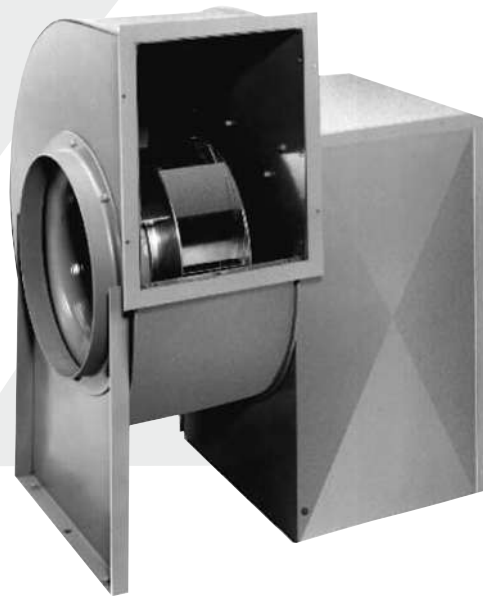




Bulletin D05



DYNAMO

Model: D
Class I Centrifugal Fans
SWSI Backward Inclined
Belt Drive

MOVING YOUR WAY

CERTIFIED RATINGS

Dynamo Centrifugal Fans



PennBarry certifies that the Dynamo models contained herein are 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 the requirements of the AMCA Certified Ratings Program

UL and CSA Certification

Dynamo fans carry the UL label. Standard Dynamo models are UL 705 (ZACT), listed under File #E28413. Dynamo fans with "Fatrap" configuration are UL762 (YZHW), listed under File #MH10684. Check Underwriters Laboratories Re-Examination Service for specific units listed.



Dynamo fans with the heat and smoke removal option are UL listed under File: MH19473

Dynamo fans are also certified by the Canadian Standard Association (File #LR13309).

FANSIZER®

Product Selection Software

FanSizer software allows you to select the best centrifugal or axial unit for your application. Input CFM and static pressure, and FanSizer will make the optimum selection. It allows you to complete job schedules which you can store, modify and print in seconds. Features include: on-line help, on-screen product drawings and dimensions, and complete text specifications. In addition, you can convert job schedules to ASCII code for use with other programs like word processing.

Table of Contents

Introduction	1
Features and Benefits	2
Options and Accessories	6
Selection Criteria	8
Centrifugal General Purpose Utility Fans	10
Dynapak Restaurant Exhauster	11
Motor Selection	12
Performance Data	14
Sound Power Data	25
Engineering Notes	29
Sample Specifications	34
Limited Warranty	35

Visit Our Web Site

Point your internet web browser to www.PennBarry.com for up-to-the-minute information including:

- On-line catalog
- List of nearest PennBarry representatives
- What's New
- HVAC "Hot Links"

©2005 PennBarry™ All rights reserved.

Following publication of this catalog changes may have been made in standard equipment, options and the like that would not be included.

We reserve the right to make changes at any time, without notice, to models, specifications, options, availability, etc.

This bulletin illustrates the appearance of PennBarry products at the time of publication and we reserve the right to make changes in design and construction at anytime without notice. Your local sales representative is the best source for current information.

Features and Benefits

Dynamo Centrifugal Fan

Dynamo centrifugal fans are SWSI, Class I, Arrangement 9 and 10 general purpose air moving devices. They are used for supply or exhaust applications in commercial, institutional and industrial HVAC systems.

At the heart of the Dynamo is a computer-designed, backward inclined, centrifugal wheel. This heavy duty non-overloading aluminum wheel assures low noise and high efficiency performance.

The fan wheel, venturi inlet, housing and frame are engineered to provide maximum performance and reliability.

Fan housings utilize heavy-gauge materials and employ Weld-Lock™ construction. Motors and all drive components have been carefully engineered and tested for durability and performance. A wide range of accessories is available to meet various application requirements.

Dynamo centrifugal blowers are designed and built to provide the end user with a highly efficient and extremely reliable air moving unit. These units offer many features as standard equipment that other manufacturers consider options. Each Dynamo is fully assembled, factory set at the specified RPM and test run prior to shipment.

Standard Features

Self Aligning Pillow Block Bearings

Bearings are sized for a minimum L₅₀ life exceeding 200,000 hours of operation. They require no maintenance other than periodic lubrication. Standard Zerk lube fittings allow for ease of lubrication. Extended lube lines are available as an option to facilitate lubrication when a weather cover is used.

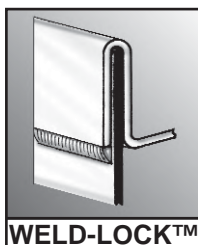
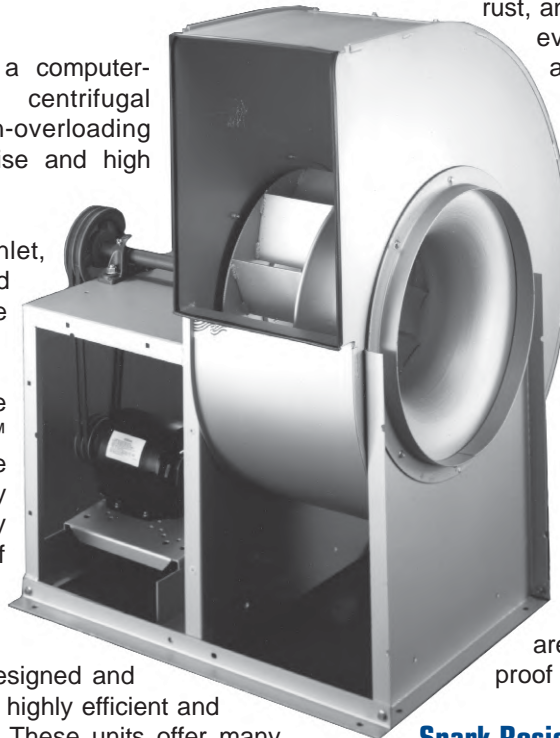
Solid Steel Shafts

Sized to withstand a minimum of 125% of maximum catalogued operating speed, shafts are precision ground, polished and treated for rust resistance.

Engineered Scrolls

PennBarry's exclusive Weld-Lock™ assembly technique ensures positive air containment with interval lockseam welding. Developed by PennBarry's engineering staff, Weld-Lock combines the advantages of several proven assembly techniques.

Durable Housings



Dynamo blowers are manufactured of heavy gauge zinc coated galvanized steel to insure a long, corrosion resistant life. Galvanized steel resists rust, and will help maintain the unit's integrity even in environments such as coastal regions where salt air will rapidly deteriorate black iron, even when it is painted.

Versatile Operation

All unit sizes are field rotatable to any of eight discharge positions. Both clockwise and counter-clockwise rotations are available.

