19 South Street, Mayfair, London

Environmental Noise Survey and Noise Impact Assessment Report
1294.01

Prepared for

Sam Famar
19 South Street
Mayfair
London

18 March 2021

By

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Acoustic Consultancy

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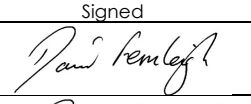
Undertaken and Prepared By		David Fernleigh Principal	MIOA
Checked By		David Fernleigh Principal	MIOA

1.0 Introduction

1.1 A new air conditioning and building services are proposed for the redevelopment of 19 South Street, Mayfair, London. The development site is in a residential area.

1.2 City of Westminster have standard plant noise emissions limits that should not be exceeded at any noise sensitive receptor location nearby.

1.3 dBA Acoustics have been commissioned to undertake a site survey and noise impact assessment in accordance with the Local Authority requirements.

1.4 This report concerns the assessment and/or control of atmospheric noise and/or vibration affecting neighboring noise sensitive property for the purposes of planning. Detailed mechanical, structural, H, S&E, conservation and legal considerations are beyond the expertise of this practice and should be dealt with by the relevant professional service providers.

1.5 Where sound pressure levels are quoted, they are in decibels ref: 2×10^{-5} Pa. Where sound power levels are quoted, they are in decibels ref: 1×10^{-12} W, unless otherwise indicated.

2.0 Summary

2.1 Environmental noise monitoring has been undertaken during a typical 24hour weekday period.

2.2 The prevailing ambient and background sound levels at site have been determined.

2.3 Plant noise emission limits to be achieved at the worst affected noise sensitive receptor(s), have been set based on the survey results and the requirements of the Local Authority.

2.4 Based on the proposed plant strategy the acoustic performance of mitigation measures has been specified such that the requirements of the Local Authority should be achieved.

2.5 The proposals are subject to the final approval of the Local Authority.

3.0 Site

3.1 The map below shows the location of the development site shown in the context of the general area.

Map Data © OpenStreetMap (north top of the page)

3.2 The existing site is basement plus 3 storeys and is bounded by residential property on all sides, the image below indicates the site boundary and noise monitoring positions:

Image Data © Google 2020 (north top of the page)

4.0 Survey

4.1 Environmental noise monitoring was undertaken for approximately 24 hours commencing approximately 11:00 on Tuesday 6 October 2020. The prevailing L_{Aeq}, L_{Amax} and L_{A90} levels were logged at 15minute intervals throughout the survey period. The following sound level meters and calibrator were deployed:

Table 1

1 / Front	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	29/01/2019			13/11/2019
Certificate No.	30778			U33334

Table 2

2 / Rear Terrace	SLM	Preamplifier	Microphone	Calibrator
Manufacturer	Norsonic AS	Norsonic AS	Norsonic AS	B&K
Type	140	1209	1225	4231
Serial No.	1405947	15793	355507	1839133
Latest Calibration	26/06/2020			13/11/2019
Certificate No.	35056			U33334

4.2 The calibration of the sound level meters used complies with IEC 61672-3:2006 class 1.

4.3 The monitoring positions were approximately as shown in the image in paragraph 3.2, above, and as detailed below:

- Position 1 sound level meter was installed in the front first floor living room. The microphone was fixed to a pole extended through a window positioned at a distance approximately 1m out from the façade. The position was chosen in order to approximate the prevailing noise levels at nearby receptors.
- Position 2 sound level meter was installed in the rear second floor external terrace. The microphone was pole mounted and fixed to the metal parapet railings at the building edge at a height of approximately 2m above the terrace floor level. The microphone was positioned away from significant reflecting surfaces. The position was chosen in order to approximate the prevailing noise levels at nearby receptors.

4.4 A proprietary windshields and extension cables were 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 greater than 0.1dB.

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

Table 3

Condition	Start	End
Wind Speed ms^{-1}	negligible	<1.8
Wind Direction (from)	n/a	north
Precipitation or Fog	no	no
Wet Ground	no	no
Frozen Ground or Snow	no	no
Temperature ° C	12	18
Cloud Cover %	80	60

4.6 It is understood the weather over the survey period was fair with no rain or strong winds.

4.7 During the manned periods at the beginning and end of the automated survey the prevailing ambient sound was dominated by distant traffic noise.

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

5.0 Results

5.1 Time history graphs presenting the automated environmental survey measurements can be found in the appendix. Full raw data is available upon request.

