TECHNICAL DATA – GENERATOR PLANT

Engine Make Perkins
Cooling Airflow: 10.2 m3/s
Engine Model 4012-46TAG2A (Remote Cooling)
Airflow Resistance (Max): 280Pa
Generator Rating Standby 1650 kvA
Ambient Temp: 40C
Combustion Airflow: 2.133m3/s
Other Noise Factors 1 Sets Operating
Exhaust Gas flow: 5.25 m3/s
Exhaust Gas Temp 450 C
Exhaust: 5 kPa

EQUIPMENT DETAILS

Refer to Allayway

Please Note:-

Cooling Airflow has been based on a heat rejection figure of 178kW and a 15 deg C temperature rise – as per the RODEng supplied calculation sheet.

Calculation of Temperature rise at Altitude

Genset Model	P1500P3		Key: Enter Data / Result
Engine Type	4012-46 TAG2A		
Altitude	152	m	
Maximum Ambient	35	°C	
Break Power	1437	kWm	From Engine Data Sheet
Alternator efficiency	95.3	%	From Alt Data Sheet
Energy radiated from the Engine:	105	kW	From Engine Data Sheet
Energy Radiated from the Exhaust:	6	kW	Approximation for Lagged and Clad Exhaust system
Alternator Energy Loss:	67.539	kW	
Total Energy Loss to Heat:	178.539	kW	
Volumetric Airflow Rate:	10.2	m³/s	Enter value for Airflow required
Density:	1.13	kg/m³	For Given Temperature & Altitude

$Q = mCp\Delta T$

where:

Q = 178.539 kW

m = D x V

m = 11.47514016

Cp = 1.005 J/gm/K

ΔT = 15 °C

RODEng Consulting LLP

NOISE CRITERIA – (Assumed 'Free-Field' Conditions)

60dB(A)@1m from Intake Grille in Goods Yard.
50dB(A) @1m from Outlet Grille at Goods Yard Entrance.
70dB(A) @1m from Exhaust Outlet. under 'Free Field' conditions.

Generator Noise Source

Silenced Noise Criteria Req'd	60/50	db(A) @	1	Meter/s	With	1	Sets Running	
NOISE SOURCE	*(unless Stated all levels below relate to 1 meter distance)*							
Frequency Hz	63	125	250	500	1000	2000	4000	8000	
Plant Noise Level dB	106.0	99.8	108.2	107.3	107.0	103.5	99.6	92.0	Lp dB
A' Weighting	-26	-16	-9	-3	0	1	1	-1	dB
Unsilenced Lp dB(A)	80.0	83.8	99.2	104.3	107.0	104.5	100.6	91.0	dB(A)

ATTENUATION / FANS & DUCTS

Air enters & leaves the plantroom through external Louvres & attenuators.
Fans have been included fitted to the Air Intake side. – 2 off 800mm diameter aerofoil type.

The external louvre for the air inlet has been based on the inclusion of a 150mm deep acoustic type this required to enhance the acoustic performance provided by the inlet attenuator and is required to achieve the
Inlet noise criteria.

The Air discharge side is fitted with a weather louvre supplied by others but having sufficient clear open area to limit pressure loss across the unit to 10 Pa at 14.6m3/sec volume flow.

Inlet Fans & Fan Plenum.
Inlet: 2 No. Short cased 'Axial' fans each 800mm diameter are included together with a sheet steel fabricated transition duct/plenum, designed for bolting to the inlet attenuator end frame.

Fan Plenum constructed from mild steel in two sections in height to ease handling. Refer to GA for arrangement.

Acoustic performance is achieved by using absorptive splitter panels spaced apart by the correct gaps within the attenuator duct casing. The desired level of attenuation is achieved through correct selection of the splitter air gaps coupled with length of the splitter elements.

Attenuation is achieved through a combination of impedance, reflection and absorption.

Please Note:

The ventilation system has been designed based on pressurising the plantroom and therefore Fans have been excluded from the discharge side.

PROJECT NAME: UCL ION (GENERATOR ATTENUATORS) PROJECT No: 70778
DATE: 17/11/2021 SCHEDULE No: 17070778Q12

Item	System Reference	Code	Suffix	DWG	L1	L2/ID	W	H/Dia	Vol	PD	Wt	No.		Performance, dB							
					mm	mm	mm	mm	m^3/s	Pa	kg	Off.		63	125	250	500	1k	2k	4k	8k
1	INTAKE	SP	GZ313	A02G	3000		2320	3600	10.2	24	2502	1	IL	22	39	54	55	55	55	55	50
													Lw	40	40	35	36	35	34	33	26
2	EXHAUST	SP	GH2Z321	A06G	3000		3575	1550	10.2	59	2166	1	IL	17	35	53	55	55	55	55	55
													Lw	48	48	43	44	43	42	41	34
3	EXHAUST SECONDARY	SP	GH2	A06G	900		2000	1000	10.2	16	183	1	IL	2	5	10	19	25	20	14	8
													Lw	49	49	44	45	44	43	42	35

NOTES

LABEL WITH ITEM NO. & SYSTEM REF.

IL = INSERTION LOSS (dB)

Lw = REGENERATED SOUND POWER LEVEL (dB re 10-12W)

G - SELF FINISH PRE-GALVANISED STEEL CONSTRUCTION.
H2 - FIRE DUCT SPECIFICATION.
Z - ATTENUATOR SUPPLIED IN MODULAR SECTIONS INDICATED. REFER TO DATA SHEET A09H & A20H.

ITEM	SYSTEM REF/DESCRIPTION	MODEL	SUFFIX	DATA SHEET	L1 mm	L2/D mm	W mm	H mm	VOL m3/s	PD Pa	WT kg	NO Off
1	INTAKE	SP	GZ313	A02G	3000		2320	3600	10.2	24	2502	1
2	EXHAUST	SP	GH2Z321	A06G	3000		3575	1550	10.2	59	2166	1
3	EXHAUST SECONDARY	SP	GH2	A06G	900		2000	1000	10.2	16	183	1

NOTES

LABEL WITH ITEM NO. & SYSTEM REF.

G - SELF FINISH PRE-GALVANISED STEEL CONSTRUCTION.
H2 - FIRE DUCT SPECIFICATION.
Z - ATTENUATOR SUPPLIED IN MODULAR SECTIONS INDICATED. REFER TO DATA SHEET A09H & A20H.

DATA SHEET A02G
RECTANGULAR ATTENUATOR FLANGED
MODEL SP / MODEL SL

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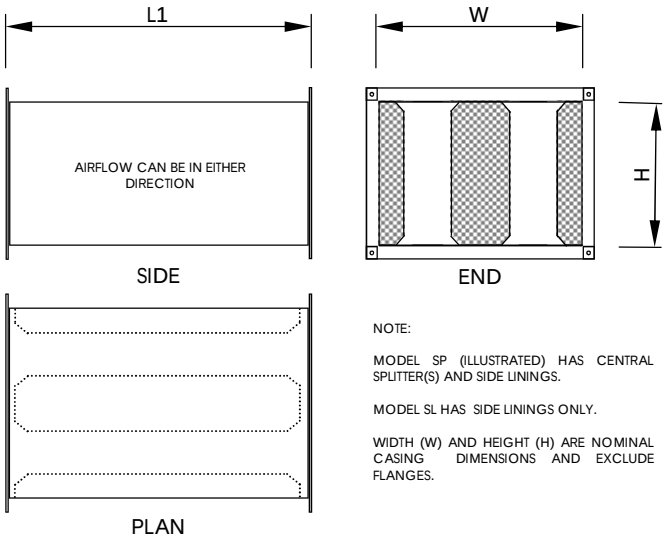
DIMENSIONS



NOTE:

MODEL SP (ILLUSTRATED) HAS CENTRAL SPLITTER(S) AND SIDE LININGS.

MODEL SL HAS SIDE LININGS ONLY.

WIDTH (W) AND HEIGHT (H) ARE NOMINAL CASING DIMENSIONS AND EXCLUDE FLANGES.

SPECIFICATION

ATTENUATORS ARE CONSTRUCTED IN ACCORDANCE WITH DW 144 SPECIFICATION FOR MEDIUM PRESSURE (CLASS B) DUCTWORK.

CASES ARE STIFFENED AND FITTED WITH PROPRIETARY FLANGES.

MODEL SP - HAS SOUND ABSORBENT SPLITTERS ARRANGED VERTICALLY WITHIN THE CASING TO FORM A SERIES OF CENTRAL ELEMENTS AND SIDE LININGS.

MODEL SL - HAS SOUND ABSORBENT SPLITTERS ARRANGED VERTICALLY WITHIN THE CASING TO FORM SIDE LININGS ONLY.

SPLITTERS AND SIDE LININGS CONTAIN A SOUND ABSORBENT INFILL THAT IS ENCAPSULATED WITH GLASS CLOTH AND PLAIN/PERFORATED STEEL.

SPLITTERS HAVE AERODYNAMIC FAIRINGS AT EACH END.

NOTES

THIS DATA SHEET IS TO BE READ IN CONJUNCTION WITH THE EQUIPMENT SCHEDULE.

LARGER ATTENUATORS WILL BE OF MODULAR CONSTRUCTION FOR EASE OF HANDLING AND MAY BE SPLIT ON THE LENGTH, WIDTH, HEIGHT OR COMBINATION THEREOF (SEE DATA SHEET A09 FOR DETAILS).

ATTENUATORS WILL BE SUPPLIED WITHOUT SUPPORT STEELWORK, BRACKETS, FIXINGS, GASKET, MASTIC OR OTHER SUCH ITEMS, UNLESS OTHERWISE STATED.

IT IS THE INSTALLERS RESPONSIBILITY TO PROVIDE THE FLANGE SEAL TO THE CONNECTING DUCT.

INSERTION LOSS, PRESSURE LOSS AND FLOW NOISE ARE DERIVED FROM TESTS CARRIED OUT IN ACCORDANCE WITH ISO 7235 AND MAY VARY DEPENDING ON INSTALLED CONDITIONS.

MANUFACTURING DIMENSIONAL TOLERANCE < 1.0 %.

SUFFIX

THE SUFFIX TO THE ATTENUATOR MODEL DEFINES THE MATERIAL OF FABRICATION AND ANY ADDITIONAL FEATURES OR SPECIAL CONSTRUCTIONAL DETAILS.

G - PRE-GALVANISED STEEL CONSTRUCTION.

S - GRADE 316 STAINLESS STEEL CONSTRUCTION.

H1 - HIGH TEMPERATURE APPLICATION (2 HOUR/300^{0}c).

D - DOUBLE SKIN CASING (CASING SIZE W+50 x H+50).

C - HIGH PRESSURE APPLICATION (DW 144, CLASS C).

K - PROTECTIVE PAINT FINISH TO VISIBLE INTERNAL METAL SURFACES.

J - SPLITTERS AND/OR SIDE LININGS ARRANGED HORIZONTALLY.

M - MELINEX ENCAPSULATED INFILL.

Z(***) - MODULAR CONSTRUCTION (SEE DATA SHEET A09 FOR DETAILS).

X - SPECIAL CONSTRUCTION, REFER TO EQUIPMENT SCHEDULE FOR DETAILS.

FLANGE DETAILS

ATTENUATORS ARE FITTED WITH 30 mm PROFILE FLANGES COMPLYING WITH DW144 AND DW/TM1.

STANDARD SIZES

LENGTH (L1) - 600, 900, 1200, 1500, 1800, 2100, 2400, 2700, & 3000 mm.

WIDTH (W) - ANY DIMENSION ABOVE 149 mm.

HEIGHT (H) - ANY DIMENSION ABOVE 99 mm.

ALL ATTENUATORS ARE MADE TO ORDER.

NON STANDARD ATTENUATORS ARE AVAILABLE.

WEIGHT

WEIGHTS ARE GIVEN ON THE EQUIPMENT SCHEDULE.

MODULAR CONSTRUCTION

ATTENUATORS MANUFACTURED IN ONE SECTION WILL HAVE NO "Z" SUFFIX IN THE CODE.

WHEN ATTENUATORS ARE SUPPLIED IN MODULAR FORM, THE ACTUAL NUMBER OF SECTIONS IN THE LENGTH, WIDTH AND HEIGHT DEFINED BY THE "Z" SUFFIX. REFER TO DATA SHEET A09 FOR DETAILS.

Z	#	#	#
A "Z" SUFFIX IN THE ATTENUATOR CODE DENOTES THAT THE ATTENUATOR WILL BE SUPPLIED IN MODULES.	NUMBER OF MODULES IN LENGTH.	NUMBER OF MODULES IN WIDTH.	NUMBER OF MODULES IN HEIGHT.

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DATA SHEET A06G
RECTANGULAR ATTENUATOR
FIRE DUCT APPLICATION
FLANGED
MODEL SP/MODEL SL

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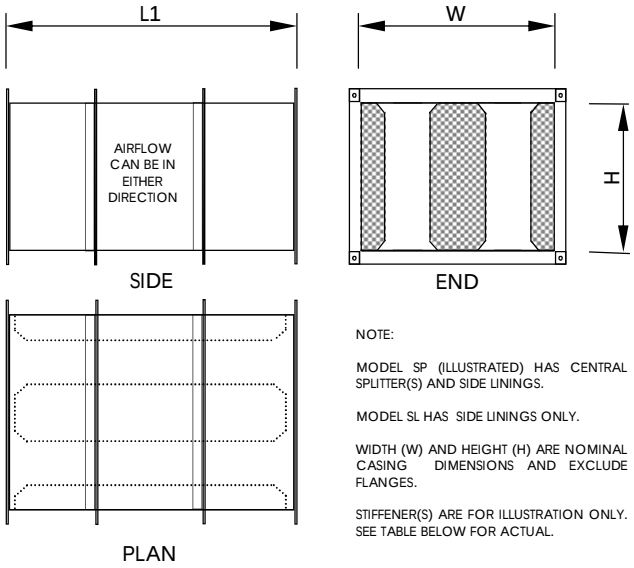
DIMENSIONS



NOTE:

MODEL SP (ILLUSTRATED) HAS CENTRAL SPLITTER(S) AND SIDE LININGS.

MODEL SL HAS SIDE LININGS ONLY.

WIDTH (W) AND HEIGHT (H) ARE NOMINAL CASING DIMENSIONS AND EXCLUDE FLANGES.

STIFFENER(S) ARE FOR ILLUSTRATION ONLY. SEE TABLE BELOW FOR ACTUAL.

SPECIFICATION

ATTENUATORS ARE CONSTRUCTED IN EXCESS TO DW 144 SPECIFICATION FOR MEDIUM PRESSURE (CLASS B) DUCTWORK.

CASING

1.2 mm THICK (MIN)
LAP JOINTS (IF APPLICABLE) TO HAVE STEEL FIXINGS @ 60 CENTRES (MAX)

FLANGES

UP TO 600 LONGEST SIDE	DOBY 30 (OR EQUIVALENT)
601 - 2000 LONGEST SIDE	DOBY 40 (OR EQUIVALENT)
ABOVE 2000	50 x 50 x 5 RSA

FLANGES TO BE FIXED BY STEEL RIVET OR WELD @ 150 CENTRES (MAX)
DOBY CORNERS TO BE WELDED

STIFFENING

UP TO 400 LONGEST SIDE	NONE REQUIRED
401 - 800 LONGEST SIDE	30 x 30 x 4 RSA @ 1000 CENTRES
801 - 1500 LONGEST SIDE	40 x 40 x 4 RSA @ 800 CENTRES
ABOVE 1501	50 x 50 x 5 RSA @ 625 CENTRES

STIFFENERS TO BE FIXED BY STEEL RIVET OR WELD @ 150 CENTRES (MAX)

SPLITTERS

TO BE OF STANDARD STEEL CONSTRUCTION BUT FITTED TO CASING WITH A DOUBLE ROW OF STEEL RIVETS @ 150 CENTRES (MAX).

SPLITTERS AND SIDE LININGS CONTAIN A SOUND ABSORBENT INFILL THAT IS ENCAPSULATED WITH GLASS CLOTH AND PLAIN/PERFORATED STEEL AND HAVE AERODYNAMIC FAIRINGS AT EACH END.

GENERAL

UNTREATED STEEL, LINISHING MARKS AND WELDS TO BE PAINTED INSIDE AND OUT WITH ZINC PHOSPHATE (GREY).

SEALANT TO BE INTUMESCENT.

ALL STEEL RIVETS ONLY.

LABLES ON INSIDE ONLY.

THIS CONSTRUCTION IS NOT FIRE CERTIFIED

SUFFIX

THE SUFFIX TO THE ATTENUATOR MODEL DEFINES THE MATERIAL OF FABRICATION AND ANY ADDITIONAL FEATURES OR SPECIAL CONSTRUCTIONAL DETAILS.

H2 - FIRE DUCT APPLICATION.

G - PRE-GALVANISED STEEL CONSTRUCTION.

S - GRADE 316 STAINLESS STEEL CONSTRUCTION.

D - DOUBLE SKIN CASING (CASING SIZE W+50 x H+50).

C - HIGH PRESSURE APPLICATION (DW 144, CLASS C).

K - PROTECTIVE PAINT FINISH TO VISIBLE INTERNAL METAL SURFACES.

J - SPLITTERS AND/OR SIDE LININGS ARRANGED HORIZONTALLY.

M - MELINEX ENCAPSULATED INFILL.

Z - MODULAR CONSTRUCTION.

X - SPECIAL CONSTRUCTION, REFER TO EQUIPMENT SCHEDULE FOR DETAILS.

NOTES

THIS DATA SHEET IS TO BE READ IN CONJUNCTION WITH THE EQUIPMENT SCHEDULE.

EXCESSIVELY LARGE OR HEAVY ATTENUATORS MAY BE MANUFACTURED IN MATING SECTIONS FOR EASE OF HANDLING.

ATTENUATORS WILL BE SUPPLIED WITHOUT SUPPORT STEELWORK, BRACKETS, FIXINGS, GASKET, MASTIC OR OTHER SUCH ITEMS, UNLESS OTHERWISE STATED.

IT IS THE INSTALLERS RESPONSIBILITY TO PROVIDE THE FLANGE SEAL TO THE CONNECTING DUCT.

INSERTION LOSS, PRESSURE LOSS AND FLOW NOISE ARE DERIVED FROM TESTS CARRIED OUT IN ACCORDANCE WITH ISO 7235 AND MAY VARY DEPENDING ON INSTALLED CONDITIONS.

MANUFACTURING DIMENSIONAL TOLERANCE < 1.0 %.

WEIGHT

WEIGHTS ARE GIVEN ON THE EQUIPMENT SCHEDULE.

STANDARD SIZES

LENGTH (L1) - 600, 900, 1200, 1500, 1800, 2100, 2400, 2700 & 3000 mm.

WIDTH (W) - ANY DIMENSION ABOVE 149 mm.

HEIGHT (H) - ANY DIMENSION ABOVE 99 mm.

ALL ATTENUATORS ARE MADE TO ORDER.

NON STANDARD ATTENUATORS ARE AVAILABLE.

IMPORTANT

ATTENUATORS ARE INTENDED FOR POST MANUFACTURE TREATMENT BY A THIRD PARTY FIRE DUCT SPECIALIST.

THE PURCHASER HAS ABSOLUTE RESPONSIBILTY FOR PROVIDING MANUFACTURING SPECIFICATIONS OR OTHERWISE GIVING UNQUALIFIED APPROVAL OF THIS DATA SHEET.

IN ANY EVENT, ALLAWAY ACOUSTICS LTD GIVE NO WARRANTY THAT ATTENUATORS MEET ANY FIRE CERTIFICATION. SUCH WARRANTIES MUST BE PROVIDED BY THE FIRE DUCT SPECIALIST.

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DATA SHEET A09H
RECTANGULAR ATTENUATOR
MODULAR CONSTRUCTION
"Z" SUFFIX

MODULAR CONSTRUCTION

ATTENUATORS MANUFACTURED IN ONE SECTION WILL HAVE NO "Z" SUFFIX IN THE CODE.

WHEN THE ATTENUATOR IS SUPPLIED IN MODULAR FORM, THE ACTUAL NUMBER OF SECTIONS IN THE LENGTH, WIDTH AND HEIGHT IS DEFINED BY THE "Z" CODE AS FOLLOWS:

Z	#	#	#
A "Z" SUFFIX IN THE ATTENUATOR CODE DENOTES THAT THE ATTENUATOR WILL BE SUPPLIED IN MODULES.	NUMBER OF MODULES IN LENGTH.	NUMBER OF MODULES IN WIDTH.	NUMBER OF MODULES IN HEIGHT.

NOTES

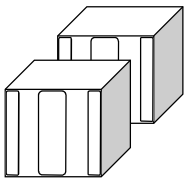
EXAMPLES SHOWN BELOW ARE FOR ILLUSTRATION PURPOSES ONLY AND ATTENUATORS MAY BE SUPPLIED IN ANY COMBINATION OF SECTIONS ON LENGTH, WIDTH OR HEIGHT. ALWAYS REFER TO THE "Z" CODE GIVEN IN THE SUFFIX COLUMN OF THE EQUIPMENT SCHEDULE.

DIMENSIONS GIVEN ON THE EQUIPMENT SCHEDULE ARE THE OVERALL ATTENUATOR BODY LENGTH (L), WIDTH (W) AND HEIGHT (H)

ASSEMBLY INSTRUCTIONS ARE SHOWN ON A SEPARATE DATA SHEET. ASSEMBLY BY OTHERS.

FIXINGS ARE PROVIDED TO ASSEMBLE ATTENUATOR. FIXINGS TO CONNECTING DUCT BY OTHERS.