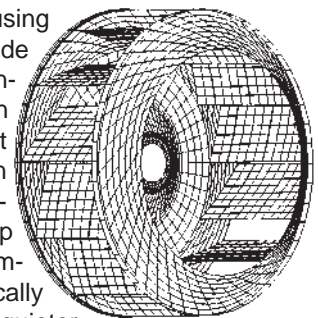
Motors and Drives

The motors and belt drives are pre-set at the factory to the specified RPM. These drives allow for system balancing in the field. All pulleys are sized for at least 165% of driven horsepower.

High quality open drip proof motors are standard. Totally enclosed, explosion proof and two speed motors are available.

Spark Resistant Aluminum Wheels

Dynamo blowers use PennBarry's computer designed aluminum wheel. They are backward inclined and non-overloading, using heavy gauge aluminum to provide AMCA "C" spark resistant construction. AMCA "B" construction is available as a moderate cost option. This new wheel design provides a high level of static efficiency while reducing start-up torque, thus extending drive component life. All wheels are statically and dynamically balanced for quieter operation.



Heavy Duty Support Frame

The heavy duty support frame provides a strong structural foundation for the motor and drive assembly, as well as rigid reinforcement for housing members.

Standard Gasketed Access Door

The standard gasketed access door enables easy maintenance of internal components.

Inlet Angle Flange

The inlet angle flange is standard to facilitate connection to the ductwork.

Dynamo Fatrap Configuration

Dynamo fans can be specially configured for food service applications with the addition of a group of accessories that either meets a requirement or eases installation requirements according to NFPA 96. NFPA 96 “Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations” is the generally recognized authority nationwide for restaurant installation requirements. However, local codes may vary.

The special Dynamo configuration is called a “**Fatrap.**” Fatrap configured fans are ideal for use in commercial kitchens over grills, charcoal broilers, deep fat fryers, steam tables, ranges, dishwashers, and other appliances.

UL 762 Listing

Fatrap configured Dynamo fans are listed at 400°F, 100°F higher than UL requirements, and the highest in the industry.

Pre-Wired Junction Box

A weather-proof junction box is factory wired and mounted to the housing exterior. An appropriately sized disconnect switch is commonly selected as an additional option. These items meet the code requirements for positive electric shut-off.

Grease Collector/Separator Box

Designed for easy installation, the grease is routed from a single swiveling collection spout to an amply sized durable galvanized steel box, trapping grease and residue, and avoiding discharge onto the roof surface. Additionally, these boxes separate the water from the grease, prolonging the time required between periodic maintenance.

Ventilated Curbs

NFPA 96 requires the use of ventilated mounting curbs to provide an approved arrangement for connecting a range hood and ductwork to the roof fan for buildings two stories or higher. PennBarry’s ventilated mounting curbs, 18" high,

comply with that standard when properly installed. Ventilated curbs have a flat mounting flange for fastening directly to the roof deck. This flange should be securely fastened and flashed to ensure weather-tightness. Ventilated pedestals are designed to fit on an existing curb. They provide cap flashing when so installed.

UL 762 Listing

Dynamo Dynapak fans consist of a standard up blast Dynamo unit attached to a fully welded inlet plenum and mounted on a curb cap. The resulting curb mounted assembly provides a unique solution to restaurant grease exhaust applications and is UL762 Listed. The Inlet plenum is equipped with a triple sealed removable access panel which allows cleaning of the fan and duct work without removal or hinging. This eliminates potential roof or fan damage caused by cleaning crews. All unwelded mating surfaces (to allow for service) are sealed with high temperature, UV rated silicone. The high velocity discharge of the exhaust air stream helps to disperse contaminants away from the restaurant and minimize the cloud that sometimes forms as a result of high volume, intense cooking. The high static pressure capability of these heavy duty blowers, (sometimes greater than 5" w.g.) makes them ideal for long, complicated duct runs or for use with specialized filtration equipment. An easily removable weather cover allows access to motors, belts, bearings, etc., for inspection or maintenance.

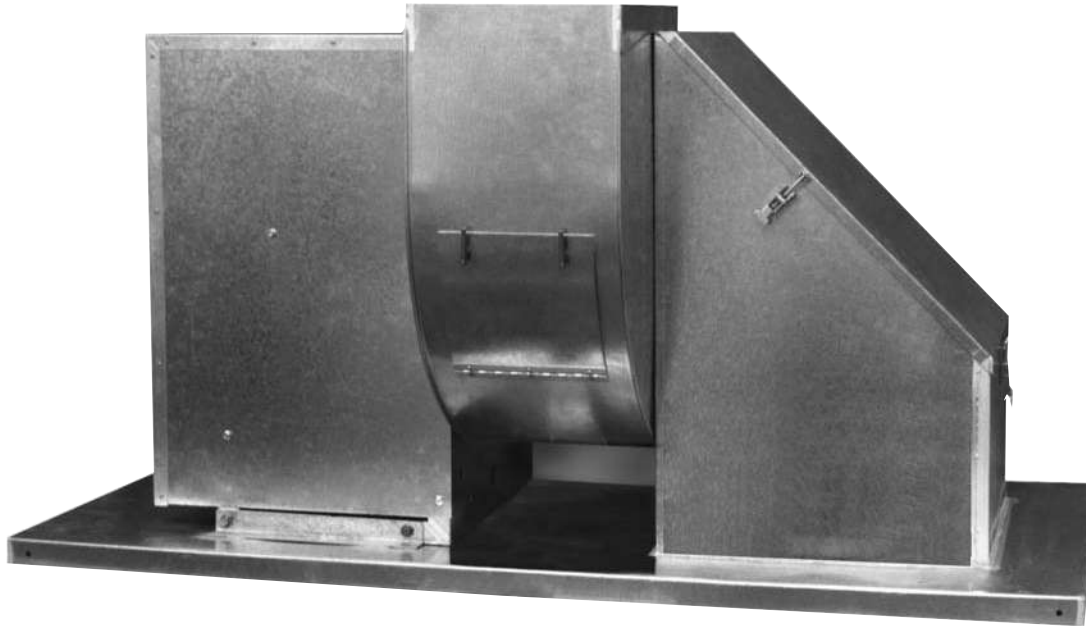
Dynapak units are available in sizes D10DPFT, D13DPFT, D16DPFT, D20DPFT & D24DPFT. For performance data refer to the corresponding Dynamo units shown on pages 14 through 28.



