



103-105 HIGHGATE ROAD LONDON W1K 6ZP

BS4142 PLANT NOISE ASSESSMENT

20 May 2020

Rosella Limited



103-105 HIGHGATE ROAD LONDON W1K 6ZP

BS4142 PLANT NOISE ASSESSMENT

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1.0 INTRODUCTION

Aran Acoustics has been appointed to carry out a noise impact assessment for the replacement of a kitchen extract unit at 103-105 Highgate Road, London.

A noise survey and assessment has been requested to ensure that noise levels from the condenser units do not cause undue disturbance to nearby noise sensitive locations.

The purpose of this assessment is to determine the existing noise levels at the nearest noise sensitive location and establish the maximum permissible noise level from the unit.

Such to establish suitable plant noise levels an assessment has been carried out to BS 4142: 2014 '*Method for rating and assessing industrial and commercial sound*'. This assessment has been benchmarked against an environmental noise survey carried out on 06 May 2020.

This report therefore describes the noise survey and its results. Figure 4.1 contains a graphical representation of the noise measurements taken on site. Section 5.0 provides the maximum permissible noise levels for the proposed plant. Section 6.0 provides an assessment of plant noise levels based on the proposed location.

2.0 SITE DESCRIPTION

The site is located at 103-105 Highgate Road in the London Borough of Camden. Proposals are to replace the existing kitchen extract system with a new system including associated intake and extract louvres located to the rear of the ground floor premises as shown on the architectural drawings within Appendix A.

The nearest noise sensitive receptor to the location of the louvres, is the rear window first floor window of the residential flat directly above the restaurant with additional residential flats located direct opposite the rear of the commercial premises.

A subjective noise assessment on site determined that the predominant noise sources in the area to impact the site and nearest sensitive receptor is background noise levels from road traffic on surrounding roads along with existing plant servicing the ground floor commercial premises to a lesser extent.

Figure 2.1 below shows a location map and aerial photo of the site and surrounding area.

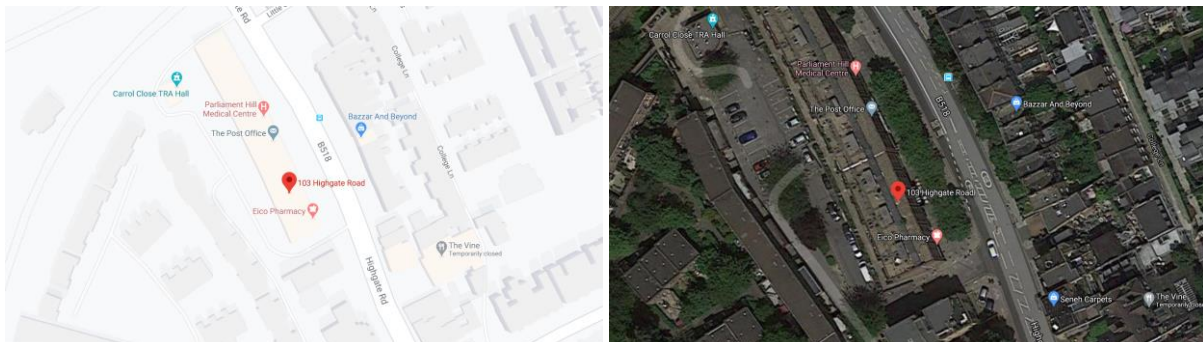


Table 2.1 – Location map and aerial photo of the site

3.0 ENVIRONMENTAL NOISE SURVEY

Due to current restrictions surrounding the Covid-19 pandemic along with security on-site it was not possible to carry out a 24-hour unattended noise survey. An attended noise survey was carried out at the site on Wednesday 06 May 2020 between 20:30 – 22:30 hours. This time period was chosen as it was considered the quietest period during the operational hours of the new kitchen extract system.

A single noise monitor was placed on the rear first floor terrace directly above the ground floor commercial unit. The microphone was placed on a tripod approximately 1.2m above floor level and 2m from the nearest residential window to the proposed location of the new kitchen extract louvres.

