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Environmental Noise Consultants

NOISE ASSESSMENT OF A NEW KITCHEN EXTRACT SYSTEM

Date of Report: 10th July 2023
Location: 42A-44 Park Road, Crouch End, London N8 8TD
Purpose: To conduct a BS4142 noise assessment for the proposed new kitchen extract system.

Noise measurements

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This report has been prepared by 247 Acoustic Services with all reasonable skill, care & diligence, and taking account of the resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid. This report is for the exclusive use of the client; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other persons without written consent of 247 Acoustic Services. 247 Acoustic Services disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of work.

1.0 Executive Summary

This noise impact assessment has been undertaken in order to assess a proposed plant installation for commercial use at 42A-44 Park Road, Crouch End, London N8 8TD.

The proposed plant installation comprises the following plant units:

- 1 No. Helios 400 Extract Fan

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with the requirements of Haringey Council.

Calculations were undertaken for the nearest identified receiver, identified as the residential flat directly above the premises. It should be noted that if there are closer receivers that 24/7 Acoustics is not aware of, a reassessment will be necessary, and this should therefore be confirmed by the Client.

It has been demonstrated that compliance with the established criterion is feasible, dependent on the following material considerations:

- The extract fan could be in use between 11:00 and 23:00 only
- The noise emissions data for the proposed unit(s) as obtained from available manufacturer information
- Plant and receiver locations are as established in this report and marked on the attached site plan

If there is any deviation from the above, 24/7 Acoustics must be informed, in order to establish whether a reassessment is necessary.

24/7 Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment.

This report is designed to be suitable to discharge typical plant noise planning conditions, as per our original scope of work. The report should not be relied upon for further reasons, such as the detailed design of mitigation measures.

2.0 Introduction

24/7 Acoustics has been commissioned by Narts Planning Services to measure existing background noise levels at 42A-44 Park Road, Crouch End, London N8 8TD. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation in agreement with the planning requirements of the Haringey Council.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures.

An acoustic terminology glossary is provided in **Appendix SP-5**.

3.0 Site Description

The premises is already benefiting bar/restaurant use. The current proposal is to install a kitchen extract system at the rear of the building as shown on the plans.

It is understood the kitchen will be in use during restaurant opening hours only, which are understood to be 11:00 to 23:00 as a worst case.

The 1st floor residential flat directly above the premise has been identified as the nearest affected receiver. This nearest noise sensitive receiver was identified through observations on-site. If there are any receivers closer to that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receiver should be confirmed by the client before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan **Appendix SP-1**.

4.0 Environmental Noise Survey

4.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing **Appendix SP1**. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest affected receiver.

The surroundings and position used for the monitoring location are described in Table 4.1.

Position No.	Description
1	The microphone was mounted on the flat roof of the building. The microphone was positioned 3.5 m from reflective surfaces. **[1]**

Table 4.1 Description of unattended monitoring locations

*Note **[1]**: The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied.*

Continuous automated monitoring was undertaken for the duration of the survey between 11:00 on 7th July 2023 and 11:00 on 8th July 2023.

The measurement procedure generally complied with BS 7445: 1991: 'Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use'.

4.2 Weather Conditions

At the time of set-up and collection of the monitoring equipment and during the attended measurements, the weather conditions were dry with light winds. It is understood that the weather conditions during the unattended survey remained dry with light winds.

It is considered that the weather conditions did not significantly adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

4.3 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed.

The equipment used was as follows:

- 1 No. Svantek Type 977 Class 1 Sound Level Meter
- Rion Type NC-74 Class 1 Calibrator

5.0 Results

5.1 Unattended Noise Survey Results

The LAeq: 5min, LAmax: 5min, LA10: 5min and LA90: 5min acoustic parameters were measured at the location shown in site drawing **SP1**.

Measured noise levels are shown as a time history in Figure SP-2, with average ambient and typical background noise levels summarised in Table 4.1.

It should be noted that the guidance of the latest revision of British Standard 4142: 2014 +A1 2019 *'Methods for rating and assessing industrial and commercial sound'*, as detailed in Section 8.1 of the standard is as follows:

'The objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.'

Therefore, the typical background noise level will be used for the purpose of this assessment.

The surroundings and position used for the monitoring location are described in Table 5.1.

Position	Time Period	Average ambient noise level $L_{Aeq: T}$, dB	Typical background noise level $L_{A90: 5min}$, dB
1	Daytime (07:00 – 23:00)	55	49
	Night-time (23:00-07:00)	50	41
	Restaurant Opening Hours (11:00-23:00)	54	49

Table 5.1 Description of unattended monitoring locations

6.0 Noise Criteria

6.1 Legislation, Policy and Guidance

The following section outlines the key planning policy and guidance that relates to the assessment of residential amenity and protection of residents from environmental noise.

