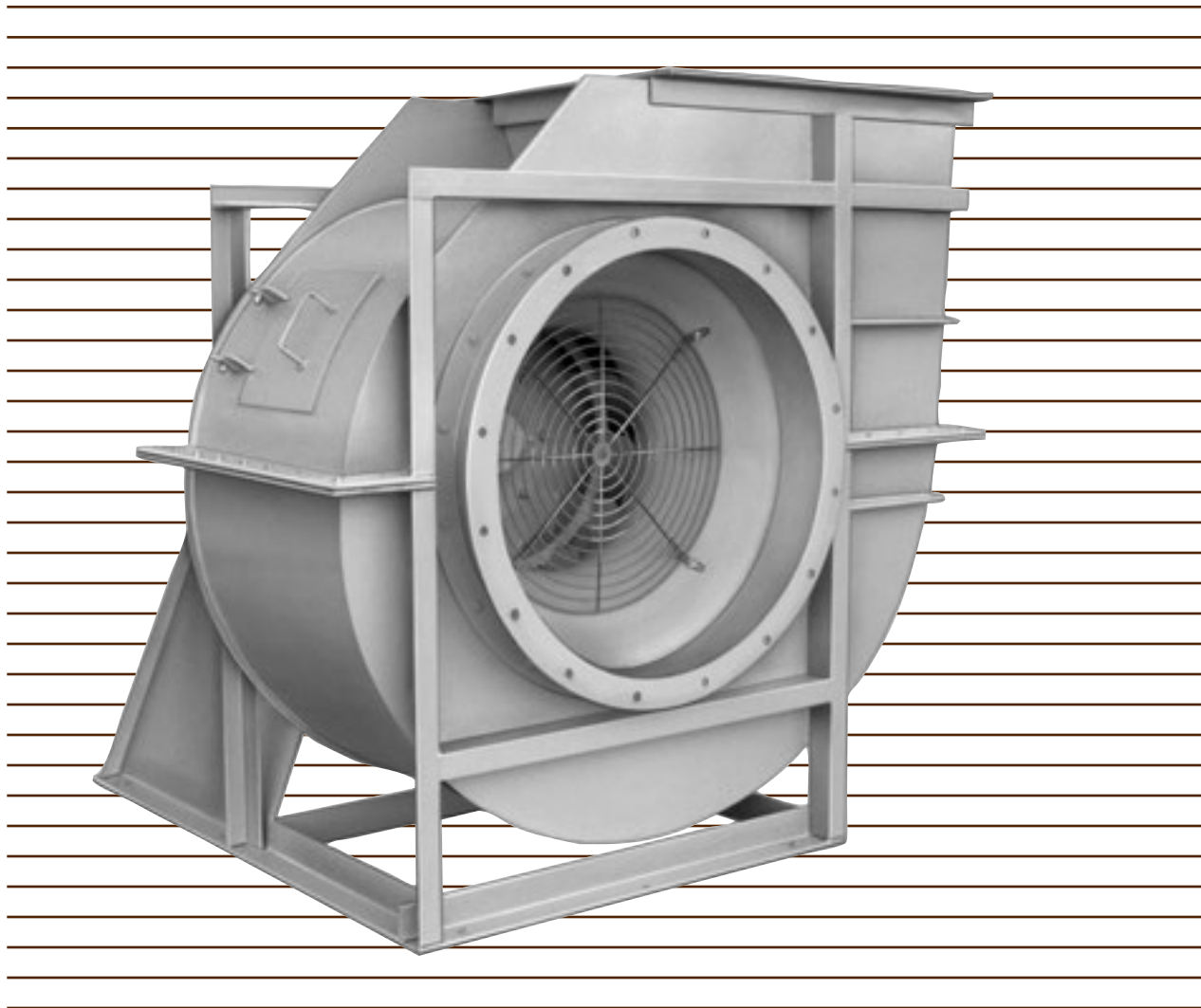


Series 4500 Centrifugal BCI Fans

Design 4570 • Model 18, 30, & 40



Series 4500 Centrifugal BCI Fans

The Design 4570 Centrifugal Backward Curved Industrial fans are highly efficient and stable operating fans suited for a wide range of rigorous industrial applications. Due to the broad capabilities of the Design 4570 fan this bulletin contains only limited performance information. Further information on extended performance and custom fans is available from your Northern Blower sales representative.

