Philip Acoustics Ltd.

Consultants in Noise and Vibration

REPORT TITLE: ACOUSTIC REPORT FOR PROPOSED AIR HANDLING UNIT AT 10 MAPLE STREET, LONDON W1T 5HA

REPORT REF: 18231-002

ISSUED TO: Yunus Emre Institute London
10 Maple Street
London
W1T 5HA

ISSUED BY: Chris Swiejkowski MEng MIOA

DATE: July 2019

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CONTENTS

SUMMARY

- Philip Acoustics has been commissioned to assess noise from an Air Handling Unit (AHU) proposed to be installed at Yunus Emre Enstitusu (Yunus Emre Institute London), 10 Maple Street, London W1T 5HA. The AHU is to be located on the flat roof of a new fourth floor roof extension to the existing building. The assessment with London Borough of Camden's planning consent noise conditions for mechanical services equipment as contained in Policy A4 – Noise and Vibration of Section 6 – Protecting Amenity of Camden Local Plan (adopted June 2017).

- As part of the assessment a noise survey has been carried out over a five day period to establish minimum existing background noise levels during operational times of the AHU at a position representative of the nearest noise sensitive positions.

- Based on results of the background noise survey and noise model calculations using equipment manufacturer's noise data, the overall noise level due to the proposed new AHU (with proposed silencers fitted) is calculated to comply with London Borough of Camden's planning consent noise requirements for mechanical services equipment.

- Full specification details for the proposed silencers are provided in Section 5 of the report.

1. INTRODUCTION

A new Systemair Air Handling Unit (AHU) is proposed to be installed at Yunus Emre Enstitusu, (Yunus Emre Institute London) 10 Maple Street, London W1T 5HA. The unit is to serve a multifunction room within the institute and is to be located externally on the roof of a new fourth floor extension to the existing building.

It is anticipated that as part of the planning application process for the development (including AHU), the Local Planning Authority (London Borough of Camden) will require information in the form of an acoustic report regarding noise from the proposed new equipment in order to seek to protect the amenity of residents in the vicinity with regard to possible noise emissions from the equipment.

Philip Acoustics has therefore been commissioned to provide an acoustic assessment for the equipment. This 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 AHU noise levels;
- Consideration of vibration from the AHU;
- Review of noise control treatments necessary to comply with London Borough of Camden's planning consent requirements.

2. LONDON BOROUGH OF CAMDEN NOISE REQUIREMENTS

Policy A4 – *Noise and Vibration* of Section 6 – *Protecting amenity* of Camden Local Plan (adopted June 2017) covers in detail noise issues relating to a wide range of planning and noise pollution scenarios, including mechanical services equipment and has been copied below:

Policy A4 Noise and vibration

The Council will seek to ensure that noise and vibration is controlled and managed.

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a. development likely to generate unacceptable noise and vibration impacts; or
b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

Camden's Noise and Vibration Thresholds are listed in Table C of Appendix 3 which has been copied below:

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 57dBL_{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 88dBL_{Amax}

Section *Industrial and Commercial Noise Sources* of Appendix 3 includes the statements: "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 10dB below background (15dB if tonal components are present) should be considered as the design criterion".

It is the author's experience and professional opinion that the type of proposed Systemair AHU as subject to this noise assessment (additionally fitted with proposed silencers) generates a typically broadband type noise without any strong or clearly perceptible tonal element to the assessment positions. Therefore the noise limit of 10dB below background of London Borough of Camden's planning consent noise conditions is applied in this instance.

The design criterion is applicable to gardens used as amenity spaces and/or to outside nearest residential windows. For this site the noise assessment is carried out to two noise sensitive positions: outside non-associated residential windows and outside the windows of the student accommodation as being observed to be the nearest noise-sensitive locations in relation to the proposed equipment location.

3. NOISE SURVEY

In order to assess noise from the proposed AHU unit against London Borough of Camden's planning consent noise requirement it is necessary to establish representative minimum background noise levels at the assessment positions. Details of the background noise survey carried out by Philip Acoustics are provided in Sections 3.1 to 3.3.

