BS4142 Noise Assessment

Report No: 3427-R2 – 61 Neal Street, London, WC2H 9PJ

Client: MD Design Associates

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Report Revisions	*Date*		
3427-R1	22/03/2015	Initial Report	
3427-R2	01/09/2017	Includes new replacement units and revised assessment.	
	Produced by:	*Checked by:*	*Authorised by:*
Name:	Steve Mckeever AMIOA	Steve Clow MIOA	Steve Clow MIOA

Steve Clow MIOA, is a member of The Institute of Acoustics and has achieved the IOA Diploma in Acoustics and Noise Control. Steve Clow has over 15 years experience in an acoustic consultant capacity working on many assessments involving planning and regulatory services.

Steve Mckeever AMIOA, is an associate member of The Institute of Acoustics and has achieved the IOA Diploma in Acoustics and Noise Control. Steve Mckeever has 10 years experience working in acoustics and 5 years in an acoustic consultant capacity.

Clover Acoustics Ltd - The Old Vicarage - Barcroft Lane - Askern - Doncaster - DN6 0DS
Tel: 01302 707 199 - Web: www.cloveracoustics.co.uk - Email: info@cloveracoustics.co.uk

1. Introduction

Clover Acoustics Ltd has been appointed by MD Design Associates to carry out a BS4142 noise assessment regarding the proposed installation and relocation of conditioning units to replace existing units at the rear of 61 Neal Street, London, WC2H 9PJ. It is understood the equipment will operate to service the retail unit between 08:00 and 18:00.

A baseline noise survey has been carried out over a representative period in order to establish the existing background noise levels. The survey was conducted at one monitoring location covering a typical day and night time period on Monday 7th March 2016.

The purpose of this report is to demonstrate that due consideration for noise affecting residential property adjacent the new position of the installation has been made and to assess the significance of any noise impact from the unit operation.

2. Assessment Methodology

BS4142:2014 Methods for rating and assessing industrial and commercial sound.

BS4142 gives a method for rating sound from industrial and commercial sources affecting people inside or outside dwellings or premises used for residential purposes. An initial estimate of the significance of the sound from the industrial/commercial nature can be assessed by subtracting the measured background noise level from the rating level (this is the specific sound level of the source with any corrections or penalties for distinctive acoustic characteristics). Typically, the greater the difference, the greater the magnitude of the impact.

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB 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 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.

3. Site Description

The site is a mixed commercial and residential area. The nearest sensitive receiver has been identified as residential properties within the upper floors of 61 Neal Street. The proposal is to extend the rear of the existing shop premises out into the yard area necessitating the movement of 2 existing ac units and their upgrade to new Mitsubishi SCM60ZM-s units to a wall mounted position at 1st floor level. The rear area has many other air handling and kitchen extract units' servicing adjacent premises and the noise climate in the area is dominated by these units, in particular the adjacent air handling kit.