6.2 The Noise Policy Statement for England (NPSE): 2010

The Noise Policy Statement for England (NPSE) was published in March 2010. It specifies the following long-term vision in policy aims: "Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

a) Avoid significant adverse impacts on health and quality of life;
b) Mitigate and minimise adverse impacts on health and quality of life; and
c) Where possible, contribute to the improvement of health and quality of life."

The NPSE introduced three concepts to the assessment of noise, which includes:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The above categories are however undefined in terms of noise levels and for the SOAEL the NPSE indicates that the noise level will vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research is therefore required to establish what may represent an SOAEL. It is acknowledged in the NPSE that not stating specific SOAEL levels provides policy flexibility until there is further evidence and guidance.

The following commentary is given on the representation of NOEL, LOAEL and SOAEL in relation to existing British Standards/ International guidelines:

NOEL – Inaudibility

LOAEL – The guideline values for community noise in specific environments as set out in Table 1 of the WHO Guidelines for Community Noise 1999 and Table 4 of British Standard 8233: 2014 Guidance on sound insulation and noise reduction in buildings.

The NPSE concludes how the LOAEL and SOAEL relate to the three aims listed in paragraph 3.3.1 above. The initial aim relates to avoiding significant adverse effects on health and quality of life, it then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when:

"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development." The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

The Government is undertaking a review of technical guidance but currently there is no agreed methodology for noise to accompany the NPPF guidance.

The Government has recently removed the existing Planning Policy Guidance on noise, which was known as PPG24: 1994. The National Planning Policy Framework, which has recently been published states "109. The planning system should contribute to and enhance the natural and local environment by:

a) Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability;"

6.3 Planning Practice Guidance (PPG):2014

The Department for Communities and Local Government published the final version of the Planning Practice Guidance (PPG) on 06 March 2014. The PPG provides further information with regard new developments which may be sensitive to the prevailing acoustic environment.

The PPG includes a table summarising the noise exposure hierarchy, based on the likely average response. Under the heading of 'perception' the 'noticeable and not intrusive' assessment of noise is defined as 'noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such there is a perceived change in the quality of life'. The increasing effect level under these conditions is deemed to be 'no observed adverse effect' and no specific measures are required.

Full details of the Planning Practice Guidance on effects are provided in Table 6.3.

Table 6.3: Noise Exposure Hierarchy

Perception	Example of Outcomes	Increasing Effect Level	Action
Not Present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The subjective nature of noise means there is not a simple relationship between noise levels and its effects. Factors to be considered in determining if noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

6.4 British Standard 4142: 2014 + A1: 2019

British Standard BS4142 was revised in 2014 and updated in 2019. The scope of the Standard has been extended to methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

a) sound from industrial and manufacturing processes;
b) sound from fixed installations which compromise mechanical and electrical plant and equipment;
c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from a forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The method is based on the difference between the background noise level without the industrial/commercial source and the noise level of the industrial source (specific sound) at the receiver location. The noise is rated for having tonality, impulsivity, intermittency or other distinguishable characteristics that may attract attention. In cases where the noise contains multiple characteristics, the penalties are cumulative.

In the majority of cases, the greater the difference between the rated noise level (specific noise and corrections for character) and background noise level, the greater the magnitude of impact (see Table 6.4).

Table 6.4: Assessment of the Impacts

Difference	Assessment
Around +10 dB or more	Likely to be an indication of a significant adverse impact, depending on the context
Around +5 dB	Likely to be an indication of an adverse impact, depending on the context

In Section 8 of the 1997 version of the Standard "Assessing the noise for complaint purposes" it is stated that an excess above the existing background noise level *L*A90 of up to 5 dB(A) due to noise from fixed plant at a new development is of 'marginal significance'. This has been interpreted, since the introduction of the Standard in 1967, that a 5 dB(A) excess due to new, fixed plant noise source is, in general, acceptable.

In terms of establishing the rating level, corrections for the noise character has to be taken into consideration. These include the following factors:

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone

which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

BS4142:2014 acknowledges that where background and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background (particularly at night).

The 2014 version of BS4142 (updated in 2019) should not be used in the assessment of conversational, skate park and entertainment-related noise. Section 1.3 of the standard specifically states that *"the standard is not intended to be applied to the rating and assessment of sound from:*

a) *recreational activities, including all forms of motorsport;*
b) *music and other entertainment;*
c) *shooting grounds;*
d) *construction and demolition;*
e) *domestic animals;*
f) *people;*
g) *public address systems for speech; and*
h) *other sources falling within the scopes of other standards or guidance.*

6.5 World Health Organisation Guidelines: 1999

The World Health Organisation's (WHO) 'Guidelines for Community Noise'[3] report for external environmental noise levels states that;

"4.2.7 Annoyance responses
During the daytime, few people are seriously annoyed by activities with LAeq levels below 55 dB; or moderately annoyed with LAeq levels below 50 dB. Sound pressure levels during the evening and night should be 5-10 dB lower than during the day…"

For night-time noise sources the WHO guidelines recommend a night-time (23.00-07.00) 8-hour noise level of 30 dB *L*Aeq inside bedrooms (for a reasonably steady noise source) to avoid sleep disturbance.