Industrial supply and exhaust:

Thermal Oxidizers

Baghouses

Scrubbers

Forced Draft

Induced Draft

Combustion Air Supply

Pulp and Paper Machines

Drying Kilns

Design Features	2
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Flanged Outlet

Punched flange to facilitate the bolting of duct connections to the fan outlet.

Backward Curved Wheel

Superior combination of efficient operation and rugged, dependable service.

Bearings

Heavy duty split pillow-block ball or spherical roller bearings sized for a generous B-10 life.

Shaft

Turned ground and polished or fully machined to close tolerance.

Shaft Seal

Used to reduce leakage through the shaft hole in the housing.

Heavy Duty Structural Bearing Pedestal

Housing

Rugged heavy gauge all welded steel housing with substantial framing sections for maximum rigidity. Standard features include flanged outlet, shaft seal and gasketted housing split on sizes 4900 and larger.

Balancing

Wheel and shaft assemblies are dynamically balanced to ISO 1940 specifications and are interference fit on Models 30 and 40.



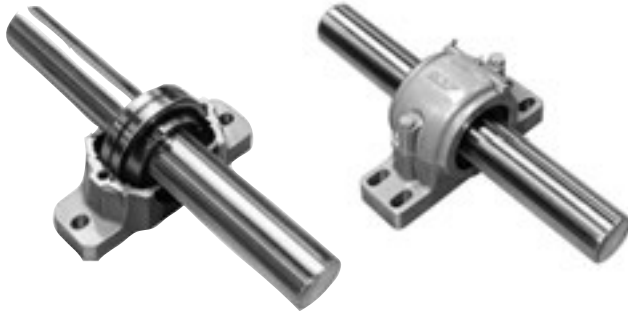
Shafts and Bearings

Shafts

Selected to have suitable strength and operate well below the first critical speed for each maximum class condition.

Bearings

Antifriction, grease or oil lubricated, ball or roller types, split housing, and manufactured to internationally adopted standards by companies having worldwide acceptance and support services. Bearings are selected for continuous belt driven operation with a generous bearing life at the maximum specified conditions.



Classes of Construction

Arrangement	Fan Size Range
	Models 18, 30, & 40
A/1 - SISW	2700 - 8900
A/8 - SISW	2700 - 8900
A/9 - SISW	2700 - 6000

*Models 18, and 30 only. Refer to pages 21 and 22 for maximum arrangement 9 motor frame sizes.

Capacities

5000 CFM to 250,000 CFM

Pressures and Tip Speeds

Model 18 to 22" S.P. and 17,000 FPM (Size 2700- 8900)
 Model 30 to 30" S.P. and 22,000 FPM (Size 2700- 8900)
 Model 40 to 40" S.P. and 26,000 FPM (Size 2700- 8900)

Temperatures

Operating Temperatures to 800°F
 See Table 2, Page 6

Design 4570 Centrifugal BCI Wheel

The Northern Blower Backward Curved Industrial (BCI) wheel has a single camber, backward curved design for high operating efficiency and a non-overloading horsepower characteristic. The blades are formed from heavy gauge single thickness material. Continuously welded steel construction is standard. Available from 27" to 89" diameters.



Standard Features

- Split Pillow Block Ball or Roller Bearings
- Integral Bearing Pedestal
- Punched Flanged Outlet
- Shaft Seal
- Wheel With Anti-thrust Vanes
- Horizontal Split Housing—Size 4900 and up
- Quick Release Access Door
- Slip Fit Inlet

Vibration Isolation Base

Rigid steel frame to provide a common mounting platform for fan and motor. May be ordered with spring isolators and motor slide base.



Inlet Box/ Inlet Box Damper

An Inlet Box provides smooth aerodynamic airflow into the fan inlet. The Inlet Box is designed as a bolt-on accessory to the fan. Inlet Dampers also are available in conjunction with the Inlet Box for efficient air volume control.



