



Project Name and No:	Manchester Metropolitan University Science & Engineering - 25716
Submission No:	1338B-NGB-ZZ-ZZ-TS-M-038 – Strobic Fan
Material/Product Reference:	Strobic Fume Extract Fan
Manufacturer's Name, Address and Contact No:	Critical Airflow Europe Ltd. Unit 6 Barnes Wallis Court, Wellington Road, Cressex Business Park, Hugh Wycombe, Bucks. HP12 3PS
Proposed Location of Material/Plant on Project:	Level 7 Ventilation Plantroom - New Build
Specification References	1388B-HOL-XX-XX-SP-V-000001 MEP Generals Spec (New Build) 1388B-HOL-XX-XX-SP-V-000002 MEP Performance Spec (New Build)
List of Attachments:	• Critical Air strobic tech sub • ESD schedule of Fume Extract Fans • Strobic Fume Extract Fan TQA
Sample Included (Y/N)	No
Compliant with Specification (Y/N) If No state Non-Compliance	Yes – Note: Strobic do not publish noise breakout data . An additional in line attenuator has been added to provide the best noise reduction solution available for the fan proposed.

Date	
06/006/2022	Name (Printed) David Morland On behalf of NG Bailey

Approved/Approved with Comments	Name (Printed) XXX	Representative of: Hoare Lea	Date: XX/XX/2022
Comments:			

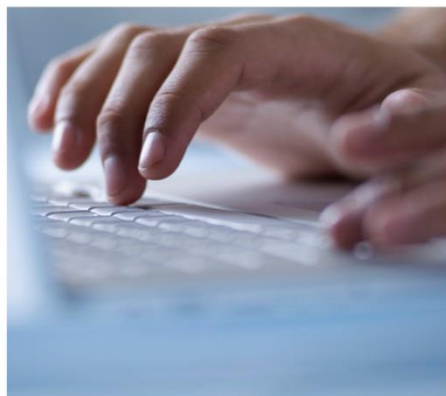
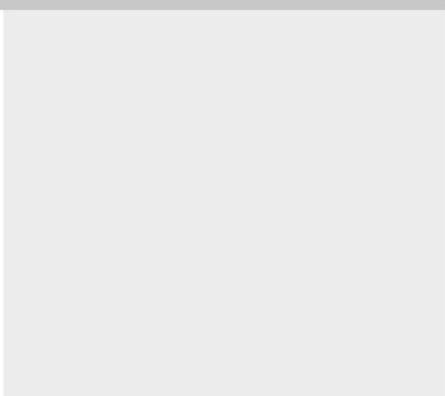
NG BAILEY

Manchester Metropolitan University – Science & Engineering

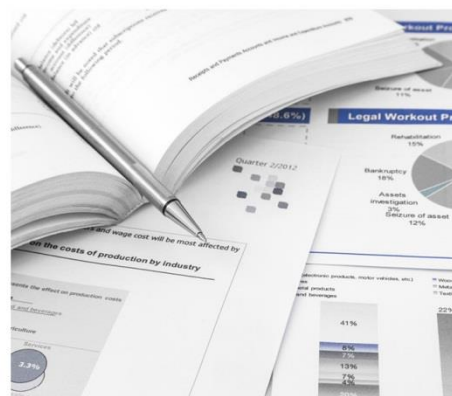
Technical Submission

1338B-NGB-ZZ-ZZ-TS-M-038

Title: Strobic Fume Extract Fan



**BOWMER
KIRKLAND**



NG Bailey

TECHNICAL SUBMISSION FOR – Strobic Fume Extract Fan

SUMMARY

Technical Submission No.	1338B-NGB-ZZ-ZZ-TS-M-038 – Strobic Fume Extract Fan
Revision:	Rev-0
Package Description:	Strobic Fume Extract Fan
Package Equipment:	Run/Standby Strobic Fan c/w discharge nozzles, in line attenuation, fan plenum, fan curb, isolation damper, bypass dampers and DDC controls package
Proposed Supplier:	Critical Air Europe Ltd
Supplier Address:	Critical Airflow Europe Ltd. Unit 6 Barnes Wallis Court, Wellington Road, Cressex Business Park, Hugh Wycombe, Buckinghamshire. HP12 3PS
Building Locations:	7 TH Floor Ventilation Plantroom – New Build
Compliance with Specification:	Yes - Note: Strobic do not publish noise breakout data . An additional in line attenuator has been added to provide the best noise reduction solution available for the fan proposed.
NGB Contact:	David Morland
NGB Contact Tel:	07980 996878
NGB Contact E-mail:	David.morland@ngbailey.co.uk
Raised By:	David Morland
Date Raised:	06/06/2022
Response Required By:	/06/2022

SUPPORTING DOCUMENTS

SUPPORTING DOCUMENTS:

- Critical Air strobic tech sub
- ESD schedule of Fume Extract Fans
- Strobic Fume Extract Fan TQA

APPROVAL STATUS

COMMENTS:

STATUS:

A

B

C

(Please Circle)

MADE BY:

DATE:

STATUS KEY

A – Approved

B – Approved with comments

C – Rejected with comments

MMU Science & Engineering – Strobic Fume Exhaust Fan System

Application

This is a laboratory fume cupboard exhaust application, serving fume cupboards, ventilated cabinets and LEVs.