Features and Benefits

Dynamo Centrifugal Fan

Dynapak



Curb Mounted Utility Set with Integral Inlet Box

Dynapak Includes all the Features of the Dynamo Blower PLUS

Integral Galvanized Curb Cap

- Eliminates need for costly customized field fabricated transition
- Fully welded corners
- Pre-punched mounting holes

Fully Welded Inlet Box

- Includes gasketed removable access cover with quick release latches
- Allows easy duct cleaning and inspection

Vented Weather Cover Provided As Standard

- Allows full access for normal maintenance

High Temperature Sealant Provided Between Scroll Casing and Side

High Velocity Discharge

- Throws contaminants further into the atmosphere
- Reduces possibility of contaminant collection on roof

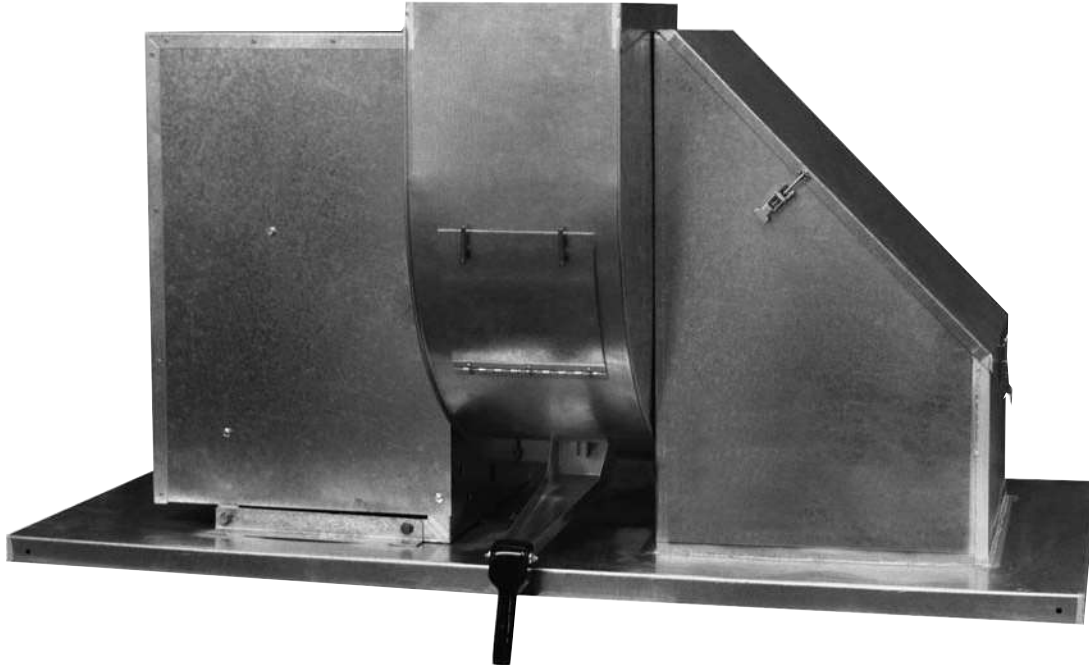
Available For Dynamo Models:

- D10DP, D13DP, D16DP, D20DP and D24DP

Typical Applications Include:

- Laboratory hoods
- Industrial Process Ventilation
- Dry Cleaning

Dynapak Fatrap Configuration



Dynapak Fatrap Includes all the Features of the Dynamo Blower PLUS

UL 762 Listing

- Rated at 400°F, highest in the industry

Pre-Wired Weatherproof Junction Box

Grease Collector

- Additionally separates the water from the grease
- Amply sized
- Longer time required between cleaning
- Collects from a single swiveling collection spout

Ventilated Curbs (Optional)

- Available to comply with NFPA96

Integral Galvanized Curb Cap

- Eliminates need for costly customized field fabricated transition
- Fully welded corners
- Pre-punched mounting holes

Fully Welded Inlet Box

- Includes gasketed removable access cover with quick release latches
- Allows easy duct cleaning and inspection

Vented Weather Cover Provided As Standard

- Allows full access for normal maintenance

High Temperature Sealant Provided Between Scroll Casing and Sides

High Velocity Discharge

- Throws contaminants further into the atmosphere
- Reduces possibility of contaminant collection on roof

Available For Dynamo Models

- D10DPFT, D13DPFT, D16DPFT, D20DPFT and D24DPFT

Options and Accessories

Dynamo Centrifugal Fan

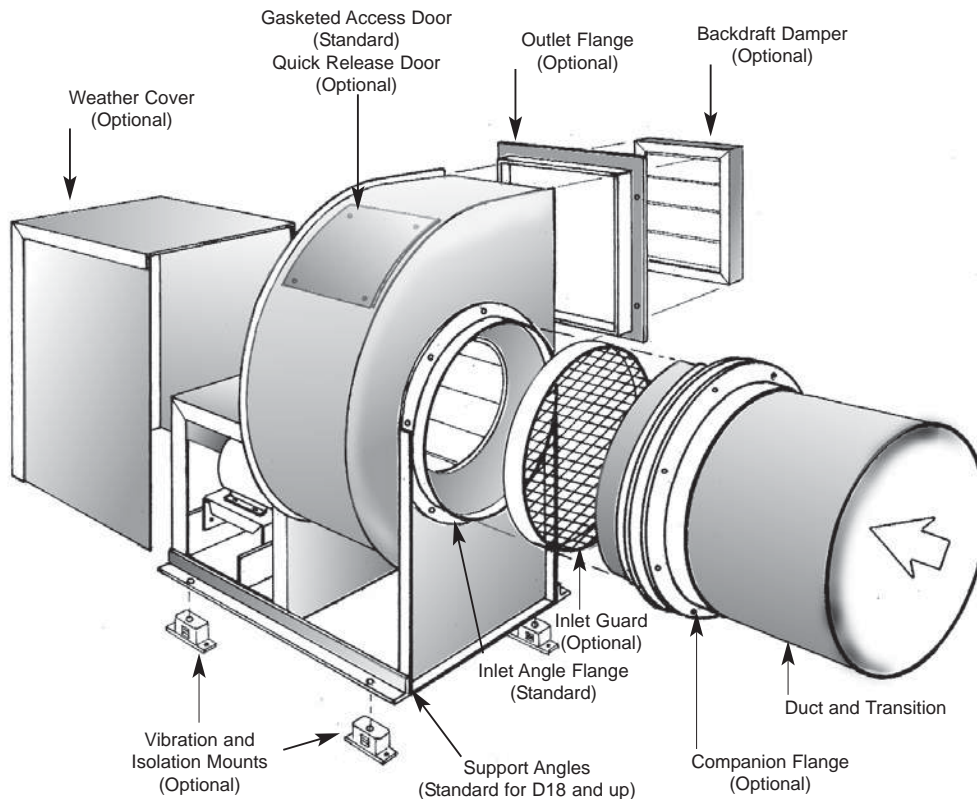
An extensive selection of accessory items to cover various application requirements is available at additional cost.

Support Angles

Heavy gauge angles, appropriately sized by unit, mean easy assembly mounting to support surface.

Flanges

Outlet flanges facilitate the connection of ductwork. Companion flanges are also available when the Dynamo is connected to ductwork by a transition section. The companion flange fits the fan to the transition and guarantees proper sizing.



