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NOISE IMPACT ASSESSMENT REPORT - MECHANICAL PLANT

UNIT 2, 10 BLOOMSBURY WAY, LONDON WC1A 2SH

FOR

MR. CEMAL POLAT



ISSUE STATUS: FINAL
DATE OF ISSUE: 27/04/2018
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CHECKED: D ROONEY DIP ACOUSTICS
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Contents Page

1	Executive Summary	
2	Introduction	
3	Site Description	
4	Environmental Noise Survey Methodology	
5	External Noise Survey Results and Observations	
	5.1	Results
	5.2	Observations
6	External Noise Emission Limits	
	6.1	Local Authority Requirements
	6.2	BS 4142:2014
7	Proposed Mechanical Plant and Associated Noise Levels	
	7.1	Silencers
8	Noise Impact Assessment	
	8.1	Proposed Operational Hours and Background Noise Levels
	8.2	Nearest Noise Sensitive Properties
	8.3	Description of Calculation process
	8.4	Noise Level Prediction
	8.5	Vibration
9	Conclusion	
Appendix A Acoustic Terminology & References		
Appendix B Data Sheets and Figures		
Appendix C Noise Monitoring Data		
Appendix D Calculations		

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1. EXECUTIVE SUMMARY

It is proposed to install new commercial mechanical plant (kitchen extraction system) to service the premises at Unit 2, 10 Bloomsbury Way, London WC1A 2SH.

Sound Licensing has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive properties, which have been identified as the 1st floor flats directly opposite the premises.

The results of the noise survey were considered reasonable given the location of the measurement position and the existing noise sources in the local vicinity.

Noise calculations of the mechanical plant have been undertaken using all available details and plans provided by the client and obtaining manufacturers' specifications wherever possible. The data and information form the basis of the assessment.

Noise break-out limits for the mechanical plant have been proposed based on the methodologies of British Standard (BS) 4142:2014 and the London Borough of Camden's policy. A robust, worst-case assessment of the noise levels associated to the proposed mechanical plant has been undertaken.

In accordance with BS 4142:2014, the predicted noise impact due to the operation of the mechanical plant, with recommended mitigation measures installed with minimum sound insulation specifications, ***"is an indication of the specific sound source having a low impact"***. The predicted noise level of the mechanical plant at the nearest noise sensitive properties is considered to comply with the London Borough of Camden's policy.

2. INTRODUCTION

The client at Unit 2, 10 Bloomsbury Way, London WC1A 2SH is proposing to install mechanical plant at the side of the premises, the noise from which could have the potential to affect existing noise sensitive properties nearby.

The purposes of this report are:

- To determine prevailing environmental noise levels affecting surrounding properties due to nearby noise sources (e.g. road traffic, commercial noise, aircraft etc),
- Based on the above, to present noise emission limits in accordance with the requirements of BS 4142:2014 and the London Borough of Camden's policy, and
- To undertake an assessment to demonstrate compliance with the Local Authority noise requirements.

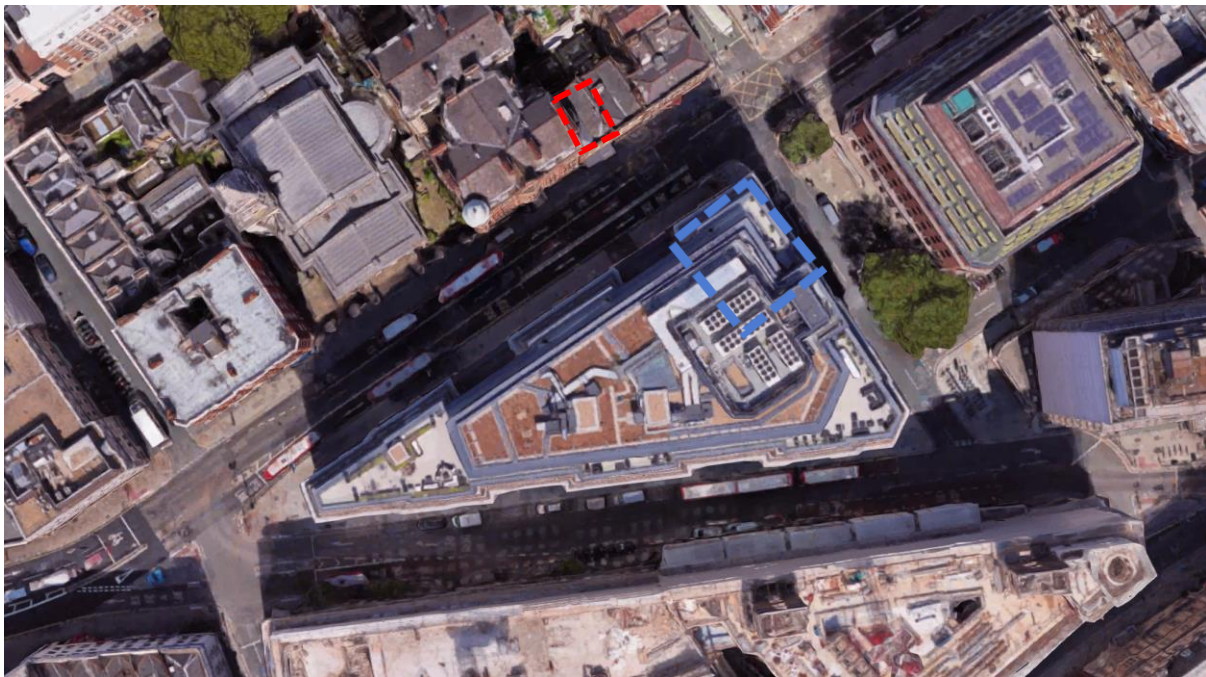
3. SITE DESCRIPTION

Unit 2, 10 Bloomsbury Way (hereafter 'the site') is seeking planning permission for the installation of mechanical plant at the side of the premises. The site is on the ground floor only with office premises located above. The site is located in a mixed commercial and residential area.

