



Noise Impact Assessment Report

Site Address:

864 High Road,
Tottenham,
London
N17 0EY

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1. Introduction

EMC Acoustics has been appointed by Gok Architecture to undertake an environmental noise impact assessment of a proposed kitchen extractor system (the plant) designed to service a kitchen (the premises) in relation to a planning application.

The purpose of this report is to assess noise that will be emitted by the plant in relationship to the nearest residential property. It is understood that the premises will be open between 0700 hours and 2300 hours and will only use the plant during these hours. To accommodate a 1 hour preparation time before opening and a 1 hour close up period this report will focus on the hours 0600 – 0000.

This report presents the results of the environmental survey followed by noise impact calculations, results and recommendations (where necessary) to mitigate chances of noise disturbance.

1.1 Location and construction of Building

The premises shop front is located at 864 High Road, Tottenham, London N17 0EY with the plant consisting of a duct running from an internally housed extractor hood through an external wall at the rear of the premises to an extractor fan then vertically to terminate in a roof hood located at least 1 meter above the eaves of the roof. (See **Appendix 1** for architects' diagram and fan details).

1.2 Nearby residents

With extractor systems there are three primary sources of noise breakout:

- a) Casing breakout from the fan enclosure
- b) End breakout from the exit from the duct
- c) Intake breakout

The nearest residential window from the proposed plant at the distance of approximately 20 meters from the proposed outlet to the rear of the premises in Cooperage Close. The intake will be terminated by an extractor hood in the kitchen area and fan enclosure and outlet will be located externally to the rear of the building in the kitchen area. Therefore the subject of this report is regarding noise radiating from the fan casing and the outlet. The nearest residential property is a block of flats located 20 meters away in Cooperage Close, equidistant from the fan enclosure and flue termination. Therefore 1 meter in front of the nearest window is identified as the nearest sensitive receptor in accordance with BS4142. See **Appendix 1** for illustrating aerial plan.

1.3 Proposed Plant

The following plant has been proposed to fill the requirements of the kitchen extractor system:

- Cooker canopy
- Grease filters
- Electrostatic precipitator
- Carbon filters
- Helios 720 Gigabox extractor fan and enclosure with anti vibrational mounting
- Exhaust flue

The acoustic elements of this system are as follows:

1. Helios Gigabox 720 box fan outlet noise
2. Helios Gigabox 720 box fan casing breakout noise
(see **Appendix 4** for manufacturers data)

The installation of the system for this proposal as designed by the architect is shown in **Appendix 1**.

2. Noise Criteria

2.1 Haringey Council Decision Notice (HGY/2022/0490)

The planning decision letter dated 12th May 2022 states the following conditions for granting of planning permission for the aforementioned extract assembly:

“The design and installation of new items of fixed plant hereby approved by this permission shall be such that, when in operation, the cumulative noise level LAeq 15 min arising from the proposed plant, measured or predicted at 1m from the facade of nearest residential premises shall be a rating level of at least 5dB(A) below the background noise level LAF90. The measurement and/or prediction of the noise should be carried out in accordance with the methodology contained within BS 4142: 1997. Upon request by the local planning authority a noise report shall be produced by a competent person and shall be submitted to and approved by the local planning authority to demonstrate compliance with the above criteria.”

As a result the lowest background noise measurement must be measured and mitigations employed to ensure any noise at the receptor resulting from the new extract assembly falls at least 5dB below.

2.2 BS4142:2014 Methods for Rating and Assessing Industrial and Commercial Noise

The Decision Notice quoted in section **2.1** references this standard as a method of evaluating the impact of noise on residents. It lays out the method of calculating the ‘specific’ noise of

commercial activity (measured in dBLAeq) and comparing it to the 'background noise' present without the activity (measured in dBLA90). BS4142 stipulates a number of corrections according to the character of the noise (tonal, impact etc.) to give the rating level and compares this against the background noise. If the "rating" level exceeds the "background" by around 10 dBA or more this *'indicates a significant adverse impact'*. A difference of around 5 dBA *'indicates an adverse impact...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.'*

BS4142 defines objective tonal quality as if any third octave band displays a difference of:

- 15dB from 25Hz-125Hz
- 8dB from 160-400Hz
- 5dB from 500-10kHz

If a tonal quality is present, then a 6dB penalty should be added to the rating.

