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BS4142 Noise Assessment

Report No: 3732-R1 – Coffee & Gift, 46-50 New Oxford Street, London, WC1A 1ES.

Client: Rustam Rezai

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Report Revisions	*Date*		
3732-R1	26/05/2017	Initial Report	
	Produced by:	*Checked by:*	*Authorised by:*
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1. Introduction

Clover Acoustics Ltd has been appointed by Arch Planning on behalf of Mr Rustam Rezai to carry out a BS4142 noise assessment at the site of a proposed kitchen extract system to be installed to a walkthrough at 46-50 New Oxford Street, London WC1A 1ES . The extract equipment will operate during the proposed operational hours of 11:00 to 23:00 hours.

A baseline noise survey has been carried out over a representative period in order to establish the existing background noise levels. The survey was conducted at one monitoring location covering a typical day and night time period on Tuesday 9th May 2017.

The purpose of this report is to demonstrate that due consideration for noise affecting residential property adjacent the installation has been made and to assess the significance of any noise impact from the operation of the new extract.

2. Assessment Methodology

BS4142:2014 Methods for rating and assessing industrial and commercial sound.

BS4142 gives a method for rating sound from industrial and commercial sources affecting people inside or outside dwellings or premises used for residential purposes. An initial estimate of the significance of the sound from the industrial/commercial nature can be assessed by subtracting the measured background noise level from the rating level (this is the specific sound level of the source with any corrections or penalties for distinctive acoustic characteristics). Typically, the greater the difference, the greater the magnitude of the impact.

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or 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.

3. Site Description

The site is a mixed commercial and residential area. The nearest sensitive receiver to the terminus has been identified as apartments above the proposed extract screened from the terminus by the building walkthrough. The extract terminus point is to be situated flush with the wall louvre at ground level approximately 4m from the nearest sensitive window. A Helios 500/4 fan unit is to be installed internally to service the extract. Subjectively the noise climate in the area is dominated by road traffic from the surrounding area.

Figure 1 – Site Location

4. Survey Information

Measurement Instrumentation

The measurement instrumentation used on the survey was as follows:

Equipment	Manufacturer & Type	Serial Number	Calibration Certificate
Sound Level Meter	Norsonic 118	28952	09739
Acoustic Calibrator	Norsonic 1251	32856	09734

The equipment was calibrated to comply with section 4.2 of BS7445:1-2003 before and after the surveys. The calibration was as follows:

Meter	Serial	Before		After	
Norsonic 118	28952	113.9	-26.2	113.9	-26.2

Measurements & Timescales

During the survey 5-minute measurements were made during a typical period on Tuesday 9th May 2017 prior to the installation of the unit.

The following measurements are reported: $L_{Aeq,T}$, $L_{A90,T}$, $L_{A10,T}$, $L_{Amax,T}$

The measurements and their interpretation shall be in accordance with BS 7445: Parts 1 and 2. All sound pressure levels are in dB (re 20µPa).

Meteorology

Wind speed measurements were recorded during the background survey close to the noise monitoring location. The monitoring location was shielded from wind by the surrounding buildings.

Temperature was recorded at 10-16°C with no precipitation during the measurement period.

Position of Monitoring Equipment

The equipment was mounted free field 1.5m from the ground at a location representative of the nearest receivers. Figure 2 shows the site location plan and proposed position of the unit.

Produced 26 May 2017 from the Ordnance Survey MasterMap(Topography)Database and incorporating surveyed revision available at this date.

The representation of a road, track or path is no evidence of a right of way. The representation of features as lines is no evidence of a property boundary.

Version 1.0 Unversioned directory PNG

Metres
0 4 8 12 16 20
1:500

Stedham Chambers 44-50
WC1A 1ES

Supplied by: Stanfords 26 May 2017
© Crown copyright and database rights 2017 OS 100035409
Reference: OI1128626
Centre coordinates: 530111 181469

Figure 2 - Site Location Plan

Proposed Installation	
Monitoring Position	

5. Survey Results

Background Noise Summary

The following tables show the summary of the background noise levels monitored. The reported results represent the free field sound pressure levels at the receivers. The lowest background recorded during the proposed operational hours was 49dB $L_{A90,5min}$.