It was noted that the existing air condenser units located on the rear wall of the commercial premises were not in operation at the time of surveying however the existing kitchen extract system was in operation up until 22:00 hours.

Noise levels measured at the microphone location are considered representative of the existing environmental noise levels to impact the nearby noise sensitive receptors. A site plan showing the microphone location is provided in Appendix A. Site photos of the microphone position are provided in Appendix B.

3.1 Measurement Equipment

The following measurement equipment was used, which complies with the performance specifications for a Class 1 device in accordance with BS EN 61672-1, BS EN 61260 and BS EN 60942.

Name	Serial Number	Last Calibrated	Calibration Due
Norsonic Precision Sound Analyser Type 140	1404425	Oct 2018	Oct 2020
Norsonic Type 1209 Pre-amplifier	13231	Oct 2018	Oct 2020
Norsonic Type 1225 Microphone	128783	Oct 2018	Oct 2020
Norsonic Type 1251 Calibrator	32994	Oct 2018	Oct 2020

Table 3.1 – Measurement equipment used on site

The meter was calibrated before and after testing - no deviations were found. The meter was set to measure consecutive 'A' weighted 15-minute samples.

3.2 Weather Conditions

The weather was fine and dry for the duration of the survey. Wind speed remained below 5 m/s. The temperature was approximately 12 °C.

The weather conditions were seen as suitable for environmental noise surveying in accordance with BS 7445-1:2003 '*Description and measurement of environmental noise*'.

4.0 SURVEY RESULTS

The noise levels measured during the survey period are shown in Figure 4.1 below. The full set of acoustic data measured on site is available upon request.