The nearest noise sensitive receptors to the proposed mechanical plant were noted to be directly across the main road at 1st floor level above 35 Bloomsbury Way (approximately 19 metres distance from the mechanical plant). If the noise impact assessment details that there is an indication of the specific sound source having a low impact at these premises then it can be safely assumed it will be met at other properties of equal distance and/or those further away.

Figure 3.1 shows the site highlighted in blue & the nearest residential receptor in red.

Figure 3.1 Site Location and Surrounding Land Use



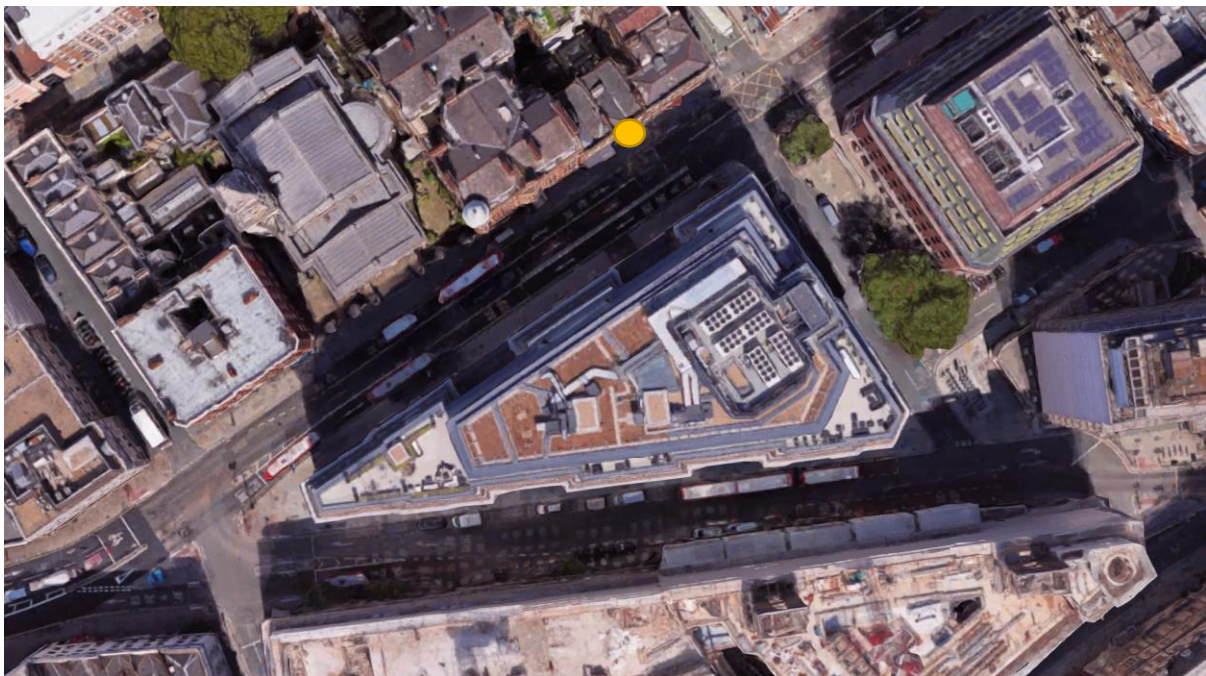
Source: Google maps

4. ENVIRONMENTAL NOISE SURVEY METHODOLOGY

An unmanned environmental noise survey was undertaken at a single measurement location at the first floor of 34 Bloomsbury Way directly opposite the site. The survey was undertaken between 13:30 hours on Friday 20th April and 22:00 hours on Sunday 22nd April 2018. A survey at this time covers the most sensitive period of times in which the mechanical plant may be operational (when background noise levels would be expected to be lower as opposed to weekdays).

Ambient, background and maximum noise levels (L_{Aeq} , L_{A90} and L_{Amax} respectively) were measured throughout the noise survey in continuous 15-minute periods. The approximate measurement position is indicated in **orange** on Figure 4.1 below.

Figure 4.1 Site Plan Showing Approximate Location of Measurement Position



Source: Google maps

The sound level meter was positioned at first floor level 1m from the front facade. The position is not considered to be in free-field and therefore a 3dB façade correction will be applied to all measurements. The monitoring position is considered representative of background noise levels at the nearest identified noise sensitive property.

The equipment used for the noise survey is summarised in Table 4.1.

Table 4.1 **Description of Equipment used for Noise Survey**

Equipment	Description	Quantity	Serial Number
Larson Davis Sound Expert LxT	Type 1 automated logging sound level meter	1	0004702
Larson Davis 377B02	½" microphone	1	142503
Larson Davis	Pre-amplifier	1	159519
Larson Davis CAL200	Class 1 Calibrator	1	0527

The noise survey and measurements were conducted in accordance with BS7445-1:2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'.

Weather conditions throughout the entire noise survey period were noted to be warm (approx. 24-9° Celsius), dry, clear skies with a light wind (<5m/s). These weather conditions were checked against and confirmed by the use of the Met Office mobile application available on smart phone technology. These conditions were maintained throughout the majority of the survey period and are considered reasonable for undertaking environmental noise measurements.

The noise monitoring equipment was field calibrated before and after the noise survey period. No significant drift was recorded (± 0.3 dB). Equipment calibration certificates can be provided upon request.

