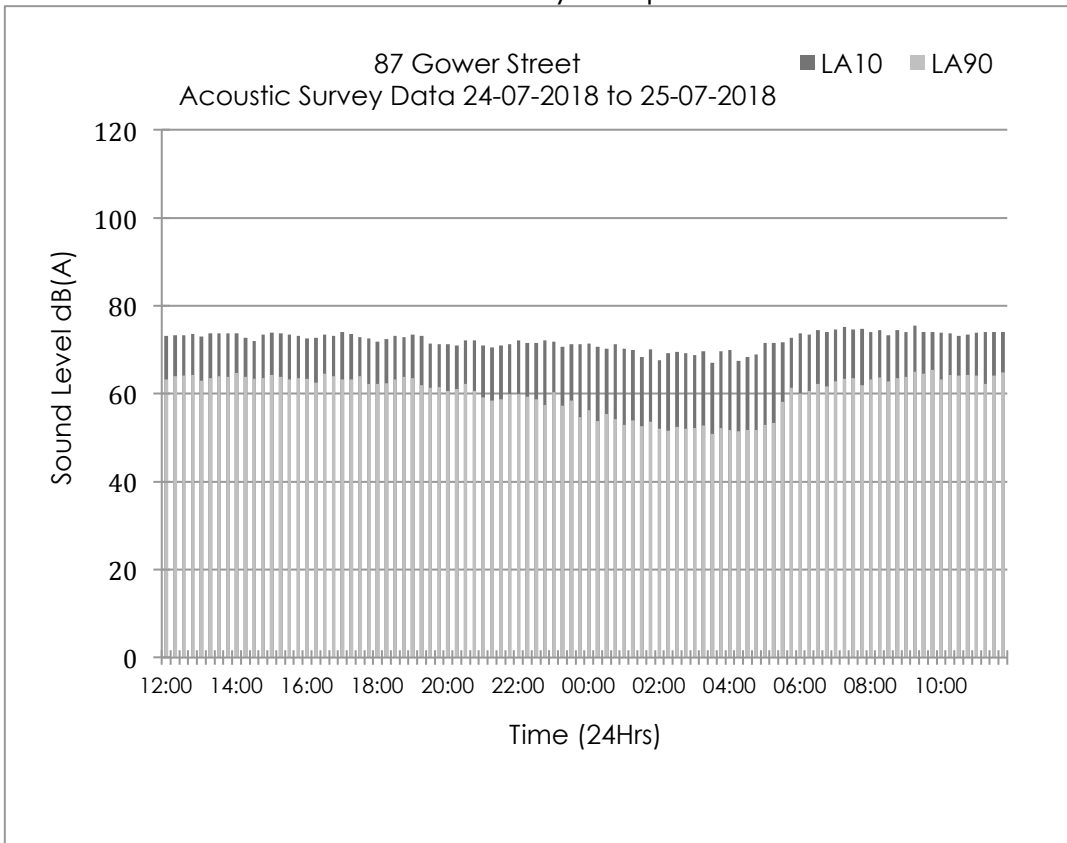
The proposals are subject to the final planning approval of The London Borough of Camden.