BS4142 also gives clarification between daytime and night time hours and the background noise measurement lengths accordingly:

Day: 1 Hour (7am to 11pm)
Night: 15 Minutes (11pm to 7am)

2.3 ISO 1996 – Part 2:2017 Description, measurement and assessment of environmental noise- Part 2: Determination of sound pressure levels

Part 2 of ISO 1996 describes the determination and assessment of environmental noise levels through either direct measurement, by extrapolation of measurement results, or by means of calculation.

3. Environmental Noise Survey

3.1 Methodology

To establish the existing background noise levels on site, a noise survey was conducted between 1210 on the 21/04/2021 and 1210 on the 22/04/2021. A fixed microphone position was used to determine the change in noise levels during typical operating hours of the development, with the fixed long-term meter set to measure consecutive 'A' weighted 15-minute time samples. Measurements have been taken in accordance with BS4142:2014. In accordance with BS4142 and ISO1996, a calculation was made based on the sound power level given in the manufacturers data documentation.

3.2 Apparatus

A type 1 NTI Audio XL2 sound level meter was calibrated and set up on tripod with full weather protection with the microphone at a position in accordance with BS4142: 2014 (see **Appendix 1** for photograph).

3.3 Weather Conditions

The weather at the start of measurement was generally mild with light wind and therefore suitable for the survey.

3.2 Calculations

Using the background sound levels established from the survey measurements and data from fan the manufacturers website, Helios (see **Appendix 4**) to calculate the specific sound level from the plant present at the receptor resulting from both outlet breakout and casing breakout. Results were established in accordance with BS4142 and BS1996. See **Appendix 3** for formula.

4. Results

4.1 Fixed measurement results

Measurement	Value (dBA)
Residual sound level (LAeq,15mins) 0600-2300	58
Lowest Background Noise	53

Table 4.1: Table of Measurements

All measurements rounded to nearest integer in accordance with BS4142

Table 4.1 shows a summary of the measured residual, background at the fixed microphone location during the operation hours with an hour added before and after to allow for opening up and closing down the shop. See **Appendix 2** for a graph representing the time distribution of these measurements.

4.2 Inlet Noise Breakout

The proposed fan inlet assembly will be located within the premises and acoustically separated from any residential property. As a result the inlet breakout from the fan unit may well be a consideration for the premises internally, but will not cause any observed adverse effects to adjacent residential properties.

4.3 Calculated Outlet Noise Breakout

As the proposed installation is not yet present to take real world measurements, specific sound pressure levels resulting from outlet noise breakout of the proposed extractor system present at the receptor were calculated in accordance to BS1996 with reference to manufacturer data and Fläkt Woods Practical Guide to Noise Control (2005). **Table 4.2** displays those for noise from the outlet with the current proposed configuration.

Octave band (Hz)	125	250	500	1000	2000	4000	8000	Lw dBA	SPL dBA
Fan Sound Power Level*	72	75	75	80	80	75	68	72	
Elbow attenuation**	0	-1	-8	-6	-3	-3	-3		
End Reflection**	-10	-5	-2	0	0	0	0		
Barrier attenuation***	0	0	0	0	0	0	0		
Discharge level	62	69	65	74	77	72	65	80	
Distance attenuation***	-37	-37	-37	-37	-37	-37	-37		
Specific noise	25	32	28	37	40	35	28		43

Table 4.2 Noise Breakout from Duct Outlet

*From manufacturer Data (see **Appendix 4**)

**Taken from Fläkt Woods Guide to Noise Control,

***According to BS1996. All values given in decibels (dB).

***Using the formula $SPL = Lw - 20\log(r) - 11$

These calculations give decibel value of **43dBA** noise resulting from the fan outlet present at the receptor.

