

**Proposed Installation of
Mechanical Plant**

**9 Harley Road,
London, NW3 3BX**

Environmental Noise Assessment

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Doc Ref: 102977.ph.Issue2



Environmental Noise Assessment Proposed Installation of Mechanical Plant	
Project Address:	9 Harley Road London NW3 3BX
Project Reference:	102977

Issue/Revision Record			
Issue:	Date:	Remarks:	Author:
1	03/12/2015	First Issue	Phil Huffer
2	19/03/2020	New survey data, revised noise policy	Phil Huffer

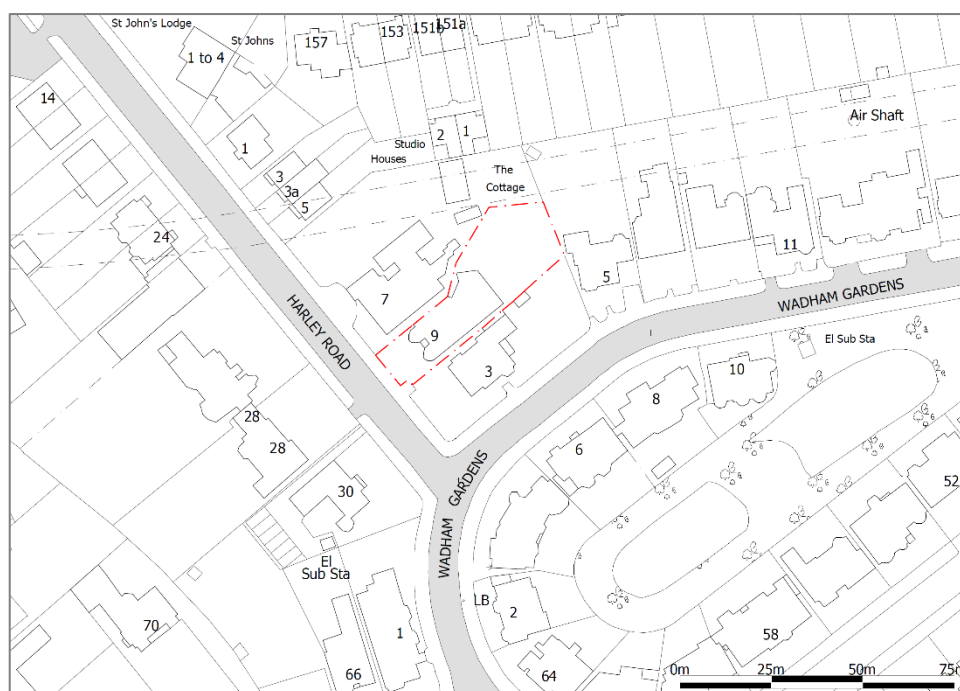
	Signature:	Print:	Title:	Date:
Author:		Phil Huffer	Principal Consultant	19/03/2020
Reviewer:		Andy Dodd	Consultant	19/03/2020

1. INTRODUCTION

- 1.1 Acoustics Plus Ltd (APL) is an independent firm of multi-disciplinary acoustic engineers. APL is engaged by both private and public sector clients. APL is a registered member of The Association of Noise Consultants (ANC) and the author is a corporate member of The Institute of Acoustics (IOA).
- 1.2 APL has been instructed by the Applicant's architect, SHH Architects, to consider and advise upon the noise implications of a proposed installation of mechanical plant.
- 1.3 The property will require the installation of a number of ventilation systems. The main items of plant will be located in a basement plant room which will also contain a number of water cooled condenser units.
- 1.4 It is understood the Local Planning Authority (LPA) require further information on noise levels from the proposed installation in order to fully assess the noise impact upon the surrounding neighbourhood. This report provides the response to the LPA, on behalf of the Applicant.

2. BASELINE SITUATION

- 2.1 The Application Site (the "site") is situated at 9 Harley Road. The site and its surroundings can be seen in Figures 1 to 10. A site location plan is shown below.



Site location plan

- 2.2 It is understood that it is the intention to extensively refurbish the house on the site. It is proposed to submit a planning application to Camden Council outlining the proposals which will include some extensive structural alterations to the existing house and the provision of a subterranean level which will feature a playroom, gym, steam room, guest bedroom, utility room and plantroom.
- 2.3 The house will require the installation of a number of items of mechanical plant to provide heating/cooling and ventilation of habitable spaces as required. It is the intention to locate the required mechanical plant in a basement plant room.
- 2.4 The basement plant room will be naturally ventilated through acoustic louvres into a lightwell in the rear garden. Additional extract ventilation will be provided by a plant room vent fan. The location of the plant room is shown in Diagram 1 with the ventilation openings shown in Diagram 2 overleaf.
- 2.5 The nearest noise sensitive façades to the ground floor ventilation openings of the plant room will be the ground floor rear windows of No.7 Harley Road immediately adjacent to the site (see Figure 6 and 9) and the rear windows of 3 Wadham Gardens (see Figure 8).
- 2.6 The operational hours of the proposed mechanical plant for the property will be on a demand basis during residential use (at any time).
- 2.7 Information in regard of the main items of mechanical plant serving the house has been provided by ME7 Ltd (a copy of the data sheets are provided in Appendix A). The units are itemised below. The equipment schedule is indicative and will be formalised during the detailed design stage of the project.
- (a) 2x PQRY P250 Mitsubishi WR2 @ 49dBA @ 1m
 - (b) 2x Broag Remeha Quinta PRO 65 @ 45dBA @ 1m
 - (c) Small circulators Grundfoss Magna 3D twin @ 43dBA @ 1m
 - (d) Water booster set – twin pump 65dBA @ 1m
 - (e) 1x Plant vent fans (S&E) – Acoustic Minibox200 40dBA @ 1m
- 2.8 The house will also include small localised domestic extract ventilation systems for bathrooms and en-suites. These will not be considered in detail but will include atmosphere attenuators on each duct run.