3.1 Survey Instrumentation

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

3.2 Survey Details and Procedure

The client has advised that the proposed AHU will operate during Institute opening hours only (which are 9:30am – 4:30pm Monday to Friday). Therefore the survey was carried out over at least a full 24 hour period to obtain background noise levels during the entire possible time of operation for the AHU.

The noise survey was carried out over a five day period from Thursday 11 July 2019 through Monday 15 July 2019 to obtain background noise levels during the entire range of operational times for the equipment. The weather included dry and calm conditions during the survey day and also night periods.

Measurements of background noise were recorded continually as overall L_{A90} dB values over 15 minute periods for the survey duration.

Proposed location for the AHU, direction to the nearest noise sensitive positions and position for the background noise survey are shown/indicated on the site location aerial image and drawing in Appendix B.

The nearest noise sensitive positions in relation to the proposed AHU location are observed to be:

- Position 1: Non-associated residential windows at top floor within adjacent building at Irvine Court Whitfield Street;
- Position 2: Top floor windows of a student accommodation within Ramsay Hall at Whitfield Street.

The background noise survey measurement position was at roof edge (overlooking Whitfield Street) of the building at 10 Maple Street using an extension pole and microphone extension lead arrangement. This measurement position was selected as being best achievable/accessible and representative of the nearest noise sensitive positions as described above.

3.3 Survey Results

Raw data results of the background noise survey are provided graphically in Appendix C.

Existing noise levels in the vicinity are predominantly due to traffic on surrounding roads, general activity in the local area and mechanical services serving other adjacent properties. Summary of the representative minimum measured L_{A90} background noise level and corresponding noise requirement are shown in Table 1.

Description	Proposed AHU Operating Times	Representative Minimum Background Noise $L_{A90,\ 15min}$	London Borough of Camden Noise Limit
Assessment to nearest noise sensitive positions	AHU operable between 9:30AM-4:30PM (Monday-Friday)	45dB *(this value occurs in the afternoon circa 2pm to 5pm)*	≤ 35dBA

Table 1: Measured background noise and associated noise limit

4. NOISE FROM AIR HANDLING UNIT

The proposed new Air Handling Unit is Systemair model Topvex SR09 HWL-R-CAV complete with matching silencers Systemair model LDR-B 110-60 to the atmosphere side intake and exhaust.

Proposed location of the AHU is described in Section 3.2 and shown on the drawing in Appendix B.

The manufacturer noise data for the Systemair AHU is in terms of octave band dB in-duct sound power levels and is provided in Appendix D.

Summary of noise data for the AHU in terms of overall dBA sound pressure levels at 1m is shown in Table 2 (overall sound pressure level for Systemair AHU fresh air intake and exhaust systems have been derived using Systemair AHU published sound power levels and take account of proposed Systemair silencers and any natural attenuation due to the apertures end reflection).

Description		Sound Pressure level at 1m Free-Field dBA
Systemair AHU Topvex SR09-HWL-R-CAV	Fresh Air Intake	35 (with silencer)
	Exhaust Air	45 (with silencer)

Table 3: Equipment free-field sound pressure levels

To calculate the noise contribution from the AHU to the assessment positions a spreadsheet based noise model has been used. The model takes account of the distance between the AHU fresh air intake and discharge terminals and assessment positions, acoustic directivity, acoustic reflections and any natural line of sight acoustic screening.

The noise model calculation also takes account of the proposed silencers noise reduction treatment applied to the AHU fresh air intake and exhaust systems as specified in Section 6.1 of this report.

Noise model calculation details are provided in Appendix E.

The model overall calculated noise levels from the proposed AHU to nearest noise sensitive positons (as described in Section 3.2) compared with London Borough of Camden's noise limit requirements are shown in Table 3.

Description	AHU Overall Noise Level	Noise Level Limit	Comment
Assessment Position 1: Outside residential windows within Irvine Court at Whitfield Street	20dBA	≤ 35dBA	Complies
Assessment Position 2: Outside windows of student accommodation within Ramsey Hall	19dBA	≤ 35dBA	Complies

Table 3: Noise from AHU to assessment positions

Table 3 shows that noise from the proposed AHU with proposed silencers fitted (as detailed in Section 6.1) readily complies with London Borough of Camden's planning consent noise requirement. Noise from the proposed AHU will be substantially below (and substantially more than 10dB below) existing minimum background and would not be expected to be audible or of impact on the amenity of adjacent residential occupiers.