Report 1118.03
dBA Acoustics

APPENDIX




Time History Graphs
Plant Data
Supplier Information
Definition of Terms

Time History Graphs



Plant Data

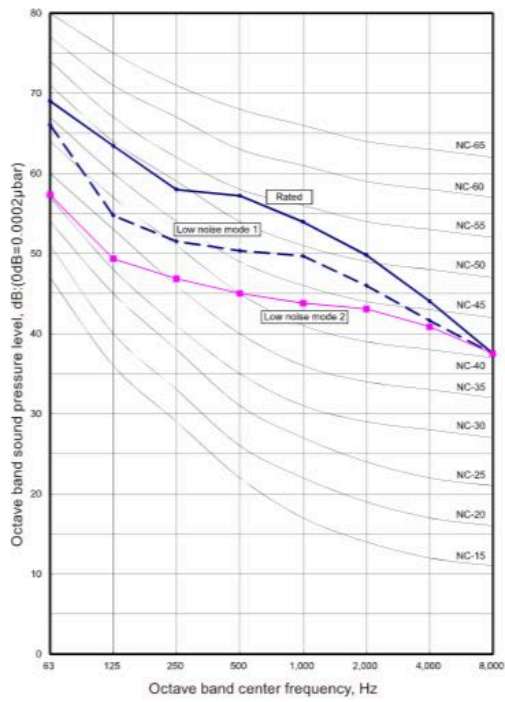
OUTDOOR UNITS

Capacity range (HP)			8	10	12
Model name			AJY072LELAH	AJY090LELAH	AJY108LELAH
Maximum connectable indoor units			1-20	1-25	1-30
					
Capacity	Cooling	kW	22.4	28.0	33.5
	Heating	kW	25.0	31.5	37.5
Sound Pressure level	Cooling/Heating	dB (A)	52/54	54/56	59/61
	Cooling	dB (A)	68	70	76
Net Dimensions (H*W*D)		mm	1,428 × 1,080 × 480		
Refrigerant	Type	R410A			
	Charge	kg	7.0	7.5	7.5

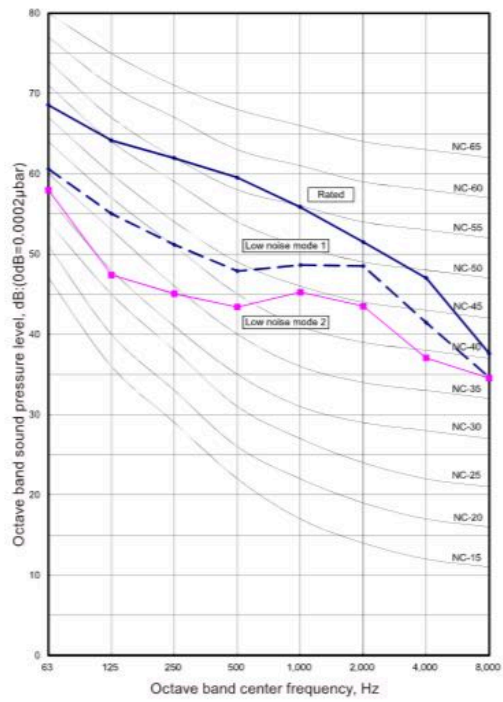
(GWP:3P (G+H+AR))

MODEL: AJ*108LELAH

● Cooling



● Heating



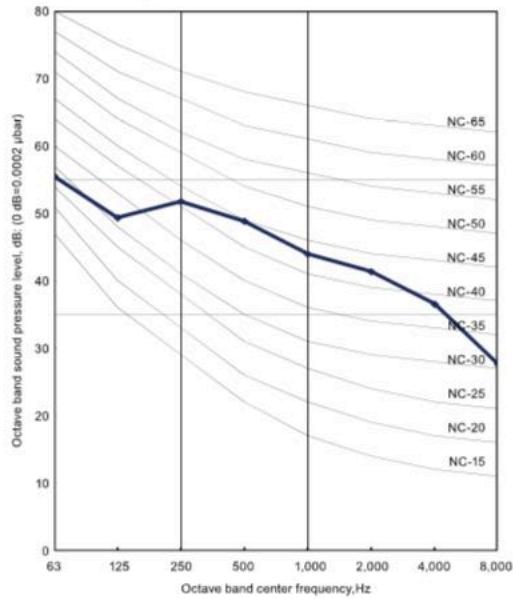
Specifications

(TENTATIVE)

