

REPORT TITLE: ACOUSTIC REPORT IN SUPPORT OF PLANNING APPLICATION FOR A
NEW KITCHEN EXTRACT VENTILATION SYSTEM AS PART OF PROPOSED
A1 TO A3 CHANGE OF USE AT 21 NEWTON STREET, LONDON WC2B 5EL

REPORT REF: 14204-002

ISSUED TO: Deco Architecture & Engineering
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DATE: September 2014

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SUMMARY

- Philip Acoustics Ltd has been commissioned to assess noise associated with a new kitchen extract ventilation system as part of a proposed A1 to A3 change of use at ground floor 21 Newton Street, London WC2B 5EL. The kitchen extract ventilation system includes a fan installed internally plus with associated filtration, high performance silencer and ducting to an aperture at the rear of the building. The assessment considers London Borough of Camden's planning consent noise requirement for mechanical services equipment.
- London Borough of Camden's requirement is nominally that noise from mechanical services equipment shall be designed to at least 5dBA below the lowest background noise level at 1m outside windows of nearest potentially affected noise sensitive (residential) properties. Additionally, where it is anticipated any equipment will have a noise that has a distinguishable discrete note (whine, hiss, screech or hum) and/or there are distinct impulses (bangs, clicks, clatters and thumps) then the requirement is slightly more onerous and is at least 10dBA below the lowest background noise level.
- As London Borough of Camden's noise requirement is dependent upon existing background noise levels a noise survey has been carried out to establish lowest existing background noise levels in vicinity of nearest noise sensitive (residential) properties during proposed operational times of the kitchen extract ventilation system. Using results of the background noise survey and London Borough of Camden's requirement, noise limits for the new equipment have been established.
- Based on acoustic calculations using manufacturer's noise data, corrections to account for location of the kitchen extract ventilation system and noise reduction of the silencer included within the equipment manufacturer's proposals, the overall dBA noise level due to operation of the equipment is at least 10dBA below the lowest background noise and readily complies with London Borough of Camden's more onerous noise condition limit.
- Full specification details for the proposed silencer are provided in Section 6.1 of the report. The silencer is a normal/standard high performance type specifically intended for the proposed kitchen extract fan make/model and is as routinely fitted to kitchen extract fan systems.
- Location of the proposed kitchen extract fan system internally within the building is structurally linked to residential properties (flats) on upper floor levels of the site itself and therefore it is possible that equipment vibration could transmit into the properties. It is recommended that proprietary high performance vibration isolators be fitted to the equipment items as good practice and to mitigate this risk. Specification details for suitable vibration isolators are provided in Section 6.2 of the report.

1. INTRODUCTION

Deco Architecture & Engineering is assisting the client with submission of a planning application to the Local Planning authority (London Borough of Camden) for a proposed A1 to A3 change of use at ground floor of 21 Newton Street, London WC2B 5EL. The proposed change of use includes installation of a new kitchen extract ventilation system.

The new kitchen extract ventilation system will comprise a mix flow fan with associated ductwork, electrostatic precipitator, filters and silencer all located internally within the building with aperture to the rear side wall of the building. The aperture positioned facing away from, and as far as practicably from, nearby noise sensitive (residential) properties.

It is anticipated that the Planning Department of London Borough of Camden will require that an acoustic report be submitted in support of the planning application to determine whether the proposed new extract ventilation system complies with London Borough of Camden's acoustic requirements for mechanical services equipment potentially affecting nearby noise sensitive properties, all in accordance with Policy DP28 - Noise and Vibration from Section 3 of Camden Development Policies 2010-2025 Local Development Framework.

Philip Acoustics has therefore been commissioned to assess noise and vibration from the proposed new kitchen extract fan system. This acoustic report presents results of the assessment and includes:

- Confirmation of London Borough of Camden's planning consent noise requirements;
- Measurement of existing background noise levels;
- Calculation of kitchen extract fan system noise levels;
- Consideration of vibration from the kitchen extract fan system;
- Review of any noise and vibration control treatments that may be necessary to ensure compliance with London Borough of Camden's planning consent acoustic requirements.

2. LONDON BOROUGH OF CAMDEN NOISE CONDITIONS

Policy DP28 – Noise and Vibration of Section 3 of Camden Development Policies 2010-2025 covers in detail noise issues relating to a wide range of planning and noise pollution scenarios, including mechanical services equipment.

Policy DP28 includes the statement *“The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds”*. Camden's noise limit thresholds for plant and machinery are listed in Table E of Policy DP28. A copy of page 133 from Camden Development Policies 2010-2025 Policy DP28 showing Table E is included in Appendix A. In summary, London Borough of Camden's noise conditions are:

- i. That overall dBA noise from equipment shall be designed to at least 5dB below the existing L_{A90} dB background noise level;
- ii. That, where it is anticipated any equipment will have a noise that has a distinguishable discrete note (whine, hiss, screech or hum) and/or there are distinct impulses (bangs, clicks, clatters and thumps) then the overall dBA noise from equipment shall be designed to at least 10dB below the existing L_{A90} dB background noise level.

