61 CAMDEN HIGH STREET, LONDON NW1 7JL

BS4142 PLANT NOISE ASSESSMENT

17 July 2020

Rooster Piri Piri

Aran Acoustics Ltd
20-22 Wenlock Road,
London N1 7GU

t: 0845 544 2695
e: info@aranacoustics.com
w: www.aranacoustics.com

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Company Registration No. 08480500 | Registered Offices: 20-22 Wenlock Road, London N1 7GU, United Kingdom

ARAN ACOUSTICS

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1.0 INTRODUCTION

Aran Acoustics has been appointed to carry out a noise impact assessment for the installation of a kitchen extract and air conditioning system at 61 Camden High Street, London.

A noise survey and assessment has been requested to ensure that noise levels from plant does not cause undue disturbance to nearby noise sensitive locations.

The purpose of this assessment is to determine the existing noise levels at the nearest noise sensitive location and establish the maximum permissible noise levels from the plant.

Such to establish suitable plant noise levels an assessment has been carried out to BS 4142: 2014 '*Method for rating and assessing industrial and commercial sound*'. This assessment has been benchmarked against an environmental noise survey carried out on 08 July 2020.

This report therefore describes the noise survey and its results. Figure 4.1 contains a graphical representation of the noise measurements taken on site. Section 5.0 provides the maximum permissible noise levels for the proposed plant. Section 6.0 provides an assessment of plant noise levels based on the proposed location.

2.0 SITE DESCRIPTION

The site is located at 61 Camden High Street in the London Borough of Camden. Proposals are to install a kitchen extract system and air conditioning system within the ground floor commercial premises as shown on the architectural drawings within Appendix A.

The nearest noise sensitive receptor to the location of the louvres, is the rear windows of the residential flat directly above the restaurant.

A subjective noise assessment on site determined that the predominant noise sources in the area to impact the site and nearest sensitive receptor is background noise levels from road traffic on surrounding roads along with existing plant servicing other ground floor commercial premises to a lesser extent.

It was noted that existing external condenser units are located on the rear wall of the commercial premises however these were not in operation at the time of surveying.

Figure 2.1 below shows a location map and aerial photo of the site and surrounding area.

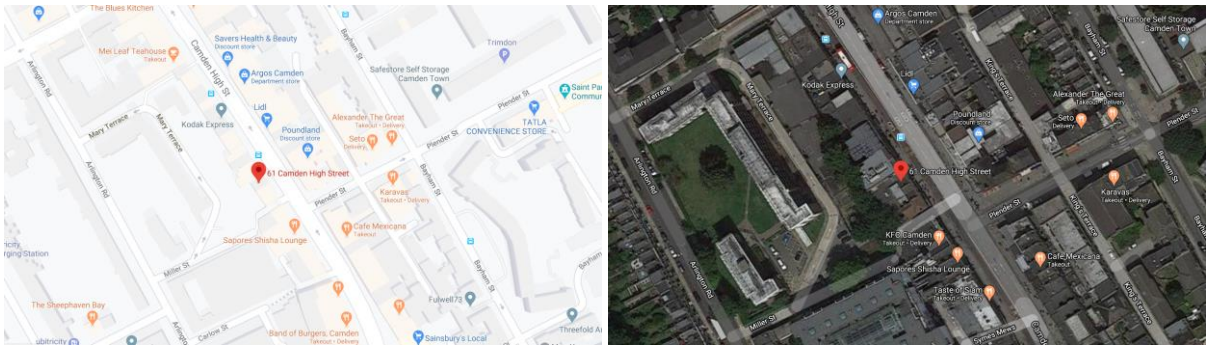


Table 2.1 – Location map and aerial photo of the site

3.0 ENVIRONMENTAL NOISE SURVEY

An environmental noise survey was carried out at the site between Wednesday 08 and Thursday 09 July 2020. The survey incorporated both day and night time measurements.

A single noise monitor was placed at the rear of the ground floor commercial unit. The microphone was placed on a tripod approximately 1.8m above floor level and 2m from the nearest residential window to the proposed location of the new plant.

Noise levels measured at the microphone location are considered representative of the existing environmental noise levels to impact the nearby noise sensitive receptors. A site plan showing the microphone location is provided in Appendix A. Site photos of the microphone position are provided in Appendix B.

3.1 Measurement Equipment

The following measurement equipment was used, which complies with the performance specifications for a Class 1 device in accordance with BS EN 61672-1, BS EN 61260 and BS EN 60942.

Name	Serial Number	Last Calibrated	Calibration Due
Norsonic Precision Sound Analyser Type 140	1404425	Oct 2018	Oct 2020
Norsonic Type 1209 Pre-amplifier	13231	Oct 2018	Oct 2020
Norsonic Type 1225 Microphone	128783	Oct 2018	Oct 2020
Norsonic Type 1251 Calibrator	32994	Oct 2018	Oct 2020

Table 3.1 – Measurement equipment used on site

The meter was calibrated before and after testing - no deviations were found. The meter was set to measure consecutive 'A' weighted 15-minute samples.

3.2 Weather Conditions

The weather was fine and dry for the duration of the survey. Wind speed remained below 5 m/s. The temperature was approximately 12 - 18 ^{o}C.