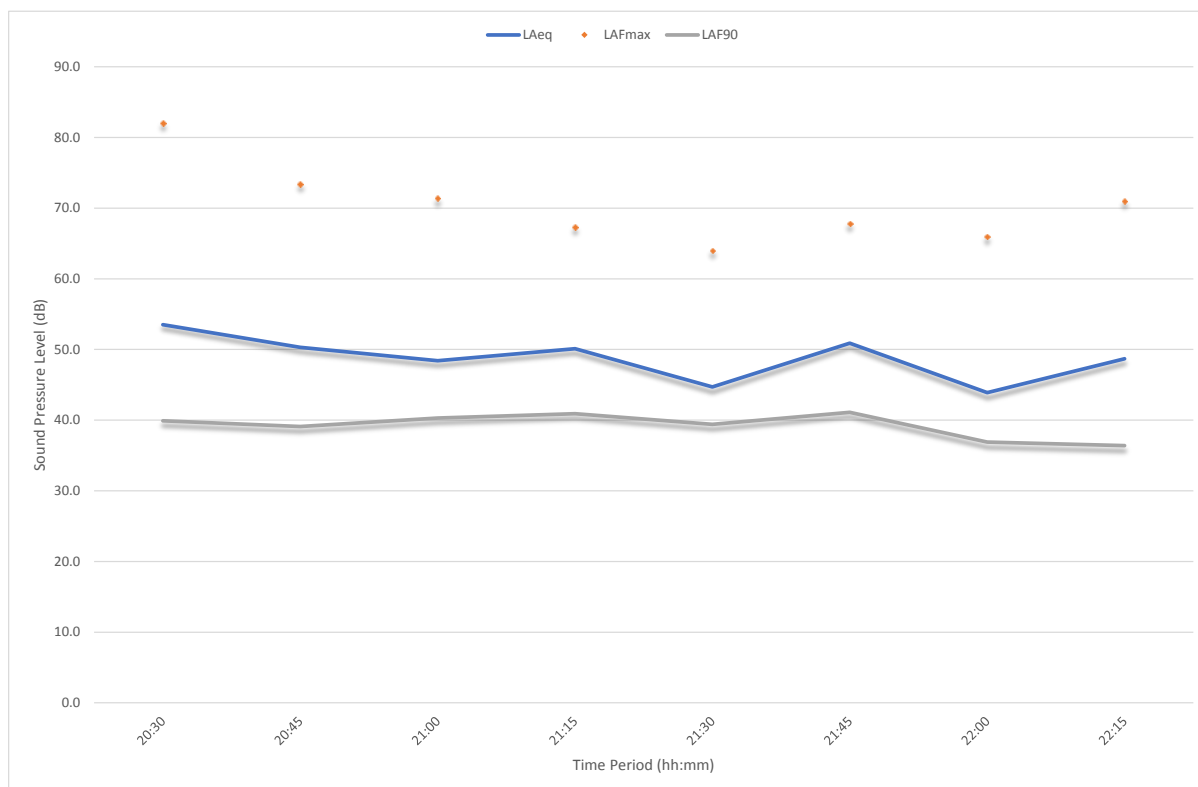


Figure 4.1 – Measured noise levels

The following table provides a summary of the noise levels measured on site at the fixed microphone position during the survey period including the equivalent continuous A-weighted sound pressure level; $L_{Aeq,T}$ and representative background noise level; $L_{A90,T}$.

Time Period	Average Noise Level $L_{Aeq, dB}$	Representative Background $L_{A90, dB}$
Day (20:30 – 22:30 hours)	50	39

Table 4.1 - Summary of measured noise levels

It is noted that due to current restrictions at the time of surveying, measured background noise levels from road traffic may be lower than under normal circumstances however have been used for assessment purposes and would be seen as a worst case scenario.

5.0 ASSESSMENT CRITERIA

Section 4.0 above provides a summary of measured noise levels on site. The following section provides a summary of guidance documentation relevant to this development.

5.1 British Standard 4142

BS 4142:2014 describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

The likelihood of complaints in response to a specific noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level. BS 4142 states that:

- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) 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.

This standard also allows for an appropriate correction for the acoustic features present in the noise using a number of methods. A correction should be applied if one or more of the following features (see the list below), are present within the noise sources in question.

- The noise is of a tonal nature, i.e. it contains a distinguishable, discreet, continuous note such as whine, hiss, screech, hum;
- The noise is impulsive, i.e. it contains distinct impulses such as bangs, clicks, clatters, or thumps;
- The noise contains other characteristics that are neither tonal nor impulsive but is irregular enough to attract attention.

5.2 Summary of Guidance Documentation

It can be concluded from BS4142 guidance document that noise levels from plant and equipment associated with the development should not generally exceed the background noise level when measured at the nearest noise sensitive location. This is a positive indication of low noise impact.

5.3 Target Plant Noise Levels

It is understood that the proposed air condenser unit will operate between 09:30 – 22:30 hours daily, i.e. daytime only. Based on the proposed hours of operation, Aran Acoustics suggest a design target of -5 dB below the existing background noise levels. This is seen as a suitable design target where noise impact would be 'low' in accordance with BS 4142 and complaints from nearby noise sensitive receptors deemed unlikely.

Calculations are based on the lowest representative background noise level during the operating period. The representative background noise level during the period of operation was determined to be 39 dB L_{A90} measured between 20:30 – 22:30 hours.

Following analysis of manufacturers sound level data, it is considered that the kitchen extract system produces a broadband noise with no tonal features. The system is also inverter driven, meaning that it will gradually increase or decrease operating capacity depending on the level of duty required. This gives a positive indication that the noise produced is not immediate or distinguishable therefore no acoustic feature correction need be applied.

Based on the lowest background noise level during the proposed operating period and the suggested design targets including any tolerance or correction factors, the following table shows the maximum permissible noise level from the kitchen extract system when measured at the window of the nearest residential receptor.

Lowest Background, L_{A90}	Tolerance Factor	Correction Factor	Max Noise Level at Residential
39 dBA	-5 dB	-0 dB	34 dBA

Table 5.1 - Plant Noise Level Target

6.0 PLANT NOISE LEVEL ASSESSMENT

Proposals are to install 2 no. Flakt Woods 40JM MaXfans used for air intake and extraction. The fans will be ducted to atmosphere through two 1200 x 400mm louvres located on the rear wall of the ground floor commercial premises as shown on the drawings in Appendix A.