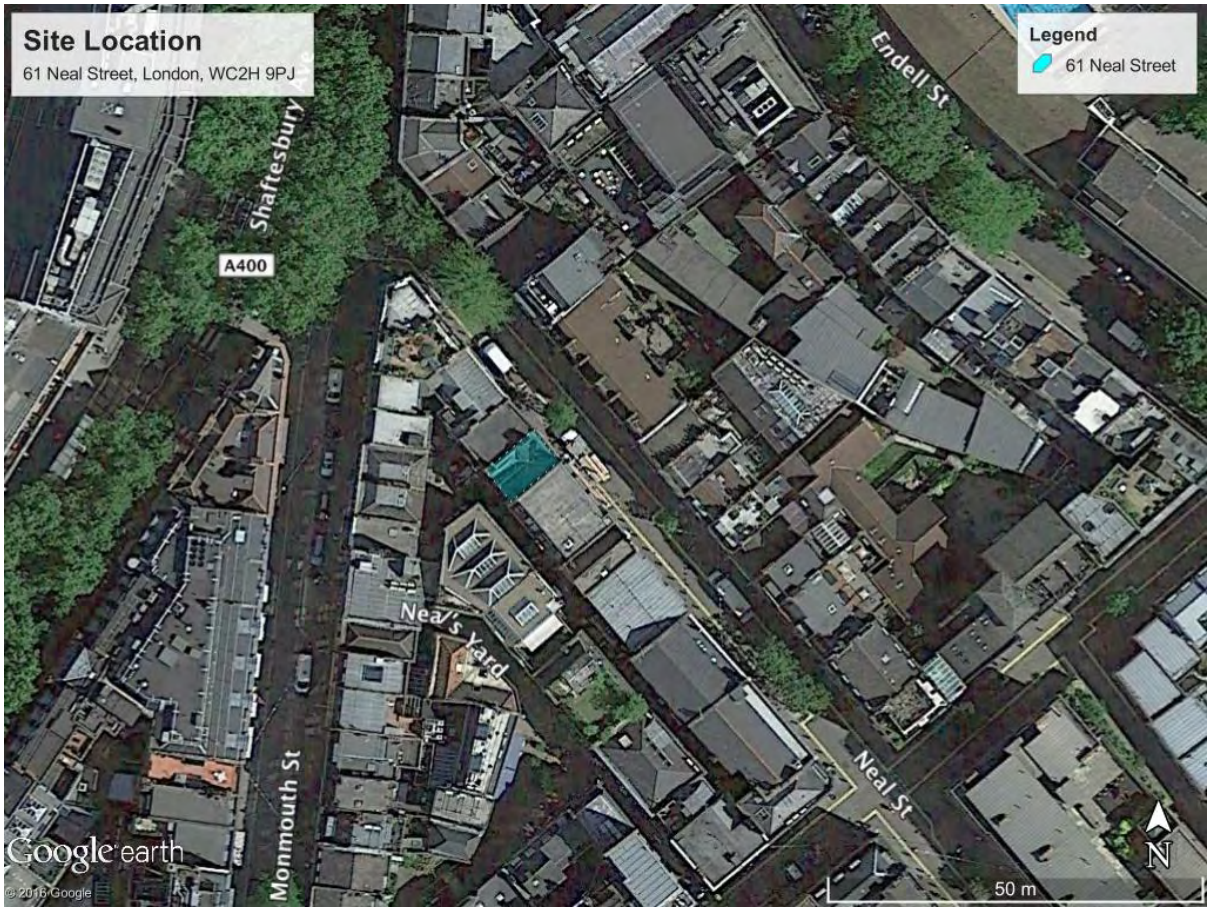


Figure 1 – Site Location

4. Survey Information

Measurement Instrumentation

The measurement instrumentation used on the survey was as follows:

Equipment	Manufacturer & Type	Serial Number	Calibration Certificate
Sound Level Meter	Norsonic 118	28952	08074
Acoustic Calibrator	Norsonic 1251	32856	U16611

The equipment was calibrated to comply with section 4.2 of BS7445:1-2003 before and after the surveys. The calibration was as follows:

Meter	Serial	Before		After	
Norsonic 118	28952	113.9	-26.2	113.9	-26.2

Measurements & Timescales

During the survey 5-minute measurements were made during a typical operational period on Monday 7th March 2016. Attended readings were made of the specific units in operation.

The following measurements are reported: $L_{Aeq,T}$, $L_{A90,T}$, $L_{A10,T}$, $L_{Amax,T}$

The measurements and their interpretation shall be in accordance with BS 7445: Parts 1 and 2. All sound pressure levels are in dB (re 20µPa).