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Site: 46-50 New Oxford Street, London, WC1A 1ES
Table 1: Summary — Start Date: 09/05/2017
Report: 3732-R1 — End Date: 09/05/2017

Hourly Summary

Hour Start	LAeq,1Hour	LAMax,1hour	Min LA90,5min	LA10,1hour
07:00	61.9	78.8	51.2	62.0
08:00	64.3	90.2	55.6	64.4
09:00	62.5	80.6	55.7	64.0
10:00	67.9	93.3	54.9	64.8
11:00	62.2	79.3	56.9	63.1
12:00	63.8	92.5	55.2	64.3
13:00	63.5	82.4	59.0	64.2
14:00	62.6	83.4	56.8	64.0
15:00	62.6	83.7	53.9	64.0
16:00	59.9	80.2	53.3	61.3
17:00	64.3	87.4	54.9	63.7
18:00	61.1	85.2	56.4	62.3
19:00	62.0	91.1	53.9	62.4
20:00	61.9	88.9	50.0	61.0
21:00	59.1	87.6	50.9	60.0
22:00	63.1	96.0	50.7	61.1
23:00	58.5	82.7	48.8	60.4
00:00	56.7	81.0	46.0	59.1
01:00	57.0	79.9	44.3	58.0
02:00	59.8	84.8	43.7	58.9
03:00	55.6	74.1	44.3	57.6
04:00	55.3	75.0	44.2	57.2
05:00	55.7	75.2	44.6	58.0
06:00	58.9	84.3	48.9	60.0

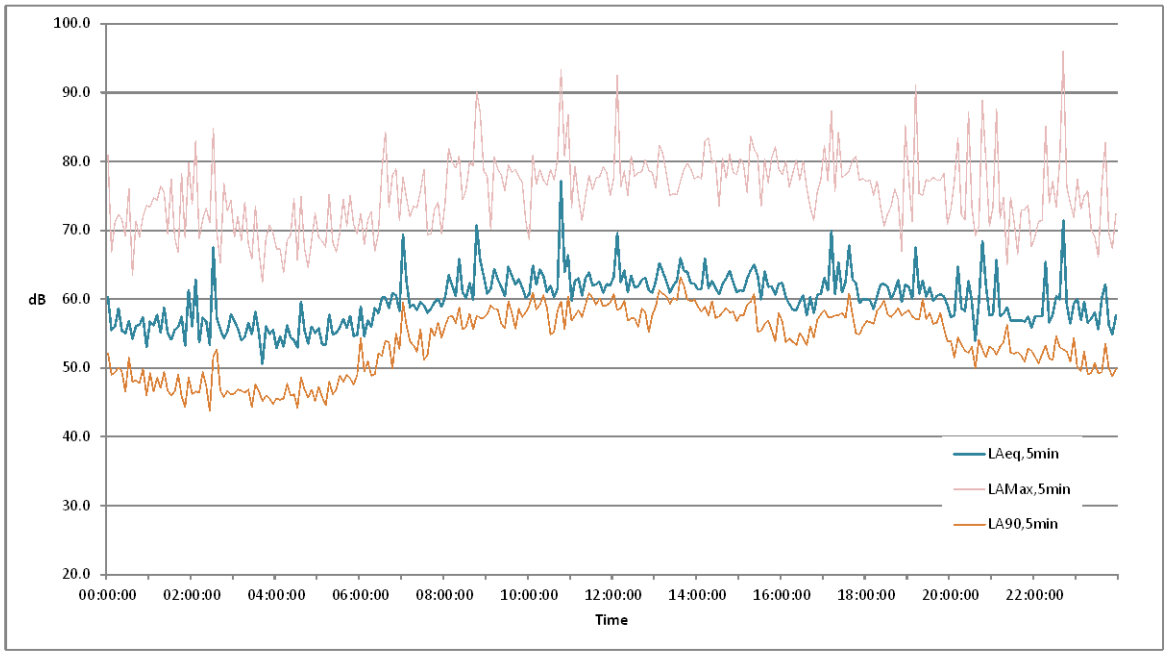

Table 1 – Summary

6. Noise Assessment

BS4142:2014 Methods for rating and assessing industrial and commercial sound.

Specific Noise Source

It is understood that a Helios 500/4 fan unit will be installed internally to reduce the potential for noise breakout from the fan unit. The flue is to terminate at the wall louver as shown in figure 3.

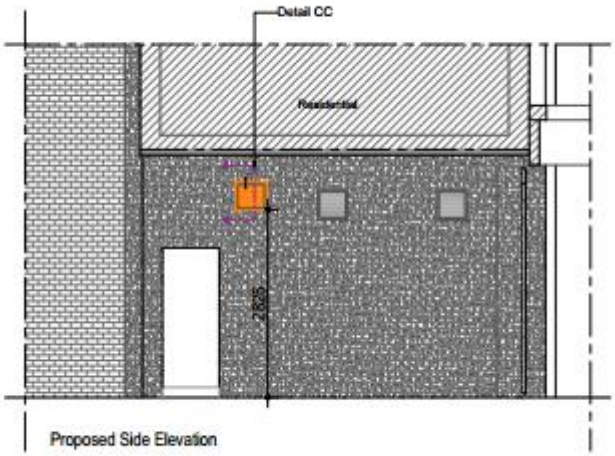

Figure 3 – Proposed Installation

Acoustic Feature Correction

BS4142:2014 allows a character correction to be applied to the specific sound level where acoustic features are present at the assessment location. BS4142 considers that certain acoustic features can increase impact of a new noise source over that expected from a straight comparison between the specific noise level and the background noise level.