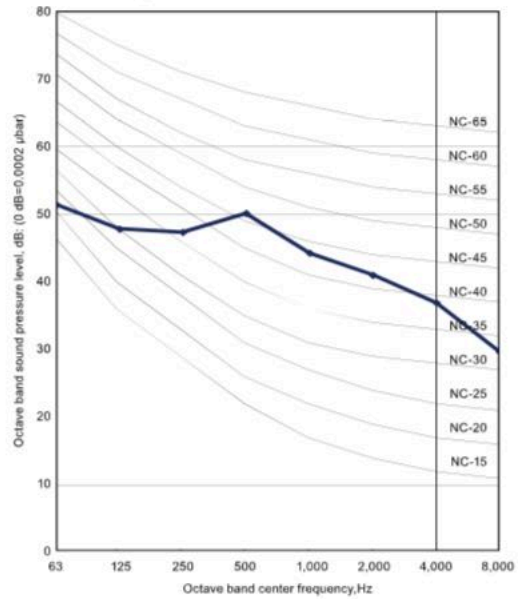
	Indoor	ASYG07LMCA	ASYG09LMCA	ASYG12LMCA	ASYG14LMCA
	Outdoor	ADYG07LMCA	ADYG09LMCA	ADYG12LMCA	ADYG14LMCA
Nominal Capacity (kW)	Cooling	2.00 (0.50-3.00)	2.50 (0.50-3.20)	3.40 (0.90-3.90)	4.00 (0.90-4.40)
	Heating	3.00 (0.50-3.40)	3.20 (0.50-4.00)	4.00 (0.90-5.30)	5.00 (0.90-6.00)
UK Total / Sensible Cooling *		1.94 / 1.30	2.42 / 1.59	3.30 / 2.14	3.52 / 2.52
Power Consumption (kW)	Cooling	0.47	0.65	0.97	1.14
	Heating	0.69	0.73	1.02	1.36
EER / COP (Nominal Conditions)		4.30 / 4.38	3.85 / 4.38	3.50 / 3.92	3.52 / 3.66
Pdesign (kW) @ -10°C	Cooling	2.00	2.50	3.40	4.00
	Heating	2.30	2.40	3.50	3.90
SEER	Cooling	6.80	7.00	7.00	6.90
SCOP	Heating (Average)	4.10	4.10	4.00	4.00
Energy Efficiency Class	Cooling	A++	A++	A++	A++
	Heating (Average)	A+	A+	A+	A+
Annual Energy Consumption (kWh/a)	Cooling	103	125	170	203
	Heating	786	820	1225	1365
Moisture Removal	l/h	1.00	1.30	1.80	2.10
Dimensions (HxWxD) mm	Inner	268x840x203	268x840x203	268x840x203	268x840x203
	Outer	535x663x293	535x663x293	535x663x293	540x790x290
Net Weight (kg)	Inner	9	9	9	9
	Outer	21	21	26	34
Room Air Circulation (high) m ³ /h	Inner	750	750	750	750
	Outer	1670	1670	1830	1800
Power Supply	V-FH-Hz	230 / 1 / 50	230 / 1 / 50	230 / 1 / 50	230 / 1 / 50
Power Supply Io	Outdoor	Outdoor	Outdoor	Outdoor	Outdoor
Running Current (A)	Cooling	2.50	3.20	4.60	5.30
	Heating	3.30	3.50	4.80	6.30
Starting Current	A	3.30	3.50	4.80	6.30
Suggested MCB/Fuse	A	10	10	10	10
Interconnecting Cable		3 + E	3 + E	3 + E	3 + E
Remote Control Type		Wireless	Wireless	Wireless	Wireless
Sound Pressure (dB(A) Cooling)	Indoor Q/LM/H	21 / 32 / 40 / 43	21 / 32 / 40 / 43	21 / 32 / 40 / 43	25 / 33 / 40 / 44
	Outdoor H	45	45	50	49
	Indoor H	59	59	59	60
	Outdoor H	58	58	61	63