5.2 The following table provides a summary of the lowest prevailing L_{A90} background sound levels measured over the survey period at the monitoring position.

Table 4

Lowest Prevailing Background Sound Level dB		
Position	Time	Lowest Measured $L_{A90,15min}$
1, front	Daytime (07:00-23:00 hrs)	46.8
	Night time (23:00-07:00 hrs)	43.1
2, rear	Daytime (07:00-23:00 hrs)	44.4
	Night time (23:00-07:00 hrs)	42.8

5.3 The next table provides a summary of the prevailing day 12hrs, evening 4hrs and night time 8hrs L_{Aeq} ambient noise levels over the survey period:

Table 5

Prevailing Ambient Sound Level L_{Aeq} dB			
Position	Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)
1, front	63.3	58.4	56.6
2, rear	55.1	49.9	45.7

6.0 Criteria

6.1 It is understood that the City of Westminster requirements for new items of building services plant are as follows:

> *"POLICY ENV 7: CONTROLLING NOISE FROM PLANT, MACHINERY AND INTERNAL ACTIVITY*
>
> *(A) Where development is proposed, the City Council will require the applicant to demonstrate that this will be designed and operated so that any noise emitted by plant and machinery and from internal activities, including noise from amplified or unamplified music and human voices, will achieve the following standards in relation to the existing external noise level at the nearest noise sensitive properties, at the quietest time during which the plant operates or when there is internal activity at the development.*
>
> *1) where the existing external noise level exceeds WHO Guideline levels of LAeq,12hrs 55dB daytime (07.00- 19.00); LAeq,4hrs 50dB evening (19.00-23.00); LAeq,8hrs 45dB night-time (23.00- 07.00):*
>
> *either*
>
> *(a) and where noise from the proposed development will not contain tones or be intermittent sufficient to attract attention, the maximum emission level (LAeq15min) should not exceed 10 dB below the minimum external background noise at the nearest noise sensitive properties. The background noise level should be expressed in terms of LA90,15min.*
>
> *or*
>
> *(b) and where noise emitted from the proposed development will contain tones, or will be intermittent sufficient to attract attention, the maximum emission level (LAeq15min) should not exceed 15 dB below the minimum external background noise at the nearest noise sensitive properties. The background noise level should be expressed in terms of LA90,15min.*
>
> *2) where the external background noise level does not exceed the above WHO Guideline levels, policy ENV 7(A)(1)(a) and (b) will apply except where the applicant is able to demonstrate to the City Council that the application of slightly reduced criteria of no more than 5 dB will provide sufficient protection to noise sensitive properties:*
>
> *either*
>
> *(a) where noise emitted from the proposed development will not contain tones or be intermittent sufficient to attract attention, the maximum emission level (LAeq15min) should not exceed 5dB below the minimum external background noise level at the nearest noise sensitive properties. The background noise levels should be expressed in terms of LA 90, 15min.*
>
> *or*
>
> *(b) where noise emitted from the proposed development will contain tones or will be intermittent sufficient to attract attention, the maximum emission level (LAeq15min) should not exceed 10 dB below the minimum external background noise level at the nearest noise sensitive properties. The background noise levels should be expressed in terms of LA 90, 15min."*

6.2 At Position 1 the ambient background sound levels measured for the day, evening and night periods exceed the WHO guideline levels. At Position 2 the ambient background sound levels marginally exceed the WHO guideline level at night. Therefore,

assuming no noticeable noise characteristics are present, plant noise emissions should be designed to be at least 10dB below the lowest background L_{A90} at the nearest receptors.

6.3 Based on the prevailing measured noise levels and the above detailed requirements of the City of Westminster, noise emissions from the future plant should not exceed the following levels at the worst affected receptor:

Table 6

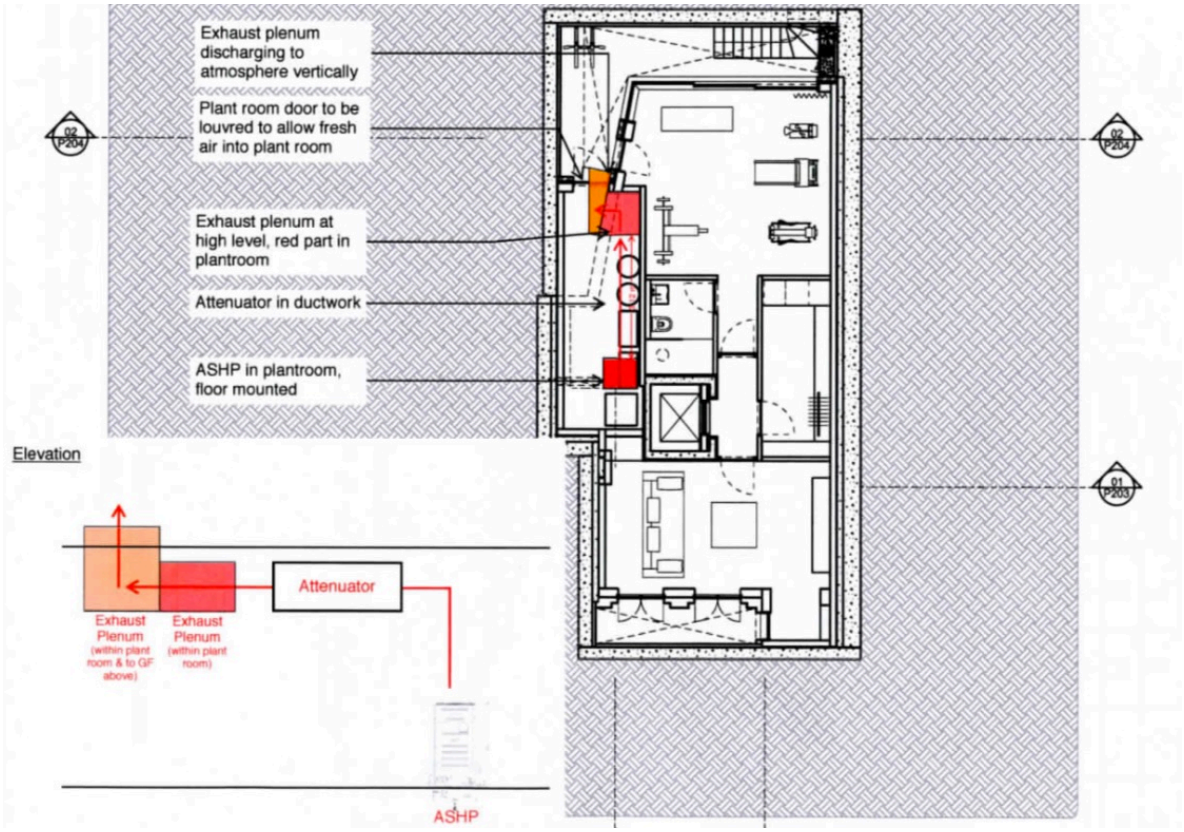
Plant Noise Emission Limits dB		
Position	Time	Limit at Receptor $L_{Aeq,15min}$
1, front	Daytime (07:00-23:00 hrs)	37
	Night time (23:00-07:00 hrs)	33
2, rear	Daytime (07:00-23:00 hrs)	34
	Night time (23:00-07:00 hrs)	33

6.4 Should the noise emissions exhibit tonal or other noise characteristics sufficient to attract attention then it is required that the above noise limits should be reduced by 5dB.

7.0 Proposed Arrangement

7.1 It is proposed to install a Samsung AM120JXVHGH/EU air source heat pump (ASHP) for 24hr operation. The manufacturers noise data for the unit is contained within the appendix. The unit has the capacity to run on any of 3 silent modes. It is proposed to limit the unit to run on silent mode 1(or quieter) the sound pressure level for which is 55 dB at 1m. Spectral data is also contained within the appendix.

7.2 The ASHP is proposed for installation within a basement plant room. Fresh air will enter the plantroom via a non-acoustic louvred plantroom door. It is proposed to duct the exhaust to a grille discharging vertically into the shared rear lightwell between nos. 17 and 19 South Street, at ground floor level, approximately 3m from the nearest neighbouring window. The proposed plant arrangement is as indicated in the excerpt from Totem Studio drawing no P001rev 02 shown below:



7.3 Preliminary calculations indicate that the ASHP requires mitigation in order to comply with the requirements of the Local Authority.

8.0 Mitigation

8.1 It is proposed to attenuate the emissions from the ducted exhaust such that they are more than 10dB lower than noise emissions from the ASHP otherwise breaking out from the plant room via the louvred door. As such, the ducted emissions should not be additive to the noise impact at the receptor. Accordingly, the table below provides the calculated minimum insertion loss requirements for the ducted exhaust. It is anticipated that this will require installation of an in-line attenuator that is approximately 2.4m long.