5. SPECIFICATIONS FOR NOISE TREATMENT

Whilst this report is based on the specific make and models of proposed Systemair Air Handling Unit as detailed in Section 4, if during installation or as part of future equipment replacement, an alternative unit make and/or model is selected then it is important that noise level for the alternative equipment be checked by Philip Acoustics or another Acoustic Consultant to ensure the treatments specified below remain valid and noise emissions remain compliant with London Borough of Camden's requirements.

The client's mechanical engineer has advised that the proposed Systemair Air Handling Unit will be equipped with matching silencers Systemair model LDR-B 110-60 to the atmosphere side intake and exhaust.

Noise assessment carried out within this report confirms that the AHU with these proposed silencers fitted readily complies with London Borough of Camden's noise requirement.

A copy of the manufacturer's data sheet (including noise attenuation data) for the Systemair silencers is provided in Appendix F. Summary specification for the silencers is provided in Table 4.

Description	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Systemair Silencer model LDR-B 110-60								
Silencer Insertion Loss (attenuation) dB	5	12	19	28	27	20	14	11

Table 4: Specification details for Systemair silencer model LDR-B 110-60

APPENDIX A

Noise Survey Instrumentation

Site: 10 Maple Street, London W1T 5HA

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Date: July 2019

NOISE SURVEY INSTRUMENTATION

- Rion sound level meter type NL-31 Class 1 serial number 01193690 plus Rion microphone type UC-53A serial number 317534 complete with weatherproof and lockable outdoor environmental kit, microphone extension lead and extension boom arrangement;
- Bruel & Kjaer calibrator type 4231 serial number 2642929 (UKAS certified).