5. NOISE SURVEY RESULTS AND OBSERVATIONS

5.1 Results

A summary of the measured ambient and typical background noise levels during the proposed operational hours are shown in Table 5.1 below.

Table 5.1 Measured ambient and typical background sound pressure levels

Date	Ambient Noise Level, dB L _{Aeq}	Typical Background Noise Level, dB L _{A90,1hour}
20.4.18	66 – 74*	61*
21.4.18	63 – 73*	59*
22.4.18	63 – 78*	59*

*façade correction of -3dB

The typical background noise level at the measurement position during the survey, at the time in which the plant could be operational, is **59dB L_{A90} (1 hour)**.

5.2 Observations

Given that the background noise survey was unmanned, noise sources could not be identified. However, at the beginning and end of the survey background noise was dominated by vehicles on the local road network & existing commercial activity. After analysis of the data no significant abnormal noise source(s) were identifiable. It is considered that the measured noise levels are reasonable given the location of the measurement position.

6. EXTERNAL NOISE EMISSION LIMITS

6.1 Local Authority Requirements

The site lies within the jurisdiction of the Local Authority, the London Borough of Camden. Relevant policy from Camden's Local Plan, Adoption Version 2017, is reproduced 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.

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise.

Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:

- NOEL – No Observed Effect Level
- LOAEL – Lowest Observed Adverse Effect Level
- SOAEL – Significant Observed Adverse Effect Level

Three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will vary depending on the context, type of noise and sensitivity of the receptor:

- Green – where noise is considered to be at an acceptable level.
- Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- Red – where noise is observed to have a significant adverse effect.

Vibration

Table A: Vibration levels from uses such as railways, roads, leisure and entertainment premises and/or plant or machinery at which planning permission will not normally be granted

Vibration description and location of measurement	Period	Time	Vibration Levels (Vibration Dose Values)
Vibration inside critical areas such as a hospital operating theatre	Day, evening and night	00:00-24:00	0.1 VDV ms ^{-1.75}
Vibration inside dwellings	Day and evening	07:00-23:00	0.2 to 0.4 VDV ms ^{-1.75}
Vibration inside dwellings	Night	23:00-07:00	0.13 VDV ms ^{-1.75}
Vibration inside offices	Day, evening and night	00:00-24:00	0.4 VDV ms ^{-1.75}
Vibration inside workshops	Day, evening and night	00:00-24:00	0.8 VDV ms ^{-1.75}

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)	SOAEL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB below background and no events exceeding 57dB L _{max}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 58dB L _{max}	'Rating level' greater than 5dB above background and/or events exceeding 58dB L _{max}

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

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

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

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

For the purposes of this report, an assessment has been undertaken in line with the above policy guidance and BS 4142:2014.

Table 6.1 Maximum noise emission design target

Typical Measured Background Noise Level, dB L _{A90,1 hour}	Rating noise level 1m from nearest noise sensitive receptor, dB L _{Aeq}	Rating noise level 1m from nearest noise sensitive receptor if source contains audible tonal elements, dB L _{Aeq}
59	49	44

These representative noise levels are considered appropriate for the assessment.

6.2 BS 4142:2014

BS 4142:2014 “Methods for rating and assessing industrial and commercial sound” presents a method for assessing the significance and possible adverse impact due to an industrial noise source, based on a comparison of the source noise levels and the background noise levels, both of which are measured or predicted at a noise sensitive receiver e.g. a residential property.

The specific noise level due to the source is determined, with a series of corrections for tonality, impulsivity, intermittency or other unusual characteristic. This can result in a maximum total correction of +18dB being added if the new noise source demonstrates all of the above characteristics. The rating level is then compared to the background noise level and the significance of the new noise source likelihood of any adverse impact is determined in accordance with the following advice:

“The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occur. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

7. PROPOSED MECHANICAL PLANT AND ASSOCIATED NOISE LEVELS

It is proposed to install the following items of plant at the side of the premise.

Table 7.1 Proposed Mechanical Plant

Make	Model	Reference Noise Levels*
Helios	GBD 630/4/4	88dB LwA

*Reference 'A' weighted sound pressure level. Manufacturer's specification is provided in Appendix B.

It is proposed to install one Helios Fan internally with 500mm ducting to terminate at the side façade of the building (above the existing vehicle entrance point) for extraction. The existing construction of the premise is substantial therefore breakout noise from the fan motor is not included in this assessment.

In reference to section 6 of this report, a penalty addition of 3dB for intermittency has been applied in the calculations as the system will turned on and off due to demand. A penalty has not been applied for tonality as the manufacturer's data shows no significant characteristics. Penalty additions have not been applied for impulsiveness or any other unusual characteristics as mechanical plant of this type generally do not demonstrate such features.

7.1 Silencer

It is recommended to install one (1no.) acoustic silencers to the extract fan ducting (post-fan to atmosphere). Helios (Model: RSD 500/900), which provides the following level of attenuation (dB) at each centre octave frequency band (Hz). All silencers should be Melinex lined.

125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
6	8	14	16	13	13	9

8. NOISE IMPACT ASSESSMENT

This section presents calculations to predict the noise impact of the proposed mechanical plant located at the side of the unit, at the nearest noise sensitive properties.

8.1 Proposed Operational Hours and Background Noise Levels

The plant is proposed to operate between the following times:

Monday – Thursday, 11:30 -00:00

Friday & Saturday, 08:00 -01:00

Sunday, 08:00 – 22:00

As detailed in Section 6.1 of this report, the typical background noise level used in this assessment is 59dB L_{A90} (1 hour). The design range is 49dB L_{Aeq} at 1 metre from the façade of the nearest/most affected noise sensitive premises.

