Centrifugal Fans and Blowers

Introduction

With 50 years' experience supplying into a wide spectrum of industrial applications, CFW is able to offer fans suitable for many different applications, including clean air, dirty air, corrosive gases, high temperature gases, as well as for abrasive, particulate, and fibrous matter conveying.

The ranges shown in this catalogue are standard pre-engineered fans which can be selected using our **Fan Selection Software**. In addition to this there are other ranges and custom engineered fans available which can be utilised to satisfy a particular duty or application.
Our sales engineers will assist with these non-standard selections.

Aerodynamic performance testing

Fans are tested to **ISO 5801** test standard in our research and development laboratory.

Quality

CFW is an ISO 9001 Quality Management System accredited company. If and when required, Quality Control Plans (QCP's) are compiled and executed to customer specification.

Applicable standards

ISO 5801	Industrial fans - Performance testing using standardised airways
ISO 5802	Industrial fans - Performance testing in situ
ISO 12499	Industrial fans - Mechanical safety of fans-guarding
EN 14461	Industrial fans - Safety requirements
ISO 14694	Industrial fans - Specification for balance quality and vibration levels
ISO 10816-1	Mechanical vibration - Evaluation of machine vibration by measurement of non-rotating parts - Part 1 - General guidelines
ISO 10816-3	Mechanical vibration - Evaluation of machine vibration by measurement of non-rotating parts - Part 3 - Industrial machines with nominal power above 15kW and nominal speeds between 120r/min and 15000r/min when measured in situ
ISO 1940	Balance quality of rigid bodies
ISO 13349	Fans - Vocabulary and definitions of categories
ISO 13348	Fans - Tolerances, methods of conversion and technical data presentation
EN 14986	Design of fans working in potentially explosive atmospheres
ISO 12759	Fans - Efficiency classification for fans

General specification

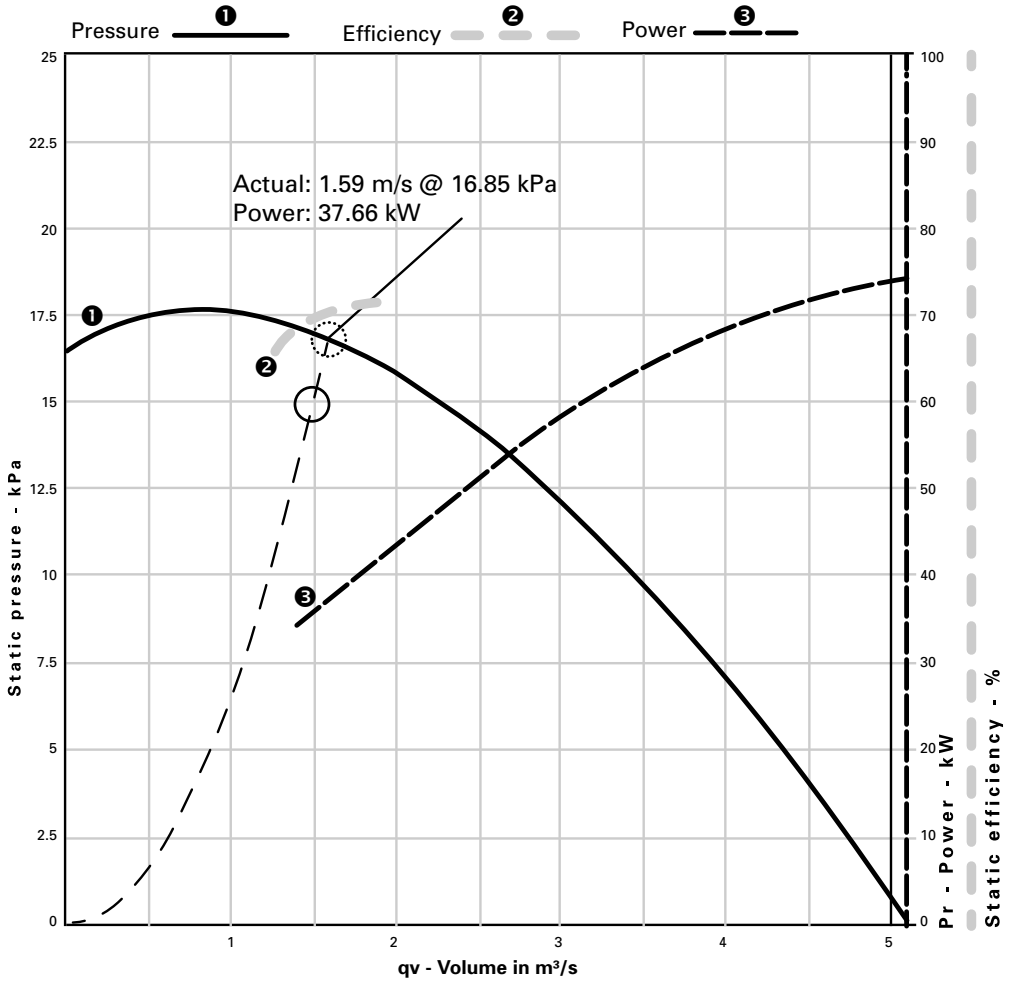
Bearings: Bearing selection is based on a L_{10} life of 100 000 hours. Bearing, grease, and seal type is selected specific to the application in which the equipment will operate.