The weather conditions were seen as suitable for environmental noise surveying in accordance with BS 7445-1:2003 '*Description and measurement of environmental noise*'.

4.0 SURVEY RESULTS

The noise levels measured during the survey period are shown in Figure 4.1 below. The full set of acoustic data measured on site is available upon request.

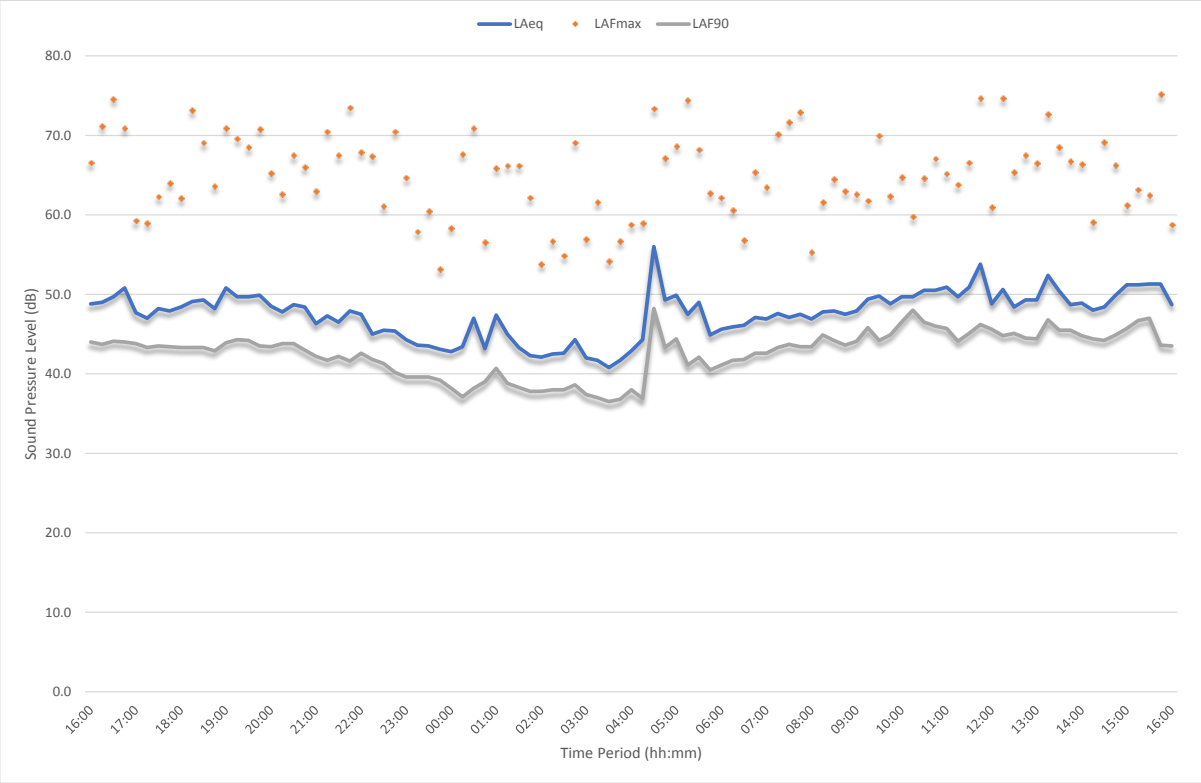


Figure 4.1 – Measured noise levels

The following table provides a summary of the noise levels measured on site at the fixed microphone position during the survey period including the equivalent continuous A-weighted sound pressure level; $L_{Aeq,T}$ and representative background noise level; $L_{A90,T}$.

Time Period	Average Noise Level L_{Aeq}, dB	Representative Background L_{A90}, dB
Day (07:00 – 23:00 hours)	49	43
Night (23:00 – 07:00 hours)	47	40

Table 4.1 - Summary of measured noise levels

It is noted that due to current Covid-19 restrictions at the time of surveying, measured background noise levels from road traffic may be slightly lower than under normal circumstances however have been used for assessment purposes and would be seen as a worst case scenario.

5.0 ASSESSMENT CRITERIA

Section 4.0 above provides a summary of measured noise levels on site. The following section provides a summary of guidance documentation relevant to this development.

5.1 British Standard 4142

BS 4142:2014 describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

The likelihood of complaints in response to a specific noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level. BS 4142 states that:

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

This standard also allows for an appropriate correction for the acoustic features present in the noise using a number of methods. A correction should be applied if one or more of the following features (see the list below), are present within the noise sources in question.

- The noise is of a tonal nature, i.e. it contains a distinguishable, discreet, continuous note such as whine, hiss, screech, hum;
- The noise is impulsive, i.e. it contains distinct impulses such as bangs, clicks, clatters, or thumps;
- The noise contains other characteristics that are neither tonal nor impulsive but is irregular enough to attract attention.

5.2 Summary of Guidance Documentation

It can be concluded from BS4142 guidance document that noise levels from plant and equipment associated with the development should not generally exceed the background noise level when measured at the nearest noise sensitive location. This is a positive indication of low noise impact.

