PC Environmental Ltd
5 Claylands Park
Bishops Waltham
Southampton SO32 1QD
[redacted]

Discharge of Planning Condition - Noise

Project: Yeomans Ltd, Littlehampton Road, Ferring, Worthing, BN12 6PB

Client: HNW Architects

Date: 9th July 2019

Author: Dr Peter Clark

Our reference: 12370

Revision: FINAL

ARUN DISTRICT COUNCIL FG/78/19/DOC

TABLE OF CONTENTS

1.0	INTRODUCTION	3
2.0	NOISE MEASUREMENTS	4
3.0	NOISE ASSESSMENT	6
4.0	CONCLUSION	7

References

APPENDICES
Appendix A. Graphs & Figures
Appendix B. Equipment Data Sheets
Appendix C. Description of Noise Terms and Units

ARUN DISTRICT COUNCIL FG/78/19/DOC

Discharge of Planning Condition - Noise

9th July 2019 Peter Clark

1. INTRODUCTION

1.1 Yeomans Ltd are to build a new Honda Motor Dealership, Head Office for Yeomans Ltd and Motor Vehicle Workshop alongside their existing Peugeot Car Dealership and Workshop at Littlehampton Road, Ferring, Worthing in West Sussex. The site lies on the north side of main A259 Littlehampton Road dual carriageway. The proposal consists of a new build Honda Car Dealership, Head Office space for Yeomans Ltd, a new vehicle workshop and associated customer and office parking. Planning consent for the development was granted in August 2018 by Arun District Council, under their reference FG/39/18/PL, subject to a number of conditions. Condition 13 relates specifically to noise levels and states that *"The development hereby approved shall be operated at all times in accordance with the contents of the acoustic report PC Environmental Ltd. dated 23 February 2018. The* ***use hereby approved shall not commence until*** *details are submitted to and approved in writing by the Local Planning Authority concerning paragraph 3.6 of the acoustic report. The submitted details shall include technical specifications for the noise output of the precise plant and equipment to be installed. Only the approved details shall be operated thereafter."* As the construction of the approved development is now nearing completion, precise details of noise generating equipment is now known. Yeomans Ltd therefore require the noise assessment to be updated, details of which are contained in this report.

ARUN DISTRICT COUNCIL FG/78/19/DOC

1.2 The site location is given in Figure 1 below:

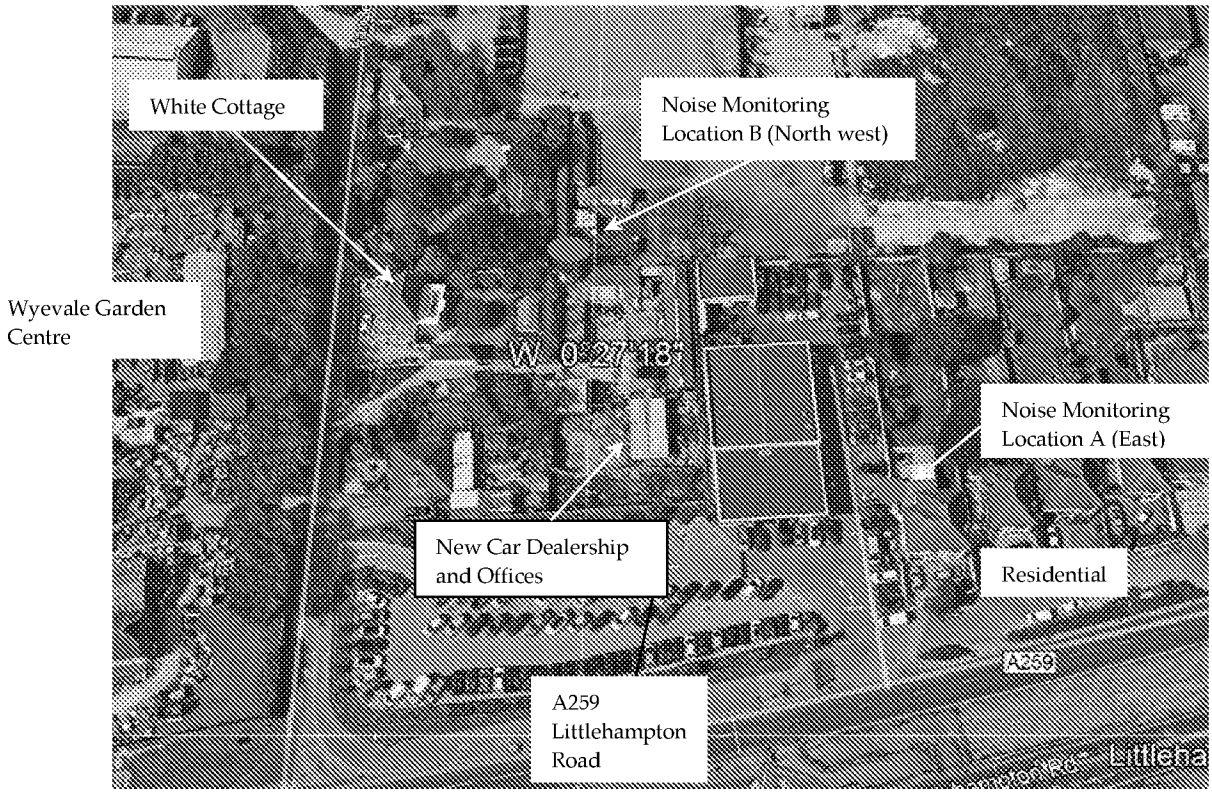


Figure 1: Site Location (© Google Maps)

1.3 The updated noise assessment has been completed by Dr Peter Clark who is a Chartered Engineer, a Member of the Institution of Mechanical Engineers and a Member of the Institute of Acoustics with 25 years professional experience.

2.0 NOISE MEASUREMENTS

2.1 Environmental noise measurements were carried out in 2018 (see our previous report) prior to the commencement of the new development. Measurements were taken in two locations; (a) near the site entrance close to the neighbouring residential properties in Littlehampton Road and (b) at the western perimeter of the site close on the boundary with White

ARUN DISTRICT COUNCIL FG/78/19/DOC

Cottage (locations shown in Figure 1 above). Locations are referred to as "A" and "B" respectively. For ease of reference the results are summarised below:

Table 2.1: Summary Results – (Location A)

	Day	Night
L_{A90}	56.9(55.0)*	42.3(30.0)*
L_{Aeq}	61.8	55.9

Table 2.2: Summary Results – (Location B)

	Day	Night
L_{A90}	53.3(52.0)*	42.8(36.0)*
L_{Aeq}	58.6	52.9

*indicates lowest representative background noise level ($L_{A90,15min}$) measured during the noise survey (see PC Environmental February 2018 report for further details)

2.2 Annex 1 of "Planning Noise Advice Document: Sussex" gives specific guidance for recommended noise thresholds to be achieved. In Annex 1 (for industrial and commercial sites) the *"The rating level of the plant should, were practicable, be no greater than the existing background levels…"* As a result, day-time rating noise levels should be no greater than 55 dB(A) for properties on Littlehampton Road itself and 52 dB(A) for all other properties/areas and corresponding night-time rating noise levels should be no greater than 30 dB(A) and 36 dB(A) respectively.

ARUN DISTRICT COUNCIL FG/78/19/DOC

3.0 NOISE ASSESSMENT

3.1 The precise details of proposed plant and equipment planned for the development are now known and these details are given in Figure A1[1]. The site layout and position of plant items is given in Figure A2. During day-time periods all equipment is assumed to be running whilst during night-time periods, only the Heating Ventilation and Air Conditioning (HVAC) plant will run.

3.2 A computer based modelling package (IMMI) has been used to determine noise levels (using the ISO9613 algorithm). The building geometry, site topography and plant locations have been input, the noise model generated and noise levels calculated and displayed in terms of both single point calculation points and a contour map.