MANUFACTURING AND ASSEMBLY DIMENSIONAL TOLERANCE < 1.0%



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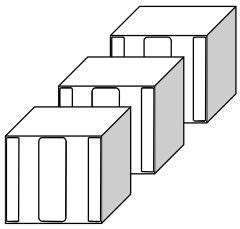

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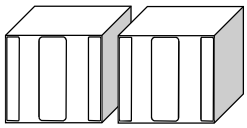

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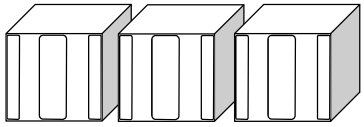

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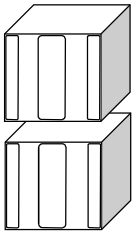

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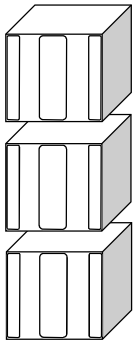

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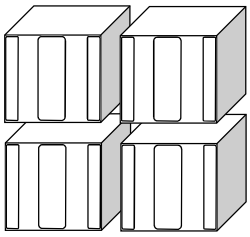

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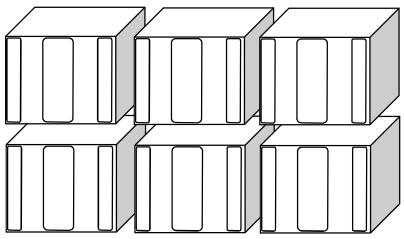

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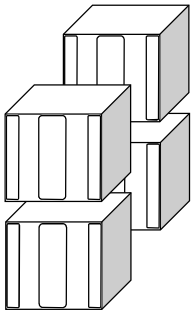

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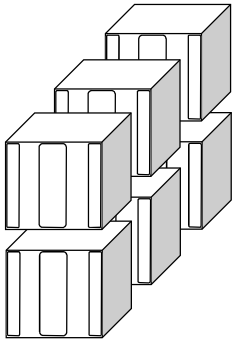

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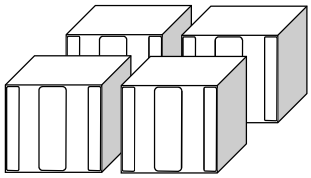

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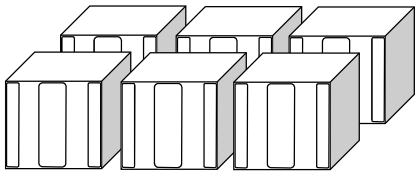

Z 231

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DATA SHEET A20H (1 of 3)

RECTANGULAR ATTENUATOR MODULAR CONSTRUCTION - "Z" SUFFIX ASSEMBLY DETAILS

THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A DATED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

NOTE

THE EXAMPLE SHOWN BELOW IS FOR ILLUSTRATION PURPOSES ONLY AND ATTENUATORS MAY BE SUPPLIED IN ANY COMBINATION OF SECTIONS ON LENGTH, WIDTH OR HEIGHT. ALWAYS REFER TO THE "Z" CODE GIVEN IN THE SUFFIX COLUMN OF THE EQUIPMENT SCHEDULE. DATA SHEET A09 REFERS.

DIMENSIONS GIVEN ON THE EQUIPMENT SCHEDULE ARE THE OVERALL ATTENUATOR BODY LENGTH (L), WIDTH (W) AND HEIGHT (H) AND EXCLUDE FLANGES.

MANUFACTURING AND ASSEMBLY DIMENSIONAL TOLERANCE < 1.0%

ASSEMBLY AND INSTALLATION BY OTHERS.

ATTENUATORS MUST BE ASSEMBLED IN SITU AND ADEQUATELY SUPPORTED.

ASSEMBLY

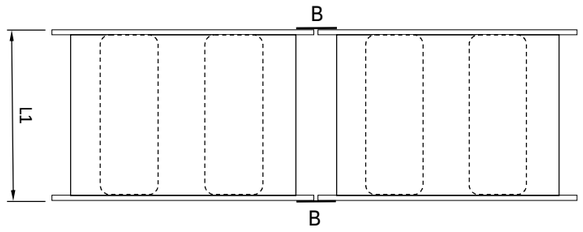
PRE-DRILLED TOP HAT SECTIONS (A) ARE PROVIDED TO CORRECTLY SPACE ADJACENT MODULES. THESE ARE SUPPLIED CUT TO LENGTH. FIX TO THE MODULE BODY WITH THE SELF-DRILLING SCREWS SUPPLIED.

WIDER MODULES HAVE INTERMEDIATE TOP HAT SECTIONS (A*) TO SUPPORT THE MODULES ABOVE.

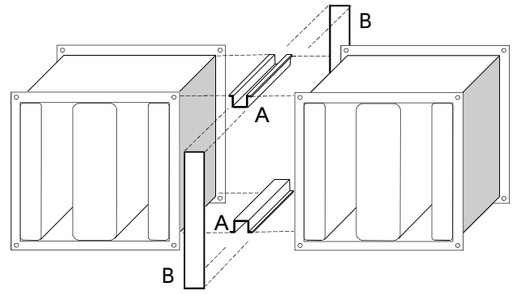
PRE-DRILLED FLAT PLATES (B) ARE PROVIDED TO CLOSE THE FLANGE JOINTS. THESE ARE SUPPLIED IN STANDARD LENGTHS AND MUST BE CUT ON SITE BY INSTALLER. FIX TO THE FLANGE FACE AT BOTH ENDS OF THE ATTENUATOR WITH THE SELF-DRILLING SCREWS SUPPLIED. THE JOINT MUST BE MADE AIR-TIGHT (SEALANT BY INSTALLER).

FLANGES (C) ARE TO BE BOLTED AND SEALED (FIXINGS AND SEALANT BY INSTALLER).

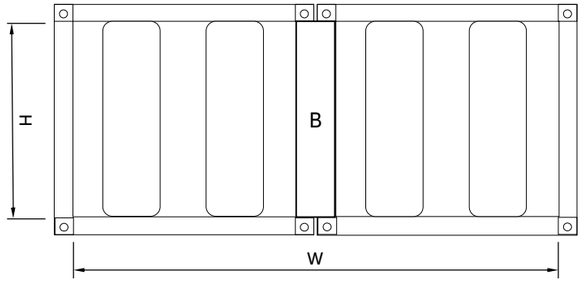
WHEN THERE ARE ADDITIONAL MODULES TO THOSE SHOWN, SIMPLY REPEAT ASSEMBLY SEQUENCE.



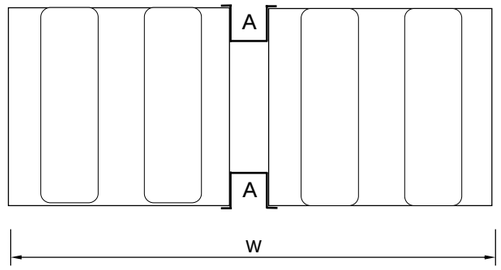
PLAN VIEW



EXPLODED ISOMETRIC VIEW

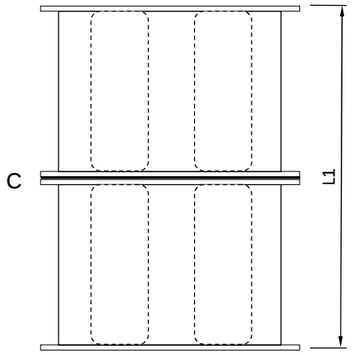


END VIEW

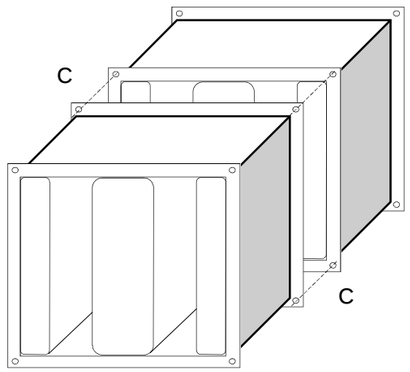


SECTIONAL END VIEW

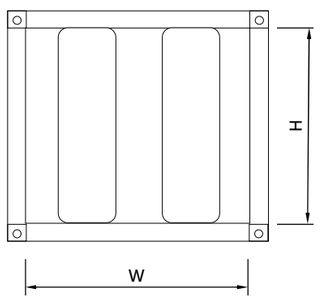
MODULAR ATTENUATOR SPLIT IN SECTIONS ON WIDTH



PLAN VIEW

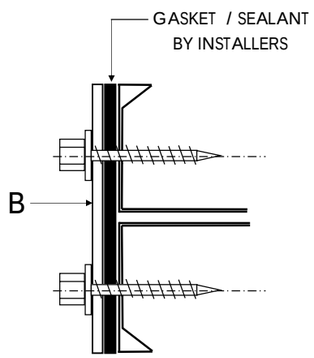


EXPLODED ISOMETRIC VIEW



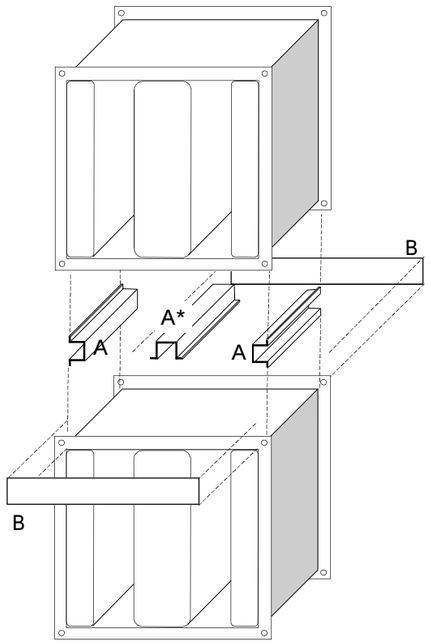
END VIEW

MODULAR ATTENUATOR SPLIT IN SECTIONS ON LENGTH



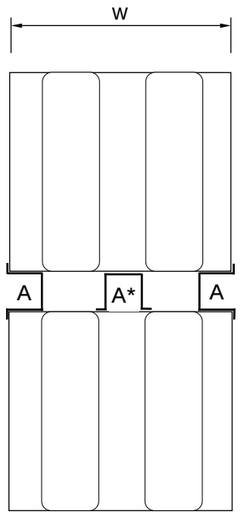
SECTION THROUGH FLANGE CLOSING PLATE (B)

INSTALLERS MUST ENSURE AIRTIGHT SEAL BETWEEN PLATE AND FLANGES



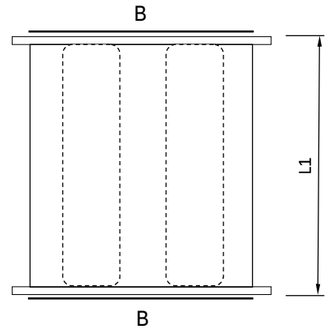
EXPLODED ISOMETRIC VIEW

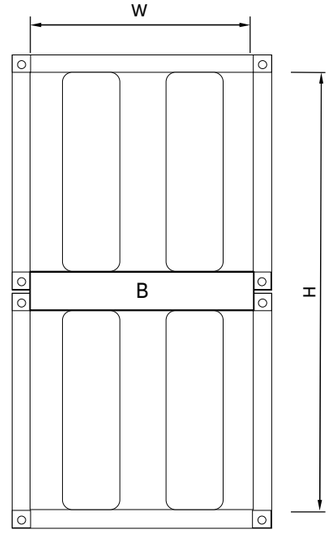
NOTE: WIDE MODULES HAVE ONE OR MORE INTERMEDIATE TOP HAT SPACERS (A*).



SECTIONAL END VIEW

PLAN VIEW





END VIEW

MODULAR ATTENUATOR SPLIT IN SECTIONS ON HEIGHT

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DATA SHEET A20H (2 of 3)
RECTANGULAR ATTENUATOR MODULAR CONSTRUCTION - "Z" SUFFIX SPLIT ON WIDTH AND HEIGHT ASSEMBLY DETAILS

THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A DATED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

NOTE

THE EXAMPLE SHOWN BELOW IS FOR ILLUSTRATION PURPOSES ONLY AND ATTENUATORS MAY BE SUPPLIED IN ANY COMBINATION OF SECTIONS ON LENGTH, WIDTH OR HEIGHT. ALWAYS REFER TO THE "Z" CODE GIVEN IN THE SUFFIX COLUMN OF THE EQUIPMENT SCHEDULE. DATA SHEET A09 REFERS.

DIMENSIONS GIVEN ON THE EQUIPMENT SCHEDULE ARE THE OVERALL ATTENUATOR BODY LENGTH (L), WIDTH (W) AND HEIGHT (H) AND EXCLUDE FLANGES.

MANUFACTURING AND ASSEMBLY DIMENSIONAL TOLERANCE < 1.0%

ASSEMBLY AND INSTALLATION BY OTHERS.

ATTENUATORS MUST BE ASSEMBLED IN SITU AND ADEQUATELY SUPPORTED.

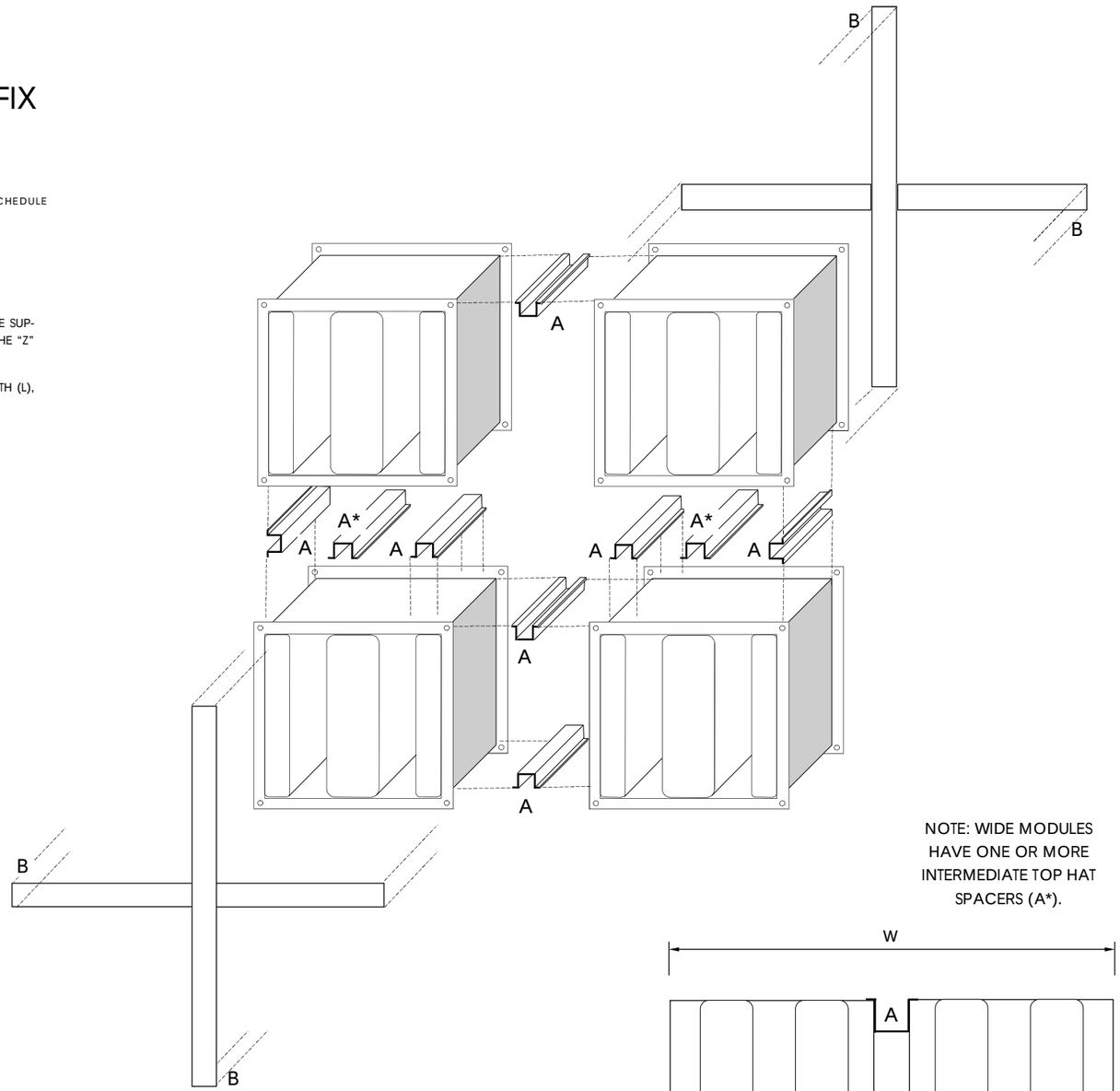
ASSEMBLY

PRE-DRILLED TOP HAT SECTIONS (A) ARE PROVIDED TO CORRECTLY SPACE ADJACENT MODULES. THESE ARE SUPPLIED CUT TO LENGTH. FIX TO THE MODULE BODY WITH THE SELF-DRILLING SCREWS SUPPLIED.

WIDER MODULES HAVE INTERMEDIATE TOP HAT SECTIONS (A*) TO SUPPORT THE MODULES ABOVE.

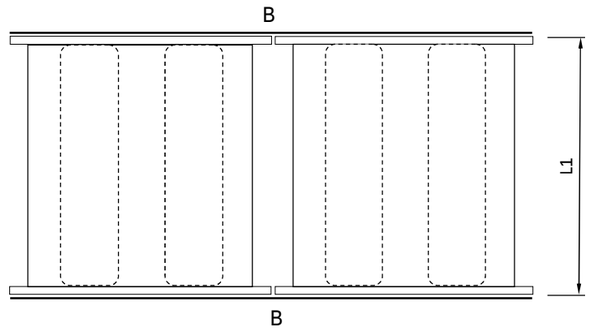
PRE-DRILLED FLAT PLATES (B) ARE PROVIDED TO CLOSE THE FLANGE JOINTS. THESE ARE SUPPLIED IN STANDARD LENGTHS AND MUST BE CUT ON SITE BY INSTALLER. FIX TO THE FLANGE FACE AT BOTH ENDS OF THE ATTENUATOR WITH THE SELF-DRILLING SCREWS SUPPLIED. THE JOINT MUST BE MADE AIR-TIGHT (SEALANT BY INSTALLER).

WHEN THERE ARE ADDITIONAL MODULES TO THOSE SHOWN. SIMPLY REPEAT ASSEMBLY SEQUENCE.

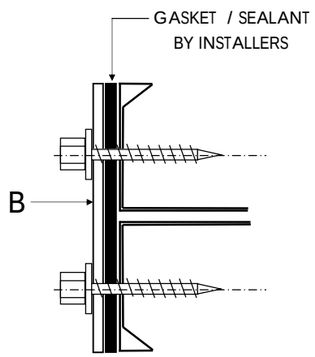


EXPLODED ISOMETRIC VIEW

NOTE: WIDE MODULES HAVE ONE OR MORE INTERMEDIATE TOP HAT SPACERS (A*).

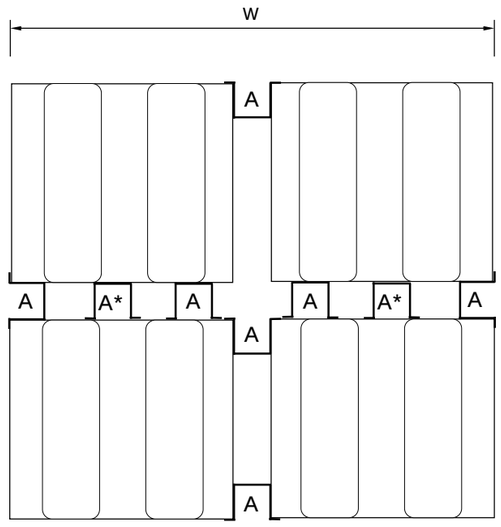


PLAN VIEW

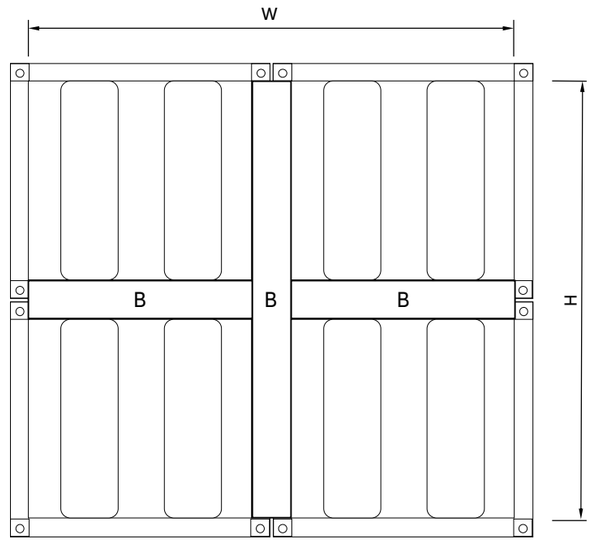


SECTION THROUGH FLANGE CLOSING PLATE (B)

INSTALLERS MUST ENSURE AIRTIGHT SEAL BETWEEN PLATE AND FLANGES



SECTIONAL END VIEW



END VIEW

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DATA SHEET A20H (3 of 3)
RECTANGULAR ATTENUATOR MODULAR CONSTRUCTION - “Z” SUFFIX SPLIT ON LENGTH, WIDTH AND HEIGHT ASSEMBLY DETAILS

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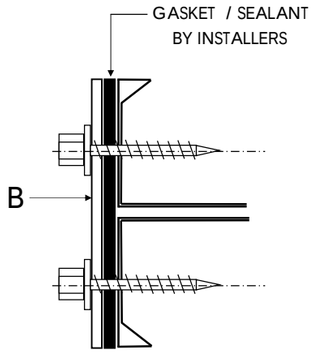
MANUFACTURING AND ASSEMBLY DIMENSIONAL TOLERANCE < 1.0%

ASSEMBLY AND INSTALLATION BY OTHERS.

ATTENUATORS MUST BE ASSEMBLED IN SITU AND ADEQUATELY SUPPORTED.