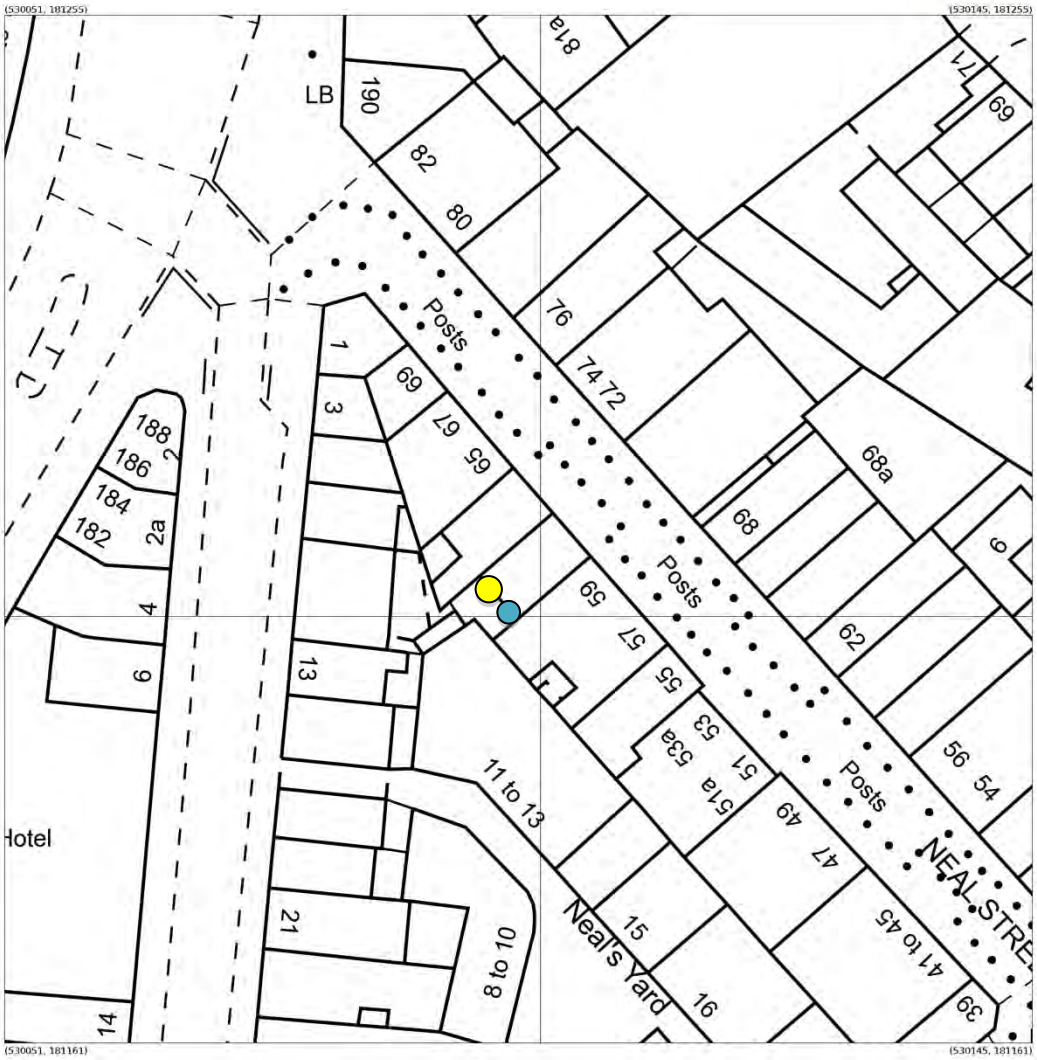
Meteorology

Wind speed measurements were recorded during the background survey close to the noise monitoring location. The monitoring location was shielded from wind by the surrounding buildings, throughout the measurement period; average wind speed measurements were below 5m/s^{-1}.

Temperature was recorded at 8°C with no precipitation during the measurement period.

Position of Monitoring Equipment

The equipment was mounted free field 1.5m from the ground at a location representative of the nearest receivers. Figure 2 shows the site location plan and proposed relocation of the units.



Produced 22 Mar 2016 from the Ordnance Survey MasterMap(Topography)Database and incorporating surveyed revision available at this date.

The representation of a road, track or path is no evidence of a right of way. The representation of features as lines is no evidence of a property boundary.

Version 1.0 Unversioned directory PNG

Metres
0 4 8 12 16 20
1:500

74, Neal St, London
WC2H 9PA

Supplied by: Stanfords 22 Mar 2016
© Crown copyright and database rights 2016 OS 100035409
Reference: OI976621
Centre coordinates: 530098 181208

Figure 2 - Site Location Plan

Proposed Installation	
Monitoring Position	

5. Survey Results

Attended measurements were made of the units in operation and were found to be 56dB(A) @1m. The following tables show the summary of the background noise levels monitored. The reported results represent the free field sound pressure levels at the receivers. The lowest operational hours background recorded was 54dB $L_{A90,5min}$.

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Site: 61 Neal Street, London, WC2H
Table 1 : Summary - Front of Site
Report: 3427-R1

Start Date: 07/03/2016
End Date: 07/03/2016

Hourly Summary

Hour Start	LAeq,1Hour	LAMax,1hour	Min LA90,5min	Ave LA10,1hour
07:00	59.4	73.1	58.5	60.1
08:00	59.4	74.9	58.5	59.8
09:00	59.3	72.6	53.5	60.0
10:00	56.0	74.4	53.8	56.9
11:00	58.2	88.7	53.8	57.8
12:00	60.6	82.1	56.7	61.1
13:00	59.3	87.5	57.4	59.5
14:00	59.8	85.6	57.0	59.9
15:00	58.3	74.3	56.9	59.0
16:00	58.5	81.9	56.8	58.8
17:00	58.1	75.1	57.0	58.7
18:00	58.2	89.3	55.3	58.3
19:00	54.1	71.4	52.7	54.7
20:00	55.1	72.9	52.6	55.6
21:00	53.9	73.1	52.7	54.3
22:00	55.9	71.5	53.0	55.5
23:00	59.3	72.3	58.0	59.8
00:00	59.0	74.5	58.0	59.6
01:00	58.7	73.3	58.0	59.2
02:00	58.6	70.7	58.0	59.2
03:00	58.7	71.9	58.0	59.3
04:00	58.7	72.7	58.0	59.3
05:00	58.7	74.6	58.0	59.3
06:00	59.1	72.2	58.5	59.6