System duties are as follows.

System FEF-07-01

- Design duty: 4.51Om/s (including 10% margin)
- ESP: 484 Pa (including 21% margin)
- Fan configuration: 1 duty, 1 standby

General System Configuration

Each system comprises of the following elements.

System FEF-07-01

- 2 x mixed flow fan assembly
- 2 x low profile discharge nozzle c/w integral attenuation package
- 1x fan plenum
- 1 x curb (base to mount plenum onto)
- 2 x isolation damper
- 2 x bypass damper
- 1 x DOC controls package

MMU Science & Engineering – Strobic Fume Exhaust Fan System

DOC Controls Package

We have included for a DOC control system with each fan package, which includes a BACnet interface to the BMS. The controls package includes the following.

System Hardware

FEF-07-01

- 1x control panel with touch screen user interface, wall mounted, IP55 enclosure
- 2 x Danfoss variable speed drive, wall mounted, IP55 enclosure
- 2 x Duct static pressure sensor
- 1x Plenum static pressure sensor (high limit)
- 2 x isolation damper actuator, 2-position
- 2 x bypass damper actuator, modulating

Control functionality includes

- Fan on/off control
- Fan speed control
- Fan staging / sequence control
- Isolation damper control
- Bypass damper control
- Common exhaust duct static pressure control
- Fan failure auto changeover
- BACnet BMS interface
- High pressure safety cut-out
- Facility for external safety interlocks

Control panel and VSDs are supplied in IP55 enclosures, suitable for wall mounting in the plantroom. If either panels or VSDs need to be mounted externally, IP65 enclosures are available, at additional cost.

MMU Science & Engineering – Strobic Fume Exhaust Fan System

Spark Resistant Internals

The Strobic fan system complies with AMCA "B" spark resistant construction. This requires that the fan components be manufactured to reduce any possibility of contact between any stationary and rotating components and that the impeller and inlet bell be manufactured from non-ferrous material. The bifurcated fan arrangement allows the motor to be direct coupled but sit outside of the contaminated exhaust airstream.

Vibration

Strobic fan systems have an extremely low vibration characteristic, so no anti-vibration mounts are required and no flexible connections are required. A Tico pad type gasket (by others) is required under the fan plenum perimeter flange, if it sits directly onto a steel frame.

Fan Selections

Strobic fan models selected are as follows.

System FEF-07-01

- Fan model TS2S150A15M (1 duty, 1 standby)

Please see attached, fan performance data.

Fan curves are de-rated to allow for losses through the plenum and discharge stack.

Scope of Work

This proposal includes for the supply of the specified systems and delivery to site in Manchester.

Off-loading and installation to be by others.

For shipping purposes, each system is broken down into a number of pieces (plenum, fan assembly & discharge nozzle, etc) to be re-assembled on site. Associated stainless-steel nuts & bolts, gasket and sealant required to assemble the system are included.

MMU Science & Engineering – Strobic Fume Exhaust Fan System

Technical Data

The following pages detail technical performance characteristics for each system, including:

- fan performance data
- fan curves
- sound data
- system assembly drawing

Strobic Air Corporation
A Cincinnati Fan Company
140 W Orville Rd.
Lansdale, PA 19446
Phone: (215) 723-4700 | Fax: (215) 723-7401
www.choosetrystack.com | www.strobicair.com

Project: MMU Science and Engineering - Fan Reference: FEF-07-01
Fans: 1 (operating)/ 1 (redundant)

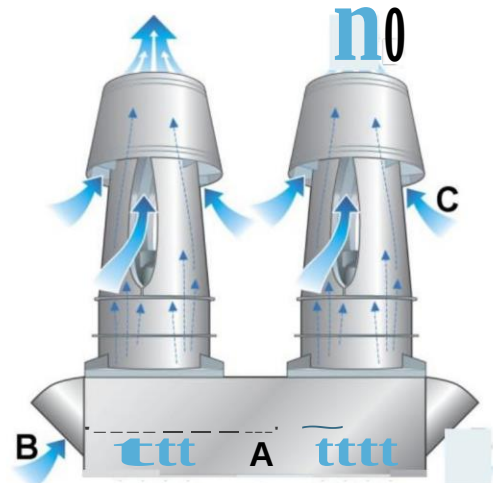
Tri-Stack™

A: Inlet Flow
4.51 m/s

B: Bypass Flow
0.09 m/s

C: Entrained Flow
2.76 m/s

D: Total System Flow
7.36 m³/s



Operating Conditions

Inlet Static Pressure: 484 Pa
Inlet Air Temperature: 21 deg C
Inlet Air Density: 1.201 kg/m³

Inlet Flow per Fan: 4.51 m/s
Ambient Air Temp.: 21 deg C
Ambient Air Dens: 1.201 kg/m³