APPENDIX B

Positions Site Location Aerial Image & Drawing Indicating Unit Location

Site: 10 Maple Street, London W1T 5HA

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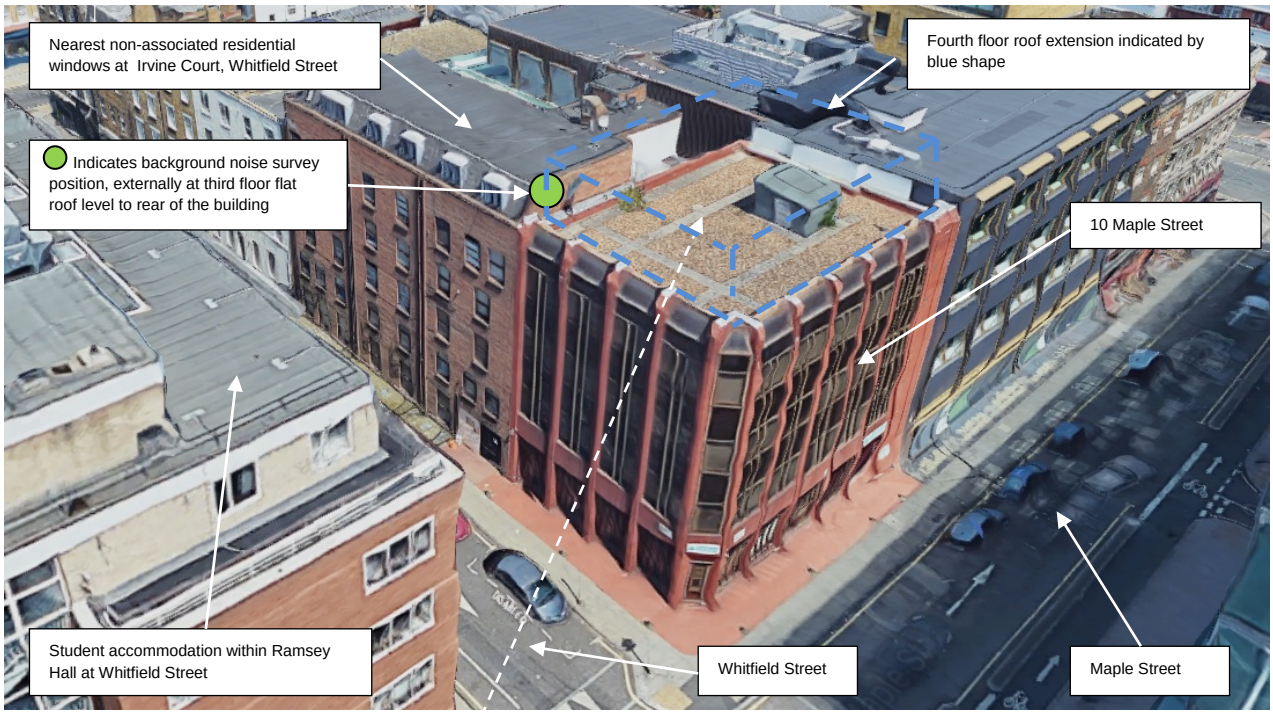
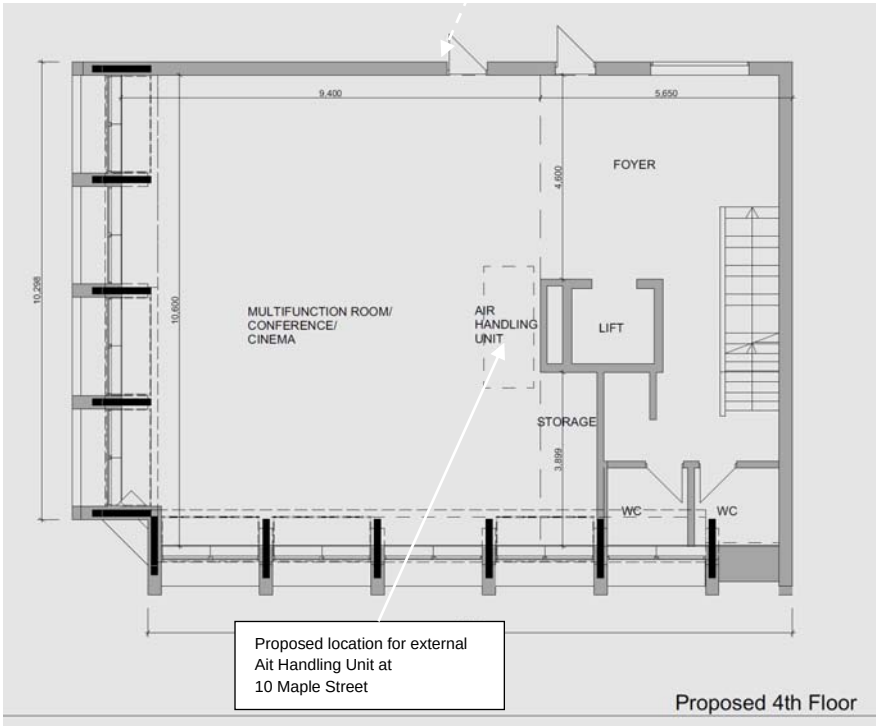
Date: July 2019