It is the author's experience and opinion that the type of kitchen extract fan subject to this assessment can potentially generate noise that includes discrete tonal notes and therefore London Borough of Camden's more onerous noise condition in item ii of 10dB below the existing L_{A90} dB background noise level is considered applicable in this instance.

Although not specifically included within Table E of Policy DP28, Philip Acoustics Ltd is aware that London Borough of Camden also has noise conditions guidance that for each octave band (63Hz to 8KHz) then noise from equipment shall be designed to not add more than 1dB to the existing lowest L_{90} dB octave band background noise level.

All of the above (i to iii) are applicable over a period of 60 minutes and measured at 1m external to noise sensitive facades. For this development and as normal acoustic assessment and design convention, noise sensitive facades are windows of nearest residential properties to proposed location of the equipment.

London Borough of Camden's noise conditions do not specifically include any limits for vibration. Notwithstanding this, equipment vibration is considered in this report and appropriate recommendations are provided for vibration isolation measures.

3. NOISE SURVEY

In order to assess noise from the proposed new kitchen extract fan system it is necessary to establish representative background noise levels external to the nearest noise sensitive (residential) windows. Details of the background noise survey carried out by Philip Acoustics Ltd are provided in Sections 3.1 to 3.3 below.

3.1 Noise Survey Instrumentation

Details of the instrumentation used for the noise survey are provided in Appendix B. The sound level meter was calibrated before and after the survey measurements using the UKAS certified calibrator.

3.2 Noise Survey Measurement Procedure

The client has advised the new kitchen extract ventilation system will operate as required during opening times of the proposed A1 to A3 change of use, nominally in the range 6am to 5pm.

Nearest noise sensitive (residential) windows to the kitchen extract ventilation system aperture are windows of flats on upper floor levels and adjacent within Holland & Thurston Dwellings overlooking the rear courtyard area behind the site. Nearest of these windows is approximately 7m from the proposed location for the kitchen extract ventilation system aperture.

Proposed location for the new kitchen extract ventilation system aperture and direction to these nearest noise sensitive (residential) windows are shown on drawings in Appendix C.

The background noise measurement position was therefore selected within the rear courtyard area behind the site and adjacent to nearest noise sensitive (residential) windows. Position for the background noise survey is indicated on the layout plan drawing in Appendix C.

The rear of the site outside nearest noise sensitive (residential) windows was not considered a secure enough location to leave expensive unmanned noise measuring equipment and therefore an attended survey was undertaken of background noise during sample periods during the range of times of operation for the equipment.

The background noise survey was carried out on 11 September 2014 from approximately 6am to 9.30am and also 2pm to 3.30pm to include (early morning) times when lowest levels of background noise will occur. The weather was dry with calm wind conditions throughout the survey periods.

Measurements of background noise were recorded as overall L_{A90} dB values over 5 minute periods throughout the survey periods carried out nominally in accordance with procedures of BS4142 (*5 minute periods were used to enable more accurate analysis of results as required*). In addition to the overall L_{A90} dB values, samples of L_{90} dB octave band background noise were also recorded.

3.3 Noise Survey Results & Observations

Existing background noise levels within the rear courtyard area behind the site and adjacent to nearest noise sensitive (residential) windows are caused by noise from traffic and general activity on surrounding streets, plus with occasional aircraft.

Raw data results of the sample period background noise survey are provided graphically in Appendix D. Summary of lowest measured background noise levels and associated London Borough of Camden noise limit requirements in terms of overall dBA and equivalent linear dB octave band values during proposed operating times for the equipment are shown in Table 1.

Description	Overall dBA	Octave Band Centre Frequency (Hz) (linear dB)							
		63	125	250	500	1k	2k	4k	8k
Equipment operating times in the range 6am to 5pm									
Lowest background noise level (<i>occurs 6am to 7am</i>) L_{90} (5 minutes)	42	53	48	45	41	34	30	26	24
London Borough of Camden noise requirement Leq (60 minutes)	≤32	≤49	≤44	≤41	≤37	≤30	≤26	≤22	≤20

Table 1: Lowest measured background noise levels and London Borough of Camden's most onerous noise conditions (*overall noise limit 10dBA below background level and octave band limit to not add more than 1dB to existing octave band noise levels*)

The overall dBA noise limit to comply with London Borough of Camden's most onerous noise requirement is ≤32dBA. This is 10dB below the lowest existing background noise levels and at this level, noise from the equipment will be significantly below the lowest existing background noise including noise from already existing equipment serving other commercial premises and will not be audible nor disturbing to occupants of nearby noise sensitive properties.

4. NOISE FROM MECHANICAL SERVICES EQUIPMENT

The proposed new kitchen extract ventilation system is conventional and comprises the following items:

- Kitchen extract fan; Arda Metal Works Ltd in-line square cased mixed-flow single phase SMVW 500/4 (500mm diameter), located internally at rear of the building;
- Atmosphere side of extract fan: Arda Metal Works Ltd silencer (see Section 6.1 of report for silencer specification) to ductwork to horizontal louvre/grille aperture in rear side wall of the building;
- Room side of extract fan: Carbon filter and Electrostatic Precipitator (ESP 1500) to ductwork to extract canopy over cook area.