Table 7

Minimum Insertion Loss dB at Octave Band Centre Frequency Hz									
Item	63	125	250	500	1k	2k	4k	8k	Limiting face velocity
Extract exhaust	8	18	31	49	50	50	38	24	5.5m/s

8.2 In order to help control noise levels within the plant room the ceiling should be acoustically lined. The assessment herein has been calculated based on an area covered no less than 12m^2. The table below provides the minimum absorption coefficient acoustic performance of the plantroom lining. It is anticipated that this would require a stabilized non-migrating acoustic media that is at least 100mm thick (e.g. mineral wool):

Table 8

Absorbent Plantroom Lining Minimum Absorption Coefficient at Octave Band Centre Frequency Hz								
Item	63	125	250	500	1k	2k	4k	8k
12m^2	-	0.85	0.95	0.95	0.95	0.95	0.9	0.9

8.3 With the above mitigation installed, calculations indicate that noise emissions from the sides and casing of the ASHP, when operated in Silent 1 mode, would need to be reduced from 55dB at 1m to 39 dB at 1m, a reduction of 16dB. It is anticipated that this is likely to require full enclosure of the unit. The table below provides the limiting sound pressure level of the enclosed ASHP to be achieved at the given location.

Table 9

Enclosed ASHP Sound Pressure Level Limits dBA		
Location	Time	Limit
At 1m from enclosure assuming hemispherical radiation	24 hrs	39.0
Inside basement at louvred entrance door inc. 12m^2 plantroom lining	24 hrs	43.0

8.4 The equipment location is indirectly structurally linked to neighboring residential property. To avoid the likelihood of unwanted vibration from the equipment transmitting

into residential properties it is good practice and recommended that the equipment is suitably isolated from the supporting structure. The isolators should be installed within the enclosure in between the unit and the enclosure. All services to and from the unit should be flexible.

8.5 To assist in sourcing acoustic hardware conforming to the above performance requirements please refer to suitable suppliers contact information within the appendix.

9.0 Conclusion

9.1 Environmental noise monitoring has been undertaken during a typical 24hour weekday period.

9.2 The prevailing ambient and background sound levels at site have been determined.

9.3 Plant noise emission limits to be achieved at the worst affected noise sensitive receptor(s), have been set based on the survey results and the requirements of the Local Authority.

9.4 Based on the proposed plant strategy, the acoustic performance of mitigation measures has been specified such that the requirements of the Local Authority should be achieved.