MODEL: AO*G12LMCA

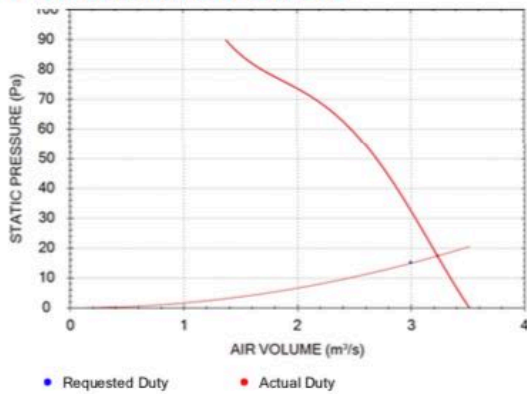
● Cooling



● Heating



Performance Chart



VSP71038

Tech Ref File:
Requested Duty: 3 m³/s @ 15 Pa
Actual Duty: 108% match
Stock Reference: VSP71038
Product Type: Ventilation
Product Range: Plate & Case Fans
Impeller: Sickle
Casing: Black epoxy coated sheet steel
Speed: 690 rpm
Airstream Temperature: -40°C to 70°C
Specific Fan Power: 0.1 W/(l/s)
dB(A): 46
eDemand inverter controlled to requested duty point
Specific Fan Power: 0.1 W/(l/s)
dB(A): 44.4
Specific Fan Power & dB(A) shown are at duty point.

Warranty: 2 years

Acoustic Information

	63	125	250	500	1k	2k	4k	8k	Total	dB(A)@3m
Inlet	66	63	63	65	62	59	50	44	71	46
Outlet	66	63	63	65	62	59	50	44	71	46
Breakout	-	-	-	-	-	-	-	-	-	-

Sound Power Level Spectra dB (re 10⁻¹² Watts)

For ducted units, sound power is given as In Duct with end reflections added.
Stated dB(A) levels at 3m with spherical propagation at a reference level of 2 x 10⁻¹² Pa

Electrical Information

Watts: 620
Supply Voltage: 380-415V/3/50Hz
Full Load Current: 1.05 A
Starting Current: 2 A
Starting Method: D.O.L.
Motor Poles: 8
Insulation: F
Motor IP Rating: IP54
Speed Controllable: Yes

Supplier Information

Attenuators:

Environmental Equipment Corporation Ltd Richmond House Churchfield Road Walton-on-Thames Surrey KT12 2TP Tel: 01932 230940 http://eec.co.uk	Allaway Acoustics Ltd 1 Queens Road Hertford SG14 1EN Tel: 01992 550825 http://www.allawayacoustics.co.uk
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Acoustic Enclosures:

Environ Technologies Ltd Regus House, 1010 Cambourne Business Park, Cambourne, Cambridgeshire, UK. CB23 6DP Tel: 0870 383 3344 www.environ.co.uk	Noise Solutions Ltd Unit 6, LDL BusinessCentre, Station Road West, Ash Vale, Aldershot GU12 5RT Tel: 01252 519881 www.noisesolutions.co.uk
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Vibration Isolation Equipment:

Eurovib (Acoustic Products) Ltd Goodwood House 86 Holmethorpe Avenue Redhil Surrey RH1 2PQ Tel: 01737 779 577 http://www.eurovib.co.uk	Environmental Equipment Corporation Ltd Richmond House Churchfield Road Walton-on-Thames Surrey KT12 2TP Tel: 01932 230940 http://eec.co.uk
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Definition of Terms

$L_{Aeq,T}$ is the equivalent continuous A-weighted sound pressure level defined IN BS4142:2014 as the value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.

L_{A90} is the background sound level as defined in BS4142:2014 as the A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T , measured using time weighting F and quoted to the nearest whole number of decibels.

Background Sound Level is the L_{A90} , see above.

Ambient Sound as defined by BS4142:2014 is the totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.

Tonal Characteristic as defined by BS4142:2014 Annex C: For a prominent, discrete tone to be identified as present, the time-averaged $L_{Zeq,T}$ sound pressure level in the one-third-octave band of interest is required to exceed the time-averaged $L_{Zeq,T}$ sound pressure levels of both adjacent one-third-octave bands by some constant level difference.

The level differences between adjacent one-third-octave bands that identify a tone are:

- 15 dB in the low-frequency one-third-octave bands (25 Hz to 125 Hz);
- 8 dB in the middle-frequency one-third-octave bands (160 Hz to 400 Hz); and
- 5 dB in the high-frequency one-third-octave bands (500 Hz to 10 000 Hz).

WHO refers to the World Health Organisation.