



INDUSTRIAL PROCESS AND  
COMMERCIAL VENTILATION SYSTEMS

# FIBERGLASS RADIAL BLADED CENTRIFUGAL FANS

MODEL RBOF



# FIBERGLASS CENTRIFUGAL FANS

## Model RBOF



RBOF  
Arrangement 9



RBOF Fiberglass Wheel



Twin City Fan & Blower certifies that the Model RBOF Fiberglass Centrifugal Fans, sizes 15 through 57, shown on pages 9 through 19 are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program. Sizes 10 through 13 shown on pages 6 through 8 are not licensed to bear the AMCA Seal.



For complete product performance, drawings and available accessories, download our Fan Selector program at [tcf.com](http://tcf.com).

The RBOF fiberglass fan offers superior corrosion resistance to gases, fumes, and vapors. The RBOF's fan housings feature solid fiberglass reinforced construction utilizing corrosion grade resin. A glass veil is standard for airstream surfaces providing a resin rich liner to maximize chemical resistance.

The standard resin used for the RBOF is resistant to a large variety of alkalis and other chemical agents. When a corrosion resistant fan is required to withstand chemicals that attack glass or polyester resin, special plastic and reinforcing material can be supplied.

### Size

10 to 57 inch wheel diameters

### Performance

Airflow to 38,300 CFM

Static pressure to 18 inches w.g.

### Advantages of Fiberglass Fans

- Superior corrosion resistance to gases, fumes & vapors
- Lower maintenance costs
- More economical than stainless steel construction
- Lighter weight than steel

### Wheel Design

The RBOF wheel features a radial blade design. All wheels are constructed of solid FRP with a steel hub embedded and encapsulated into the backplate.

## CONSTRUCTION FEATURES

### Corrosion Resistance

Fan housings are solid FRP hand lay-up construction utilizing corrosion grade flame retardant vinyl ester resin. A glass veil is standard for airstream surfaces providing a resin rich liner to maximize chemical resistance (see Corrosion Resistance Guide on page 4).

### Wheel/Shaft Assembly

The fan wheel is attached to a 316 SS stepped shaft using a 316 SS retaining plate. The retaining plate is encapsulated in FRP following assembly.

### Flanged Outlet

Integral flanged outlet with drilled bolt pattern is standard.

### Inlet Connection

Slip-type connection is standard.

## Accessories

### RBOF

**Bolted Inspection Door** — Limited access panel bolted and sealed to the housing.

**Weather Cover (Arr. 10)** — For complete protection of shaft, bearings, motor and drive from weather.

**OSHA Type Belt Guard (Arr. 1 & 9)** — Provides maximum protection for all personnel and complete coverage of belts and sheaves. Includes a tachometer opening for checking the fan speed.

**Shaft & Bearing Guard** — Solid sheetmetal enclosure designed to cover the shaft and bearings. Grease lines are accessible for lubrication purposes.

**Flanged Inlet** — Heavy fiberglass flange; drilling standard.

**Unitary Base (Arr. 1)** — Unitary bases offered in sizes 15 – 57.

**Vibration Isolation** — Rubber-in-shear or spring isolators available for all sizes and arrangements.

**Housing Drain** — Provided with female pipe thread at low point of scroll.

## OPTIONAL CONSTRUCTION

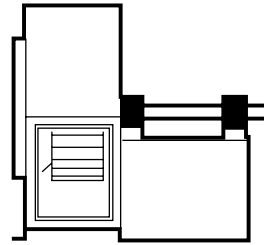
### Optional Materials

- 304 SS or 316 SS bearing pedestals and inlet supports
- Synthetic surfacing veil
- Special resins to suit specific applications
- Fire Retardant Resin reduces the resin's tendency to burn. Antimony trioxide is included to attain a flame spread rating of 25 or less.

### Spark Resistant Construction

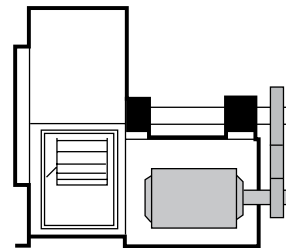
Spark resistant construction for fiberglass fans is recommended when the fan is handling explosive fumes. Although fiberglass is a non-sparking material, it can build and retain a static charge that can be potentially hazardous. With spark resistant construction, the fan is statically grounded by carbon impregnation to reduce a static charge buildup.

