

BCE Series

SINGLE INLET CENTRIFUGAL FAN
with Backward Inclined Wheels

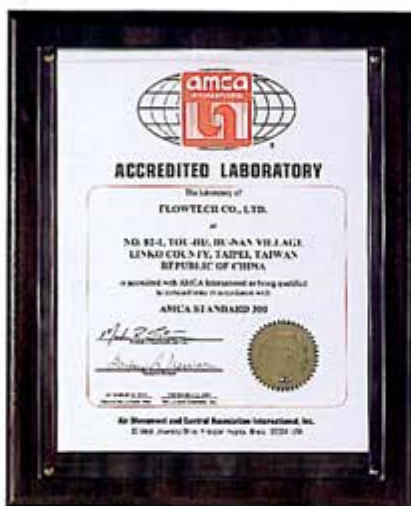


通風設備性能與耐溫測試實驗室

Ventilation Performance and Smoke Management Laboratory



AMCA 210



AMCA 300

世界級的認證

GLOBALLY RECOGNIZED CERTIFICATIONS AND STANDARDS



亞洲唯一UL認證實驗室



常溫風機性能測試設備

Fan Performance Testing Facility

測試標準(Standards)

- AMCA 210-85
- BS 848-1
- ISO 5801
- DIN 24163-2

消音箱/消音百葉測試設備

Silencer / Acoustical Louver Testing Facility

測試標準(Standards)

- ASTM-E477
- ISO 7235

風門、百葉壓損測試設備

Louver Pressure Drop Testing Facility

測試標準(Standards)

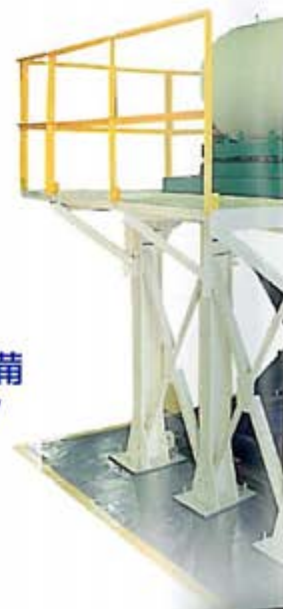
- AMCA 500

排煙閘門洩漏測試設備

Smoke Damper Leakage Testing Facility

測試標準(Standards)

- AMCA 500
- ISO 10294
- UL 555S
- GB 15930





全響室迴風道出口
Exhaust Duct exit of Reverberant



流量噴嘴
Multiple Nozzles for Flow Measurement



全 響 室

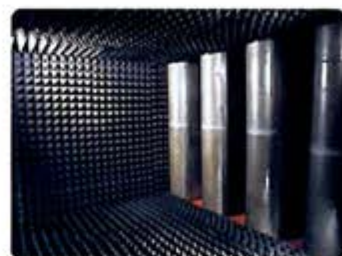
Reverberant Room

360° 旋轉收音器

360° Routing Microphone in Reverberant



整流裝置
Flow Straightener



全響室迴風道裝置
Silencer in Exhaust Duct

測試標準：

- | | | |
|-------------|------------|-----------|
| AMCA 210-85 | BS 7346-2 | ISO 5801 |
| AMCA 300 | BS 848-1 | ISO 7235 |
| AMCA 500 | BS 848-2 | ISO 10294 |
| AS 4429 | BS 848-10 | ISO 13350 |
| ASTM-E477 | GA 211 | UL 555 |
| ASHRAE 149 | GB 15930 | UL 555S |
| DIN 24163-2 | EN 12101-3 | |



隧道通風機振動/ 推力測試設備

Jet Fan Thrust Testing Facility

測試標準(Standards)

- ISO 13350
- BS 848-10

防火風門測試設備

Fire Damper Testing Facility

測試標準(Standards)

- UL 555





SINGLE INLET CENTRIFUGAL FAN with Backward Inclined Wheels

Low and Medium pressure high efficiency centrifugal fan



FLOWTECH CO., LTD. Certifies that Model BCE shown on pages 17-32 and 37-52 is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with requirements of the AMCA Certified Ratings Program.