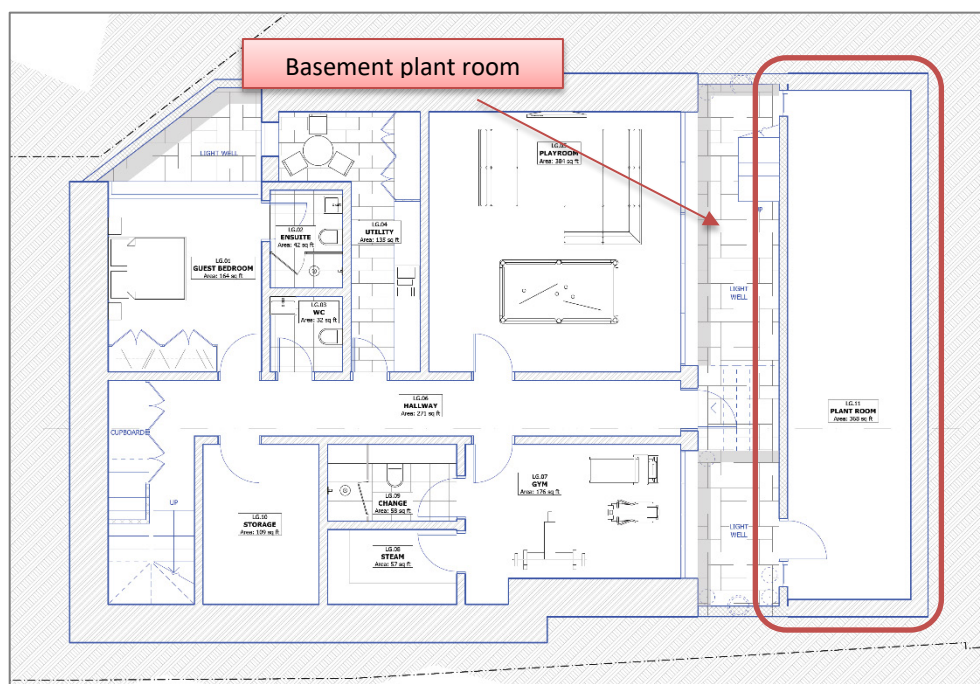


Diagram 1

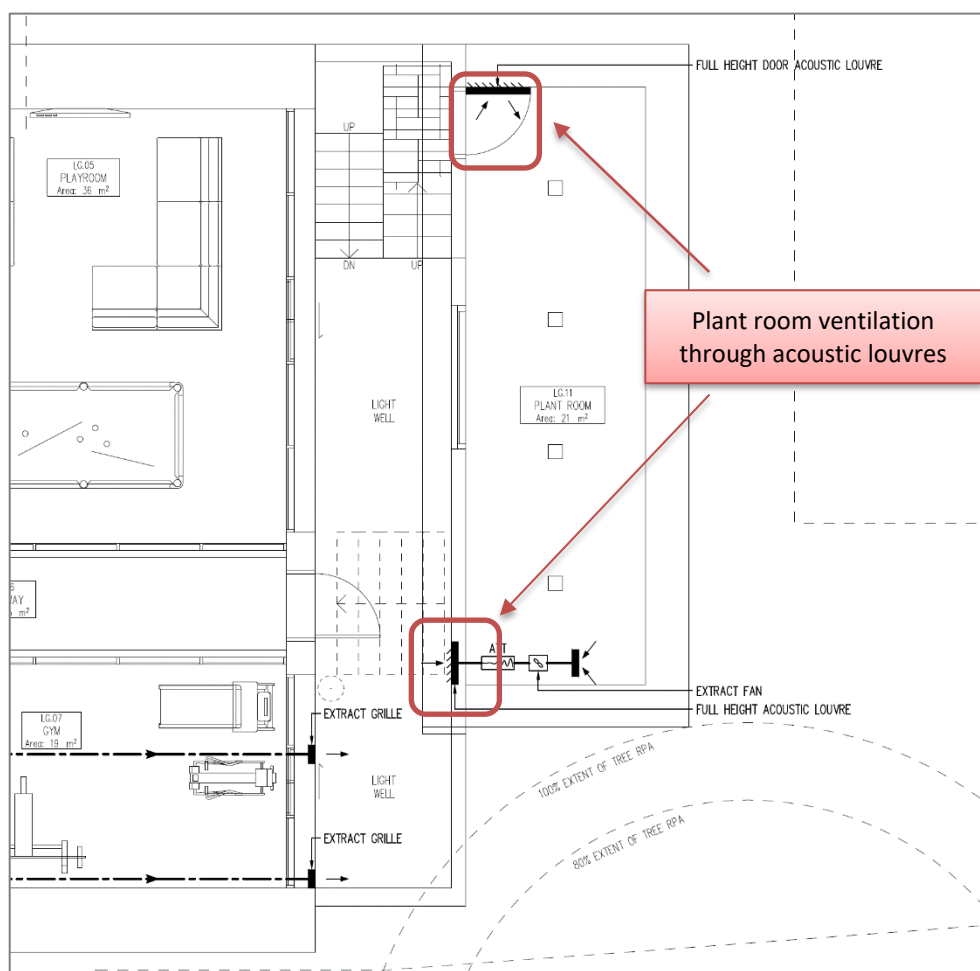


Diagram 2

3. NOISE OUTLINE

- 3.1 In order to produce an environmental noise assessment, consideration must be given to the prevailing background noise in the locality of the installation. Measurements of background noise were obtained over a 24 hour period at a location deemed representative of background noise levels experienced at the nearest noise sensitive façade.
- 3.2 The measurements obtained during the exercise were undertaken in the rear garden of 9 Harley Road. The main source of ambient noise was traffic noise along Harley Road and Wadham Gardens. The ambient noise climate throughout the day and night period was considered to be particularly low for an urban area.
- 3.3 The particulars of the measurement exercise are recorded below:
- Date: 18th – 19th March 2020
Start Time: 12:00 hrs
Location: rear garden, 9 Harley Road, London, NW3
- 3.4 The weather conditions were considered appropriate to monitor environmental noise. The weather conditions were obtained from www.wunderground.com
- 3.5 Minimum background and average noise levels are shown in Table 1 below. The level vs time history for the time period is shown in Diagram 3 (L_{Aeq} and L_{A90}).