## ARRANGEMENTS



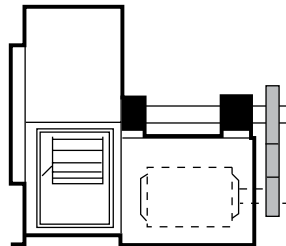
### Arrangement 1

Shaft and bearing assembly designed to be driven by a separately mounted motor. Maximum temperature is 200°F.



### Arrangement 9

Motor is mounted on the bearing base support. A slide rail base under the motor adjusts for belt tension. Motor is located on the right side as standard (when viewed from the drive end of shaft). Maximum temperature is 200°F.



### Arrangement 10

V-belt drive with the motor mounted directly under the fan shaft on a slide rail base. This provides for easy adjustment of the belt tension. Maximum temperature is 200°F.



# CORROSION RESISTANCE GUIDE



The following table lists gases, fumes, and vapors that are commonly exhausted from chemical processes. Using the "Legend of Symbols," the table indicates how TCF's standard fiberglass fans will withstand exhausting the particular gas, fume, or vapor.

### Legend of Symbols

- S — Satisfactory Application
- L — Limited Life or Life Tests Incomplete
- U — Unsatisfactory

This data is based on a maximum temperature of 200°F (93°C).

APPLICATION	SATURATED VAPOR	DRY VAPOR	EXCESS DRY AIR	APPLICATION	SATURATED VAPOR	DRY VAPOR	EXCESS DRY AIR
<b>ACIDS</b>				<b>ALKALINE SALTS</b>			
Acetic	L	S	S	Sodium Bicarbonate	L	S	S
Aqua Regia	U	U	L	Sodium Carbonate	L	S	S
Boric	S	S	S	Sodium Chloride	L	S	S
Butyric	S	S	S	Sodium Cyanide	L	S	S
Carbonic	S	S	S	Trisodium, Phosphate	L	L	S
Chromic	S	S	S	<b>ALKALIS</b>			
Citric	S	S	S	Ammonium Hydroxide	U	L	S
Formic	L	S	S	Calcium Hydroxide	U	L	S
Hydrochloric	S	S	S	Potassium Hydroxide	U	L	S
Hydrocyanic	L	S	S	Sodium Hydroxide	U	L	S
*Hydrofluoric	L	S	S	Sodium Hypochlorite	U	L	S
Hypochlorous	L	S	S	<b>KETONES</b>			
Lactic	S	S	S	Acetone	U	L	S
Maleic	S	S	S	Methyl Ethyl Ketone	U	U	L
Nitric	L	S	S	Methyl Isobutyl Ketone	U	U	L
Oleic	S	S	S	<b>ESTERS</b>			
Oxalic	S	S	S	Butyl Acetate	U	L	S
Perchloric	U	U	U	Ethyl Acetate	U	U	S
Phosphoric	S	S	S	Zinc Acetate	S	S	S
Picric	L	S	S	<b>GASES</b>			
Stearic	S	S	S	Ammonia	L	S	S
Sulfuric	S	S	S	Bromine	U	U	U
Sulfurous	S	S	S	Carbon Dioxide	S	S	S
Tannic	S	S	S	Carbon Disulfide	L	L	S
Tartaric	S	S	S	Chlorine	L	S	S
<b>SALTS, ACID &amp; NEUTRAL</b>				*Fluorine	L	S	S
Alum	S	S	S	*Hydrogen Fluoride	L	S	S
Aluminum Chloride	S	S	S	Hydrogen Sulfide	S	S	S
Aluminum Sulphate	S	S	S	Sulfur Dioxide	S	S	S
Ammonium Chloride	S	S	S	<b>HYDROCARBONS</b>			
Ammonium Nitrate	S	S	S	Benzene	U	U	U
Ammonium Sulphate	S	S	S	Fuel Oil	S	S	S
Calcium Chloride	S	S	S	Gasoline	S	S	S
Calcium Sulphate	S	S	S	Kerosene	S	S	S
Copper Chloride	S	S	S	Lubricating Oil	S	S	S
Copper Sulphate	S	S	S	Mineral Oil	S	S	S
Ferric Chloride	S	S	S	Toluene	U	U	U
Ferric Nitrate	S	S	S	Vegetable Oil	S	S	S
Ferric Sulphate	S	S	S	Naphtha	S	S	S
Magnesium Salts	S	S	S	Methane	S	S	S
Nickel Salts	S	S	S	Butane	S	S	S
Potassium Chloride	S	S	S	Propane	S	S	S
Potassium Nitrate	S	S	S	Xylol	S	S	S
Potassium Sulphate	S	S	S	<b>CHLORINATED SOLVENTS</b>			
Sodium Chloride	S	S	S	Carbon Tetrachloride	L	S	S
Sodium Sulphate	S	S	S	Chlorobenzene	U	U	U
Sodium Sulphite	S	S	S	Chloroform	U	U	U
Stannous Chloride	S	S	S	Perchlorethylene	U	U	L
Zinc Chloride	S	S	S	Trichlorethylene	U	U	L
Zinc Sulphate	S	S	S				
<b>ALCOHOLS</b>				<b>GLYCOLS</b>			
	S	S	S		S	S	S