Classes: Stresses in fan components are calculated using design software. The six fan class speed maximums are specific to each fan impeller design, rather than being limited to specific impeller tip speeds. The grade of material, from commercial quality mild steel to certified structural high strength steels, and reinforcing, increases as the classes increase.

Also, according to ISO 13349, fans are categorised according to fan pressure as per the following table.

Fan description	Maximum fan pressure in kPa (standard air)	Code	Category
Low pressure	> 0 and ≤ 0.7	**L**	**0**
	> 0.7 and ≤ 1.0		**1**
	> 1 and ≤ 1.6		**2**
	> 1.6 and ≤ 2.0		**3**
Medium pressure	> 2.0 and ≤ 3.6	**M**	**4**
	> 3.6 and ≤ 6.3		**5**
	> 6.3 and ≤ 10		**6**
High pressure	> 10 and ≤ 16	**H**	**7**
	> 16 and ≤ 22.4		**8**
	> 22.4 and ≤ 30		**9**

Both of the above classifications are given in the **Fan selection software**.



Fan specs

Fan type	BC_HTCZ
Fan sizeØ	1000
Fan width	100
Fan Rpm	2960
Max Rpm	3055
Outlet area	0.049m²
Tip speed	155 m/s
Exit volicity	32.4 m/s
Installation	ISO 5801 Type D
Inlet coeff	1.00
Fan class	3 (75%) H8

Operating specs

Temperature	20 °C
Barometric	101.3 kPa
Density	1.204 kg/m²
Altitude	0 m
dBA at 3m	87.7

Fan performances within AN3 tolerances (ISO 13348)

Materials and methods of construction:

Various methods of construction ranging from Pittsburgh joints to fully welded and hard faced specialised steels are utilised to match the duty required from the equipment. Standard fans are manufactured to ISO 13348 AN3 manufacturing tolerances. When required, equipment is manufactured to AN1 and AN2 manufacturing tolerance.

Protective finishes:

Standard CFW blue
- Blast clean to ISO-SA2.5 (40 – 70µm)
- Single coat Sigmafast two component high build zinc phosphate polyurethane primer/finish (80 - 120µm)

High temperature application
- Blast clean to ISO-SA2.5 (40 - 70µm)
- Prime coat – Sigmarine 28 (40 - 75µm)
- Top coat – Sigmatherm 350 (25 - 30µm)

In addition to the above, various other specialised finishes can be applied, including hot dip galvanising to SANS 121 (ISO 1461), marine specification epoxy, acid resistant epoxy, as well as special coatings to customer specification.

Balancing: Balancing of rotating parts is carried out in accordance to ISO 14694 and ISO 1940-1 to balance quality grade G6.3, applicable to fan application category BV-3.

Vibration: Vibration levels are tested at our works to the following limits. In addition a coast-down vibration analysis can be carried out if required.