For internal noise levels during the daytime and evening period it is suggested that a noise level of 35 dB *L*Aeq,16h (07.00-23.00 hours) is achieved to avoid speech intelligibility and moderate annoyance.

A summary of the guideline internal noise levels, taken from Table 1 of the WHO guidelines, is given in Table 6.5.1

Table 6.5.1: Relevant Information from WHO Guidelines

Specific Environment	Critical Health Effect(s)	*L*Aeq [dB]	Time Base [hours]	*L*Amax, fast [dB]
Dwelling, indoors	Speech intelligibility & moderate annoyance daytime & evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outdoor living area	To avoid serious annoyance, daytime and evening	55	16	-
Outdoor living area	To avoid minimal moderate annoyance, daytime and evening	50	16	-

An extract from Section 3.4 of 'Guidelines for Community Noise' states that;

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAmax more than 10-15 times per night (Vallet & Vernet 1991), and most studies show an increase in the percentage of awakenings at SEL values of 55- 60 dBA (Passchier-Vermeer 1993; Finegold et al. 1994; Pearsons et al. 1995."

The extract confirms that some researchers believe that people can be exposed to 10-15 events above 45 dB *L*Amax and still achieve a good nights sleep, and that as the noise level from an event increases above 45 dB(A) then the risk of sleep disturbance increases. As the WHO tend (not unreasonably) to take a cautious approach, the 45 dB(A) in their Table 4.1 is actually a level below which there is a not a material effect on the quality of sleep.

The World Health Organisation (WHO) Europe has published the WHO Environmental Noise Guidelines for the European Region (2018). This provides Guidance on outdoor environmental noise levels and the potential effects on human health, supplementing WHO Guidelines (1999).
The Guidelines are based on long-term yearly average day-evening-night (*L*den) and night (*L*night) parameters which are primarily intended to aid policy makers.

6.6 British Standard 8233: 2014

British Standard 8233:2014 'Guidance on sound insulation and noise reduction of buildings' offers guidance on suitable internal noise levels for spaces when they are unoccupied.

The suggested design criteria for reasonable listening and resting/sleeping conditions are given in Table 4 of BS8233, and reproduced in below table.

Activity	Location	Design Range *L*Aeq,T	
		07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB *L*Aeq,16hour	30 dB *L*Aeq, 8hour
Sleeping (daytime resting)	Bedroom	35 dB *L*Aeq,16hour	
Resting	Living room	40 dB *L*Aeq,16hour	

It can be seen that a design standard should be adopted to ensure internal noise from steady external sources in living rooms should not exceed 35 dB *L*Aeq,16hour.

The design criteria for bedrooms suggests that a noise level not exceeding 35 dB *L*Aeq, 16hour during the daytime (07:00 to 23:00) and 30 dB *L*Aeq,8hour during the night-time (23:00 to 07:00).

In terms of external areas, BS8233:2014 (Section 7.7.3.2) states:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB LAeq,T, with an upper guideline value of 55dB LAeq,T which would be acceptable in noisier environments. However it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

6.7 Local Authority Criteria

The Local Authority criteria for noise emissions are as follows:

> *"The **Haringey Council** criterion typically requires any noise from new plant installations to be controlled to 10 dB below the background sound level (LA9015mins) during its operating hours"*

It is understood that the proposed extract fan units will be for commercial takeaway/restaurant use operational between 11:00 and 23:00.

Based on the results of the environmental noise survey and requirements Table 6.7 presents the proposed plant noise emission criteria to be achieved at 1m from the nearest noise sensitive receiver:

Period	Plant Noise Emission Limit $L_{Aeq:T}$, dB
Night-time (23:00 - 07:00)	34
Restaurant Opening Hours - All Plant Operational (11:00 - 23:00)	39

Table 6.7 Description of unattended monitoring locations

7.0 Plant Noise Impact Assessment

7.1 Proposed Installation

The proposed plant installation comprises the following:

- 1 No. Helios 400 Extract Fan

Noise emissions for the proposed plant units, as provided by the manufacturer, are shown in Table 7.1. Loudest modes of operation have been used in order to present a robust worst-case assessment.

The Helios Extract fan is to be installed inside the building, venting to atmosphere via a trough-wall duct at the rear of the building, therefore only outlet noise is considered here.

Unit	Sound Power Level, (dB) in each Frequency Band, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Helios 400/4	**87**	**78**	**83**	**78**	**75**	**73**	**69**	**62**	**81**

Table 7.1 Manufacturer provided noise emissions levels
[1] The manufacturer-applied A-weighting corrections have been removed

The extract fan vents to atmosphere via a through-wall duct at the rear of the ground floor extension, approximately 1m from the receiver and screened from direct line of sight by the building envelope.