Inlet Flow Total: 4.51 m/s
Altitude at Site: 0 m
Operating Frequency: 40 Hz

Fan Performance Data- (single fan)

Fan Model: TS2S150A15M

Fan Flow Rate: 4.6 m/s
Total Flow: 7.36 m³/s
Operating Speed: 1180 rpm
Dilution Ratio: 163 %

Nozzle Velocity: 26 m/s
Wind Band Area: 0.9 sq. m
Min. Motor Hp: 15 kW
Corrected BHP: 5.51 kW

Effective Stack Height:
16 kph Wind: 16 m
24 kph Wind: 11 m

Altitude and Temperature Corrections

Mixed Air Density:
1.201 kg/m³

Mixed Air Temperature:
21 deg C

Corrected Static Pressure:
484 Pa

Comments

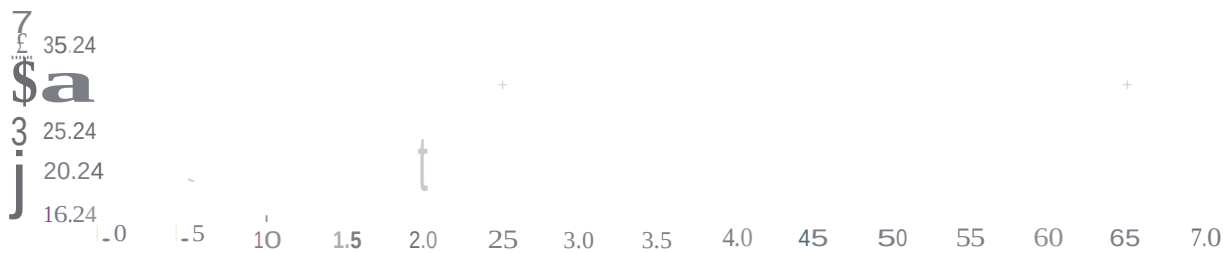
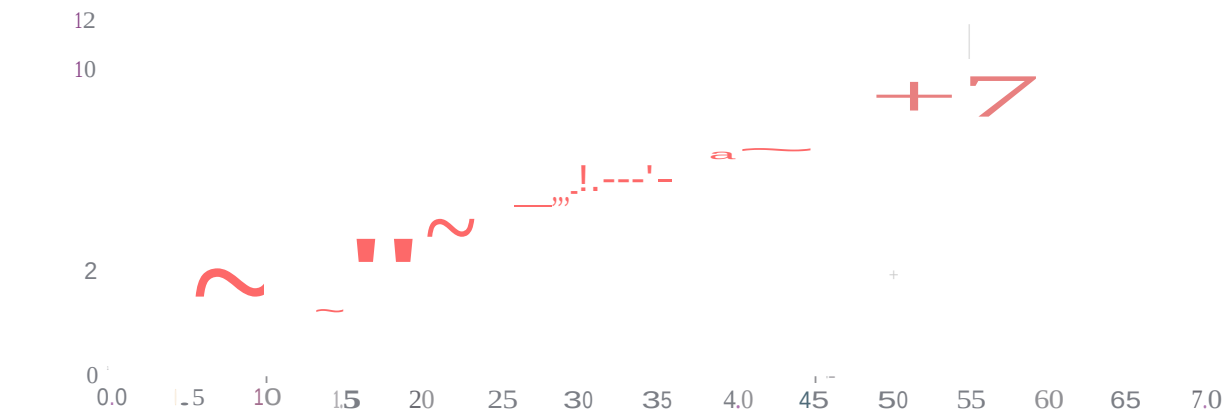
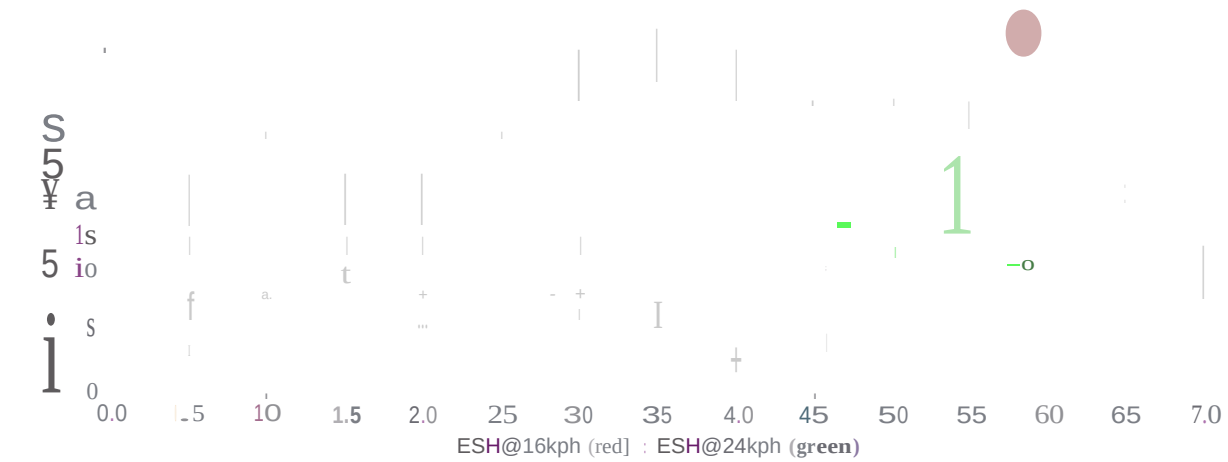
1. Number of fans running does not include redundant fan.
2. Inlet static pressure had been derated for discharge nozzle, windband, airfoil isolation damper, and outlet silencer
3. Inlet static pressure had been derated for system effects through the mixing box, based on the factory-recommended duct configurations.
4. Consult factory for additional derations when duct configurations do not meet factory guidelines.
5. Add an additional 37 pa. static pressure for gravity isolation dampers (usable on single fan mixing boxes only).
6. Effective stack height from roof line is given for fan without a mixing box, mounted on a .5 m high curb.
7. Stack height calculated using Briggs equation, per ASHRAE Fundamentals (1997).