Vibration Levels Limits

Fan application category	Rigidly mounted mm/s		Flexibly mounted mm/s	
	Peak	r.m.s.	Peak	r.m.s.
BV-1	12.7	9.0	15.2	11.2
BV-2	5.1	3.5	7.6	5.6
BV-3	3.8	2.8	5.1	3.5
BV-4	2.5	1.8	3.8	2.8
BV-5	2.0	1.4	2.5	1.8

Fan Application Categories

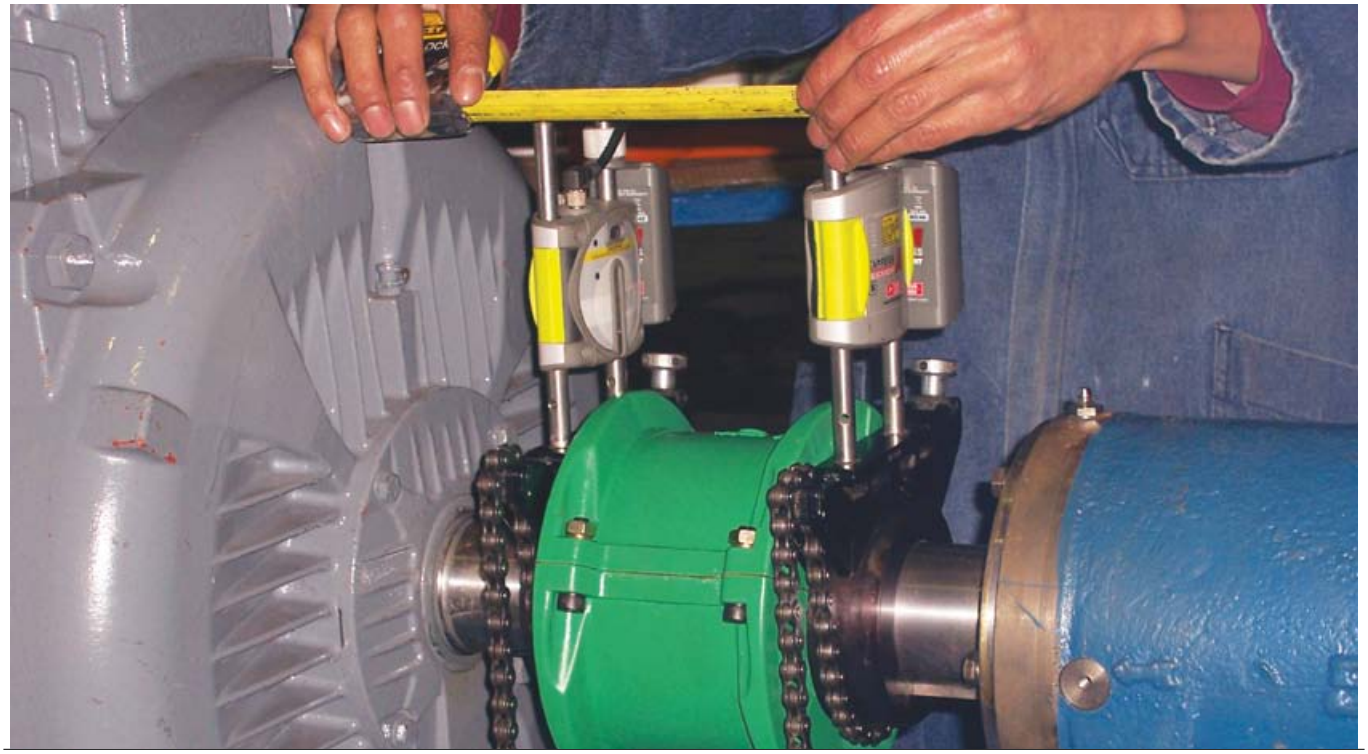
Application	Examples	Limits of driver Power (kW)	Fan application Category BV
Residential	Ceiling fans, attic fans, window AC	≤ 0.15 > 0.15	BV-1 BV-2
HVAC & agricultural	Building ventilation and air conditioning, commercial systems.	≤ 3.7 > 3.7	BV-2 BV-3
Industrial process, power generation	Baghouse, scrubber, mine, conveying, boilers, combustion air, pollution control, wind tunnels.	≤ 300 > 300	BV-3 See ISO 10816-3
Transportation & marine	Locomotives, trucks, automobiles.	≤ 15 > 15	BV-3 BV-4
Transit/tunnel	Subway emergency ventilation, tunnel fans, garage ventilation, tunnel jet fans.	≤ 75 > 75 None	BV-3 BV-4 BV-4
Petrochemical process	Hazardous gases, process fans.	≤ 37 > 37	BV-3 BV-4
Computer chip manufacture	Clean rooms.	None	BV-5

Motors: A wide range of electric motors is outsourced to suit customer requirements. In special applications fans can be fitted with compressed air driven motors, or internal combustion engines.