WHO period	Lowest L _{A90,15min}	Average L _{Aeq,T}
07:00-19:00hrs	41	56
19:00-23:00hrs	35	43
23:00-07:00hrs	32	49

Table 1

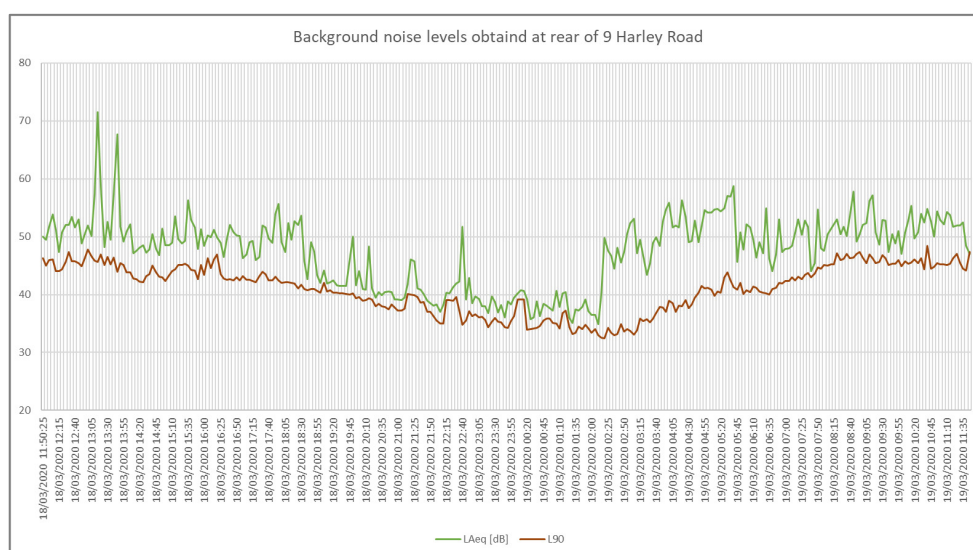


Diagram 3

4. DESIGN CRITERIA

- 4.1 Information regarding the noise levels not to be exceeded by the proposed installation was extracted from the LPA (London Borough of Camden) Local Plan Adopted version June 2017 (Appendix 3 Noise thresholds).

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dB L _{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L _{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dB L _{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

- 4.2 Since the Camden Local Plan was issued, BS4142:2014 has been revised with additional explanatory information. BS 4142:2014+A1:2019 primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific' sound from the proposed development) at residential NSRs (noise sensitive receptors).
- 4.3 The specific sound level may then be corrected for the character of the sound (e.g. perceptibility of tones and/or impulses), if appropriate, and it is then termed the rating level, whether or not a rating level penalty is added.
- 4.4 The 'residual' sound is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
- 4.5 The specific sound levels should be determined separately in terms of the LAeq,T index over a period of T = 1-hour during the daytime and T = 15-minutes during the night-time. For the purposes of the Standard, daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours.
- 4.6 BS 4142:2014 requires that the background sound levels adopted for the assessment be representative for the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated. However, the Standard states that there is no 'single' background sound level that can be derived from these measurements.
- 4.7 BS 4142:2014+A1:2019 states that measurement locations should be outdoors, where the microphone is at least 3.5 m from any reflecting surfaces other than the ground and, unless there is a specific reason to use an alternative height, at a height of between 1.2 m and 1.5 m above ground level. However, where it is necessary to make measurements above ground floor level, the measurement position, height and distance from reflecting surfaces should be reported, and ideally measurements should be made at a position 1 m from the façade of the relevant floor if it is not practical to make the measurements at least 3.5 m from the façade.
- 4.8 The background noise levels were assessed using statistical analysis of the measured data, as directed in BS4142. The histogram can be seen in Diagram 3 and shows the statistical analysis of the background noise level that would occur during the operational hours of the plant (at any time).
- 4.9 With regards to the rating correction, paragraph 9.2 of BS 4142:2014+A1:2019 states:

"Consider the subjective prominence of the character of the specific sound at the noise sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention"

- 4.10 The commentary to paragraph 9.2 of BS 4142:2014+A1:2019 suggests the following subjective methods for the determination of the rating penalty for tonal, impulsive and/or intermittent specific sounds:

Tonality

- 4.11 For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a rating penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.
- 4.12 If the subjective method is not sufficient for assessing the audibility of tones in sound or the prominence of impulsive sounds, BS4142:2014 suggests using the one-third octave method and/or the reference methods, as appropriate.
- 4.13 The $\frac{1}{3}$ octave method tests for the presence of a prominent, discrete-frequency spectral component (tone) and typically compares the LZeq,T sound pressure level averaged over the time when the tone is present in a $\frac{1}{3}$ octave band with the time-average linear sound pressure levels in the adjacent $\frac{1}{3}$ octave bands. For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level in the $\frac{1}{3}$ octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent $\frac{1}{3}$ octave bands by some constant level difference. The level differences between adjacent $\frac{1}{3}$ octave bands that identify a tone are:
- 15 dB in the low-frequency one-third-octave bands (25Hz to 125Hz);
 - 8 dB in the middle-frequency one-third-octave bands (160Hz to 400Hz);
and
 - 5 dB in the high-frequency one-third-octave bands (500Hz to 10,000Hz).

Impulsivity

- 4.14 A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Intermittency

- 4.15 When the specific sound has identifiable on/off conditions, the specific sound level should be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Other Sound Characteristics

- 4.16 Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.
- 4.17 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the Standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance. Typically, the greater this difference, the greater is the magnitude of the impact:
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
 - *difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
 - *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.*
- 4.18 The background noise levels vary during the day and night period when the mechanical plant would be operational. The most commonly occurring background noise level during the more sensitive night period (at the rear of the site) was 33dB LA90,15min.

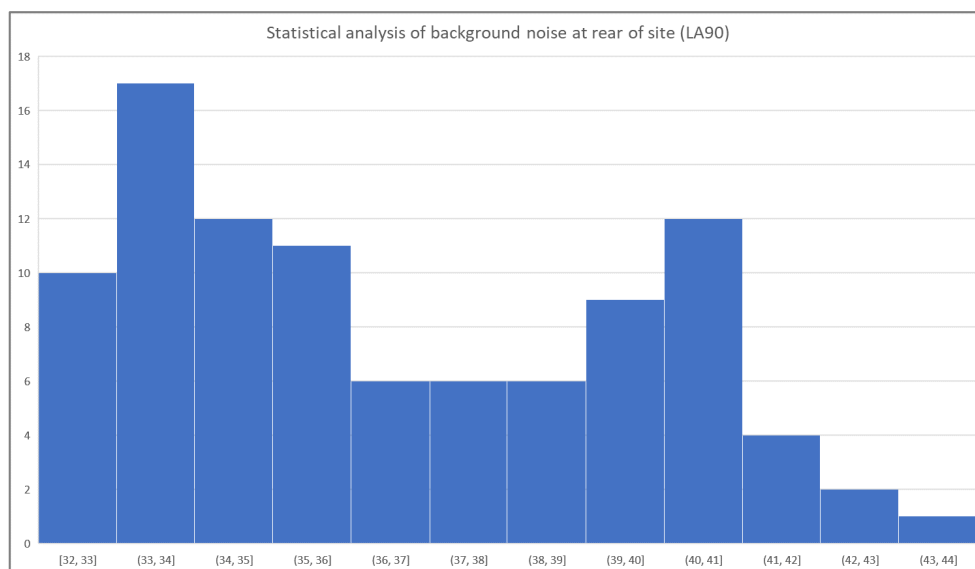


Diagram 4

- 4.19 The plant noise emission criteria that should not be exceeded is therefore based on Diagram 4 and is shown in Table 2 below. This level should not be exceeded at the nearest noise sensitive façade and is indicative of being 10dB less than the considered measured background noise. At such a level, there is an indication that the specific sound source will have a low impact.