5.3 Target Plant Noise Levels

It is understood that the proposed units of plant will operate between 11:00 – 23:00 hours daily, i.e. daytime only. Based on the proposed hours of operation, Aran Acoustics suggest a design target of -5 dB below the existing background noise levels. This is seen as a suitable design target where noise impact would be 'low' in accordance with BS 4142 and complaints from nearby noise sensitive receptors deemed unlikely.

Calculations are therefore based on the lowest representative background noise level during the operating period. The representative background noise level during the period of operation was determined to be 39 dB L_{A90} measured between 20:30 – 22:30 hours.

Following analysis of manufacturers sound level data, it is considered that the proposed plant produces a broadband noise with no tonal features. The units of plant are also inverter driven, meaning that it will gradually increase or decrease operating capacity depending on the level of duty required. This gives a positive indication that the noise produced is not immediate or distinguishable therefore no acoustic feature correction need be applied.

Based on the lowest background noise level during the proposed operating period and the suggested design targets including any tolerance or correction factors, the following table shows the maximum permissible noise level from the kitchen extract system and external air condenser unit when measured at the window of the nearest residential receptor.

Lowest Background, L_{A90}	Tolerance Factor	Correction Factor	Max Noise Level at Residential
43 dBA	-5 dB	-0 dB	**38 dBA**

Table 5.1 - Plant Noise Level Target

6.0 PLANT NOISE LEVEL ASSESSMENT

Proposals are to install 2 no. Helios GigaBox fans used for kitchen air intake and extraction along with a Daikin external condenser unit associated with the Air Conditioning system. The associated ductwork is located on the rear wall of the ground floor commercial premises. along with the external condenser unit as shown on the drawings in Appendix A.

The nearest noise sensitive receptor is the rear window of the first floor flat directly above the ground floor commercial unit. Other nearby receptors are the residential block of flats located approximately 23m to the west at the nearest point. At distance, the units of plant are considered a point source and noise levels will decay at a rate of 6dB per doubling of distance.

Proposal include acoustic attenuators to be placed on the atmosphere side of the kitchen fans to prevent excessive noise breakout from the fans. Calculation show that to achieve the noise level target within Table 5.1 above, the in-line acoustic attenuators should the insertion loss values presented in the following table:

	Octave Band Centre Frequency, dB						
	63 Hz	125 Hz	250 Hz	500 Hz	1.0 K Hz	2.0 K Hz	4.0 K Hz
Kitchen Extract Fan[1]	-	-6	-9	-19	-25	-25	-20
Kitchen Intake Fan	-	-6	-9	-19	-25	-25	-20

Table 6.1 – Insertion Loss for Attenuators

Calculations show that the combined noise level from the proposed kitchen intake and extraction fans including the proposed attenuators along with the air condenser unit will be approximately **37 dBA** when measured at the nearest residential window directly above the commercial premises. This does not exceed the target plant noise level of **38 dBA** established in Section 5.0 above therefore no further mitigation is proposed at this stage.

Note that for attenuators to be effective they must be placed on the atmosphere side of the kitchen fans. Further attenuator can be added to the room side if required.

Plant noise calculation sheets are provided in Appendix C. Manufacturers noise level data sheets are provided in Appendix D.

[1] Data based on Helios 500/ 900 Cylindrical Silencer (Ref No. 8756)