Inlet and Outlet Guards

Inlet and Outlet Guards provide safety in non-ducted installations. Guards are constructed of expanded steel in a removable frame attached to the fan housing. They are easily removed by maintenance personnel for cleaning or inspection.

Drive Guards

Drive guards are also available to protect personnel and drive assemblies. Drive guards comply with OSHA requirements and are easily removed for drive inspection and belt adjustment.

Guards are highly recommended whenever the fan is mounted within 7" of occupied space and/or otherwise unprotected with ductwork. Each application must be reviewed for OSHA compliance.

Access Door

While a gasketed access door is standard, an optional quick release type door is available to allow for periodic inspection and cleaning.

Ventilated Weather Cover

Available on Arrangement 10 fans, the weather cover protects the shaft, bearings, motor and drive components from weather and other detrimental conditions. Galvanized steel covers are easily removed and reinstalled using ordinary hand tools. On larger sizes, the cover incorporates a removable end panel for easy access to drive components without removing the entire cover.

Coatings

Factory applied, multi-coat enamel paint is available for a modest charge. In addition, special coatings - Polyamide Epoxy and Heresite - are available for applications involving corrosive conditions and/or other damaging influences. Please contact your representative with any questions on suggested applications.

Drain Connections

Drains are made of 2" pipe which is mechanically fastened and sealed to prevent leakage at the lowest point of the scroll. All fans can be supplied with drains except bottom-horizontal discharge, where it is not required.

Dampers

Dampers can be installed at the discharge outlet to prevent backdrafts when fans are not in operation. Dampers can be used when outlet velocities do not exceed 4000 FPM for all discharge positions. Gravity dampers are not effective for use in top-angular-down, bottom-angular-down or downblast discharge positions.

Variable Inlet Vanes

Also known as vortex dampers, vanes provide efficient regulation of fan output over all operating ranges with substantial increases in energy efficiency when full fan output is unnecessary. This accessory is suitable for inlet temperatures up to 200°F. (Not available for D10.)

Vibration Isolators, Hangers and Rails

These items are available in both rubber-in-shear and spring-type to mitigate residual vibration transmission. All isolators are properly sized to the unit. Floor flex pads are also available.

Safety Switches

Switches in housings are available to turn fans on and off for service only. Field wiring is required.

Extended Lube Lines

Preloaded at the factory, lube lines allow bearing maintenance when a weather cover is installed or when easy access to the bearings is unavailable.

Spark-Resistant Construction

AMCA "C" and "B" construction are available. AMCA standards offer the following definitions and notes concerning spark-resistant construction:

- C. The fan shall be so constructed that a shift in the impeller or shaft will not permit two ferrous parts of the fan to rub or strike.

- B. The fan shall have a non-ferrous impeller and non-ferrous ring about the opening through which the shaft passes. Ferrous hubs, shafts and hardware are allowed provided construction is such that a shift in impeller or shaft will not permit two ferrous parts of the fan to rub or strike. Steps must also be taken to insure that the impeller, bearings and shaft are adequately attached and/or restrained to prevent a lateral or axial shift in these components.

Notes:

1. No bearings, drive components or electrical components shall be placed in the air or gas stream unless they are constructed or enclosed in such a manner that failure of that component cannot ignite the surrounding gas stream.
2. The user shall electrically ground on all fan parts.
3. For this standard, non-ferrous material shall be material with less than 5% iron or any other material with demonstrated ability to be spark-resistant.
4. The use of aluminum or aluminum alloys in the presence of steel which has been allowed to rust required special consideration. Research by the U.S. Bureau of Mines and others has shown that aluminum impellers rubbing on rusty steel may cause high-intensity sparking.

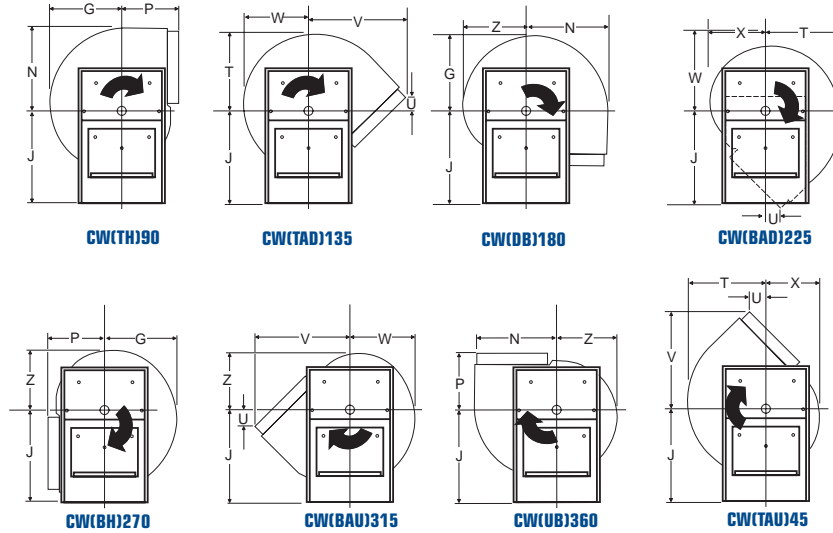
The use of the above standard in no way implies a guarantee of safety for any level of spark resistance. Spark-resistant construction does not protect against ignition of explosive gases caused by catastrophic failure or from any airstream material that may be present in a system.

Selection Criteria

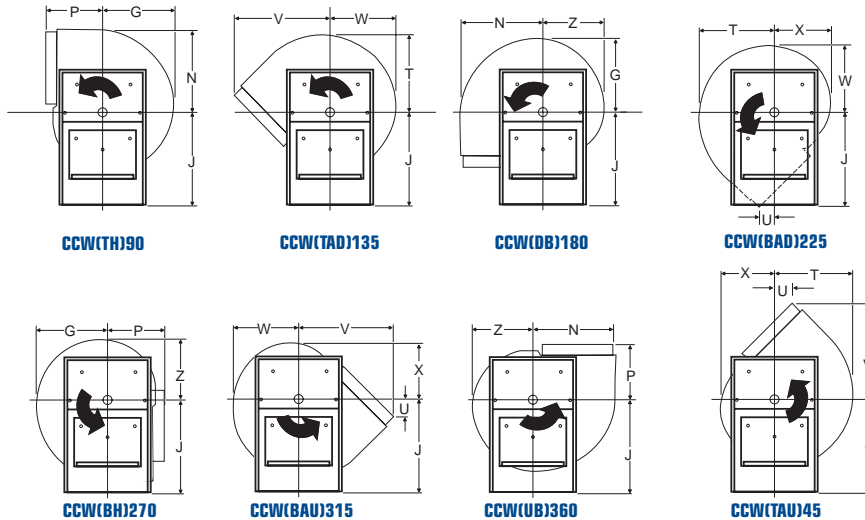
Dynamo Centrifugal Fan

Discharge Positions

Clockwise Rotation - CW



Counterclockwise Rotation - CCW



Rotation and Discharge Dimensions

The direction of rotation is determined from the drive side of the fan. On single inlet fans, drive side is always considered as the side opposite the fan inlet. Direction of discharge is determined per diagrams shown. Angle of discharge is referred to the vertical axis of the fan and designated in degrees.