Fan Model: T2S150415

Reference: FEF-07-01

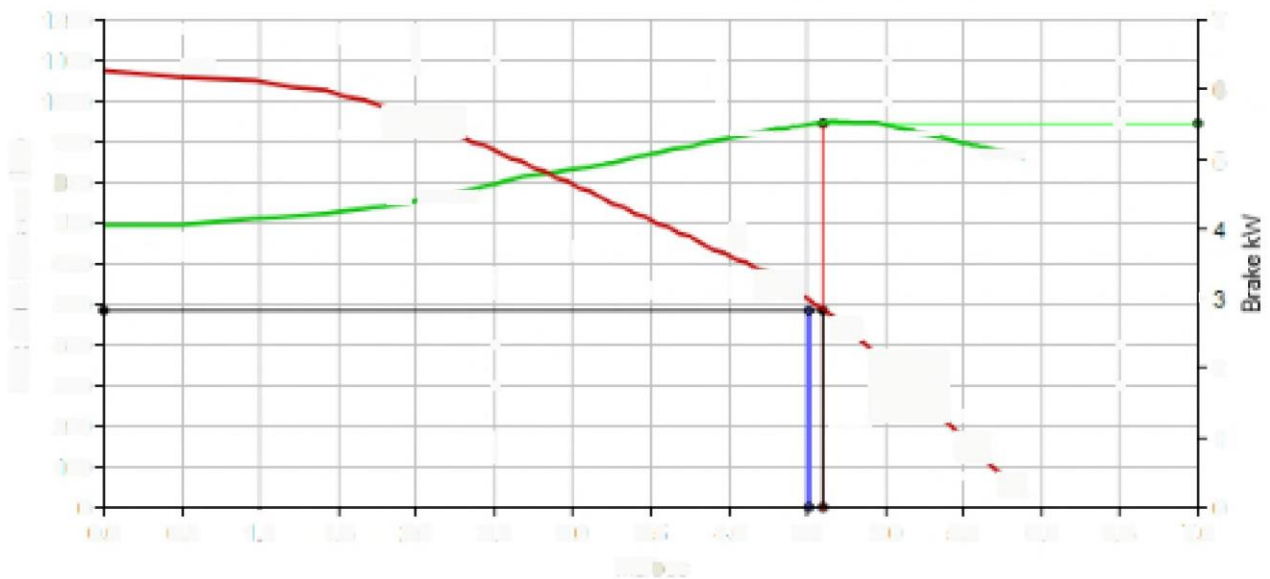
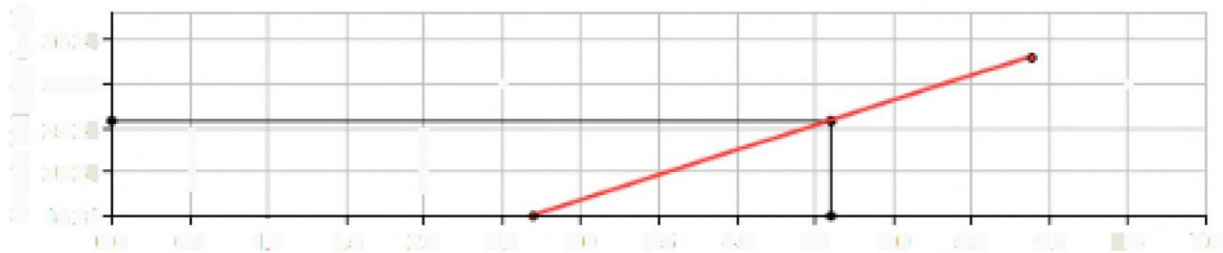
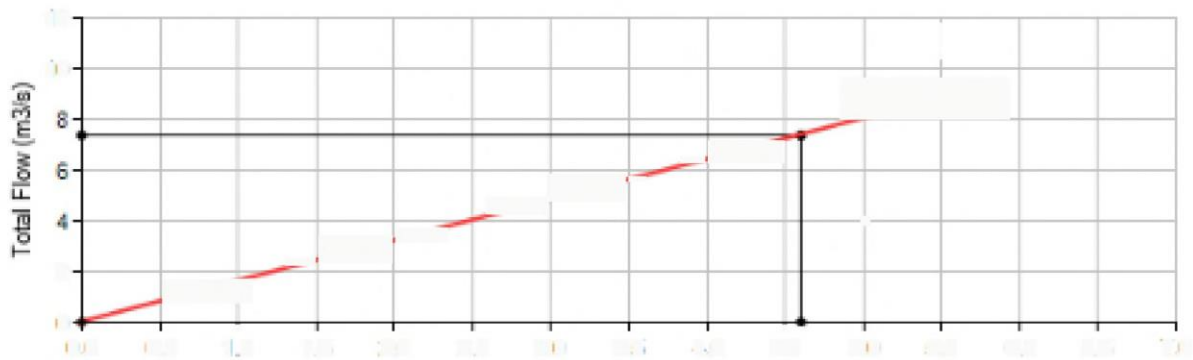
Speed: 118RPM