These features and the penalties applied to calculate a rating level when assessing subjectively as defined by BS4142 are as follows:

Tonality: For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 and +6dB for tonality.

- 2dB for a tone that is just perceptible
- 4dB where it is clearly perceptible
- 6dB where it is highly perceptible

Impulsivity: A correction of up to 9dB can be applied for sound that is highly impulsive, considering both the rapidity of change in sound level and the overall change in sound level.

- 3dB just perceptible impulsivity
- 6dB clearly perceptible impulsivity
- 9db highly perceptible impulsivity

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

Intermittency: Where the specific sound has identifiable on/off conditions the specific sound level should be representative of the time period of length equal to the reference time period which contain the greatest amount of 'on' time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

Corrections Applied: It is likely that the source may be distinctive from the residual acoustic environment and as such it would be prudent to allow a 3dB penalty in this respect. Typically air handling equipment would not be considered impulsive. In normal operation the extract equipment would not switch on/off several times within the reference time period and as such would not be considered intermittent.

Context

The site is exposed to traffic and city noise from the surrounding area which was dominant.

Barrier Attenuation

Screening of the unit to prevent line of sight to the source would reduce noise levels at the receiver. In this instance the unit is screened from the receiver by the brick walk ways and walls above the installation and attenuation through screening has been accounted for. Calculation sheets are presented in the appendix.

Other Attenuation

A Helios RSD 250/300 286 silencer is included in the calculation.

Kitchen Extract Calculation

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Site: Proposed 46-50 New Oxford Street, London, WC1A 1ES
Plant Noise Prediction
Report: 3732-R1

Kitchen Extract Terminus	Comments	Description	63	125	250	500	1000	2000	4000	8000	
Source Spectrum	Helios 500/4	dB Lw	0	57	73	74	74	73	69	60	
Duct Loss	Rectangular 450-900 Unlined	4m	2.4	1.6	1.2	0.4	0.4	0.4	0.4	0.4	
Bend Loss	Square 900 Unlined	x1	1	5	8	4	3	3	3	3	
Silencer/Attenuator Loss	Helios RSD 250/300 286	x1	0	3	5	8	8	9	7	5	
Distance Attenuation		2m	14	14	14	14	14	14	14	14	
Screening Attenuation			8	10	12	15	18	20	20	20	
Other Attenuation			0	0	0	0	0	0	0	0	
Lp at Receiver		dB	0	23	33	33	31	27	25	18	38 dB(A)

BS4142 Assessment – Extract – Operational Hours

A noise rating level of 41dB(A) has been predicted at the assessment location. This would give an assessment level 8dB below the lowest measured existing background noise level during the proposed operational hours. BS4142 advises, "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 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 Assessment - Extract	dB(A)
Specific Noise Level at Receiver	38
Distinctive Characteristic Penalty	3
Rating Level	41
Operational Background Level L_{A90}	49
Rating Below Background	8

7. Conclusion

A BS4142 noise assessment has been carried out at the site of 46-50 New Oxford Street, London WC1 1ES to assess the impact of a proposed kitchen extract to service the Coffee & Gift outlet. A background noise survey was conducted during a typical period on Tuesday 9th May 2017 at a location representative of the nearest sensitive receivers.

An assessment has been made in accordance with BS4142 which has shown that the proposed Kitchen extract system would predict noise rating levels 8dB below the local background provided the attenuation identified is installed. BS4142 advises “Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact”. Based upon the above and the guidance identified in BS4142 we consider this installation unlikely to have an adverse impact, and that there are no reasons why the proposed use should be refused on the ground of adverse impacts from noise as the development can be appropriately accommodated at this unit.

Steve Clow MIOA
Acoustic Consultant

8. Appendix

Glossary of Terms

Specific Noise Source
The noise source under investigation for assessing the likelihood of complaints.

Specific Noise Level, $L_{Aeq,T}$
The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating Level, $L_{A,T}$
The specific noise level plus any adjustment for the characteristic features of the noise.