\*Synthetic Surfacing Veil Required

The performance tables in this catalog are based on standard air conditions of 70°F at sea level (0.075 lbs./cu. ft. density). If the performance of the fan is based on standard conditions, the fan can be selected directly from the performance tables in this catalog.

When a fan operates at temperatures other than 70°F or altitudes other than sea level, a “temperature and altitude density ratio” (Table 1) is used to convert these conditions to standard air conditions. This conversion must be done before the fan can be selected from the performance tables in this catalog. After the fan is selected at standard conditions, the temperature correction ratio must be used to convert the brake horsepower at standard air conditions to the brake horsepower at operating conditions. This is shown in the example below.

**Example:** Specifications are for a 29" FRP fan to provide 3,200 CFM at 5" SP at 150°F at 1,000 ft. elevation (0.0628 lbs./cu. ft. density).

For 150°F and 1,000 ft. elevation Table 1 shows a density ratio of 0.838. Using the temperature and altitude density ratio, the static pressure at standard conditions is determined as follows:

$$\text{Operating SP} \div \frac{\text{Temp. \& Alt.}}{\text{Density Ratio}} = \text{SP at Std. Conditions}$$

$$5" \text{ SP} \div 0.838 = 6" \text{ SP at Standard Conditions}$$

Turn to page 13 for the Size 29 RBOF fan performance table. Using 3,200 CFM at 6" SP at standard conditions, find the RPM and brake horsepower to be 1,120 RPM and 5.07 BHP. Note: 5.07 BHP is the brake horsepower required at standard conditions and is also referred to as the “cold brake horsepower” or “starting brake horsepower.”

The actual brake horsepower at the operating condition of 150°F and 1,000 ft. elevation is determined by the following equation:

$$\frac{\text{BHP at Std. Conditions}}{\text{Temp. \& Alt. Density Ratio}} = \text{BHP at Oper. Conditions}$$

$$5.07 \text{ BHP} \times 0.838 = 4.26 \text{ BHP at Operating Conditions}$$

Therefore, the Size 29 RBOF fan providing 3,200 CFM at 5" SP at 150°F and 1,000 ft. elevation will run at 1,120 RPM and will require 4.26 BHP at operating conditions and 5.07 BHP at starting. Refer to Table 2 and Table 3 for maximum safe speeds at elevated temperatures.