SECTION THROUGH FLANGE CLOSING PLATE (B)

INSTALLERS MUST ENSURE AIRTIGHT SEAL BETWEEN PLATE AND FLANGES

ASSEMBLY

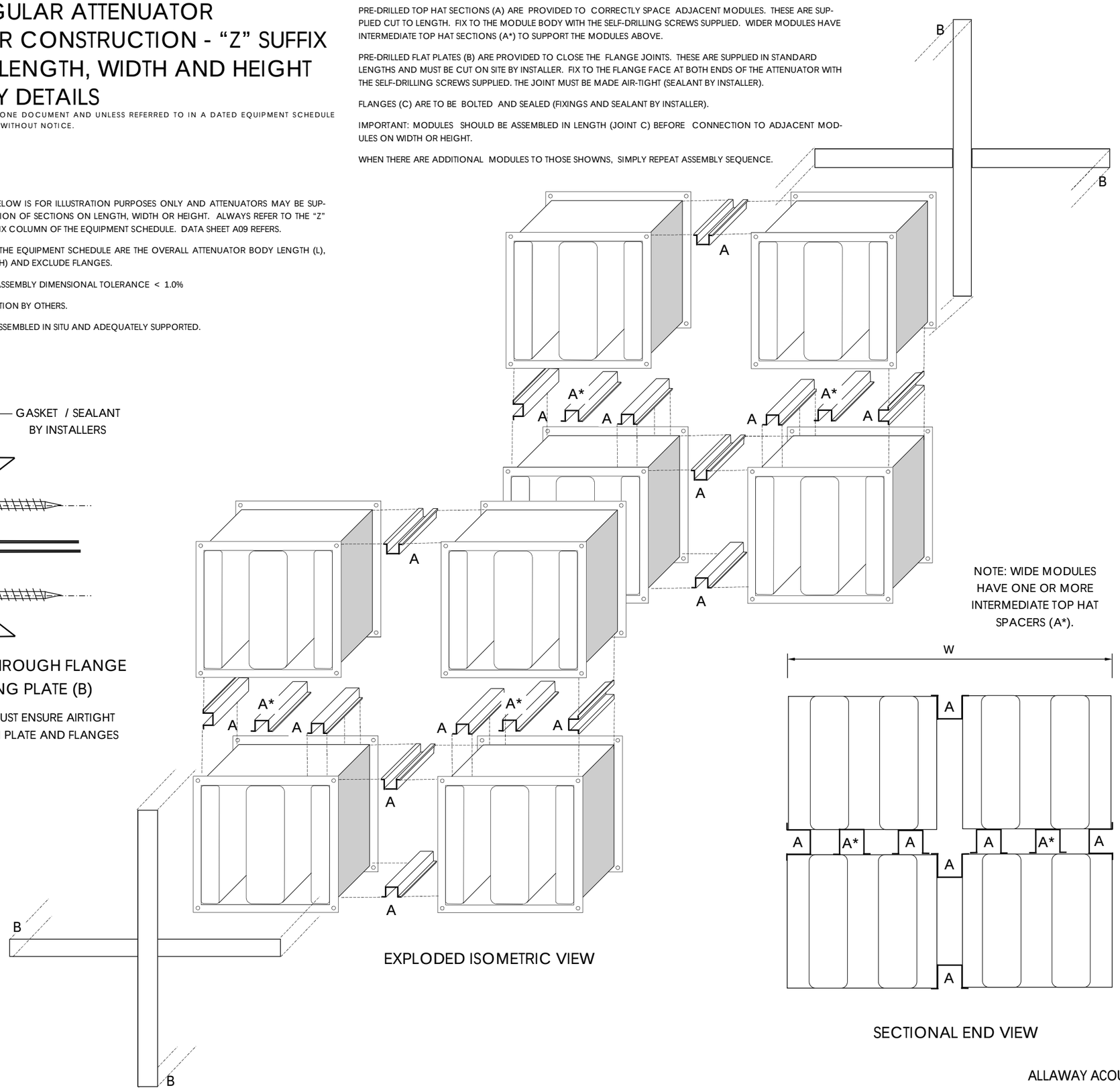
PRE-DRILLED TOP HAT SECTIONS (A) ARE PROVIDED TO CORRECTLY SPACE ADJACENT MODULES. THESE ARE SUPPLIED CUT TO LENGTH. FIX TO THE MODULE BODY WITH THE SELF-DRILLING SCREWS SUPPLIED. WIDER MODULES HAVE INTERMEDIATE TOP HAT SECTIONS (A*) TO SUPPORT THE MODULES ABOVE.

PRE-DRILLED FLAT PLATES (B) ARE PROVIDED TO CLOSE THE FLANGE JOINTS. THESE ARE SUPPLIED IN STANDARD LENGTHS AND MUST BE CUT ON SITE BY INSTALLER. FIX TO THE FLANGE FACE AT BOTH ENDS OF THE ATTENUATOR WITH THE SELF-DRILLING SCREWS SUPPLIED. THE JOINT MUST BE MADE AIR-TIGHT (SEALANT BY INSTALLER).

FLANGES (C) ARE TO BE BOLTED AND SEALED (FIXINGS AND SEALANT BY INSTALLER).

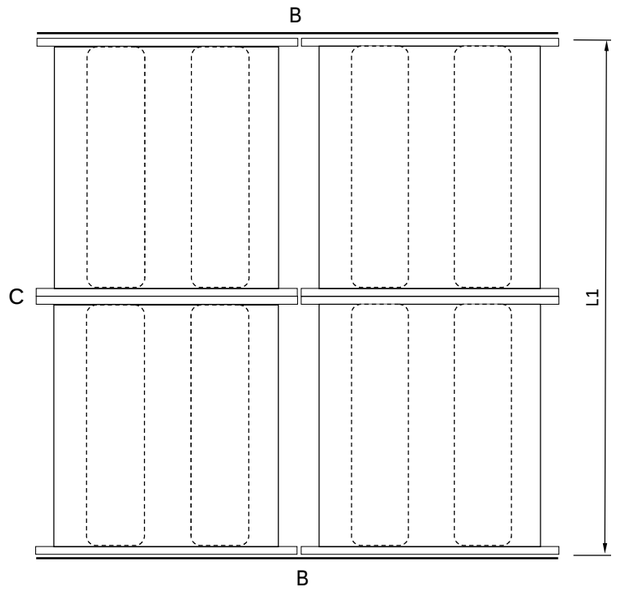
IMPORTANT: MODULES SHOULD BE ASSEMBLED IN LENGTH (JOINT C) BEFORE CONNECTION TO ADJACENT MODULES ON WIDTH OR HEIGHT.

WHEN THERE ARE ADDITIONAL MODULES TO THOSE SHOWNS, SIMPLY REPEAT ASSEMBLY SEQUENCE.



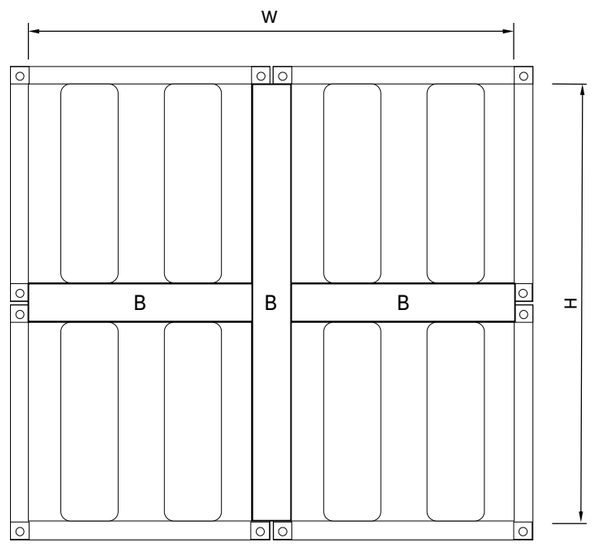
EXPLODED ISOMETRIC VIEW

NOTE: WIDE MODULES HAVE ONE OR MORE INTERMEDIATE TOP HAT SPACERS (A*).



PLAN VIEW

SECTIONAL END VIEW



END VIEW

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EXHAUST SILENCERS

The exhausts include Primary & Secondary silencers supplied loose and un-insulated.

Primary Silencer – IMS – MA41 – 400mm Bore

Secondary Silencer – IMS – FP2 – 450mm Bore

The Primary silencer is of multi-chamber construction with the initial section designed to reduce pulsation effects from the engine firing frequency and the following section or sections providing noise absorption.

The Secondary silencer provides additional levels of acoustic absorption across the frequency spectrum and incorporates in its construction, internal insulation to the casing limiting both noise break-out and radiated heat.

Important Notes:-

Exhaust silencers mounted within noise sensitive areas will be thermal insulation and over-cladding to limit noise break-out.

Customer	**Sound Engineering**	Ref.	
		Author	**RG**

NOISE SOURCE DATA

○ From Data Sheet
◉ Predicted

PREDICTED ENGINE NOISE

Engine Input Data (necessary if unsilenced spectrum not available)

Engine ID			No. Cylinders		12
Brake Power	1320	kW	Stroke (2/4)		4
Engine Speed	1500	RPM	Type of Engine	Turbocharged	
Firing Freq.	**150Hz**	(Consult Engineering if under 50Hz)			

Frequency			31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
UNSILENCED	Lw	dB	128	133	139	134	130	129	124	119	119	**134.1**

NOISE CALCULATIONS

Target SPL	70	dB(A)	Target Distance	1	metres
			Target Angle	90	deg.

Frequency			31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
UNSILENCED	Lp	dB	118	123	129	124	120	119	114	109	109	
A-weighting		dB	-39	-26	-16	-9	-3	0	1	1	-1	**124.1**
A-weighted	Lp	dB	79	97	113	116	117	119	116	110	108	

	TYPE	NOM. BORE
Primary Silencer	MA41	400mm
Secondary Silencer	FP2	450mm
Tertiary Silencer		

NOTICE: Sizes not included in IMS catalogue are not available.

Frequency			31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
TOTAL ATTEN. (dB)		dB	36	58	70	69	64	62	60	58	57	**62.3**
SILENCED (Lin)	Lp	dB	82	66	59	55	56	57	54	52	53	
A-weighting		dB	-39	-26	-16	-9	-3	0	1	1	-1	
A-weighted	Lp	dB	43	40	43	47	53	57	56	53	52	

BACKPRESSURE CALCULATIONS

			STD UNITS	
Gas Flow Rate	5.25	m³ / sec	5.25	m³/s
Gas Temp.	450	°C	723.2	K
Installation	New Install		0.488	kg/m³

NOTICE: Velocities (U) shown in **red** are excessive. Please reduce them by increasing the section's nominal bore.

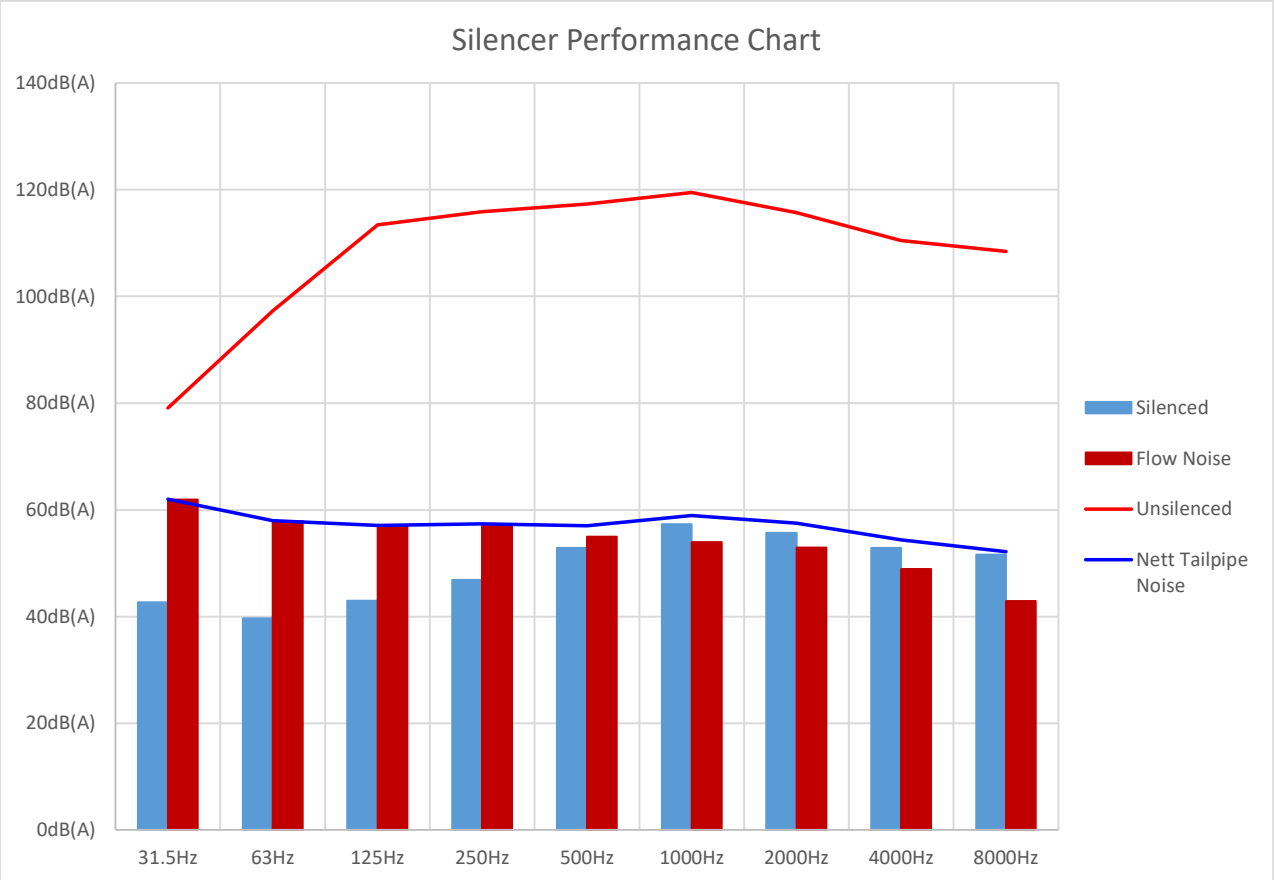
Resultant Backpressure: 2697 **Pa**

	Items	**U [m/s]**	**Dyn p**	**Δp**	
Primary		41.78	426	1917	Pa
Secondary		41.57	421.8	139.2	Pa
Tertiary		0.00		0	Pa
Straight Run [m]	0	41.57	421.8	0	Pa
Long Rad [#]	0	41.57	421.8	0	Pa
Short Rad [#]	2	41.57	421.8	219.3	Pa
End Loss	1	41.57	421.8	421.8	Pa
TOTAL				2697	Pa

REGENERATED (FLOW) NOISE

Frequency		31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Flow Lw to VDI 3733	dB(A)	72	68	67	67	65	64	63	59	53	69
Regenerated Lp	dB(A)	62	58	57	57	55	54	53	49	43	66
Dynamic Instertion Loss	dB(A)	**17**	**39**	**56**	**59**	**60**	**61**	**58**	**56**	**56**	**57**

		31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Resultant Lp at Tailpipe	dB(A)	**62**	**58**	**57**	**57**	**57**	**59**	**58**	**54**	**52**	**67**



M41 Residential **28dB(A)** Attenuation
MA41 Critical **40dB(A)** Attenuation

Reactive Exhaust Gas Silencer

The M41 range of 'residential' exhaust silencers are of high degree attenuation design recommended for use on stand-by or continuous running applications such as in hospitals, schools or residential areas. Highly efficient and advanced in design, they are primarily used on two- and four-stroke internal combustion engine exhausts and occasionally on compressor intakes.

The units are suitable for mounting in the vertical, horizontal or inclined positions, without affecting performance.

The M41 'residential grade' reactive exhaust silencer series are of all welded design, sturdily constructed in carbon steel with a heat resisting aluminium or black paint finish to ensure a long service life. All units are fitted with drain points to remove exhaust condensate.

MA41 Range

The acoustically treated MA41 type silencer increases the higher frequency performance by up to 12dB(A), reducing casing breakout as well as lowering the surface temperature. The units can be used where good overall acoustic performance is required without a secondary or terminal silencer.

Options

- BS10 Table 'D' flanges fitted as standard.
- Alternative flange patterns available on request.
- B.S.P. connections available on smaller sizes.

- Radial/axial inlet.
- Radial/axial outlet.

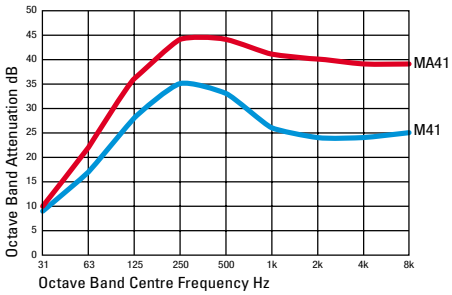
- Heat resisting aluminium or black paint.
- Shot blast and aluminium metal sprayed.

- Stainless steels.
- Corten steel.

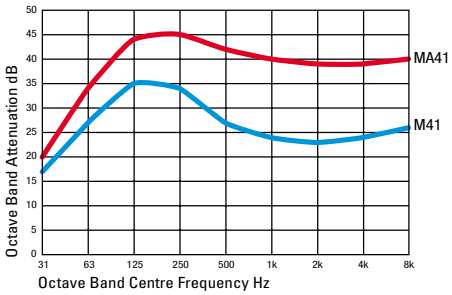
- Support feet and brackets.
- Lifting lugs.

- Catalytic converters.

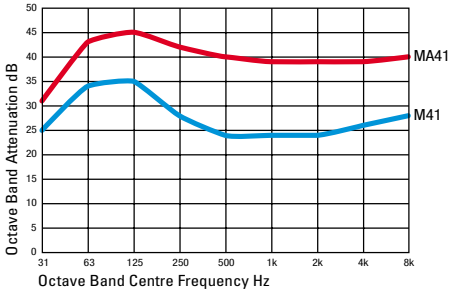
Back pressure figures can vary greatly with temperature and gas velocity, please contact IMS for advice.



6" Bore

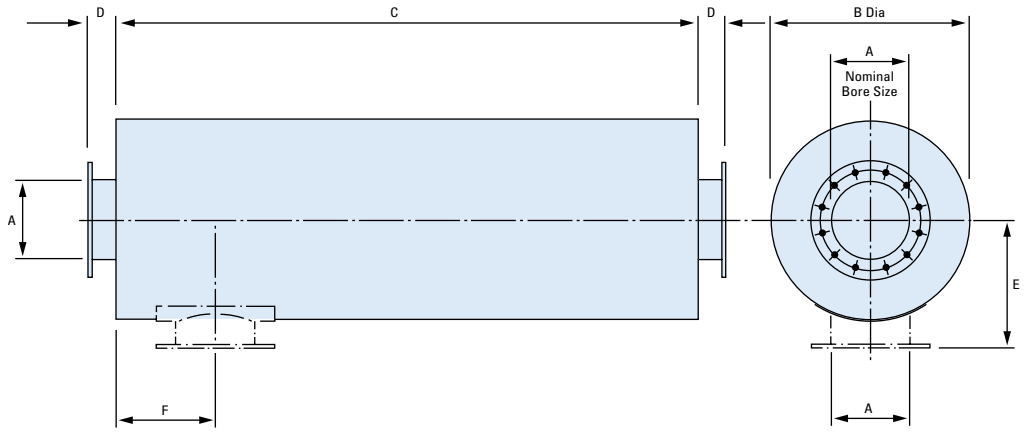


12" Bore



24" Bore

M41 series



	All	M41	MA41	All	All	M41	MA41	All	All	Weight	Weight
Silencer Ref	A	B	B	C	D	E	E	F min	F max	M41	MA41
	inch	mm	mm	mm	mm	mm	mm	mm	mm	kgs	kgs
M41/MA41 **038**	1.5	160		650	50	155		60	280	6	
M41/MA41 **050**	2	210		800	50	180		60	400	9	
M41/MA41 **063**	2.5	260		900	50	205		70	450	16	
M41/MA41 **075**	3	310		1000	50	230		90	500	36	
M41/MA41 **090**	3.5	360		1100	75	255		150	550	45	
M41/MA41 **100**	4	360		1200	75	255		160	600	55	
M41/MA41 **125**	5	410		1400	75	280		180	700	80	
M41/MA41 **150**	6	460		1600	75	305		190	800	127	
M41/MA41 **175**	7	540		1600	75	350		200	800	180	
M41/MA41 **200**	8	560		2000	75	355		220	1000	220	
M41/MA41 **225**	9	660		2000	75	420		235	1000	260	
M41/MA41 **250**	10	660		2400	75	420		250	1200	340	
M41/MA41 **300**	12	760		3000	100	470		280	1500	545	
M41/MA41 **350**	14	920		3100	100	550		320	1550	660	
M41/MA41 **400**	16	~~1020~~	1120	~~3200~~	~~100~~	~~600~~	650	~~340~~	~~1600~~	~~830~~	900
M41/MA41 **450**	18	1170		3600	100	685		370	1800	1060	
M41/MA41 **500**	20	1270		4200	100	735		400	2100	1300	
M41/MA41 **550**	22	1370		4700	100	785		430	2300	1570	
M41/MA41 **600**	24	1470		5000	100	915		460	2500	2020	

Larger sizes available on request.

FP	Industrial	**15dB(A)** Attenuation
FP1	Semi Residential	**25dB(A)** Attenuation
FP2	Residential	**35dB(A)** Attenuation

Absorptive Intake/Exhaust Gas Silencer

The FP series silencer is a straight through absorption type, suitable for vertical and horizontal installations. The design gives good attenuation in the higher frequency octave band widths and is, therefore, versatile in its application as an intake or exhaust silencer on fan blowers, centrifugal compressors, internal combustion engines, and small low-pressure gas vents and steam ejectors.

When used as a secondary or terminal silencer in conjunction with a high performance reactive silencer, stringent noise limitations can be achieved as a result of their complementary effect on the noise spectrum.

The FP 'industrial grade' absorptive silencer series are of all welded design, sturdily constructed in carbon steel with a heat resisting aluminium or black paint finish to ensure a long service life.

Options

- BS10 Table 'D' flanges fitted as standard.
- Alternative flange patterns available on request.
- B.S.P. connections available on smaller sizes.

- Radial/axial inlet.
- Radial/axial outlet.

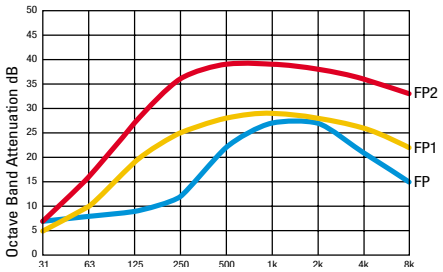
- Heat resisting aluminium or black paint.
- Shot blast and aluminium metal sprayed.

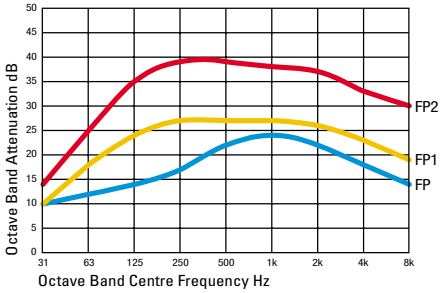
- Stainless steels.
- Galvanised steel (intakes only).
- Corten steel.