BCE Series



BCE Series Single Inlet Centrifugal Fans Backward wheels

The BCE series is SWSI centrifugal fans with high efficiency non-overloading backward curved impellers. The fans are auditable for supply or extract applications in commercial, process and industrial HVAC systems. Sizes of this are in accordance with AMCA standard 99-0098-76 R20.

Type / Operating Limit

	Model 250-280	Model 315-630	Model 710-2000
Type M	I		
Type M-T		I	
Type H-T		II	I
Type V-T		III	II
Type X-T			III

Each fan type has its maximum operation speed and power due to its mechanical design.

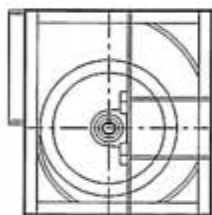
The operating limit of BCE series fan type is design to meet the requirement of class I, II and III limit as defined in AMCA standard 99-2408-69.

The BCE series is available in type M, H, V, X, T



Type M This type has a frame fitted on both sides of the fan which gives better strength and rigidity and allows mounting in four different orientations. Without outlet flange, with welded rectangular frame.

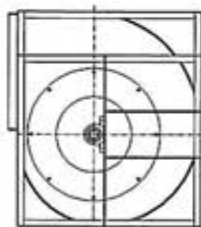
Size : 250 to 630 Volume : 0.15 to 5 m³/s Total Pressure. : up to 2000 Pa
Performance of 250,280,315 are not AMCA licensed.



Type H This type has a welded frame giving increased stiffness and rigidity required for higher operating performance.

Without outlet flange, with welded rectangular frame.

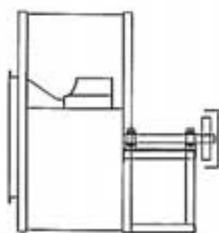
Size : 315 to 2000 Volume : 0.5 to 55 m³/s Total Pressure. : up to 2000 Pa
Performance of 315 are not AMCA licensed.



Type V This type is similar to type H but utilizes enhanced bearings to support higher load necessary for the increased performance.

Without outlet flange, with welded rectangular frame.

Size : 315 to 2000 Volume : 0.75 to 80 m³/s Total Pressure. : up to 3500 Pa
Performance of 315 are not AMCA licensed.



Type T This type is manufactured with a special frame with two bearing fixed externally to the airflow eliminating any obstruction to the inlet and allow operation with air temperature up to max. of 400°C.

Size : 315-2000 Volume : 0.75 to 80 m³/s Total Pressure. : up to 3500 Pa
Performance of 315 are not AMCA licensed.

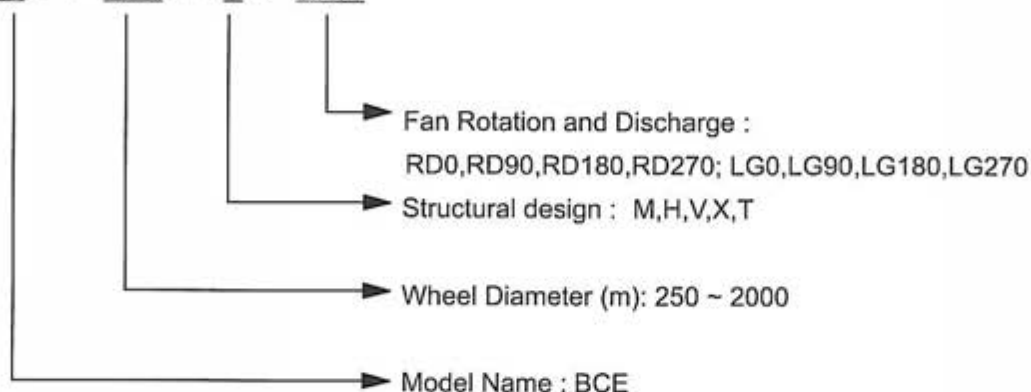
Fig.1

The type "X" is non-standard , for more information , please consult **FLOWTECH CO., LTD.**



Designation ,Formula signs

BCE - 1000 - H - RD90



TECHNICAL SPECIFICATION



■ Wheel

The Wheel of BCE series is made of mild steel backward curved blades with polyester powder coating finish and fully welded. The material of wheel also made of stainless steel or aluminum. All wheels are statically and dynamically balanced to ISO1940 and AMCA 204/3-G2.5 standards.