**Table 1. Temperature and Altitude Density Ratios**

AIR TEMP °F	ALTITUDE IN FEET ABOVE SEA LEVEL											
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	15000
	BAROMETRIC PRESSURE IN INCHES OF MERCURY											
	29.92	28.86	27.82	26.82	25.84	24.90	23.98	23.09	22.22	21.39	20.58	16.89
-50	1.293	1.247	1.201	1.159	1.116	1.076	1.036	0.997	0.960	0.924	0.889	0.729
0	1.152	1.111	1.071	1.032	0.995	0.959	0.923	0.889	0.856	0.824	0.792	0.650
50	1.039	1.003	0.967	0.932	0.897	0.864	0.833	0.801	0.772	0.743	0.715	0.586
70	1.00	0.964	0.93	0.896	0.864	0.832	0.801	0.772	0.743	0.714	0.688	0.564
100	0.946	0.912	0.88	0.848	0.818	0.787	0.758	0.73	0.703	0.676	0.651	0.534
150	0.869	0.838	0.808	0.770	0.751	0.723	0.696	0.671	0.646	0.620	0.598	0.490
200	0.803	0.774	0.747	0.720	0.694	0.668	0.643	0.620	0.596	0.573	0.552	0.453

## Maximum Safe Speeds

When operating at temperatures other than 70°F, the maximum speed of the fan is affected. To determine the maximum speed at the operating temperature, a “Maximum Safe Speed Temperature Factor” (Table 3) is applied to the “Maximum Safe Wheel Speed at 70°F” (Table 2).

**Table 2. Maximum Safe Wheel Speed at 70°F**

SIZE	RPM	SIZE	RPM
10	4477	29	1935
12	4090	33	1740
13	4100	36	1570
15	3670	40	1435
19	2995	45	1270
22	2535	50	1135
26	2195	57	1000

**Table 3. Maximum Safe Speed Temperature Factors**

TEMPERATURE		FACTOR
°F	°C	
70	21	1.00
100	38	1.00
150	66	0.95
200	93	0.90

**Example:** The maximum safe speed for a Size 29 RBOF operating at 150°F is 1,838 RPM. The calculation is shown below.

$$\frac{\text{Max. RPM at 70°F}}{\text{(Table 2)}} \times \frac{\text{Temp. Factor}}{\text{(Table 3)}} = \frac{\text{Max. RPM at Operating Temp.}}{\text{(Table 3)}}$$

$$1,935 \times 0.95 = 1,838 \text{ Max. RPM at 150°F}$$

Since the Max. RPM at 150°F is 1,553, the fan in our previous example running at 1,120 RPM at 150°F would be acceptable.

**Table 4. Metric Conversion Factors**

DESCRIPTION	ENGLISH UNIT	METRIC UNIT	CONVERSION FACTOR	
			ENGLISH TO METRIC	METRIC TO ENGLISH
VOLUME	CFM	m³/s	0.000472	2118.90
PRESSURE	in. w.g.	kPa	0.24866	4.02156
POWER	BHP	kW	0.74570	1.3410
VELOCITY	fpm	m/s	0.00508	196.85
SPEED	RPM	rps	0.01667	60.00
AREA	ft²	m²	0.09290	10.7640
CIRCUMFERENCE	ft	m	0.30480	3.2808
DIAMETER	in.	mm	25.400	0.03937





















RBOF 36

Outlet Area = 2.43 Sq. Ft. Wheel Dia. = 36.5

Fan Efficiency Grade = FEG71 Tip Speed = 9.556 x RPM

Table with 12 columns: CFM, OV, 0.5" SP (RPM, BHP), 1" SP (RPM, BHP), 1.5" SP (RPM, BHP), 2" SP (RPM, BHP), 2.5" SP (RPM, BHP), 3" SP (RPM, BHP), 3.5" SP (RPM, BHP), 4" SP (RPM, BHP), 4.5" SP (RPM, BHP). Rows include CFM values from 2430 to 11664.

Table with 12 columns: CFM, OV, 5" SP (RPM, BHP), 5.5" SP (RPM, BHP), 6" SP (RPM, BHP), 6.5" SP (RPM, BHP), 7" SP (RPM, BHP), 7.5" SP (RPM, BHP), 8" SP (RPM, BHP), 8.5" SP (RPM, BHP), 9" SP (RPM, BHP). Rows include CFM values from 3888 to 14094.