3.3 Many of the proposed noise sources are naturally screened from neighbouring properties by the existing car showroom and new development. The plant area at the rear is also screened by a 2m high close-boarded wooden boundary fence. The acoustic model predicts noise levels from the new plant and equipment to be 21 (A) at the west façade of the nearest property on Littlehampton Road and 41 dB(A) at White Cottage during the day-time when all plant may be operating (with noise contributions from workshops and servicing operations). The night-time noise levels are reduced to 13 dB(A) and 41dB(A) respectively as only fixed Heating Ventilation and Air Conditioning (HVAC) will operate. Noise contour maps for both day and night-time periods are given in Figures A3

[1] Equipment noise data sheets for respective plant items are given in Appendix B.

ARUN DISTRICT COUNCIL FG/78/19/DOC

and A4 respectively at the end of this report. Summary acoustic calculations are given in Figure A5.

3.9 It therefore follows that noise levels from both day-time and night-time operations will be below the existing background noise levels.

4.0 CONCLUSION

4.1 A noise measurement survey and assessment has been carried out on the external plant and equipment that is to be installed as a part of the proposed new car showroom, offices and workshop at Littlehampton Road, Ferring near Worthing. Planning Permission for the new development, which is to be located immediately adjacent to the existing Yeoman's Peugeot car dealership and workshop, was granted in August 2018 subject to conditions.

4.2 Noise levels are shown to be very low and below existing background noise levels at the nearest neighbouring residential properties. The requirements of planning Condition 13 on noise levels are satisfied.

ARUN DISTRICT COUNCIL FG/78/19/DOC

APPENDIX A: GRAPHS AND FIGURES.

Mechanical Services Equipment Noise Ratings

Reference	Location	Noise dBA	Data Sheet
EC01	External adjacent workshop	64.5	EC01 - PURY-EP500YNW-A
EC02	External adjacent workshop	63.5	EC02 - PURY-EP450YNW-A
EC03	External adjacent workshop	51.0	EC03 - PUHZ-ZRP100VKA3
EC04	External adjacent workshop	64.0	EC03 - PURY-EP350YNW-A
AC12-FF	External adjacent workshop	48.0	AC12-FF - PUHZ-ZRP60VHA2
AHU-01	External adjacent workshop	57.0	AHU-01 Swegon Data Sheet
F01-GF	Ground floor ceiling void	39.0	F01-GF - EXTRACT FAN
F01-FF	Wall mounted above showroom roof	49.0	F01-FF - EXTRACT FAN

Notes: Full technical data sheets are given in Appendix C

Figure A1: Equipment Noise Levels (Summary)

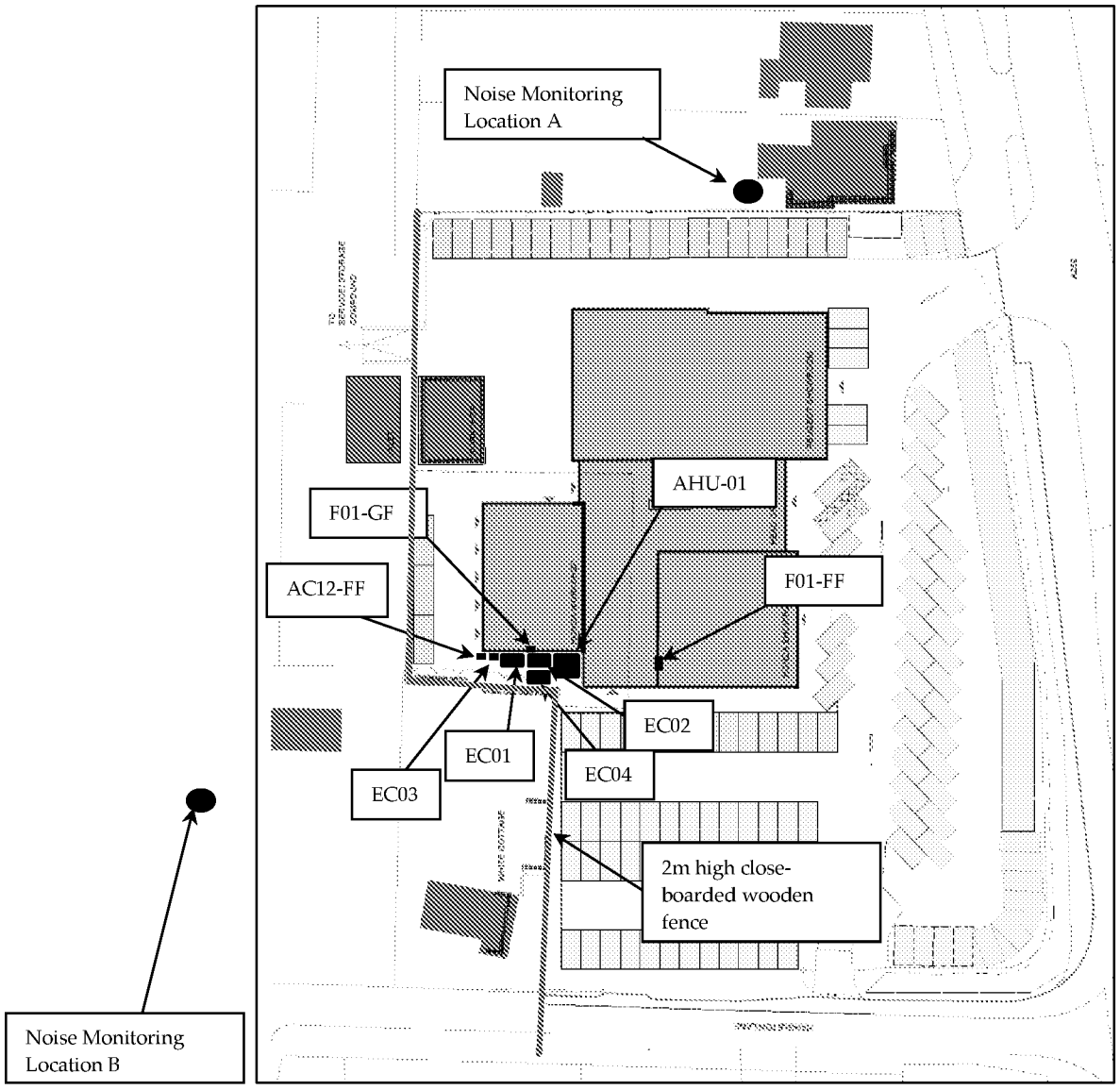


Figure A2 Site layout showing new plant and noise monitoring locations

Figure A3: Noise Level Contour Map (Day-time)