The nearest noise sensitive receptor is the rear window of the first floor flat directly above the ground floor commercial unit at an approximate distance of 7.3m. Other nearby receptors are the residential block of flats located approximately 17.3m to the west at the nearest point. At distance, the units of plant are considered a point source and noise levels will decay at a rate of 6dB per doubling of distance.

Based on the location of the louvres and parapet wall there is no direct line of sight to the nearest residential window therefore a barrier correction has been included in our calculations. It is also noted that the louvres face away from the first floor residential window therefore a directivity correction has also been included in our calculations where appropriate.

Preliminary calculations show that noise levels at the residential block of flat to the west exceed the target level within Table 5.1 above therefore additional mitigation will be required. It is proposed that in-line acoustic attenuators are added to the air intake and extract fans to achieve the following insert loss values:

	Octave Band Centre Frequency, dB						
	63 Hz	125 Hz	250 Hz	500 Hz	1.0 K Hz	2.0 K Hz	4.0 K Hz
Acoustic Attenuator ¹	-2	-3	-5	-10	-13	-11	-9

Table 6.1 – Insertion Loss for Attenuators

Calculations show that the combined noise level from the proposed air intake and extraction fans with attenuation will be approximately **25 dBA** when measured at the nearest residential window directly above the commercial premises. This does not exceed the target plant noise level of **34 dBA** established in Section 5.0 above.

Further calculations show that noise levels from the extract system including attenuators will be **34 dBA** when measured at the nearest window of the residential block of flats directly opposite the rear of the commercial premises which meets the design target therefore no further mitigation is proposed at this stage.

Note that for attenuators to be effective they must be placed between the fans and louvres.

¹ Data based on 400mm JM Cylindrical Silencer

Plant noise calculation sheets are provided in Appendix C. Manufacturers noise level data sheets are provided in Appendix D.

7.0 SUMMARY AND CONCLUSION

A noise survey was carried out at the proposed location of a kitchen extract system to be installed to the rear of 103 – 105 Highgate Road, London on 06 May 2020.

From this survey the minimum representative background noise level at the nearest sensitive property was found to be 39 dB L_{A90} during the proposed operational hours.

Using guidance in BS 4142, noise levels from the proposed air intake and extract fans associated with the kitchen extract system should not generally exceed 5 dBA below the background noise level at the window of the nearest noise sensitive receptor.

Based on manufacturer's noise level data for the kitchen extract fans including the proposed acoustic attenuators, calculations show that noise levels at the nearest noise sensitive receptor would be approximately 25 dBA. Further calculations show that noise levels at the block of residential flats directly opposite would be 34 dBA. This does not exceed the maximum permissible noise level target of 34 dBA which is a positive indication of low noise impact in accordance with BS 4142 where complaints are deemed unlikely.

PROPOSED VENTILATION SPECIFICATION

1200 X 1350 X 500 EXTRACT AND SUPPLY CANOPY
 MINIMUM SPECIFIC EXTRACT FLOW RATE 1.27M/s
 400 MAXFAN FOR EXTRACT SYSTEM @ 250Pa
 400 MAXFAN FOR SUPPLY SYSTEM @150Pa
 DISCHARGE VIA WEATHER LOUVRE GRILL
 INTAKE VIA WEATHER LOUVRE GRILL

[illegible]