7.2 Proposed Mitigation Measures – Extract Fan Outlet

In order to meet the proposed criteria stated in Section 6.0, it is recommended that an in-line attenuator is installed between the fan and the outlet duct terminus. The attenuator should provide sufficient noise reduction to achieve a maximum sound pressure level of 64 dB(A) when measured at 1 m in all directions.

Mitigation	Sound Power Level, (dB) in each Frequency Band, Hz							
	63	125	250	500	1k	2k	4k	8k
In-Line Attenuator	**-1**	**-1**	**-2**	**-3**	**-5**	**-6**	**-5**	**-4**

Table 7.2 Manufacturer provided noise emissions levels

7.3 Noise Impact Assessment

The closest receiver has been identified as the window on the 1st floor flat above the premises.

Screening of the nearest noise sensitive receptor is provided by the building envelope.

It has been assumed that the extract fan will operate only during premises operating hours. Therefore, the assessment has been undertaken to demonstrate compliance with daytime criteria. Detailed calculations are shown in **Appendix SP-3**.

Period	Operating Hours Criterion	Noise Level at Receiver (due to all proposed plant)
Premises Opening Hours - All Plant Operational	39 dB(A)	39 dB(A)
Premises Opening Hours - All Plant Operational	31 dB(A)	31 dB(A)

Table 7.3 Noise levels and project criterion at noise sensitive receivers

As presented in Table 7.3 and **Appendix SP-4.1** and **Appendix SP-4.2**, the proposed plant installation with acoustic enclosure would be expected to meet the requirements of the proposed criteria.

7.4 British Standard Requirements

Further calculations have been undertaken to assess whether the noise emissions from the proposed plant unit would be expected to meet recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

British Standard 8233: 2014 '*Guidance on sound insulation and noise reduction for buildings*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS 8233: 2014 recommends 35dB(A) as being acceptable internal resting conditions during daytime and 30 dB(A) as being acceptable internal sleeping conditions during night-time.

With loudest external levels of 39 dB(A), acceptable internal conditions would be met by taking the attenuation of the window itself into consideration. According to BS 8233: 2014, a typical building facade with a partially open window offers 15 dB attenuation.

It can therefore be predicted that, in addition to meeting the requirements of the set criteria, the emissions from the proposed plant would be expected to meet the most stringent recommendations of the relevant British Standard, with neighbouring windows partially open. Predicted levels are shown in Table 7.4.

Receiver	Period	Recommended Target - For resting /sleeping conditions in a bedroom, in BS 8233: 2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	Day	35 dB(A)	24 dB(A)
Inside Residential Window	Night	30 dB(A)	16 dB(A)

Table 7.4 Noise levels and BS 8233: 2014 criteria inside nearest residential space

8.0 Conclusion

An environmental noise survey has been undertaken at 42A-44 Park Road, Crouch End, London N8 8TD. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in accordance with the requirements of the Haringey Council.

A noise impact assessment has then been undertaken using manufacturer noise data to predict the noise levels, due to the proposed plant, at the nearby noise sensitive receivers.
Calculations show that noise emissions from the proposed units should meet the requirements of the Haringey Council with the recommended mitigation installed as stated herein.