SITE LOCATION AERIAL IMAGE & DRAWING INDICATING PROPOSED AHU LOCATION





APPENDIX C

Noise Survey Results

Site: 10 Maple Street, London W1T 5HA

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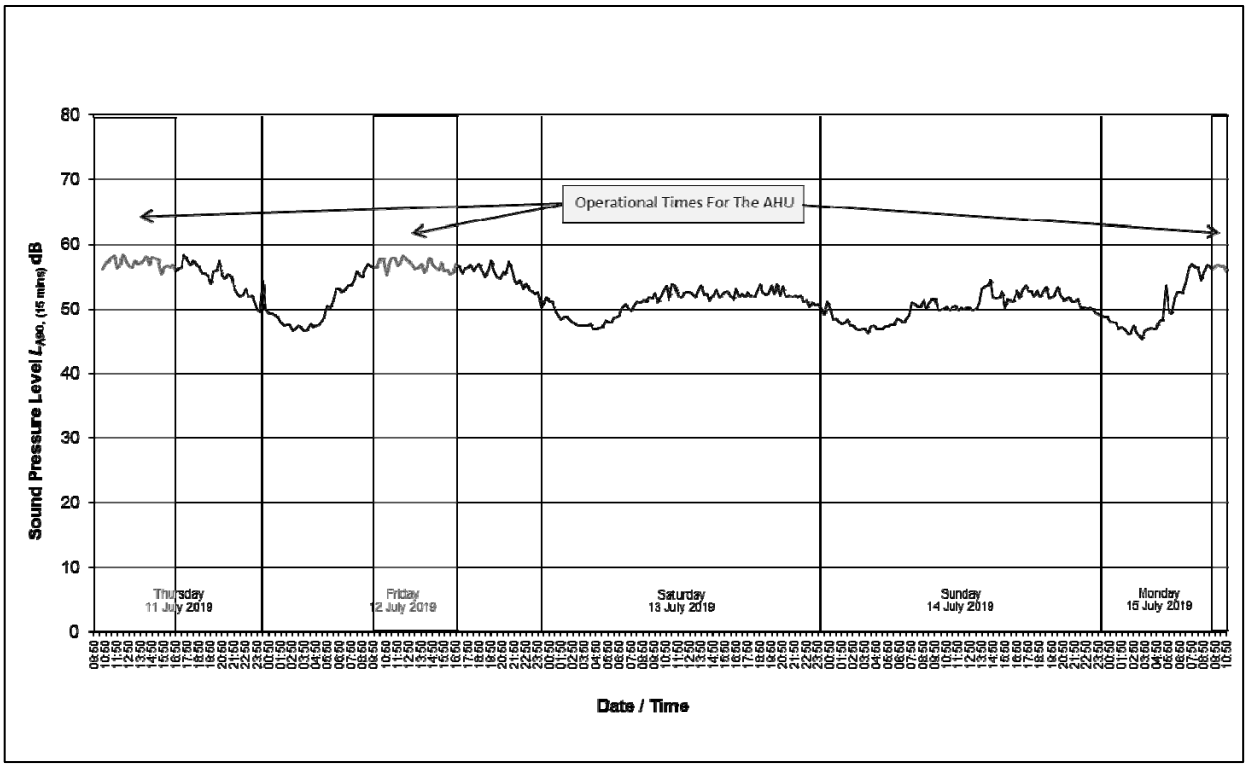
Date: July 2019

NOISE SURVEY RESULTS

Raw Data Five Day Background Noise Survey Results



APPENDIX D

Manufacturers Noise Data For Air Handling Unit

Site: 10 Maple Street, London W1T 5HA

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Date: July 2019

MANUFACTURER NOISE DATA FOR AIR HANDLING UNIT

Systemair model Topvex SR09 HWL-R-CAV:

systemair

Project name Project

Project number

Unit no. 1

29.6.2019

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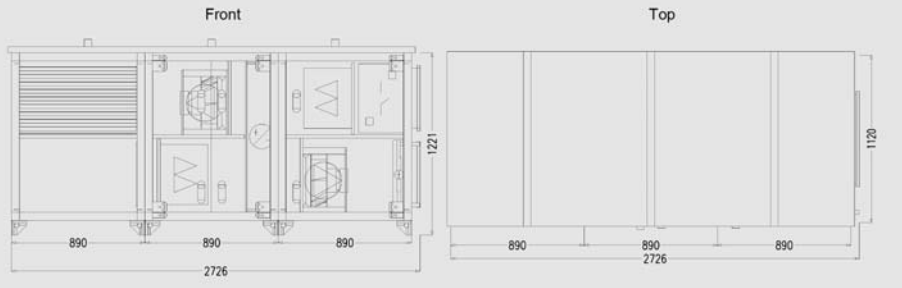