7.0 SUMMARY AND CONCLUSION

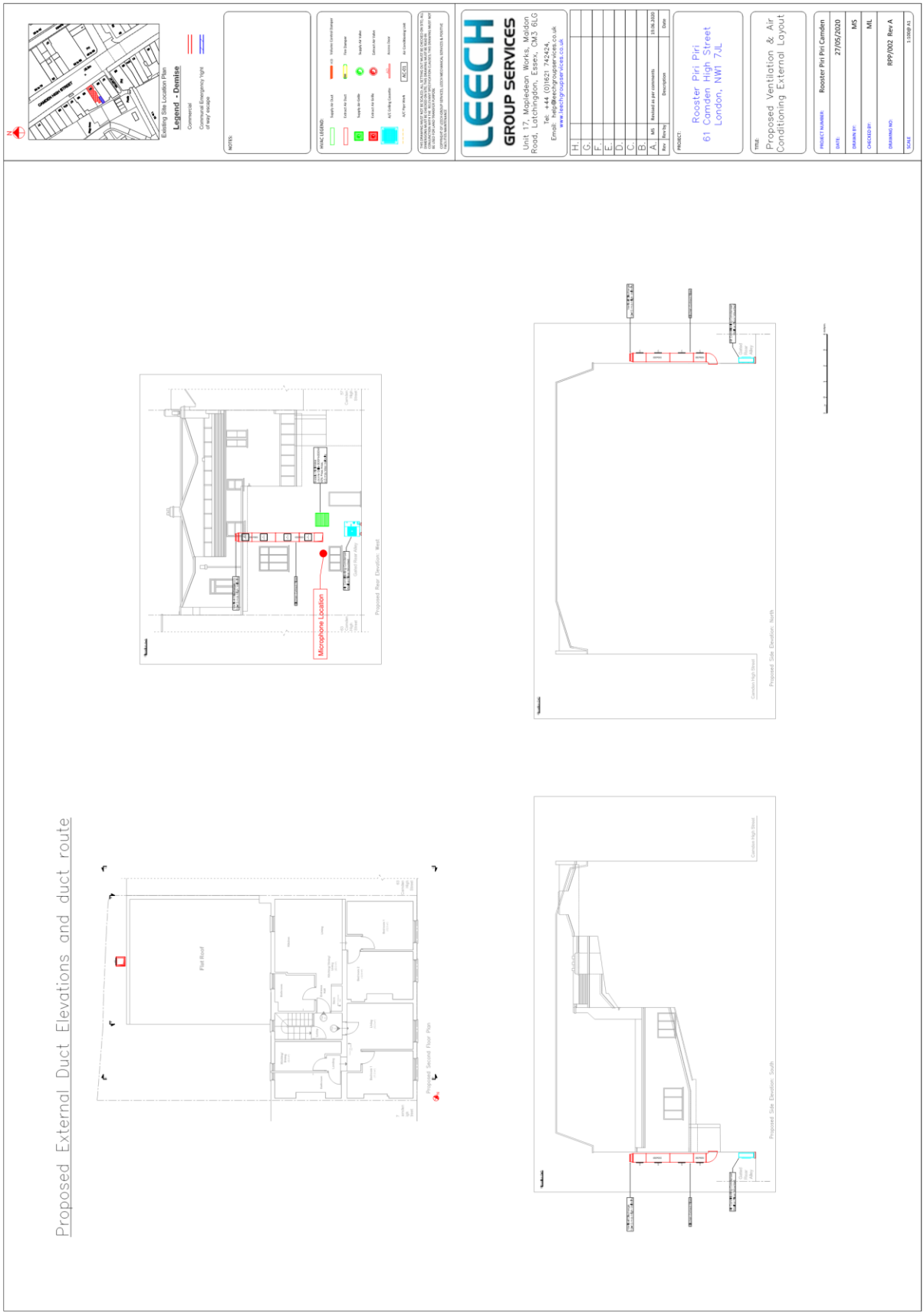
A noise survey was carried out at the location of a kitchen extract and air conditioning system to be installed to the rear of 61 Camden High Street, London on 08 July 2020.

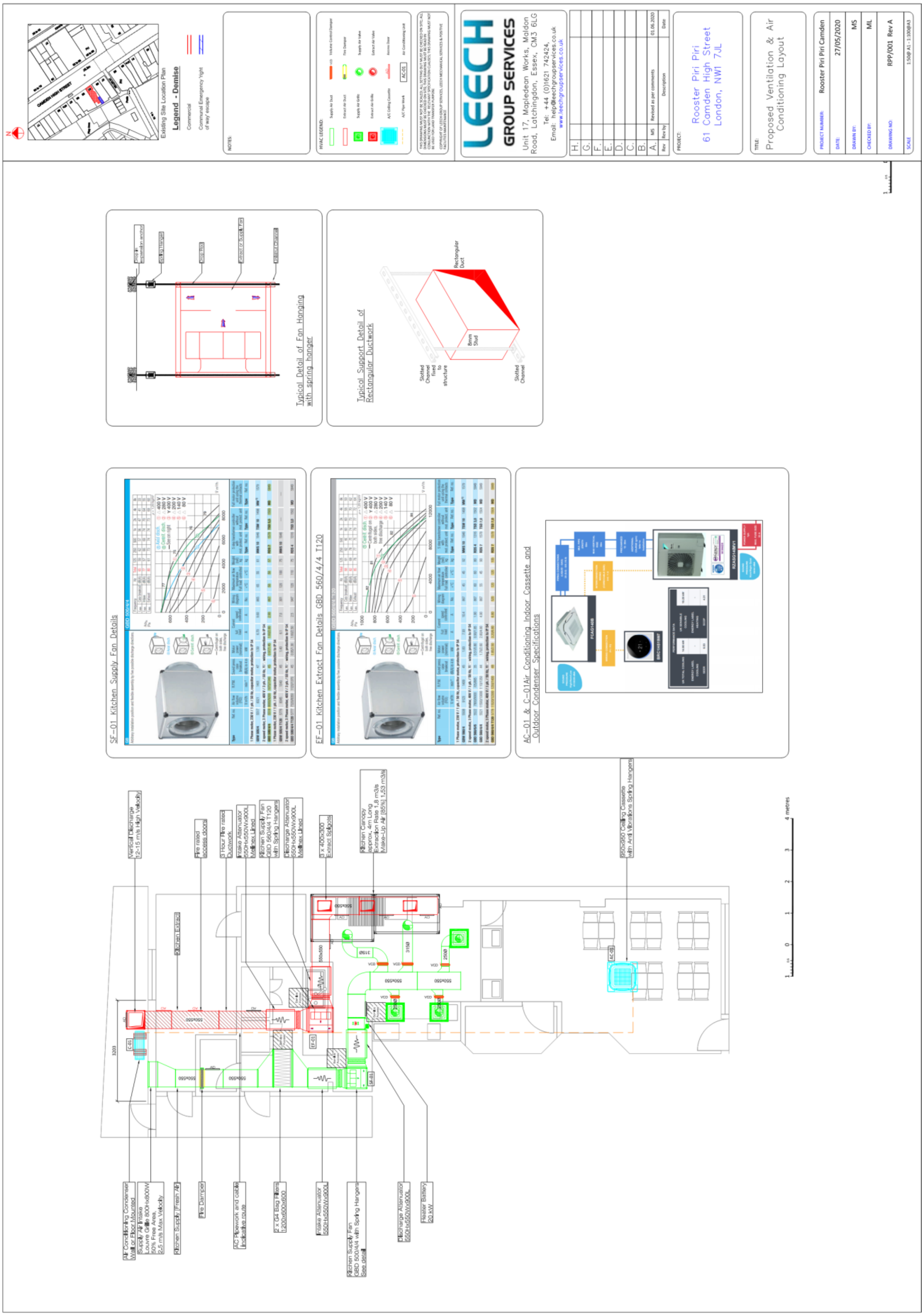
From this survey the minimum representative background noise level at the nearest sensitive property was found to be 43 dB L_{A90} during the proposed operational hours.