4.4 Calculated Fan Casing Breakout

As the proposed installation is not yet present to take real world measurements, specific sound pressure levels resulting from casing radiation noise breakout of the proposed extractor system present at the receptor were calculated in accordance to BS1996 with reference to manufacturer data and Fläkt Woods Practical Guide to Noise Control (2005). **Table 4.3** displays those for noise from the outlet with the current proposed configuration.

Octave band (Hz)	125	250	500	1000	2000	4000	8000	Lw dBA	SPL dBA
Fan Sound Power Level*	68	65	63	66	63	62	59	73	
Distance attenuation**	-37	-37	-37	-37	-37	-37	-37		
Specific noise	31	28	26	29	26	25	22		36

Table 4.3 Noise Breakout from Duct Outlet

*From manufacturer Data (see **Appendix 4**)

**According to BS1996. All values given in decibels (dB).

**Using the formula $SPL = Lw - 20\log(r) - 11$

These calculations give decibel value of **36dBA** noise resulting from the fan casing breakout present at the receptor.

4.5 Combined Outlet and Casing Values

To calculate the specific noise present at the receptor, combined noise breakout levels resulting from the outlet duct and fan casing radiation the 2 results must be logarithmically combined.

Octave band (Hz)	125	250	500	1000	2000	4000	8000	SPL dBA
Outlet Breakout	25	32	28	37	40	35	28	43
Casing Breakout	31	28	26	29	26	25	22	36
Total Specific noise	32	33	30	38	40	35	29	44

Table 4.4 Noise Breakout from Duct Outlet

Table 4.4 shows the combined octave and total noise breakout present at the receptor.

4. Assessment of Results

The Local Authority planning notice (see 2.1) stipulates that specific noise “at 1m from the facade of nearest residential premises shall be a rating level of at least 5dB(A) below the background noise level LAF90. The measurement and/or prediction of the noise should be carried out in accordance with the methodology contained within BS 4142: 1997. “. As the calculated specific noise with the current proposal varies between more than 8dB between the octave bands 500 and 1kHz, there is a tonal quality present. This results in a **6dB** penalty added to the calculated specific noise rating.

The lowest background sound level measured is **53dBLA₉₀**. Therefore the target value for the total fan breakout noise from the extractor system to fall below is **48dBLA**.

From the results in **Table 4.4** it can be seen that the specific sound of the plant is **44dBA**. However with the 6dB tonal penalty this is increased to a rating level of **50dB**, which is just above the required level.

This indicates mitigation measures must be added to the system to achieve the desired level. As a result this report will offer robust measures to achieve this in the following section.

5. Recommendations

All the following recommendations should be certified by the ventilation system designer to ensure mitigation methods are compatible with the plant regarding air pressure etc.

5.1 Inline silencer as part of the duct system

It is recommended that the specification of the existing proposed silencer is increased to that of the longer an Acoustica CP03-C-710-1D is inserted along the duct. This design of silencer will add an additional air flow resistance in the system and therefore should be checked with the HVAC engineer to confirm this will not add excess stress to the system. Manufacturers data has been included in **Appendix 4**. Similar silencers can be used in its place at the discretion of the ventilation contractor so long as it displays at least the same attenuation properties.

5.2 Calculations of fan breakout noise to encompass recommendations

Table 5.1 shows the revised specific sound calculations to encompass the recommendations. These calculations give a decibel value of **44dBA** noise resulting from the fan assembly present at the receptor. This is 9dB lower than the background sound level given in the survey and therefore in accordance with the local authority requirement of at least 5dB below lowest background noise level

of **53dBLA₉₀**. The 4dB excess of the requirement allows for factors that may lead to deviation from the manufacturer data and therefore constitutes a robust solution.

