# Safety

Differential Pressure safety
 Switch which will activate if the fan stops operating or if the duct system becomes blocked, thus shutting down the boiler.

## Ease of Use

 6 or 10 Pole Plug and Socket for easy wiring and installation



Easier electrical Connections



### The Range

The Airflow Range of Ecodesign ErP 2013/2015 Compliant 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.

Pressure Safety

Switch

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 IGE/UP/10-Edition 3. Installation of Gas Appliances in Industrial & Commercial premises.
- (iii) Department of Environment Chimney heights; Third Edition of the 1956 Clean Air Act Memorandum. (Defra Amended) Clean Air Act - 1993

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 2. is a typical boiler house installation incorporating an Airflow dilution fan illustrating the requirements for satisfactory and safe operation.



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# **Typical Installations of Flue Dilution Fans**

Fig 1

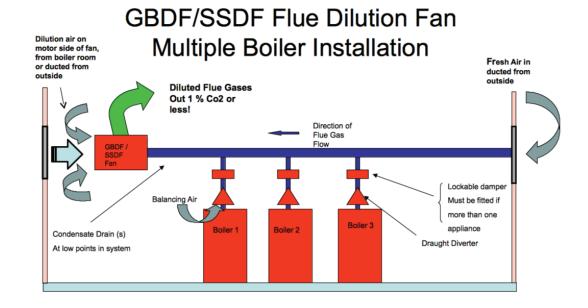
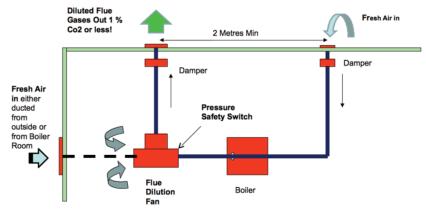


Fig 2

# GBDF/SSDF – Flue Dilution Fan Single Boiler Installation



## **Airflow Ventilation Solutions**



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Cressex Business Park,
High Wycombe, Buckinghamshire,
HP12 3QP

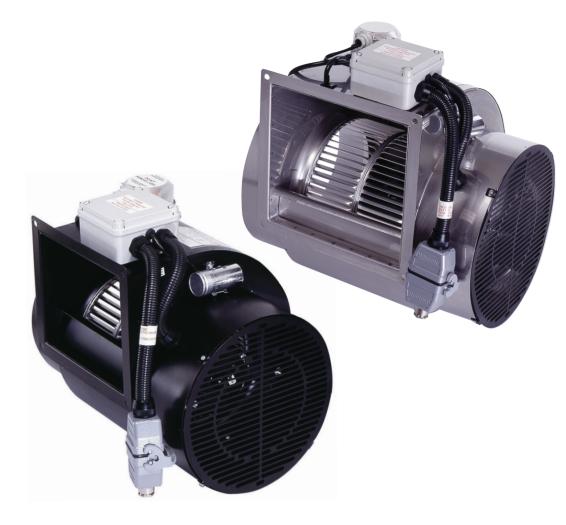
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# INDUSTRIAL VENTILATION SOLUTIONS

**FLUE DILUTION FANS** 



'The Low Level C0<sub>2</sub> Discharge Solution for Industry'







**Innovative** 

Compliant

Flexible



# Flue Dilution

Discharging low level CO<sub>2</sub> safely



### **Key Features**

- Multi size flue dilution fans
- Ecodesign ErP 2013 / 2015 compliant
- Easy electrical installation
- Safe operation internal differential pressure switch for boiler shut off
- Avoid unsightly or expensive discharge flues
- Quiet and efficient
- 1% C0<sub>2</sub> content at outlet max
- C<sub>0</sub> 50 ppm at outlet max
- N<sub>0</sub> 5 ppm at outlet max
- High levels of corrosion resistance allow use with condenstion boilers
- Ecodesign EuP compliant IE2
- Dynamically balanced to DIN ISO 1940 -Grade 6.3

## Flue Dilution GBDF & SSDF range

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 range of ErP 2013/2015 compliant 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 Regulatory 1% CO2 level will be met. Multiple boiler installations can use a common header as long as the dilution fan has been sized on total Kw Input. See: Fig 1

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.

# **Tech Support / Spares**

www.airflow.com / 01494 525252. For technical support on the selection of your flue dilution fan or information on our spare motor packs please contact our technical department.

# Safety

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.