Using guidance in BS 4142, noise levels from the proposed air intake and extract fans associated with the kitchen extract system should not generally exceed 5 dBA below the background noise level at the window of the nearest noise sensitive receptor.

Based on manufacturer's noise level data for the kitchen extract fans including the proposed acoustic attenuators, calculations show that noise levels at the nearest noise sensitive receptor would be approximately 37 dBA. This does not exceed the maximum permissible noise level target of 38 dBA which is a positive indication of low noise impact in accordance with BS 4142 where complaints are deemed unlikely.

APPENDIX A – SITE DRAWINGS




LEECH GROUP SERVICES
Rooster Piri Piri 61 Camden High Street London, NW1 7JL
Proposed Ventilation & Air Conditioning Layout
Rooster Piri Piri Camden
27/05/2020
RPP/001 Rev A
SF-01 Kitchen Supply Fan Details
EF-01 Kitchen Extract Fan Details GBD 560/4/4 T120
AC-01 & C-01 Air Conditioning Indoor Cassette and Outdoor Condenser Specifications
Typical Detail of Fan Hanging with spring hanger
Typical Support Detail of Rectangular Ductwork

APPENDIX B – SITE PHOTOS

APPENDIX C – PLANT NOISE CALCULATION SHEETS

	QTY	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	dBA
Extract Fan Outlet (Lw)	1	0	60	62	69	67	66	61	**72**
Acoustic Attenuator		0	-6	-8	-14	-16	-13	-13	
Duct Loss		-8.2	-6.6	-3.3	-1.6	-1.6	-1.6	-1.6	
90 Bend Loss		0	0	-6	-8	-4	-3	-3	
End Reflection Loss		-8	-4	-1	0	0	0	0	
Directivity Correction	-6	-6	-6	-6	-6	-6	-6	-6	
Distance Attenuation	2.9	-20.2	-20.2	-20.2	-20.2	-20.2	-20.2	-20.2	
SPL at Receiver (Lp)		-42.4	17.2	17.5	19.2	19.2	22.2	17.2	**26**
Extract Fan Duct Breakout (Lw)	1	0	60	62	69	67	66	61	**72**
Acoustic Attenuator		0	-6	-9	-19	-25	-25	-20	
Duct Loss		-7.0	-5.6	-2.8	-1.4	-1.4	-1.4	-1.4	
90 Bend Loss		0	0	-6	-8	-4	-3	-3	
Duct Transmission Loss		-20	-23	-26	-29	-31	-39	-43	
Distance Attenuation	2	-17.0	-17.0	-17.0	-17.0	-17.0	-17.0	-17.0	
SPL at Receiver (Lp)		-44.0	8.4	1.2	-5.4	-11.4	-19.4	-23.4	**-2**
Intake Fan Inlet (Lw)	1	0	57	66	69	74	70	64	**77**
Acoustic Attenuator		0	-6	-8	-14	-16	-13	-13	
Duct Loss		-5.1	-4.1	-2.0	-1.0	-1.0	-1.0	-1.0	
End Reflection Loss		-8	-4	-1	0	0	0	0	
Louvre Loss		-3	-3	-3	-3	-3	-3	-3	
Directivity Correction		-3	-3	-3	-3	-3	-3	-3	
Reflection Q	2	3	3	3	3	3	3	3	
Distance Attenuation	3.5	-21.9	-21.9	-21.9	-21.9	-21.9	-21.9	-21.9	
Barrier Attenuation	-10	0	0	0	0	0	0	0	
SPL at Receiver (Lp)		-38.0	18.0	30.1	29.1	32.1	31.1	25.1	**36**
A/C Condenser Unit (Lp)	1	53	55	52.5	53	47.5	46.5	38	**54**
Acoustic Attenuator		0	-6	-9	-19	-25	-25	-20	
Reflection Q	2	3	3	3	3	3	3	3	
Distance Attenuation	4.8	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6	
Barrier Attenuation	-10	0	0	0	0	0	0	0	
SPL at Receiver (Lp)		42.4	38.4	32.9	23.4	11.9	10.9	7.4	**28**
Combined SPL at Receiver (Lp)		42.4	38.5	34.8	30.5	32.4	31.7	25.8	**37**