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APPENDIX B – SITE PHOTOS



APPENDIX C – PLANT NOISE CALCULATION SHEETS

First Floor Residential Flat	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	dBA
Extract Fan Outlet (Lw)	86	88	90	84	77	72	65	85
Acoustic Attenuator	0	0	0	0	0	0	0	
Duct Loss	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	
End Reflection Loss	-6	-2.5	-0.5	0	0	0	0	
Louvre Loss	-3	-3	-3	-3	-3	-3	-3	
Duct to Atmosphere	-6	-6	-6	-6	-6	-6	-6	
Directivity Correction	-2	-3	-6	-8	-8	-8	-8	
Distance Attenuation	-28.3	-28.3	-28.3	-28.3	-28.3	-28.3	-28.3	
Barrier Attenuation	-10.8	-13.2	-15.9	-18.7	-21.6	-24.6	-27.6	
SPL at Receiver	29.6	31.9	30.3	20.0	10.1	2.1	-7.9	24
Intake Fan Inlet (Lw)	77	81	86	78	72	66	59	80
Acoustic Attenuator	0	0	0	0	0	0	0	
Duct Loss	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	
End Reflection Loss	-6	-2.5	-0.5	0	0	0	0	
Louvre Loss	-3	-3	-3	-3	-3	-3	-3	
Duct to Atmosphere	-6	-6	-6	-6	-6	-6	-6	
Directivity Correction	-2	-3	-6	-8	-8	-8	-8	
Distance Attenuation	-28.3	-28.3	-28.3	-28.3	-28.3	-28.3	-28.3	
Barrier Attenuation	-10.8	-13.2	-15.9	-18.7	-21.6	-24.6	-27.6	
SPL at Receiver	20.6	24.9	26.3	14.0	5.1	-3.9	-13.9	19
Combined Noise Level (Lp)	30.1	32.7	31.7	20.9	11.2	3.1	-6.9	25

Ground Floor Residential Flats	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	dBA
Extract Fan Outlet (Lw)	86	88	90	84	77	72	65	85
Acoustic Attenuator	-2	-3	-5	-10	-13	-11	-9	
Duct Loss	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	
End Reflection Loss	-6	-2.5	-0.5	0	0	0	0	
Louvre Loss	-3	-3	-3	-3	-3	-3	-3	
Duct to Atmosphere	-6	-6	-6	-6	-6	-6	-6	
Directivity Correction	0	0	0	0	0	0	0	
Distance Attenuation	-35.9	-35.9	-35.9	-35.9	-35.9	-35.9	-35.9	
Barrier Attenuation	0	0	0	0	0	0	0	
SPL at Receiver	32.8	37.4	39.5	29.0	19.1	16.1	11.1	33
Intake Fan Inlet (Lw)	77	81	86	78	72	66	59	80
Acoustic Attenuator	-2	-3	-5	-10	-13	-11	-9	
Duct Loss	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	
End Reflection Loss	-6	-2.5	-0.5	0	0	0	0	
Louvre Loss	-3	-3	-3	-3	-3	-3	-3	
Duct to Atmosphere	-6	-6	-6	-6	-6	-6	-6	
Distance Attenuation	-35.9	-35.9	-35.9	-35.9	-35.9	-35.9	-35.9	
Barrier Attenuation	0	0	0	0	0	0	0	
SPL at Receiver	23.8	30.4	35.5	23.0	14.1	10.1	5.1	28
Combined Noise Level (Lp)	33.3	38.2	41	30	20.2	17	12	34

APPENDIX D – TECHNICAL DATA SHEETS



Fläkt Woods Limited Technical Data Sheet MaXfan2

FläktGroup

Quotation Number :	Project Code :
Project Name : 40JM MaXfan Noise Data	Customer : Aran Acoustics
Item Reference: : Selection 1	Date: : Monday, May 18, 2020

Fan Code	40-1 MaXfan2/16/4/5/37/30
Fan Diameter / Size	400 Size / mm
Blades	5
Fan Speed	1420 rpm
Velocity	10.1 m/s
Blade Angle	37-30
Installation Type / Form of Running	C / AB (Vertical)
Fan Casing	Long

Requested Duty	1.27m³/s @ 250 Pa (static)
Outlet Dynamic Pressure	61 Pa

Duty Shaft Power	0.530 kW (Both Stages)
Max Shaft Power	0.622 kW (Both Stages)
Total Efficiency	74.3 %

Motor Frame	BT9 [Class F]
Motor Rating	0.320 kW (Per Stage)
Full Load Current	4.4 A (Per Stage)
Starting Current	10 A (Per Stage)
Motor Mounting	Pad
Electrical Supply	220-240 Volts 50 Hz 1 Phase
Start Type	DOL
Motor Winding	Standard
Enclosure	Standard All