Mixed Air Density: 1.201 kg/m³





Inlet Static Pressure has been Derated for Discharge Nozzle, Windband, Airfoil Isolation Damper, and Outlet Silencer, as well as System Effects Based on Factory-Recommended Duct Configurations. Add an additional 37 pa. for Gravity Isolation Dampers (On Single Fan Plenums Only). Consult Factory for Additional Deration for Duct Configurations that do not meet Factory Guidelines. Effective Stack Height at Stated Wind Speed from Roof Line for Fan w/o Mixing Box, mounted on a .5 m high curb. Add height of mixing box.



Inlet Static Pressure has been Derated for Discharge Nozzle, Windband, Airfoil Isolation Damper, and Outlet Silencer, as well as System Effects Based on Factory-Recommended Duct Configurations. Add an additional 37 pa. for Gravity Isolation Dampers (On Single Fan Plenums Only). Consult Factory for Additional Deration for Duct Configurations that do not meet Factory Guidelines. Effective Stack Height at Stated Wind Speed from Roof Line for Fan w/o Mixing Box, mounted on a .5 m high curb. Add height of mixing box.

Fan Outlet Sound Data For Fan Model TS2S150A15M.
Number of Fans Running: 1 - With Silencer, at 40Hz

Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Outlet Sound Power Levels	91	93	92	90	87	83	76	68
Dynamic Insertion Loss for nozzle silencer	0	-4	-9	-11	-12	-13	-9	-4
Corrected Outlet Sound Power Levels	91	89	83	79	75	70	67	64

Corrections for 3 m Distance	-17	-17	-17	-17	-17	-17	-17	-17
Sound Levels (3 m)	74	72	66	62	58	53	50	47
A Scale Corrections	-26	-16	-9	-3	0	1	1	-1
dB'A' Spectrum (3 m)	48	56	57	59	58	54	51	46

Net Sound Level at 3 m: 64dB'A' (at 50Hz) / 60dB'A' (at 40Hz)

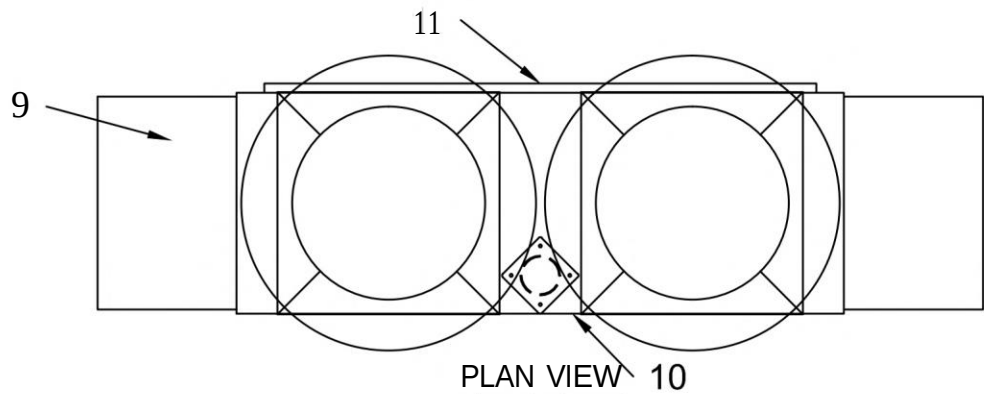
Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Outlet Sound Power Levels	91	93	92	90	87	83	76	68
Dynamic Insertion Loss for nozzle silencer	0	-4	-9	-11	-12	-13	-9	-4
Corrected Outlet Sound Power Levels	91	89	83	79	75	70	67	64

Corrections for 15 m Distance	-31	-31	-31	-31	-31	-31	-31	-31
Sound Levels (15 m)	60	58	52	48	44	39	36	33
A Scale Corrections	-26	-16	-9	-3	0	1	1	-1
dB'A' Spectrum (15 m)	34	42	43	45	44	40	37	32