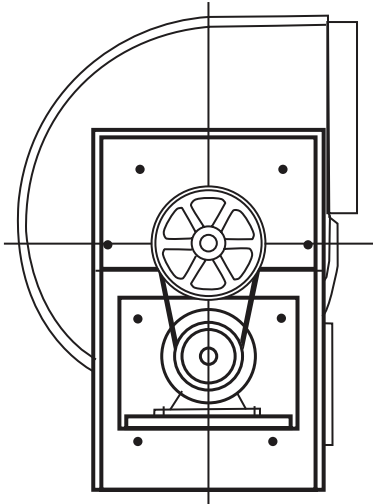
Rotational Designations*

- TH - Top Horizontal
- TAD - Top Angular Down
- DB - Down Blast
- BAD - Bottom Angular Down
- BH - Bottom Horizontal
- UB - Up Blast
- TAU - Top Angular Up
- BAU - Bottom Angular Up

* Units will be supplied in the CW90(TH) position unless otherwise specified.

Unit Size	G	J	P	T	U	V	W	X	Z
10	11 5/16	15 1/2	8 11/16	12 1/4	2 7/8	15 1/8	10 3/8	8 9/16	9 7/16
12	12 7/16	17	9 3/8	13 7/16	3 1/4	16 9/16	11 3/8	9 3/8	10 3/8
13	13 3/4	18	10 5/16	14 7/8	3 3/4	18 5/16	12 5/8	10 5/16	11 1/2
15	15 3/8	20	11 5/16	16 5/8	4 7/16	20 3/8	14 1/16	11 1/2	12 13/16
16	16 11/16	22	12 5/16	18 3/16	4 7/8	22 1/4	15 7/16	12 5/8	14
18	18 1/2	24	13 7/8	20 1/16	5 3/16	24 3/4	17	13 7/8	15 7/16
20	20	25 1/2	14 13/16	21 5/8	5 11/16	26 11/16	18 5/16	15	16 5/8
22	21 7/8	28 3/4	16 1/16	23 11/16	6 7/16	29 1/8	20 1/16	16 3/8	18 1/4
24	23 15/16	31 1/2	17 1/4	26	7 5/16	31 11/16	21 7/8	17 13/16	19 7/8
30	29 49/64	38	21 13/16	32 17/64	8 63/64	39 27/32	27 17/64	22 1/4	24 49/64
36	33 1/2	44	25 7/8	36	8 3/4	45 3/8	31	25 31/32	28 15/32

All dimensions in inches.



Arrangement 10

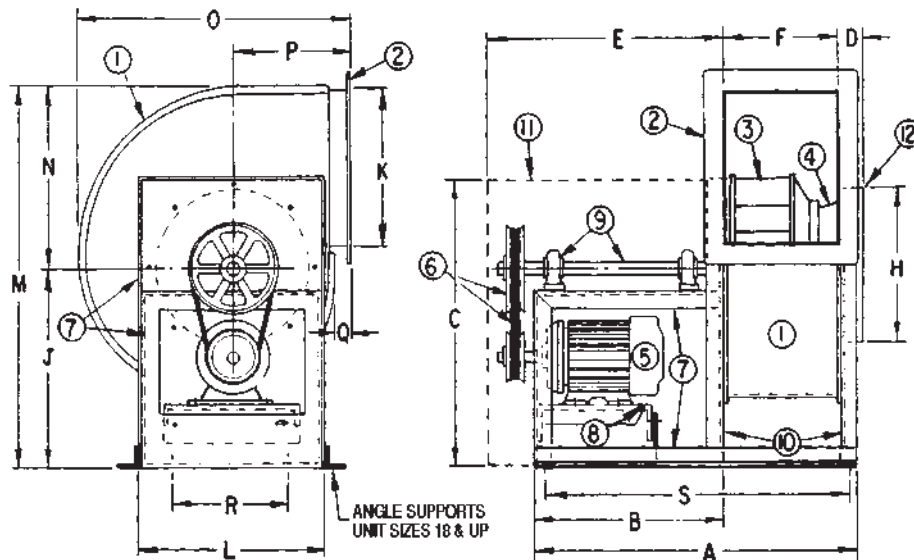
Arrangement 10 Single Width, Single Inlet

Fans are constructed with the motor and bearings out of the airstream. Motors are mounted inside of the pedestal on an adjustable motor plate. This arrangement allows for the use of a weather cover and can be used in ducted or non-ducted applications.

NOTE: Dynamo fans are one component of a system. As such, fan performance is directly effected by that system. It is critical that system designers determine the actual system losses to ensure that the actual flow is as specified in the system design.

Centrifugal General Purpose Utility Fans

Dynamo Centrifugal Fan



Legend

- | | |
|---|---|
| 1. Blower Scroll Housing | 7. Drive Frame Support Assembly |
| 2. Outlet Duct Flange (optional) | 8. Adjustable Motor Mounting Plate |
| 3. Centrifugal Wheel (aluminum non-overloading) | 9. Fan Shaft and Bearings |
| 4. Spun Inlet with Cutoff (D16 and up) | 10. Support Legs with Mounting Holes |
| 5. Ball Bearing Motor | 11. Belt and Bearing Enclosure (optional) |
| 6. Belt and Pulleys (where required twin groove belts and pulleys will be provided) | 12. Inlet Angle Flange |