A copy of the manufacturer's data sheet (including noise data) for the proposed kitchen extract fan is provided in Appendix E. The noise data is in terms of overall free-field dBA sound pressure levels at 1m from the fan taken as being with open outlet.

Summary of noise from the fan type SMVW 500/4 (500mm diameter) in terms of overall free-field dBA and equivalent octave band linear dB sound pressure levels at 1m from the fan open outlet making allowance for duct losses (i.e. duct bend between the fan position and the aperture) is shown in Table 2. The octave band linear dB sound pressure levels are as typical for 500mm diameter kitchen extract fan and as typical of those measured by the author on site for similar kitchen extract fans.

Description	Overall dB(A)	Octave Band Centre Frequency (Hz) (linear dB)							
		63	125	250	500	1k	2k	4k	8k
Arda Metal Works mixed-flow single phase fan type SMVW 500/4 fan (500mm diameter). Free-field open outlet sound pressure level at 1m	59.2	56	58	56	53	54	54	48	42

Table 2: Extract fan noise data (*un-silenced levels*)

To calculate the overall noise contribution from the equipment to outside the nearest residential windows a spreadsheet based noise model calculation has been used. The model takes account of the worst-case scenario of the extract fan operating continually in any 1 hour (60 minutes) period, attenuation due to the proposed Arda Metal Works Ltd silencer (see Section 6.1 and Appendix E for silencer specification), distance between the equipment location and nearest residential windows, acoustic directivity, acoustic reflections and any natural acoustic screening. Acoustic calculation details are provided in Appendix F.

The overall dBA calculated noise level from the equipment (with proposed silencer fitted) to outside the windows of nearest noise sensitive properties compared with the London Borough of Camden's noise limit is shown in Table 3.

Description	Equipment Overall Noise Level	London Borough Of Camden Overall Noise Limit
Noise to nearest residential windows from proposed kitchen extract fan type SMVW 500/4 (500mm diameter) with silencer fitted	28.3dBA	≤32dBA

Table 3: Equipment noise to nearest residential windows compared with noise limit

Table 3 shows that overall equipment noise (with the proposed silencer fitted) readily complies with London Borough of Camden's planning consent noise limit.

Note that in addition to the overall dBA value calculated and shown in Table 3, an assessment has also been carried out of octave band noise levels for the equipment. With the proposed silencer fitted it is calculated that octave band noise levels for the equipment will also readily comply with London Borough of Camden's requirement to not add more than 1dBA to the existing L₉₀ octave band background noise level.

5. VIBRATION FROM MECHANICAL SERVICES EQUIPMENT

The location for the proposed new kitchen extract fan system internally within the building is structurally linked to residential properties on upper floor levels of the site itself. Therefore it is possible that equipment vibration could transmit into the properties. It is therefore recommended that proprietary high performance vibration isolators be fitted to the equipment items as good practice and to mitigate this risk. Specification details for suitable vibration isolators are provided in Section 6.2 of the report.

6. SPECIFICATIONS FOR NOISE & VIBRATION TREATMENTS

Note that whilst this report is based on the specific proposed make and model of kitchen extract fan as detailed in Section 4, if during later design stages or during construction or as part of routine equipment maintenance or equipment replacement, an alternative make and model of extract fan is selected then it is important that noise levels for the alternative equipment be checked by Philip Acoustics or another Acoustic Consultant to ensure the treatments specified below remain valid and noise/vibration emissions will remain compliant with London Borough of Camden's planning consent requirements.

6.1 Noise

A silencer will be fitted to within the kitchen extract fan system atmosphere side duct. The proposed silencer is type KSD 1000/500 (ref 8733) by Arda Metal Works Ltd specifically intended to suit the square cased mixed-flow single phase fan SMVW 500/4 (500mm diameter).

A copy of the manufacturer's data sheet (including noise attenuation data) for the proposed silencer is provided in Appendix E. Summary specification for the silencer is given in Table 4.

Description	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Silencer TYPE KSD 1000/500 (ref 8733) by Arda Metal Works Ltd								
Silencer Insertion Loss (attenuation) dB	2*	5	7	16	21	21	17	12

Note * No silencer performance data provided for 63Hz octave band, data for 63Hz in Table 5 is as typical for the type of silencer proposed

Table 4: Specification details for silencer type KSD 1000/500 (ref 8733) by Arda Metal Works Ltd

The silencer should be positioned within the outlet (atmosphere) side duct adjacent to and after the extract fan as shown on the layout drawing in Appendix C. It is also recommended that the silencer be suitable for kitchen extract system which normally means the silencer would have a melinex lining.

The normal build-up of deposits inside kitchen extract ductwork can degrade the performance of silencers over time. It is important therefore to clean the inside of the oven extract fan silencer at regular intervals. This cleaning should be at least every 6 to 12 months depending up on the level of deposit build up and would normally take place during routine kitchen extract ductwork cleaning (usually an insurance requirement). Cleaning is done by scraping heavy deposits from the inside of the silencer using a non-sharp wooden or plastic implement and then cleaning off the remainder light deposits with mild detergent and a soft brush. It is important that the cleaning process does not damage the melinex lining of the silencer.