- Support feet and brackets.
- Lifting lugs.

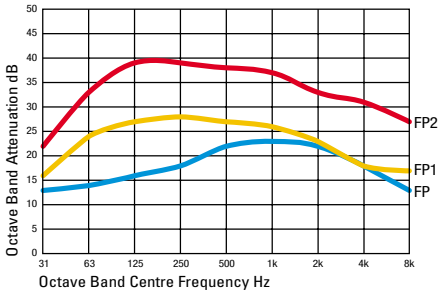
- Catalytic converters.

Back pressure figures can vary greatly with temperature and gas velocity, please contact IMS for advice.



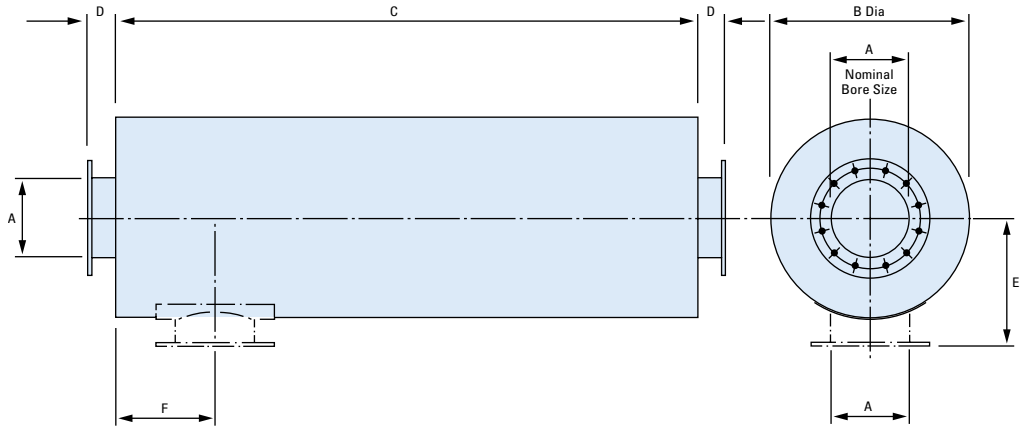


12" Bore



24" Bore

FP series



	All	FP	FP1/2	FP	FP1	FP2	All	FP	FP1/2	All	Weight	Weight	Weight
Silencer Ref	**A**	**B**	**B**	**C**	**C**	**C**	**D**	**E**	**E**	**F**	**FP**	**FP1**	**FP2**
	INCH	**MM**	**MM**	**MM**	**MM**	**MM**	**MM**	**MM**	**MM**	**MM**	**KGS**	**KGS**	**KGS**
FP/1/2 **038**	1.5	115		600	800		50	93		60	3	10	
FP/1/2 **050**	2	115		700	850		50	98		60	5	17	
FP/1/2 **063**	2.5	140		700	850		50	110		70	6	25	
FP/1/2 **075**	3	152		700	900		50	126		90	9	35	
FP/1/2 **090**	3.5	178		850	950		75	164		150	15	60	
FP/1/2 **100**	4	230		850	1100		75	190		160	20	85	
FP/1/2 **125**	5	310		850	1200		75	230		180	30	120	
FP/1/2 **150**	6	360		1150	1400		75	255		190	46	160	
FP/1/2 **175**	7	360		1150	1500		75	255		200	47	170	
FP/1/2 **200**	8	410		1450	1650		75	280		220	64	190	
FP/1/2 **225**	9	410		1450	1800		75	280		235	68	220	
FP/1/2 **250**	10	460		1750	2000		75	305		250	130	290	
FP/1/2 **300**	12	560		2200	2200		100	380		280	200	400	
FP/1/2 **350**	14	560		2200	2400		100	380		320	218	490	
FP/1/2 **400**	16	660		2600	2700		100	430		340	280	630	
FP/1/2 **450**	18	660	920	~~2900~~	~~3000~~	4200	~~100~~	~~430~~	550	~~370~~	~~310~~	~~780~~	1000
FP/1/2 **500**	20	760		2900	3300		100	480		400	330	900	
FP/1/2 **550**	22	760		3200	3600		100	480		430	375	1100	
FP/1/2 **600**	24	810		3500	3700		100	505		460	430	1300	

Larger sizes available on request.

Fläkt Woods Limited
Technical Data Sheet
Power S

Quotation Number	:	EA 14189-D	Project Code	:	BA-5123-1
Project Name	:	UCL-ION	Customer	:	Bells Power
Item Reference:	:	Air Inlet Fans - Generator	Date:	:	Tuesday, February 23, 2021

Fan Code	80JM/25/4/9/24
Fan Diameter / Size	800 Size / mm
Blades	9
Fan Speed	1440 rpm
Velocity	12.3 m/s
Blade Angle	24°
Installation Type / Form of Running	C / B (Horizontal)
Fan Casing	Short
Requested Duty	6.25m³/s @ 400 Pa (static)
Outlet Dynamic Pressure	90 Pa
Accessory Losses	36 Pa
Duty Shaft Power	4.76 kW
Max Shaft Power	4.92 kW
Total Efficiency	62.2 %
Motor Frame	132M [Class F]
Motor Rating	9.00 kW [IE3]
Full Load Current	16.6 A
Starting Current	118 A
Motor Mounting	Foot
Electrical Supply	380-420 Volts 50 Hz 3 Phase
Start Type	Enquire
Motor Winding	Standard
Enclosure	Standard All
ErP [FMEG] Rating	N 54 (ErP Compliant 2015)
ErP [FMEG] Target	N 50
FMEG Blade Angle [Range]	20° [8° - 36°]
Measurement Category	C (Static)
VSD	N
Fan + Motor Efficiency	52.2% (5.12 m³/s @ 432 Pa)
Motor Input Power (ErP)	4.23 kW
SFP value	0.85 W/(l/s) @ Requested Duty
Power from mains	5.25 kW
Energy Consumption	15737 kWh (3000 h/year)
Running Cost / Year	£1102
Air Density	1.2 kg/m³ / 20 °C / 0 m / 50% RH
Smoke Venting	Non Smoke Venting
Product Number	AJXS-080-31-20-36

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.

Acoustic data has been derived from tests carried out in a Flakt Woods laboratory, in accordance with BS 848 Pt 2, 1985 / ISO 5136 under Ducted conditions. The LpA figure provided is the overall Inlet sound pressure level calculated at the specified distance, under spherical, free field conditions. Breakout levels stated are estimated from induct sound power levels and are provided for guidance.

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*	90	85	88	90	88	83	80	76	96	72
Outlet*	91	85	88	90	88	83	81	78	96	72
Breakout*	91	85	88	90	88	83	81	78	96	72

* Lw dB re 10^{-12} W ** dBA re $2x10^{-5}$ Pa

Sound data at requested duty.

Description	Qty
Fan	
AJXS-080-31-20-36 - 80JM/25/4/9/24	1
Accessories	
Guard - Motor Side	1
Estimated Despatch : 4 Weeks	

Optional Controllers & Sensors

IDDXF54 - 3/3 - Inverter
[EA901023]

Optional Accessories

Mounting Feet
[AS021113]

Flexible Connector
[AS040800]

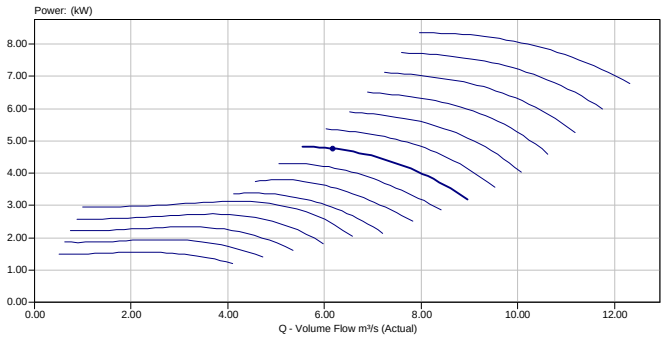
Matching Flange
[74917]

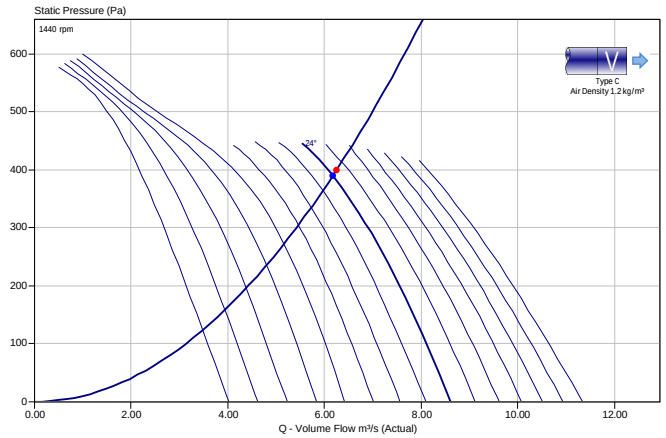
Website:
, , TN24 8DH
Email: ian@soundengineeringltd.com
Tel: Fax:

Fläkt Woods Limited
Combination Data Sheet
Power S

Quotation Number	:	EA 14189-D	Project Code	:	BA-5123-1
Project Name	:	UCL-ION	Customer	:	Bells Power
Item Reference:	:	Air Inlet Fans - Generator	Date:	:	Tuesday, February 23, 2021

Fan Code	80JM/25/4/9/24
Fan Diameter / Size	800 Size / mm
Blades	9
Fan Speed	1440 rpm
Velocity	12.3 m/s
Blade Angle	24°
Installation Type / Form of Running	C / B (Horizontal)
Fan Casing	Short
Requested Duty	6.25m³/s @ 400 Pa (static)
Outlet Dynamic Pressure	90 Pa
Accessory Losses	36 Pa
Duty Shaft Power	4.76 kW
Max Shaft Power	4.92 kW
Total Efficiency	62.2 %
Motor Frame	132M [Class F]
Motor Rating	9.00 kW [IE3]
Full Load Current	16.6 A
Starting Current	118 A
Motor Mounting	Foot
Electrical Supply	380-420 Volts 50 Hz 3 Phase
Start Type	Enquire
Motor Winding	Standard
Enclosure	Standard All
ErP [FMEG] Rating	N 54 (ErP Compliant 2015)
ErP [FMEG] Target	N 50
FMEG Blade Angle [Range]	20° [8° - 36°]
Measurement Category	C (Static)
VSD	N
Fan + Motor Efficiency	52.2% (5.12 m³/s @ 432 Pa)
Motor Input Power (ErP)	4.23 kW
SFP value	0.85 W/(l/s) @ Requested Duty
Power from mains	5.25 kW
Energy Consumption	15737 kWh (3000 h/year)
Running Cost / Year	£1102
Air Density	1.2 kg/m³ / 20 °C / 0 m / 50% RH
Smoke Venting	Non Smoke Venting
Product Number	AJXS-080-31-20-36





	Sound Spectrum (Hz)								Overall	
	63	125	250	500	1k	2k	4k	8k	Lw*	LpA @ 3 m**
Inlet*	90	85	88	90	88	83	80	76	96	72
Outlet*	91	85	88	90	88	83	81	78	96	72
Breakout*	91	85	88	90	88	83	81	78	96	72

* Lw dB re 10^{-12} W ** dBA re $2x10^{-5}$ Pa

Sound data at requested duty.

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.

Description	Qty
Fan	
AJXS-080-31-20-36 - 80JM/25/4/9/24	1
Accessories	
Guard - Motor Side	1
Estimated Despatch : 4 Weeks	

Optional Controllers & Sensors

IDDXF54 - 3/3 - Inverter
[EA901023]

Optional Accessories

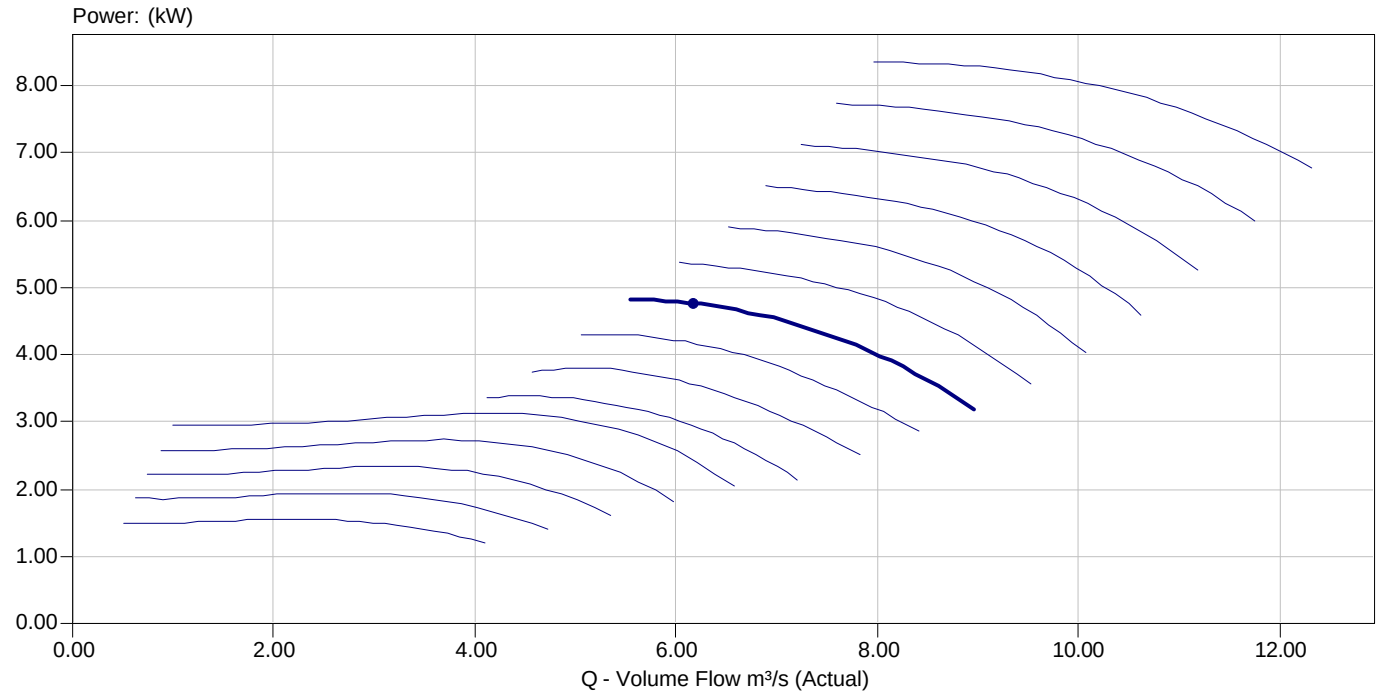
Mounting Feet
[AS021113]

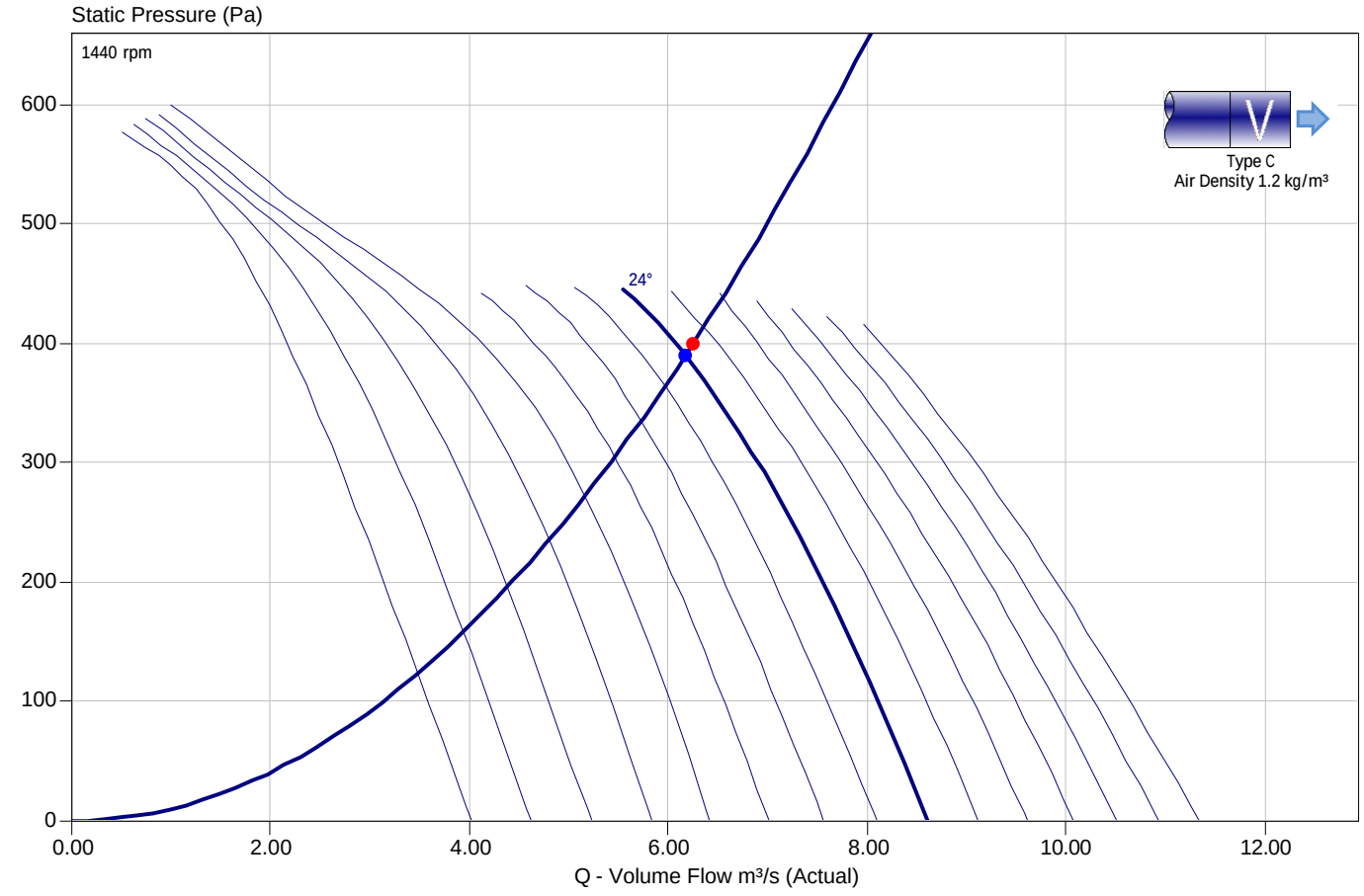
Flexible Connector
[AS040800]

Matching Flange
[74917]

, , TN24 8DH
Tel: Fax:
Website:
Email: ian@soundengineeringltd.com

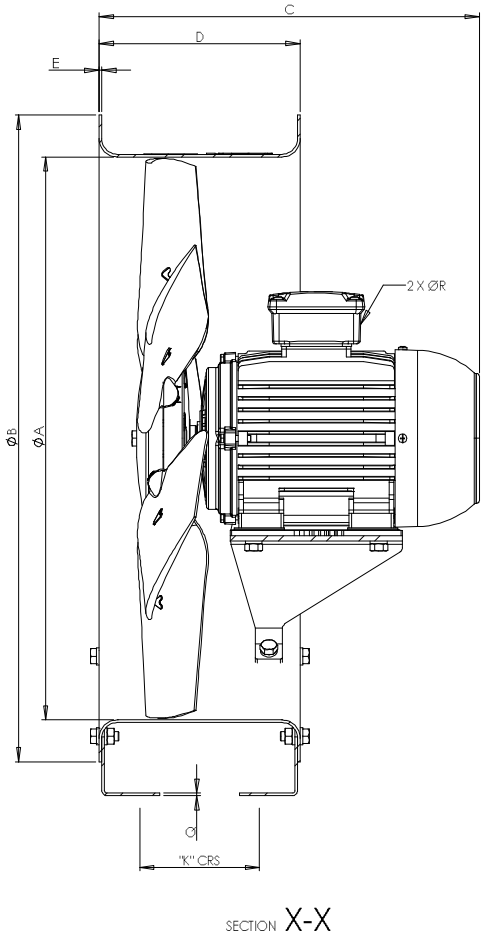
Quotation Number	:	EA 14189-D	Project Code	:	BA-5123-1
Project Name	:	UCL-ION	Customer	:	Bells Power
Item Reference:	:	Air Inlet Fans - Generator	Date:	:	Tuesday, February 23, 2021
			Fan Code	:	80JM/25/4/9/24



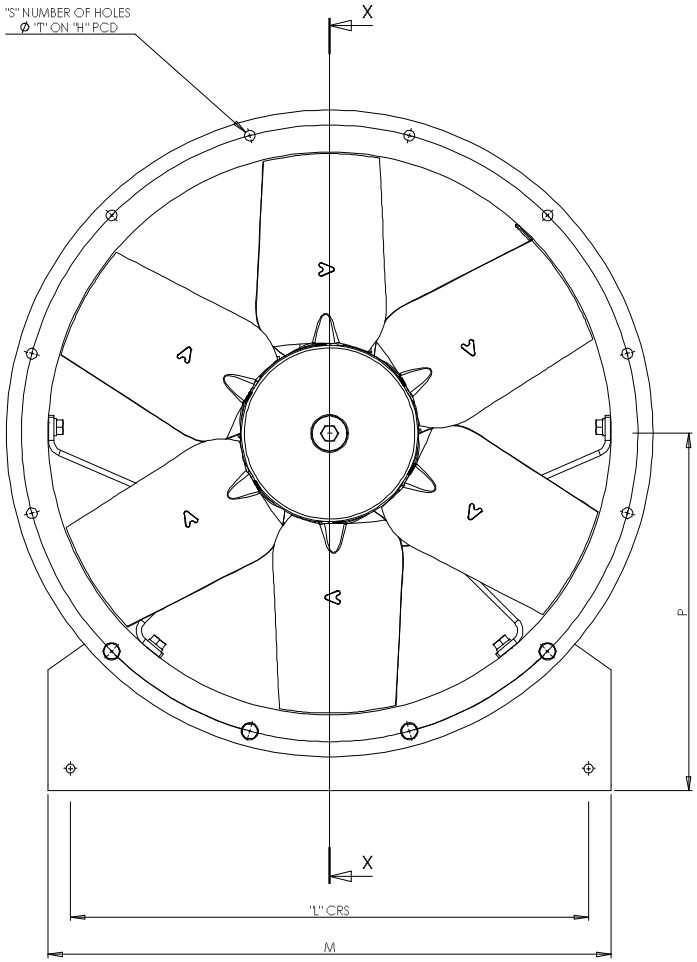


Fläkt Woods Limited
Drawing and Dimensions
Power S

Quotation Number	:	EA 14189-D	Fan Code	:	80JM/25/4/9/24
Project Name	:	UCL-ION	Customer	:	Bells Power
Item Reference:	:	Air Inlet Fans - Generator	Date:	:	Tuesday, February 23, 2021



SECTION X-X



C	560.5
D	260
E	4
H	860
K	142
L	750
M	800
ØA	800
ØB	894
ØR	M32
P	500
Q	6
S	16
T	12
Weight (kg)	139

Notes : Dimensions shown in mm / Weight in kg

Reference :838562

This drawing shows dimensions that should be used as a guide only and are subject to change. Certified drawings are available on request.