Dimensional Data

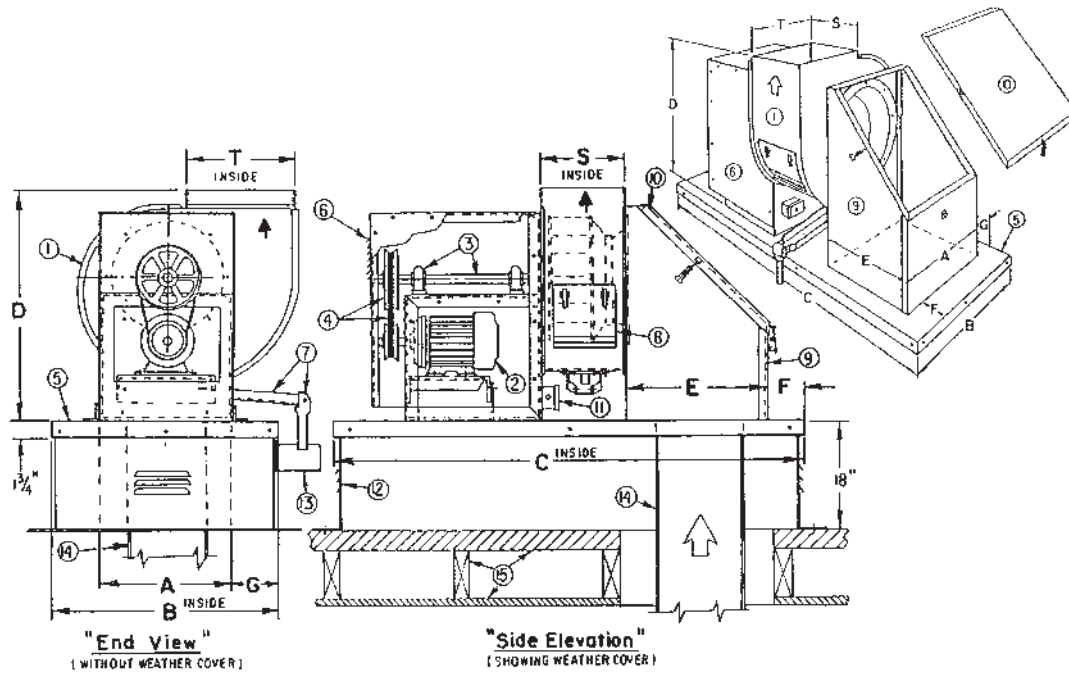
Unit Size	Wheel Dia.	Shaft Dia.	A	B	C	D	E	Outlet		Inlet H	J	L	M	N	O	P	Q	R	S	Mtg. Hole Dia.	Ship. Wts.*
								F	K												
10	11 1/4	3/4	24	14 1/2	22 1/2	1 1/4	18 1/2	8 1/4	11 1/4	11 1/4	15 1/2	14	28 11/16	13 3/16	20	8 11/16	1 1/2	10	22 3/4	1/2	130
12	12 7/8	3/4	26 1/8	14 1/2	25 1/4	1 1/4	18 1/2	10 3/8	12	13	17	16	31 1/2	14 1/2	21 13/16	9 3/8	1 1/2	13	24 7/8	1/2	136
13	13 5/8	1	26 1/4	14 1/2	26 1/2	1 1/4	18 1/2	10 1/2	14 3/8	14	18	17 1/4	34 1/16	16 1/16	24 1/16	10 5/16	1 1/2	14	25	1/2	140
15	15 7/8	1	30 3/8	16	29 5/8	1 1/4	20 1/2	11 5/8	15 3/4	15 3/4	20	19 1/4	37 7/8	17 7/8	26 11/16	11 5/16	1 1/2	15	29 1/8	1/2	176
16	16 3/8	1 3/16	30 1/4	16	32 3/8	1 1/4	20 1/2	12 3/4	17 1/2	17 1/4	22	20 3/4	41 5/8	19 5/8	29 1/8	12 5/16	1 1/2	16	28 3/4	1/2	194
18	18 1/2	1 3/16	33 1/2	17 7/8	35 1/4	1 1/2	23 1/2	14 1/8	19 3/8	19	24	22 1/2	45 5/8	21 5/8	32 3/8	13 7/8	1 1/2	18	32	1/2	274
20	20	1 3/16	36 1/4	20	37 5/8	1 1/2	28 1/2	14 3/4	21 3/4	20 1/2	25 1/2	24 1/4	48 13/16	23 5/16	34 13/16	14 13/16	1 1/2	20	34 3/4	5/8	312
22	22 7/8	1 3/16	38 1/2	20	43	1 1/2	28 1/2	17	23 7/16	24	28 3/4	28	54 5/16	25 9/16	37 15/16	16 1/16	1 1/2	24	37	5/8	351
24	24 5/8	1 7/16	40 1/2	20	46	1 1/2	28 1/2	19	26	25	31 1/2	29	59 9/16	28 1/16	41 3/16	17 1/4	1 1/2	24	39	5/8	462
30	30 7/16	1 11/16	50 3/8	25	56 1/2	1 3/4	35 1/8	23 1/8	31 11/16	31 1/2	38	36 15/16	72 13/16	34 13/16	51 1/2	21 13/16	2	30	46 3/8	5/8	875
36	36 15/16	2	55 1/2	25	66 3/8	1 3/4	35 1/8	28 1/4	38 7/16	41 1/8	44	44 3/4	82 9/16	38 9/16	59 7/16	25 7/8	2 3/8	34	51 1/2	5/8	1250

All dimensions in inches.

*Shipping weights include standard motors, drives and weather cover. These weights will vary depending on motor selection and accessories used.

Dynapak (Fatrap) Curb Mount Restaurant Exhauster

Dynamo Centrifugal Fan



Legend

- | | |
|--|---|
| 1. Blower Scroll Housing - Upblast Discharge | 9. Continuously Welded Plenum |
| 2. Ball Bearing Motor | 10. Positively Sealed Access Door with Adjustable Tension Latches |
| 3. Fan Shaft and Bearings | 11. Disconnect Switch Box |
| 4. Belt and Pulleys | 12. Vented Prefabricated Steel Curb (optional) |
| 5. Curb Cap Mounting Base | 13. Grease Collection Box (optional) |
| 6. Vented Weather Cover | 14. Welded Exhaust Duct (by others) |
| 7. Grease Drain Trough and Downspout (Fatrap only) | 15. Roof Structure (by others) |
| 8. Hinged and Latched Access Door | |

Dimensional Data

Model	Wheel Dia.	Shaft Dia.	A	B	C	D	E	F	G	S	T
D10DP	11 3/4	3/4	14 1/4	26 1/8	52 1/8	24 1/8	17 9/16	5 1/32	5 15/16	8 1/4	11 1/4
D13DP	13 5/8	1	17 3/4	28 1/8	56 1/8	28 5/16	17 5/16	4 31/32	5 11/32	10 1/2	14 3/8
D16DP	16 3/8	1 3/16	20 15/16	34 1/8	68 1/8	34 5/16	20 13/16	6 1/32	6 19/32	12 3/4	17 1/2
D20DP	20	1 3/16	24 1/2	40 3/16	80 3/16	40 5/16	24 5/16	6 1/32	7 27/32	14 3/4	21 3/4
D24DP	24 5/8	1 7/16	29 5/16	44 3/16	88 3/16	48 3/4	29 1/16	5 31/32	7 7/16	19	26

All dimensions in inches.