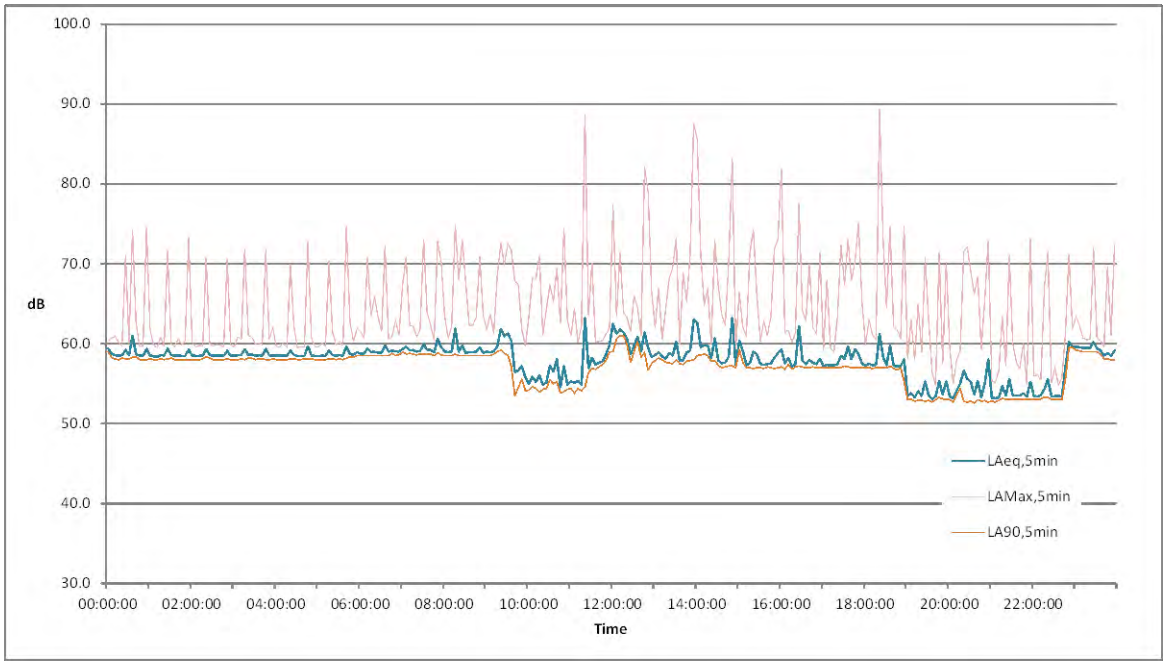

Table 1 - Summary

6. Noise Assessment

BS4142:2014 Methods for rating and assessing industrial and commercial sound.

Specific Noise Source

The existing condensers are to be replaced with 2 new Mitsubishi SCM60ZM-s and moved from a ground floor position to a wall mounted 1st floor position as shown below. Manufacturers published data give a sound pressure level at 1m of 52dB(A)