6.2 Vibration

It is recommended that the kitchen extract fan be installed using high performance spring type vibration isolator hangers or mounts having a nominal static deflection minimum 25mm under the installed total weight of the fan. Four isolators are normally required, one for each corner of the extract fan unit.

The hangers or mounts should only take weight of the extract fan unit; ductwork (including silencer) attached to the fan should be supported by other separate rubber or neoprene vibration isolator hangers. The vibration isolators must incorporate rubber or neoprene noise stop pads.

The extract fan unit must also have ductwork flexible connections fitted. To be effective the flexible connections need to be "loose" (not taugt) when installed and would be typically formed using rubber or neoprene sheet material, standard size flexible connections are available from most duct suppliers. It is not recommended to use canvas type flexible connections as these are generally not as "loose" as rubber and neoprene connections and do not therefore provide as much vibration isolation. It is also recommended that the ductwork either side of the fan unit be mounted using proprietary rubber or neoprene mountings.

APPENDIX A

London Borough Of Camden Noise Conditions For Mechanical Services Equipment

Table D: Noise levels from places of entertainment on adjoining residential sites at which planning permission will not be granted

Noise description and measurement location	Period	Time	Sites adjoining places of entertainment
Noise at 1 metre external to a sensitive façade	Day and evening	0700-2300	L _{Aeq'} 5m shall not increase by more than 5dB*
Noise at 1 metre external to a sensitive façade	Night	2300-0700	L _{Aeq'} 5m shall not increase by more than 3dB*
Noise inside any living room of any noise sensitive premises, with the windows open or closed	Night	2300-0700	L _{Aeq'} 5m (in the 63Hz Octave band measured using the 'fast' time constant) should show no increase in dB*

* As compared to the same measure, from the same position, and over a comparable period, with no entertainment taking place

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL _{Aeq'}

Key evidence and references

- Camden's Noise Strategy, 2002
- The London Plan (Consolidated with Alterations since 2004), 2008
- Planning Policy Guidance 24: Planning and noise