8.2 Nearest Noise Sensitive Properties

The nearest residential premises to the proposed plant was noted to be the directly across the main road at 1st floor level above 35 Bloomsbury Way at approximately 19 metres distance. Measurements have been completed to ensure noise levels are 1 metre from the façade of the premises in line with Local Authority requirements.

8.3 Description of Calculation Process

In accordance with the methodologies of BS 4142:2014 and the London Borough of Camden's Policy, calculations have been undertaken to predict noise levels at which the plant could be operational. It has been assumed that the plant will be operational continuously for a full hour and at their typical level. Given the distances between the plant to the sensitive receptors, point source calculations have been used.

8.4 Noise Level Predictions

Calculations to predict the noise of the plant operating 1metre from the window of the residential property are given below (see Appendix D for full calculations):

The rating noise level at 1m from the 1st floor residential rear façade window, with the mechanical plant operating, is predicted to be **47dB L_{Aeq}** **which is 2dB(A) below** the maximum noise emission design target and **12dB(A) below** the typical background noise level (59dB L_{A90,1hour}).

In accordance with BS 4142:2014 guidance the rating noise level, with recommended mitigation measures installed with minimum sound insulation specifications, ***“is an indication of the specific sound source having a low impact”***. *The lower the rating level is relative to the measured background level, the less likely it is that the specific sound source will have an adverse impact.*

In accordance with the Camden Local Plan (2017), with recommended mitigation measures installed the mechanical plant operational noise level at 1 metre from the nearest residential premises is determined to be at the Lowest Observed Effect Level (LOAL) and meets the London Borough of Camden’s ‘Green’ Design Target whereby *‘where noise is considered to be at an acceptable level’*.

8.5 Vibration

In addition to the control of airborne noise transfer, it is important to consider the transfer of noise as vibration to adjacent properties as well as any sensitive areas of the same building. Vibration from the system is not expected, however, as a precaution plant should wherever possible be installed on steel spring type isolators. The isolators shall incorporate rubber or neoprene high-frequency isolation pads. The fan should be installed with flexible connections to adjacent structures.

Uncertainty

The levels of uncertainty in the data and calculations are considered to be low given the robust exercise undertaken in noise monitoring and the confidence in the data statistical analysis. Manufacturers’ data for the plant is highly likely to be robust. Detailed calculations and resultant noise levels at the residential location are considered to be confidently predicted.

9.0 Conclusion

Sound Licensing has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive properties. The operation of the mechanical plant, in accordance with BS 4142:2014 guidance, indicates to creating a low impact. In accordance with the Camden Local Plan (2017), the mechanical plant operational noise level at 1 metre from the nearest residential premises is determined to be at **12dB(A)** below the typical background & at the Lowest Observed Effect Level (LOEL). All worst-case scenarios have been applied to the assessment. The predicted maximum operating noise level of the mechanical plant is demonstrated to comply with the London Borough of Camden’s policy requirements.

APPENDIX A – Acoustic Terminology

Parameter	Description
Acoustic environment	Sound from all sound sources as modified by the environment
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far
Ambient sound level, $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T
Background sound level, $LA_{90,T}$	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
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing (20×10^{-6} Pascals).
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	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
Measurement time interval, T_m	Total time over which measurements are taken
Rating level, $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Reference time interval, T_r	Specified interval over which the specific sound level is determined
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound
Residual sound level, $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T
Specific sound level, $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r
Specific sound source	Sound source being assessed

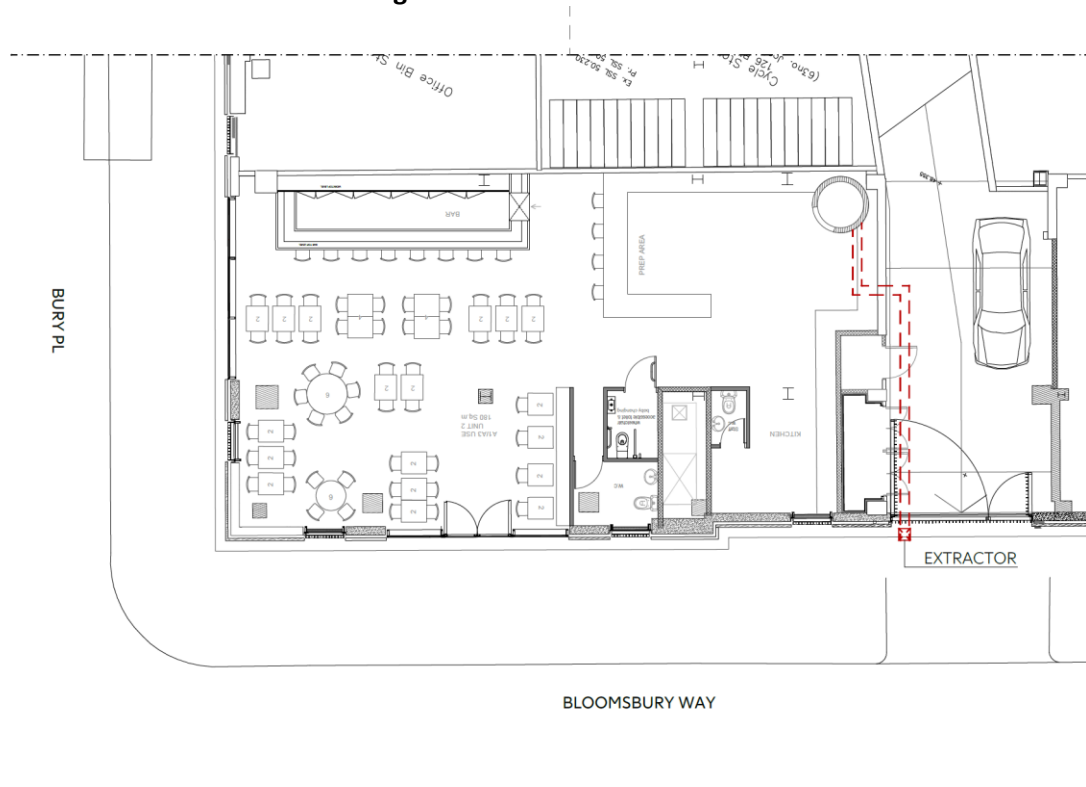
References:

BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'

http://camden.gov.uk/ccm/cms-service/stream/asset/?asset_id=3601932&https://www.camden.gov.uk/ccm/cms-service/download/asset?asset_id=2694293

Red Book of Acoustics

APPENDIX B – Data Sheets and Figures



1 Proposed Plan

Scale: 1:100 @ A1



1 Proposed Front Elevation

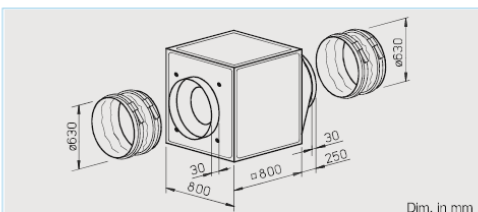
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630 mm ø GigaBox centrifugal fan

Helios

GB

Arbitrary installation position and flexible assembly by five possible discharge directions.



Special features of types GB T120

- Designed for moving dirty, humid and hot air volumes up to max. 120° C.
- Motor located outside of air flow.
- Temperature insulated partition panel between motor and impeller, lined with 20 mm thick, flame-retardant mineral wool.
- Easily accessible motor and impeller unit, removable without disassembling the system components.
- Inspection cover with handle, simply remove for cleaning and maintenance.
- Condensate collector with condensate spigot included in delivery. Drill hole for rain drainage (accessories) for outdoor installation is prepared.

Assembly GB T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

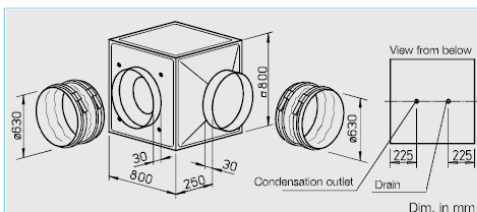
Feature

Assembly of types GB

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter. For wall mounting the wall bracket (accessories) have to be used. Outdoor installation is possible using outdoor cover

GB T120

Designed for moving dirty, humid and hot air up to max. 120° C. Motor located outside the air flow.



hood and external weather louvers (accessories).

Specification of both types

Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve (for the respective max. permissible air flow temperature) for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

Impeller

Smooth running backward curved aluminium centrifugal impeller highly efficient and direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 54. With ball bearings and interference-free as standard.

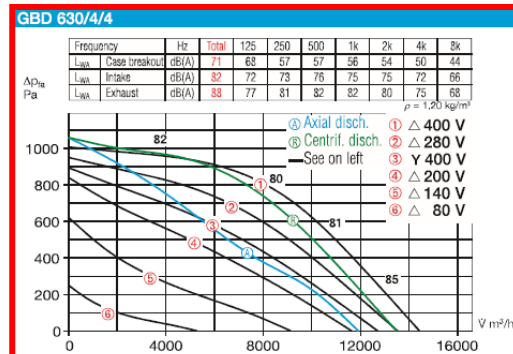
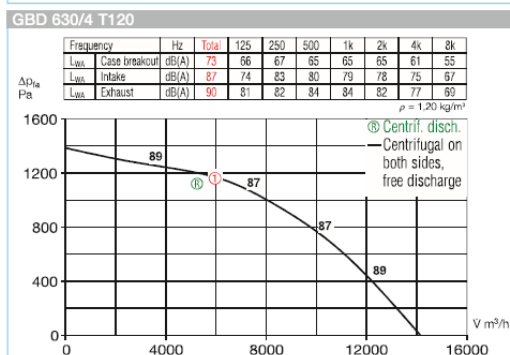
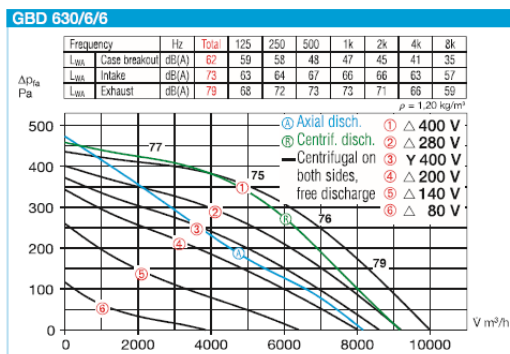
Electrical connection

Standard terminal box (IP 54) fitted on the motor; with GB T120 fitted on the motor support plate.

Type	Ref. no.	Air flow volume (FID)	R.P.M.	Sound press. case breakout	Motor power (nominal)	Full load	Current speed controlled	Wiring diagram	Maximum air flow temperature	Weight (net)	5 step transformer controller with mot. protect. unit	Full motor protection unit using the thermal contacts
		m³/h	min⁻¹	dB(A) in 4 m	kW	A	A	No.	+°C	kg	Type Ref. no.	Type Ref. no.
2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ, wiring, protection to IP 54												
GBD 630/6/6	5524	8600/9990	723/893	42	0.64/0.93	1.08/1.88	2.03	867	60	86	RDS 4 1316	TSD 5,5 1503
GBD 630/4/4	5523	12954/14430	1128/1383	51	2.40/3.45	4.10/6.20	7.20	867	75	105	RDS 11 1332	TSD 11,0 1513
3 Phase motor, 3~, 400 V, 50 Hz, protection to IP 54												
GBD 630/4 T120	5779	14200	1445	53	4.40	8.0	—	499	120	105	—	MD 5849

Helios

GigaBox centrifugal fan 630 mm ø



Motor protection

Types GBD with thermal contacts embedded on the terminal strip, which must be wired with the full motor protection device. Type GBD T120 with PTC thermistor for direct wiring with the full motor protection device or frequency inverter FU-BS (see table below, accessories).