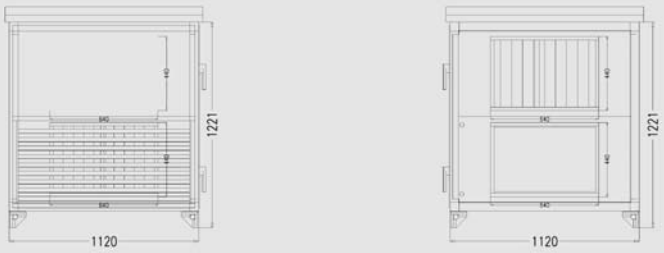

Winter

	63	125	250	500	1000	2000	4000	8000	Hz	Total	
Supply	81	74	78	78	76	72	68	62	dB	80	dB(A)
Outdoor	82	73	64	68	56	48	40	32	dB	67	dB(A)
Extract	76	74	72	67	58	49	41	31	dB	68	dB(A)
Exhaust	84	78	82	76	71	66	61	50	dB	78	dB(A)
Surrounding	63	68	62	54	49	46	42	43	dB	58	dB(A)

Summer

	63	125	250	500	1000	2000	4000	8000	Hz	Total	
Supply	81	74	78	78	76	72	68	62	dB	80	dB(A)
Outdoor	82	73	64	68	56	48	40	32	dB	67	dB(A)
Extract	76	74	72	67	58	49	41	31	dB	68	dB(A)
Exhaust	84	78	82	76	71	66	61	50	dB	78	dB(A)
Surrounding	63	68	62	54	49	46	42	43	dB	58	dB(A)

EUROVENT CERTIFIED PERFORMANCE

Systemair configurator 1.8.3 | 2019-06-28

APPENDIX E

Noise Model Calculation For Air Handling Unit

Site: 10 Maple Street, London W1T 5HA

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Date: July 2019

NOISE MODEL CALCULATION FOR AIR HANDLING UNIT

ASSESSMENT POSITION 1: Non-associated residential windows at Irvine Court, Whitfield Street

NOISE CONDITION: Systemair AHU Topvex SR09-HWL-R-CAV Fresh Air Intake & Exhaust systems operating

NOISE MITIGATION: Systemair Silencers Model LDR-B110-5 to Fresh Air Intake & Exhaust Systems

		Lin dB at Octave Band Centre Frequency Hz							
Equipment & Description	**Overall dBA**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
SYSTEMAIR AHU: Topvex SR09 HWL-R-CAV									
Sound pressure level Lp dB; *free-field level at 1m from fresh air intake aperture outlet*	55	62	57	51	57	45	37	29	21
Attenuation; Systemair Silencer Model LDR-B 110-5		-5	-12	-19	-28	-27	-20	-14	-11
Distance; *free-field correction for 10m from aperture to assessment position*		-20	-20	-20	-20	-20	-20	-20	-20
Screening; partial *line of sight screening correction applicable, limit to -5dB*		-5	-5	-5	-5	-5	-5	-5	-5
Directivity; none applied		0	0	0	0	0	0	0	0
Reflections; *nil correction applicable for this source*		0	0	0	0	0	0	0	0
Individual contribution at assessment location	10	32	20	7	4	-7	-8	-10	-15
SYSTEMAIR AHU: Topvex SR09 HWL-R-CAV									
Sound pressure level Lp dB; *free-field level at 1m from exhaust aperture outlet*	66	64	62	69	65	60	55	50	39
Attenuation; Systemair Silencer Model LDR-B 110-5		-5	-12	-19	-28	-27	-20	-14	-11
Distance; *free-field correction for 10m from aperture to assessment position*		-20	-20	-20	-20	-20	-20	-20	-20
Screening; partial *line of sight screening correction applicable, limit to -5dB*		-5	-5	-5	-5	-5	-5	-5	-5
Directivity; none applied		0	0	0	0	0	0	0	0
Reflections; *nil correction applicable for this source*		0	0	0	0	0	0	0	0
Individual contribution at assessment location	20	34	25	25	12	8	10	11	3
Cumulative contribution all sources at assessment position	**20.3**	36	26	25	13	8	10	11	3

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NOISE MODEL CALCULATION FOR AIR HANDLING UNIT

ASSESSMENT POSITION 2: Student accommodation windows within Ramsay Hall, Whitfield Street

NOISE CONDITION: Systemair AHU Topvex SR09-HWL-R-CAV Fresh Air Intake & Exhaust systems operating

NOISE MITIGATION: Systemair Silencers Model LDR-B110-5 to Fresh Air Intake & Exhaust Systems