APPENDIX D – TECHNICAL DATA SHEETS

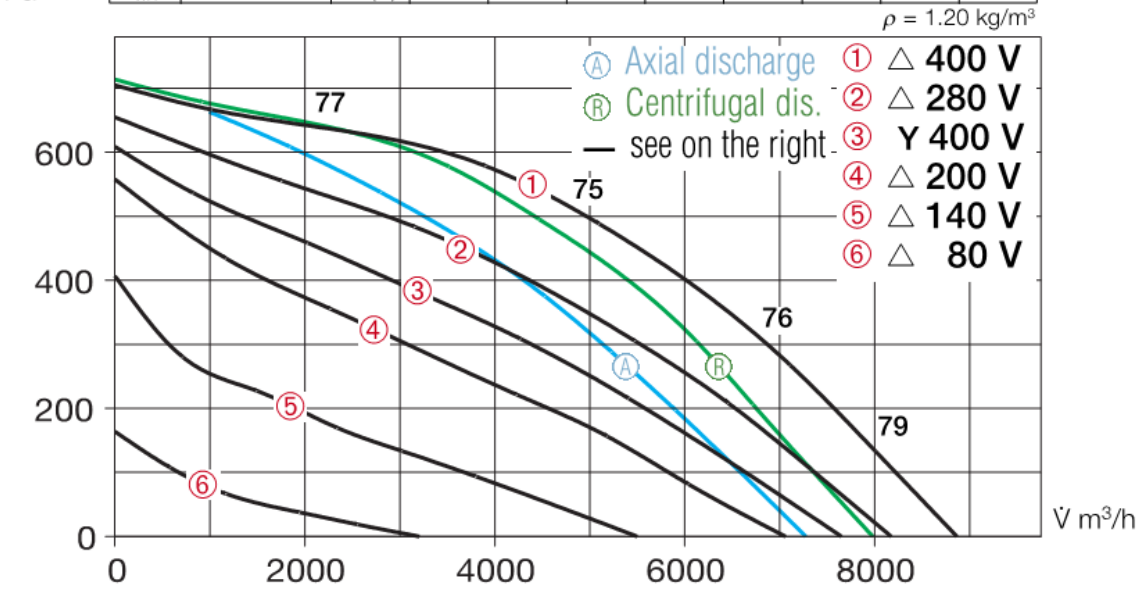
Helios

Quick selection chart for GB.. and GB.. T120
Requirements for exhaust air systems in commercial kitchens

	Sound press. Case breakout	Sound press. Intake	Air flow volume V̇ m³/s against static pressure												
Type GB..	L_{PA} dB(A)	L_{PA} dB(A)	(ΔP_{stat}) in Pa												
	at 4 m	at 4 m	**0**	**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**500**	**600**	**700**	**800**
GBW 250/4	27	39	0.389	0.319	0.244	0.147									
GBW 315/4	29	41	0.414	0.361	0.300	0.236	0.153	0.042							
GBW 355/4	34	46	0.817	0.747	0.675	0.594	0.505	0.400	0.258						
GBD 355/4/4	34	46	0.836	0.772	0.711	0.638	0.577	0.492	0.367	0.089					
GBW 400/4	38	50	1.142	1.092	1.036	0.975	0.917	0.85	0.764	0.656	0.511				
GBD 400/4/4	38	50	1.097	1.031	0.961	0.889	0.811	0.725	0.628	0.469	0.114				
GBW 450/4	40	52	1.514	1.433	1.361	1.292	1.217	1.122	1.006	0.867	0.692	0.083			
GBD 450/4/4	40	52	1.514	1.431	1.344	1.256	1.161	1.061	0.947	0.822	0.664	0.083			
GBW 500/4	45	57	2.333	2.236	2.139	2.042	1.947	1.85	1.744	1.628	1.506	1.219	0.778	0.042	
GBD 500/4/4	44	57	2.458	2.367	2.278	2.189	2.097	2.006	1.903	1.789	1.664	1.369	0.947	0.014	
GBW 500/6	35	46	1.600	1.478	1.347	1.189	0.978	0.678	0.144						
GBD 560/4/4	44	57	3.497	3.397	3.300	3.203	3.106	3.011	2.911	2.811	2.706	2.461	2.142	1.731	1.144
GBD 560/6/6	35	48	2.400	2.261	2.114	1.953	1.767	1.539	1.239	0.767					
GBD 630/4/4	48	61	4.153	4.058	3.961	3.869	3.775	3.683	3.592	3.500	3.403	3.194	2.953	2.675	2.333
GBD 630/6/6	43	56	3.192	2.992	2.794	2.597	2.375	2.103	1.767	1.356	0.792				
GBD 710/6/6	46	59	5.194	4.989	4.783	4.564	4.333	4.083	3.811	3.511	3.178	2.333	0.753		
Type GB.. T120	L_{PA} dB(A)	L_{PA} dB(A)	(ΔP_{stat}) in Pa												