Noise emission rating limit for mechanical plant
Rear of site $L_{Aeq} \leq 23dB$

Table 2

5. EQUIPMENT

- 5.1 All measurements were obtained using the following equipment:

- Svantek Class 1 Sound Level Meter Type 958
Serial No. 45530
- Rion Calibrator Type NC-74 Class 1
Serial No. 00410215

- 5.2 The relevant equipment carries full and current traceable calibration. The equipment, where necessary, was calibrated prior to and after the measurements were carried out.

6. CALCULATIONS

6.1 A prediction exercise was undertaken. The calculation exercise utilised information provided by equipment manufacturers (copy of the data sheets are provided in Appendix A).

6.2 The noise impact from the noise egress of mechanical plant located within the basement plant room was considered. The following impacts were considered:

- (a) *Noise Impact A – noise egress of extract fan through ductwork*
- (b) *Noise Impact B – noise egress of plant through extract duct*
- (c) *Noise Impact C – noise egress of plant through acoustic louvres*

Noise Impact A

6.3 Consideration was given to the noise produced by the plantroom extract fan and its egress through the ductwork system. Throughout the calculation exercise, guidance and formula were extracted from the publication “*Noise Control in Building Services*” (published by SRL).

6.4 The ductwork system attenuation was calculated by considering the attenuation of sound energy produced by each component of the ductwork system. The predicted level at the nearest noise sensitive façade was calculated by also considering distance attenuation from the location of the louvre to the nearest noise sensitive façade and building edge diffraction.

6.5 The calculation exercise provided the following results. A full set of calculations is shown in Appendix C.

Plantroom LG.11 Extract fan	Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Noise from extract fan	21	25	22	5	0	0	1	0	16

Table 3

Noise Impact B

6.6 Consideration was also given to the reverberant sound level within the plantroom endeavouring to enter the plant room extract grilles and then propagation through the duct work system. This was then added to the noise level from the plant room vent fan that was also propagated through the ductwork system.

- 6.7 The sound power level entering the grilles is given by:

$$L_w \text{ (total)} = L_w \text{ (reverberant)} + L_w \text{ (direct)} \text{ dB}$$

Where: $L_w \text{ (reverberant)} = L_p \text{ (reverberant)} + 10\log_{10}A - 6 \text{ dB}$

And: $L_w \text{ (direct)} = L_p \text{ (direct)} + 10\log_{10}A \text{ dB}$

- 6.8 The calculation exercise provided the following results. A full set of calculations is shown in Appendix C.

Plantroom LG.11	Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Noise through duct	16	11	7	0	0	0	0	0	8
Noise from extract fan	21	25	22	5	0	0	1	0	16
TOTAL at neighbour	22	25	22	6	3	3	4	3	17

Table 4

Noise Impact C

- 6.9 In considering the propagation of noise from the plant room, consideration was given to attenuation through the louvred openings to the garden lightwell and propagation to the nearest noise sensitive window. The following formulas were utilised:

$$L_p = L_w + 10\log_{10}T - 10\log_{10}V + 14$$

Where L_p is the reverberant sound pressure level in the plantroom
 L_w is the sound power level of the basement plant equipment
 T is the plantroom reverberation time, s
 V is the plantroom volume, m³

$$L_{p_2} = L_{p_1} - R - 6$$

Where L_{p_2} is the sound pressure level close to the louvre on the outside
 L_{p_1} is the reverberant sound pressure level in the plantroom
 R is the sound reduction index of the acoustic louvre

- 6.10 The calculation exercise provided the following results. In order to meet the LPA requirements, a plantroom wall lining panel (datasheet in Appendix A) has been used to minimise the reverberation within the plant room.
- 6.11 The total attenuation was calculated by considering distance attenuation from the location of the louvre to the nearest noise sensitive façade.

- 6.12 The sound reduction index of the acoustic louvre was extracted from manufacturer's data as follows:

Louvre type	Transmission Loss Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Gilberts ALS/30	-6	-7	-9	-12	-19	-22	-17	-15

Table 5

- 6.13 The calculation exercise can be shown as follows:

All plant room equipment	Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Mitsubishi PQRY-P250	65	53	51	44	36	34	33	35	47
2No. PQRY-P250	68	56	54	47	39	37	36	38	50
Groundfos Magna 3D	61	49	47	40	32	30	29	31	43
Water booster set	72	60	58	51	43	42	40	42	55
Plant vent fan	58	46	44	37	29	27	26	28	40
TOTAL plant room noise	74	62	60	53	45	43	42	44	56
TOTAL plant room noise L_w	85	73	71	64	56	54	53	55	67
Reverberant level in LG.11	78	67	65	58	50	48	47	49	61
R_w acoustic louvre	-6	-7	-9	-12	-19	-22	-17	-15	18
Building edge diffraction	-5	-5	-5	-5	-5	-5	-5	-5	
Distance attenuation	-22	-22	-22	-22	-22	-22	-22	-22	
Level at façade	40	27	23	13	0	0	0	1	19

Table 6

- 6.14 For the purposes of the calculations shown in Table 6, it has been assumed that the Water Booster sets will be contained within proprietary enclosures affording 10dB attenuation.

- 6.15 The following corrections were accounted for to determine a rating level:

Results	Correction	Relevant clause	Commentary
On time correction	-3dB	7.3.14	The equipment is likely to switch on and off as required on a demand for cooling basis. The condenser is assumed to be operating for half the assessment period
Acoustic feature corrections	+2dB	9.2	Just perceptible tonality
	+3dB	9.2	Readily distinctive intermittency

Table 3

- 6.16 In order to comply with the requirements of the LPA, any noise from the proposed installation of the mechanical plant should not exceed a level of 23 dBA (10dB below the lowest measured background noise over the operational hours of the plant).

- 6.17 The combined calculated noise impact is 21dBA. The rated noise level with the BS4142 acoustic feature corrections is 23dBA. The calculation demonstrates that the noise egress meets the LPA criteria.