APPENDIX B

Noise Survey Instrumentation

Site: 21 Newton Street, London WC2B 5EL

Report: 14204-002 Appendix B

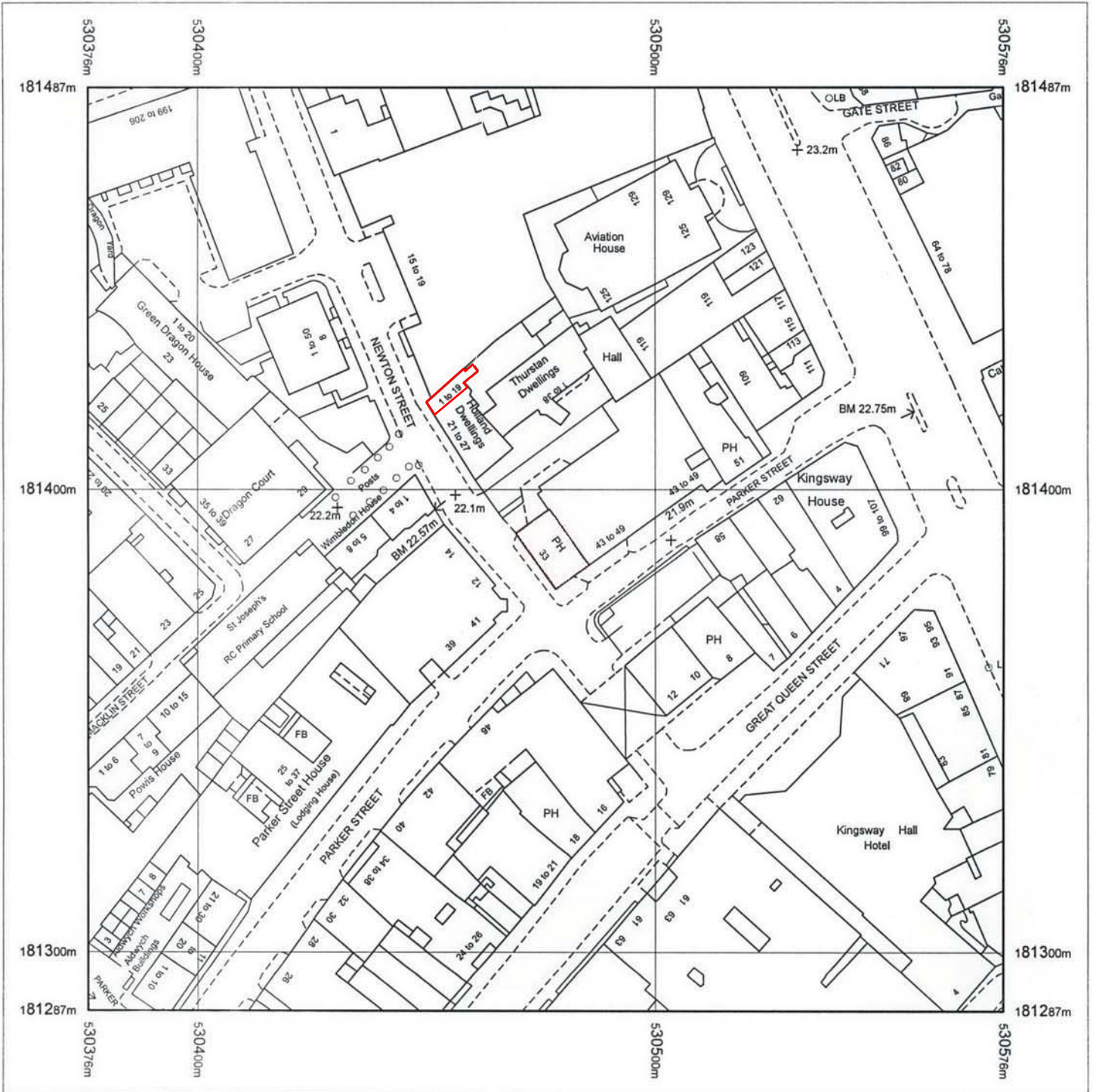
Date: September 2014

NOISE SURVEY INSTRUMENTATION

Equipment Description and Serial Number	Type Number	Manufacturer	Date of Calibration Expiration	Calibration Certificate Number
Class 1 Sound Level Meter s/n 2627604	2260	Bruel & Kjaer	08/07/2016	1407348
0.5" Microphone s/n 2625249	4189	Bruel & Kjaer	08/07/2016	1407348
Preamplifier s/n 4091	ZC0026	Bruel & Kjaer	08/07/2016	1407348
Calibrator s/n 2642929	4231	Bruel & Kjaer	04/07/2016	07808
Tripod	PV27	Centon	N/A	N/A
Explorer Software	7815	Bruel & Kjaer	N/A	N/A

APPENDIX C

Site Location Plan & Drawing Showing Proposed Equipment Location



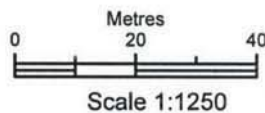
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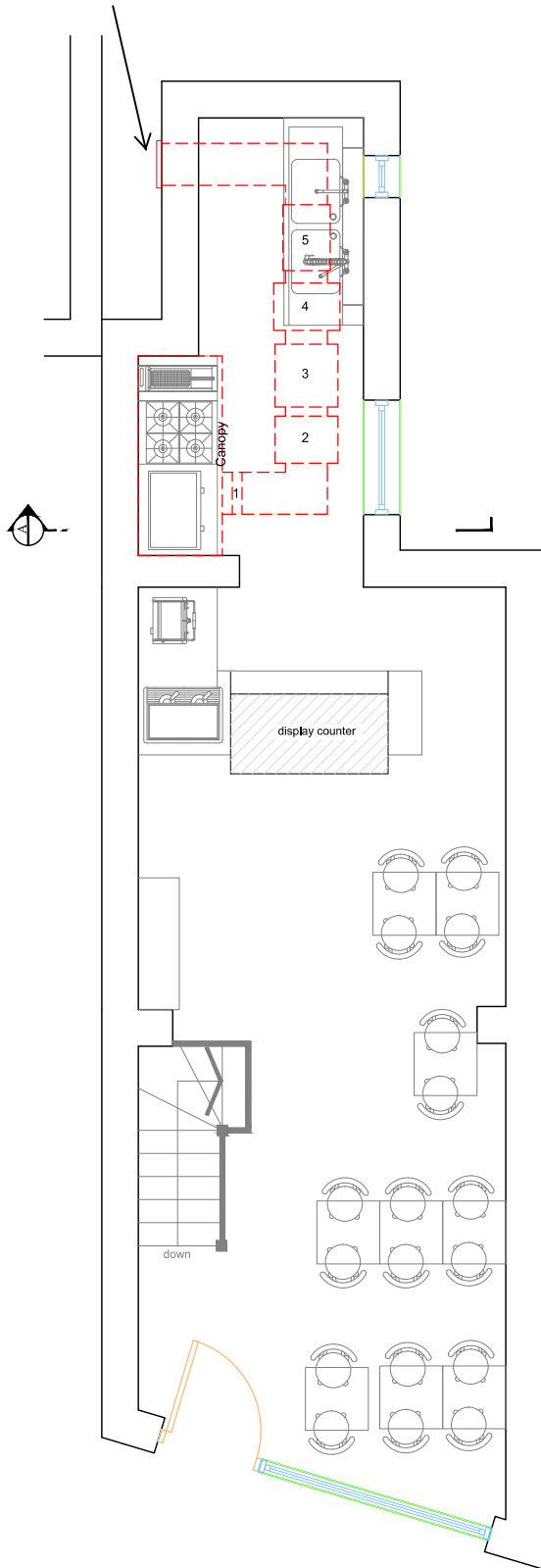
Supplied by: **Blackwells**
Serial number: 00719500
Centre coordinates: 530476 181387