Coupling/ Shaft and Bearing Guard

The coupling guard encloses the coupling from the face of the motor to the outboard bearing. The Shaft and Bearing Guard encloses the shaft and bearings from the inboard bearing to just beyond the outboard bearing.



Raised Access Door

Access door raised 6" beyond scroll surface to provide room for insulation on exterior of fan housing. Insulated door plug surface is flush with inside of housing scroll.



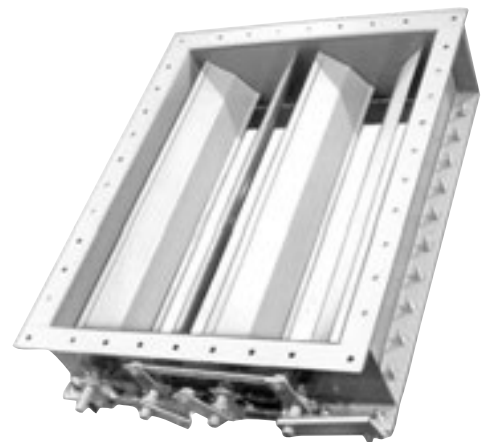
Hinged Quick Release Access Door

The hinged option adds hinges to the standard Quick Release Access Door. Both the standard and Hinged Quick Release Access Doors are mounted flush to the fan scroll and are secured with quick release handles.



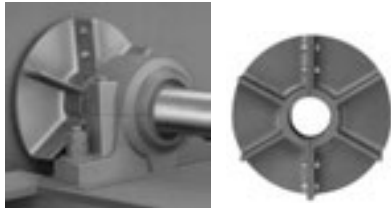
Outlet Damper

Opposed Blade Outlet Dampers are the least expensive air volume control device. Northern Blower Outlet Dampers have punched flanges on both ends to allow for convenient fan and duct connections. Outlet Dampers are available for operating temperatures to 800°F.



Cooling Wheel

Split aluminum wheel mounted between the inboard bearing and the fan housing. Protects the inboard bearing from shaft conveyed heat and housing radiated heat. Supplied with protective guard as standard. Required for high temperature application; see Page 7.



Belt Guard

Enclosed on all sides, for safe operation, with a mesh cover and quick release fasteners. Tachometer holes and safety colour coatings also available.



Variable Inlet Vanes

Variable Inlet Vanes provide accurate volume control with minimal reduction in performance efficiency. Fan performance remains stable through fully open to fully closed positions. Available for both manual and automatic operation to temperatures of 300°F. Special design available for temperatures to 650°F.



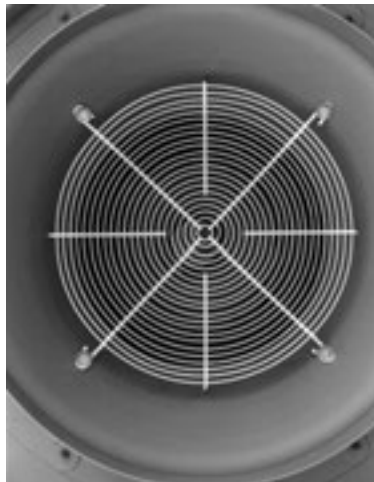
Flanged Inlet

Punched flanges to facilitate the bolting of duct connections to the fan inlet and outlet.



Inlet Screen

Steel screen mounted to the inlet cone. Screens are split where required for easy removal.



Additional Accessories

- Spark Resistant Construction
- Protective Coatings
- Split Housings
Accessory Sizes 2700-4450
Standard Sizes 4900-8900
- Special Metals
- Drain Openings
- High Temperature Construction
- Extended Grease Fittings
- Insulation Clips
- Mounted Drive Package
- Square Flanged Inlet
- Stainless Steel Construction

Due to the wide variety of fans available from Northern Blower we are unable to publish all information in one bulletin. Further information on custom fans is available from your Northern Blower sales representative.

Fan Selection at Elevated Temperature and Altitude

Fan Selection Tables

Ratings shown in the Performance Tables are based on standard air density of .075 pounds per cubic foot at the fan inlet. Standard air is dry air at 70°F and 29.92" Hg barometric pressure. When air density varies from standard, due to temperature or altitude changes, the Air Density Correction Factor from Table 1 is applied. Refer to the sample selection that follows.