Background Noise Level, $L_{A90,T}$
The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 % of a given time interval, T.

Residual Noise
The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Ambient Noise
Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Reference Time Interval, T
The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

$L_{Aeq,T}$
The A-weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as the fluctuating sound over a specified measurement period, T.

$L_{A10,T}$
The A-weighted sound level exceeded for 10% of the specified measurement period, T.

L_{Amax}
The highest short duration A-weighted sound level recorded during a noise event.

A-Weighting
The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies.

Octave Band
A frequency band in which the upper limit of the band is twice the frequency of the lower limit.

One-third-octave Band
A frequency band in which the upper limit of the band is 1/3 times the frequency of the lower limit.

Site Plan

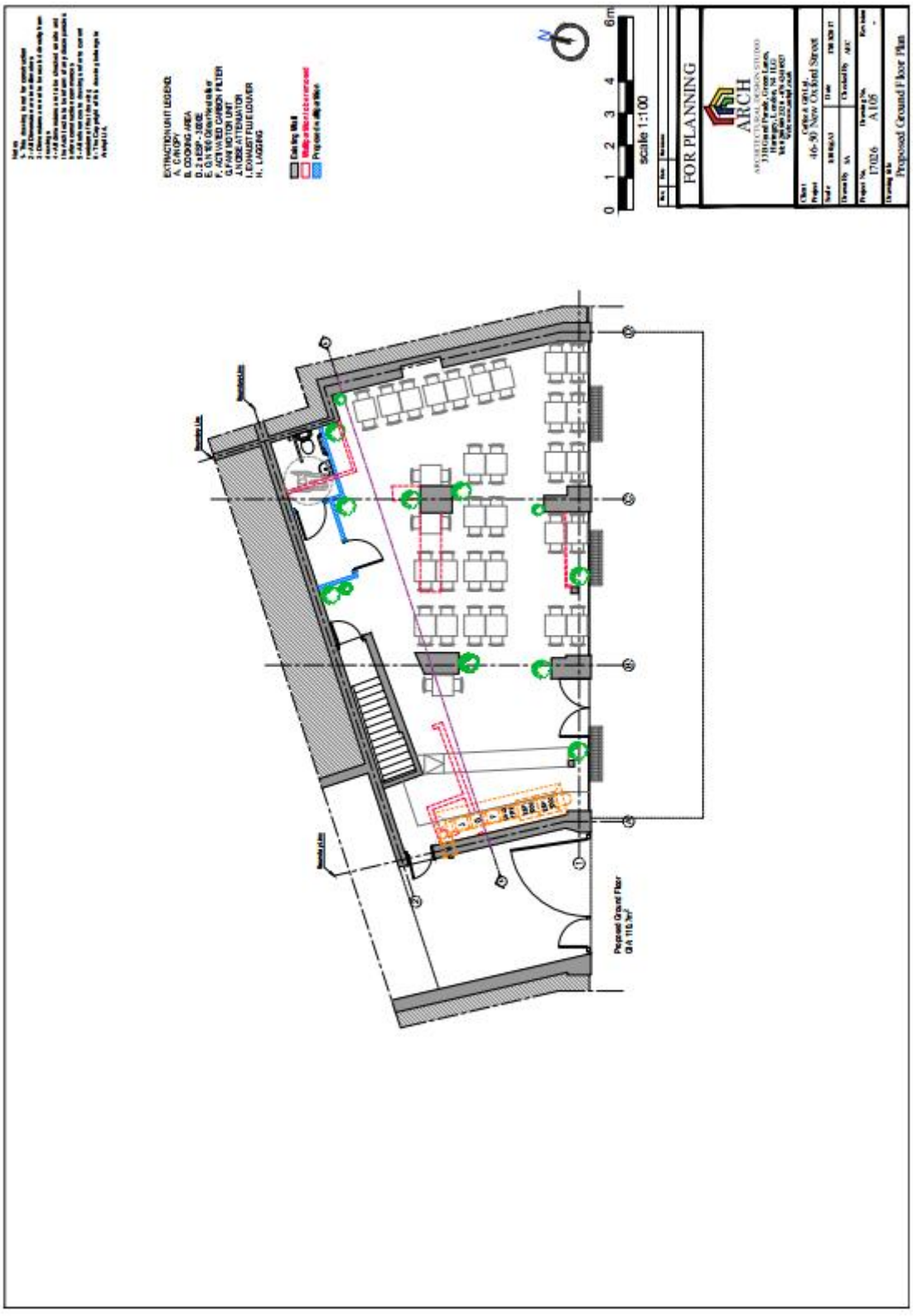

Figure 4 – Site Plan

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Site: 46-50 New Oxford Street
Barrier Attenuation
3732-R1