, , TN24 8DH

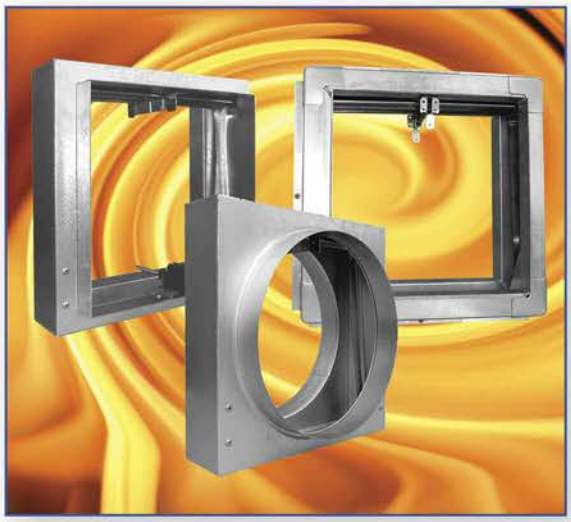
Tel: Fax:

Website:

Email: ian@soundengineeringltd.com

V1155

FD Series



Fire Dampers

- LPCB certificated fire dampers (LPS 1162)
- Tested and assessed installation methods to BS EN 1366-2 and BS 476-20/22
- E classified fire dampers complying with BS EN 13501-3
- FD-AF has been tested both vertically and horizontally. It is installed using single side access without the need to provide fire rated infill material
- Galvanised and stainless steel blade options
- Microswitch option for remote indication
- Complies with the temperature/time curve as specified in ISO 834 and EN 1363-1

MADE IN BRITAIN

MANUFACTURERS OF AIR, FIRE AND SMOKE CONTROL PRODUCTS

BSB

FD Series
Fire Dampers – Introduction

Introduction

What is a fire damper and why might they be needed?

The FD Series Steel Curtain Fire Damper is designed to stop the spread of fire through ducts, walls, floors and ceilings.

The product range has many features and options to meet the requirements of specifiers, contractors, local and national authorities. Dampers are available to suit both low/medium and high velocity applications.

What is the 'E' classification?

To achieve the classifications to EN13501-3, fire dampers and fire and smoke dampers shall be tested to EN1366-2 and a 300Pa pressure difference is applied across the damper. During the fire test period, the integrity of the seal between the damper and the structure shall not have any gaps larger than 150mm x 6mm. There shall not be any sustained flaming. The largest size of damper to be manufactured for sale as a single section shall be fire tested.

E = Integrity

The maximum leakage permissible at 300Pa corrected to 20°C is 360m^3/hr/m^2 (100 l/s/m^2) throughout the fire test period.

Fire dampers should be installed as tested.

Test reports showing testing to EN 1366-2 should be acceptable to meet the requirements of BS 476-20/22, but the reverse is definitely not the case and no classifications are available.

Some applications (fan off) allow the use of tests undertaken to BS 476-20/22 and this is allowed worldwide in areas outside of the EU.

However, as a word of caution, in whichever case, the correct model must be selected, to match fire resistance time with installation method and with the supporting construction (wall or floor).

To ensure that all testing and assessments are traceable back to initial fire test reports, the BSB FD series is product certificated by the Loss Prevention Certification Board (LPCB). This means that in addition to normal BS EN ISO 9001 compliance, the product is also checked to ensure that same product is being manufactured that has been tested or assessed.

BSB have a policy of continued testing and product certification to try and provide as broad a number of installation methods as possible.

BSB also follow regulation and standards development very carefully to provide input on changes and to be able to pass on relevant information to designers, specifiers, building control authorities (BCA's) and installers.

The FD Series Range

The BSB FD series is available in a variety of vertical or horizontal mounting configurations from 100mm x 100mm to 1200mm wide x 1000mm high.

Type FD Rectangular Spigot

A - Blades in air stream on heights greater than 300mm.
B - Blades held clear of the air stream.

Type FD Circular Spigot

C - Blades held clear of the air stream.

Type FD In-Duct

I - Blades and case within air stream.

Type FD Flat Oval Spigot

O - Blades held clear of the air stream.

Testing and Conformities

See installations section for full details.

E Classification (BS EN 1366-2/BS EN 13501-3)

- BSB FD fitted with HEVAC frame
  - E 120 - Blockwork/masonry wall
  - E 120 - Concrete floor
- BSB FD fitted with cleats
  - E 120 - Dry partition wall
- BSB FD fitted with angle frame
  - E 120 - Dry partition wall
  - E 120 - Concrete floor

E Classification (BS ISO 10294-1/2)

- As BS EN 1366-2/BS EN 13501-3 above

Corrosion testing (ASTM B117)

- Tested and satisfies LPS 1162

FD Blade leakage (BS EN 1751)

- Class 2

FD Features and Benefits

- The majority of the FD product variants are covered by third party Loss Prevention Certification Board (LPCB) product certification. This represents both full BS EN ISO 9001 quality compliance and a guarantee that the products are fully representative of those actually tested.
- Tested and certified installation variants of the FD are available to cover masonry walls, dry walls, batt walls and floors. These cover the majority of applications/supporting constructions that are required to maintain compartmentation.
- All BSB tested installation methods give at least a E120 classification, usually only limited by the wall construction used.
- Sleeve and angle methods, HEVAC frame methods, cleat and drop rod methods and batt infill methods are available.
- Some rarer installation applications are covered by assessment/test information to BS 476-20/22.
- Minimum size 100mm x 100mm.
- Maximum single section size 1200mm x 1000mm, available from the smallest size up to this in millimetre increments.
- Multi-section configurations are available to specific customer requirements, but will be subject to BCA approval.
- Standard construction is a fully welded galvanised steel case, which gives a casing leakage that complies with Class C ductwork leakage specifications.
- Other combinations of galvanised mild steel, type 1.4016 (430) and 1.4401 (316) stainless steels for the blades and case are available to specific customer requirements.
- The BSB FD has a strong and robust design to both meet the exacting fire testing requirements and be resilient to site handling. This is supported by sound production techniques which result in a quality product.
- All the above, supported with BSB's enviable delivery performance, provide an unbeatable combination.

Regulations and Standards

Approved Document B: Fire safety (ADB)
ADB is the UK government's guide to fulfilling the Building Regulations in terms of fire safety. It is available as a free download from the planning portal website.

It gives clear guidance on where fire dampers are to be used and what their performance or classification shall be. The BSB FD fulfils the E classification and reference should be made to the installation method to confirm exact time periods. These will generally be 120 minutes, but may be up to 240 minutes (limited by wall construction).

Health Technical Memo 05/02 (HTM05/02)
HTM05/02 is the Department of Health Firecode - fire safety in the NHS: Guidance in support of functional provisions for healthcare premises.

It basically underlines the requirements stated in ADB, requiring fire damper testing to BS EN 1366-2 and classification to BS EN 13501-3.

It supersedes HTM81 and should be read in conjunction with HTM2025: Ventilation in healthcare premises, as it gives guidance on maintenance and testing.

Building Bulletin 100
BB100 is the Department for Children, Schools and Families document on Fire safety in schools.

It basically underlines the requirements stated in ADB, requiring fire damper testing to BS EN 1366-2 and classification to BS EN 13501-3.

It also states: "For property protection, fire dampers should also satisfy LPS 1162".

Regulatory Reform (Fire safety) Order (RRFSO)
This is the regulatory requirement that allows people to self fire certificate their buildings. There are requirements for keeping testing and maintenance records for all passive fire protection equipment, which includes fire dampers.

BS EN 1366-2
The fire resistance test standard for fire dampers.

BS EN 15650
Fire Damper product standard. Ventilation for Buildings.

BS EN 1751
The standard for aerodynamically testing dampers. This includes casing leakage.

Other publications

DW 144 (HVCA)
This states the general requirements for HVAC ductwork, including the use of fire dampers. It also states ductwork leakage limits. The BSB FD fulfils the requirements of classes A, B & C.

DW 145 (HVCA)
This document will give guidance on the whole process of the selection and installation of fire dampers, with responsibilities and project planning etc.

The Grey Book (ASFP)
This gives further guidance on the application and installation of fire dampers.

Scotland
These are technical standards (AMD's). They give similar guidance to ADB. They already include direct references to the application of European standards. They are obtainable as a free download from the Scottish Executive website.

FD Series

Fire Dampers – Product Specification

Fusible Link Bracket
The Fusible Link Bracket is manufactured from galvanised steel as standard.

Fusible Link
Blades are held in the open position by a straight bar link (fitted as standard) rated at 72°C (162°F) with a formed reinforcing swage and two location holes.

- BSB can supply the FD Series Fire Damper with the alternative rated fusible link for higher temperature applications as follows:

  95°C (202°F)

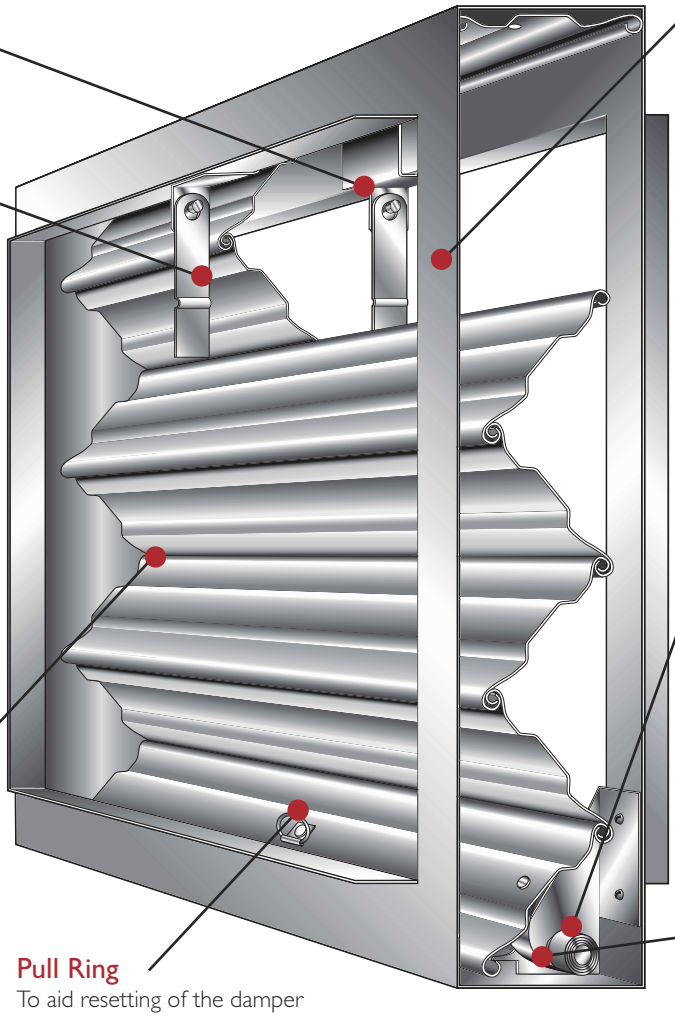
  124°C (260°F)

  145°C (286°F)

  182°C (360°F)

Blades
Formed to provide a continuous interlocking hinge extending the full length with dual swages providing maximum strength and rigidity. Nominally 0.7mm (22swg) thick cold reduced hot dipped galvanised mild steel to BS EN 10346 Grade DX51D + Z275.

Blade material options to order are Ferritic 430 type 1.4016 grade or Austenitic 316 type 1.4401 grade to BS EN 10088-2.



Casing
Formed to provide two continuous internal flanges not less than 30mm.
Casing and components not less than 1.2mm thick cold reduced hot dipped galvanised mild steel to BS EN 10346 Grade DX51D + Z275.

Casing material options to order are Ferritic 430 type 1.4016 grade or Austenitic 316 type 1.4401 grade to BS EN 10088-2.

Side Seals
0.20mm gauge 301 stainless steel to BS EN 10088-2, available to order.

Closure Springs
Dampers are supplied with two constant force coil springs exerting a pull of not less than 35N, with one end fixed to the leading blade by rivets and the coil fitted on the spindle of the locking ramp. The spring is manufactured from Grade 302 stainless steel to BS 5770, 4 hard.

Locking Ramps
Dual locking ramps ensure positive closing action of the blade pack in horizontal or vertical installations.

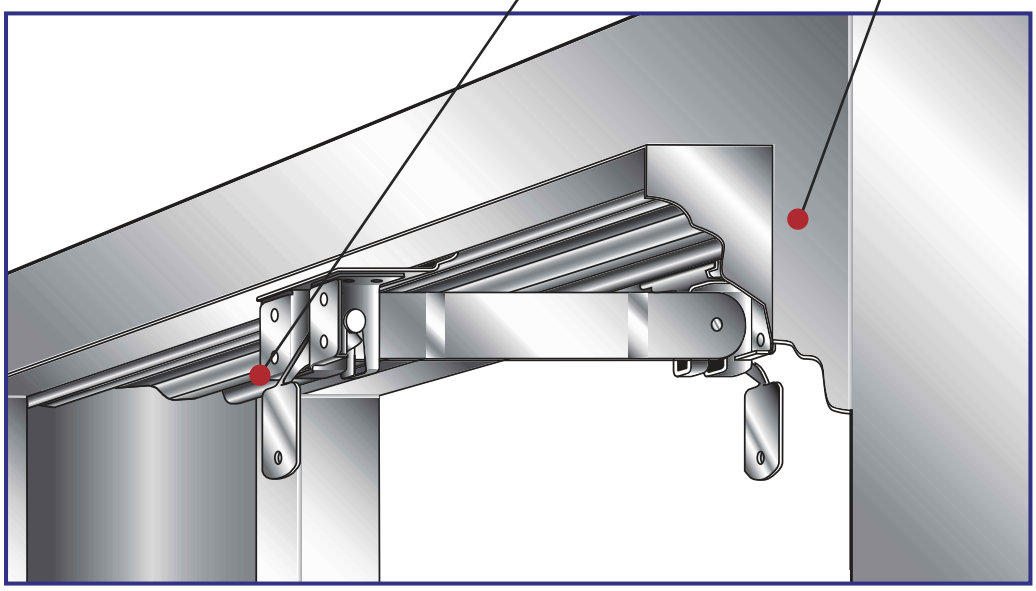
Pull Ring
To aid resetting of the damper blade pack, the bottom closing blade will be fitted with a single pull ring centrally to the width for dampers up to and including 500mm wide or 500mm diameter. For all dimensions above this, two equally spaced pull rings will be fitted.

Gate Latch Release
Optional mechanism for electrical release when required. Rated 72°C (162°F), alternative ratings available as per standard straight bar link.

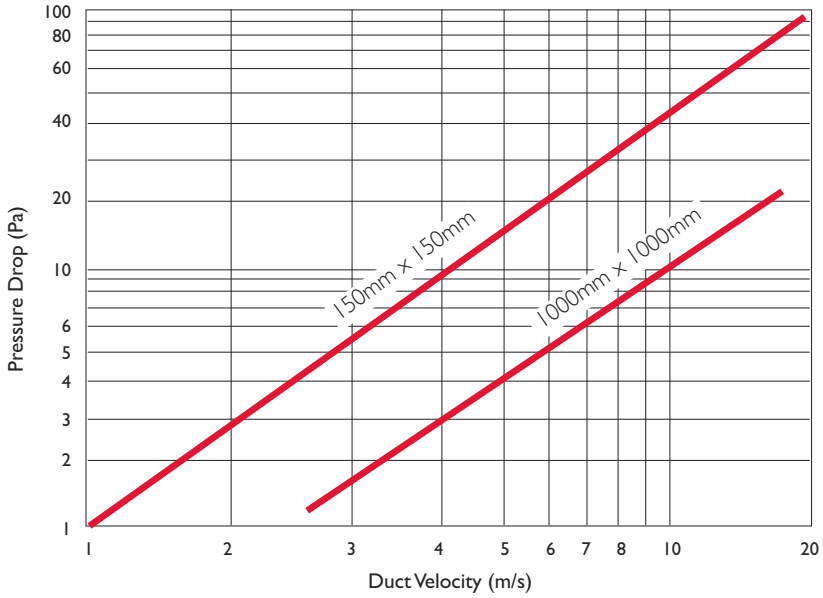
Paint
All welds, seams and joints are sprayed with commercial grade aluminium paint.

Microswitches
All BSB FD Fire Dampers are available with factory fitted single or double pole microswitches as optional extras. (See page 9)

Mechanical Visual Indicator
Local visual indication of the blade status is available as an optional extra. (See page 9)



Performance Data

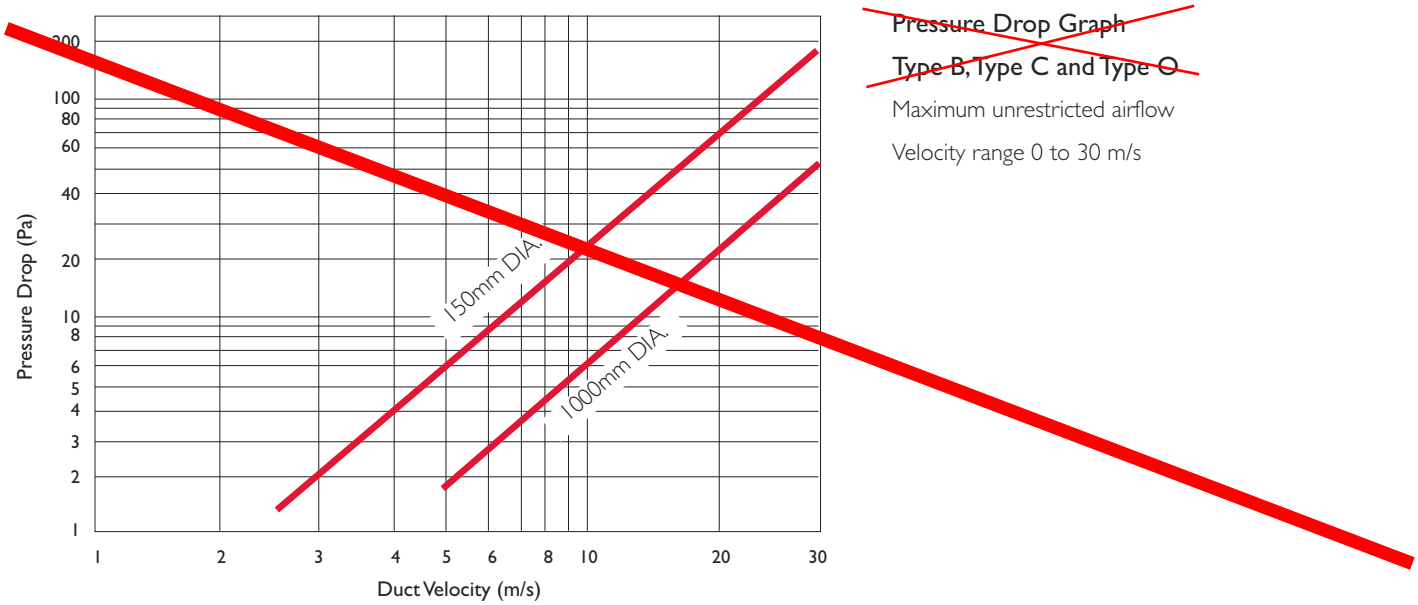


Pressure Drop Graph

Type A and Type I

Minimum free area = 91%

Velocity range 0 to 12.5 m/s

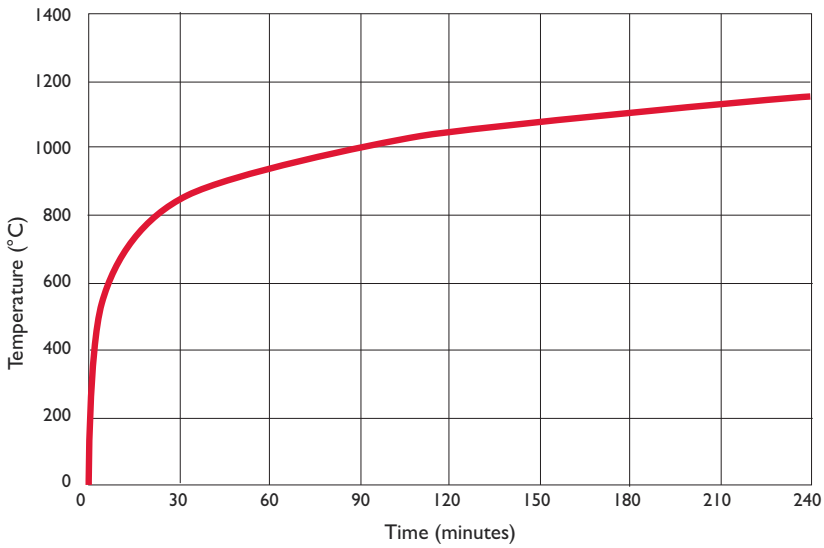


~~**Pressure Drop Graph**~~

~~**Type B, Type C and Type O**~~

Maximum unrestricted airflow

Velocity range 0 to 30 m/s



Standard Time/Temp. Curve (4 hours)
As specified in ISO 834

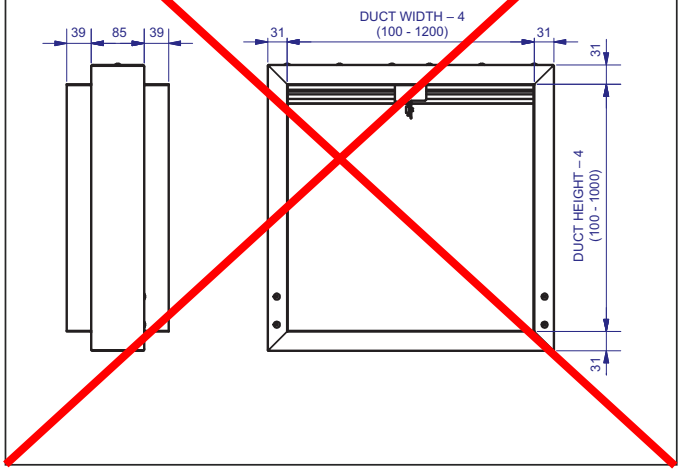
EN1366-2 Vertical Test Report TE201633

FD Series

Fire Dampers – Base Dimensions

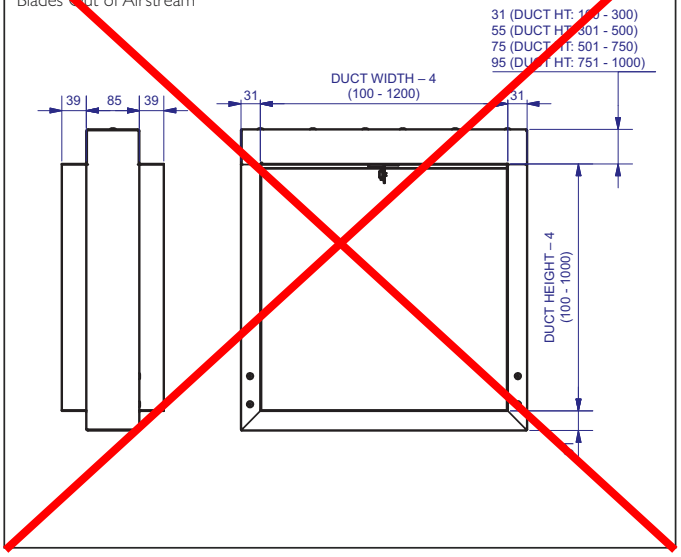
Type A

Square/Rectangular Spigot Connection
Blades Partially in Airstream
on heights greater than 300mm