7. CONCLUSION AND MITIGATION MEASURES

- 7.1 The foregoing assessment indicates that the proposed installation of mechanical plant will meet the requirements imposed by the LPA as set out in their Local Plan Adopted version June 2017 (Appendix 3 Noise thresholds). Further mitigation measures other than those detailed in this design report will not be required.
- 7.2 In order to meet the requirements the following mitigation measures will need to be incorporated:
- (a) *The plant room walls will be lined with a plant room wall lining system (such as CMS plant room wall liners) to ensure the noise within the plant room is not increased due to reverberant sound.*
 - (b) *The plant room extract fan features in line attenuation on atmosphere exhaust ducts.*
 - (c) *The water booster set is located within an acoustic enclosure.*
 - (d) *Acoustic louvres located in the garden lightwell openings are based on Gilberts Series ALS/30 louvres.*
- 7.3 Where alternative manufacturers of plant and attenuation are used, the data should be checked to ensure it meets the relevant requirements.
- 7.4 It is recommended that all plant and machinery is mounted on anti-vibration mounts to minimise the transmission of structure borne sound.

Figures

9 Harley Road, London, NW3



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10

Appendix A

- 100mm - 315mm diameter spigot sizes
- Volume flow up to 0.42m³/s
- Static pressures up to 710 Pa
- Low profile unit, robust construction
- Easy installation, suitable for wall or ceiling mounting

- Models 100mm to 150mm with forward curved and 200mm to 315mm with backward curved impellers
- Operation up to 75°C (depending on model)
- Integral capacitor, fitted in side T/box

MiniBox

Boxed Fans



Introduction

Often modern building designs restrict the space available to install ventilation equipment. In these situations the size of the ductwork is limited and often the fan itself has to be mounted in ceiling voids close to the building occupants. These restrictions mean that fans need to be compact, reliable and quiet in operation.

The Fläkt Woods MiniBox units have been specifically designed to meet these requirements. The MiniBox offers an extremely compact single fan unit suitable for installation in the most confined situations.

Sizes

Mini 100, Mini 125, Mini 150, Mini 200, Mini 250, Mini 300, Mini 315.

Construction

Casings are manufactured from pre-galvanised sheet steel and are carefully designed to provide a strong and rigid casing. MiniBox units are provided with pre-formed circular inlet and outlet spigots and are unlined. An integral fixing bracket with key hole slots is provided offering easy installation.

Motors

The motor is mounted within the centrifugal impeller to form a compact unit, powered by a single phase 220-240V, 50Hz motor, giving silent and virtually vibration free running, operating at temperatures of up to a maximum of between 55°C and 75°C (depending on model). All motors are manufactured in accordance with BS5000 and incorporate thermal overload protection, they are maintenance free, with sealed for life bearings offering an expected life L10 of 40000 hours.

Electrical Supply

220 - 240V / 50Hz / 1 φ

Wiring/Controls

All units are fully speed controllable using Fläkt Woods standard speed controllers. MiniBox and units are fitted with a surface mounted Terminal box.

Servicing

The fan assembly can be easily removed from the casing for cleaning and maintenance purposes, with the swing access.

Accessories

Speed controllers, Changeover panels and run on timers, Electric heater batteries, Panel filter cassettes, non return dampers, silencers, flexible connectors and solid duct fasteners. For a full range please see pages 100-101.

Mounting

Suitable for both horizontal and vertical mounting.

Application Guide

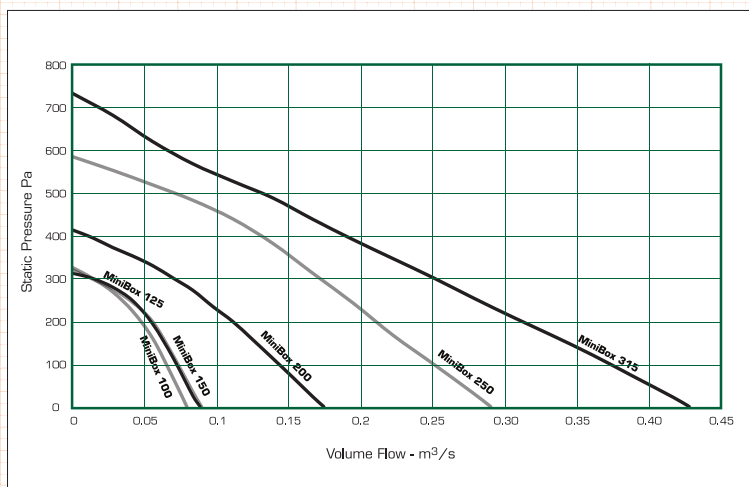


MiniBox

Boxed Fans

Super
EXPRESS
Range

Performance Data



Sound Data

Product Code	Speed (rev/min)	Sound Power Levels (dB) In Octave Band Centre Frequency - Hz							Total dBA @ 3m
		125	250	500	1K	2K	4K	8K	
Mini 100	2330	70	61	54	53	51	51	48	39
Mini 125	2280	69	65	57	54	53	52	49	41
Mini 150	2300	67	67	58	54	53	53	50	42
Mini 200	2520	69	68	68	59	57	55	47	47
Mini 250	2530	76	74	70	64	61	61	57	51
Mini 315	2270	74	74	69	65	64	62	58	51

Electrical Data

Product Code	Speed (rev/min)	Product Number	220-240V/50Hz/1ø					m³/s @ Pa (Static)															
			Motor Rating (kW)	Full Load Current (at 230V) (A)	Starting Current (at 230V) (A)	Wiring Diagram	Speed Controller	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	
																							Transformer
Mini 100	2330	DC100211	0.090	0.4	0.48	CDWMBO	MT1.1.5	0.08	0.072	0.064	0.057	0.047	0.034	0.014									
Mini 125	2280	DC125211	0.095	0.41	0.5	CDWMBO	MT1.1.5	0.088	0.078	0.071	0.063	0.054	0.04	0.012									
Mini 150	2300	DC150211	0.095	0.41	0.5	CDWMBO	MT1.1.5	0.089	0.08	0.072	0.064	0.055	0.39	0.012									
Mini 200	2520	DC200211	0.095	0.41	0.5	CDWMBO	MT1.1.5	0.173	0.157	0.143	0.126	0.11	0.092	0.068	0.042	0.1							
Mini 250	2530	DC250211	0.190	0.83	1.4	CDWMBO	MT1.1.5	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.07	0.03				
Mini 315	2270	DC315211	0.290	1.3	2.0	CDWMBO	MT1.5	0.43	0.40	0.37	0.34	0.31	0.28	0.25	0.22	0.19	0.16	0.13	0.09	0.06	0.04	0.02	0.01

Performance tested in accordance with DIN 24163, noise levels to DIN 45635. Sound pressure levels quoted are average dBA at 3m distance over a sphere, under free field conditions and are presented for comparative purposes only.