Table with 12 columns: CFM, OV, 10" SP (RPM, BHP), 11" SP (RPM, BHP), 12" SP (RPM, BHP), 13" SP (RPM, BHP), 14" SP (RPM, BHP), 15" SP (RPM, BHP), 16" SP (RPM, BHP), 17" SP (RPM, BHP), 18" SP (RPM, BHP). Rows include CFM values from 6318 to 15552.

- 1. Performance certified is for Installation Type D: Ducted Inlet, Ducted Outlet.
2. Power rating (BHP) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. Underlined figures indicate maximum static efficiency.



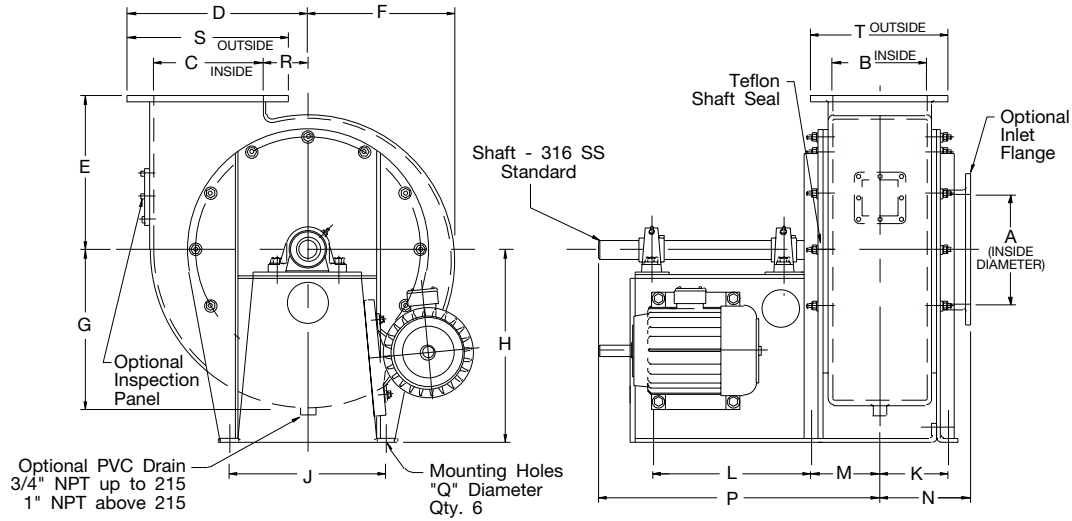








Arrangement 1 & 9



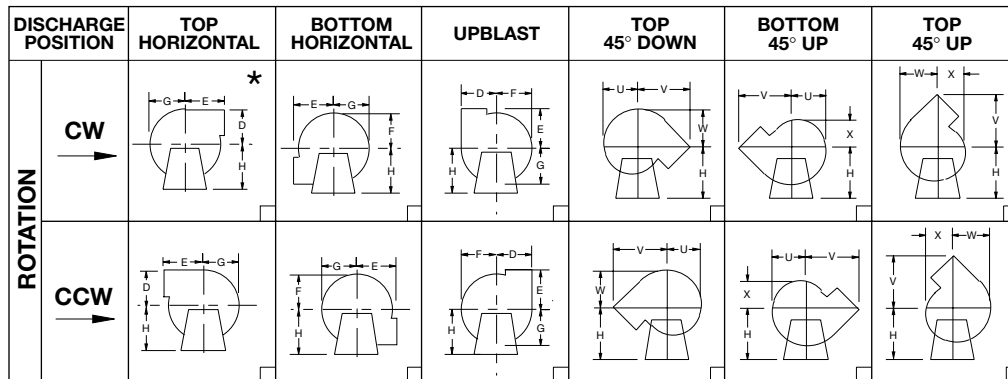
SIZE	A	B	C	D	E	F	G	H	J	K	L	M
15	9.00	7.75	8.88	14.56	11.81	10.94	12.00	18.75	16.50	5.44	15.00	6.44
19	11.00	9.13	10.63	17.31	14.13	13.50	14.50	21.75	18.88	6.13	20.00	7.13
22	13.00	10.75	12.56	20.13	16.25	15.75	17.00	22.25	22.25	6.94	20.00	7.94
26	15.00	12.50	14.44	22.94	18.38	18.25	19.69	24.25	25.75	7.88	22.25	8.88
29	17.00	14.13	16.31	25.88	20.44	20.63	22.31	27.00	29.00	8.94	21.75	9.94
33	19.00	15.75	18.13	29.13	22.50	21.63	24.88	30.50	32.50	9.75	24.50	10.75
36	21.00	17.44	20.06	31.94	24.63	25.06	27.44	33.50	35.25	10.72	24.50	11.72
40	23.00	19.13	21.94	34.75	26.81	26.94	30.00	36.00	39.00	11.56	26.25	12.56
45	26.00	21.56	24.81	39.00	29.88	29.81	33.88	40.75	46.25	13.41	25.25	14.41
50	29.00	24.13	27.69	43.38	33.13	32.69	38.00	45.00	47.50	14.69	30.75	15.69
57	33.00	27.38	31.50	49.06	37.38	36.50	39.13	50.75	53.50	16.31	30.75	17.31