9.5 The proposals are subject to the final approval of the Local Authority.

Report 1294.01
dBA Acoustics

Appendix

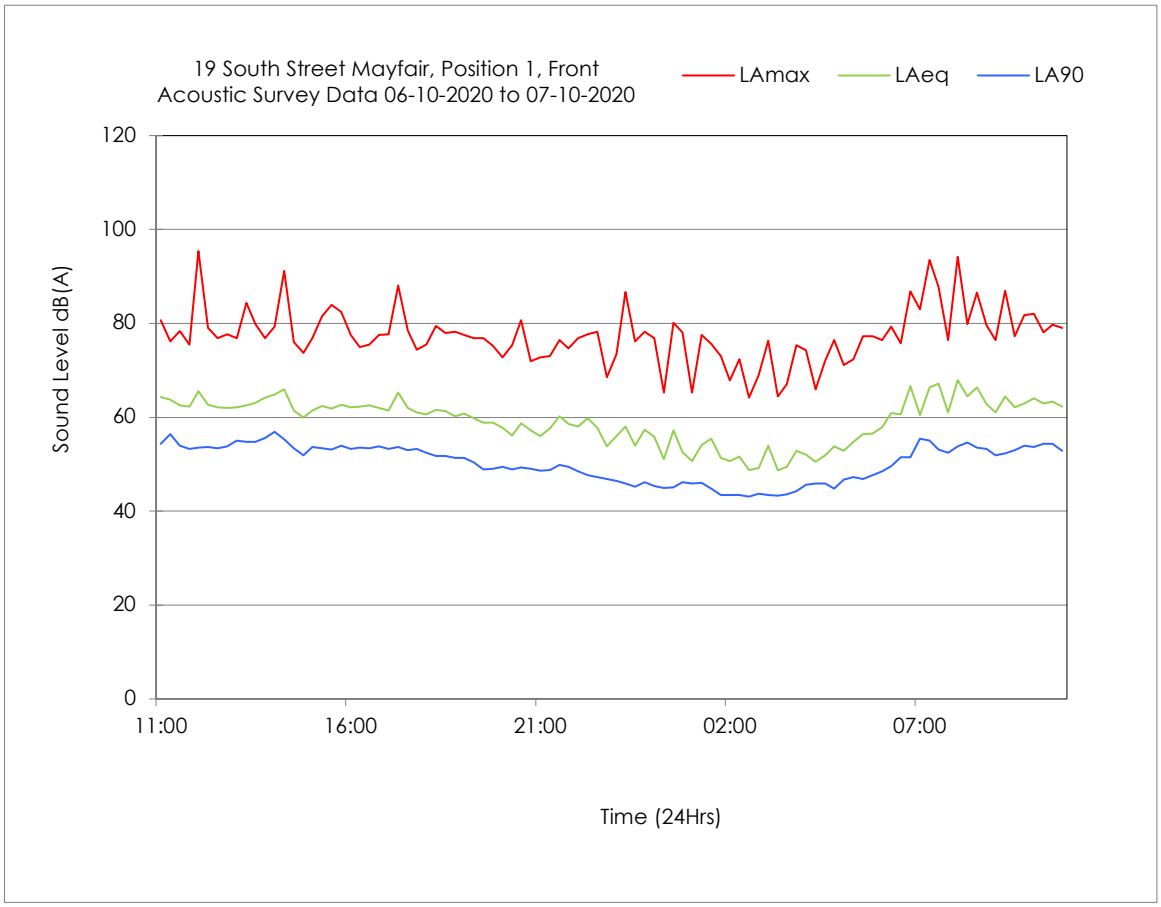
Time History Graphs

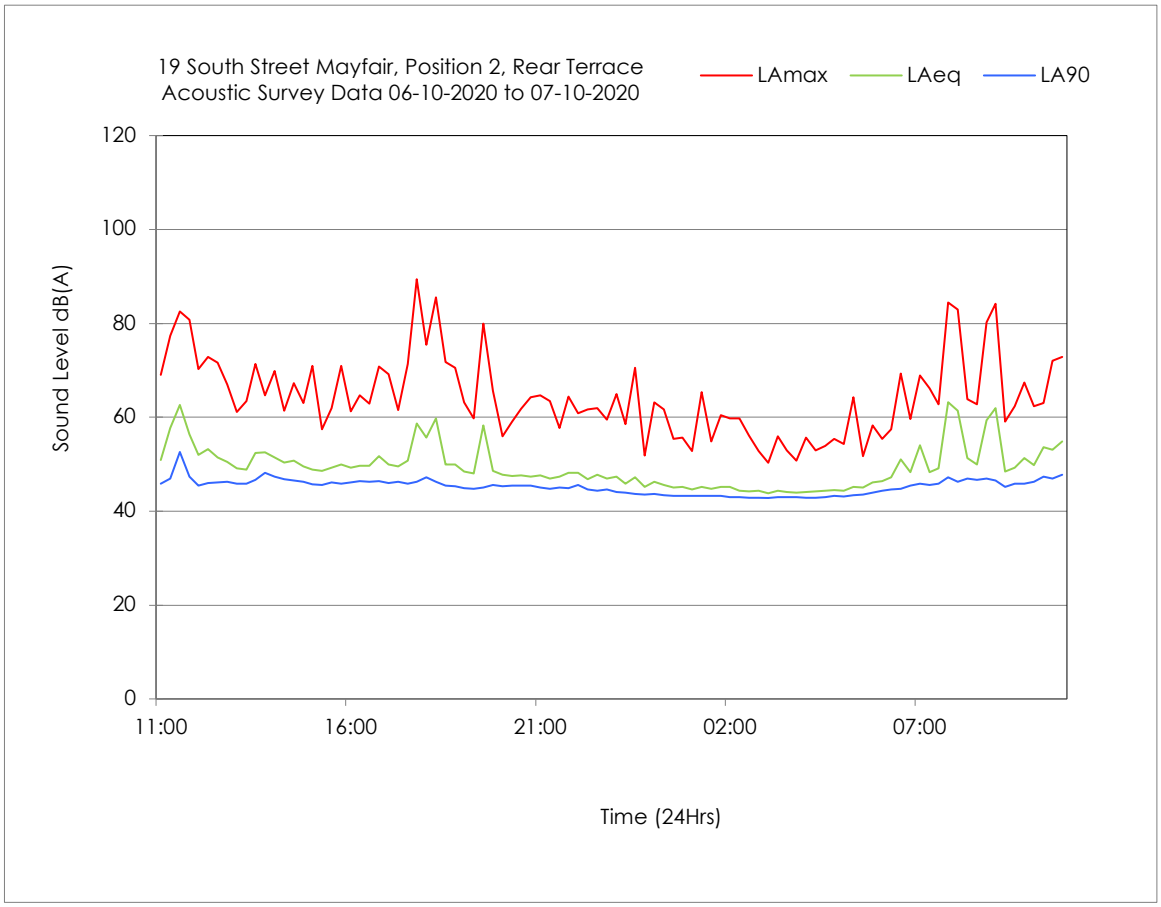
Manufacturers Plant Noise Data

Calculations

Suitable Suppliers

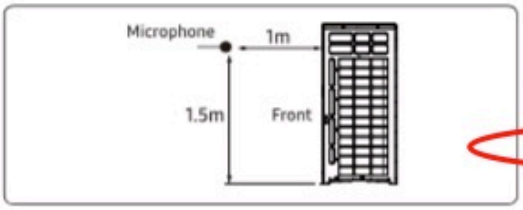
Glossary of Acoustic Terminology


19 South Street Mayfair, Position 1, Front
Acoustic Survey Data 06-10-2020 to 07-10-2020
LAmax
LAeq
LA90
Sound Level dB(A)
120
100
80
60
40
20
0
11:00
16:00
21:00
02:00
07:00
Time (24Hrs)


19 South Street Mayfair, Position 2, Rear Terrace
Acoustic Survey Data 06-10-2020 to 07-10-2020