Speed control

All types (except GB T120) are speed controllable by voltage reduction using a transformer controller. The 3-phase models can also be 2 speed controlled by Y/Δ switch or full motor protection unit M4; Type GBD T120 is exclusively controllable via frequency inverter with Sine filter. The duties at different speeds are given in the performance curve.

Sound levels

Total sound power levels and the spectrum figures in dB(A) are given for:
 - Sound level case breakout
 - Sound level intake
 - Sound level exhaust
 In the table below as well as underneath the performance curve you can find additionally the sound pressure levels at 4 m (free field conditions).

Accessories of both types

Anti vibration mounts for installation indoors. Set of 4.
SDD-U Ref. no. 5627

Wall bracket for wall mounting.
GB-WK 630 Ref. no. 5626

External weather louvers to cover exhaust opening.
GB-WSG 630 Ref. no. 5640

Outdoor cover hood for outdoor installation.
GB-WSD 630 Ref. no. 5749

Specific accessories

for types GB
Condensate collector with condensate spigot for pipe connection.
GB-KW 630 Ref. no. 5645
 (Condensate collector with condensate spigot included in delivery with GB T120).

On/Off and 2-speed switch for 3-phase Y/Δ motors.
Type DS 2¹⁾ Ref. no. 1351
¹⁾ full motor protection unit recommended: MD Ref. No. 5849

for types GB T120
Rain drainage for outdoor installation (drill holes for rain drainage is already prepared).
GB-RA Ref. no. 9418

Information	Page
Information for planning	10 on
General techn. information, speed control	15 on
Accessory-Details	Page
Speed controller and full motor protection unit	525 on

Silencer Specifications

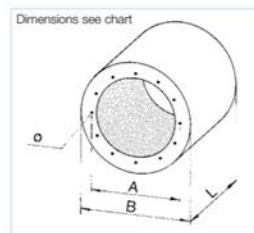
Helios

Flanged circular attenuator RSD

■ **Specification – Installation**
Casing made of galvanised steel, acoustically lined with high quality mineral wool covered with cloth to prevent erosion. Dimensions and tapped flange holes of all sizes fit fan's nominal diameter (R 20). Tapped holes in accordance to DIN 24155, Pt. 2.

■ **Insertion loss**
To increase the attenuation, several attenuators can be installed in-line.

■ **Pressure drop**
The resistance of the RSD attenuators is very low. When designing the system consider twice the pressure drop of rigid ducting.



Type	Ref. No.	Basic length	L	Dimensions in mm	Hole ø	Nominal weight kg	125	250	Insertion loss level	D _a dB	4000	8000	Average attenuation
Nominal-ø				A B					500 1000 2000				
RSD 280/ 400	8740	1	400	322 454	8 x M 8	10	4	5	8 14 9	8	6	8	8
RSD 280/ 800	8741	2	800	322 454	8 x M 8	18	7	9	16 28 18	17	14	14	14
RSD 280/1200	8742	3	1200	322 454	8 x M 8	25	9	12	23 37 23	20	16	18	18
RSD 315/ 400	8743	1	400	356 504	8 x M 8	11	3	3	7 13 8	7	5	5	5
RSD 315/ 800	8744	2	800	356 504	8 x M 8	19	6	8	14 26 16	12	9	12	12
RSD 315/1200	8745	3	1200	356 504	8 x M 8	28	9	12	21 36 18	17	14	18	18
RSD 355/ 400	8746	1	400	395 564	8 x M 8	13	3	4	7 11 7	6	4	6	6
RSD 355/ 800	8747	2	800	395 564	8 x M 8	23	6	7	13 22 14	12	8	11	11
RSD 355/1200	8748	3	1200	395 564	8 x M 8	33	8	11	17 29 18	15	10	17	17
RSD 400/ 400	8749	1	400	438 564	12 x M 8	12	3	4	6 9 7	5	3	6	6
RSD 400/ 800	8750	2	800	438 564	12 x M 8	21	6	6	12 18 13	12	8	9	9
RSD 400/1200	8751	3	1200	438 564	12 x M 8	30	7	10	14 22 18	13	9	15	15
RSD 450/ 400	8752	1	400	487 634	12 x M 8	17	4	5	8 10 8	7	5	8	8
RSD 450/ 800	8753	2	800	487 634	12 x M 8	27	6	7	13 18 13	12	9	11	11
RSD 450/1200	8754	3	1200	487 634	12 x M 8	38	8	10	18 23 17	14	10	15	15
RSD 500/ 600	8755	1	600	541 714	12 x M 8	27	4	5	9 11 9	9	6	8	8
RSD 500/ 900	8756	2	900	541 714	12 x M 8	36	6	8	14 16 13	13	9	12	12
RSD 500/1200	8757	3	1200	541 714	12 x M 8	45	8	11	22 24 17	16	12	17	17
RSD 560/ 600	8758	1	600	605 804	8 x M 10	32	3	5	9 9 8	8	6	8	8
RSD 560/1200	8759	2	1200	605 804	8 x M 10	52	6	10	19 19 16	13	10	15	15
RSD 630/ 600	8760	1	600	674 900	8 x M 10	44	3	5	8 8 8	7	5	8	8
RSD 630/1200	8761	2	1200	674 900	8 x M 10	68	5	10	16 15 15	11	8	15	15
RSD 710/ 600	8762	1	600	751 1000	8 x M 10	51	3	5	7 7 7	6	4	8	8
RSD 710/1200	8763	2	1200	751 1000	8 x M 10	80	5	10	14 13 13	10	7	15	15
RSD 800/ 600	8764	1	600	837 1100	12 x M 10	57	2	5	7 6 6	5	4	8	8
RSD 800/1200	8765	2	1200	837 1100	12 x M 10	88	5	9	13 11 11	9	6	14	14
RSD 900/ 900	8766	1	900	934 1220	12 x M 10	82	2	4	10 9 6	5	4	6	6
RSD 900/1800	8767	2	1800	934 1220	12 x M 10	135	4	9	21 17 13	9	8	14	14
RSD 1000/ 900	8768	1	900	1043 1350	12 x M 10	96	2	4	8 7 5	4	3	6	6
RSD 1000/1800	8769	2	1800	1043 1350	12 x M 10	157	4	7	16 14 10	7	6	11	11
RSD 1120/ 900	8770	1	900	1174 1350	12 x M 10	81	2	3	7 6 4	3	3	5	5
RSD 1120/1800	8771	2	1800	1174 1350	12 x M 10	136	3	6	14 11 8	6	5	9	9
RSD 1250/ 900	8772	1	900	1311 1460	12 x M 10	86	1	2	5 4 3	2	2	3	3
RSD 1250/1800	8773	2	1800	1311 1460	12 x M 10	146	2	4	11 9 7	5	4	6	6