SIZE	N	P	Q	R	S	T	U	V	W	X	MAX. MTR	SHAFT
15	8.94	27.00	0.56	3.94	12.38	11.25	11.47	18.66	12.53	10.38	215T	1.44
19	9.63	33.19	0.56	4.94	14.13	12.63	14.00	22.22	15.16	12.69	256T	1.69
22	10.31	34.00	0.56	5.81	16.06	14.25	16.38	25.72	17.81	14.88	256T	1.69
26	10.94	38.00	0.56	6.75	17.94	16.00	18.97	29.22	20.56	17.19	284T	1.94
29	11.69	38.81	0.56	7.81	19.81	17.63	21.47	32.75	23.34	19.41	286T	1.94
33	13.88	43.13	0.69	8.75	22.63	19.25	23.91	36.50	25.88	21.59	324T	2.19
36	14.53	44.09	0.69	9.63	24.56	22.44	26.34	40.00	28.56	23.81	326T	2.44
40	15.38	47.44	0.69	10.56	26.44	24.13	28.88	43.53	31.25	26.13	365T	2.44
45	17.03	48.91	0.81	11.94	29.31	26.56	32.47	48.72	35.31	29.31	365T	2.69
50	17.56	56.94	0.81	13.44	32.19	29.13	36.41	54.09	39.56	32.81	405T	3.19
57	18.88	58.56	0.81	15.31	36.00	32.38	39.19	61.13	42.97	37.16	405T	3.44

Dimensions are not to be used for construction.