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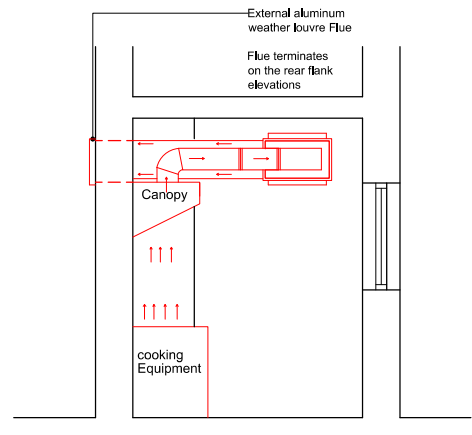
Extract via duct to louvre aperture in rear side wall




PROPOSED GROUND FLOOR

- 1 - Grease Filter
- 2 - Electrostatic Precipitator (ESP 1500)
- 3 - Carbon Filter
- 4 - Extract Fan
- 5 - Silencer

Background noise survey position in rear courtyard area behind site & directly adjacent to nearest residential windows



SECTION A-A

 deco architecture & engineering devrim@decoeng.co.uk	
Project	21 Newton Street WC2B 5EL
Client	Mr Sedat Duymus
Drawing Title	Section
Project Number	Date
21NS	01/05/2014
Drawn by	Checked by
DS	-
Scale	Revision
1:50@A3	-
Drawing No	
21NS-05	

APPENDIX D

Background Noise Level Survey Results

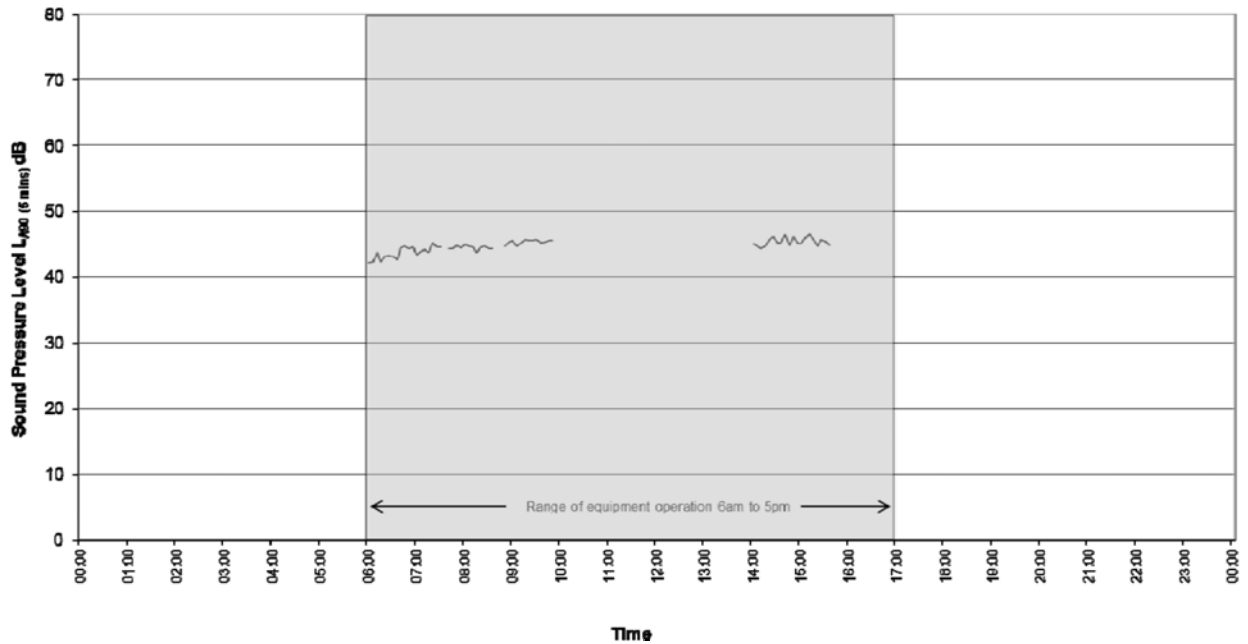
Site: 21 Newton Street, London WC2B 5EL

Report: 14204-002 Appendix D

Date: September 2014

BACKGROUND NOISE SURVEY RESULTS

Raw Data Background Noise Survey Results 11 September 2014 In Rear Courtyard Area
Behind Site At Position Adjacent To Windows Of Nearest Residential Properties