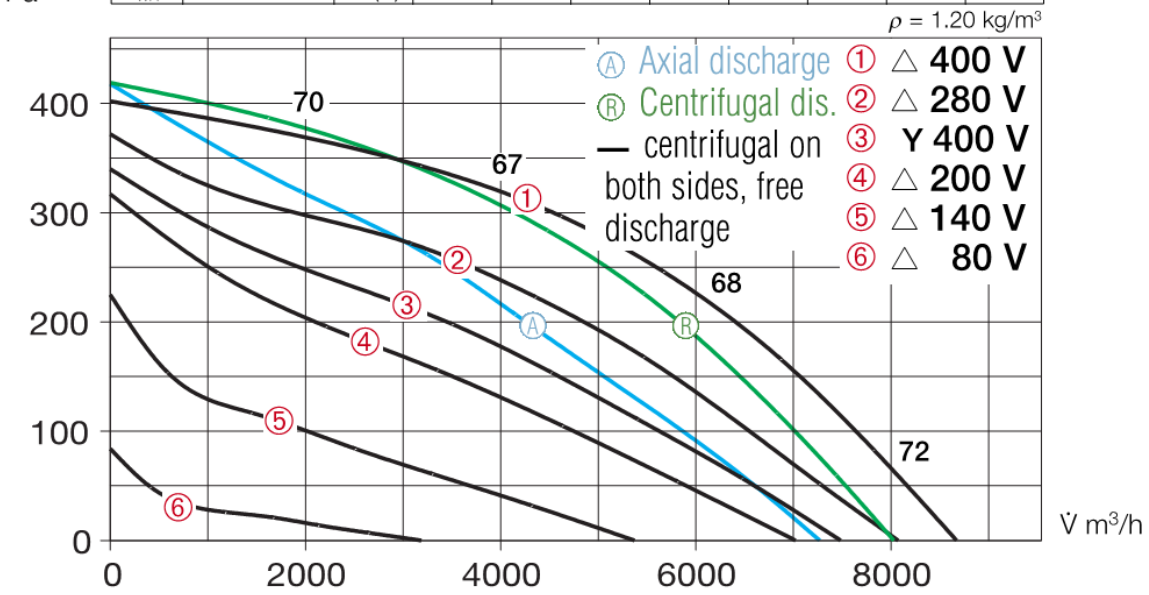
GBD 500/4/4

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	65	59	62	57	56	47	41	33
L_{WA}	Intake	dB(A)	77	57	66	69	74	70	64	55
L_{WA}	Extract	dB(A)	80	61	73	74	74	73	69	60



GBD 560/6/6

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	55	52	51	42	40	37	32	25
L_{WA}	Intake	dB(A)	68	51	53	63	64	61	53	43
L_{WA}	Extract	dB(A)	72	60	62	69	67	66	61	50



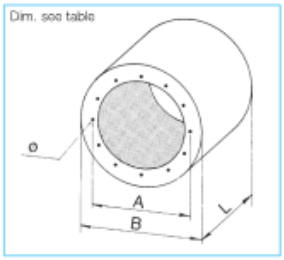
Flanged circular attentuator RSD

Helios

Design – Installation
Casing made of galvanised sheet steel. Cladding with high-quality mineral wool covered with fleece to prevent abrasion. Dimensions and fixing holes of all sizes fit the nominal diameter of the fan (R 20). Fixing holes according to DIN 24155, Pt. 2.

Insertion insulation
For larger insertion insulation, several attenuators with the same diameter can be installed in-line.

Pressure loss
The resistance of the RSD attenuators is very low. When designing the system, twice the friction resistance should be into account.