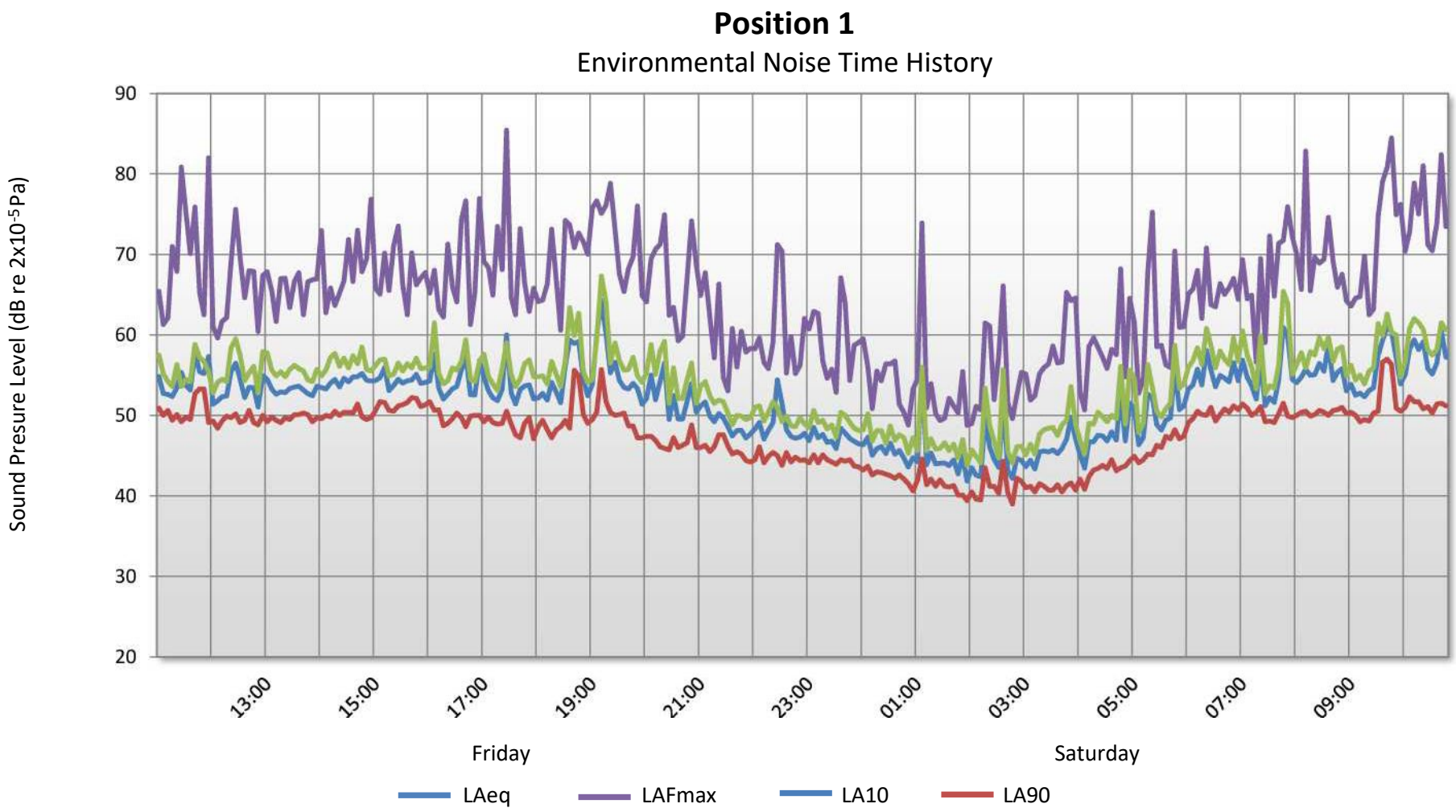
Indicative site plan indicating noise monitoring position, nearest noise sensitive receiver

Date: 7th July 2023

Noise Sensitive Receiver

Noise Survey Position

42A-44 Park Road, Crouch End, London N8 8TD



EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver
Source: Extract Fan

Description	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Helios 400/4	61	62	74	75	75	74	70	61	81
A-weighting Correction	26	16	9	3	0	-1	-1	1	
Correction to sound pressure level, accounting for reflections, dB	-8	-8	-8	-8	-8	-8	-8	-8	
Correction for end reflections	-8	-4	-2	-1	0	0	0	0	
Distance correction to receiver, dB (6 m) [1]	-16	-16	-16	-16	-16	-16	-16	-16	
Correction for screening, dB	-8	-10	-12	-14	-17	-20	-23-	-28	
Insertion loss required by in-line attenuator, dB	-1	-1	-2	-3	-5	-6	-5	-4	
Sound pressure level at receiver	46	40	44	36	29	23	17	9	38
Cumulative Sound pressure level at receiver	46	40	44	37	31	25	18	9	39

[1] Distance loss calculated assuming Point Source attenuation (*typically used where distance is more than 3x the largest source dimension*)

Design Criterion Daytime	39
Design Criterion Night time	34

BS 8233 ASSESMENT CALCULATION

Receiver: Inside Nearest Residential Window
Source: Proposed Plant installation

Description	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Sound pressure level outside window	46	40	44	37	31	25	18	9	39
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	31	25	29	22	16	10	3	-6	24

Design Criterion Daytime	30

400 mm ø GigaBox EC centrifugal fans

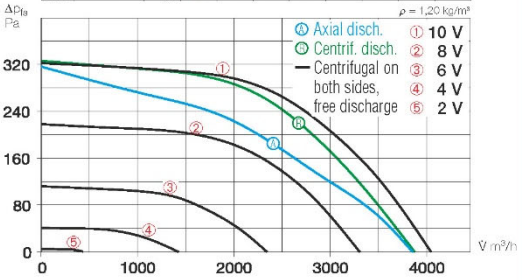
Helios

GB EC

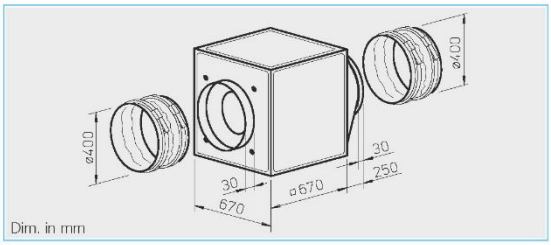
Arbitrary installation position and assembly in five possible discharge directions.