APPENDIX E

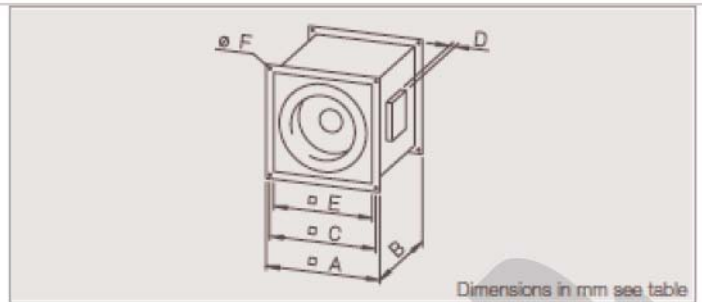
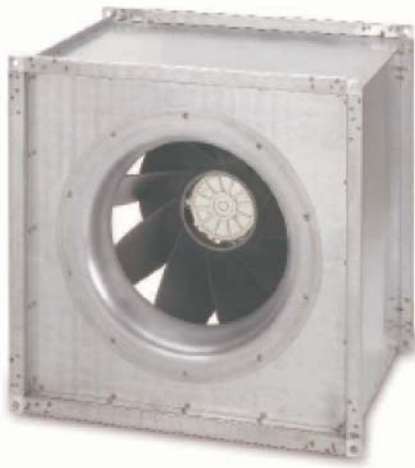
Manufacturer's Noise Data For Proposed Extract Fan & Silencer

ARDA METAL WORKS LTD.

Unit 6 • 20 Kynoch Road Edmonton • London • N18 3BD
020 8807 78 78 • activems@gmail.com

450 - 630 MM Diameter Square Mix Flow Fan Extraction Motor Unit Details

SMV



Unit dimensions in mm						
Type	A	B	C	D	E	ø F
SMV.. 450	492	400	470	65	447	10
SMV.. 500	547	450	520	65	502	10
SMV.. 560	595	485	573	65	550	10
SMV.. 630	707	510	680	65	661	10

Applications/use

- For medium airflow volumes against high resistances.
- Square flanges for quick connection onto ducting.

Features

- The Square Mixed flow vent range offers excellent fan performance in nominal duct dimensions of 450 to 660 mm square.
- Compact design to minimise space and cost.
- Square quick fix flanges offer fast and effective installation.
- 100 % speed controllable.
- Extensive range of accessories including starters, speed controllers, flexible connectors, silencers and filters.
- Units can be mounted in any position.
- Simple electrical connection via a terminal box on the casing.
- Robust corrosion resistant casing, designed for duct connection. Suitable for internal or external installation.

Specification

Motor

Maintenance free, external rotor motor with sealed for life ball bearings. Protection to IP 54, insulation-class B for 1 phase and class F for 3 phase motors.

Motor protection

All models are fitted with thermal contacts which should be connected to a motor protection device.

Casing

Made from galvanised sheet steel with fitted quick fix flanges.

Impeller

Mixed-flow impeller made from galvanised steel.

Speed control

All models are fully speed controllable. Suitable controllers, electronic and auto-transformers, are available as accessories.

Terminal box

The external terminal box for electrical connection is IP 55.

Electrical connection

The connection of the electrical supply must be carried out in accordance with all relevant regulations. Connection is via the terminal box on the casing.

Installation

Installation at any angle.

Safety notice

Protection against accidental contact to DIN EN 294 must be provided by the installer.

Noise levels

The data table below gives the sound pressure level (air noise) in dB(A) at 1 metre under freefield conditions. The total sound power levels shown on the performance curves are for intake, extract and case break-out.

Performances

All performances are at an air density of 1.20 kg/m³.

Other accessories	Pages
Adaption plate for circular ducts, flexible connectors, attenuators, filters, heaters and speed controllers	210

Type	Ref. No.	R.P.M.	Air flow volume FID	Sound press. level at 1 m	Power	Max. air flow temp.	Current Amps	Wiring diagram	Nominal Weight	5 step transformer controller		5 step transformer controller with full motor protection	
										Type	Ref. No.	Type	Ref. No.
Single phase, 230 V / 1 ph. / 50 Hz, capacitor start motor, protection to IP 54													
SMVW 450/4	7822	1385	1.00	54	0.33	50	1.55	SS-434	26.0	TSW 3.0	1496	MWS 3	1948
SMVW 500/4	7823	1330	1.45	62	0.51	45	2.27	SS-434	41.0	TSW 3.0	1496	MWS 3	1948
SMVW 560/4	7824	1280	1.94	61	0.86	45	4.10	SS-434	42.0	TSW 5.0	1497	MWS 5	1949
SMVW 630/4	7825	1315	3.10	69	1.50	40	6.60	SS-434	57.0	TSW 7.5	1596	MWS 7.5	1950
Three phase, 400 V / 3 ph. / 50 Hz motor, protection to IP 54													
SMVD 500/4	7826	1400	1.48	57	0.55	70	1.48	SS-469	32.0	TSD 3.0	1502	RDS 2	1315
SMVD 560/4	7827	1315	1.87	62	0.79	50	1.51	SS-469	40.0	TSD 3.0	1502	RDS 2	1315
SMVD 630/4	7828	1305	2.90	63	1.28	50	2.24	SS-469	52.0	TSD 3.0	1502	RDS 4	1316

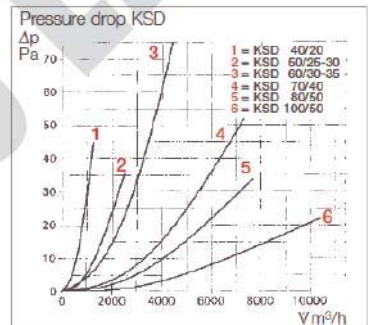
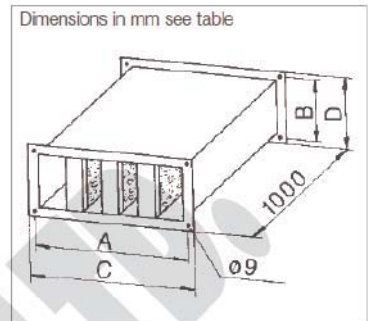
ARDA METAL WORKS LTD.