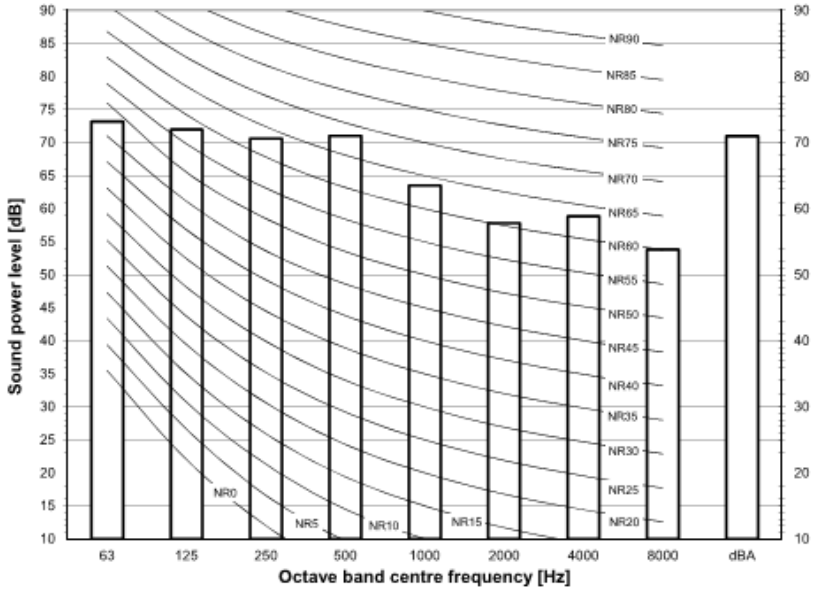
RSD

Information	Page
Selection acoustic calculation	434

Type Nominal Ø	Ref. no	Basic length	Dimensions in mm L	A	B	Hole Ø	Weight approx. kg	Insertion insulation level D_e dB 125	250	500	1000	2000	4000	8000	average insulation
RSD 225/ 300	8734	1	300	259	404	6 x M 6	7	2	5	9	14	13	8	6	8
RSD 225/ 600	8735	2	600	259	404	6 x M 6	12	4	10	17	27	25	17	14	15
RSD 225/ 900	8736	3	900	259	404	6 x M 6	17	7	13	25	33	31	20	16	20
RSD 250/ 300	8737	1	300	286	404	6 x M 6	7	3	5	8	8	9	7	5	8
RSD 250/ 600	8738	2	600	286	404	6 x M 6	12	5	10	16	24	19	14	10	15
RSD 250/ 900	8739	3	900	286	404	6 x M 6	16	6	12	22	28	21	15	11	18
RSD 280/ 400	8740	1	400	322	454	8 x M 8	10	4	5	8	14	9	8	6	8
RSD 280/ 800	8741	2	800	322	454	8 x M 8	18	7	9	16	28	18	17	14	14
RSD 280/1200	8742	3	1200	322	454	8 x M 8	25	9	12	23	37	23	20	16	18
RSD 315/ 400	8743	1	400	356	504	8 x M 8	11	3	3	7	13	8	7	5	5
RSD 315/ 800	8744	2	800	356	504	8 x M 8	19	6	8	14	26	16	12	9	12
RSD 315/1200	8745	3	1200	356	504	8 x M 8	28	9	12	21	36	18	17	14	18
RSD 355/ 400	8746	1	400	395	564	8 x M 8	13	3	4	7	11	7	6	4	6
RSD 355/ 800	8747	2	800	395	564	8 x M 8	23	6	7	13	22	14	12	8	11
RSD 355/1200	8748	3	1200	395	564	8 x M 8	33	8	11	17	29	18	15	10	17
RSD 400/ 400	8749	1	400	438	564	12 x M 8	12	3	4	6	9	7	5	3	6
RSD 400/ 800	8750	2	800	438	564	12 x M 8	21	6	6	12	18	13	12	8	9
RSD 400/1200	8751	3	1200	438	564	12 x M 8	30	7	10	14	22	18	13	9	15
RSD 450/ 400	8752	1	400	487	634	12 x M 8	17	4	5	8	10	8	7	5	8
RSD 450/ 800	8753	2	800	487	634	12 x M 8	27	6	7	13	18	13	12	9	11
RSD 450/1200	8754	3	1200	487	634	12 x M 8	38	8	10	18	23	17	14	10	15
RSD 500/ 600	8755	1	600	541	714	12 x M 8	27	4	5	9	11	9	9	6	8
RSD 500/ 900	8756	2	900	541	714	12 x M 8	36	6	8	14	16	13	13	9	12
RSD 500/1200	8757	3	1200	541	714	12 x M 8	45	8	11	22	24	17	16	12	17

2-7 Technical Specifications					RZASG71MV1	RZASG100MV1	RZASG125MV1	RZASG140MV1
Capacity control	Method				Inverter controlled			
Casing	Colour				Ivory white			
	Material				Painted galvanized steel plate			
Dimensions	Unit	Height		mm	770	990		
		Width		mm	900	940		
		Depth		mm	320			
	Packed unit	Height		mm	900	1,170		
		Width		mm	980	1,015		
		Depth		mm	420	422		
Weight	Unit			kg	60	70		78
	Packed unit			kg	64	78	79	87
Packing	Weight			kg	4	9		
Heat exchanger	Fin	Type			WF fin			
		Treatment			Anti-corrosion treatment (PE)			
Compressor	Quantity				1			
	Type				Hermetically sealed swing compressor			
	Starting method				Inverter driven			
Fan	Type				Propeller			
	Discharge direction				Horizontal			
	Quantity				1			
	Air flow rate	Cooling	Nom.	m^3/min	56	69	71	76
		Heating	Nom.	m^3/min	50	82		
Fan motor	Quantity				1			
	Model				Brushless DC motor			
	Output			W	94	200		
	Drive				Direct drive			
	Speed	Cooling	Super low	rpm	-			
		Heating	Super low	rpm	-			
Sound power level	Cooling			dBA	65	70	71	73
	Heating			dBA	-			
Sound pressure level	Night quiet mode	Level 2		dBA	42	44		
	Cooling	Nom.		dBA	46	53		54
	Heating	Nom.		dBA	47	57		
Operation range	Cooling	Ambient	Min.	°CDB	-15			
			Max.	°CDB	46			
	Heating	Ambient	Min.	°CWB	-15			
			Max.	°CWB	15.5			

AZAS125MV1
AZAS125MY1
RZASG125MV1
RZASG125MY1



Notes
- dBA = A-weighted sound power level (A scale according to IEC).
- Reference acoustic intensity 0dB = 10E-6µW/m²
- Measured according to ISO 3744

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