APPENDIX C – Noise monitoring Data

20th April 2018

Time	L _{Aeq}	L _{Amax}	L _{A90}	L _{A90,1hour}
13:30:00	70.1	82.8	63.9	64
13:45:00	68.6	80.5	63.2	
14:00:00	70.1	83.6	64.3	
14:15:00	76.8	101.3	65.3	
14:30:00	71.3	84.6	65.2	65
14:45:00	75.0	98.5	64.8	
15:00:00	70.8	83.8	64.8	
15:15:00	76.0	97.1	65.9	
15:30:00	71.3	83.1	65.2	65
15:45:00	70.9	86.6	64.4	
16:00:00	72.7	95.0	64.6	
16:15:00	70.8	88.0	64.8	
16:30:00	69.5	82.1	64.1	64
16:45:00	70.6	85.3	64.9	
17:00:00	69.4	80.2	63.0	
17:15:00	70.1	88.0	63.8	
17:30:00	70.2	84.0	64.2	64
17:45:00	69.9	87.0	62.2	
18:00:00	70.7	85.6	64.0	
18:15:00	69.5	83.5	64.0	
18:30:00	69.8	97.9	63.2	63
18:45:00	77.3	100.3	63.2	
19:00:00	76.7	104.5	63.7	
19:15:00	70.4	88.0	63.7	
19:30:00	70.2	79.0	62.7	63
19:45:00	75.0	101.7	62.9	
20:00:00	70.3	85.3	62.2	
20:15:00	71.9	93.6	62.6	
20:30:00	75.3	102.0	60.8	62
20:45:00	69.2	81.0	62.7	
21:00:00	69.9	89.4	62.9	
21:15:00	68.9	81.6	61.5	
21:30:00	74.6	102.3	61.9	62
21:45:00	68.7	81.5	63.1	
22:00:00	69.8	83.7	62.0	
22:15:00	69.2	79.6	62.4	
22:30:00	69.4	79.1	63.4	

22:45:00	69.0	81.6	62.4	62
23:00:00	75.2	100.1	60.5	
23:15:00	69.4	80.2	61.5	
23:30:00	70.0	87.3	62.6	61
23:45:00	68.6	79.4	61.1	
00:00:00	70.6	91.7	60.3	
00:15:00	69.3	82.4	59.6	
00:30:00	69.1	81.3	60.1	
00:45:00	69.7	90.7	60.8	

21st April 2018

Time	L _{AFeq}	L _{AFmax}	L _{A90}	L _{A90,1hour}
08:00:00	69.0	83.6	57.2	59
08:15:00	68.8	80.7	59.9	
08:30:00	71.3	88.1	60.5	
08:45:00	69.9	84.1	59.2	
09:00:00	69.5	81.0	58.4	61
09:15:00	69.1	81.8	59.9	
09:30:00	70.1	83.4	60.8	
09:45:00	72.5	95.7	62.1	
10:00:00	72.2	96.2	62.0	62
10:15:00	70.7	84.5	63.0	
10:30:00	70.3	83.9	61.9	
10:45:00	69.7	79.9	60.7	
11:00:00	71.0	94.0	62.4	62
11:15:00	70.5	81.2	62.5	
11:30:00	69.9	80.1	62.0	
11:45:00	69.4	80.3	61.4	
12:00:00	69.5	79.7	62.8	62
12:15:00	72.4	96.9	62.1	
12:30:00	69.1	81.5	62.4	
12:45:00	69.0	83.5	62.2	
13:00:00	69.9	80.5	62.9	63
13:15:00	76.5	103.2	62.0	
13:30:00	69.3	85.7	63.2	
13:45:00	69.4	88.3	62.3	
14:00:00	69.7	92.7	61.6	62
14:15:00	70.8	93.3	63.1	
14:30:00	68.9	81.6	61.7	
14:45:00	68.6	84.8	61.8	