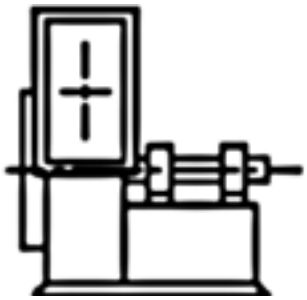
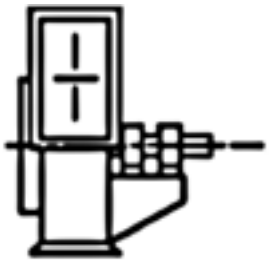
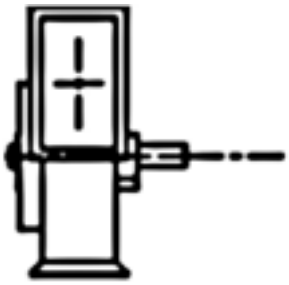
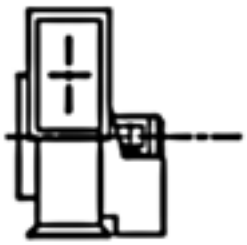
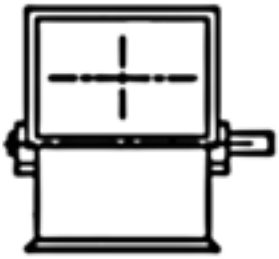
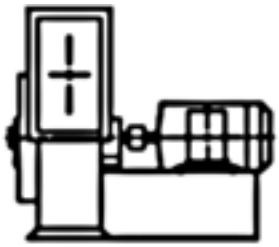
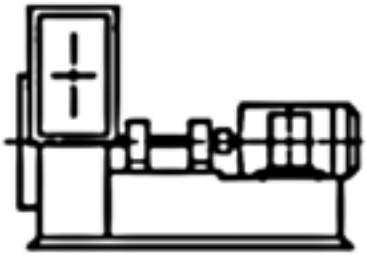
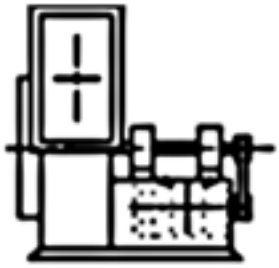
Temperature: Suitably constructed fans are available for handling hot gases up to 550 °C. Arrangements 1; 2; 4 (with extension shaft); 8; 9; 10; and 12 are applicable for this application.

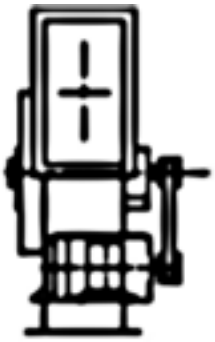
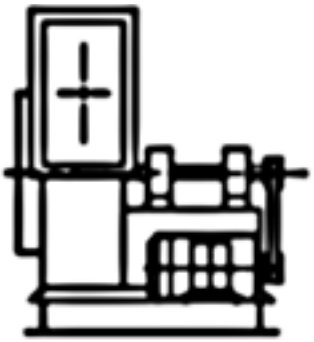
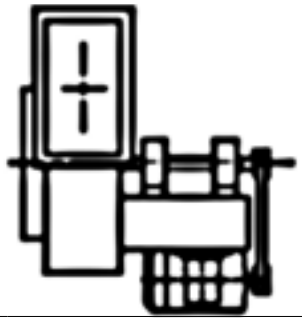
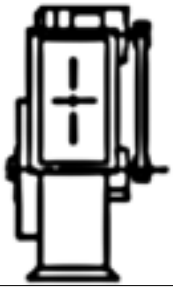
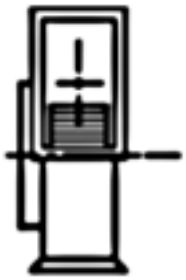
Factory testing: CFW has dedicated factory test bays which incorporate reinforced concrete inertia test beds. All fans undergo a rigorous testing procedure before despatch. This documented inspection includes but is not limited to the following:

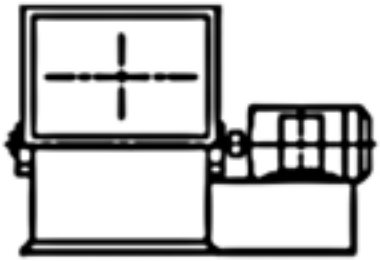
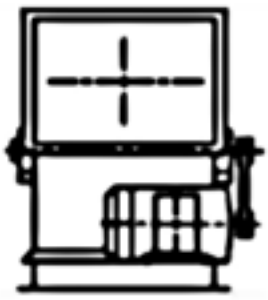
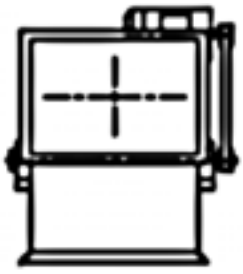
- Balancing
- Vibration
- Bearing temperature monitored over time period
- Protective coatings
- Guarding
- Safety caution decals
- Documentation pack:
  - Material certificates
  - All component manufacturing RCS
  - Welding RCS
  - Protective finish RCS
  - Bearing locking RCS
  - Bearing temperature RCS
  - Motor certificates
  - NDT reports
  - Balancing printout
  - Vibration monitoring RCS
  - Laser alignment printout
  - Quality control plan



Fan drive arrangements in accordance with ISO 13349

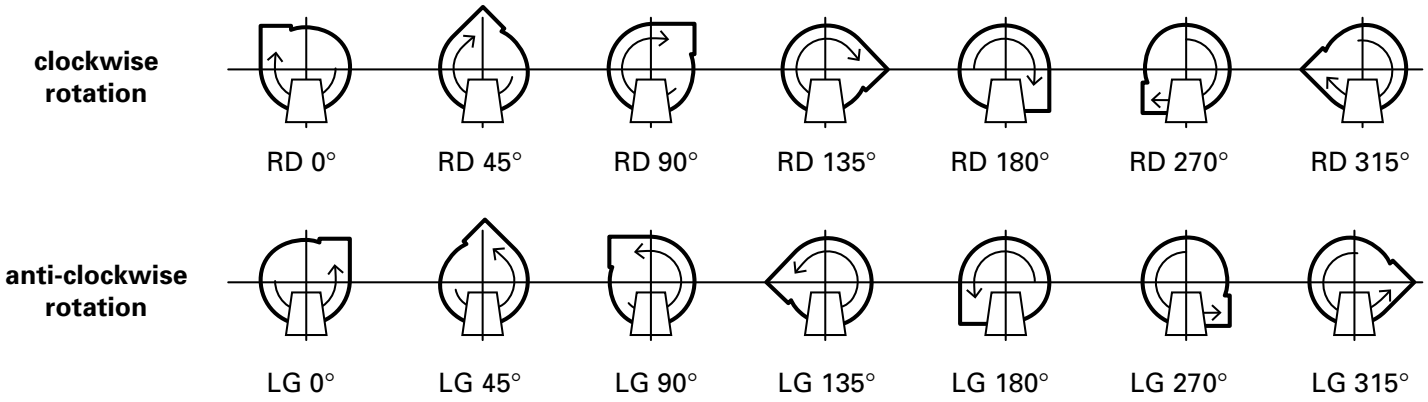
Arrangement No.	Description	Schematic drawing
1	Single-inlet fan for belt drive. Impeller overhung on shaft running in two plummer block, pillow block, or a double bearing block supported by a pedestal.	
2	Single-inlet fan for belt drive. Impeller overhung on shaft running in bearings supported by a bracket attached to the fan casing.	
3	Single-inlet fan for belt drive. Impeller mounted on shaft running in bearings on each side of the fan casing, and supported by the fan casing.	
4	Single-inlet fan for direct drive. Impeller overhung on motor shaft. No bearings on fan. Motor supported on a pedestal.	
5	Single-inlet fan for direct drive. Impeller overhung on motor shaft. No bearings on fan. Motor attached to the casing side by its flanged end-shield.	
6	Double-inlet fan for belt drive. Impeller mounted on shaft running in bearings on each side of the fan casing, and supported by the fan casing.	
7	Single-inlet fan for coupling drive. Generally as per arrangement 3 but with a pedestal for the driving motor.	
8	Single-inlet fan for coupling drive. Generally as per arrangement 1 plus an extended pedestal for the driving motor.	
9	Single-inlet fan for belt drive. Generally as per arrangement 1 but with the motor mounted on the outside of the bearing pedestal.	
10	Single-inlet fan for belt drive. Generally as per arrangement 1 but with the motor mounted on the inside the bearing pedestal.	