Octave band (Hz)	125	250	500	1000	2000	4000	8000	SPL dBA
Specific Noise from Outlet	77	81	82	82	80	75	68	43
With Silencer (CP03-C-710-1D)*	-9	-15	-14	-10	-9	-8	-9	33
Specific Noise from Casing	31	28	26	29	26	25	22	36
Total Specific Noise	31	29	26	30	31	28	24.	38
Tonal Penalty								6
Specific noise rating								44

Table 5.1 Noise Breakout from Duct Outlet after Recommendations

*From manufacturers data (see **Appendix 4**)

5.4 General Comments on Recommendations

These recommendations are a minimum that need to be implemented. Changes to the extractor system must be authorised by the ventilation engineer to ensure the increased resistance to the air flow is within a safe limit.

7. Conclusions

EMC Acoustics has been appointed by Gok Architects to undertake an environmental noise survey of background noise to evaluate a proposed kitchen extractor assembly designed to service a kitchen on the ground floor of the premises. The survey was carried out in accordance with BS4142.

Based upon the results of the noise survey, specific sound rating from plant should be no more than **49dBA** during the operation period 0600-0000 to comply with local authority criteria.

Calculations were made according to ISO1996 to predict the noise present at the receptor from the existing plant proposal. This was **50dBA**.

The results of the assessment have identified that the proposed plant does not meet the acoustic planning obligations and therefore mitigation measures to reduce noise breakout will be necessary. Recommendations of inserting a specified silencer to be placed in-line with outlet duct have been made with minimum specifications provided.

The implementation of these recommendations will bring the specific noise levels from the proposed plant to a projected **44dBA** and thus in line with the local authority planning requirements with a 5dB margin for error.

Appendix 1: Photos



Figure A1.1 Site Plan (864 High Road, Tottenham, London N17 0EY)

The building containing the premises is outlined in red

The location for the acoustic survey is marked by X

The location of the Receptor is marked by R



Figure A1.2 Background Sound Assessment Point

weather protected Class 1 microphone set up in suitable location (marked X on Figure A1.1)