Sound power levels are non-ducted, measured at mid point on the fan characteristic. **Bold text denotes Super Express Product, next day delivery available if ordered by 4pm.**

The fan noise levels shown are for the specified operating point. When an electronic controller is incorporated, a magnetic noise (enhanced motor noise) can occur - particularly if the fan is operating at speeds well below maximum. For noise sensitive applications FWL recommend using an auto transformer speed controller.

Wiring diagrams can be found on page 65.

EXPRESS
RANGE

Telephone:
01206 222 555

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01206 222 905

Email:
fans.uk@flaktwoods.com

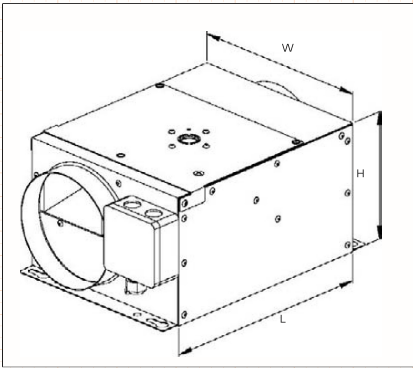
Express Website:
www.flaktwoods.com/express

Fan Selector:
www.flaktwoods.com/fanselector

BOX

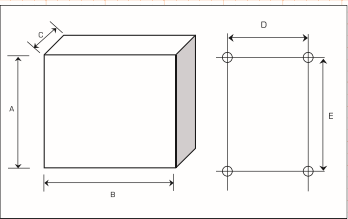
63

Dimensions



MiniBox
Boxed Fans

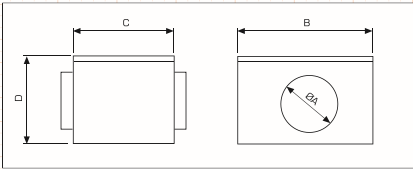
Transformer Speed Controller



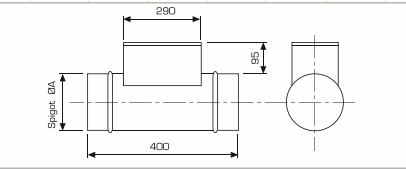
Product Code	L	W	H	Conduit	Weight (kg)
Mini 100	300	248	170	M20	5.3
Mini 125	300	248	170	M20	5.3
Mini 150	300	248	170	M20	5.3
Mini 200	400	353	231	M20	8.8
Mini 250	400	353	280	M20	10.5
Mini 315	400	402	345	M20	12.9

Type	Number Product	A	B	C	D	E	Max. Weight (kg)
MT1.1.5	402008	205	115	100	98	140	2.1
MT1.5	423099	255	170	140	155	194	5.5

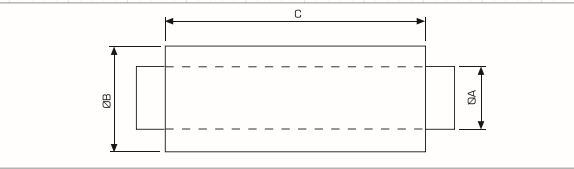
Panel Filter



Electric Heater Battery



Silencer



Note: There are no Panel Filters or Electric Heater Battery for the Mini 100 Unit, if you require these please select a 125mm fan.

Product Code	Product Number	sA	B	C	D	Weight (kg)	Press. loss Pa @ Mid flow
WCF-125	DH125001	125	200	122	200	3	16
WCF-150	DH150001	150	200	122	200	2	28
WCF-200	DH200001	200	245	122	245	3	48
WCF-250	DH250001	250	295	122	295	4	68
WCF-315	DH315001	315	345	122	345	5	111
WCF-355	DH355001	355	395	122	395	6	121
WCF-400	DH400001	400	445	122	445	8	77
WCF-500	DH500001	500	600	400	600	20	78

Accessories are fitted to units using Solid Duct Fasteners (SDF - Size).

Where Panel Filters/Electric Heater Batteries are required for Mini 100, please use spigot size 125mm (i.e. Mini 125).

Product Code	Product Number	sA	Weight (kg)	Press. loss Pa @ Mid flow	Min Airflow m ³ /s
WEHB-125/1kW	DH125051	125	4	5	0.03
WEHB-150/1.5kW	DH150051	150	4	15	0.04
WEHB-200/2kW	DH200051	200	6	15	0.07
WEHB-250/2.5kW	DH250051	250	7	20	0.1
WEHB-315/3kW	DH315051	315	8	30	0.16
WEHB-355/3kW	DH355051	355	10	30	0.2
WEHB-400/9kW	DH400051	400	11	22	0.26
WEHB-500/18kW	DH500051	500	16	20	0.4

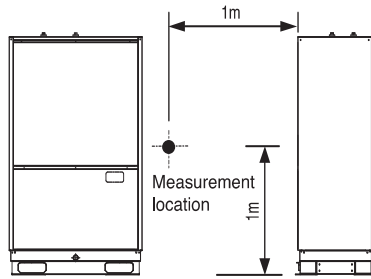
Heaters 9kW and above are made of 3kW elements therefore can be connected to 3 Ø supply.

Product Code	Product Number	Acoustic Performance (dB) Octave Band Centre Frequency - Hz							Dimensions			
		63	125	250	500	1K	2K	4K	Ø A	Ø B	C	Weight (kg)
S100	DH100061	3	8	13	25	40	50	40	100	200	600	4.8
S125	DH125062	2	7	12	23	39	47	32	125	225	600	5.2
S150	DH150062	3	4	8	21	37	40	22	150	250	600	6.3
S200	DH200062	2	4	8	20	31	32	20	200	300	600	7.5
S250	DH250062	1	2	6	15	27	25	15	250	355	900	9.3
S315	DH315062	3	3	7	12	17	14	11	315	415	900	12.7

MiniBox fans now supplied with connection cable and plug & socket for ease of connection.

