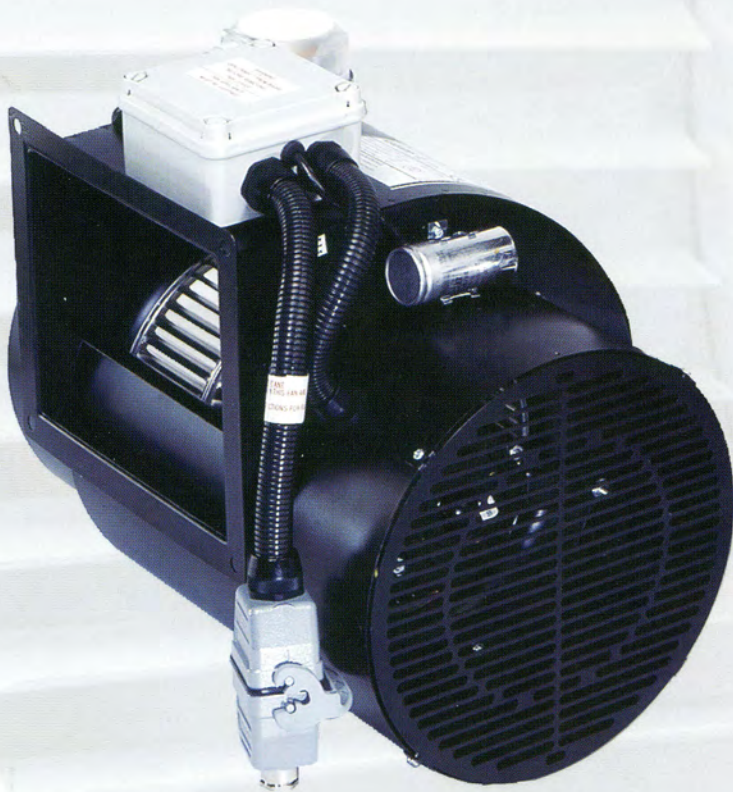
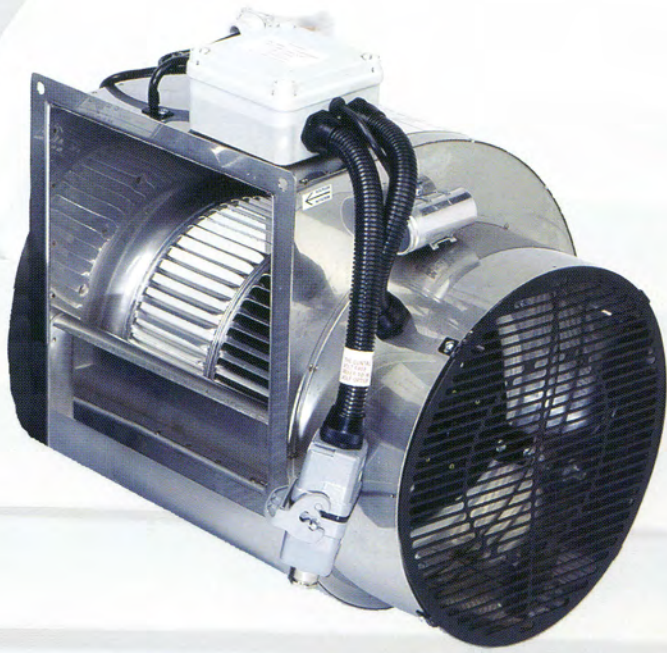


Flue Dilution Fans



AIRFLOW™

*SPECIALISTS IN AIR MOVEMENT
TECHNOLOGY SINCE 1955*

- **SAFETY - NEW** Differential Pressure Safety Switch for boiler shut down in the event of fan failure or blocked flue.
- **SIMPLE - NEW** electrical connections, designed with the installer in mind.
- **FLEXIBLE** - siting of boilers within new or refurbished plant rooms.
- **ELIMINATES** - unsightly external flues; and the need for expensive installation or refurbishment of internal flues.
- **EFFICIENT** - and quiet centrifugal fans capable of overcoming system resistance in flue duct runs.
- **HIGH LEVELS** of protection with the use of stainless steel casings on enhanced corrosion resistance versions and Aluzinc coated steel on standard versions.