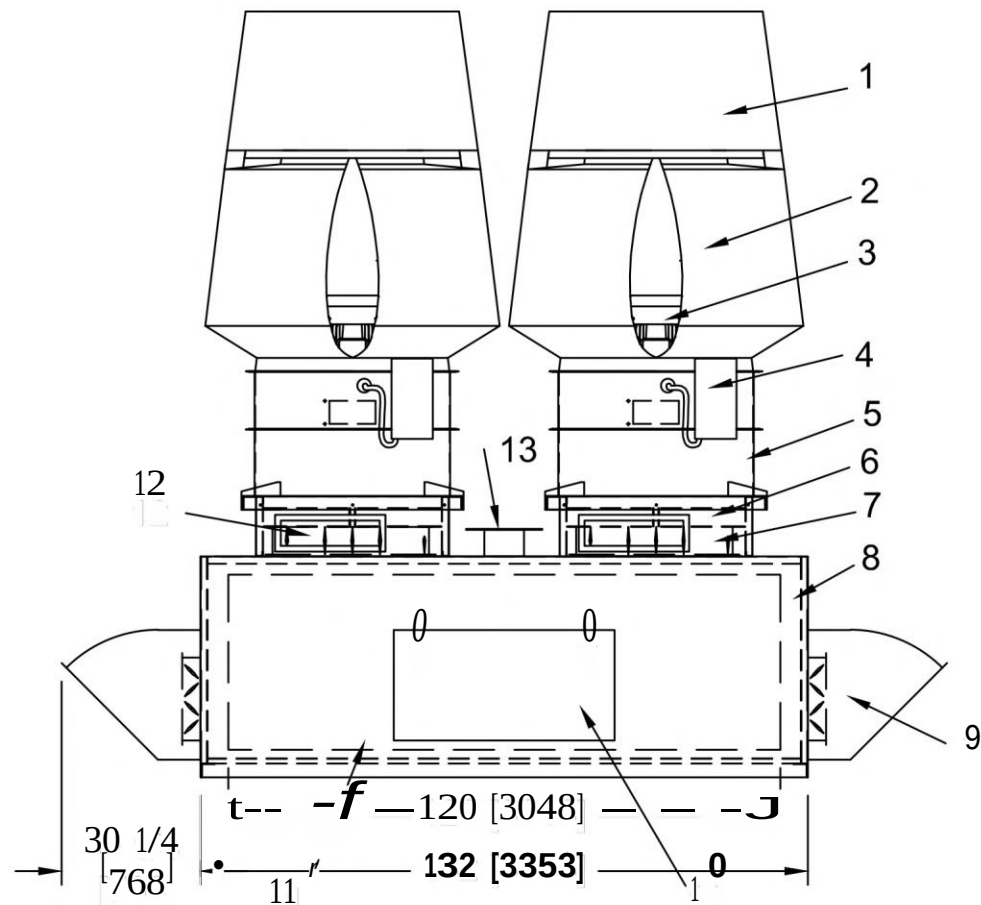
Net Sound Level at 15 m: 50dB'A' (at 50Hz) / 46dB'A' (at 40Hz)

Not all inline and silencer nozzle combinations have been tested in conjunction with each other for sound performance. The results of the additional attenuation of both sets of silencers in this arrangement is conservatively estimated based off of similar applications. Please contact Strobic Air for additional information regarding sound values.