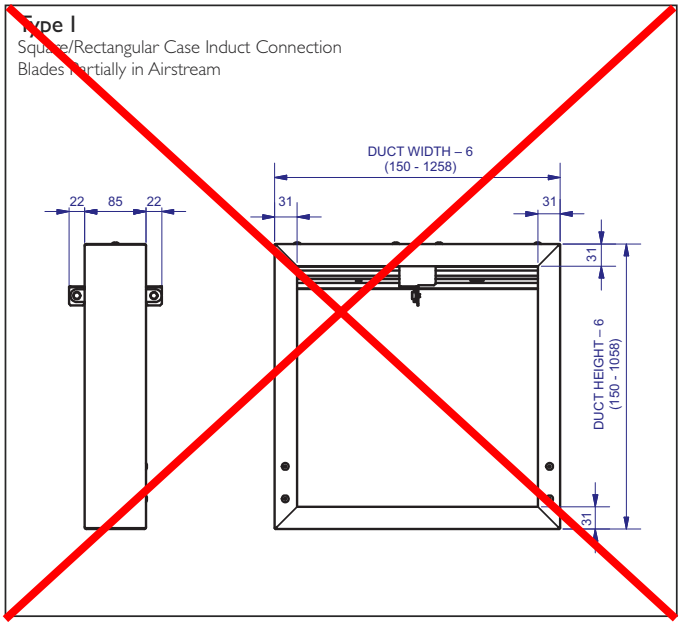
Type B

Square/Rectangular Spigot Connection
Blades Out of Airstream



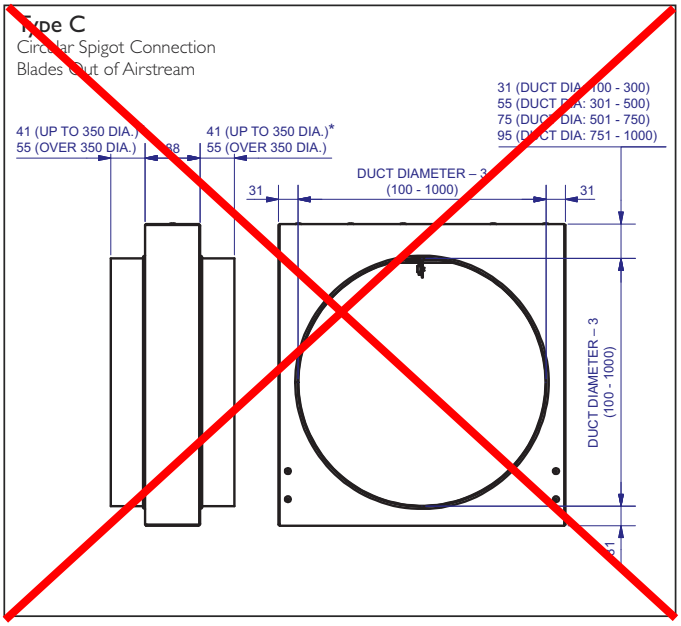
Type I

Square/Rectangular Case Induct Connection
Blades Partially in Airstream



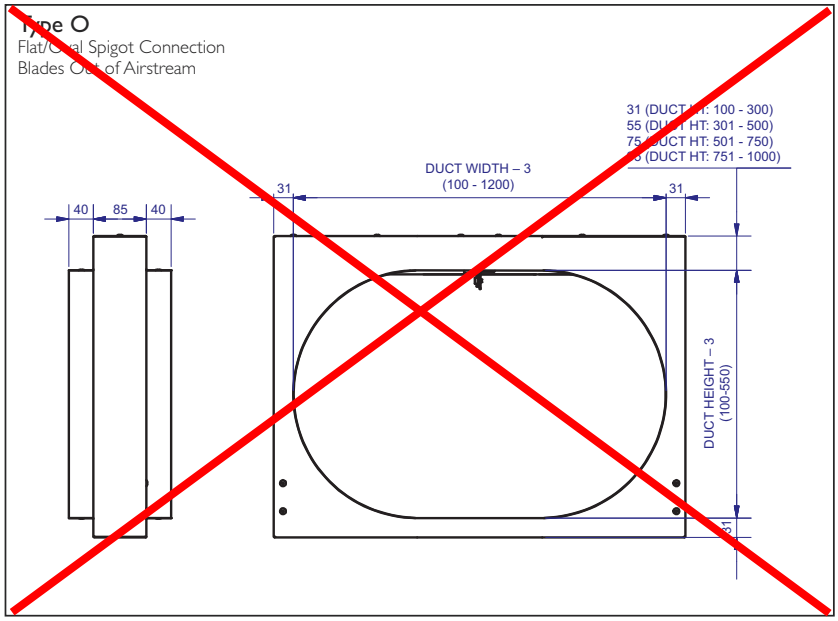
Type C

Circular Spigot Connection
Blades Out of Airstream



Type O

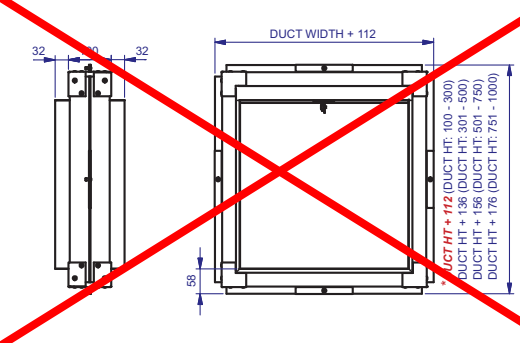
Flat/Oval Spigot Connection
Blades Out of Airstream



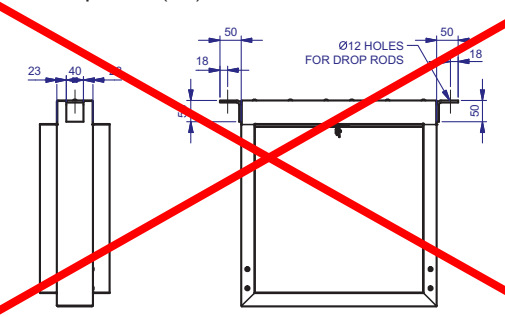
Notes:

1. All dimensions are in mm.
2. Rectangular spigoted models are supplied with actual spigot dimensions nominal less 4mm ± 1mm.
3. Circular and Flat Oval spigoted models are supplied with actual spigot dimensions nominal less 3mm ± 1mm.
4. For sizes greater than detailed maximum sizes, multiple section units will be supplied.
5. Where gate latches are fitted on dampers below 150mm in height or diameter release testing is only possible from opposite to ramp side. Please refer to our sales office.

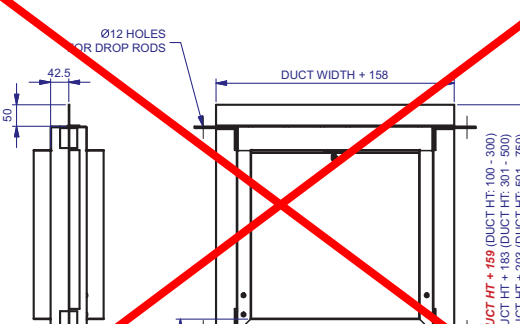
HEVAC Frame (HF)



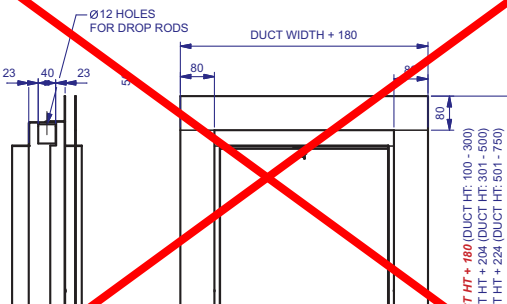
Cleats for Drop Rods (CL)



Bott Frame (BF)

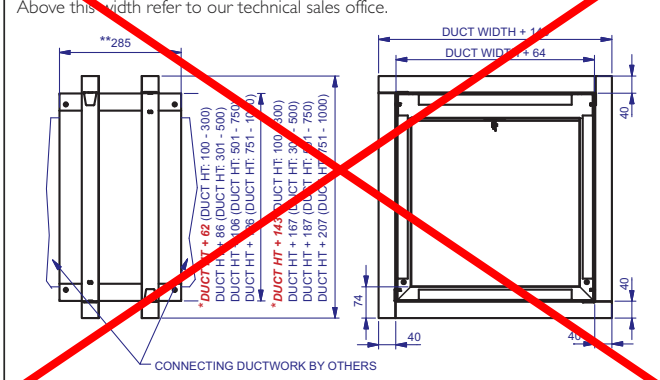


Fire Curtain (FC)

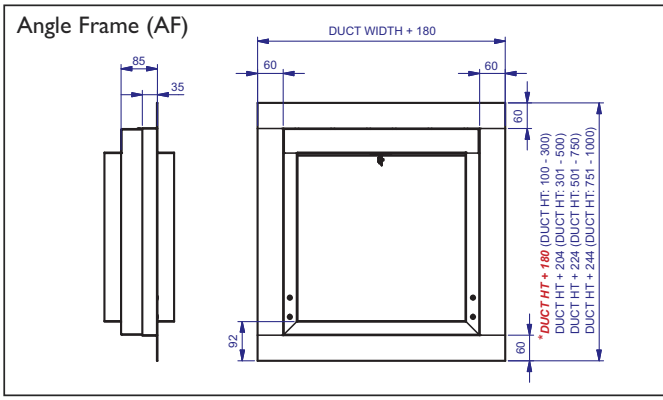


Sleeve and Angle (SA)

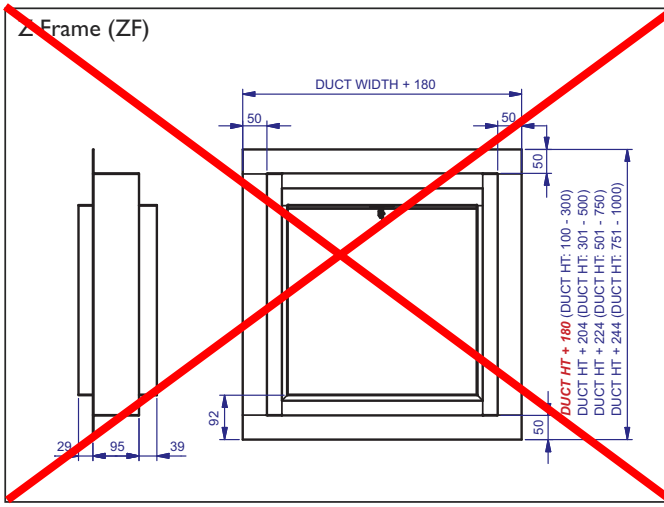
** Suitable for walls up to 200mm thick.
Above this width refer to our technical sales office.



Angle Frame (AF)



Z Frame (ZF)



Notes:

1. Dimensions with * apply for a type A damper at any height.

FD Series
Fire Dampers – Installation Notes

HEVAC/HVCA Frames

The HEVAC/HVCA approved factory fitted Installation Frame is designed to allow expansion of the damper under fire conditions, without affecting its integrity or the construction it is installed within.

Fixing Tie Tabs

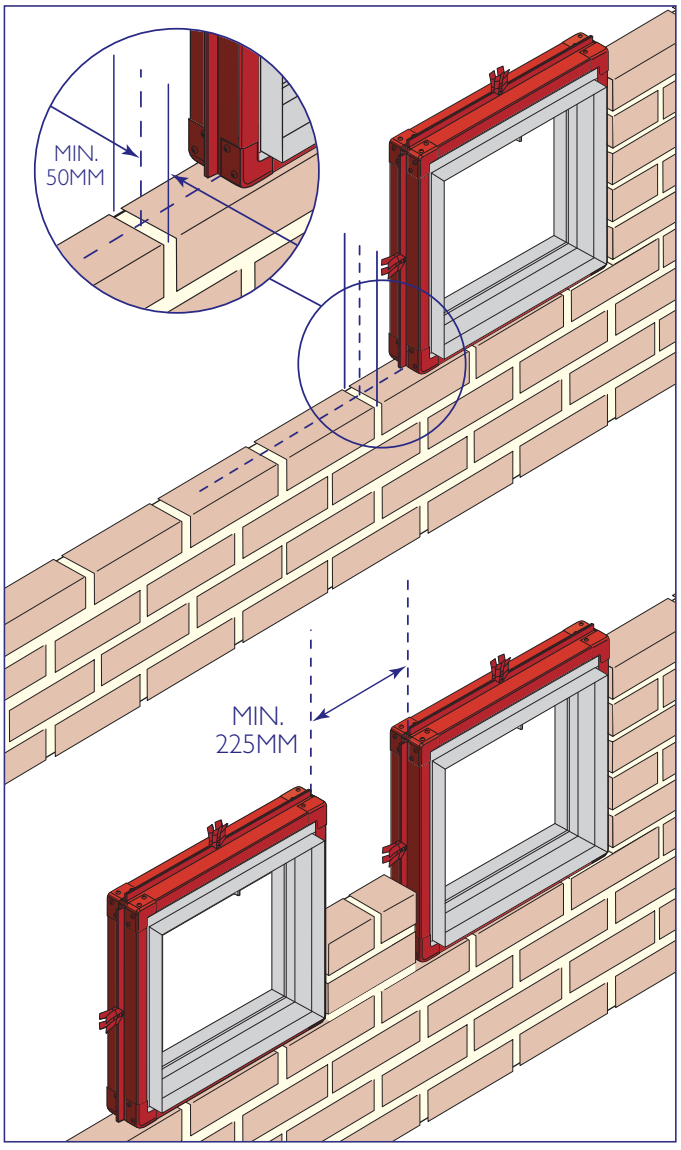
For securing the assembly into the builders work structure as specified by the specifying/authorising authority. In brick or Blockwork walls the fixing tie tabs must be bent out and be securely built into the mortar joints between the brick or Blockwork.
Installation within reinforced concrete walls and floors, the fixing tie tabs shall be bent out and tied back with stainless steel wire to the reinforcing bars that should be left protruding into the structural opening or to "eye bolts" but so as not to interfere with the installation of the damper. The gap between the installation frame and the builders work shall be backfilled with mortar or concrete on both sides of the upstand flange to the satisfactory requirements of the approving authoritative body.

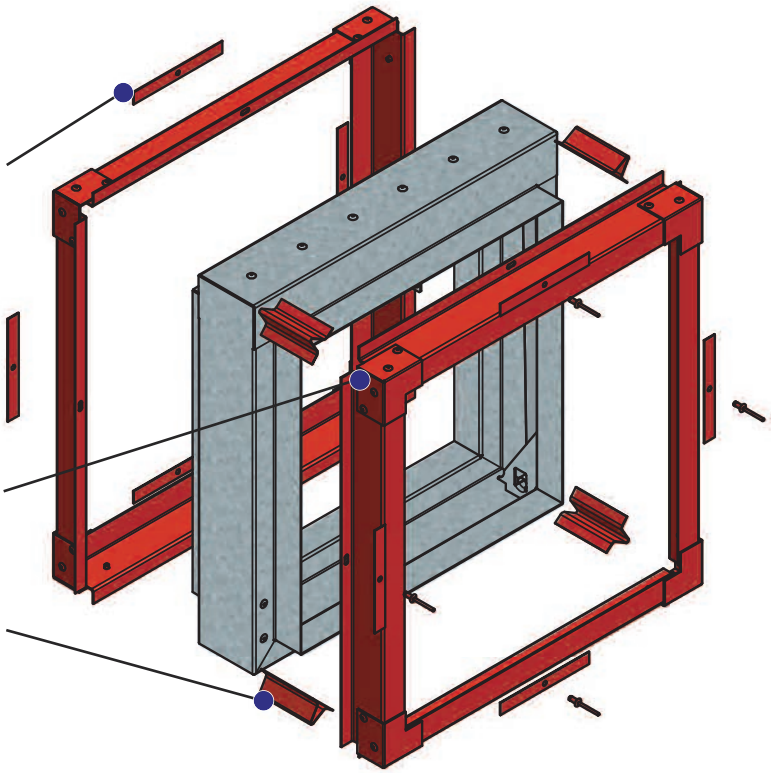
One Piece Corner Bracket

The one piece pressed corner bracket is rivetted (using aluminium rivets) to the "Z" Section which makes the frame. This bracket allows the frame to expand under fire conditions without affecting the integrity of the construction it is installed within.

Expansion Spacers

These pressed spacers are fitted into each corner to permit expansion of the fire damper within the construction of the frame.





Installation Codes of Practice

The frame should be installed centrally within the thickness of the surrounding wall or floor. Or, in the case of thick walls or floors, the centre line of the frame should be at least 50mm away from the nearest face.

Where more than one duct penetrates a wall or floor, adjacent fire damper assemblies should be separated by builder's work of a minimum thickness of 225mm. During installation, all fixing tabs should be bent out and built into the surrounding structure so as to ensure "positive fixing into the surrounding builder's work".

The illustrated detail on this page is BSB's interpretation of the HEVAC/HVCA Installation Frame specification. For additional details, contact our sales office.

Special Note:
All fire damper installations should be carried out to the satisfaction of the appropriate district surveyor, fire officer, building control authority and/or specifying authority as other approved methods of installation may well be used.

Installation Parameters

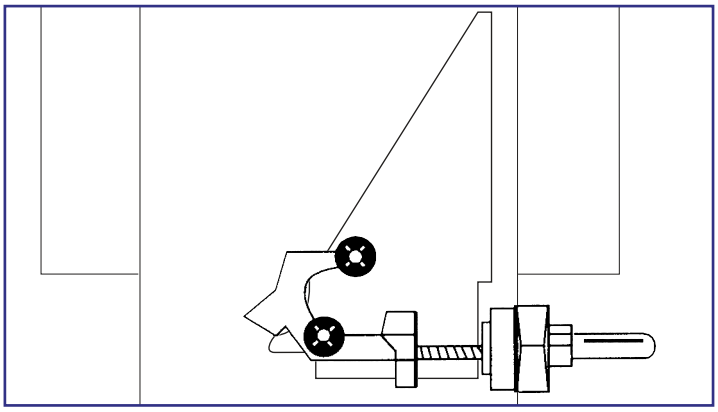
FD Series Fire Dampers are designed for application in normal dry filtered air systems. If exposed to fresh air intakes and/or inclement conditions the damper should be subject to a planned inspection programme.

Installations involving corrosive and/or aggressive hostile environmental conditions (e.g. swimming pools) may invalidate our warranty and should be referred to our Sales Office.

Mechanical Visual Indicator

To provide local indication of the blade status.

When the indicator appears in the bulb, this shows that the blades are closed.

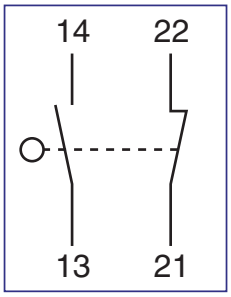


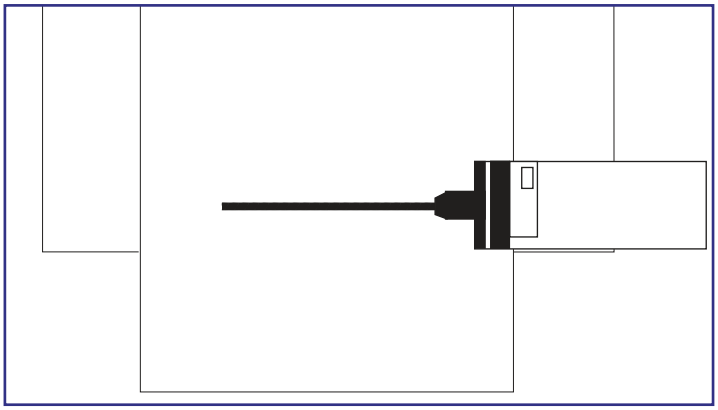
Single Pole Microswitch

To provide remote indication of the blade status. As the leading blade travels to the locking ramp, it contacts the arm and operates the switch. Factory Fitted.