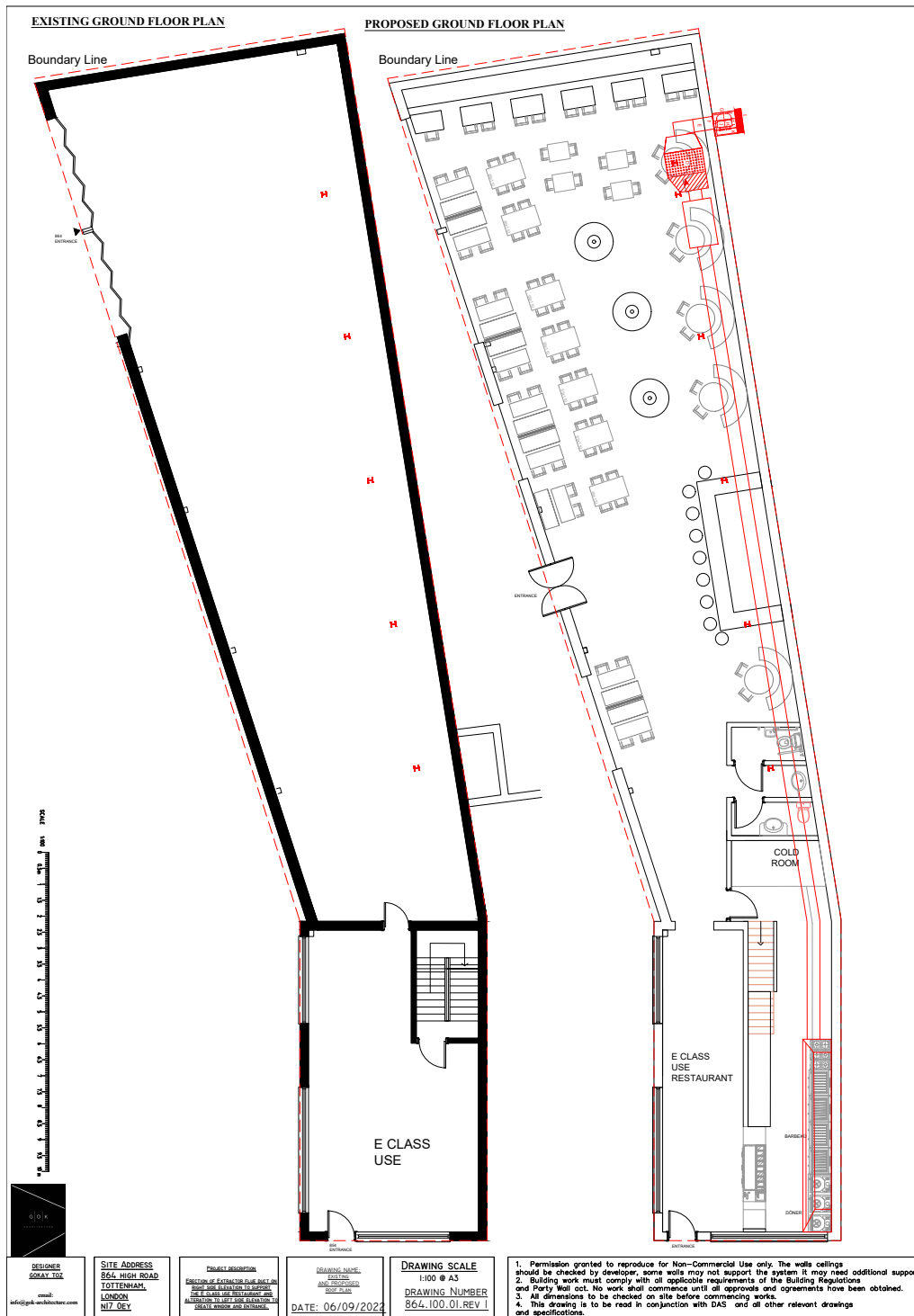


Figure A.4 Architects Ariel Diagram of Proposed Plant

Appendix 2: Sound Measurements

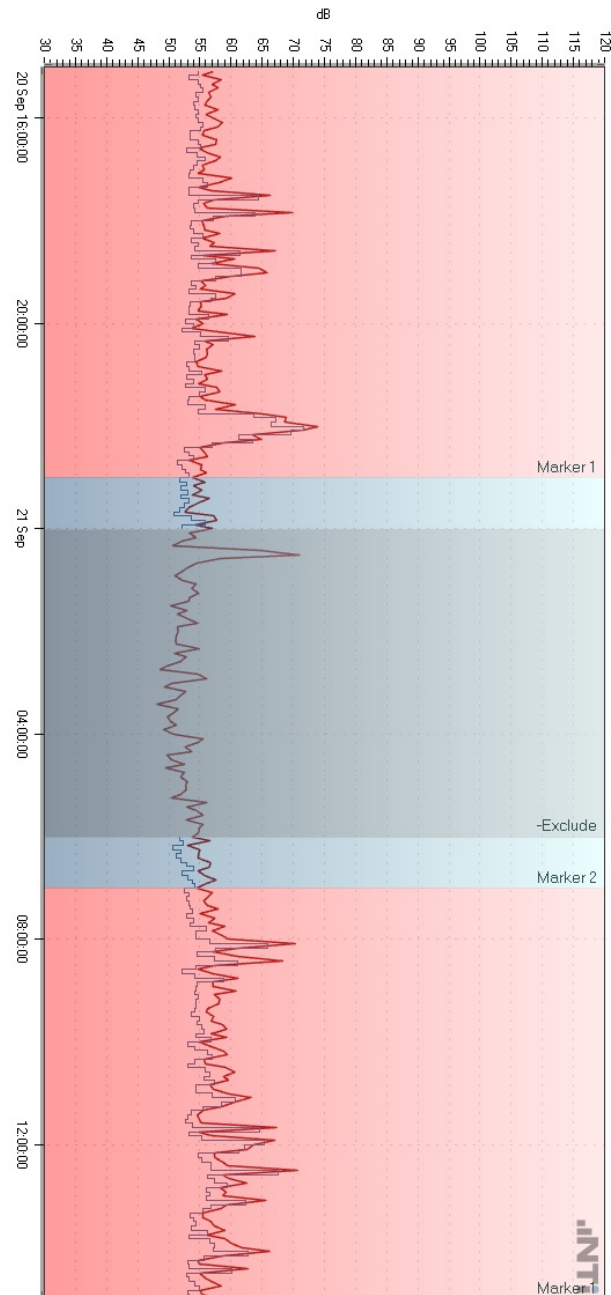


Figure A2.1 Graph showing the 24H recorded residual sound (LAeq) and background (LA90) measurements against time

Data collected on 20-21/9/22.

Overall results (with out of hours period excluded) were as follows:

Lowest Background Noise: 54dBLA90

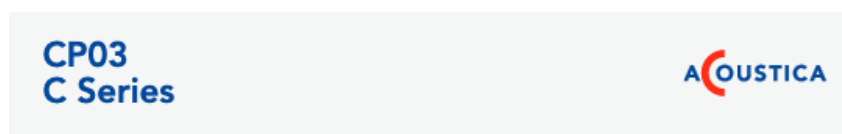
Residual Sound: 57.9LAeq

Appendix 3 Explanation of Acoustic Terms

Term	Abbreviation	Description
Decibel	dB	a relative unit of measurement widely used in acoustics, electronics and communications. The dB is a logarithmic unit used to describe a ratio between the measured level and a reference or threshold level of 0dB. A 3dB increase represents a doubling of sound pressure level and is generally taken as the smallest increase easily perceivable by the human ear. In sound pressure level, dB reference 2×10^{-5} Pascal.
Hertz	Hz	the unit of frequency or pitch of a sound. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc. The optimum range of human hearing is generally taken as 20Hz-20kHz, 20Hz being very low bass and 20kHz being very high treble.
A weighting	dBA	a filter that covers the full audio range, 20 Hz to 20 kHz, and the shape is similar to the response of the human ear at the lower levels. It is less sensitive to low frequency sound.
C weighting	dBC	a standard frequency weighting filter for sound level meters, commonly used for higher level measurement. It is more sensitive to low frequency sounds and will show a higher value than dBA in low frequency environments.
Z weighting	dBZ	Unweighted sound pressure level
Equivalent continuous sound level	$L_{eq,mins}$	is the sound level in decibels equivalent to the total sound energy measured over the period of time stated after the comma.