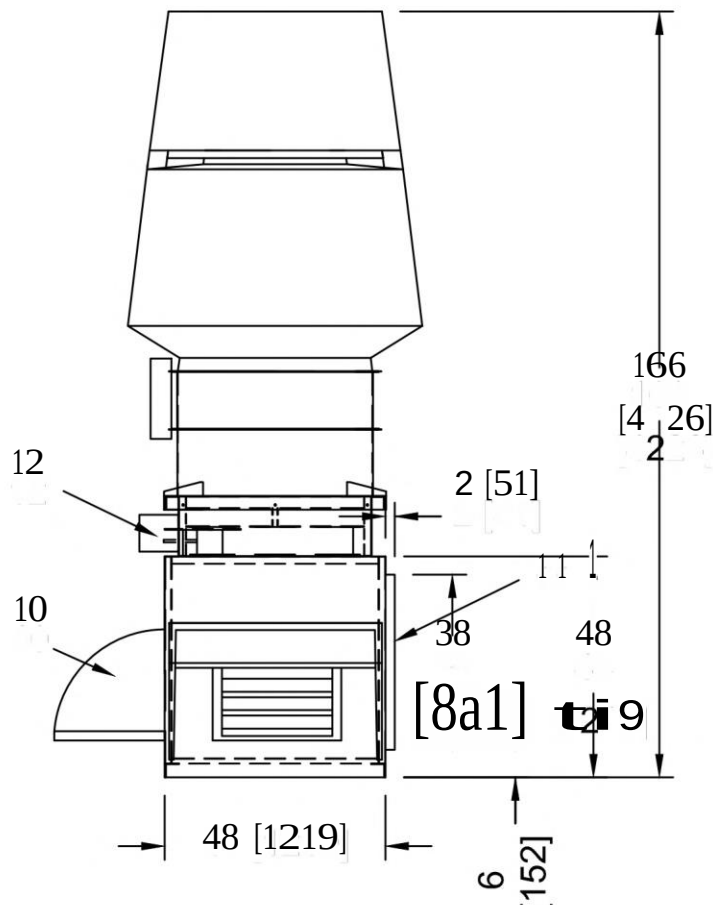
Last revised date October, 2015



66 [1676] J



FRONT VIEW



SIDE VIEW

REVISION			
LTR.	DESCRIPTION	DATE	APPROVED
A	NOTE "D" ADDED	7/2/04	ECA
B	PLENUM DIMS CHANGED	3/2/04	KHM
C	REVISED DAMPER BOX LOCATION	4/27/12	JCN
D	CHANGED TOTAL WEIGHT	2/26/15	ARM

- NOTES:
1. ACOUSTICAL WINDBAND® (TYP-2)
 2. TRI-STACK™ SILENCER NOZZLE (TYP-2)
 3. MOTOR (TYP-2)
 4. DISCONNECT SWITCH (TYP-2)
 5. FAN HOUSING (TYP-2)
 6. VORTEX BREAKER (TYP-2) (OPTIONAL)
 7. ISOLATION DAMPER (TYP-2)
 8. DOUBLE-WALLED MIXING PLENUM
 9. BYPASS DAMPER WITH RAINHOOD (TYP-2)
 10. 48"L X 24"H ACCESS DOOR
 11. 120"L X 38"H DUCT OPENING
 12. ISOLATION DAMPER ACTUATOR (TYP-2)
 13. JIB CRANE SOCKET (OPTIONAL)

TOTAL WEIGHT: 5,088 LBS. [2,308 KG]

DIMENSIONS ARE GIVEN IN INCHES [MILLIMETERS]

NOTE: BECAUSE WE ARE CONSTANTLY STRIVING TO IMPROVE OUR PRODUCTS, WE RESERVE THE RIGHT TO PROVIDE VERSIONS OF THESE PRODUCTS WITH SLIGHT VARIATIONS FROM THOSE ILLUSTRATED HERE.

- ADDITIONAL NOTES:
- A) A 3" FLANGE IS ADDED TO THE PERIMETER BASE OF THE PLENUM FOR MOUNTING TO A STRUCTURAL BASE (CONCRETE CURB, STRUCTURAL STEEL, ETC.)
 - B) STROBIC AIR® RECOMMENDS THAT DUCT INLET CONDITIONS FOLLOW SMACNA GUIDELINES TO MINIMIZE SYSTEM EFFECT.
 - C) WEIGHT CALCULATED USING FAN MODEL TS2L150C12. ACTUAL WEIGHTS MAY VARY FROM THIS VALUE.
 - D) 3/4" COARSE THREAD COUNTERSUNK HOLES PROVIDED FOR LIFTING EYES (SUPPLIED BY OTHERS) TO LIFT PLENUM IN ACCORDANCE WITH STANDARD RIGGING PROCEDURES.

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NOT BE COPIED, OR USED FOR PRODUCTION, OR COMMUNICATED TO A THIRD PARTY, WITHOUT THE EXPRESSED WRITTEN PERMISSION OF THIS COMPANY.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE XXX= MATERIAL	CONTRACT NO.		(2) TS-2 FANS SIDE INLET W/ SILENCER NOZZLE	
	APPROVALS	DATE		
	DRAWN E.C.A.	6/17/03	STROBIC AIR® CORPORATION 700 EMLEN WAY TELFORD, PA. 18969	
	CHECKED			
LAYOUT				
de,usu		SIZE	CONFIDENTIAL NO.	DRAWING NO.
U.S. PATENT NO. 6,431,974 U.S. PATENT NO. 6,112,850 U.S. PATENT NO. 4,806,076		B	TS22 SI SN	061703E-4 REV.C

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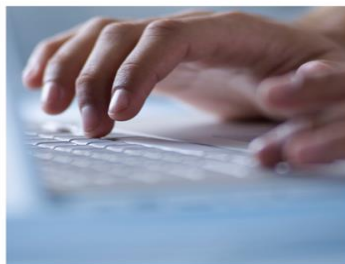
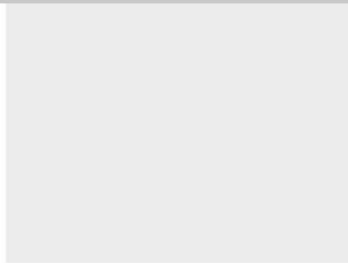
Schedule of Fume Extract Fans

Project: 1338B

Date: 06.06.22

Revision: P06

File reference: MMU-NGB-00-SH-M-510035



NG Bailey

AMENDMENT RECORD SHEET

Project No. 1338B
Date: 06.06.22
Revision: P04
File reference: MMU-NGB-00-SH-M-510035