Arrange-ment No.	Description	Schematic drawing
11	Single-inlet fan for belt drive. Generally as per arrangement 3 but with the fan and motor supported by a common base frame.	
12	Single-inlet fan for belt drive. Generally as per arrangement 1 but with the fan and motor supported by a common base frame.	
13	Single-inlet fan for belt drive. Generally as per arrangement 1 but with the motor fixed underneath the bearing pedestal.	
14	Single-inlet fan for belt drive. Generally as per arrangement 3 but with the motor supported by the fan scroll.	
15	Single-inlet fan for direct drive. Driving motor in-set within the impeller and fan casing.	

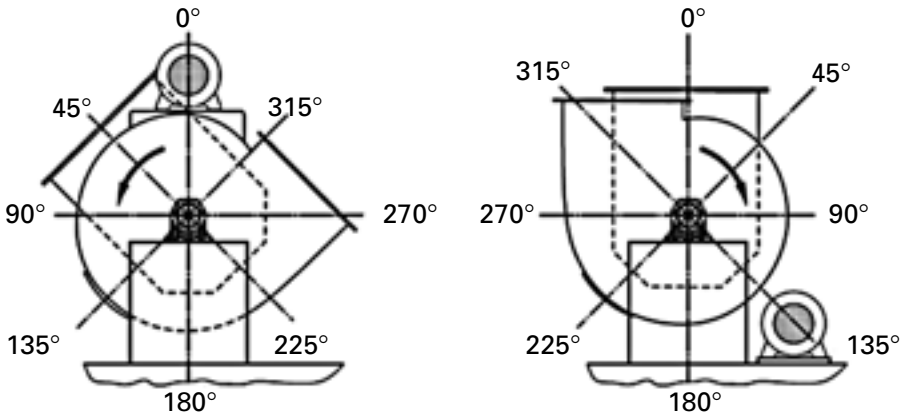
Arrange-ment No.	Description	Schematic drawing
16	Double-inlet fan for direct drive. Driving motor in-set within the impeller and fan casing.	
17	Double-inlet fan for coupling drive. Generally as per arrangement 6 but with a pedestal for the driving motor.	
18	Double-inlet fan for belt drive. Generally as per arrangement 6 but with the fan and motor supported by a common base frame.	
19	Double-inlet fan for belt drive. Generally as per arrangement 6 but with the motor supported by the fan scroll.	

Note: Arrangements 1, 3, 6, 7, 8, & 17 may also be provided with the bearings mounted on pedestals for base set independent of the fan housing.

Rotation and angle of discharge, and motor position

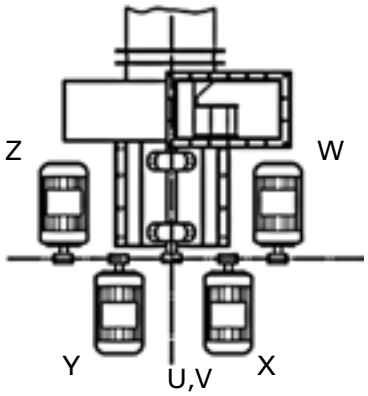


ISO 13349 – Recommended positions for the outlet of a centrifugal fan



Examples:				
	Outlet	LG 315°	Outlet	RD 0°
	Inspection Door	LG 135°	Inspection Door	RD 225°
	Inlet Box	LG 45°	Inlet Box	RD 0°
	Motor	LG 0°	Motor	RD 135°

ISO 13349 – Conventional designation of the angular position of component parts of a centrifugal fan with volute casing.



Key: **U** – Below fan bearing level **V** – Above fan bearing level

ISO 13349 – Conventional designation of the alternative positions in plan view of a motor for a belt driven fan

Accessories

Standard accessories include:

- Base frames
- Motors
- Motor slide rails
- Couplings
- V-Belt drives
- Drive guards
- Flexible connectors
- Matching flanges
- Anti-vibration mountings
- Inlet screens
- Inspection doors
- Split casings
- Casing drain sockets
- Inlet vane control
- Volume control and shut-off dampers
- Inlet boxes
- Discharge evase's
- Spark proof construction
- Shaft seals
- Vibration and temperature sensors
- High temperature construction
- Cladding for noise breakout and temperature
- Noise attenuation
- Shaft brakes
- Spare parts for critical machinery.

Energy saving inlet vane control