GBW EC 400 A

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	56	52	52	47	43	40	35	27
L_{WA}	Intake	dB(A)	68	53	62	67	60	58	55	48
L_{WA}	Exhaust	dB(A)	71	61	62	64	67	62	57	48

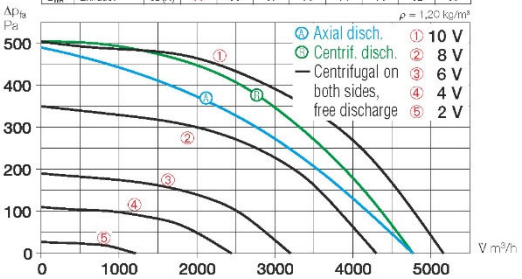


Free discharge						
Voltage V	n min⁻¹	V̇ m³/h	P W	I A	Lp dB(A)	SFP kW/m³/s
10	1200	4040	209	1,2	36	0,19
8	990	3300	118	0,7	32	0,13
6	710	2340	49	0,3	25	0,08
4	430	1420	21	0,2	18	0,05



GBW EC 400 B

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	57	46	54	49	48	46	43	39
L_{WA}	Intake	dB(A)	72	53	64	65	66	67	59	53
L_{WA}	Exhaust	dB(A)	76	56	67	70	71	70	62	55



Free discharge						
Voltage V	n min⁻¹	V̇ m³/h	P W	I A	Lp dB(A)	SFP kW/m³/s
10	1500	5160	395	2,52	37	0,28
8	1250	4300	244	1,63	34	0,21
6	930	3200	117	0,85	29	0,13
4	710	2440	63	0,49	25	0,09

Specification

Casing

Self-supporting frame construction made from hollow aluminium profiles. Lined with 20 mm thick double-walled side panels made from galvanised sheet steel, sound and thermally insulated with flame-retardant mineral wool. Intake cone for ideal airflow, spigot and flexible connector 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 with standard crane hooks.

Impeller

Impeller and remaining design see description on page 241.

Accessories

Anti vibration mounts for installation indoors. 1 set = 4 pcs.
SDD-U Ref. no. 5627

Wall bracket for wall mounting.
GB-WK 400 Ref. no. 5626

External weather louvre to cover exhaust opening.
GB-WSG 400 Ref. no. 5639

Outdoor cover hood for protected outdoor installation.
GB-WSD 400 Ref. no. 5748

Condensate collector with condensate spigot (centre) for pipe connection.
GB-KW 400 Ref. no. 5644

ECgreen Vent **60% Saving *** ** with speed control*

Accessory details	Page
Universal control system, electronic controller, speed-potentiometer	539 on

Type	Ref. no.	Connection Ø	Air flow volume (FID)	R.P.M.	Sound press. case breakout	Motor power	Current	Wiring diagram	max. air flow temperature	Weight net approx.	Universal control system		Speed-potentiometer flush		Speed-potentiometer surface	
		mm	V̇ m³/h	min⁻¹	dB(A) in 4 m	kW	A	No.	+ °C	kg	Type	Ref. no.	Type	Ref. no.	Type	Ref. no.
Single phase motor, 1~, 230 V, 50/60 Hz, EC motor, protection to IP 54																
GBW EC 400 A	5817	400	4050	1200	36	0.35	2.00	973	50	43.0	**EUR EC** 1) 2)	1347	**PU 24** 1)	1736	**PA 24** 1)	1737
GBW EC 400 B	5810	400	5160	1500	37	0.62	3.70	976	50	46.0	**EUR EC** 1) 2)	1347	**PU 24** 1)	1736	**PA 24** 1)	1737

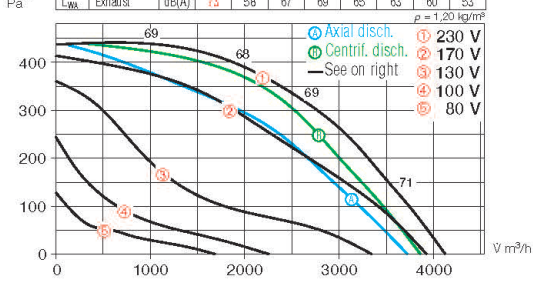
1) several EC fans can normally be connected 2) alternative electronic differential pressure/temp. controller (EDR/ETR, No. 1437/1438) or three-step speed switch (SU/SA, No. 4266/4267), see accessories

Helios

GigaBox centrifugal fan 400 mm ø

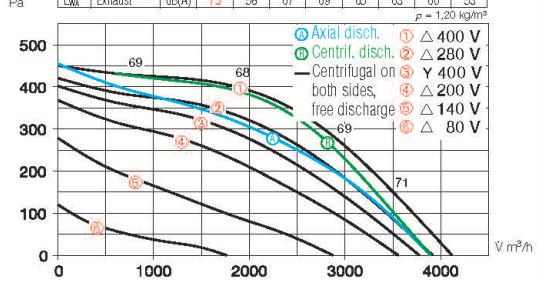
GBW 400/4

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	58	54	54	49	45	42	37	29
L_{WA}	Intake	dB(A)	70	60	61	63	66	61	56	47
L_{WA}	Exhaust	dB(A)	73	58	67	69	65	63	60	53