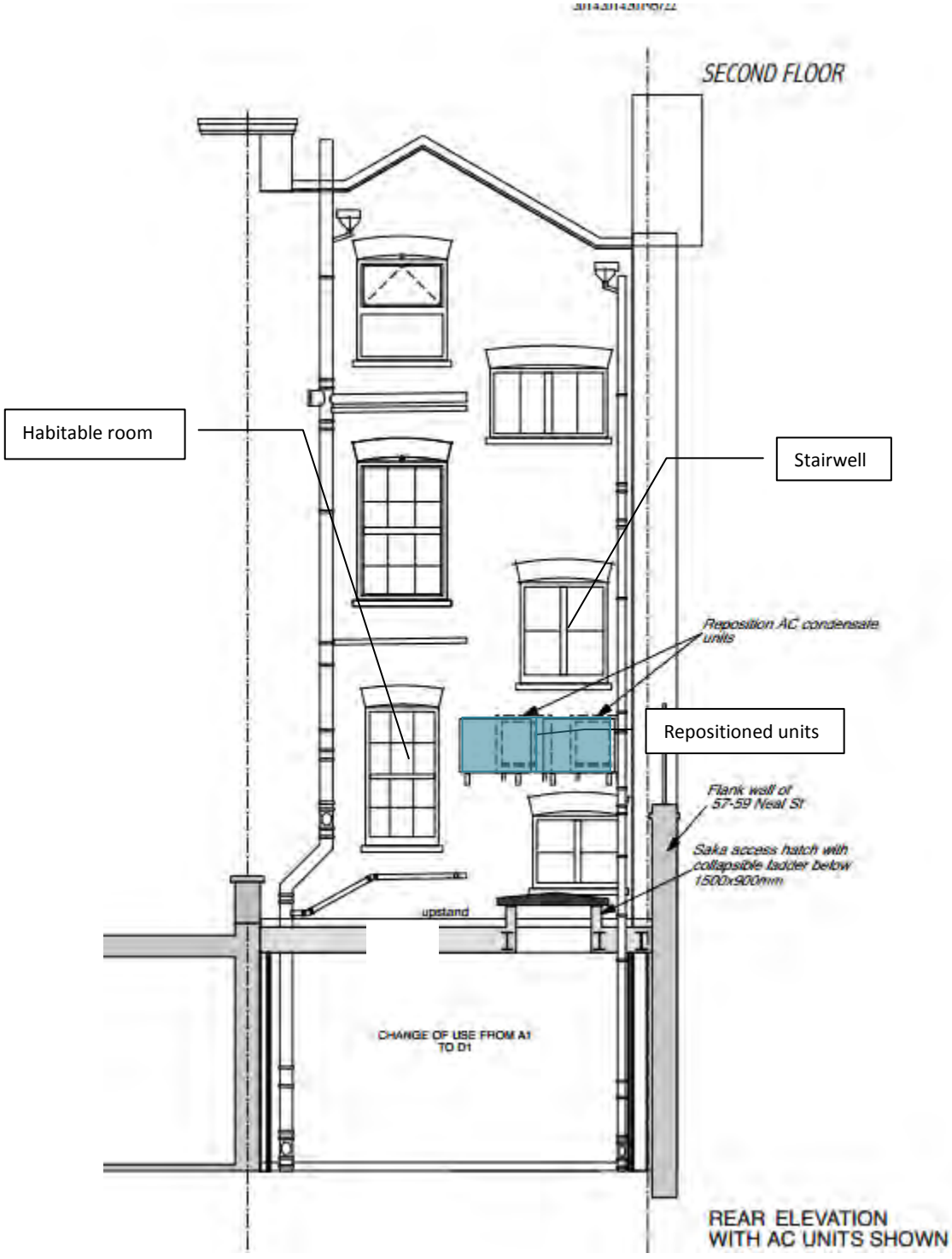

Figure 3 – Proposed Installation

Acoustic Feature Correction

BS4142:2014 allows for a character correction to be applied to the specific sound level where acoustic features are present at the assessment location. The specific sound level can be considered a steady source inline with background levels and it would be prudent in this instance to allow a 3dB penalty to account for the potential of the source being readily distinctive against the residual environment.

Context

The rear of site is exposed to noise from adjacent air conditioning and kitchen extract equipment. The existing equipment is well established at the rear of the property and is being upgraded and moved to a similar location.

Distance Attenuation

The nearest sensitive receiver identified is the residential adjacent the proposed installation 1m away.

Barrier Attenuation

Screening of the unit to prevent line of sight to the source would reduce noise levels at the receiver. In this instance attenuation through screening has been accounted for and the provision of an "L" shaped screen is recommended. Calculations are presented in the appendix.

BS4142 Assessment – Operational Hours

A noise rating level of 51dB(A) has been predicted at the assessment location. This would give an assessment level of 4dB below the lowest measured existing background noise level during the proposed operational hours. BS4142 advises, "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 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".

BS4142 Assessment - Extract	dB(A)
Specific source single unit	52
X 2 units	+3
Specific Noise Level at Receiver	55
Distinctive Characteristic Penalty	3
Barrier Attenuation	-8
Rating Level	50
Operational Background Level L_{A90}	54
Rating Below Background	-4

7. Recommendations

We recommend the provision of an "L" shaped screen to prevent line of sight of the units from adjacent habitable windows. Attenuation from a screen 750mm high has been calculated is included in the appendix. The barrier should have a minimum superficial mass of 15Kg/m^2 will ensure the barrier attenuation is not compromised by sound passing through the barrier. The barrier should be of solid construction with timber thickness of at least 20mm in all places. 25mm timber boards mass is around 16Kg/m^2. The screen should be designed so as to ensure gaps do not appear over time.