Motor Selection

Dynamo Centrifugal Fan

Motor Frame Size

HP	Single Phase					200V, 230V, 460V OR 575V Three Phase			
	Open Drip Proof		TE 115/230	Expl Proof	2 Speed 2 WDG	Open Drip Proof	TE	Expl Proof	2 Speed 2 WDG
	115V	230V							
1/4	48	48	48	48 / 56	48	48	48	48	–
1/3	48 / 56	48 / 56	56	56	56	56	56	56	–
1/2	48 / 56	48 / 56	56	56	56	56	56	56	56
3/4	56	56	56	56	56	56	56	56	56
1	56	56	56	56	56	56	56	56	145T
1 1/2	56	56	145T	184T	–	56	56	56	182T
2	145T	145T	182T	182T	–	56 / 145T	145T	145T	182T
3	184T	184T	184T	215T	–	56 / 145T	182T	182T	184T
5	–	–	–	–	–	184T	184T	184T	215T
7 1/2	–	–	–	–	–	213T	213T	213T	215T
10	–	–	–	–	–	215T	215T	215T	256T
15	–	–	–	–	–	254T	254T	254T	284T
20	–	–	–	–	–	256T	256T	256T	284T
25	–	–	–	–	–	284T	284T	284T	286T

380V/3Ph/50Hz motors are available. On horsepowers less than 1, motor frame sizes may change due to variations in voltage, special features and motor manufacturer. Motors shown are ball bearing, continuous duty, 1750 RPM or 1750/1140 RPM for two speed, two winding motors.

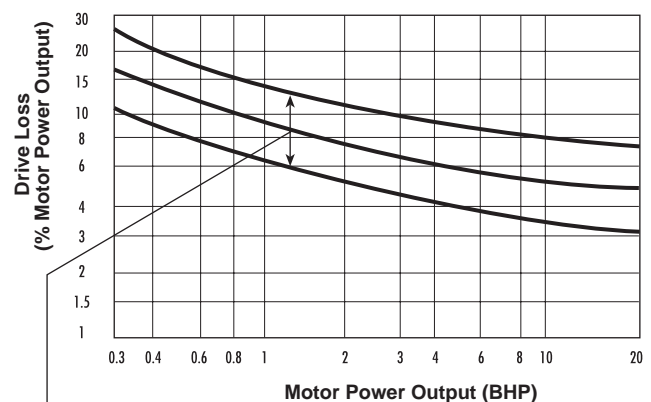
Belt Drive Losses

The AMCA Review Committee has developed the chart shown below for the purpose of estimating belt drive losses. To calculate total BHP (including drive losses): Find the BHP of your operating point on the x-axis on the graph below. Follow the vertical line to the curves indicating the range of drive losses. Look at the y-axis on the left and find the drive loss percentage. Calculate the total BHP by adding the drive loss to the operating point BHP. For BHP's below 0.3, use 30%.

Caution: For totally enclosed, explosion proof, multi-speed and all 1.0 Service Factor motors, fan BHP plus drive losses should not exceed motor rated HP.

Note: FanSizer software incorporates a drive loss allowance when selecting a required nominal horsepower.

Reprinted from AMCA publication 203, with the express written permission from the Air Movement and Control Association, Inc., 30 West University Drive, Arlington Heights, IL 60004-1983



Range of drive loss for standard belts. Higher fan speeds tend to have higher losses than lower fan speeds at the same horsepower.

Nominal Ampere Ratings

Single Phase

HP	115V	208V	230V
1/6	4.4	2.4	2.2
1/4	5.8	3.2	2.9
1/3	7.2	4.0	3.6
1/2	9.8	5.4	4.9
3/4	13.8	7.6	6.9
1	16.0	8.8	8.0

The values of full-load currents, shown on the left, are for motors running at usual speeds and motors with normal torque characteristics. Motors built for especially low speeds or high torques may have higher full-load currents, and multi-speed motors will have full-load current varying with speed, in which case the nameplate current ratings shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 230 to 240 volts.

The table data shown on the left is from the NEC 2005 edition, table 430-148.

Three Phase

HP	208V	230V	460V
1/2	2.4	2.2	1.1
3/4	3.5	3.2	1.6
1	4.6	4.2	2.1
1 1/2	6.6	6.0	3.0
2	7.5	6.8	3.4
3	10.6	9.6	4.8
5	16.7	15.2	7.6
7 1/2	24.2	22	11
10	30.8	28	14
15	46.2	42	21
20	59.4	54	27
25	74.8	68	34

The values of full-load currents, shown on the left, are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics. Motors built for low speeds (1200 RPM or less) or high torques may require more running current, and multi-speed motors will have full-load current varying with speed, in which case the nameplate current ratings shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 230 to 240 and 440 to 480 volts.

The table data shown on the left is from the NEC 2005 edition, table 430-150.

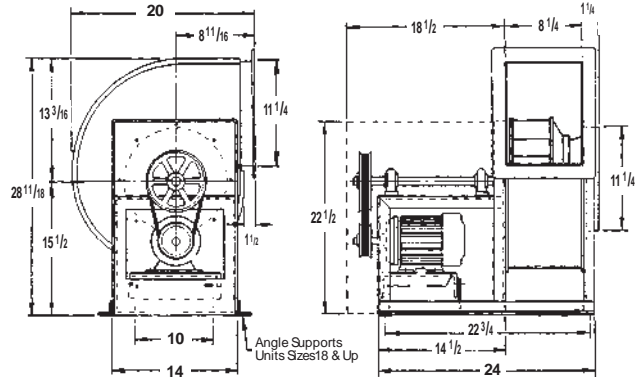
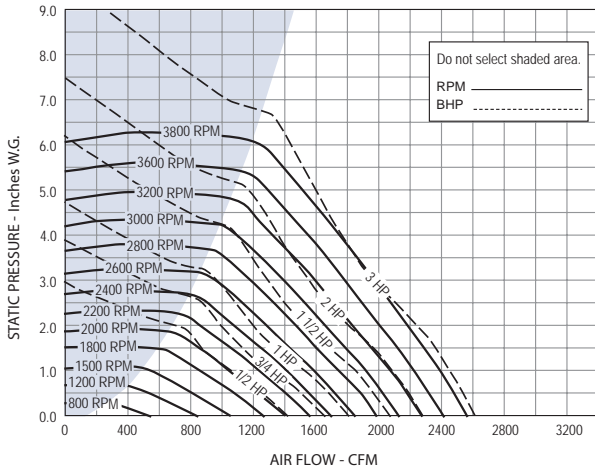
The amperages given here are approximate values only and represent averages compiled from the tables of leading motor manufacturers. Overload relay heaters should not be selected on the basis of these tables only. Heaters must be selected in accordance with the actual motor current as shown on the nameplate. It is also important that ambient temperatures of the area in which the motor control is located be taken into consideration when making heater selections. Ambient compensated overload relays are available for abnormal temperature conditions.

NOTE: On most Belt Drive PennBarry roof exhausters the motor synchronous speed is 1800 RPM.