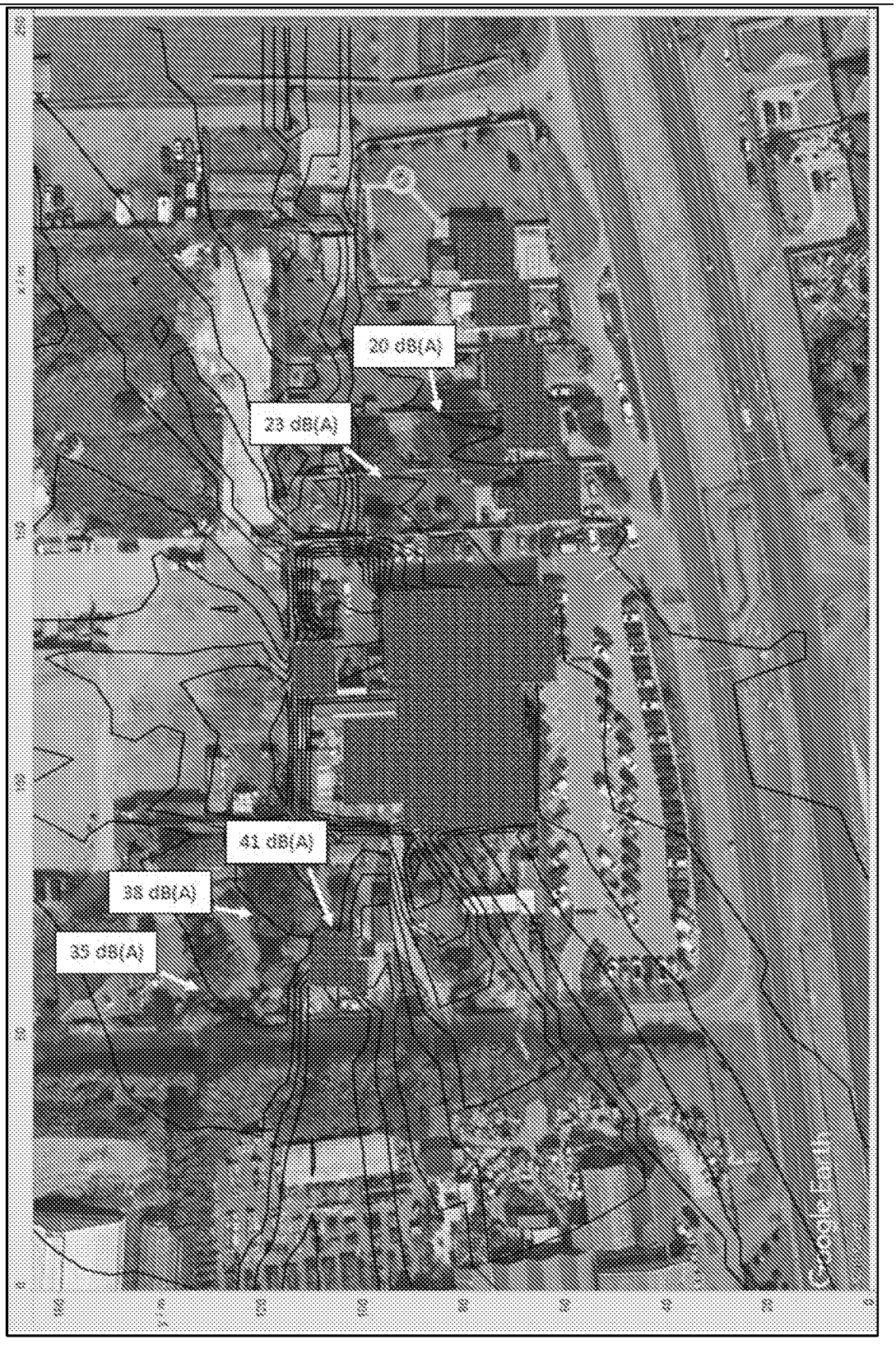


Figure A4: Noise Level Contour Map (Night-time)

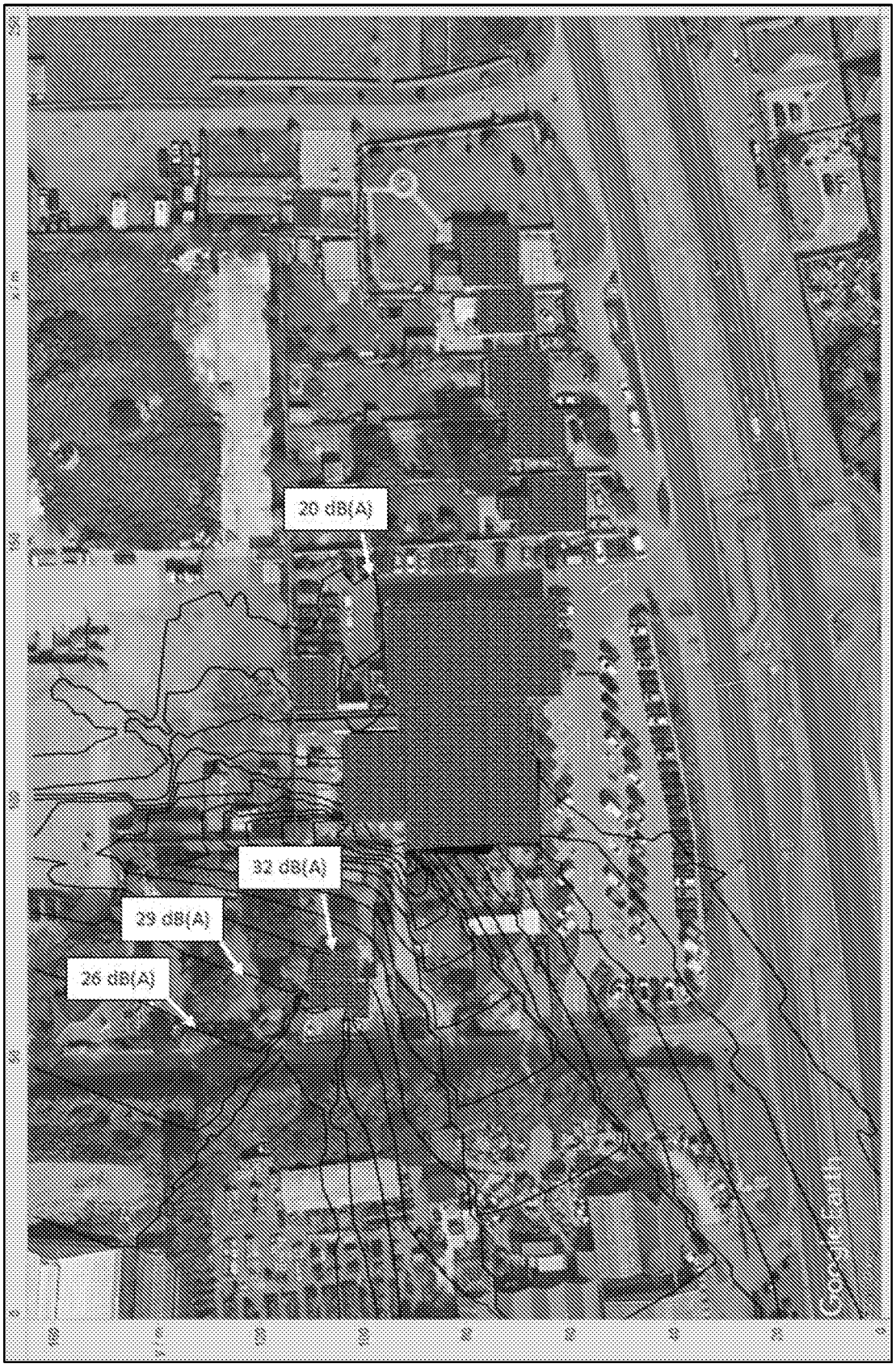


Figure A5: Detailed Acoustic Calculations

Calculated Noise Level at nearest façade/window of White Cottage (Day-time)

	White Cottage	Day Time	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
FLQi001 »	Workshop Doors		30.8	30.8	31.8	32.9	31.3	33.5	34.6	31.8	40.1
EZQi019 »	AHU01 Exhaust		39.3	33.0	31.3	27.0	25.4	22.5	14.0	8.7	30.5
EZQi021 »	High Level Fan		15.8	20.7	31.7	15.7	7.7	3.5	-1.1	-1.3	23.7
EZQi020 »	AHU01 Intake		33.4	29.4	24.9	12.9	1.5	-3.3	-11.7	-14.7	19.1
EZQi008 »	Air Compressor		26.6	19.6	18.4	13.4	12.1	14.6	1.5	-12.2	19.0
EZQi013 »	EC02		31.3	20.6	21.5	17.4	9.9	2.5	-6.4	-13.6	18.1
EZQi015 »	EC01		34.9	24.2	21.0	13.9	5.9	1.0	-5.4	-13.4	16.9
EZQi014 »	EC04		26.6	19.6	18.2	13.4	5.7	-2.2	-10.1	-18.7	14.4
EZQi011 »	F01-FF					16.5					13.3
EZQi022 »	AHU1		31.4	22.2	11.4	9.3	-4.3	-7.2	-16.7	-19.4	11.5
EZQi018 »	AHU 01 Case		31.4	22.1	11.3	9.1	-4.4	-7.4	-16.8	-19.5	11.4
EZQi010 »	F01-GF		4.1	5.7	12.8	-6.7	-17.6	-23.6	-29.8	-32.3	4.5
EZQi016 »	EC03		11.0	7.8	4.2	0.1	-5.5	-12.3	-21.7	-30.4	1.5
EZQi017 »	AC12-FF		10.1	5.9	2.3	-2.9	-6.4	-14.2	-23.0	-33.5	-0.5
	Sum spectrum	A	16.8	21.0	28.5	31.1	32.4	35.1	35.7	30.8	40.8