■ Shaped Inlets (Inletcone)

The aerodynamically shaped inlets are bolted in and guarantee a perfect inlet stream onto the impeller. The inletcone is made of galvanized sheet metal or mild steel or aluminum.

■ Housing

For all sizes except 1120 and above, the housing is manufactured in galvanized sheet steel with the housing fixed to the side plates in "Pittsburg lock" form system. Housings for 1250-2000 are manufactured in mild steel finished with polyester powder coating. Fully welded steel plate housing with painted finish are available for all sizes upon request.

■ Frame

The frame is manufactured with galvanized angular bars for type "M". For type "H" and "V", They are manufactured with sections of steel and finished with polyester powder coating.






TECHNICAL SPECIFICATION

■ Shaft

Shafts are manufactured from C45 carbon steel using an automatic process for positioning and cutting of the keyways. All dimensional tolerances of the shaft are fully checked to ensure a precision fit and then coated with an anti-corrosion varnish after assembly. Both shaft ends have as a standard feature diameters complying with ISO286. Shafts are sized to operate 20% or more below the first critical speed for each class of duty.

■ Bearings

Bearings used are either deep groove ball bearing type with an eccentric locking collar or an adapter sleeve, or spherical roller bearings type sealed at both sides for different duty application. Bearing are selected for continuous operation and ample size for best possible operating results. They are selected for a basic rating fatigue life (L-10) per AFBMA Standards in excess of 40,000 hours at maximum operating speed for each pressure class. L-10 is the life associated with 90% reliability of a bearing.,

<p>Fan Type M</p> 	<p>For fan type "M" are use single row, deep groove, self-aligning ball bearings with an eccentric locking collar. They are mounted in a rubber housing and sealed at both sides for light duty application. (Light Duty)</p>
<p>Fan Type H</p> 	<p>For fan type "H" use single row sealed ball bearings, locked on the shaft with conical sleeve and mounted inside cast-iron blocks ,with grease points, bolted to the side-frames. (Medium Duty)</p>
<p>Fan Type V,T</p> 	<p>For type "V" and "T", Bearings are mounted on cast iron supports with grease points. According to the fan duty and size, bearings use double-row ball type with conical sleeve inside split block housings.(Heavy Duty)</p>

The bearings are lubricated for life and maintenance-free. If re-lubrication is necessary, it is recommended to use a lithium base grease suitable for all temperatures within the operational limits.

■ Balancing Quality

All wheels are statically and dynamically balanced to ISO1940 and AMCA 204-G2.5 standards.

All fans after assembly are trim-balanced to ISO1940 and AMCA 204-G2.5 standard.

Clean room application fans with balancing grade of G1.0 are available upon request.

■ Special paint & corrosion resistant coatings : Consult Flowtech office.



OPTIONAL ACCESSORIES

■ Casing Drain

This option is available when using fans exposed to the atmosphere or operating in high humidity conditions.

■ Outlet Flanges

Outlet flanges are in accordance with DIN 24193 sheet 2 and available upon request.

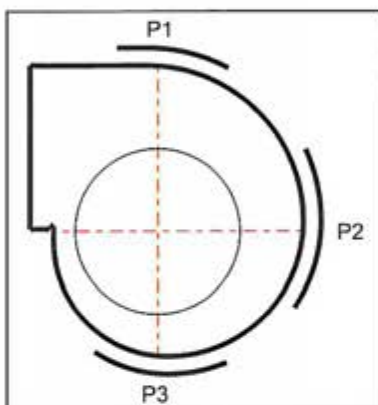
■ Inlet Flanges

Inlet flanges are set against the fan to facilitate installation.

It is available in 2 types - "L" flange or "U" flange.

■ Guards

Inlet guards, discharge guards and non-drive end shaft guards are available on request.



■ Inspection Doors

The inspection door can be supplied upon request. It can be supplied in one of the three positions (P1, P2, & P3).