The Single Pole Microswitch is supplied as a dependent snap action contact 1NO + 1NC.

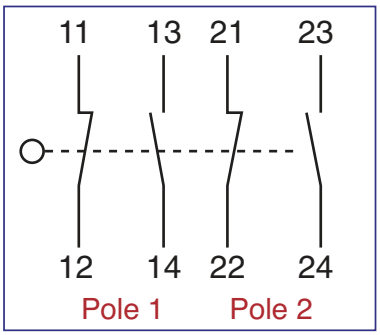
For indication of damper closed, terminals 13 and 14 should be used. Degree of protection: IP66.

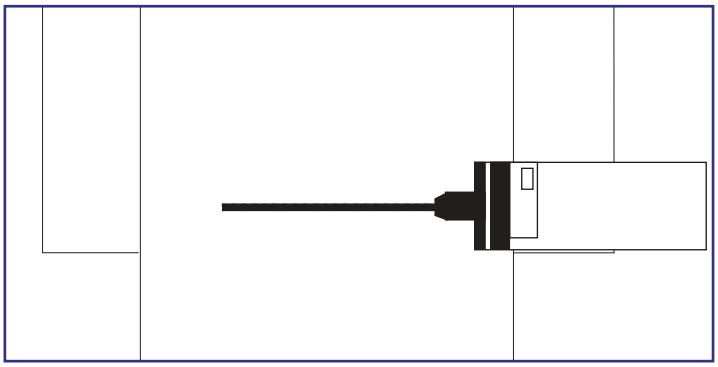




Double Pole Microswitch

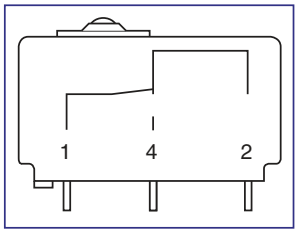
Operates as above but with two switches for double pole operation. Can also provide a signal to a control panel enabling isolation of plant in case of fire. Factory fitted.





V4 Sealed Microswitch

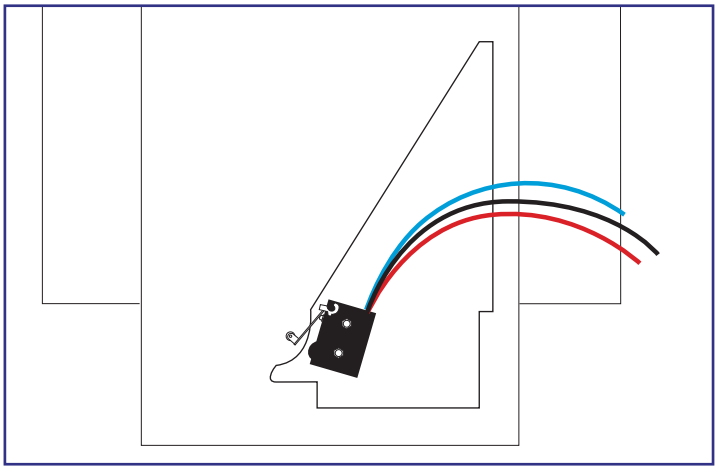
To provide remote indication of the blade status.
As the leading blade travels over the locking ramp, the lever is depressed and operates the switch. Factory fitted.



Degree of protection: Casing and Outlet IP67
Lead Length: 460mm

Connection details:

Common (1)	Black lead
Normally open (4)	Blue lead
Normally closed (2)	Brown lead

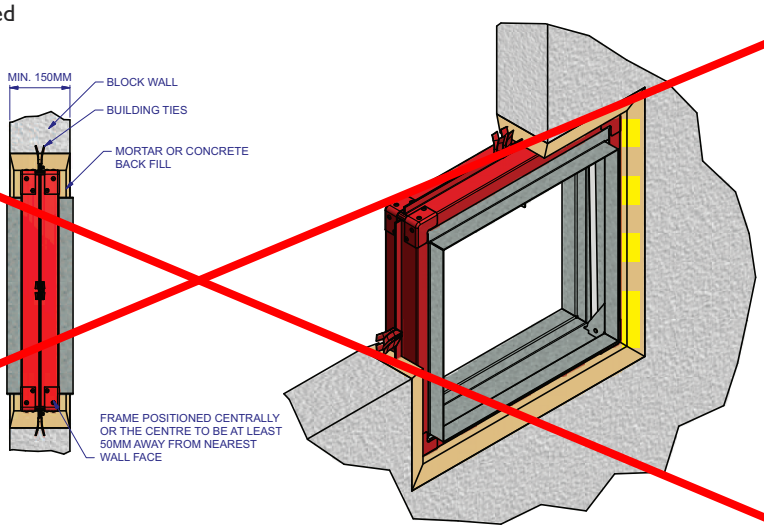


FD Series

Fire Dampers – Installation

BLOCK/MASONRY WALL - HEVAC FRAME Fitted

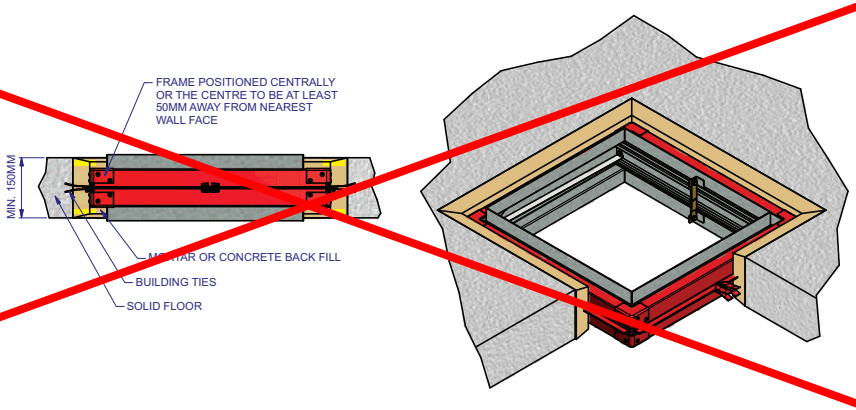
Single Section Sizes (mm)
100 x 100 to 1200 x 1000



TESTED TO BS EN 1366-2 FOR 4 HOURS
BS EN 13501-3 CLASSIFICATION: E120
BRE GLOBAL CLASSIFICATION REPORT NO: 274347.2
MEETS THE REQUIREMENTS OF BS 476-20/22 - REFER TO BS 476-10.6.6.3

CONCRETE/MASONRY FLOOR - HEVAC FRAME Fitted

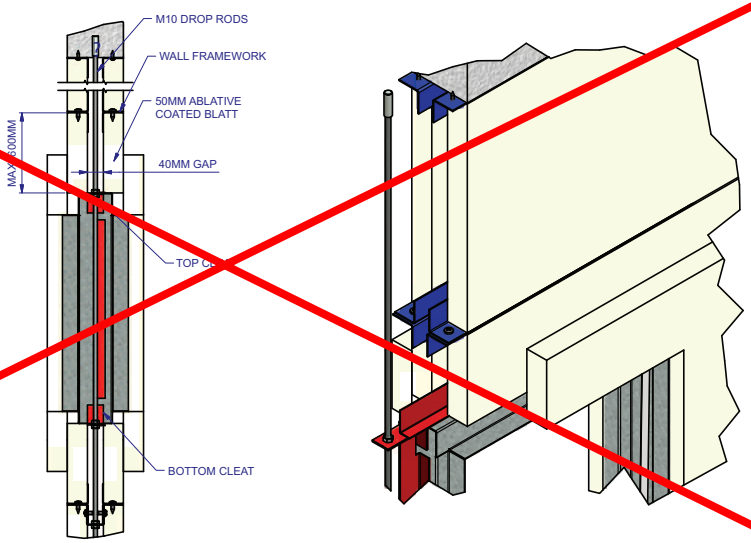
Single Section Sizes (mm)
100 x 100 to 1200 x 1000



TESTED TO BS EN 1366-2 FOR 4 HOURS
BS EN 13501-3 CLASSIFICATION: E120
BRE GLOBAL CLASSIFICATION REPORT NO: 274347.2
MEETS THE REQUIREMENTS OF BS 476-20/22 - REFER TO BS 476-10.6.6.3

BATT WALL - BATT FRAME Fitted

Single Section Sizes (mm)
100 x 100 to 1200 x 1000

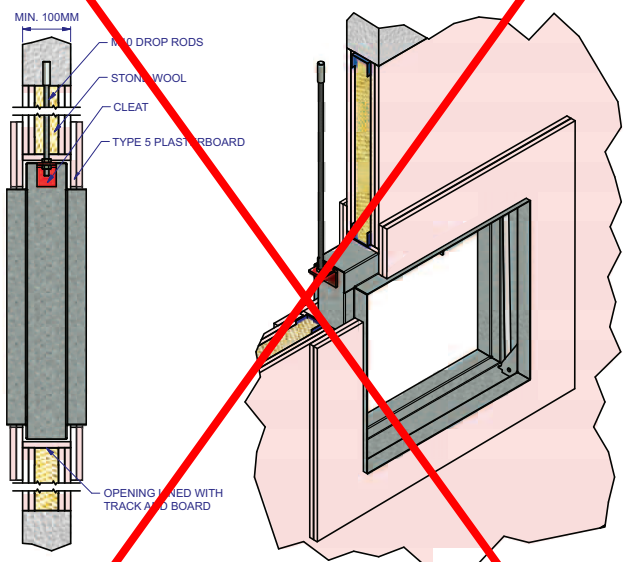


ASSESSED TO BS EN 1366-2 FOR 2 HOURS
BS EN 13501-3 CLASSIFICATION: E120
BS EN 1366-2 ASSESSMENT REFERENCES: CC 261451
MEETS THE REQUIREMENTS OF BS 476-20/22 - REFER TO BS 476-10.6.6.3

* If your proposed installation method has minor variations to that shown, please confirm acceptance with the local Building Control Authority (BCA) before proceeding. Manufacturers are not able to "approve" specific installation methods. It is generally accepted that EN 1366-2 tested installations will fulfil any requirements to BS 476-20/22 as the test method is much more severe.

DRY WALL - CLEATS Fitted

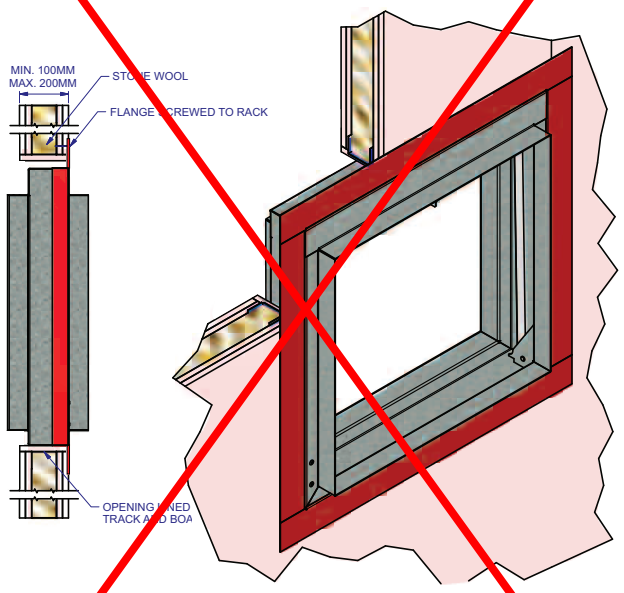
Single Section Sizes (mm)
100 x 100 to 1200 x 1000



TESTED TO BS EN 1366-2 FOR 2 HOURS
BS EN 13501-3 CLASSIFICATION: E120
BRE GLOBAL CLASSIFICATION REPORT NO: 287718C
MEETS THE REQUIREMENTS OF BS 476-20/22 - REFER TO BS 476-10.6.6.3

DRY WALL - ANGLE FRAME Fitted

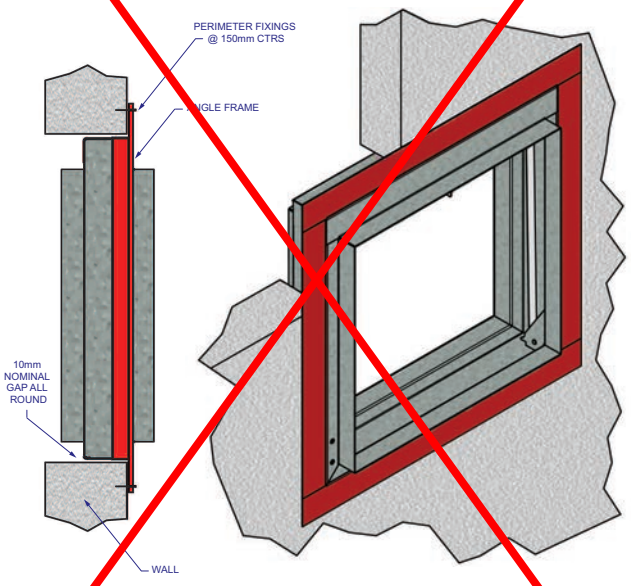
Single Section Sizes (mm)
100 x 100 to 1200 x 1000



TESTED TO BS EN 1366-2 FOR 2 HOURS
BS EN 13501-3 CLASSIFICATION: E120
BRE GLOBAL CLASSIFICATION REPORT NO: 287718A
MEETS THE REQUIREMENTS OF BS 476-20/22 - REFER TO BS 476-10.6.6.3

MASONRY WALL - ANGLE FRAME Fitted

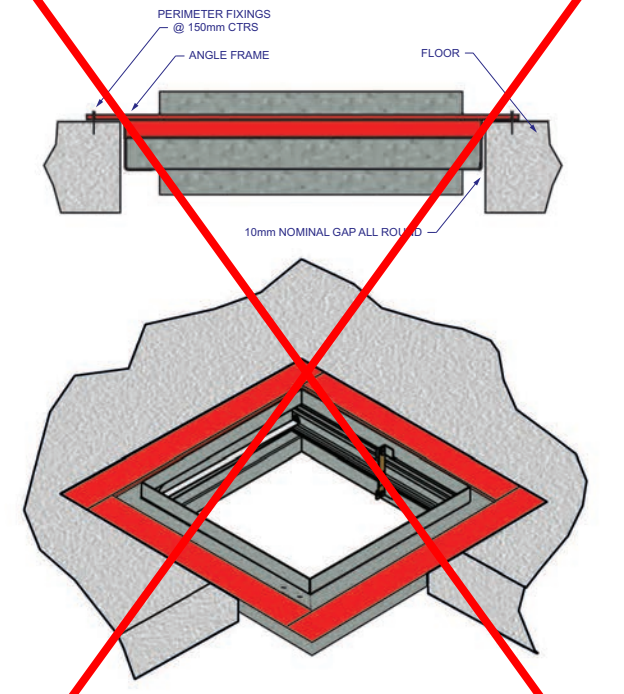
Vertical Application:
Single Section Sizes (mm) 100 x 100 to 1200 x 1000



TESTED TO BS EN 1366-2 FOR 4 HOURS
BS EN 13501-3 CLASSIFICATION: E120
MASONRY WALL BRE GLOBAL CLASSIFICATION REPORT NO: 287718A
MEETS THE REQUIREMENTS OF BS 476-20/22 - REFER TO BS 476-10.6.6.3

CONCRETE FLOOR - ANGLE FRAME Fitted

Horizontal Application:
Single Section Sizes (mm)100 x 100 to 1200 x 1000



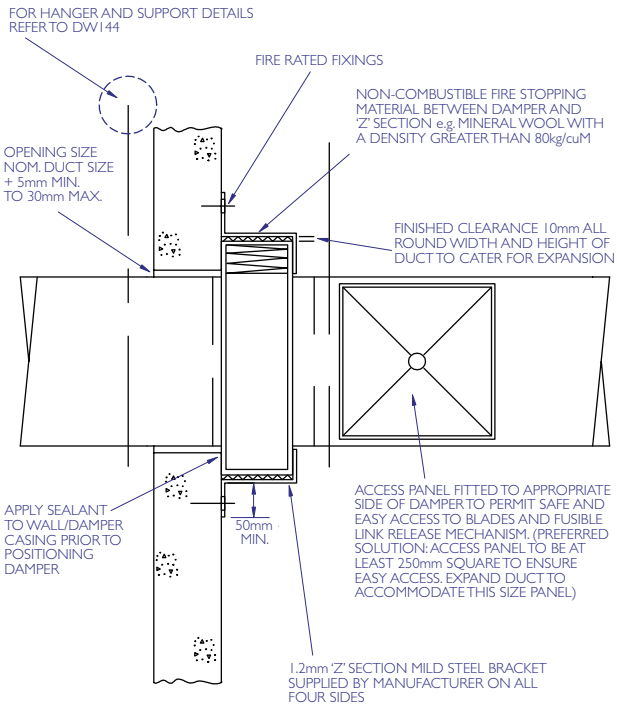
TESTED TO BS EN 1366-2 FOR 4 HOURS
BS EN 13501-3 CLASSIFICATION: E120
MASONRY WALL BRE GLOBAL CLASSIFICATION REPORT NO: 287718B
MEETS THE REQUIREMENTS OF BS 476-20/22 - REFER TO BS 476-10.6.6.3

Tested or assessed to BS 476-20/22 for up to 2 hours

CONCRETE/DRY WALL

FD ZF

Damper size:
Min. 100mm x 100mm.
Max. 1000mm x 1000mm

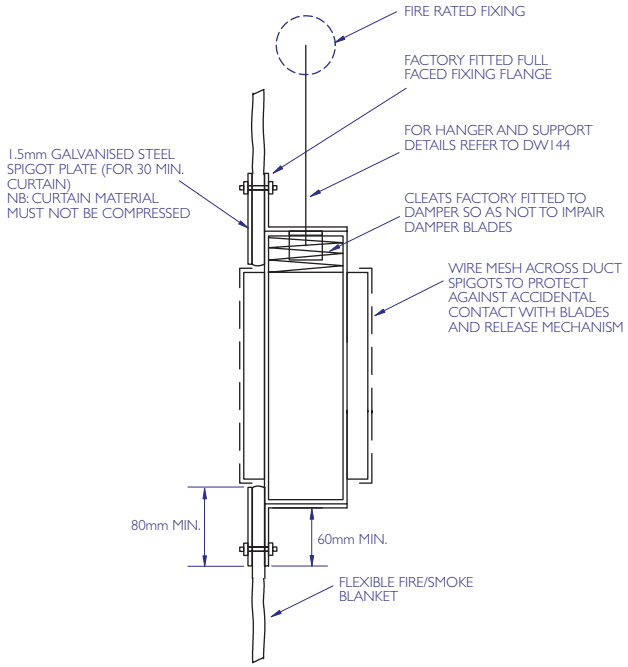


Assessment reference: CC256681
BS 476-20/22: 2 hours

FIRE CURTAIN - ANGLE FRAME AND CLEATS

FD FC

Damper size:
Min. 100mm x 100mm.
Max. 1000mm x 1000mm

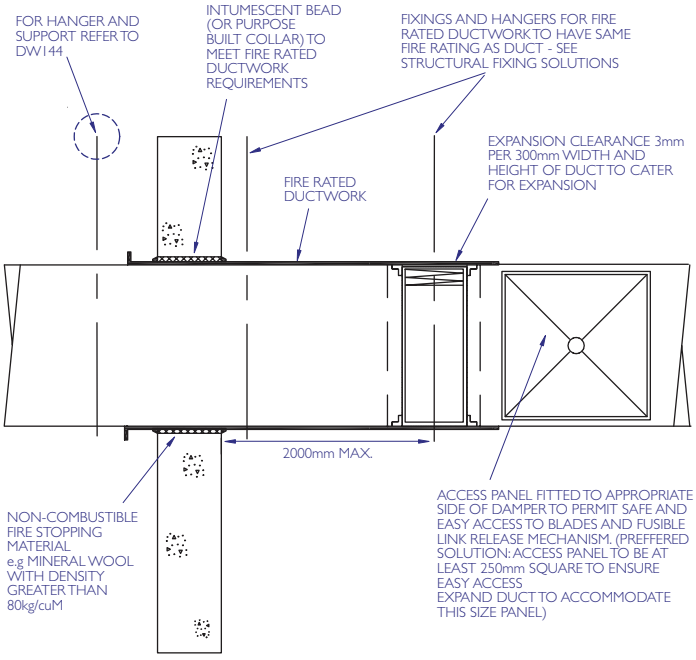


Assessment reference: CC256681
BS 476-20/22: 2 hours

REMOTE FROM WALL

FD I

Damper size:
Min. 100mm x 100mm.
Max. 1000mm x 1000mm



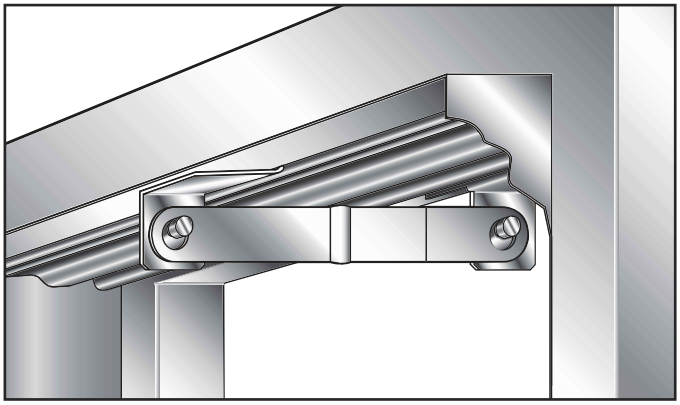
Assessment reference: CC256680
BS 476-20/22: 30 minutes

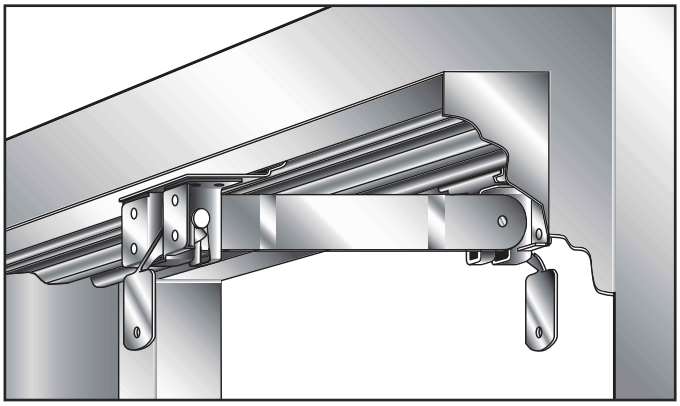
* If your proposed installation method has minor variations to that shown, please confirm acceptance with the local Building Control Authority (BCA) before proceeding. Manufacturers are not able to "approve" specific installation methods. It is generally accepted that EN 1366-2 tested installations will fulfil any requirements to BS 476-20/22 as the test method is much more severe.