Unit 6 • 20 Kynoch Road Edmonton • London • N18 3BD
020 8807 78 78 • activems@gmail.com

450 - 630 MM Diameter Square Mix Flow Fan Silencer Details

- Rectangular attenuator KSD
- Specification – Installation
Casing made from galvanised steel with flanges to fit the fan's dimensions. To be installed in-line with ducting on inlet or exhaust. To reduce vibration transmission from the fan, a flexible connector (accessories VS or VS... Ex) should be installed between fan/attenuator and ducting.

- Pressure drop
The attenuator will add an additional resistance to the duct system (see chart), which must be considered when selecting a fan. The figures shown refer to an equal inlet into the attenuator. Turbulences from the fan's exhaust can be reduced if 1 metre of straight ducting is fitted between fan and attenuator. Otherwise allow for a higher resistance.



Type	Ref. No.	Duct size in mm	Dimensions in mm				Nominal weight kg	Attenuation D_e dB						Average attenuation	
			A	B	C	D		125	250	500	1000	2000	4000		8000
KSD 400/200	8728	400/200	420	220	443	240	13	8	11	23	31	31	26	18	17
KSD 500/250..	8729	500/250-300	520	270/320	540	340	16.5	6	9	19	25	25	20	15	14
KSD 600/300..	8730	600/300-350	620	320/370	640	390	20	7	10	21	28	28	23	16	12
KSD 700/400	8731	700/400	720	420	740	440	25	6	8	18	24	24	20	14	12
KSD 800/500	8732	800/500	820	520	840	540	31	7	9	19	26	26	21	15	14
KSD 1000/500	8733	1000/500	1020	520	1040	540	35	5	7	16	21	21	17	12	11

450 - 630 MM Diameter Square Mix Flow Fan Speed Controller



Type	Ref. No.	I max. A	Dims. in mm		
			W	H	D
For 1 ph. / 230 V					
TSW 3.0	1496	3.0	154	200	148
TSW 5.0	1497	5.0	200	254	98
TSW 7.5	1596	7.5	200	254	167
For 3 ph. / 400 V					
TSD 3.0	1502	3.0	200	254	167

5 step transformer controller TSW / TSD
Robust ISO casing, of impact resistant polymers colour light grey. Protection IP 54. Built in 5 step switch providing on/off and 5 speed settings. Available for 220/240 V 1 ph. and 400/440 V, 3 ph. supply.

APPENDIX F

Acoustic Calculations

Site: 21 Newton Street, London WC2B 5EL
Report: 14204-002 Appendix F
Date: September 2014

ACOUSTIC CALCULATION SHEET

ASSESSMENT POSITION: To outside windows of nearest residential properties (rear of site)

NOISE CONDITION: Proposed kitchen extract fan system operating full duty

NOISE MITIGATION: High performance duct silencer fitted to system (see Section 6.1 of report 14204-002)

Equipment	Equipment Sound Pressure Level Lp dBA (1)	Correction for noise attenuation dBA (2)	Distance to assessment position m (3)	Correction for distance to assessment position dBA (4)	Correction for line of sight screening dBA (5)	Correction for acoustic directivity dBA (6)	Correction for acoustic reflections dBA (7)	Individual Contributions dB
Kitchen Extract Fan System	59.2	-15	7	-17	-5	0	+6	28.3
SMVW 500/4 fan								
Overall SPL from sources at assessment position:	28.3 dBA (8)							

Notes:

Note 1: Equipment Sound Pressure Level (Lp dBA) based on manufacturer noise data and takes account of any natural ducting losses and external aperture end reflection as appropriate applied to manufacturer's data.

Note 2: High performance silencer to kitchen extract fan system (see Section 6.1 of Report 14204-002), silencer attenuates noise by different amounts at different frequencies, overall reduction is -15dBA for silencer as applied to fan type SMVW 500/4.

Note 3: Distance is from center of sound source (extract aperture) to center of receiving position (nearest residential windows).

Note 4: Distance correction allowing free-field sound radiation (see note 7 for correction to take account for non free-field conditions).

Note 5: Complete line of sight natural acoustic screening between extract aperture position and residential windows (no windows overlook the extract aperture), cautiously limit acoustic screening loss benefit to -5dBA.

Note 6: Cautiously nil "off axis" directivity loss / correction applied.

Note 7: Reflections, allow correction to account for acoustic reflections off surrounding hard vertical structures (walls), i.e. the extract aperture does not radiate noise into free-field conditions, cautiously allow a high (onerous) correction +6dBA.

Note 8: Overall sound pressure level at assessment position (with silencer fitted) is 28.3dBA.