ARUN DISTRICT COUNCIL FG/78/19/DOC

Calculated Noise Level at nearest façade/window of Littlehampton Road (Day-time)

	No.1	Day Time	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
EZQi008 »	Air Compressor		24.7	18.0	17.6	13.9	12.2	14.7	1.5	-12.4	19.0
FLQi001 »	Workshop Doors		16.2	12.7	10.5	9.1	6.7	6.9	7.0	1.8	13.9
EZQi019 »	AHU01 Exhaust		22.6	13.9	10.6	6.8	7.4	6.8	0.3	-7.9	12.6
EZQi020 »	AHU01 Intake		16.4	9.7	3.4	-8.2	-17.6	-20.1	-26.6	-30.7	-1.3
EZQi011 »	F01-FF					1.8					-1.4
EZQi013 »	EC02		13.7	0.5	-0.3	-3.8	-7.4	-12.4	-19.4	-28.8	-1.6
EZQi010 »	F01-GF		-3.0	-1.8	5.9	-12.8	-21.5	-26.0	-31.2	-33.0	-2.3
EZQi015 »	EC01		17.2	4.0	-0.8	-7.4	-11.4	-13.9	-18.5	-30.1	-2.7
EZQi014 »	EC04		9.6	0.5	-2.3	-4.9	-10.4	-15.9	-22.4	-34.4	-3.8
EZQi021 »	High Level Fan		-5.3	-3.8	4.0	-15.1	-24.9	-29.4	-34.9	-38.2	-4.2
EZQi018 »	AHU 01 Case		14.5	2.8	-9.5	-11.2	-22.6	-23.1	-30.6	-35.8	-7.4
EZQi022 »	AHU1		14.5	2.8	-9.5	-11.2	-22.6	-23.2	-30.7	-35.9	-7.5
EZQi016 »	EC03		-6.9	-12.6	-17.9	-21.4	-23.0	-27.5	-35.1	-47.2	-18.2
EZQi017 »	AC12-FF		-8.0	-14.7	-19.9	-24.5	-24.1	-29.6	-37.5	-50.3	-20.0
	Sum spectrum	A	2.3	4.9	11.0	12.8	14.3	17.1	9.8	1.3	21.0

ARUN DISTRICT COUNCIL FG/78/19/DOC

Calculated Noise Level at nearest façade/window of Residential at White Cottage (Night-time)

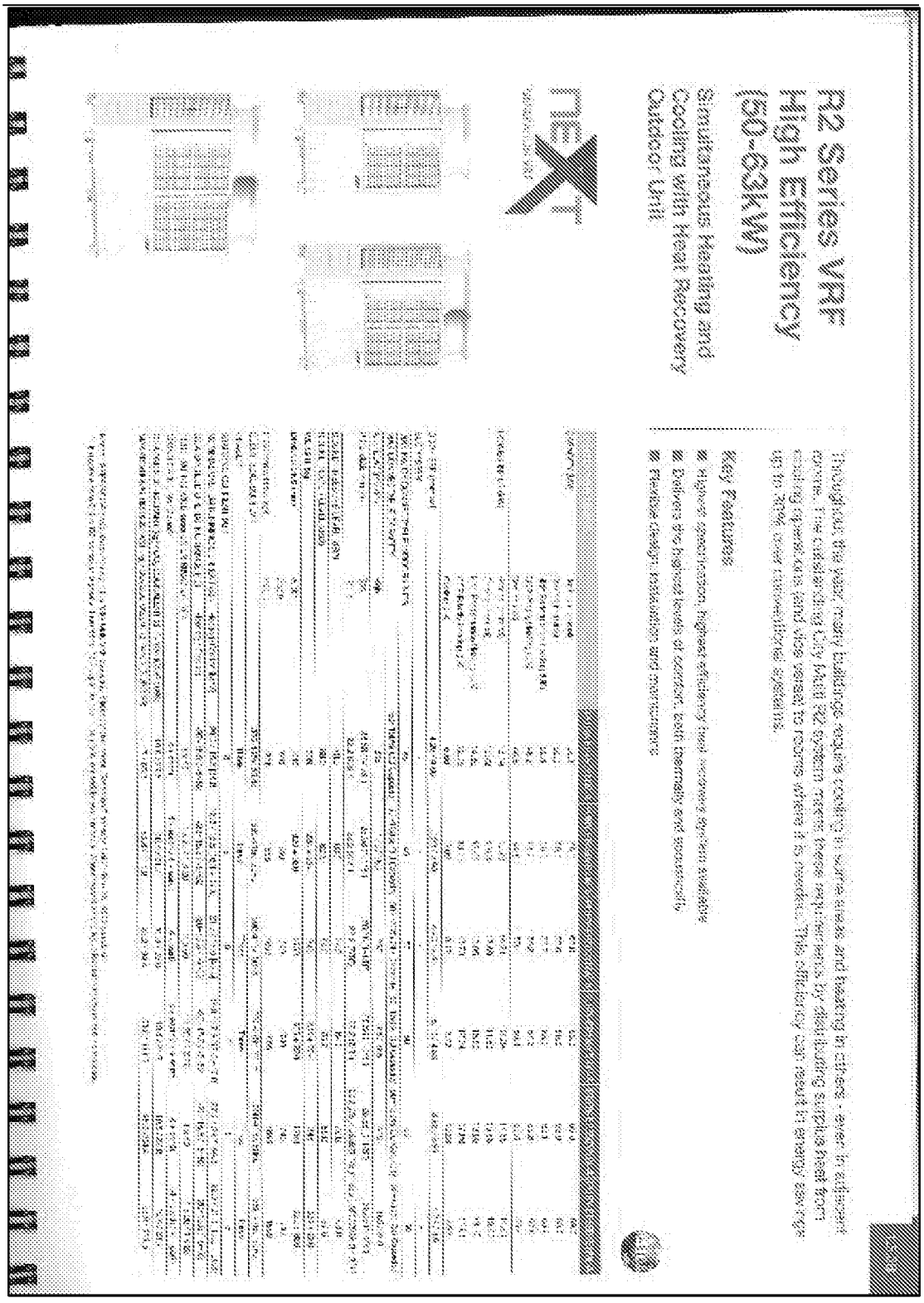
	White Cottage First Floor	Night Time	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
EZQi019 »	AHU01 Exhaust		40.4	33.8	31.7	27.3	25.6	22.7	14.1	7.2	30.8
EZQi020 »	AHU01 Intake		35.4	31.6	27.5	15.9	5.0	0.5	-7.9	-12.2	21.6
EZQi013 »	EC02		31.0	20.3	21.2	17.2	9.8	2.5	-6.5	-15.5	17.8
EZQi015 »	EC01		34.3	23.6	20.6	13.6	5.7	0.9	-5.6	-16.9	16.5
EZQi014 »	EC04		26.2	19.1	17.7	12.9	5.3	-2.7	-11.2	-20.7	13.9
EZQi018 »	AHU 01 Case		32.7	23.5	12.7	10.5	-3.0	-5.9	-15.5	-20.0	12.7
EZQi022 »	AHU1		32.3	22.8	11.8	9.4	-4.1	-7.0	-16.6	-20.9	12.0
EZQi016 »	EC03		10.2	7.1	3.7	-0.3	-5.6	-12.4	-21.9	-33.9	1.1
EZQi017 »	AC12-FF		9.2	5.1	1.7	-3.2	-6.5	-14.3	-24.8	-37.0	-0.9
	Sum spectrum	A	17.3	20.6	25.2	25.2	25.9	24.0	15.3	6.2	31.8