REVISION	DESCRIPTION	DATE	APPROVED
P01	Preliminary Issue	13.08.21	PJS
P02	General Update	16.11.21	PJS
P03	Updated Oven Fan	19.05.22	PJS
P04	Duties amended to suit HL schematic 1338B-HOL-XX-XX-SM-M-570004	06.06.22	DM

MMU-NGB-00-SH-M-510035 - Schedule of Fume Extract Fans

Ref	Room Name	Level	Volume	Vol with 10% Margin	Pressure Drop External Static Pa	Pressure Drop External Static with 21% Margin Pa	Fan Type	Selection Ref	Specific Fan Power	Motor Power (FLC) A	Motor	Electrical Supply V/ph/hz	Breqakout Noise @ 3m dBA	Comments
			m³/s	m³/s					W/l/s					
FEF/07/01-01	Roof	Roof	4.100	4.510	400	484.0	Strobic	TBC	TBC	TBC	Single Phase	230 / 1 ph / 50 Hz	45	Duty/Standby
FEF/07/01-02 - Oven ATEX	Roof	Roof	0.640	0.704	250	302.5	Centrif	TBC	TBC	TBC	Single Phase	230 / 1 ph / 50	45	Atex Rated (Zone 2)

- Notes:
- 1) Fans to be selected on the figures with margins
 - 2) Final Fan pressure drops to be confirmed
 - 3) Strobic Fans with integral silencer nozzle and bleed dampers (motors outside airstream)
 - 4) Strobic fans to be provided with motorised damper and backdraught damper
 - 5).Motors to be located out of airstream



Project No:	25716	Company:	Critical Air
Package Description:	Fume Extract Fans	Contact:	Phil Milne Smith
Date:	18/05/2022	Tel:	07977 460186
		E-Mail:	p.milnesmith@criticalairflow.com
Compliance		Compliant with Scope Checklist:	COMPLIANT
Quote Reference and date			6620/010/PMS - 17/05/22
TQA response received			18/05/2022
Lead time			22 Weeks
Technical Section Part 1			
FEF/07/ENG.01- 01	Level 7 Roof		
Vol m3/s	4.1	COMPLIANT	
Vol m3/s including 10% margin (m3/s)	4.51	COMPLIANT	
PD (Pa)	400	COMPLIANT	
PD including 21% margin (Pa)	484	COMPLIANT	
Fan Type	Strobic	COMPLIANT	
Fan Power (Kw)	TBC	COMPLIANT	22 Kw
SFP (w/l/s)	TBC	COMPLIANT	0.749
Electrical Supply (v/ph/hz)	TBC	COMPLIANT	3 PHASE, 415V, 50Hz
Noise breakout @ 3m (dBA)	45	NON-COMPLIANT	Strobic do not publish noise breakout data . An additional in line attenuator has been added to provide the best noise reduction solution available for the fan .
Internal/External	External	COMPLIANT	
Technical Section Part 2			
Integral silence nozzle		COMPLIANT	
Mixed flow fans	HL Spec U10/380	COMPLIANT	
In line attenuators		COMPLIANT	
Attenuators to include a protective membrane to protect the acoustic media from impregnation		COMPLIANT	
Site attendance at fan installation (1 day)		COMPLIANT	
Fan plenum		COMPLIANT	
Bypass (bleed)dampers c/w actuator	HL Spec U10/380	COMPLIANT	
Isolation dampers c/w actuator	HL Spec U10/380	COMPLIANT	
DDC controls package	HL Spec U10/380	COMPLIANT	
Roof curb		COMPLIANT	
Pre wired motors		COMPLIANT	Not stated
A NEMA 3R non-fused disconnect switch shall be provided, mounted and wired to the motor.		COMPLIANT	Not stated
Fans shall have been tested under AMCA 210-85, "Laboratory Methods of Testing Fans for Rating", or British Standard 848, Part I, "Methods of Testing Performance", 1980, and shall have been	HL Spec U10/380	COMPLIANT	Not stated
Documented aspiration tests shall have been performed in conjunction with the fan performance test.	HL Spec U10/380	COMPLIANT	Not stated
Sound testing shall be in accordance with AMCA 300.	HL Spec U10/380	COMPLIANT	Not stated
Fans shall be UL and CUL listed per UL 705 safety standard	HL Spec U10/380	COMPLIANT	Not stated
Fans shall meet the criteria of NFPA-45.	HL Spec U10/380	COMPLIANT	Not stated
Fan and all drive components shall have a combined bearing life of up to L10=100,000hours.	HL Spec U10/380	COMPLIANT	Not stated
Discharge guide vanes	HL Spec U10/380	COMPLIANT	Not stated
UV & chemical resistant FRP nozzles	HL Spec U10/380	COMPLIANT	Not stated
Stainless steel fasteners	HL Spec U10/380	COMPLIANT	Not stated
Extended motor lube lines of Teflon tubing covered with braided stainless steel	HL Spec U10/380	COMPLIANT	Not stated
Safety screens over fan inlets	HL Spec U10/380	COMPLIANT	Not stated