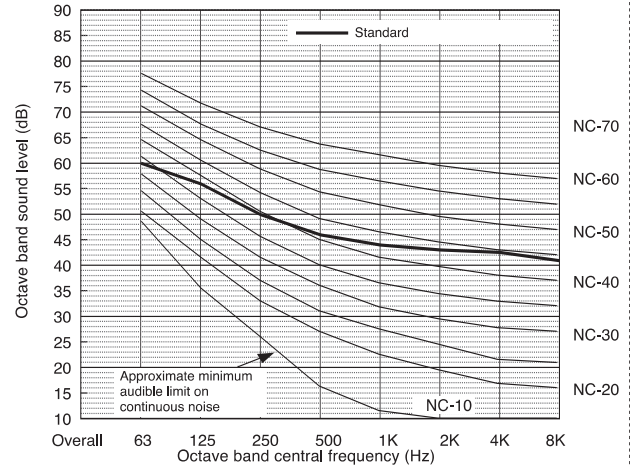
All dimensions shown in mm.

Measurement condition PQRY-P200,250YGM PQRY-P400,500YSGM



Sound level of PQRY-P400YSGM-A

Ref. : PQRY-P400YSGM-WYNB0-5119

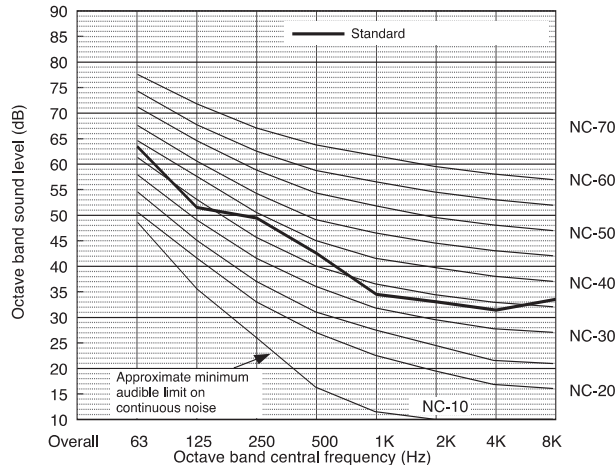


		63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	dB(A)
Standard	50Hz	60.0	56.0	50.0	46.0	44.0	43.0	42.5	41.0	51.0
	60Hz	60.0	56.0	50.0	46.0	44.0	43.0	42.5	41.0	51.0
Night mode	50/60Hz	-	-	-	-	-	-	-	-	-

* When Night Mode is set, the A/C system's capacity is limited. The system could return to normal operation from Night Mode automatically in the case that the operation condition is severe.

Sound level of PQRY-P200YGM-A

Ref. : PQRY-P200YGM-WYNB0-5115

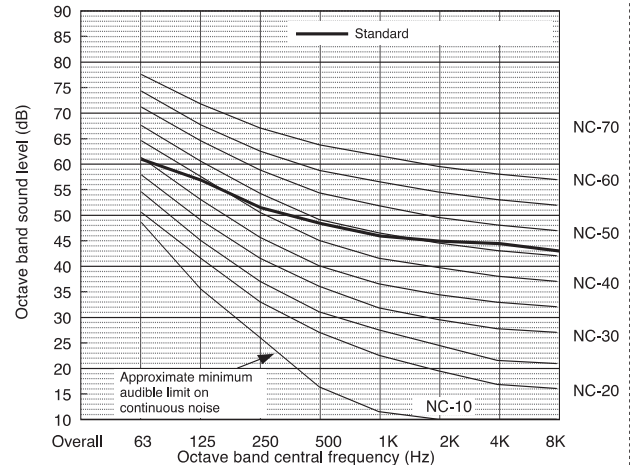


		63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	dB(A)
Standard	50Hz	63.5	51.5	49.5	42.5	34.5	33.0	31.5	33.5	46.0
	60Hz	63.5	51.5	49.5	42.5	34.5	31.5	31.5	33.5	
Night mode	50/60Hz	46.0	-	-	-	-	-	-	-	-

* When Night Mode is set, the A/C system's capacity is limited. The system could return to normal operation from Night Mode automatically in the case that the operation condition is severe.

Sound level of PQRY-P500YSGM-A

Ref. : PQRY-P500YSGM-WYNB0-5120

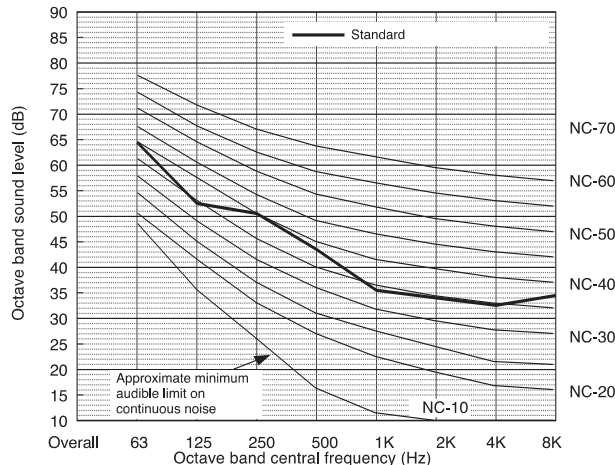


		63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	dB(A)
Standard	50Hz	61.0	57.0	51.5	48.5	46.0	45.0	44.5	43.0	53.0
	60Hz	61.0	57.0	51.5	48.5	46.0	45.0	44.5	43.0	53.0
Night mode	50/60Hz	-	-	-	-	-	-	-	-	-

* When Night Mode is set, the A/C system's capacity is limited. The system could return to normal operation from Night Mode automatically in the case that the operation condition is severe.

Sound level of PQRY-P250YGM-A

Ref. : PQRY-P250YGM-WYNB0-5116



		63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	dB(A)
Standard	50Hz	64.5	52.5	50.5	43.5	35.5	34.0	32.5	34.5	47.0
	60Hz	64.5	52.5	50.5	43.5	35.5	34.0	32.5	34.5	
Night mode	50/60Hz	47.0	-	-	-	-	-	-	-	-

* When Night Mode is set, the A/C system's capacity is limited. The system could return to normal operation from Night Mode automatically in the case that the operation condition is severe.



Type ALS/30

Single Bank 300mm deep

Type ALS is our most effective single bank acoustic design with a full 300mm depth with this extra bulk providing a strong acoustic performance with a typical weighted SRI of 18 dBA

With a recessed frame as standard a flange border alternative can also be specified along with other features such as Birdguard and Insect screen accessories.