Calculated Noise Level at nearest façade/window of Littlehampton Road (Night-time)

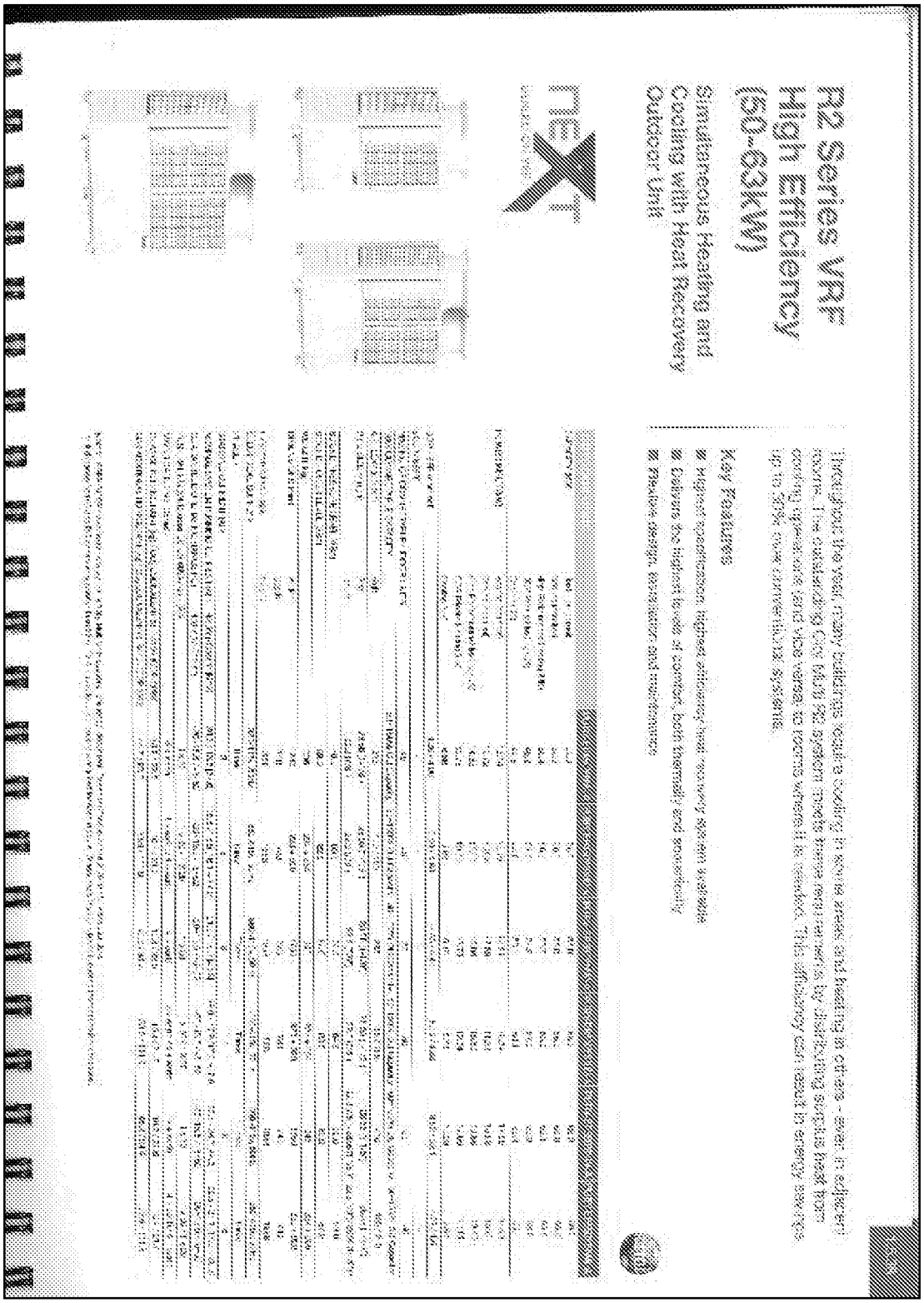
	No.1 First Floor	Night Time	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
EZQi019 »	AHU01 Exhaust		24.6	15.5	11.6	6.7	7.0	6.3	-0.3	-8.9	12.5
EZQi020 »	AHU01 Intake		18.3	11.1	4.3	-8.3	-17.9	-20.6	-27.2	-31.7	-0.2
EZQi013 »	EC02		15.8	2.2	0.8	-3.8	-7.9	-13.0	-20.2	-30.0	-1.3
EZQi015 »	EC01		18.5	5.1	0.1	-7.3	-11.9	-14.6	-19.3	-31.7	-2.2
EZQi014 »	EC04		11.8	2.2	-1.2	-4.6	-10.9	-16.5	-23.2	-35.5	-3.3
EZQi018 »	AHU 01 Case		16.5	4.4	-8.5	-11.3	-23.0	-23.7	-31.3	-36.9	-6.2
EZQi022 »	AHU1		16.5	4.4	-8.5	-11.3	-22.9	-23.6	-31.3	-36.8	-6.2
EZQi016 »	EC03		-5.5	-11.4	-16.8	-21.2	-23.4	-28.1	-35.9	-48.9	-18.0
EZQi017 »	AC12-FF		-6.2	-13.1	-18.6	-24.0	-24.4	-30.2	-39.0	-52.0	-19.7
	Sum spectrum	A	1.4	1.7	4.5	4.5	7.3	7.7	0.8	-9.9	13.2