■ **Stainless steel fan shafts** are available on fan sizes for applications where standard carbon steel shafts may exhibit excessive corrosion or heat stress.

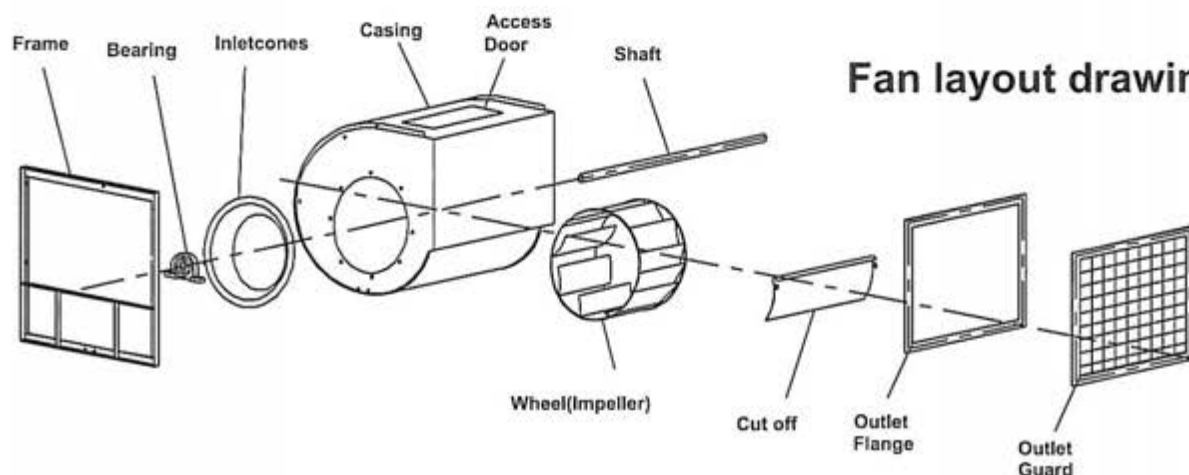
■ **Split housings.** Type H, V fan can be furnished with horizontal split housings to facilitate wheel removal at additional cost. Housing splits are caulked and bolted when fan is shipped assembled.

■ Spring Isolation Bases and Spring Isolators

Flowtech offers a complete line of spring isolation bases with free standing or housed spring isolators. Base are available with height saving brackets for minimal fan and base height. Inertia bases built to accept poured concrete are also available.

■ Ignition protected versions

Ignition protected versions can be built on request, with inletcones made of aluminum, copper or with copper rubbing stripes on the edge of the inletcones. Please contact Flowtech for selection and detail.



Fan layout drawing

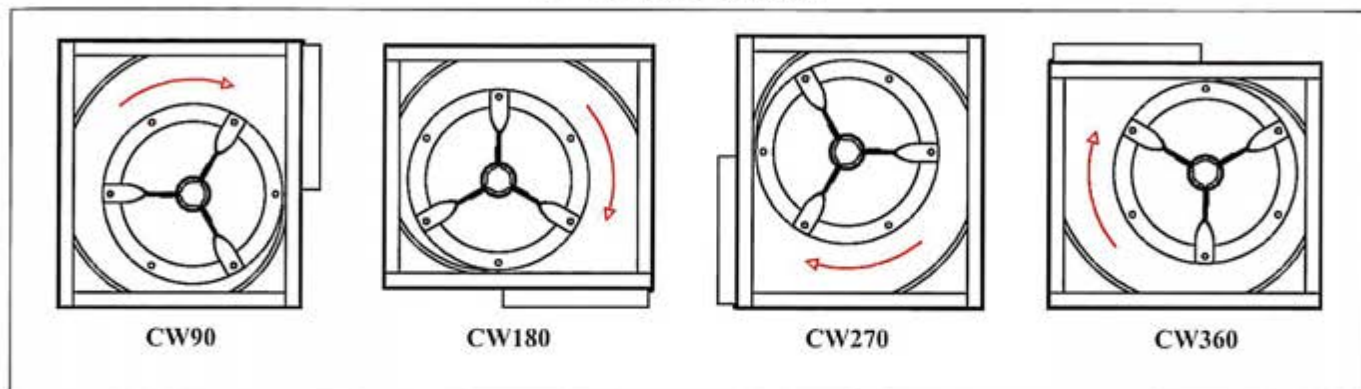


FAN ROTATION AND DISCHARGE

The rotation and discharge of the fan is in accordance with AMCA standard 99-2406-03.