LAmax
LAeq
LA90
Sound Level dB(A)
120
100
80
60
40
20
0
11:00
16:00
21:00
02:00
07:00
Time (24Hrs)

Manufacturers Plant Noise Data

Sound Pressure level

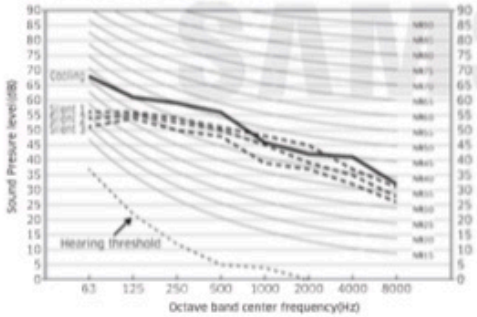


Unit: dB(A)

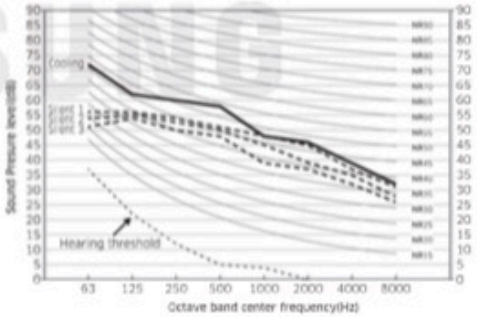
Model	Cooling	Silent1	Silent2	Silent3
AM080JXVHGH/EU	57	55	52	49
AM100JXVHGH/EU	58	55	52	49
AM120JXVHGH/EU	62	55	52	49
AM140KXVGGH/EU	61	57	55	49

- NR Curve

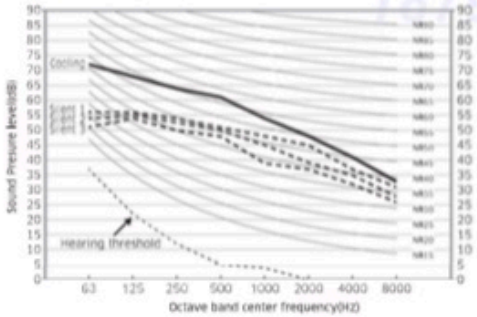
1) AM080JXVHGH/EU



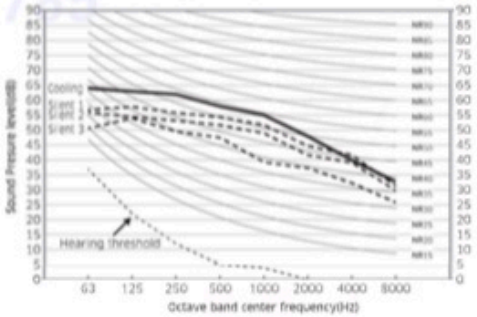
2) AM100JXVHGH/EU



3) AM120JXVHGH/EU



4) AM140KXVGGH/EU



Calculations

Sound power level of plant:

Manufacturers hemispherical SPL + 8dB

Reverberant sound pressure level just inside plant room door:

$$RevLp = Lw + \left(\left(\frac{Q}{4\pi r^2}\right) + \left(\frac{4}{Rc}\right)\right)$$

Sound power level at louvred plant room door:

$$Lw = RevLp + 10LogS - 3$$

Sound pressure level at receptor:

$$Lp = Lw - 20Logr - 11 + Q$$

Combined noise emissions at nearest lightwell window											
		63	125	250	500	1000	2000	4000	8000	dBA	
		50.0	50.0	49.0	41.0	41.0	40.0	30.0	26.0	46.6	(39 +8)
N	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
Q	8	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0		
Rc		10.0	12.8	14.5	15.5	15.5	15.5	17.8	18.0		
r	2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
other		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Lp at door		47.5	46.7	45.4	37.2	37.2	36.2	25.8	21.8	42.9	
S opening	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
10logS		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8		
in to out	-3	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Lw out		46.2	45.5	44.1	36.0	36.0	35.0	24.6	20.6	41.6	
r	3	-20.5	-20.5	-20.5	-20.5	-20.5	-20.5	-20.5	-20.5		
Q	8	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0		
reflections	3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
screening		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Plantroom breakout at		37.7	37.0	35.6	27.5	27.5	26.5	16.1	12.1	33.1	
Exhaust emissions at receptor										21.0	
Total at Receptor (rounded)										33.0	
									Criteria	33.0	
									Exceedance	0.0	

Suitable Suppliers

Acoustically Lined Panels

Allaway Acoustics Ltd
1 Queens Road
Hertford
SG14 1EN
Tel: 01992 550825
www.allawayacoustics.co.uk

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton-on-Thames, Surrey
KT12 2TP
Tel: +44 (0) 1932 230940
Email: info@eecnoisecontrol.co.uk
Web: http://eec.co.uk

Acoustic Enclosures

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton-on-Thames, Surrey
KT12 2TP
Tel: +44 (0) 1932 230940
Email: info@eecnoisecontrol.co.uk
Web: http://eec.co.uk

Environ Technologies Ltd
Regus House,
1010 Cambourne Business Park,
Cambourne,
Cambridgeshire, UK. CB23 6DP
Tel: 0870 383 3344
www.environ.co.uk

Vibration Isolation hardware

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton-on-Thames, Surrey
KT12 2TP
Tel: +44 (0) 1932 230940
Email: info@eecnoisecontrol.co.uk
Web: http://eec.co.uk

Noise Solutions Ltd
Unit 6, LDL Business Centre,
Station Road West,
Ash Vale,
Aldershot GU12 5RT
Tel: 01252 519881
www.noisesolutions.co.uk

Acoustic Attenuators

IAC
IAC House, Electron Way
Chandlers Ford
Hampshire
SO53 4SE
Tel: 01962 873000
Email: info@iacl-uk.com
www.iacacoustics.com

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton-on-Thames, Surrey
KT12 2TP
Tel: +44 (0) 1932 230940
Email: info@eecnoisecontrol.co.uk
Web: http://eec.co.uk

Glossary of Acoustic Terminology

$L_{Aeq,T}$ 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.

L_{Amax} is the maximum A-weighted sound pressure level that occurs in a given time interval, *T*, measured using time weighting F(fast) or S (slow) depending upon the subject.

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

BB93 is Building Bulletin 93 "Acoustic Design of Schools: Performance standards" and sets out the minimum performance standards for the acoustics of school buildings.

IANL as defined in BB93 is the indoor ambient noise level within teaching accommodation and is comprised of a 30minute LAeq.

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.

Specific Sound as defined by BS4142:2014 is the sound source being assessed.

Residual Sound as defined by BS4142:2014 is the ambient sound remaining at the assessment location when the specific sound is suppressed to such a degree that it does not contribute to the ambient sound.

Rating Level as defined by BS4142:2014 is the specific sound level plus any adjustment for the characteristic features of the sound.

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.