ARUN DISTRICT COUNCIL FG/78/19/DOC

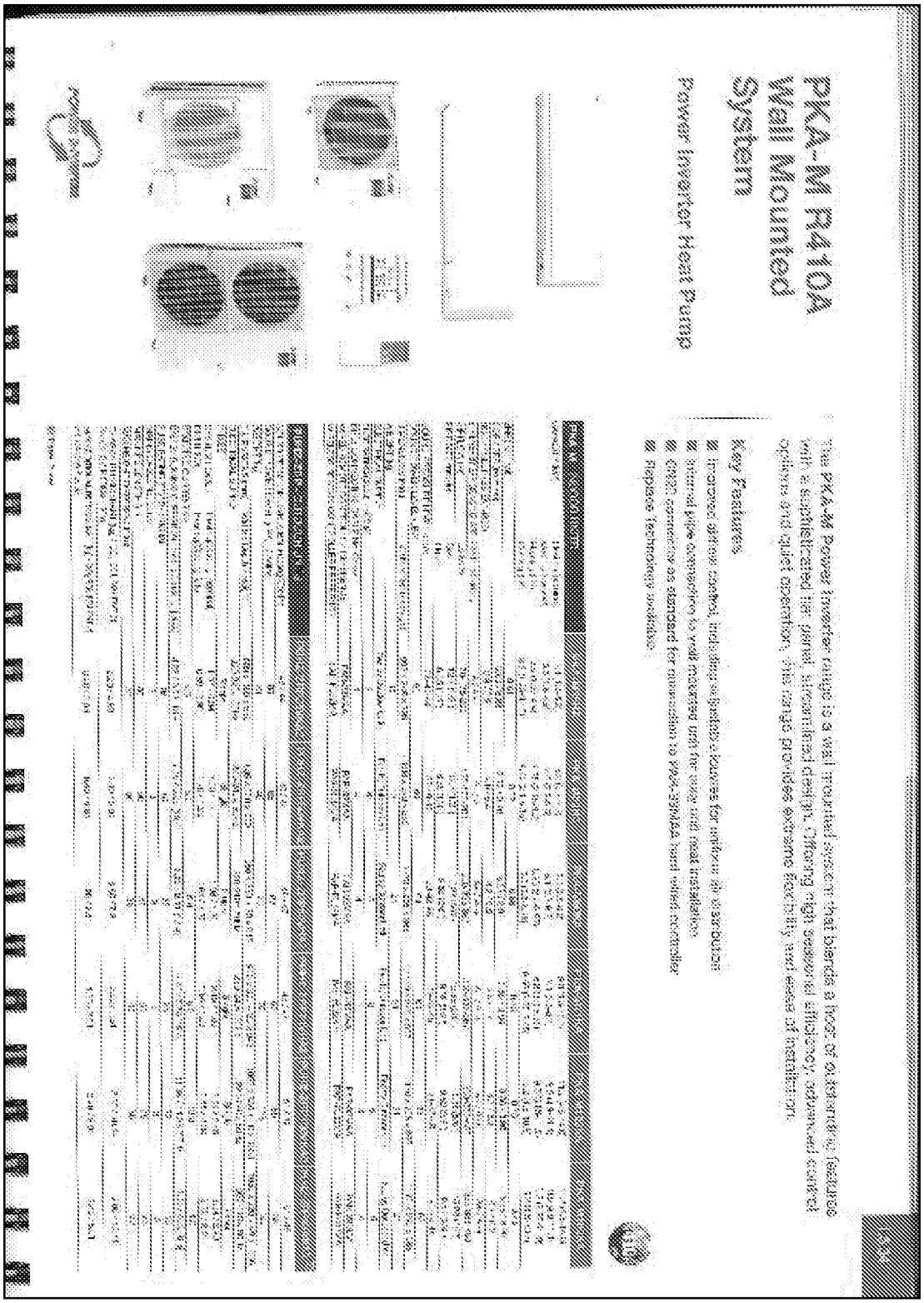
APPENDIX B: EQUIPMENT DATA SHEETS



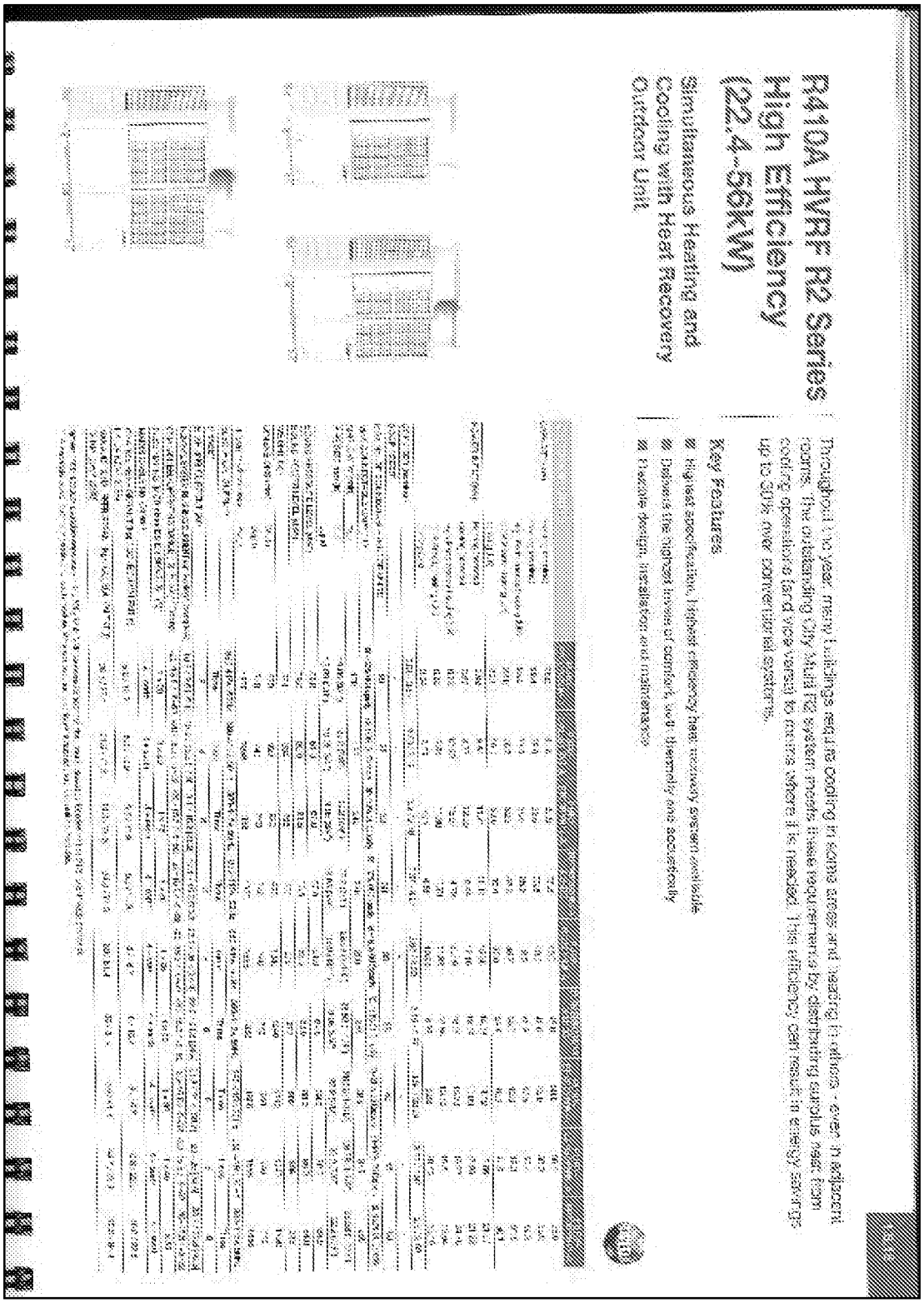
External Condenser Unit EC01



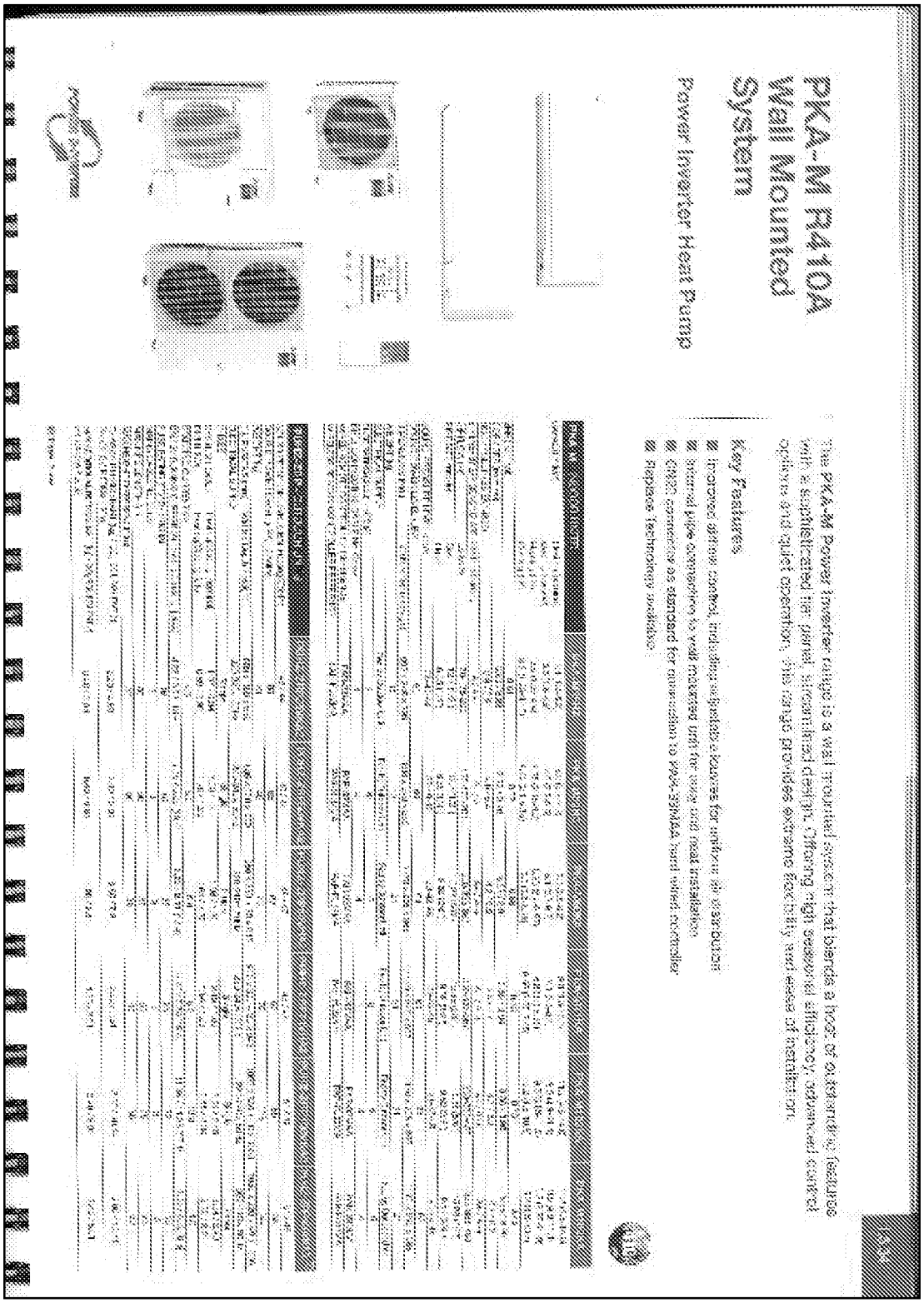
External Condenser Unit EC02



External Condenser Unit EC03



External Condenser Unit EC04



External Condenser Unit AC12-FF

AHU Design
Technical specification

Swegon

Project: Honda Worthing (3530394)
Unit name: AHU1 (External) - Design data

Date: 04/03/2019
14 / 1.0.20190123.1182529
Unit ID: AO-180306478577

Component, Section, Airflow direction	Quantity pcs	Δp dynamic (Recommended / Max) Pa	Δp static (Recommended / Max) Pa	Power kW	Pressure (Recommended / Max) Pa	Weight (Dry) kg
Outdoor air duct					-9	65
Damper					-2	
End section					-6	
Filter	1.41				-101	
Rotary heat exchanger	1.89	-6.5/17.2	30.5/23.2		-117	
Fan				1.08	573	