Flue Dilution

With the main advantage of avoiding the use of unsightly or expensive flues, regulations require that if the products of combustion are dispersed at low level, then the CO₂ content must be 1% or below.

The Airflow flue dilution fans achieve this by introducing fresh air into the boilers discharge flue duct and diluting the flue gases.

With the correct selection of fan for the boiler rating and the recommended flue duct layout the 1% CO₂ level will be met.

By following the recommended installation, mixing of fresh air and combustion gases takes place before the fan inlet, within the fan and in the discharge section giving satisfactory and safe discharge at low levels.

Correct installation also ensures a long and trouble free service life. However on the rare occasion that a problem may occur with the fan or in the flue duct system the built in self proving pressure safety switch is an important safety feature.

This switch consists of a relay circuit which will fail safe and prevent operation of the gas burner under the following conditions:

- a) loss of fan air supply due to blocked intake or discharge flue or fan motor inlet.
- b) a stalled fan motor
- c) interrupted power supply

The relay contacts are rated at 5A maximum for non inductive load.

For normal operation this switch allows the boiler to fire when the fan is operating correctly and dilution air is entering the fan.

- (i) Dilution Fans are intended for use in Boiler Rooms where the maximum temperature is to 40°C at ceiling height.
- (ii) Ensure fan is sized to cope with system resistance of all ducts including motor side inlet duct if fitted.
- (iii) If motor side inlet is open to the Boiler Room, adequate ventilation must be provided to the Boiler Room.
- (iv) Multiple boiler installations can use a common header as long as the Dilution Fan has been sized for total kW input.
- (v) Duct sizes must match the inlet and outlet spigots and flange of the selected Dilution Fan.
- (vi) Where flue gas temperatures and/or dilution air are likely to cause condensation in the ducts, stainless steel versions type SSDF should be used.

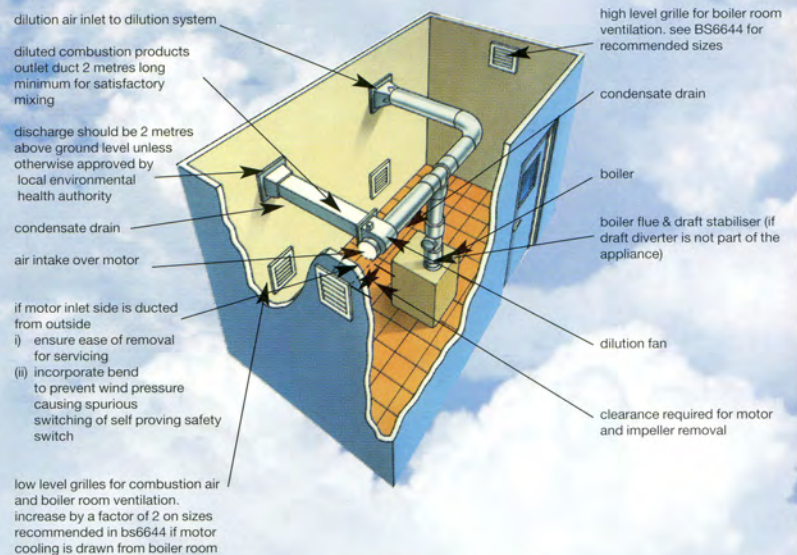


Fig 1.

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Choosing the Correct Size and Type of Fan

Where possible there should be at least 2 metres of flue ducting from the fan to the outlet. To ensure a maximum of 1% CO₂ content at the outlet, the volume flow rate of diluted flue gases necessary for a given boiler can be calculated as follows:

Flow rate in litres/s = 2.69 x rated input of boiler in kW.