Note that data in the selection tables does not include the effects of accessories such as inlet dampers, outlet dampers, screens, or other components in the air stream.

High Temperature

Fans selected for high temperature service must fall within the limits for a particular arrangement as shown in Table 2. For selection, both fan performance and physical operating limits must be corrected. Refer to the sample selection on the following page.

Table 1

Air Density Correction Factor							
Air Temp °F	Elevation (Feet) above Sea Level						
	0	500	1000	2000	3000	4000	5000
-40°	.79	.81	.82	.85	.88	.92	.95
0°	.87	.88	.90	.93	.97	1.00	1.04
40°	.94	.96	.98	1.01	1.05	1.09	1.13
70°	1.00	1.02	1.04	1.08	1.12	1.16	1.20
100°	1.06	1.08	1.10	1.14	1.18	1.22	1.27
140°	1.13	1.15	1.17	1.22	1.26	1.31	1.36
180°	1.21	1.23	1.25	1.30	1.35	1.40	1.45
200°	1.25	1.27	1.29	1.34	1.39	1.44	1.50
250°	1.34	1.36	1.39	1.44	1.49	1.55	1.61
300°	1.43	1.46	1.49	1.54	1.60	1.66	1.72
350°	1.53	1.56	1.58	1.64	1.71	1.77	1.84
400°	1.62	1.65	1.68	1.75	1.81	1.88	1.95
450°	1.72	1.75	1.78	1.85	1.92	1.99	2.06
500°	1.81	1.84	1.88	1.95	2.02	2.10	2.18
600°	2.00	2.04	2.07	2.15	2.23	2.32	2.40
700°	2.19	2.23	2.27	2.35	2.44	2.53	2.63
800°	2.38	2.42	2.46	2.56	2.65	2.75	2.86

Table 2

High Temperature Operating Limits		
Arrangement	Without Cooling Wheel	With Cooling Wheel
1 SW	300°F	800°F
8 SW	300°F	800°F
9 SW	300°F	650°F

Table 3

Wheel & Shaft Maximum Speeds at 70 °F			
Size	Design 4570		
	Model 18	Model 30	Model 40
2700	2405	3112	3600
3000	2165	2800	3310
3300	1968	2546	3000
3650	1779	2302	2721
4025	1613	2088	2467
4450	1459	1888	2232
4900	1325	1715	2027
5425	1197	1549	1831
6000	1082	1401	1655
6600	984	1273	1505
7300	890	1151	1360
8075	804	1041	1230
8900	730	944	1116

Table 4

Safe Speed Deration Factors	
Temp °F	Alloy Steel Wheel
-50 to 150	1.0
200	.97
300	.96
400	.95
500	.94
600	.92
700	.87
800	.68

Sample Selection of a Belt Drive Fan

Select a 4570 BCI fan for the operating conditions of 36000 CFM at 12" SP, 200°F and 2000 feet elevation.

- 1) Multiply the Operating SP by the Air Density Correction Factor (Table 1) to obtain Equivalent SP:

$$\begin{aligned} \text{Equivalent SP} &= \text{Operating SP} \times \text{Air Density Corr. Factor} \\ &= 12" \times 1.34 = 16" \end{aligned}$$

- 2) From the Performance Tables, select the fan size. For 36000 CFM at 16" SP an efficient selection would be a size 4025 fan. Interpolating from the Performance Table given on page 12, the selected fan performance is 1638 RPM and 111.3 BHP at standard temperature and pressure.

- 3) Divide the Equivalent BHP by the Air Density Correction Factor to obtain the Operating BHP:

$$\text{Operating BHP} = \frac{\text{Equivalent BHP}}{\text{Air Density Correction Factor}}$$

$$= \frac{111.3}{1.34} = 83.1 \text{ BHP}$$

- 4) Multiply the Wheel & Shaft Maximum Speed at 70°F values (Table 3) by the Safe Speed Deration Factors (Table 4). For a 4570 BCI fan, size 4025, Model 30, the maximum speed at 200°F is:

$$\text{Max Speed} = 2088 \times 0.97 = 2025 \text{ RPM}$$

Since the fan selection speed of 1638 RPM is below the maximum allowable speeds, the Model 30 fan is a suitable selection.