The direction of rotation is determined from the drive side of fan [refer Fig.2]: -

CW -clockwise rotation :



CCW -counter-clockwise rotation :

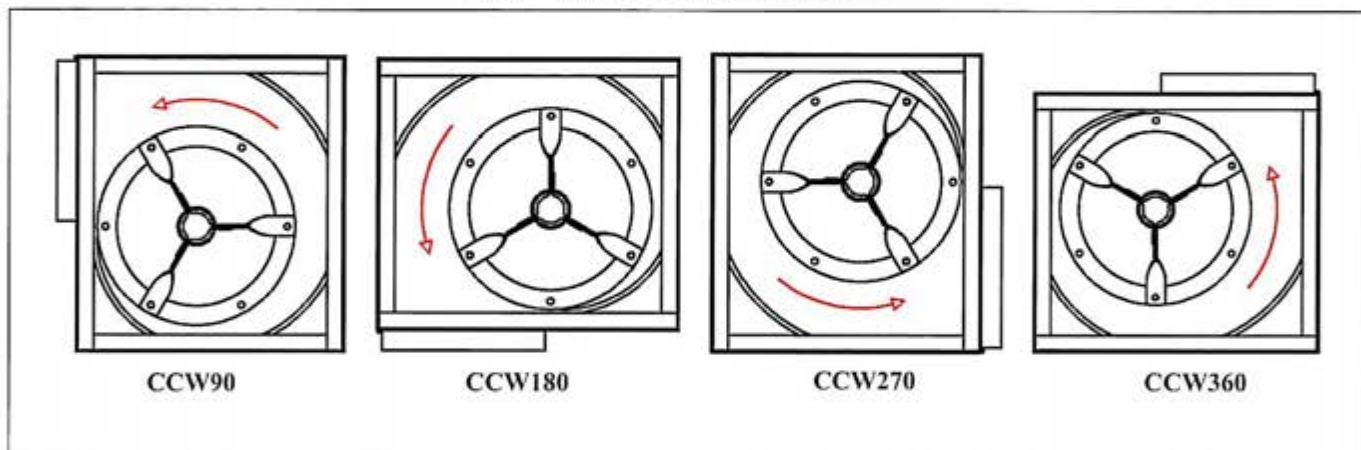


Fig.2-Fan rotation and discharge



MOTOR POSITION

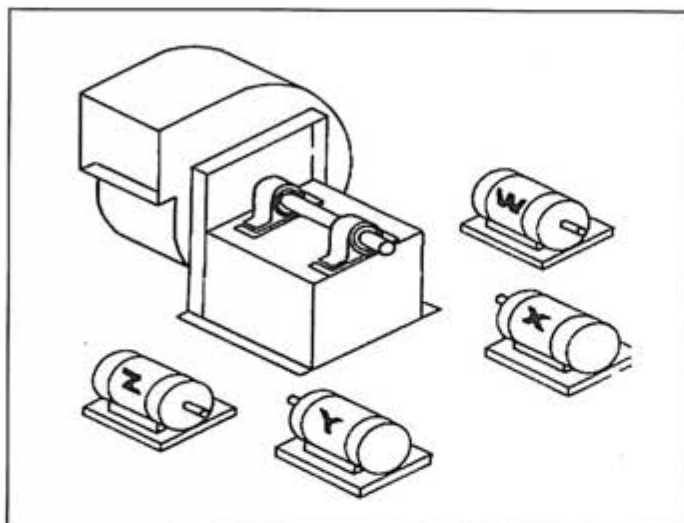


Fig. 3 Motor Position

The position of the motor for belt drive centrifugal fan is in accordance with AMCA standard 99-2407-03.