ErP [FMEG] Rating	N 48 (ErP Compliant)
ErP [FMEG] Target	N 40
FMEG Blade Angle [Range]	37° [37° - 37°]
Measurement Category	C (Static)
VSD	N
Fan + Motor Efficiency	40.4% (1.09 m³/s @ 330 Pa)
Motor Input Power (ErP)	0.446 kW

SFP value	0.50 W/(l/s) @ Requested Duty
Power from mains	0.64 kW
Energy Consumption	1920 kWh (3000 h/year)
Running Cost / Year	£230

Air Density	1.2 kg/m³ / 20 °C / 0 m / 50% RH
Smoke Venting	Non Smoke Venting
Product Number	EQ411463

Performance data has been derived from tests carried out in a Fläkt Woods laboratory, in accordance with ISO 5801 and is specifically applicable for Ducted installations. When an electronic controller is incorporated, enhanced motor noise can occur - particularly when the operating speed is well below maximum. FWL therefore recommend using an auto transformer speed controller for noise sensitive applications. Bifurcateds are Erp exempt when used continuously at >100C. They are not for use in the EEA at lower temperatures.

Acoustic data has been derived from tests carried out in a Fläkt Woods laboratory, in accordance with BS 848 Pt 2, 1985 / BS EN ISO 5136 under Ducted conditions. The single figure provided is the overall Inlet sound pressure level at the specified distance, under spherical, free field conditions.

Acoustic figures for adjusted running speeds have been interpolated and are for reference only.






This Offer is made subject to the latest version of our A100-19 Terms and Conditions, a copy of which can be made available on request.

	Sound Spectrum (Hz)								Overall	
	63	125	250	500	1k	2k	4k	8k	Lw*	LpA @ 3 m**
Inlet*	85	86	88	83	76	69	62	55	93	64
Outlet*	86	88	90	84	77	72	65	58	94	65
Breakout*	79	76	73	66	54	46	43	38	82	48

* Lw dB re 10⁻¹² W

** dBA re 2x10⁻⁵ Pa

Sound data at requested duty.

Description		Qty
Fan		
EQ411463 - 40-1 MaXfan2/16/4/5/37/30		1
Accessories		
Thermostat		1
Optional Controllers & Sensors		Optional Accessories
	EEDS (Switched - Electronic) [EA900104]	 Mounting Feet [897728]
		 Rubber AV Mounts [AS035471]
		 Matching Flange [74913]
		 Flexible Connector