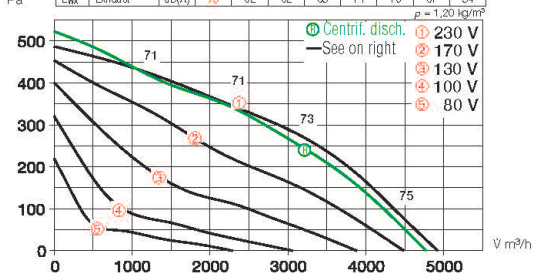
GBD 400/4/4

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	58	54	54	49	45	42	37	29
L_{WA}	Intake	dB(A)	70	60	61	63	66	61	56	47
L_{WA}	Exhaust	dB(A)	73	58	67	69	65	63	60	53



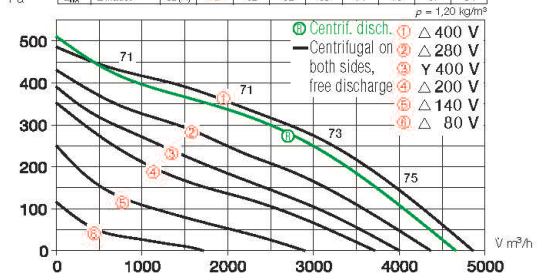
GBW 400/4 T120

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	60	56	53	51	52	50	47	39
L_{WA}	Intake	dB(A)	73	58	60	63	68	69	63	52
L_{WA}	Exhaust	dB(A)	75	62	62	65	71	70	67	54



GBD 400/4/4 T120

Frequency		Hz	Total	125	250	500	1k	2k	4k	8k
L_{WA}	Case breakout	dB(A)	60	56	53	51	52	50	47	39
L_{WA}	Intake	dB(A)	73	58	60	63	68	69	63	52
L_{WA}	Exhaust	dB(A)	75	62	62	65	71	70	67	54



Electrical connection

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

Motor protection

Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

Speed control

All types are speed controllable by voltage reduction using a transformer controller.
The 3-phase models can also be 2 speed controlled by star/delta switch (accessories DS 2 or full motor protection unit M 4). 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 400 Ref. no. 5626

External weather louvers to cover exhaust opening.
GB-WSG 400 Ref. no. 5639

Outdoor cover hood for outdoor installation.
GB-WSD 400 Ref. no. 5748

On/Off and 2-speed switch for 3-phase Y/△ motors.
Type DS 2 [2] Ref. no. 1351

[2] full motor protection unit recommended: MD Ref. No. 5849

Specific accessories

for types GB
Condensate collector with condensate spigot for pipe connection.
GB-KW 400 Ref. no. 5644
(Condensate collector with condensate spigot included in delivery with GB T120).

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

Box fans

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in pascals, Pa). Because of this wide range a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.

The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure noise is weighted to represent the performance of the ear. This is known as the 'A weighting' and annotated as dB(A).

Human subjects, under laboratory conditions, are generally capable of noticing changes in steady levels of 1 dB(A). However, in the general environment changes of around 3 dB(A) can be detected. It is generally accepted that a change of 10 dB(A) in an overall, steady noise level is perceived to the human ear as a doubling (or halving) of loudness. (These findings do not necessarily apply to transient or non-steady noise sources such as changes in noise due to changes in road traffic flow, or intermittent noise sources).

The following lists the sound pressure level in dB(A) for common situations.

Table SP-5.1: Noise Levels for Common Situations

Typical Noise Level dB(A)	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library, Refrigerator humming at 2m
50	Quiet office, no machinery, Boiling kettle at 0.5m
60	Normal conversation
70	Telephone ringing at 2m, Vacuum cleaner at 3m
80	General factory noise level
90	Heavy goods vehicle from pavement, Powered lawnmower, operator's ear
100	Pneumatic drill at 5m
120	Discotheque - 1m in front of loudspeaker
140	Threshold of pain

The noise level at a measurement point is rarely steady, even in rural areas, and varies over a range dependent upon the effects of local noise sources. Close to a busy motorway, the noise level may vary over a range of 5 dB(A), whereas in a suburban area this may increase up to 40 dB(A) and more due to the multitude of noise sources in such areas (cars, dogs, aircraft etc.) and their variable operation. Furthermore, the range of night-time noise levels will often be smaller and the levels significantly reduced compared to daytime levels. When considering environmental noise, it is necessary to consider how to quantify the existing noise (the ambient noise) to account for these second to second variations.

LAeq

The equivalent continuous A-weighted sound pressure level, LAeq, is the single number that represents the total sound energy measured over that period. The LAeq is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period. It is commonly used to express the energy level from individual sources that vary in level over their operational cycle.