15:00:00	69.4	84.3	62.3	62
15:15:00	72.2	87.4	61.8	
15:30:00	68.8	81.0	61.8	
15:45:00	67.9	85.7	61.8	
16:00:00	73.9	98.9	61.0	62
16:15:00	69.2	82.6	62.3	
16:30:00	68.4	88.4	62.2	
16:45:00	68.3	79.9	61.9	
17:00:00	67.5	90.3	62.1	63
17:15:00	68.9	81.0	63.0	
17:30:00	69.0	86.3	62.7	
17:45:00	69.3	83.5	64.0	
18:00:00	69.1	89.8	63.3	62
18:15:00	68.6	81.6	63.1	
18:30:00	68.3	88.5	60.5	
18:45:00	68.4	81.1	61.8	
19:00:00	75.4	101.0	61.9	62
19:15:00	76.1	100.8	62.5	
19:30:00	69.2	93.8	62.1	
19:45:00	68.7	84.0	61.4	
20:00:00	68.3	85.0	61.7	62
20:15:00	68.2	83.5	61.4	
20:30:00	69.0	90.8	62.3	
20:45:00	72.5	94.2	61.2	
21:00:00	68.4	82.5	61.1	61
21:15:00	70.8	94.3	60.8	
21:30:00	67.5	80.9	60.7	
21:45:00	77.0	106.0	60.8	
22:00:00	71.5	96.1	60.4	61
22:15:00	70.3	91.5	61.2	
22:30:00	75.7	102.5	62.1	
22:45:00	72.7	100.3	61.5	
23:00:00	67.6	80.2	61.1	61
23:15:00	71.6	95.2	60.8	
23:30:00	67.9	89.4	60.9	
23:45:00	67.3	79.9	59.2	
00:00:00	72.7	96.1	60.9	60
00:15:00	68.0	79.3	60.7	
00:30:00	67.6	82.2	60.7	
00:45:00	66.1	80.7	59.5	

22nd April 2018

Time	L _{AFeq}	L _{AFmax}	L _{A90}	L _{A90,1hour}
08:00:00	66.4	81.1	54.7	55
08:15:00	66.2	79.1	53.8	
08:30:00	66.7	79.3	56.2	
08:45:00	66.7	78.6	55.5	
09:00:00	66.3	77.5	56.4	57
09:15:00	66.5	81.1	56.5	
09:30:00	67.4	85.4	57.0	
09:45:00	73.1	100.4	58.4	
10:00:00	67.8	81.6	59.3	59
10:15:00	67.2	80.1	58.3	
10:30:00	67.8	80.3	58.8	
10:45:00	72.7	98.0	58.5	
11:00:00	68.3	81.2	60.5	60
11:15:00	66.8	82.1	58.9	
11:30:00	68.8	84.7	59.9	
11:45:00	68.7	85.0	60.8	
12:00:00	69.1	83.0	61.2	62
12:15:00	68.8	83.9	62.0	
12:30:00	68.4	82.4	60.9	
12:45:00	68.2	86.3	62.0	
13:00:00	69.0	88.0	62.2	62
13:15:00	68.9	82.1	62.1	
13:30:00	68.9	87.0	62.1	
13:45:00	68.8	92.3	61.7	
14:00:00	73.3	99.4	61.2	62
14:15:00	68.8	85.5	61.8	
14:30:00	68.8	80.8	63.1	
14:45:00	67.8	83.5	61.2	
15:00:00	68.6	86.4	61.6	62
15:15:00	71.0	85.4	62.6	
15:30:00	68.4	79.3	61.9	
15:45:00	68.1	81.9	61.2	
16:00:00	81.3	108.3	60.7	61
16:15:00	67.8	80.7	60.5	
16:30:00	69.0	92.8	61.4	
16:45:00	68.0	83.1	59.8	
17:00:00	68.5	79.5	61.3	62
17:15:00	67.4	82.7	62.0	
17:30:00	69.3	90.6	61.6	
17:45:00	68.8	80.4	61.4	
18:00:00	69.0	82.4	61.6	62
18:15:00	68.5	88.6	62.0	
18:30:00	68.0	80.5	60.9	
18:45:00	70.5	90.6	62.7	

19:00:00	77.9	105.3	62.6	61
19:15:00	68.4	83.6	60.0	
19:30:00	69.3	90.0	60.5	
19:45:00	68.9	83.8	61.6	
20:00:00	68.3	86.4	60.5	60
20:15:00	73.4	101.8	60.6	
20:30:00	68.5	88.8	59.7	
20:45:00	68.0	83.0	60.0	
21:00:00	68.5	80.7	59.6	60
21:15:00	70.8	93.9	60.2	
21:30:00	68.0	82.7	59.0	
21:45:00	68.4	86.8	59.6	

Appendix D - Calculations

Attenuation per double distance required =		6	dB				Metres	
(6dB for LpA recommended)			Enter Distance =				18	
	Frequency Hz							
	125	250	500	1000	2000	4000	8000	Total
	93.1	89.6	85.2	82	78.8	74	69.1	95.51
								9.03
								9.03
Total LW	93.1	89.6	85.2	82.0	78.8	74.0	69.1	95.51
'A' Weight	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	77.0	81.0	82.0	82.0	80.0	75.0	68.0	88.00
LPA at New Dist'	43.98	47.98	48.98	48.98	46.98	41.98	34.98	54.98
SILENCER RSD 500/900	6	8	14	16	13	13	9	
DUCT BENDS (0)	0	0	0	0	0	0	0	
DUCT LENGTH, 4m	0	0	0	0	0	0	0	
DIRECTIVITY 0°	0	0	0	0	0	0	0	
LPA After Insert	37.98	39.98	34.98	32.98	33.98	28.98	25.98	43.99

The rating level @ 1m from the residential façade, corrected for intermittency (+3dB) = 47dB(A)