Air cooler direct expansion	1.58		23.5/20.6	6.50	-43	
End section					-5	
Supply air duct					-388	78
Extract air duct					-600	66
End section					-5	
Filter	1.27				-46	
Rotary heat exchanger	1.89	21.5/-1.2	22.6/28.8		-109	
Extra pressure drop					-5	
Fan				5.94	468	
End section					-7	
Damper					-2	
Exhaust air duct					-5	82

Sound power to duct, measured according to ISO 5136
Noise reduction for function section included to duct.
Sound power emitted to surroundings, measured according to ISO 3741

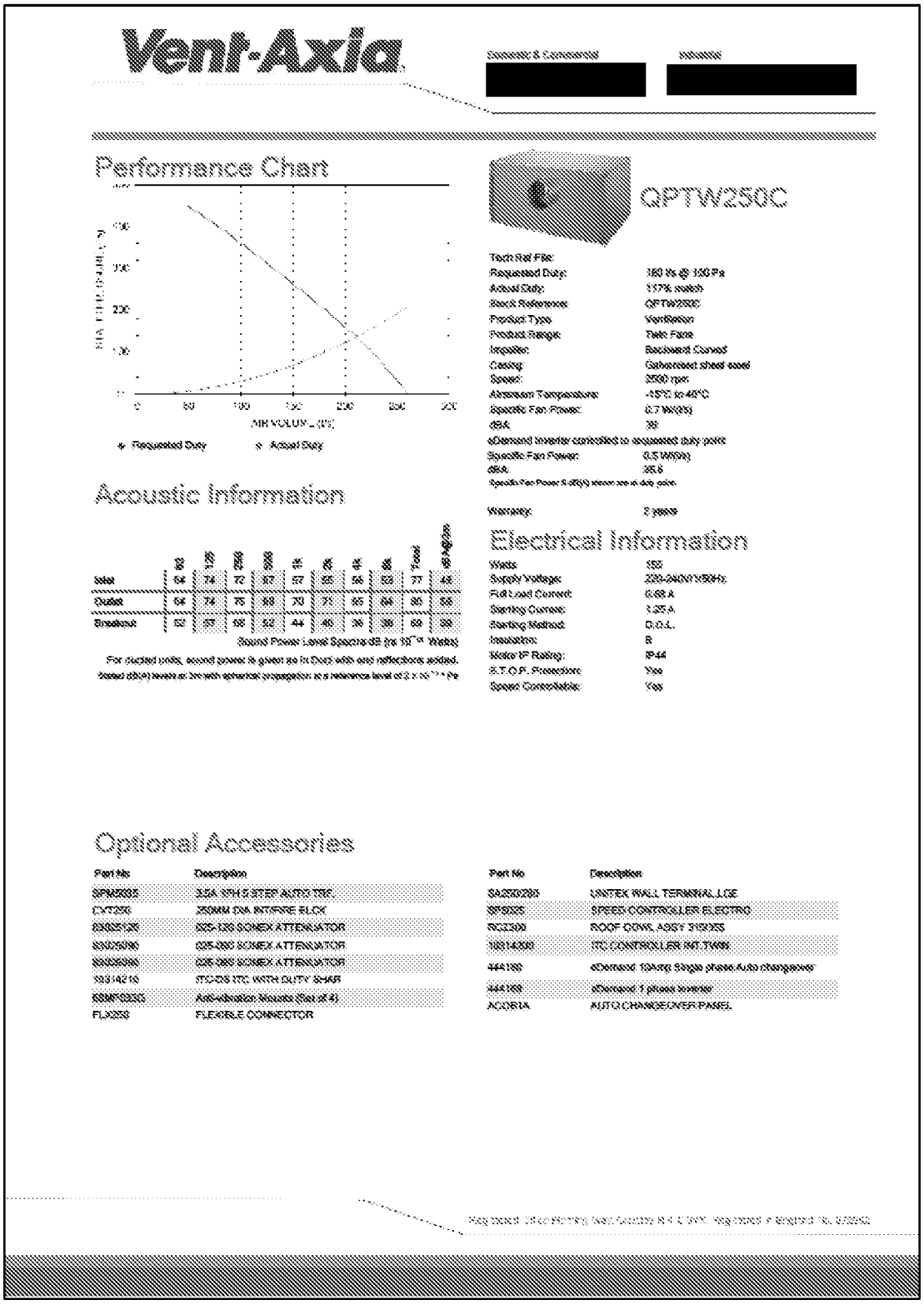
Component, Section	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)	NC	
To supply air duct	80	75	74	71	72	72	67	64	66	76	dB(A)
To outdoor air duct	78	73	70	60	51	49	44	43	65	65	dB(A)
To extract air duct	77	74	72	61	62	61	49	50	65	66	dB(A)
To exhaust air duct	82	77	77	75	76	76	71	66	69	82	dB(A)
To surroundings	74	66	57	57	46	46	45	45	68	57	dB(A)