LA10

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

LA90

A parameter that is widely accepted as reflecting human perception of the ambient noise is the background noise level, LA90. This is the noise level exceeded for 90% of the measurement period and generally reflects the noise level in the lulls between individual noise events. Over a 1-hour period the LA90 will be the noise level exceeded for 54 minutes.

***L*Amax,fast**

The *L*Amax,fast measurement parameter is the maximum instantaneous sound pressure level attained during the measurement period (30 seconds, 15 minutes etc.), measured on the 'fast' response setting of the sound level meter. It is generally used when assessing likelihood of night-time sleep disturbance.

***L*Amax,slow**

The *L*Amax,slow measurement parameter is again the maximum instantaneous sound pressure level attained during the measurement period but with the sound level meter on the 'slow' response setting. PPG24 states that where individual noise events regularly exceed 82 dB *L*Amax (S time weighting) several times in any hour during the night time period then the site should be treated as being in Noise Exposure Category C (described in detail later).

Rw

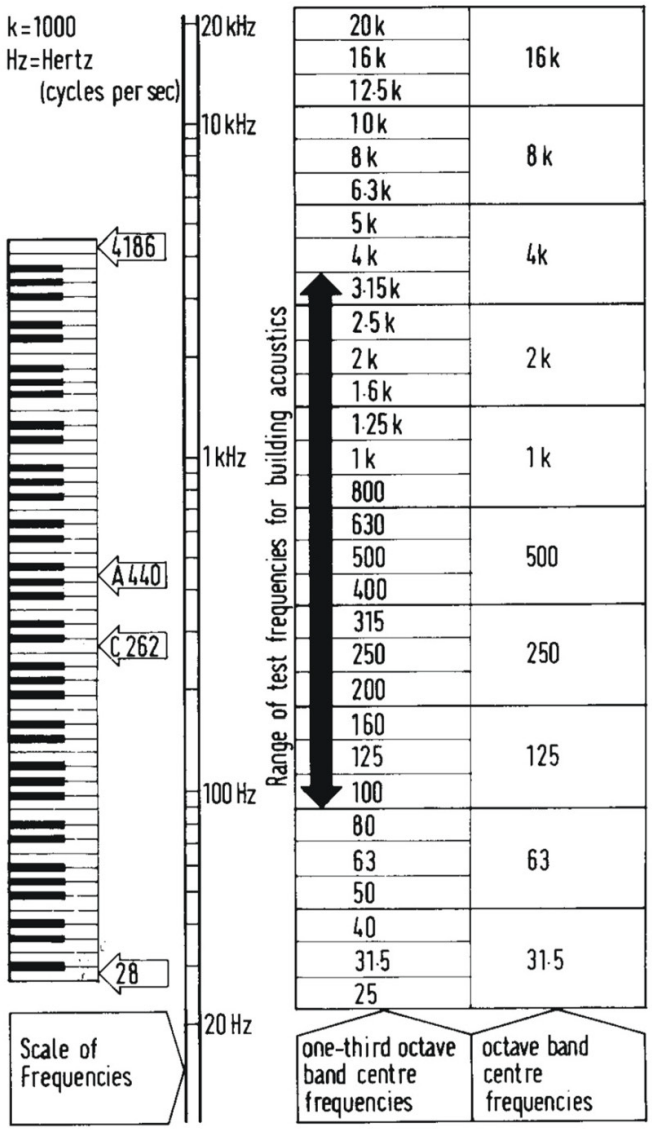
The Rw is a single number rating used to describe the sound insulation of building elements. Traditional masonry walls will achieve no less than 48 dB Rw, single glazed windows approximately 25 dB Rw. The figure is mostly used when calculating noise transmission through building elements.

Perception - Frequency

Frequency is the rate at which the air particles vibrate. The more rapid the vibrations, the higher the frequency and perceived pitch. Frequency is measured in Hertz (Hz).

A young person with average hearing can generally detect sounds in the range 20 Hz to 20,000 Hz (20 kHz). Figure below illustrates the range of frequencies, for example, the lowest note on a full scale piano, 'A', has a fundamental at 28 Hz, and the highest, 'G', a fundamental at 4186 Hz (there will be higher order harmonics). Human speech is predominantly in the range 250 Hz - 3000 Hz.

The musical term 'octave' is the interval between the first and eighth note in a scale and represents a doubling of frequency. A series of octave and one-third octave bands have been derived, as shown in the Figure below, and these are commonly used in noise measurements where it is necessary to describe not only the level of the source noise but also the frequency content. The frequency content of a noise source can be useful for identifying acoustic features such as a whine, hiss or screech.

In most instances it is necessary only to specify and use the overall A-weighted noise values, for example when assessing noise from fixed plant (pumps, motors, refrigeration plant etc.), road traffic and general industrial sources. However, in certain circumstances it is necessary to consider the contribution to the overall A-weighted noise level in individual octave frequency bands, such as when assessing architectural acoustics or noise from amplified music events.

1/1 Octave and 1/3 Octave Frequency Bands