Drive Configurations

Belt Drive

Design 4570 BCI fans operate at high speeds in systems with large horsepower requirements. Motor sizes are limited to the maximum horsepower limits listed in the accompanying table.

Belt drives are carefully selected by Northern Blower to minimize shaft stress and increase bearing life.

On customer selected belt drives, consult with the motor manufacturer for the motor sheave minimum diameter and maximum width, on motors 125 HP and larger.

Direct Drive

Direct drive arrangements are suitable if the system pressure requirements are known and changes to the system are not expected. The advantage is that belt drive horsepower losses and belt maintenance are eliminated.

Motor sizes are limited to the maximum horsepower limits listed in the accompanying table.

The shafts and bearings selected by Northern Blower operate to these limits with a generous B-10 life.

Motor Horsepower Limits *		
Size	Design 4570	
	Arrangement 1 Belt Drive	Arrangement 8 Direct Drive
2700	100	50
3000	150	50
3300	150	125
3650	200	125
4025	250	250
4450	300	250
4900	350	350
5425	350	350
6000	350	350
6600	350	500
7300	350	500
8075	350	500
8900	350	500

*Refer to pages 21, and 22 for maximum arrangement 9 motor frame sizes.

Wheel Diameter = 30 in.

Outlet Area = 5.17 sq. ft. inside

Maximum BHP = 5.99 x (RPM/1000)³

Tip Speed, fpm = 7.85 x RPM

Model 18 2165

Model 30 2800

Model 40 3310

Size

3000 SISW

Design 4570 Centrifugal BCI Fans

Table with 12 columns for static pressure (1"SP to 10"SP) and 2 columns for Volume (CFM, FPM). Each cell contains RPM and BHP values.

Table with 12 columns for static pressure (11"SP to 20"SP) and 2 columns for Volume (CFM, FPM). Each cell contains RPM and BHP values.

Table with 12 columns for static pressure (22"SP to 40"SP) and 2 columns for Volume (CFM, FPM). Each cell contains RPM and BHP values.

Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream. Performance shown is for installation type B-Free inlet, Ducted outlet. Maximum Motor Horsepower: Belt Drive Arrangement 1 - 150 HP, Direct Drive Arrangement 8 - 50 HP. Refer to factory for motor horsepower exceeding these limits.



Wheel Diameter = 66.00 in.
Outlet Area = 25.04 sq. ft. inside
Maximum BHP = 304 x (RPM/1000)³
Tip Speed, fpm = 17.28 x RPM

Model 18 984
Model 30 1273
Model 40 1505

Size
6600 SISW
Design 4570 Centrifugal BCI Fans

Table with 11 columns (Volume, 1" SP to 10" SP) and multiple rows showing performance metrics like CFM, FPM, RPM, and BHP.

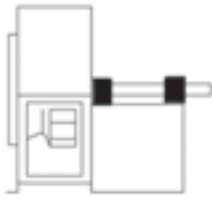
Table with 11 columns (Volume, 11" SP to 20" SP) and multiple rows showing performance metrics like CFM, FPM, RPM, and BHP.

Table with 11 columns (Volume, 22" SP to 40" SP) and multiple rows showing performance metrics like CFM, FPM, RPM, and BHP.

Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream. Performance shown is for installation type B-Free inlet, Ducted outlet. Maximum Motor Horsepower: Belt Drive Arrangement 1 - 350 HP, Direct Drive Arrangement 8 - 500 HP. Refer to factory for motor horsepower exceeding these limits.

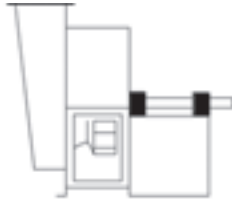


SI - Single Inlet DI - Double Inlet
 SW - Single Width DW - Double Width



1 SWSI

For belt drive or direct connection. Impeller overhung. Two bearings on base.