Fusible Link Release

Straight Bar Fusible Link *(Standard)*
The standard fusible link will be supplied and rated at 72°C unless otherwise specified.

Gate Latch Link Option
Providing a trigger operation feature, this self-locating and easily resettable cassette can be used with either the solenoid or electro-magnet controls - or, as a standard component to assist the engineer in the resetting of the fire damper during regular inspection and maintenance procedures.
Below 150mm in height or diameter release testing only possible from opposite to ramp side.





Maintenance Notes

FD Series dampers are designed for normal dry filtered air systems. A programme of planned inspections should be carried out to include full operational checks, correct interface with, and function of, any control systems, cleaning and light lubrication.

As a guide, this should take place on a maximum of six months intervals.

Reference should be made to BS 5588-12 and BS 9999 for more information.
Records of damper installation and position shall be kept. Records of the condition of the dampers and their functionality/repair etc should be kept as these products come under the requirements of the Regulatory Reform (Fire safety) Order (RRFSO).

These inspection and maintenance programmes may need to be repeated more regularly if the dampers are exposed to inclement/dusty conditions or fresh air intakes and the frequency of such checks should be developed based on site experience.

Multiple Assemblies

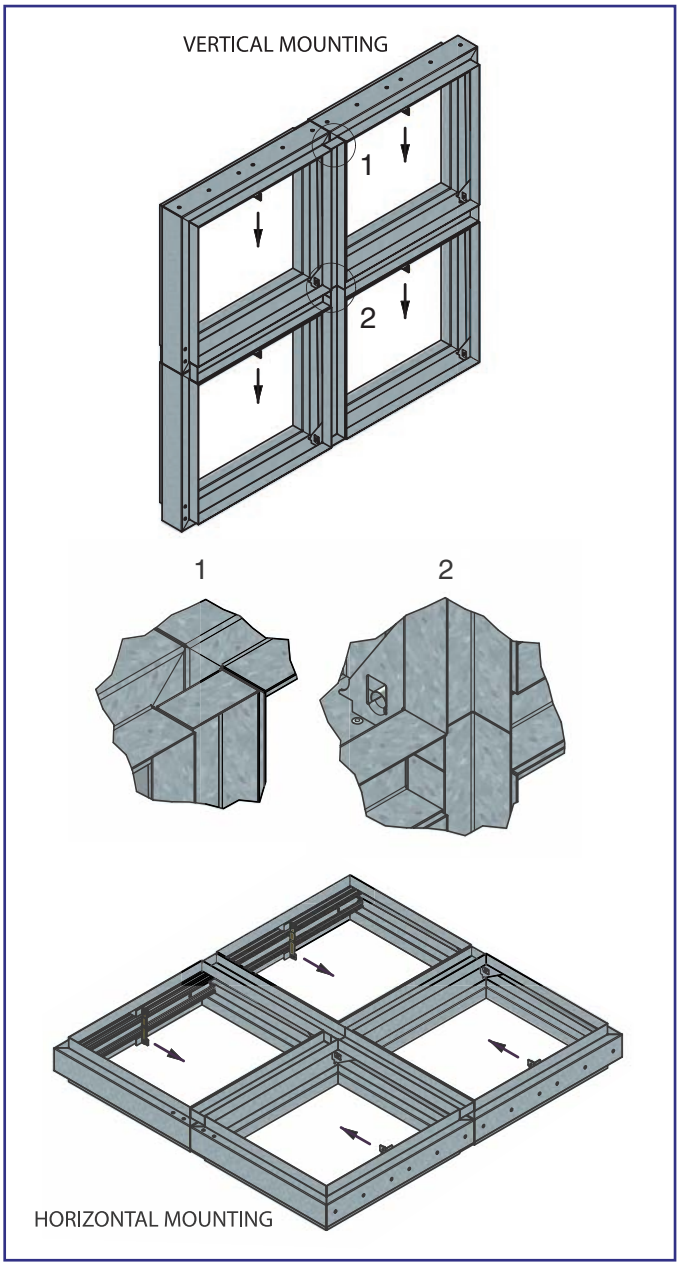
FD Series dampers can be supplied in multiple module sections to achieve requested sizes larger than the maximum manufactured single module units.

Such units and their installation method must be approved by the BCA before installation. For this, consideration must be given to additional structural steelwork that might be needed to support the weight of the damper. BSB cannot offer or approve supporting structures for multiple assemblies.

Illustrated are several variants of multiple module arrangements.

When there are transportation restrictions, large multiple units will be shipped in individual sections for site assembly by others. Joining strips are supplied un-drilled unless requested otherwise. Large multiple units required to be shipped fully assembled will incur additional packing/shipping costs. Please contact our sales office for further information.

BSB can manufacture to individual specifications and applications. Illustrated above are standard variants with other variants available to order.



FD Series

Fire Dampers – Weight Charts

Weight Chart (kg approx.)

Height (mm)	Width (mm)											
	100	200	300	400	500	600	700	800	900	1000	1100	1200
100	2.0	2.5	3.0	4.0	4.5	5.0	5.5	6.5	7.0	8.0	8.5	9.0
200	2.5	3.0	4.0	4.5	5.0	6.0	6.5	7.5	8.0	9.0	9.5	10.5
300	3.0	4.0	4.5	5.5	6.0	7.0	8.0	9.0	9.5	10.5	11.0	12.0
400	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5
500	4.5	5.5	6.5	7.5	8.5	9.5	10.5	12.0	13.0	14.0	15.0	16.0
600	5.0	6.0	7.5	8.5	9.5	11.0	12.0	13.5	14.5	16.0	17.0	18.5
700	5.5	6.5	8.0	9.0	10.5	11.5	13.0	14.5	15.5	17.0	18.0	19.5
800	6.0	7.5	9.0	10.5	11.5	13.0	14.5	16.0	17.5	19.0	20.5	21.5
900	6.5	8.0	9.5	11.0	12.5	14.0	15.5	17.5	19.0	20.5	22.0	23.5
1000	7.0	9.0	10.5	12.0	13.5	15.0	17.0	18.5	20.5	22.0	23.5	25.0

Weight Chart + Hevac Frame (kg approx.)

Height (mm)	Width (mm)											
	100	200	300	400	500	600	700	800	900	1000	1100	1200
100	3.5	4.5	5.5	6.5	7.5	8.5	8.5	11.0	12.0	13.0	14.0	15.0
200	4.5	5.5	6.5	7.5	8.5	10.0	11.0	12.0	13.5	14.5	15.5	16.5
300	5.5	6.5	8.0	9.0	10.0	11.5	12.5	14.0	15.0	16.0	17.5	18.5
400	6.5	8.0	9.0	10.5	11.5	13.0	14.5	16.0	17.5	18.5	20.0	21.5
500	7.5	9.0	10.5	11.5	13.0	14.5	16.0	17.5	19.0	20.5	22.0	23.5
600	8.5	10.0	11.5	13.0	14.5	16.5	18.0	19.5	21.5	23.0	24.5	26.0
700	9.5	11.0	12.5	14.0	15.5	17.5	19.0	21.0	22.5	24.0	26.0	27.5
800	10.5	12.0	14.0	15.5	17.5	19.0	21.0	23.0	24.5	26.5	28.5	30.0
900	11.5	13.0	15.0	17.0	18.5	20.5	22.5	24.5	26.5	28.5	30.5	32.5
1000	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.5	30.5	32.5	34.5

Weight Chart + Angle Frame (kg approx.)

Height (mm)	Width (mm)											
	100	200	300	400	500	600	700	800	900	1000	1100	1200
100	2.5	3.5	4.5	5.0	6.0	6.5	7.5	8.5	9.5	10.0	11.0	12.0
200	3.5	4.5	5.0	6.0	7.0	7.5	8.5	9.5	10.5	11.5	12.5	13.0
300	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
400	5.0	6.0	7.5	8.5	9.5	10.5	11.5	13.0	14.0	15.5	16.5	17.5
500	6.0	7.0	8.5	9.5	10.5	12.0	13.0	14.5	16.0	17.0	18.5	19.5
600	6.5	8.0	9.5	11.0	12.0	13.5	15.0	16.5	18.0	19.5	20.5	22.0
700	7.5	9.0	10.0	11.5	13.0	14.5	16.0	17.5	19.0	20.5	22.0	23.5
800	8.0	10.0	11.5	13.0	14.5	16.0	17.5	19.5	21.0	22.5	24.0	26.0
900	9.0	10.5	12.5	14.0	15.5	17.5	19.0	21.0	22.5	24.5	26.0	27.5
1000	10.0	11.5	13.5	15.0	17.0	18.5	20.5	22.5	24.5	26.0	28.0	29.5

Weight Chart Circular (kg approx.)

Nom dia. (mm)	Width (mm)		
	FDC	FDC+HF	FDC+AF
100	1.5	3.5	3.0
150	2.5	4.5	4.0
200	3.0	5.5	4.0
250	3.5	6.5	5.0
300	4.5	7.5	6.0
350	6.5	10.0	8.0
400	8.0	11.5	10.0
450	9.0	13.5	11.0
500	10.5	15.0	13.0
550	12.0	17.0	15.0
600	13.5	19.0	16.0
650	15.0	21.0	18.0
700	16.5	22.5	20.0
750	18.0	24.5	22.0
800	20.5	27.5	24.0
850	22.5	29.5	26.0
900	24.5	32.0	28.0
950	26.5	34.5	31.0
1000	28.5	37.0	33.0

Fuel System Technical Submittal
UCL ION/DRI
Q4105

Bells Power Solutions Ltd
70 Clifton Street
London
EC2A 4HB

020 3259 0100
contact@bellspowersolutions.co.uk
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BELLS THE STANDBY POWER SPECIALISTS	TECHNICAL SUBMITTAL SHEET TS No: 003 R1 Project: UCL ION/DRI Date: 28th November 2021 Job No: Q4105	MJL MICHAEL J.LONSDALE *Creating the right environment*

To: Adrian Wells	From: James Murphy
Company: M J Lonsdale	Technical Enclosures: Fuel System
Date answer is required:	Date answer was received:

SUBJECT:

Please find attached for approval technical information for the Fuel System:-

Fuel System Scope of Works
Bulk Storage Tank Calculations
Bulk Storage Tanks Specification
Fuel Polisher Datasheet
Kingsway & Leak Detection Datasheet
Alarm, OLE, Hydrostatic Gauge, OPV & Basket Strainer Datasheet
Fill Point Cabinet GA Layout
Generator & Tank Room Layout
Fuel Schematic

RESPONSE / STATUS	A	B	C

COMMENTS:

Fuel System Scope of Works

We have allowed to supply and install a diesel fuel transfer system to provide fuel to the 2 generators for approx. 24 hours at full load, comprising the following works.

Supply & Installation of 1 x 7,500 & 1 x 5,000 Litres Double Skin Bulk Tank, c/w with balance pipe, overfill prevention valves, float switches, gauges and valves

We have allowed to install a Fill point cabinet, and to install pipework to run from the cabinet to the Bulk Tank for fill 63mm welded pipe in pipe and 80mm single screwed vent lines.

We have made allowance within our bid for all filters, gauges, strainers and valves as required.

We have allowed to install flow and return 25mm pipework to/from the generator within the bunded areas of both rooms.

We have allowed to install all necessary filters, strainers and valves to the generator.

A Kingsway Fire System consisting of drop valve, heat link and stop buttons will be installed to the Bulk Storage Tank Room and Generator, as well as a leak detection system to the bulk tank and generators.

All of which will be relayed back and mimicked on the Main PLC via the fuel master control panel, which will also provide interfaces for BMS monitoring and fire alarm shutdown.

A fuel polishing system has been included.

We have allowed to carry out testing and cleaning of the newly installed pipework.

Pipework Specification

Fill Line Fill Point Cabinet to Bulk Tank

63 Pipe in 100mm pipe in pipe – Black Mild Steel Pipework - Welded

Vent Line Fill Point Cabinet to Bulk Tank

80mm Pipe – Black Mild Steel Pipework – Screwed

Generator Flow & Return:
25mm – Black Mild Steel Pipework – Screwed within bunded area of tank/generator room

Generator Fuel Connection:
Flexible Hoses

Testing:
Fuel Lines to be air tested to twice the working pressure of the system (1-1.5 Bar)

Fuel Tank Specification and Sizing Calculations – UCL ION/DRI

Fuel Tank Calculation Sizing

The FG Wilson P1500P3/1650E3 Generator at full load has a ESP fuel full load consumption of 326.3 Litres per hour.

Specification requirement is for 24 hours bulk and 8 hours day, there is no space allocation for a 8 hour day tank and as bulk tanks are located within the next room bulk tanks are to be sized to provide a minimum of 32 hours running at load.

The project requirement is to allow for 1 x 7,500 & 1 x 5,000 useable Litres tanks balanced providing 12,500 brimful 12,050 useable litres total capacity. Therefore;

12,050 Litres useable = 1,205 Litres ullage allowance @ 10%

12,050 – 1,205 = 10,845 Litres

10,845 Litres / 326.3 Litre/Hr = **33.23** litres running @ full load.

Balanced tank arrangement provides overall the 32-hour fuel capacity at full load running condition.

Equipment Description

1 x 7,500 & 1 x 5,000 Litre brimful bunded mild steel tank to BS799 part 5 type J 2010.

Manufactured with 5mm mild steel plate for tank and bund.

Metcraft Tanks are manufactured to the Water Environment (Oil Storage) Regulations 2006, the Control of Pollution (Oil Storage) (England) Regulations 2001 and to SEPA & EA Guidelines

Outer Bund Size Approx. 7,500 Litre - 2500mm Long x 1750mm Wide x 2100mm High
5,000 Litre - 2100mm Long x 1450mm Wide x 2100mm High

Inner Tank Size: Approx. 7,500 Litre - 2400mm Long x 1500mm Wide x 2000mm High

5,000 Litre – 2000mm Long x 1200mm Wide x 2000mm High

TANK COMPLETE WITH:

600mm Round Raised Manway flanged neck.
50mm Fill
Connection
50mm Vent unit
25mm Socket for level probe (Plugged)
25mm Socket -
spare (Plugged)
50mm Socket - spare (Plugged)
25mm Draw line c/w valve - if required
25mm Return line socket (Plugged) - if required
Suitable Lifting
Lugs
Earth Lug to main body of vessel

STANDARD PAINT FINISH

Wire brush & Degrease steelwork where necessary
1 coat primer & top coat of enamel paint
Minimum Paint Thickness - 70Microns
Standard Colours:
BS4800 06C39 Saddle Brown
Tank base & bearers 1 coats zinc paint – Nominal Thickness 50 Microns

Product Data Sheet

Metcraft 60K Fuel Polisher

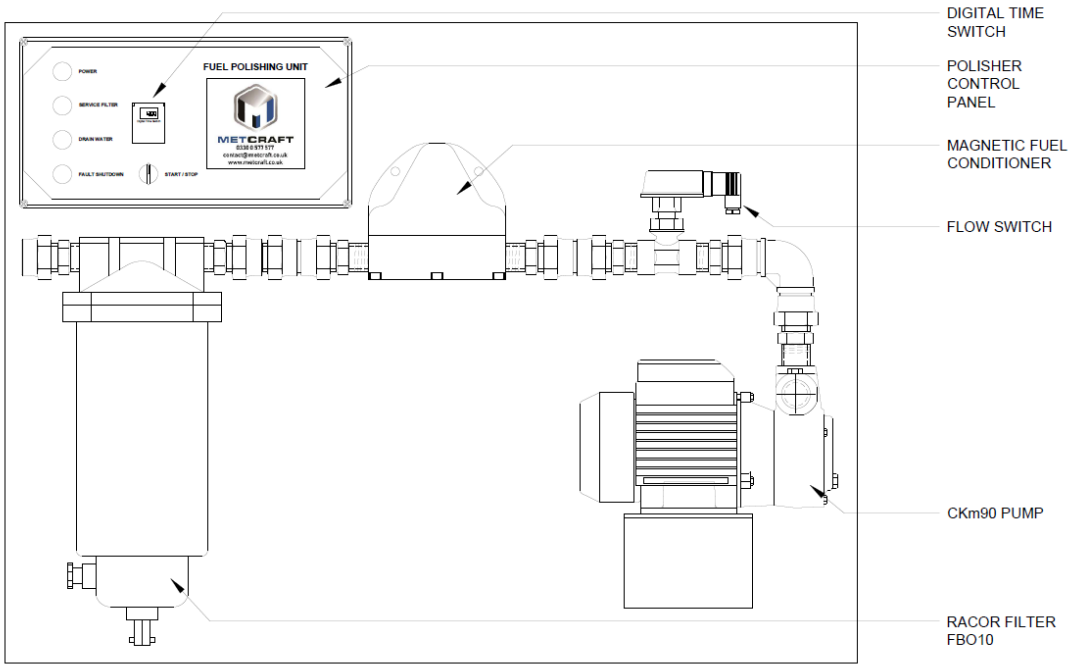
The Metcraft Fuel Polisher range is our solution to the problem of stored fuel becoming contaminated and out of spec. The polisher is fitted with a control panel including an integrated timer and indicator lights to inform the user when the unit is running or, working in conjunction with an inline flow switch, when the filter requires changing.

Consisting of a three-stage filtration process, the Metcraft polisher ensures that your fuel is clean, dry and ready for use.

Stage 1: Magnetic Conditioning. This inhibits the growth of bacteria in the fuel and removes and metallic particles that could block the filter

Stage 2: Centrifugal water separation. As the oil passes through the filter body it is spun, causing large particles and water to coalesce on the sides of the filter housing. Over time these particles become heavy enough to fall to the bottom of the bowl where they can be drained using the integral drain valve.

Stage 3: Fuel Filter. A traditional paper cartridge fuel filter that removes particulates from the fuel, allowing for cleaner more efficient combustion and reducing build-up of particulates on fuel filters mounted directly on the engine.



Office Address:
Metcraft Group LTD
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Rochester, Kent
ME2 4GU

Factory Address:
Metcraft Group LTD
4 Old Mill Lane
Aylesford
Kent
ME20 7DT

www.metcraft.co.uk
contact@metcraft.co.uk
+44 (0) 1903 714 226

METCRAFT

Model	MET-60KFP
Flow rate	51 lit/min
Recommended Tank size	0-60,000L
Power options	220v 50hz 1ph AC
Particulate removal to	10 Micron
Control unit	Push button start/stop with built in timer
Backplate Size	1050mm x 800mm
Suction capability	5m vertical - we always recommend using a non-return valve and priming the unit before use
Connections	1" BSPT Male
Pump Body	Cast Iron
Gears	Brass
Shaft	Stainless steel
Pump Seal	Ceramic, Graphite and Viton
Options	Water in filter indicator lamp/sounder

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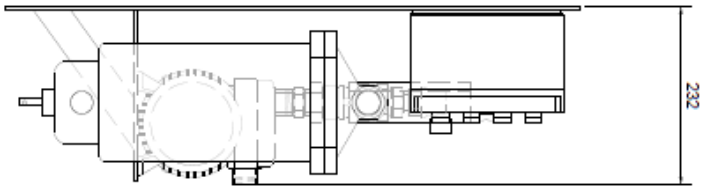
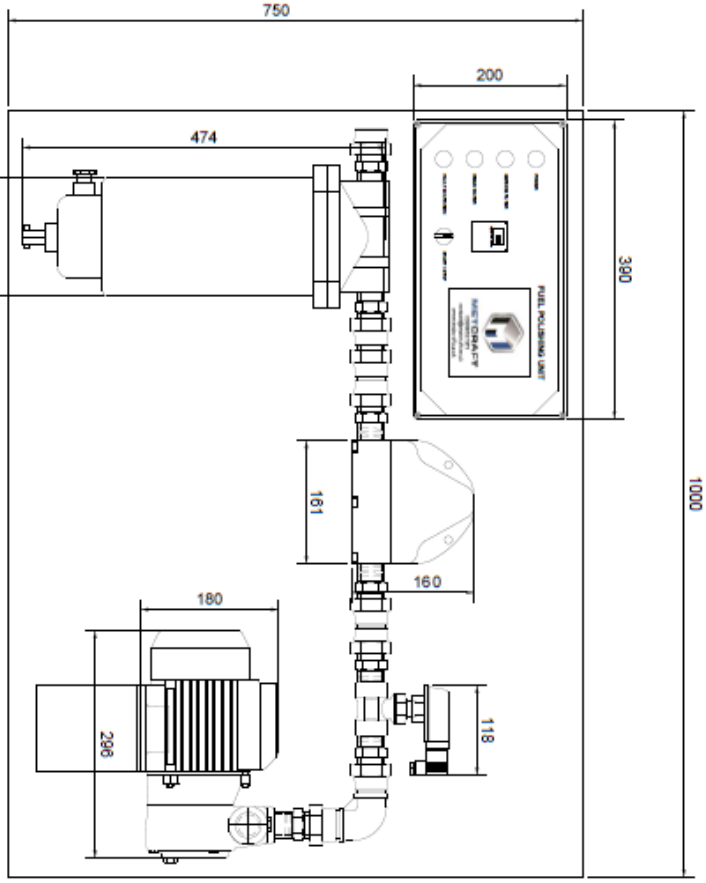
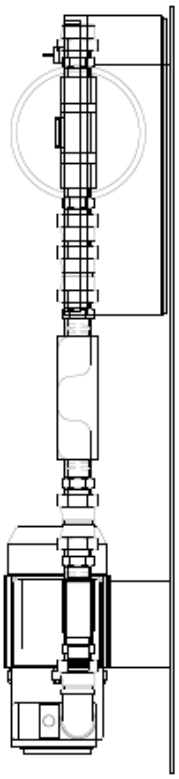
METCRAFT



SIDE VIEW



FRONT VIEW



PLAN VIEW

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Metcraft Fuel Polisher

Installation and Operation Manual

(Pictured is our 12KFP Model)

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