8. Conclusion

A BS4142 noise assessment has been carried out at the site of the proposed extension to the rear of 61 Neal Street, London, WC2H 9PJ to assess the impact of a proposed relocating and upgrading of an existing air conditioning installation. A background noise survey was conducted during a typical period at a location representative of the nearest sensitive receivers.

An assessment has been made in accordance with BS4142 which has shown that the proposed installation would predict noise rating levels below the local background provided the attenuation identified is installed. BS4142 advises "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 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".

Steve Clow MIOA
Acoustic Consultant

9. Appendix

Glossary of Terms

Specific Noise Source
The noise source under investigation for assessing the likelihood of complaints.

Specific Noise Level, $L_{Aeq,T}$
The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating Level, $L_{A,T}$
The specific noise level plus any adjustment for the characteristic features of the noise.

Background Noise Level, $L_{A90,T}$
The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 % of a given time interval, T.

Residual Noise
The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Ambient Noise
Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Reference Time Interval, T
The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

$L_{Aeq,T}$
The A-weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as the fluctuating sound over a specified measurement period, T.

$L_{A10,T}$
The A-weighted sound level exceeded for 10% of the specified measurement period, T.

L_{Amax}
The highest short duration A-weighted sound level recorded during a noise event.

A-Weighting
The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies.

Octave Band
A frequency band in which the upper limit of the band is twice the frequency of the lower limit.

One-third-octave Band
A frequency band in which the upper limit of the band is 1/3 times the frequency of the lower limit.