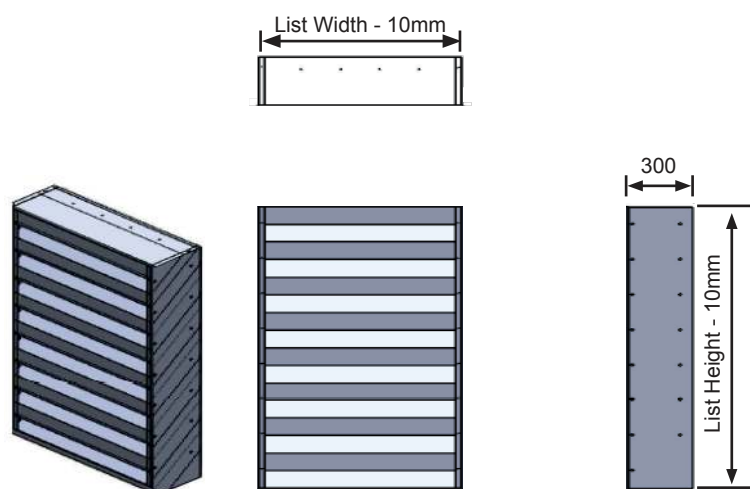
Dimensions: Specify the aperture size as List Width by Height (mm). We will provide a unit with an overall size that is 10mm less all round than list size in order to provide builders work clearance.

Size Range: Single units up to 1440 wide and 2940 high with a weight limit of 50kg per section.

Fixing: Casing sides are provided with 11mm dia holes for fixing louvre into opening. These holes also allow fixing of adjacent sections on multiple units.

Material: Standard construction is galvanised mild steel. Aluminium or stainless steel optionally available.

Finish: Standard finish is mill finish (unpainted). Polyester powder coat to BS or RAL colour optionally available.



Model	63	125	250	500	1k	2k	4k	8k	RW
ALS/30	6	7	9	12	19	22	17	15	18
Face Velocity	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5
Pressure Drop	3	7	12	18	26	35	46	58	71
Weight	41kg/m2				Visual Profile:				
Visual Free Area	50%				Blade = 100mm				
Actual Free Area	34%				Airway = 100mm				

Appendix B

CONTRACT TITLE: 9 Harley Road, London, NW3
SOUND SOURCE: Plant room LG.11 Equipment through supply duct
MAKE & TYPE: n/a

OVERALL Lw					OCTAVE BAND CENTRE FREQUENCY (Hz)								
					63	125	250	500	1k	2k	4k	8k	dBA
1	UNIT Lw												
2					68	60	59	54	49	48	46	43	57
3													
4													
5					LENGTH (m)	C or R	x (mm)	x (mm)					
6	2.00	C	200-400		0.14	0.20	0.20	0.32	0.46	0.46	0.46	0.46	
7	0.50	C	200-400		0.04	0.05	0.05	0.08	0.12	0.12	0.12	0.12	
8													
9													
10													
11													
12													
13													
14													
15													
16	BENDS												
17	NUMBER	TYPE	SIZE (mm)										
18	1	90	0250-0300		0.00	0.00	1.00	7.00	7.00	4.00	3.00	3.00	
19													
20													
21													
22													
23													
24													
25	BRANCHES & DUCT X-SECTIONAL AREAS												
26													
27													
28													
29													
30													
31													
32													
33	OTHER ATTENUATION												
34	In line attenuator				3	3	7	12	17	14	11	11	
35	Building edge diffraction				10	10	10	10	10	10	10	10	
36	Gilberts Series ALS/30 louvre				6	7	9	12	19	22	17	15	
37													
38	END REFLECTION SIZE (mm)												
39	500mm				10	5	2	1	0	0	0	0	
40													
41	Lw LEAVING SYSTEM				39	35	30	11	-5	-3	4	4	24
42	Room Volume (m³)			10000	-26	-26	-26	-26	-26	-26	-26	-26	
43	Mid-Frequency RT (s)			0.5	-3	-3	-3	-3	-3	-3	-3	-3	
44	REVERBERANT SPL				10	6	1	-18	-34	-32	-25	-25	-5
45	Distance to Listener			8	-29	-29	-29	-29	-29	-29	-29	-29	
46	Directivity (flush/corner)			0.04	4	4	5	6	7	8	9	9	
47	DIRECT SPL				14	10	6	-12	-27	-24	-16	-16	0
48	RESULTANT TOTAL SPL				16	11	7	0	0	0	0	0	8
49	NR DESIGN CRITERION			20	51	39	31	24	20	17	14	13	
50	Additional Attenuation Required				0	0	0	0	0	0	0	0	

CONTRACT TITLE: 9 Harley Road, London, NW3
SOUND SOURCE: Plant room LG.11 extract fan
MAKE & TYPE: MiniBox 315

OVERALL Lw					OCTAVE BAND CENTRE FREQUENCY (Hz)								
					63	125	250	500	1k	2k	4k	8k	dBA
1	UNIT Lw												
2					74	74	74	69	65	64	62	58	72
3													
4													
5					LENGTH (m)	C or R	x (mm)	x (mm)					
6	2.00	C	200-400		0.14	0.20	0.20	0.32	0.46	0.46	0.46	0.46	
7	0.50	C	200-400		0.04	0.05	0.05	0.08	0.12	0.12	0.12	0.12	
8													
9													
10													
11													
12													
13													
14													
15													
16	BENDS												
17	NUMBER	TYPE	SIZE (mm)										
18	1	90	0250-0300		0.00	0.00	1.00	7.00	7.00	4.00	3.00	3.00	
19													
20													
21													
22													
23													
24													
25	BRANCHES & DUCT X-SECTIONAL AREAS												
26													
27													
28													
29													
30													
31													
32													
33	OTHER ATTENUATION												
34	In line attenuator				3	3	7	12	17	14	11	11	
35	Building edge diffraction				10	10	10	10	10	10	10	10	
36	Gilberts Series ALS/30 louvre				6	7	9	12	19	22	17	15	
37													
38	END REFLECTION SIZE (mm)												
39	500mm				10	5	2	1	0	0	0	0	
40													
41	Lw LEAVING SYSTEM				45	49	45	27	11	13	20	18	38
42	Room Volume (m³)			10000	-26	-26	-26	-26	-26	-26	-26	-26	
43	Mid-Frequency RT (s)			0.5	-3	-3	-3	-3	-3	-3	-3	-3	
44	REVERBERANT SPL				16	20	16	-2	-18	-16	-9	-11	9
45	Distance to Listener			8	-29	-29	-29	-29	-29	-29	-29	-29	
46	Directivity (flush/corner)			0.04	4	4	5	6	7	8	9	9	
47	DIRECT SPL				20	24	21	4	-11	-8	0	-2	14
48	RESULTANT TOTAL SPL				21	25	22	5	0	0	1	0	16
49	NR DESIGN CRITERION			20	51	39	31	24	20	17	14	13	
50	Additional Attenuation Required				0	0	0	0	0	0	0	0	