Location of motor is determined by Facing the drive side of fan and Designating the positions by letters W, X, Y or Z [refer Fig. 3]

MOTOR SELECTION

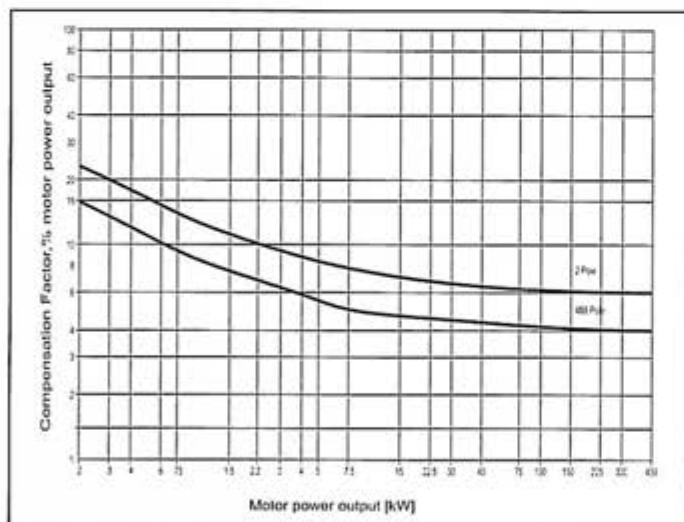


Fig.4-Recommended for motor compensation

The power curve shown on each Performance curve represents the Absorbed power at the shaft of the fan measured in kW.

To determine the power of the motor to be installed, a correction Factors as shown in fig. 4 should be applied to compensate for transmission losses.

For conversion to horsepower (HP), use multiplying factor 1.34.



DYNAMIC PRESSURE

The dynamic pressure and outlet air velocity shown on each curve are both calculated on the full air discharge area i.e. ducted outlet conditions.

With free outlet conditions the velocity pressure is higher. To determine this value multiply the velocity Pressure of the ducted outlet obtained from the fan curve by the following correction factor "K" Fan performances calculated with this correction factors are not licensed by AMCA.

$$[K = 2.2]$$

PERFORMANCE

The performance data show on each diagram has been tested and measured in accordance to AMCA Standard 210 Fig 15 installation type D (ducted inlet and ducted outlet condition).

Ratings are referred to the standard air density with the total pressure as function of the air volume, using logarithmic scales.

It is essential that, the same installation type and test standards are used at all times, when comparing fan performances.

NOISE

The noise level shown on each diagram refer to the sound power "A-weighted" and the data on the inlet side has been measured in accordance with AMCA Standard 300 figure 3 installation Type "D". The noise level of the fan determined as follows :

■ sound power level ("A" scale) : $L_{wo}(A)$ as catalogue

■ octave band spectrum : L_{wo} as catalogue

■ Sound pressure level :

● Free field : $L_p(A) = L_{wo}(A) - (20 \log_{10} d) - 11$

● Room conditions : $L_p(A) = L_{wo}(A) - (20 \log_{10} d) - 7$

Where d : distance between the fan and the microphone in m .

Sound power

Sound power data is charted for the full range of speed and percent of fan flow rate (%POF) for each unit size.

The %POF is a convenient way to indicate the operating point (pressure and fan flow rate, cmm) for given fan speed. To calculate %POF for a given fan size, use the equation shown below.

Because the constant K in the equation changes for each fan size, use the equation which is located on the specific performance page.

$$\%POF = \frac{CMM \times 3531.5}{RPM \times K}$$

Use the following to calculate sound power data for a specific Fan speed and %POF:

1. Determine the eight sound power levels for the specified %POF using the higher Fan RPM shown.
2. Determine the eight sound power levels for the specified %POF using lower Fan RPM shown.
3. Interpolate between the higher and lower sound power levels using the specified RPM.