90th percentile of continuous sound level	LA_{90}	the noise level exceeded for 90% of the measurement period, A-weighted and calculated by statistical analysis. The 90 th percentile of L_{Aeq} .
Octave	oct	a range of frequencies whose upper frequency limit is twice that of its lower frequency limit. For example, the 1000 Hertz octave band contains noise energy at all frequencies from 707 to 1414 Hertz.
Residual sound		an average sound level taken with the plant off ($L_{Aeq-15mins}$ averaged over a the period of operation) as defined by BS4142
Background sound		the 90 th percentile of the residual noise (LA_{90}) as defined by BS4142
Ambient sound		the sound of the plant working with residual noise included ($L_{Aeq1hour}$ for daytime hours between 0700-2300hrs, $L_{Aeq15mins}$ for night time hours between 2300-0700) as defined by BS4142
Specific sound		the ambient sound with the residual sound logarithmically subtracted as defined by BS4142
Sound Power Level	SWL, L_w	The total amount of sound energy generated by a sound source irrespective of acoustic environment
Sound Pressure Level	SPL	The amount of pressure deviation from ambient pressure caused by a soundwave at a specific receptor

Sound Pressure Level (dB)	Example of Equivalent Sound
130	artillery fire at close proximity (threshold of pain)
120	amplified rock music; near jet engine
110	loud orchestral music, in audience
100	electric saw
90	bus or truck interior
80	automobile interior
70	average street noise; loud telephone bell
60	normal conversation; business office
50	restaurant; private office
40	quiet room in home
30	quiet lecture hall; bedroom
20	radio, television, or recording studio
10	soundproof room
0	absolute silence (threshold of hearing)