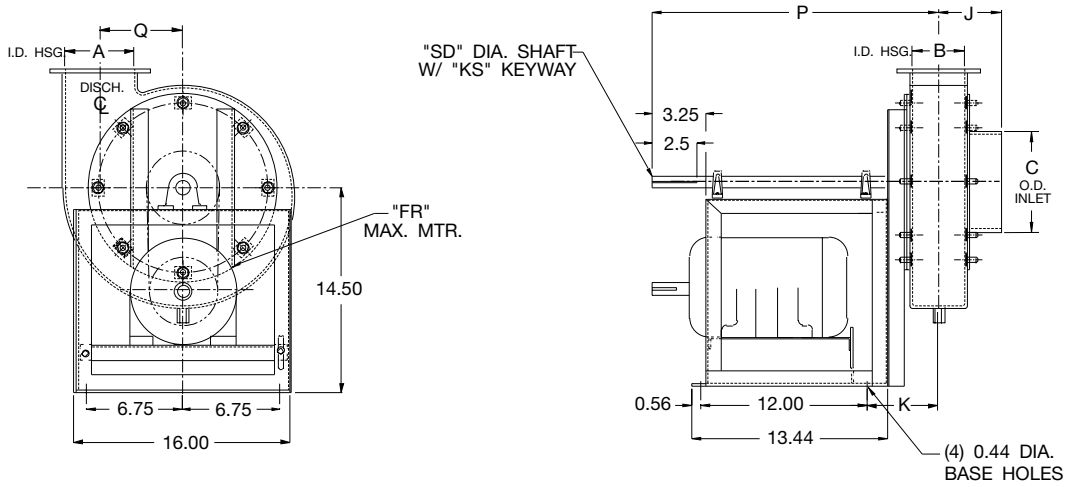
AC1005847

Fan Discharge Options



\*STANDARD POSITION & ROTATION

# Arrangement 10



**NOTE:** Arrangement 10 available for sizes 15 through 36. Contact factory for dimensional data.

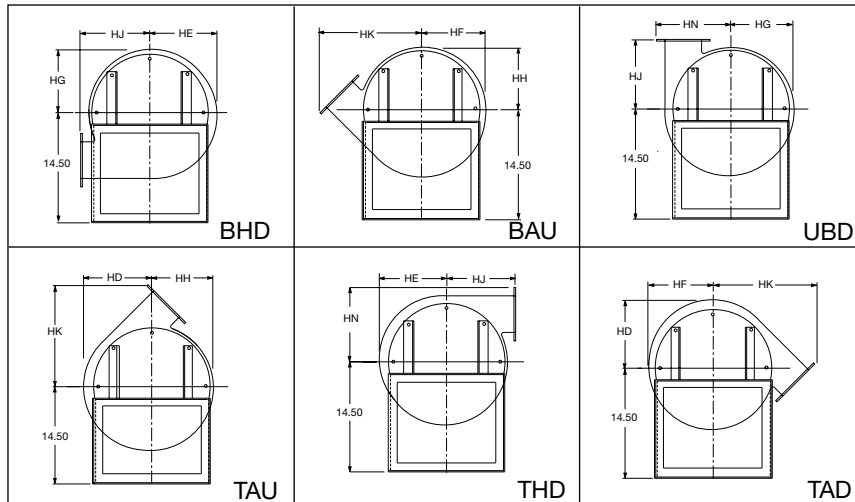
SIZE	A	B	C	FR	HD	HE	HF	HG	HH
10	4.00	3.38	6.38	56	8.25	8.25	8.25	7.94	7.44
12	5.00	3.88	7.38	145T	9.50	9.25	9.50	9.06	8.69
13	7.06	5.50	8.38	145T	11.78	11.78	11.75	11.31	10.44

SIZE	HJ	HK	HN	J	K	KS	P	Q	SD
10	8.97	13.13	9.56	4.06	4.63	.25 x .13	19.06	6.06	1.00
12	10.28	15.25	11.25	4.31	4.88	.25 x .13	19.31	7.25	1.187
13	11.84	17.38	12.68	4.81	5.69	.25 x .13	20.13	7.31	1.187

Dimensions are not to be used for construction.

BC1005850

## Fan Discharge Options



# INDUSTRIAL PROCESS AND COMMERCIAL VENTILATION SYSTEMS

CENTRIFUGAL FANS | UTILITY SETS | PLENUM & PLUG FANS | INLINE CENTRIFUGAL FANS  
MIXED FLOW FANS | TUBEAXIAL & VANEAXIAL FANS | PROPELLER WALL FANS | PROPELLER ROOF VENTILATORS  
CENTRIFUGAL ROOF & WALL EXHAUSTERS | CEILING VENTILATORS | GRAVITY VENTILATORS | DUCT BLOWERS  
RADIAL BLADED FANS | RADIAL TIP FANS | HIGH EFFICIENCY INDUSTRIAL FANS | PRESSURE BLOWERS  
LABORATORY EXHAUST FANS | FILTERED SUPPLY FANS | MANCOOLERS | FIBERGLASS FANS | CUSTOM FANS



**TWIN CITY FAN & BLOWER**  
**[WWW.TCF.COM](http://WWW.TCF.COM)**

5959 TRENTON LANE N | MINNEAPOLIS, MN 55442 | PHONE: 763-551-7600 | FAX: 763-551-7601

©2018 Twin City Fan Companies, Ltd., Minneapolis, MN. All rights reserved. Catalog illustrations cover the general appearance of Twin City Fan & Blower products at the time of publication and we reserve the right to make changes in design and construction at any time without notice.