MINIMUM DIAMETER RECOMMENDED FOR THE SMALLEST TRANSMISSION PULLEY

	Size	355			400			450		
		M-T	H-T	V-T	M-T	H-T	V-T	M-T	H-T	V-T
Rating power	4	85								
	5.5	100	90		112			112		
	7.5	112	112	100	140	100		125	112	
	11		125	112		132		180	140	
	15			118		180	118		180	125
	18.5						140			140
	22						150			160
	30									212

	Size	500			560			630		
		M-T	H-T	V-T	M-T	H-T	V-T	M-T	H-T	V-T
Rating power	5.5	125								
	7.5	132	132		140			140		
	11	160	150		180	150		180	150	
	15		200	140	224	200		250	200	
	18.5			140		224	150		250	180
	22			150			160			180
	30			200			212			236
	37									280

	Size	710		800		900		1000	
		H-T	V-T	H-T	V-T	H-T	V-T	H-T	V-T
Rating power	11								
	15	224		200					
	18.5	250		250		160			
	22	315	180	280	180	180		180	
	30		224		212	250	212	236	212
	37		250		250		224	315	224
	45						224		224
	55						250		250
	75						280		280



OPERATIONAL LIMITS

Operational Limits - "BCE"

			250	280	315	355	400	450	500
Maximum Absorbed Power	M	kW	0.8	1	0.8	2.5	4	4	5
	H	kW			1.5	5	8	10	10
	V	kW			2	8	10	12.5	15
	T	kW			2	8	10	12.5	15
Maximum Fan Speed	M	rpm	4600	4100	3100	2950	2650	2300	2100
	H	rpm			3900	3800	3500	3100	2550
	V	rpm			4300	4200	3800	3350	3000
	T	rpm			4300	4200	3800	3350	3000
Air Temperature Min.-20°C	M	Max.°C	85	85	85	85	85	85	85
	H-V	Max.°C	100	100	100	100	100	100	100
Wheel	Diameter	mm	250	280	315	355	400	450	500
	Weight	kg	2.9	4.2	5	6.4	8.4	12	15.8
	$J=PD^2/4$	Kgm ²	0.031	0.056	0.086	0.14	0.23	0.42	0.68
Fan weight	M	kg	17.5	22.5	21.4	28.5	34.5	46	58
	H-V	kg			33	43	53	58	73
	T	kg			40	53	64	72	88

Operational Limits - "BCE"

			560	630	710	800	900	1000	1120	1250	1400
Maximum Absorbed Power		M	6	8							
		H	12.5	15	10	15	15	20	20	25	40
		V	20	20	20	30	40	40	50	60	80
		T	20	20	30	40	50	60	80	100	125
Maximum Fan Speed		M	1900	1600	1450	1300	1150	1000	900	800	750
		H	2400	2100	1850	1700	1500	1300	1200	1050	950
		V	2650	2300	2100	1850	1650	1500	1350	1200	1100
		T	2650	2300	2100	1850	1650	1500	1350	1200	1100
Air Temperature Min.-20°C		M	85	85							
		H-V	100	100	100	100	100	100	100	100	100
Wheel	Diameter		560	630	710	800	900	1000	1120	1250	1400
	Weight		19.6	26.4	45	64.2	78.8	99.7	165	197	230
	J=PD²/4		1.05	1.78	3.85	6.97	10.9	17	34.4	49.3	75
Fan weight		M	71	88							
		H-V	95	113	192	233	289	336	585	782	1058
		T	115	133	216	263	324	374	624	861	1165