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Selection Engine: 3.1.3.38a







Fläkt Woods Limited

Technical Data Sheet

MaXfan2

FläktGroup

Quotation Number	:		Project Code	:	BO-12093-3																																																							
Project Name	:	40JM MaXfan Noise Data	Customer	:	Aran Acoustics																																																							
Item Reference:	:		Date:	:	Monday, May 18, 2020																																																							
Fan Code	:	40-1 MaXfan2/16/4/5/37/30	<p>Performance data has been derived from tests carried out in a Flakt Woods laboratory, in accordance with ISO 5801 and is specifically applicable for Ducted installations. When an electronic controller is incorporated, enhanced motor noise can occur - particularly when the operating speed is well below maximum. FWL therefore recommend using an auto transformer speed controller for noise sensitive applications. Bifurcateds are Erp exempt when used continuously at >100C. They are not for use in the EEA at lower temperatures.</p> <p>Acoustic data has been derived from tests carried out in a Flakt Woods laboratory, in accordance with BS 848 Pt 2, 1985 / BS EN ISO 5136 under Ducted conditions. The single figure provided is the overall Inlet sound pressure level at the specified distance, under spherical, free field conditions.</p> <p>Acoustic figures for adjusted running speeds have been interpolated and are for reference only.</p> <p>This Offer is made subject to the latest version of our A100-19 Terms and Conditions, a copy of which can be made available on request.</p>																																																									
Fan Diameter / Size	:	400 Size / mm																																																										
Blades	:	5																																																										
Fan Speed	:	1164 rpm (Speed Controlled)																																																										
Max / Min Motor Speed	:	1420 rpm (100%) / 354 rpm (25%)																																																										
Velocity	:	8.6 m/s																																																										
Blade Angle	:	37-30																																																										
Installation Type / Form of Running	:	C / AB (Vertical)																																																										
Fan Casing	:	Long																																																										
Actual Duty	:	1.08m³/s @ 150 Pa (static)																																																										
Outlet Dynamic Pressure	:	44 Pa																																																										
Duty Shaft Power	:	0.284 kW (Both Stages)	<table><thead><tr><th></th><th colspan="8">Sound Spectrum (Hz)</th><th colspan="2">Overall</th></tr><tr><th></th><th>63</th><th>125</th><th>250</th><th>500</th><th>1k</th><th>2k</th><th>4k</th><th>8k</th><th>Lw*</th><th>LpA @ 3m</th></tr></thead><tbody><tr><td>Inlet*</td><td>77</td><td>81</td><td>86</td><td>78</td><td>72</td><td>66</td><td>59</td><td>52</td><td>88</td><td>60</td></tr><tr><td>Outlet*</td><td>79</td><td>84</td><td>88</td><td>79</td><td>73</td><td>68</td><td>62</td><td>55</td><td>90</td><td>61</td></tr><tr><td>Breakout*</td><td>72</td><td>72</td><td>71</td><td>61</td><td>50</td><td>42</td><td>40</td><td>35</td><td>76</td><td>44</td></tr></tbody></table> <p>* Lw dB re 10⁻¹² W </p>				Sound Spectrum (Hz)								Overall			63	125	250	500	1k	2k	4k	8k	Lw*	LpA @ 3m	Inlet*	77	81	86	78	72	66	59	52	88	60	Outlet*	79	84	88	79	73	68	62	55	90	61	Breakout*	72	72	71	61	50	42	40	35	76	44
	Sound Spectrum (Hz)								Overall																																																			
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Breakout*	72	72				71	61	50	42	40	35	76	44																																															

Description	Qty
Fan EQ411463 - 40-1 MaXfan2/16/4/5/37/30	1
Accessories Thermostat	1
Controllers & Sensors DA414855 - ME1.12	1
<p>Optional Controllers & Sensors</p> <p>Optional Accessories</p> <div>  Mounting Feet [897728]  Matching Flange [74913] </div> <div>  Rubber AV Mounts [AS035471]  Flexible Connector </div>	

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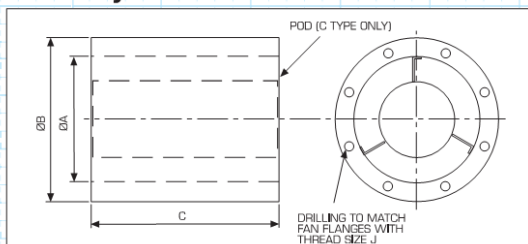
Website: www.flaktwoods.co.uk/woods

Email: Daniel.luesley@flaktgroup.com

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Selection Engine: 3.1.3.38a

JM - Cylindrical Silencers



Bore Dia. mm (D)	Length	Acoustic Performance (dB) – Octave Band Mid Frequency – Hz							
		63	125	250	500	1K	2K	4K	8K
400	1D	2	3	5	10	13	11	9	8
450	1D	2	3	6	12	13	11	10	6
500	1D	2	3	6	13	14	10	10	5
560	1D	2	4	7	14	14	19	10	7
630	1D	2	5	7	15	13	8	9	8

Suitable for fan OA	Product Numbers	B	C	J	Weight (kg)	
					B Type	C Type
400	SB241401	500	400	M10	15	18
450	SB251401	600	450	M10	20	24
500	SB271401	650	500	M10	25	29
560	SB281401	710	560	M10	30	35
630	SB301401	780	630	M10	35	42

* For C type silencer change prefix from SB to SC

The above silencers give the following approximate dBA reductions:

B Type 1 diameter length – 7 to 10 dBA

For full acoustic details and resistance to air flow for type C see publication SP01.