Where 2 metres of discharge ducting is not possible then the calculation is:

Flow rate in litres/s = 4.44 x rated input of boiler in kW.

The volume flow rate provided by the fan will depend on the static pressure imposed by the size and length of flue ducting and the number of bends, louvres etc. comprising the installation. The performance table below enables selection of the correct dilution fan based on the flow rate requirement and the fans ability to overcome duct system resistance.

(Note if LPG or Butane are being used then the factors above should be increased to 3.23 and 5.33 respectively. These flue dilution fans must not be used for any other fuels).

Performance table at 20°C

FAN SIZE	Static Pressure (Pascals)	Free Air	10	20	30	40	50	60	70	80	90	100	110	120	130	140	160	180	200	225	250	275	300	325	350	375
GBDF 2 SSDF 2	Volume Litre/s	300	290	280	260	250	240	230	220	190	140	80	40	0												
GBDF 3 SSDF 3	Volume Litre/s	600	580	570	560	540	520	510	500	480	460	440	410	380	320	280	120	40	0							
GBDF 4 SSDF 4	Volume Litre/s	1000	985	970	950	935	920	900	880	860	840	815	780	760	740	710	640	520	340	200	80	0				
GBDF 5 SSDF 5	Volume Litre/s	← NOT SUITABLE DO NOT USE →										1400	1370	1350	1325	1300	1260	1200	1150	1075	975	850	450	200	80	0
GBDF 6 SSDF 6	Volume Litre/s	← NOT SUITABLE DO NOT USE →										→ 1750 1675 1570 1420 1280 1085 850 625 460														

NOTE: A MINIMUM DUCT RESISTANCE OF 90 Pa ON THE SIZE 5 AND 180 PA ON THE SIZE 6 IS NECESSARY TO AVOID OVERLOADING MOTOR

Typical performance table at 20°C

The above calculation should generally be used. However, if all the following conditions can be met then the typical performance table shown below can be used.

- (i) Ducts match inlet and outlets of fan.
- (ii) The louvres on the discharge and fresh air inlets have 50% FREE

- areas and not less than the minimum sizes shown in the chart below.
- (iii) The dilution air inlet is on the same face of the building as the discharge.
- (iv) There are not more than two right angle bends in the system.
- (v) The flue system is not more than 10 metres total length and includes not less than 2 metres after the fan outlet.

FAN SIZE	UNITS	GBDF 2 SSDF 2	GBDF 3 SSDF 3	GBDF 4 SSDF 4	GBDF 5 SSDF 5	GBDF 6 SSDF 6
maximum boiler input rating	kw	80	160	270	425	650
minimum inlet duct diameter	mm	254	305	305	457	457
minimum inlet louver size	mm	300 x 300	400 x 400	400 x 400	600 x 600	600 x 600
minimum discharge duct diameter	mm	225	275	345	370	457
minimum discharge grille size	mm	300 x 300	400 x 400	450 x 450	500 x 500	600 x 600
diluted flue gas volume	l/s	215	430	730	1145	1750
total static pressure loss in system	pa	70	93	130	160	180
maximum flue velocity	m/s	5.5	7.3	7.9	10.7	10.7

FAN SIZE	MIN. DUCT RESISTANCE	MAX. LINE CURRENT
GBDF 5 SSDF 5	90 Pa	2.6 AMPS
GBDF 6 SSDF 6	180 Pa	2.9 AMPS

THESE minimum duct resistances required on model sizes 5 and 6 to avoid overloading motors.

General Installation Advice

Each Airflow flue dilution fan is provided with a fresh air inlet on the drive side of the fan. Typically 30-40% of the air passing through the fan enters this inlet which if not ducted to the outside takes fresh air from the boiler room.

An adequate supply of fresh air by means of inlet louvres in the boiler room walls must be made available to the boiler to provide air for combustion and ventilation. To ensure this AND provide dilution air to an unducted motor side inlet the following calculation for high and low level grilles should be used.