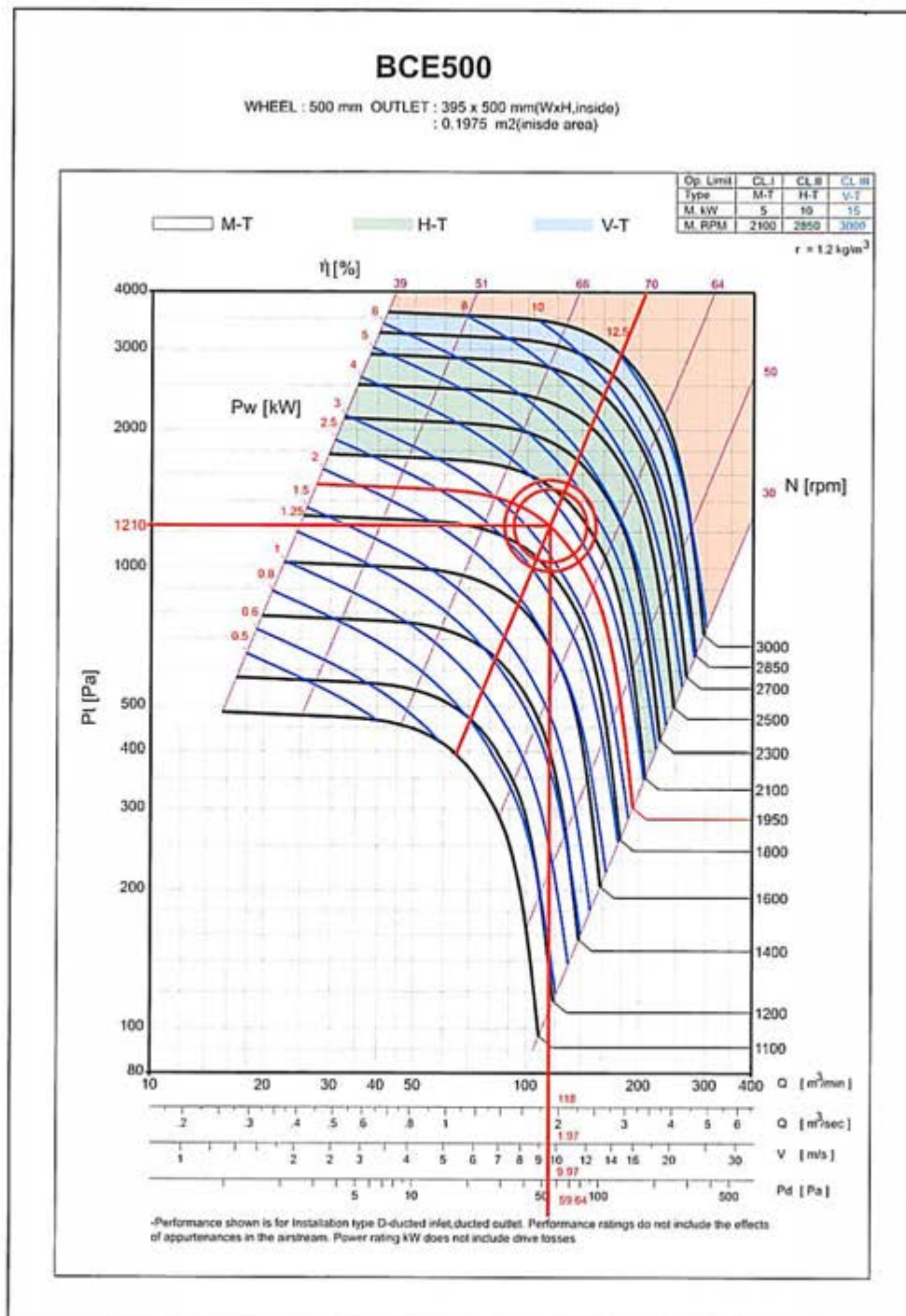


'BCE' OUTLET AREAS AND PAGE NUMBERS

Fan Size	Outlet Width mm	Outlet Height mm	Outlet Area (Inside area) m ²
250	200	250	0.0500
280	218	280	0.0610
315	250	315	0.0787
355	280	355	0.0994
400	316	400	0.1264
450	358	450	0.1611
500	395	500	0.1975
560	445	560	0.2492
630	500	630	0.3150
710	565	710	0.7950
800	635	800	0.5080
900	715	900	0.6435
1000	795	1000	0.7950
1120	890	1120	0.9968
1250	992	1250	1.2400
1400	1110	1400	1.5540
1600	1270	1600	2.0320
1800	1430	1800	2.5740
2000	1590	2000	3.1800



EXAMPLES OF SELECTION



Air Volume $Q = 1.97 \text{ cms}$

Fan Speed $N = 1950 \text{ rpm}$

Outlet Velocity $V = 9.97 \text{ m/s}$

Absorbed Power $P_w = 4 \text{ kw}$

Dynamic Pressure $P_d = 59.64 \text{ Pa}$

Total Efficiency $\eta = 70 \%$

Total Pressure $P_t = 1210 \text{ Pa}$

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BCE Series

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