GOLD- Unit with control system

Components are arranged according to airflow direction

Quantity	Supply air	
1	Damper, TBBA-S-100-640-1-1	
	Damper motor: With spring return	
	Damper blade: Uninsulated	
	Static pressure drop	2 Pa
1	End section, outdoor air	
	Static pressure drop	6 Pa
1	Filter	
	Filter class ePM1 50% (F7)	

Air Handling Unit AHU 01



Vent-Axia

Domestic & Commercial [redacted] Industrial [redacted]

Performance Chart

QPTW250C

Tech Ref File:

Requested Duty:	160 l/s @ 150 Pa
Actual Duty:	157% match
Stock Reference:	QPTW250C
Product Type:	Ventilation
Product Range:	Twin Fans
Impeller:	Backward Curved
Casing:	Galvanised sheet steel
Speed:	2550 rpm
Airstream Temperature:	-15°C to 40°C
Specific Fan Power:	0.7 W/(l/s)
dBA:	39
sDemand Inverter controlled to requested duty point	
Specific Fan Power:	0.5 W/(l/s)
dBA:	35.6

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	64	74	72	67	57	55	56	53	77	48
Outlet	64	74	75	69	70	71	65	64	80	56
Breakout	52	57	55	52	44	40	36	30	59	30

Sound Power Level Spectra dB (re 10^{-12} Watts)

For ducted units, sound power is given as in Duct with end reflections added.

dB(A) levels at 3m with spherical propagation, as a reference level of 2×10^{-5} Pa

Electrical Information

Watts:	160
Supply Voltage:	220-240V 50Hz
Full Load Current:	0.68 A
Starting Current:	1.25 A
Starting Method:	D.O.L.
Insulation:	B
Motor IP Rating:	IP44
S.T.O.P. Protection:	Yes
Speed Controllable:	Yes

Optional Accessories

Part No	Description
SPM3035	3.5A 3PH 5 STEP AUTO TRF.
CXT250	250MM DIA INTAPRE ELOK
93655126	625-126 SONEX ATTENUATOR
93655186	625-186 SONEX ATTENUATOR
93655246	625-246 SONEX ATTENUATOR
93142216	ITC-DS ITC WITH DUTY SHAR
93MF033G	Anti-vibration Mounts (Set of 4)
FLX250	FLEXIBLE CONNECTOR

Part No	Description
SA250/200	UNITEX WALL TERMINAL LGE
SPS025	SPEED CONTROLLER ELECTRO
RG2300	ROOF COWL ASSY 315/355
93314200	ITC CONTROLLER INT.TWIN
444188	sDemand 10Amp Single phase Auto changeover
444189	sDemand 1 phase inverter
ACCB1A	AUTO CHANGEOVER PANEL

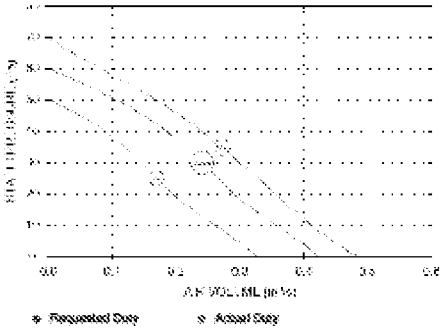
Extract Fan F01-GF

PC Environmental

Vent-Axia

[redacted]

Performance Chart



W164510

Tech Ref File:

Stock Reference:	W164510
Product Type:	Ventilation
Product Range:	Unitary Fans
Impeller:	Axial
dBA:	49

Specific Fan Power & dB(A) shown are a duty point.

Warranty: 2 Years

Electrical Information

Watts:	100
Supply Voltage:	220-240V 50Hz

Acoustic Information

	63	125	250	500	1K	2K	4K	8K	Total	dB(A) @3m
Inlet	-	-	-	-	-	-	-	-	-	-
Outlet	-	-	-	-	-	-	-	-	-	-
Breakout	-	-	-	-	-	-	-	-	-	-

Sound Power Level Spectra dB (re 10^{-12} Watts)

For ducted units, sound power is given as in Duct with one reflections added.

dB(A) levels at 3m with spherical propagation, at a reference level of 2×10^{-5} Pa

Optional Accessories

Part No	Description
W160320	ECOTRONIC 400 CONTROLLER
593020	Ambient Response Humidity Sensor
593015	7 DAY TIMESWITCH BOXED A/S
561720	525mm dia WORM DRIVE 13.5P
561414	12"LVRD GRILLE ASSY BROWN
561434	12"LOUVRED GRILLE ASSY WH
560505	12 T-SERIES DIRECT MOUNT
560146	12 SINGLE SPIGOT
561142	12 FIXING PLATE
W560354	ADAPTOR KIT 12"
W560354	12" WINDOW/WALL TERMINA

Part No	Description
480603	VISIONEX MK3 240V PIR
593519	TIME SPAN CONT.240V 250W
W561178	S.S.U. SURFACE CONTROLLER
560518	PVC Coated Glass Fibre Flexible Ducting - Unit Size 12 - 4Metre - 5m length
560506	FLEXIMIRSPIGOT 450SQ315I
560259	MOUNTING BOX SIZE 9/12
560548	GUARDIAN P.I.R ASSY
560106	EXTENDED ROD ASSY SIZE 12
593522	Ecotronic Humidity Sensor

Registered Office Fleming Way Crawley RH10 9YX Registered in England No. 878952

Extract Fan F01-FF

APPENDIX C: GLOSSARY OF NOISE TERMS AND UNITS.

1.0 Noise

1.1 The sounds that we hear are as a result of successive air pressure changes. These air pressure changes are generated by vibrating sources, such as train engines or wheels, and they travel to a receiver, i.e. the human ear, as air pressure waves.

1.2. The human ear is capable of detecting a vast range of air pressures, from the lowest sound intensity that the normal ear can detect (about 10^{-12} watts/m^2) to the highest that can be withstood without physical pain (about 10 watts/m^2). If we were to use a linear scale to represent this range of human sensitivity it would encompass more than a billion units. Clearly this would be an unmanageable scale yielding unwieldy numbers.

1.3. The scale can be compressed by converting it to a logarithmic or Bel scale, the number of Bels being the logarithm to the base 10 of one value to another (as applied by Alexander Graham Bell to measure the intensity of electric currents). The Bel scale gives a compressed range of 0 to 12 units which in practice is a little too compressed. A more practical operating range of 0 to 120 is obtained by multiplying by 10, ie. 10 x Bel, which produces the scale units known as decibels or dB.

1.4. Examples of typical sound intensity levels within the decibel range of 0 to 120 dB are listed below:

Commercial four-engine jet aircraft at 100m	120dB
Riveting of steel plate at 10m	105dB
Pneumatic drill at 10m	90dB
Circular wood saw at 10m	80dB
Heavy road traffic at 10m	75dB

Male speech, average, at 10m	50dB
Whisper at 10m	25dB
Threshold of hearing, 100Hz	0dB

1.5. Due to this logarithmic scale noise levels have to be combined logarithmically rather than arithmetically. For example, two equal sound sources of 70 dB each, when operated simultaneously, do not produce a combined level of 140 dB but instead result in a level of 73 dB, ie. A rise of 3dB for each doubling of sound intensity. Subjectively, a 3dB change does not represent a doubling or halving of loudness; to make a sound appear twice as loud requires an increase in sound pressure level of about 10dB.

1.6. The subjective loudness of noise can be measured by applying a filter or weighting which equates to the frequency response of the human ear. This is referred to as an A-weighting and when applied results in noise levels expressed as dB(A).

1.7. dB(A) noise levels can be measured using a variety of noise indices. The index which correlates best with human response due to machinery noise is the L_{Aeq} this is the A-weighted L_{eq} which is referred to as the 'equivalent continuous noise level' and is a measure of the total sound energy generated by a fluctuating sound signal within a given time period.