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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	<b>←</b>		NOT	SUITA	BLE D	O NO	USE		->	1400	1370	1350	1325	1300	1260	1200	1150	1075	975	850	450	200	80	0	
GBDF 6 SSDF 6	Volume Litre/s	<b>←</b>					— N	OT SU	ITABL	E DO I	NOT U	SE —					-	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	GBDF 3	GBDF 4	GBDF 5	GBDF 6
		SSDF 2	SSDF 3	SSDF 4	SSDF 5	SSDF 6
maximum boiler input rating	kw	80	160	270	425	650
minimum inlet duct diameter	mm	254	305	305	457	457
minimum inlet louvre 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	ра	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 mode 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 cm<sup>2</sup> plus 9 cm<sup>2</sup> for each kilowatt input in excess of 60 kw rated input.

High level (extract): 270 cm<sup>2</sup> plus 2.25 cm<sup>2</sup> 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

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

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#### 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 casina

#### **Electrical Installation**

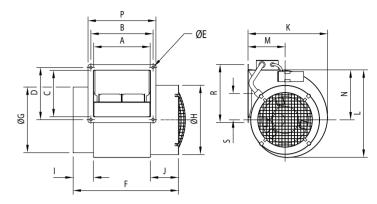
In all classes of installation, it is essential that the pressure safety switch is connected into the supply circuit of the appliance gas valve so that the gas valve is shut off in the event of a fan failure or flue system blockage. After the fan has been installed and electrically connected, a check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

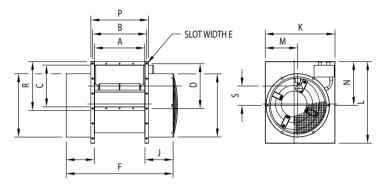
### Approval of System

Boiler installations incorporating fan diluted flue systems with low level discharge are subject to the conditions of the Clean Air Act 1993 and therefore local Environmental Health Approval should be sought.

#### **Materials**

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 SSDF4. 5 and 6 impellers are manufactures from 316 grade





FANSIZE A B C D E F G H I J K L M N P R S

Standard GBDF units have cases GBDF4, 5 and 6 are produced from Aluzinc coated mild steel (painted). stainless steel.

PART UMBERS	FAN SIZE	WEIGHT Kg	ELECTRICAL SUPPLY	START CURRENT	FULL LOAD RUNNING	MOTOR	NOMINAL IMP.	MAX AMBIENT		FAN SIZE	minimum clearance		
		s	V/Ph/Hz	AMPS	CURRENT	WATTS	SPEED RPM	TEMP.			mm	in.	
					AMPS					GBDF 2 SSDF 2	250	10	
2546201	GBDF 2	9.1	230/1/50	1.2	0.64	75	900	40°C		GBDF 3 SSDF 3	300	12	
2553201	SSDF 2	8.8	230/1/50						ŀ	GBDF 4			
2546301	GBDF 3	12.1	230/1/50	2.5	1.45	120 860	40°C		SSDF 4	460	18		
2553301	SSDF 3	12.0	230/1/50	2.5	1.40		300	<del>-</del> 50 C		GBDF 5 SSDF 5	500	20	
2546401	GBDF 4	22.5	230/1/50	8.4	2.8	335	930	40°C		GBDF 6 SSDF 6	630	25	
2553401	SSDF 4	23.4	230/1/50						L				
2546501	GBDF 5	42.8	415/3/50	12.0*(line)		900	940	40°C	*LINE CURRENT Minimum clearance for				
2553501	SSDF 5	44.0	415/3/50		(MAX)					servicing moto			
2546601	GBDF 6	46.7	415/3/50	12.0*(line)	2.9*	900	900	40°C	(	(between motor side inlead any obstruction).			
2553601	SSDF 6	47.5	415/3/50	, ,	(MAX)					) 000			

#### Flue Assistance

The GBDF range can also be used for flue assistance rather than flue dilution (ie: the fan handles all the products of combustion). It is important that the air into the motor side of the fan is ducted from outside the building. The maximum temperature allowed at the inlet of the non drive side of the fan is 110C (230F) to maintain acceptable motor bearing and winding temperature. Experience has shown that if a fan is chosen to give a maximum C02 concentration of 2% that this maximum temperature will not be exceeded.

Should you wish to use any of our fans purely as an induction fan WITHOUT dilution then the volume rate needed will be:

Flow rate (induction only) in litres /s = 1.35 x rated input of bolier in Kw.



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