Barrier Attenuation

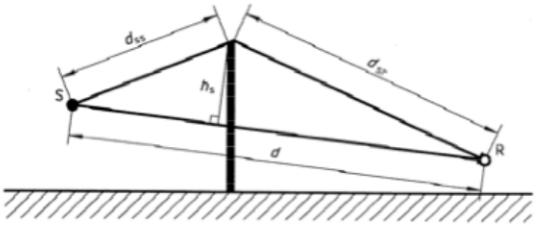


Figure 6 — Geometrical quantities for determining the pathlength difference for single diffraction

from ISO 9613-2:1996

Noise Source				Frequency	Hz	63	125	250	500	1000	2000	4000	8000
Description: Kitchen Extract				Source Spectrum	dB	66.75	61.5	56.06	53.83	51.95	48.24	43.19	39.97

Barrier Attenuation - Source 1				Frequency	Hz	63	125	250	500	1000	2000	4000	8000
Source to Barrier	1	Receiver to Barrier	5	Barrier Attenuation	dB	6.2	7.2	8.8	10.8	13.3	16.0	18.8	21.7
Source Height	0.5	Receiver Height	4	Effective Attenuation	dB	6.2	7.2	8.8	10.8	13.3	16.0	18.8	20.0
Barrier Height	1.8			Resultant Spectrum	dB	60.6	54.3	47.3	43.0	38.7	32.3	24.4	20.0
Path Difference	0.157									Barrier Attenuation	dB		-7

Figure 5 – Barrier Calculation

GigaBox centrifugal fan 500 mm ø

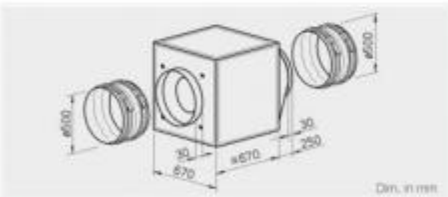
Helios

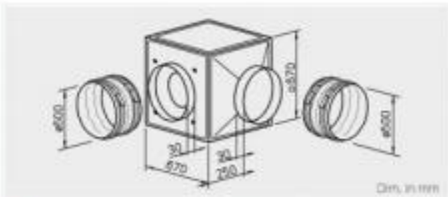
Models GB..

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

Models GB.. T120 NEW!

Designed for moving dirty, humid and hot air up to max. 120° C.





■ Special features of type GB.. T120

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

□ Assembly of types GB.. T120

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

■ Feature

□ Assembly of types GB..

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

■ Specification of both types

□ Casing

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

□ Impeller

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

□ Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 44 or 54. With ball bearings and radio suppressed as standard.

□ Electrical connection

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

Type	Ref. No.	Air flow volume (FID)	R.P.M.	Sound press. level case breakout	Motor power (nominal)	Current full load	Current speed controlled	Wiring diagram	Maximum air flow temperature full load	Maximum air flow temperature controlled	Nominal weight (net)	5 step transformer controller with motor protect unit		5 step transformer controller without motor protect unit		Full motor protection unit using the thermal contacts	
		V m³/h	min⁻¹	dB(A) at 4 m	kW	A	A	No.	+°C	+°C	kg	Type	Ref. No.	Type	Ref. No.	Type	Ref. No.
1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54																	
GBW 500/6	5519	5700	880	35	0.52	2.30	2.60	864	45	45	47	**MWS 3**	1948	**TSW 3.0**	1496	**MW**[1]	1579
GBW 500/4	5517	8400	1350	45	1.38	6.40	8.20	885	65	55	61	**MWS 10**	1946	–	–	–	–
2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/△-wiring, protection to IP 54																	
GBD 500/4/4	5518	8000/6850	1075/1340	45	0.97/1.45	1.60/2.80	2.90	867	50	50	57	**RDS 7**	1578	**TSD 5.5**	1503	**M4**[2]	1571
1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54																	
GBW 500/4 T120	5776	8345	1340	45	1.40	6.1	7.0	301	120	100	75	**MWS 10**	1946	–	–	**MW**[1]	1579
2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/△-wiring, protection to IP 54																	
GBD 500/4/4 T120	5777	7320/6350	1070/1365	45	1.07/1.50	1.80/3.80	3.0	947	120	110	75	**RDS 4**	1316	**TSD 3.0**	1502	**M4**[2]	1571

[1] incl. operation switch [2] incl. operation and 2 speed switch

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Figure 6 – Fan Unit Specification

Photo Appendix

Figure 7 – View of Proposed Extract Flue Location