Low level (intake): 1080 cm² plus 9 cm² for each kilowatt input in excess of 60 kw rated input.

High level (extract): 270 cm² plus 2.25 cm² for each kilowatt input in excess of 60 kw rated input.

In order to avoid recirculation and therefore build-up of products of the combustion in the system, it is advisable to ensure that the dilution air inlet is at least 2 metres (6ft) from the discharge.

If positioning of discharge and inlet is difficult, it is always better to have the discharge higher than the inlet as the warm diluted products of combustion will rise due to convection and be taken away.

If the inlet and discharge are well over 2 metres (6ft) from each other their height relationship is generally of little consequence.

It is essential to provide easy access to the fan motor to facilitate repair or maintenance. See minimum clearance figures on back cover.

Condensation

It is recommended that drains are incorporated into the duct systems when condensation of the combustion products is likely to occur (see typical installation diagram). Condensation should not be allowed to collect in the fan casing

Electrical Installation

In all classes of installation, it is essential that the pressure safety switch is connected into the supply circuit of the appliance gas valve so that the gas valve is shut off in the event of a fan failure or flue system blockage. After the fan has been installed and electrically connected, a check should be made to ensure that the pressure safety switch causes the boiler to be switched off when failure or blockage is simulated.

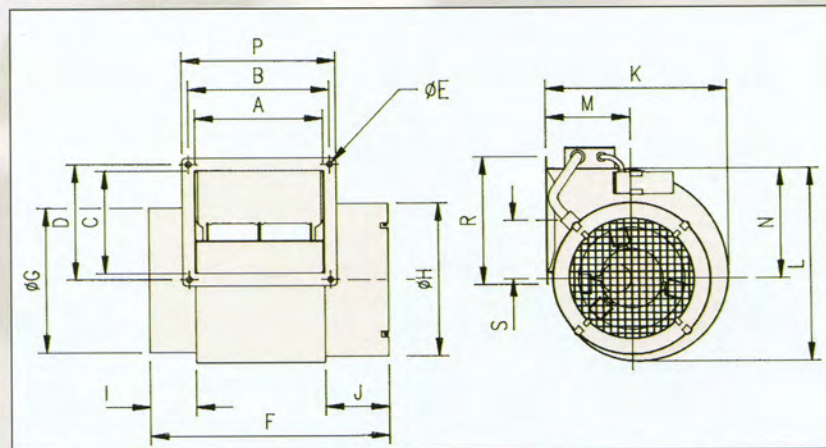
Approval of System

Boiler installations incorporating fan diluted flue systems with low level discharge are subject to the conditions of the Clean Air Act and therefore local Environmental Health Approval should be sought.

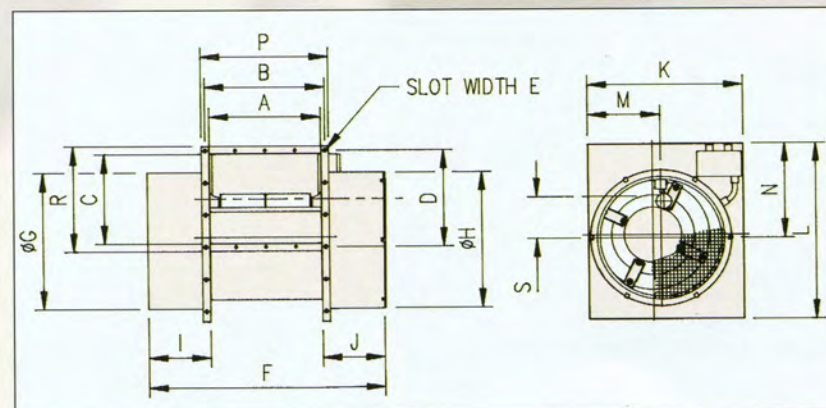
Materials

Standard GBDF units have cases manufactured from Aluzinc coated mild steel, with cases finished in black Polyester high temperature paint. Enhanced corrosion resistance SSDF units have cases manufactured from 316 grade stainless steel and are supplied in this finish. Impellers for the GBDF and SSDF sizes 2 and 3 are manufactured in Aluminium, while GBDF4, 5 and 6 are produced from Aluzinc coated mild steel (painted). SSDF4, 5 and 6 impellers are manufactured from 316 grade stainless steel.