Manufacturers data

Technical data

Model			SCM 40 ZM-S	SCM 45 ZM-S	SCM 50 ZM-S	SCM 60 ZM-S	SCM 71 ZM-S	SCM 80 ZM-S	SCM 100 ZM-S	SCM 125 ZM-S
Type			DC Inverter	DC Inverter	DC Inverter	DC Inverter	DC Inverter	DC Inverter	DC Inverter	DC Inverter
Indoor unit connectable (Min.-Max.)		n°	2 - 2	2 - 2	2 - 3	2 - 3	2 - 4	2 - 4	4* - 5	4* - 6
Total capacity connectable (I.U.)		kW	6.0	7.0	8.5	11.0	12.5	13.5	16.0	19.5
Capacity (T=35°C)	Cooling	kW	4.00 (1.80~5.90)	4.50 (1.80~6.40)	5.00 (1.80~7.10)	6.00 (1.80~7.50)	7.10 (1.80~8.80)	8.00 (1.80~9.20)	10.00 (1.80~12.00)	12.50 (1.80~14.00)
Power Input (T=+35° C)	Cooling	kW	0.84 (0.49~1.90)	1.04 (0.49~2.14)	1.08 (0.50~2.15)	1.43 (0.50~2.39)	1.74 (0.48~2.75)	2.16 (0.48~2.83)	2.86 (0.65~4.03)	3.90 (0.65~4.80)
Annual Consumption	Cooling	kWh/a	237	264	265	321	388	446	687	
Energy Efficiency Class Seasonal	Cooling	626/2011[1]	A+	A+	A++	A++	A++	A++	A	
Energy Efficiency Class Seasonal Index	Cooling	SEER[2]	5.92	5.98	6.62	6.55	6.41	6.29	5.10	
Energy Efficiency Rated	Cooling	EER[3]	4.76	4.33	4.63	4.20	4.08	3.70	3.50	3.21
Design load (Pdesignc)	Cooling	kW	4.00	4.50	5.00	6.00	7.10	8.00	10.00	
Capacity (T=+7° C)	Heating	kW	4.50 (1.40~6.90)	5.60 (1.40~7.40)	6.00 (1.40~7.50)	6.80 (1.50~7.80)	8.60 (1.50~9.40)	9.30 (1.50~9.80)	12.00 (1.50~13.50)	13.50 (1.50~14.00)
Power Input (T=7° C)	Heating	kW	0.9 (0.47~2.30)	1.20 (0.47~2.57)	1.31 (0.48~2.58)	1.51 (0.60~3.00)	2.00 (0.60~3.35)	2.26 (0.60~3.43)	2.93 (0.70~3.40)	3.25 (0.70~3.42)
Annual Consumption	Heating	kWh/a	1798	2014	2091	2480	2682	2755	3519	
Energy Efficiency Class Seasonal	Heating	626/2011[1]	A+	A+	A	A+	A	A	A+	
Energy Efficiency Class Seasonal Index	Heating	SCOP[2]	4.05	4.03	3.95	4.01	3.81	3.81	4.02	
Energy Efficiency Rated	Heating	COP[3]	5.00	4.67	4.58	4.50	4.30	4.12	4.10	4.15
Design load (Pdesignh) @-10°C	Heating	kW	5.20	5.80	5.90	7.10	7.30	7.50	10.10	
T° operational limit (Tol)	Heating	°C	-15	-15	-15	-15	-15	-15	-15	
Power supply		Ph-V-Hz	1~220~230V-50HZ	1~220~230V-50HZ	1~220~230V-50HZ	1~220~230V-50HZ	1~220~230V-50HZ	1~220~230V-50HZ	1~220~230V-50HZ	1~220~230V-50HZ
		I.U. ~ O.U.	O.U.	O.U.	O.U.	O.U.	O.U.	O.U.	O.U.	O.U.
Input Rated Current (Cooling - Heating)		A	3.9 - 4.1	4.8 - 5.5	5.0 - 6.0	6.8 - 7.1	8.0 - 9.2	9.90 - 10.4	13.0 - 13.3	17.3 - 17.7
Wiring cables i.u./o.u. (without ground)		n°	3 + 3	3 + 3	3 + 3 + 3	3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3 + 3	3 + 3 + 3 + 3 + 3 + 3
Refrigerant Pipe Liquid/Gas side		mm (inch.)	2x6.35 (1/4") 2x9.52 (3/8")	2x6.35 (1/4") 2x9.52 (3/8")	3x6.35 (1/4") 3x9.52 (3/8")	3x6.35 (1/4") 3x9.52 (3/8")	4x6.35 (1/4") 4x9.52 (3/8")	4x6.35 (1/4") 4x9.52 (3/8")	5x6.35 (1/4") 5x9.52 (3/8")	6x6.35 (1/4") 6x9.52 (3/8")
Total splitting length		m	30	30	40	40	70	70	90	90
Max splitting level difference O.U./I.U. - I.U./ O.U.		m	15/15	15/15	15/15	15/15	20/20	20/20	20/20	20/20
Refrigerant Precharge		Kg	2	2	2.5	2.5	3.15	3.15	6	6
MAX Splitting without Refrigerant Precharge		m	30	30	40	40	40	40	50	50
Refrigerant Precharge / Liquid piping ø1/4"		g/m	-	-	-	-	20	20	20	20
Temperature range cooling		°C	-15°C ~ +43°C	-15°C ~ +43°C	-15°C ~ +43°C	-15°C ~ +43°C	-15°C ~ +43°C	-15°C ~ +43°C	-15°C ~ +43°C	-15°C ~ +43°C
Temperature range heating		°C	-15°C ~ +24°C	-15°C ~ +24°C	-15°C ~ +24°C	-15°C ~ +24°C	-15°C ~ +24°C	-15°C ~ +24°C	-15°C ~ +24°C	-15°C ~ +24°C
Product specifications										
Outdoor Unit	Dimensions (HxWxD)	mm	640x850(+65)x290	640x850(+65)x290	640x850(+65)x290	640x850(+65)x290	750x880(+73)x340	750x880(+73)x340	945x970(+73)x370	945x970(+73)x370
	Net weight	Kg	47	47	48	49	62	62	92	92
Max noise pressure level 1 m		dB(A)	47	47	49	52	52	54	56	57