		Lin dB at Octave Band Centre Frequency Hz							
Equipment & Description	**Overall dBA**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
SYSTEMAIR AHU: Topvex SR09 HWL-R-CAV									
Sound pressure level Lp dB; *free-field level at 1m from fresh air intake aperture outlet*	55	62	57	51	57	45	37	29	21
Attenuation; Systemair Silencer Model LDR-B 110-5		-5	-12	-19	-28	-27	-20	-14	-11
Distance; *free-field correction for 22m from aperture to assessment position*		-27	-27	-27	-27	-27	-27	-27	-27
Screening; none applied		0	0	0	0	0	0	0	0
Directivity; none applied		0	0	0	0	0	0	0	0
Reflections; *nil correction applicable for this source*		0	0	0	0	0	0	0	0
Individual contribution at assessment location	8	30	18	5	2	-9	-10	-12	-17
SYSTEMAIR AHU: Topvex SR09 HWL-R-CAV									
Sound pressure level Lp dB; *free-field level at 1m from exhaust aperture outlet*	66	64	62	69	65	60	55	50	39
Attenuation; Systemair Silencer Model LDR-B 110-5		-5	-12	-19	-28	-27	-20	-14	-11
Distance; *free-field correction for 22m from aperture to assessment position*		-27	-27	-27	-27	-27	-27	-27	-27
Screening; none applied		0	0	0	0	0	0	0	0
Directivity; none applied		0	0	0	0	0	0	0	0
Reflections; *nil correction applicable for this source*		0	0	0	0	0	0	0	0
Individual contribution at assessment location	18	32	23	23	10	6	8	9	1
Cumulative contribution all sources at assessment position	**18.5**	34	24	23	11	6	8	9	1

APPENDIX F

Noise Reduction Treatment For Air Handling Unit

Site: 10 Maple Street, London W1T 5HA

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Date: July 2019

NOISE REDUCTION TREATMENT FOR AIR HANDLING UNIT

Systemair Silencers Model LDR-B 110-60 to AHU Fresh Air Intake & Exhaust Systems

systemair

LDR-B 110-60 SILENCER, BAFFLE

Item no. 9698

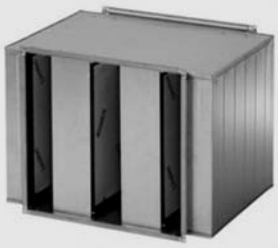
Document type: **Product card**
Document date: **2019-07-21**
Generated by: **Systemair Online Catalogue**

Description

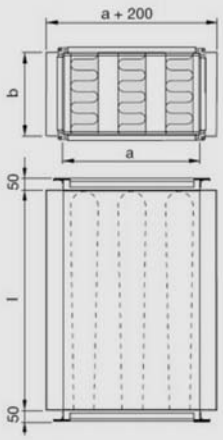
Rectangular baffle silencer

Description
LDR-B is fitted with built-in baffles and side baffles located outside the fitting dimensions.

Design
LDR-B has an external shell of trapezoidal corrugated sheet for stability and reduced risk of natural oscillation. LDR-B is designed for low air resistance with baffle combinations that dampen particularly low-frequency noise well. The type of insulation material is Lindtec which has been developed to provide good noise properties, low weight and to be cleanable. LDR-B meets the requirements of air tightness class C and pressure class 2 according to EN 1507:2006.



Dimensions



	a	b	l	
LDR-B 40-20	400	200	1250	16.0 kg
LDR-B 50-25	500	250	1250	19.7 kg
LDR-B 50-30	500	300	1250	21.6 kg
LDR-B 60-30	600	300	1250	23.6 kg
LDR-B 60-40	600	400	1250	27.6 kg
LDR-B 70-30	700	300	1250	25.6 kg
LDR-B 70-40	700	400	1250	29.8 kg
LDR-B 80-35	800	350	1250	29.1 kg
LDR-B 80-40	800	400	1250	31.2 kg
LDR-B 90-50	900	500	1250	41.6 kg
LDR-B 100-35	1000	350	1250	39.2 kg
LDR-B 110-60	1100	600	1250	56.4 kg
LDR-B 120-60	1200	600	1250	57.7 kg