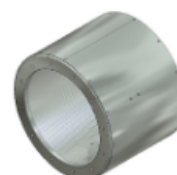
Appendix 4: Manufacturers Data



CP03 - CA - 0710 Silencer

Available in two standard lengths C Series silencers have excellent attenuation properties, achieved with sound absorbing infill retained in the attenuator casing by a perforated liner. The central pod (code P) is an option to increase the insertion loss, however it will add resistance.

- Fits directly onto 710mm diameter fans
- Standard lengths 710mm (1D) & 1420mm (2D)
- Use up to 70°C (standard construction)
- Systems up to 1000 Pascals
- Special lengths on request



Insertion Loss (dB) - Centre Band Frequency

Product Code	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
CP03 - C* - 0710 - 1D	3	5	9	15	14	10	9	8
CP03 - C* - 0710 - 2D	4	9	16	22	23	17	13	9
CP03 - C*P - 0710 - 1D	3	5	10	19	25	22	18	14
CP03 - C*P - 0710 - 2D	5	9	17	28	29	30	26	20

Replace * in code with A or B for connection pattern. Insertion loss data is derived from continual testing to BS4718 and other standards in independent UKAS certified laboratories, which includes where appropriate, re-generated or self-noise testing in both forward and reverse flow conditions. If you request system analysis from our technicians all predictions will be assessed using the relevant certified insertion loss data together with relevant dynamic corrections.

Dimensional Data

Product Code	A (mm)	B (mm)	C (mm)	Weight (kg)
CP03 - CA - 0710 - 1D	710	865	710	32
CP03 - CA - 0710 - 2D	710	865	1420	59
CP03 - CAP - 0710 - 1D	710	865	710	39
CP03 - CAP - 0710 - 2D	710	865	1420	71

Pattern A
16 x M10 - 770 PCD

Pattern B
16 x M10 - 751 PCD

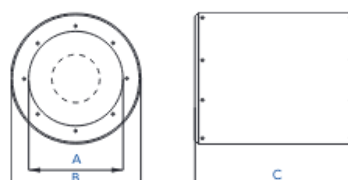


Figure A4.1 Acoustica Outlet attenuator insertion loss

Selected option: CP03-C-710-1D

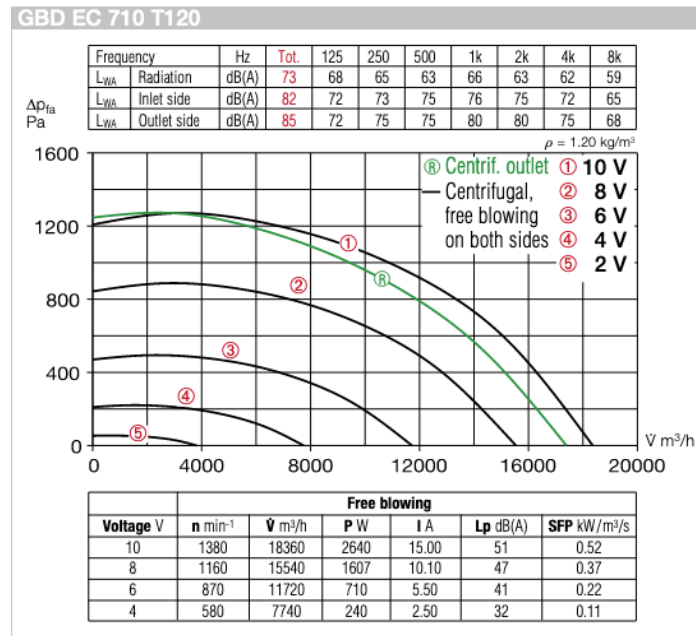


Figure A4.2 a & b Helios Manufacturer data for the Proposed Fan Unit
Selected option: GBD EC 710