Site Plan

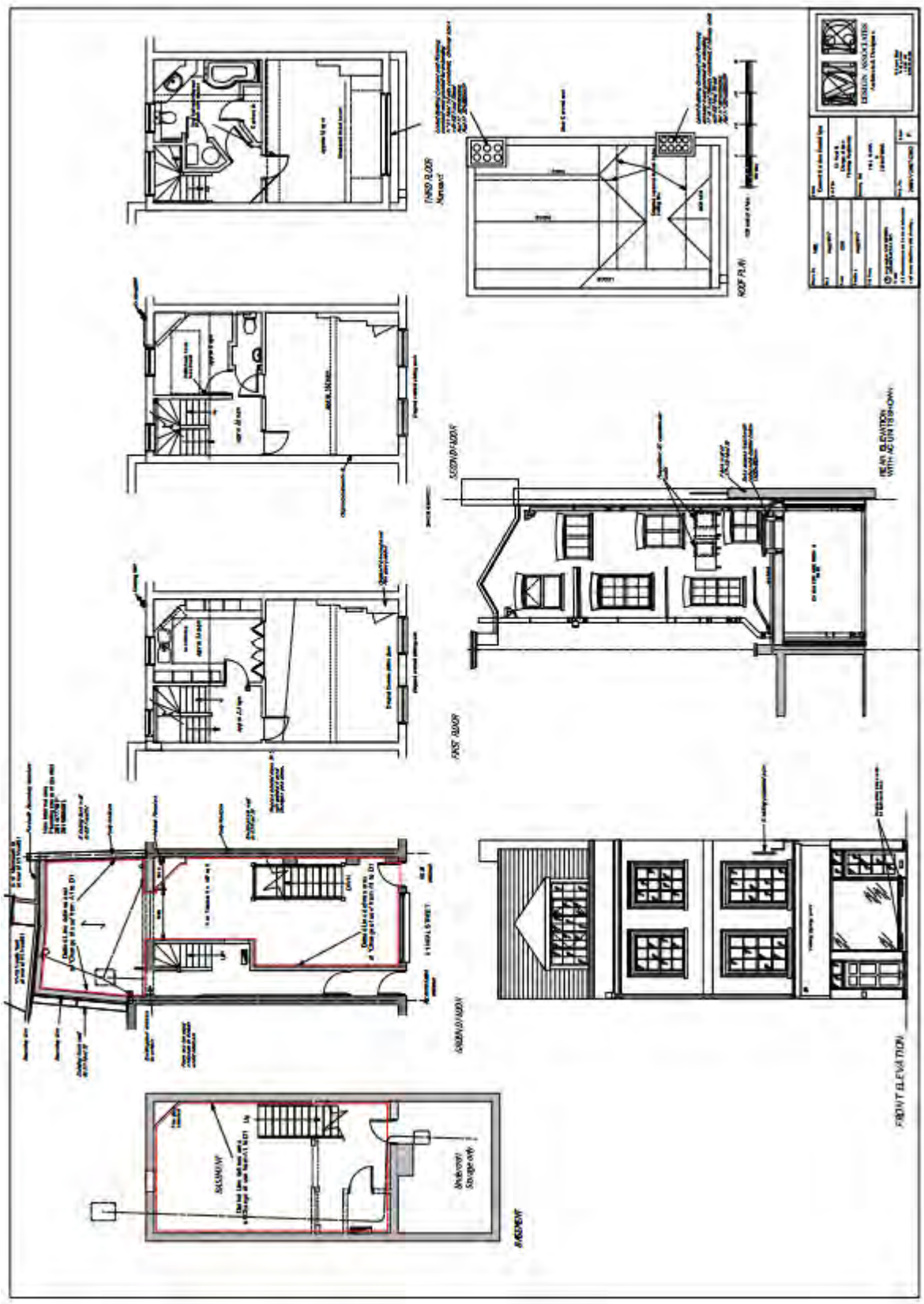

Figure 4 – Elevations

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Site: 61 Neal Street, London, WC2H 9PJ
Barrier Attenuation
Report: 3427-R1

Barrier Attenuation

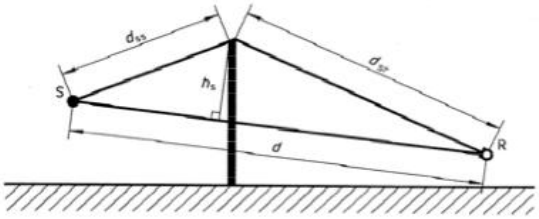

Figure 6 — Geometrical quantities for determining the pathlength difference for single diffraction

from ISO 9613-2:1996

Noise Source				Frequency	Hz	63	125	250	500	1000	2000	4000	8000
Description: Air Conditioning Units				Source Spectrum	dB	53.6	48	47.6	43.5	43.1	35.2	30.8	27.4

Barrier Attenuation for Source 1				Frequency	Hz	63	125	250	500	1000	2000	4000	8000
Source to Barrier	0.5	Receiver to Barrier	0.75	Barrier Attenuation	dB	6.8	8.1	10.0	12.3	14.9	17.7	20.6	23.5
Source Height	0.5	Receiver Height	0.1	Effective Attenuation	dB	6.8	8.1	10.0	12.3	14.9	17.7	20.0	20.0
Barrier Height	0.75			Resultant Spectrum	dB	46.8	39.8	37.6	31.2	28.2	17.5	10.8	7.4
Path Difference	0.239									**Barrier Attenuation**		**dB**	**-7.8**

Figure 5 – Screening attenuation

Photo Appendix

Figure 7 – Existing units