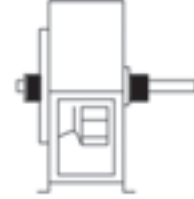
1 SWSI c/w BOX

For belt drive or direct connection. Impeller overhung. Two bearings on base. Inlet box may be self-supporting.



2 SWSI

For belt drive or direct connection. Impeller overhung. Bearings in bracket supported by fan housing.



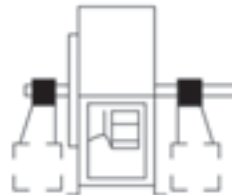
3 SWSI

For belt drive or direct connection. One bearing on each side and supported by fan housing.



3 SWSI c/w BOX

For belt drive or direct connection. One bearing on each side and supported by fan housing and inlet box. Shaft extending through inlet box.



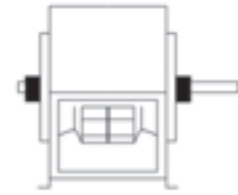
3 SWSI c/w IND. PED.

For belt drive or direct connection. Housing is self-supporting. One bearing on each side supported by independent pedestals.



3 SWSI c/w BOX & IND. PED.

For belt drive or direct connection. Housing is self-supporting. One bearing on each side and supported by independent pedestals with shaft extending through inlet box.



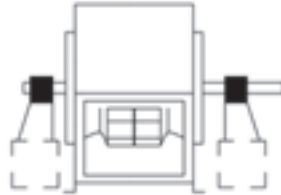
3 DWDI

For belt drive or direct connection. One bearing on each side and supported by fan housing.



3 DWDI c/w BOXES

For belt drive or direct connection. One bearing on each side and supported by inlet boxes. Shaft extending through inlet boxes.



3 DWDI c/w IND. PED.

For belt drive or direct connection. Housing is self-supporting. One bearing on each side and supported by independent pedestals.



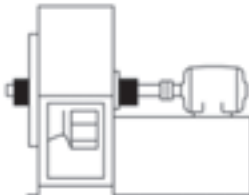
3 DWDI c/w BOXES & IND. PED.

For belt drive or direct connection. Housing is self-supporting. One bearing on each side supported by independent pedestals with shaft extending through inlet box.



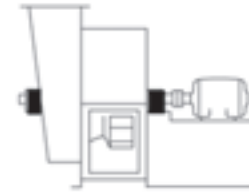
4 SWSI

For direct drive. Impeller overhung on prime mover shaft. No bearings on fan. Prime mover base mounted or integrally directly connected.



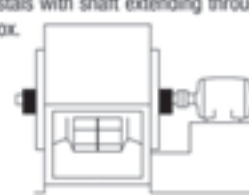
7 SWSI

For belt drive or direct connection. Arrangement 3 plus base for prime mover.



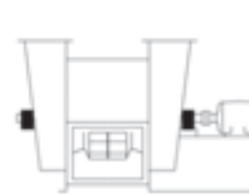
7 SWSI c/w BOX

For belt drive or direct connection. Arrangement 3 plus base for prime mover. Shaft extending through inlet box.



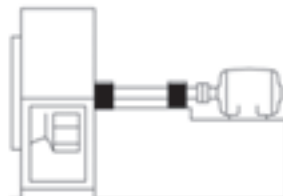
7 DWDI

For belt drive or direct connection. Arrangement 3 plus base for prime mover.



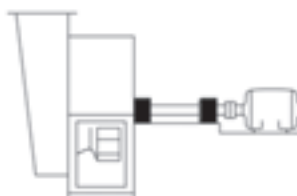
7 DWDI c/w BOXES

For belt drive or direct connection. Arrangement 3 plus base for prime mover. Shaft extending through inlet box.



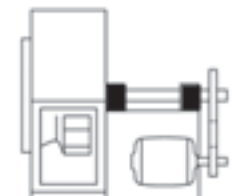
8 SWSI

For belt drive or direct connection. Arrangement 1 plus extended base for prime mover.



8 SWSI c/w BOX

For belt drive or direct connection. Arrangement 1 plus extended base for prime mover.



9 SWSI

For belt drive. Impeller overhung, two bearings, with prime mover outside base.



10 SWSI

For belt drive. Impeller overhung, two bearings, with prime mover inside base.



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