Dimensions



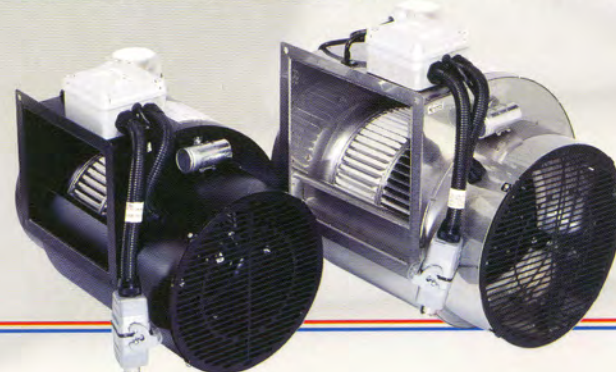
FAN SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	R	S
2	218	238	179	200	9.5	402	251	265	78	106	304	335	140	191	260	222	101
3	250	270	236	257	9.5	440	302	302	78	109	359	394	175	222	294	281	109
4	352	384	263	295	9.5	578	302	340	78	141	408	445	194	256	409	321	121



FAN SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	R	S
5	360	386	298	321	7	761	454	454	200	200	500	585	233	314	411	350	129
6	490	517	332	355	7	892	454	454	200	200	500	585	232	336	542	384	145

Specifications

FAN SIZE	WEIGHT Kg	ELECTRICAL SUPPLY V/Ph/Hz	START CURRENT AMPS	FULL LOAD RUNNING CURRENT AMPS	MOTOR POWER WATTS	NOMINAL IMP. SPEED RPM	MAX AMBIENT TEMP.	FAN SIZE		minimum clearance	
										mm	in.
GBDF 2	9.1	230/1/50	1.2	0.64	75	900	40°C	GBDF 2	SSDF 2	250	10
SSDF 2	8.8	230/1/50						GBDF 3	SSDF 3	300	12
GBDF 3	12.1	230/1/50	2.5	1.45	120	860	40°C	GBDF 4	SSDF 4	460	18
SSDF 3	12.0	230/1/50						GBDF 5	SSDF 5	500	20
GBDF 4	22.5	230/1/50	8.4	2.8	335	930	40°C	GBDF 6	SSDF 6	630	25
SSDF 4	23.4	230/1/50						GBDF 5	SSDF 5	44.0	415/3/50
GBDF 5	42.8	415/3/50	12.0" (line)	2.9" (MAX)	900	900	40°C	*LINE CURRENT			
SSDF 5	44.0	415/3/50						Minimum clearance for servicing motor and impeller (between motor side inlet and any obstruction).			
GBDF 6	46.7	415/3/50	12.0" (line)	2.9" (MAX)	900	900	40°C				
SSDF 6	47.5	415/3/50									



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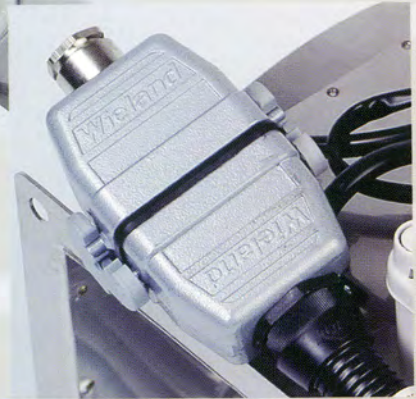
New for the MK5

The new MK5 range of GBDF and SSDF fans now feature:

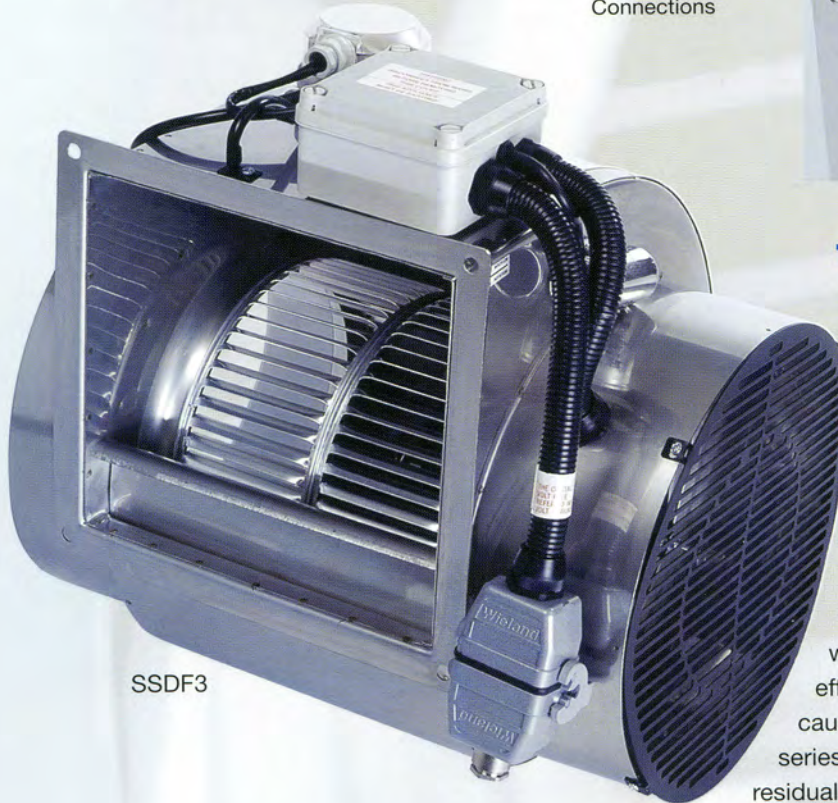
- **Differential Pressure safety Switch** which will activate if the fan stops operating or if the duct system becomes blocked, thus shutting down the boiler.
- **6 or 10 Pole Plug and Socket** for easy wiring and installation.



New Pressure Safety Switch



Easier electrical Connections



SSDF3

The Range

The Airflow Range of flue dilution fans is available in 5 sizes to satisfy the dilution needs of industrial and commercial boilers rated up to 650 kW (2,200,000 Btu) input.

Each size is available in standard form (GBDF series) for atmospheric boilers and water heaters of circa 75% efficiency. If excessive corrosion causing the failure of a GBDF series unit is due to the presence of residual condensate, then this will not be covered by our warranty.

Enhanced corrosion resistance versions (SSDF series) with stainless steel fan cases are also available for installation where regulations or the specification calls for stainless steel ducting, and when higher efficiency boilers such as modular designs are likely to produce condensation. SSDF's are therefore recommended for installations where condensation will occur.

Typical Installations

Important when designing and installing a dilution system incorporating Airflow flue dilution fans, attention should be paid to the latest edition of the following standards and guides.

- (i) BS6644: 2005 Installation of gas fired hot water boilers of rated input between 60 kW and 2 MW.
- (ii) The institute of Gas Engineers & Managers Utilization procedure UP/10 Part1. Installation of Gas Appliances in Industrial & Commercial premises.

- (iii) Department of Environment - Chimney heights; Third Edition of the 1956 Clean Air Act Memorandum.

The boiler is connected by a vertical flue to a header which is open to the "outside" air at both ends. One end of the header acts as the primary air intake for the dilution air and the other as the discharge. The fan is located on the discharge side of the header duct.

Note: a draught stabiliser or diverter must be incorporated in the boilers primary flue, if not part of the boiler. Shown in Fig 1. is a typical boiler house installation incorporating an Airflow dilution fan illustrating the requirements for satisfactory and safe operation.

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