Performance Data

Dynamo Centrifugal Fan

D10



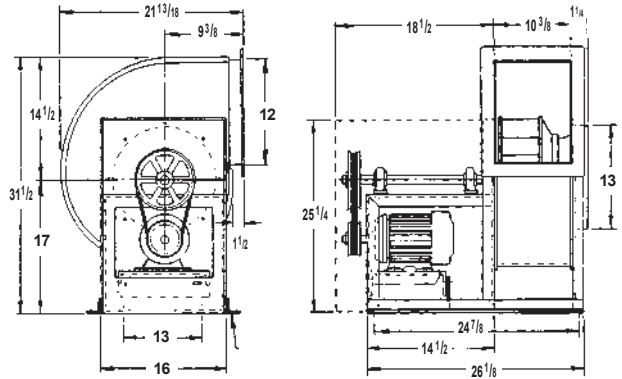
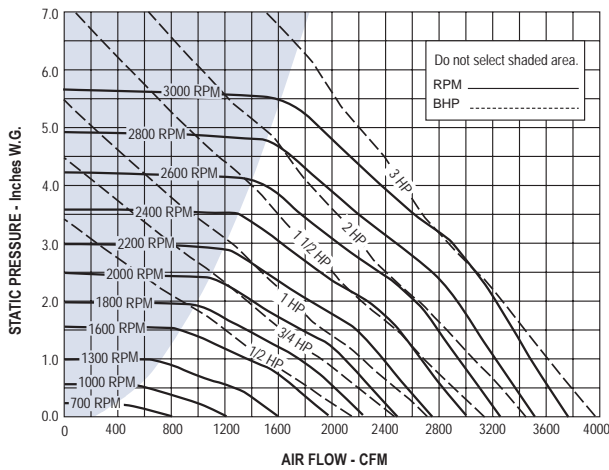
Maximum RPM: 3615	Max BHP: (RPM/2485) ³	Outlet Area: 0.65 Sq. Ft.
Wheel Diameter: 11 1/4"	Tip Speed: 2.95 X RPM	Max Motor Frame Size: 145T

CFM	OV (FPM)	.25" SP		.50" SP		.75" SP		1" SP		1.25" SP		1.50" SP		1.75" SP		2" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
500	769	949	0.056	1137	0.089	1293	0.123	1429	0.162								
600	923	1063	0.076	1232	0.119	1381	0.159	1513	0.199	1627	0.241	1744	0.293				
700	1077	1176	0.100	1335	0.155	1474	0.202	1602	0.248	1717	0.295	1821	0.343	1917	0.393	2017	0.453
800	1231	1291	0.130	1447	0.193	1575	0.251	1694	0.306	1806	0.359	1911	0.412	2007	0.465	2096	0.522
900	1385	1412	0.169	1561	0.237	1681	0.308	1794	0.370	1899	0.431	2000	0.491	2095	0.550	2185	0.611
1000	1538	1537	0.219	1674	0.289	1795	0.367	1898	0.445	2000	0.512	2094	0.580	2186	0.647	2274	0.713
1100	1692	1664	0.278	1790	0.349	1909	0.434	2010	0.520	2103	0.604	2195	0.677	2282	0.752	2365	0.827
1200	1846	1793	0.348	1907	0.418	2022	0.510	2125	0.605	2213	0.698	2298	0.787	2383	0.868	2464	0.950
1300	2000	1923	0.429	2030	0.503	2137	0.596	2238	0.698	2328	0.800	2408	0.901	2487	0.998	2565	1.085
1400	2154	2055	0.524	2156	0.603	2254	0.693	2351	0.801	2443	0.912	2522	1.020	2596	1.129	2669	1.235
1500	2308	2191	0.634	2282	0.716	2372	0.802	2466	0.916	2555	1.034	2639	1.154	2710	1.268	2779	1.385
1600	2462	2325	0.759	2410	0.844	2496	0.935	2583	1.045	2669	1.168	2750	1.294	2826	1.420	2894	1.544
1700	2615	2461	0.900	2539	0.987	2622	1.085	2701	1.186	2784	1.316	2863	1.448	2939	1.583	3009	1.716
1800	2769	2598	1.059	2669	1.147	2748	1.250	2823	1.353	2901	1.479	2978	1.618	3051	1.757	3122	1.900
1900	2923	2734	1.234	2799	1.324	2876	1.434	2948	1.542	3019	1.656	3094	1.802	3165	1.947	3235	2.098
2000	3077	2871	1.429	2933	1.523	3004	1.635	3074	1.749	3141	1.864	3211	2.002	3281	2.156	3348	2.310
2100	3231	3009	1.645	3068	1.743	3133	1.855	3201	1.976	3266	2.096	3329	2.219	3397	2.378	3463	2.540
2200	3385	3146	1.880	3203	1.984	3263	2.096	3328	2.222	3391	2.347	3452	2.474	3515	2.621	3579	2.788
2300	3538	3284	2.138	3339	2.247	3393	2.358	3456	2.489	3518	2.622	3577	2.754				
2400	3692	3422	2.419	3475	2.533	3526	2.647	3585	2.779								

CFM	OV (FPM)	2.25" SP		2.50" SP		2.75" SP		3" SP		3.50" SP		4" SP		4.50" SP		5" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
800	1231	2179	0.579	2265	0.644	2356	0.719										
900	1385	2270	0.671	2348	0.735	2423	0.799	2497	0.867	2657	1.031						
1000	1538	2358	0.779	2438	0.846	2514	0.913	2585	0.983	2719	1.125	2857	1.291				
1100	1692	2448	0.900	2526	0.972	2602	1.046	2674	1.118	2810	1.268	2935	1.424	3056	1.589	3186	1.785
1200	1846	2541	1.032	2617	1.112	2691	1.190	2763	1.270	2899	1.430	3027	1.592	3143	1.759	3255	1.932
1300	2000	2641	1.174	2713	1.262	2783	1.351	2853	1.436	2988	1.608	3114	1.780	3234	1.955	3345	2.134
1400	2154	2743	1.330	2814	1.424	2882	1.519	2948	1.615	3078	1.801	3203	1.986	3322	2.172	3435	2.359
1500	2308	2847	1.502	2916	1.601	2983	1.702	3048	1.804	3172	2.009	3294	2.209	3411	2.406	3523	2.605
1600	2462	2958	1.668	3021	1.796	3086	1.902	3150	2.010	3272	2.227	3387	2.445	3502	2.659	3613	2.871
1700	2615	3072	1.846	3134	1.981	3193	2.115	3254	2.236	3374	2.465	3487	2.693	3596	2.927		
1800	2769	3188	2.041	3248	2.181	3306	2.321	3362	2.462	3477	2.720	3589	2.962				
1900	2923	3301	2.247	3364	2.398	3420	2.542	3476	2.692	3582	2.991						
2000	3077	3414	2.468	3477	2.626	3536	2.783	3590	2.936								
2100	3231	3527	2.704	3589	2.869												

Performance shown is for installation type B - Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream.

D12



Maximum RPM: 3020	Max BHP: (RPM/2065) ³	Outlet Area: 0.87 Sq. Ft.
Wheel Diameter: 12 7/8"	Tip Speed: 3.38 X RPM	Max Motor Frame Size: 145T

CFM	OV (FPM)	.25" SP		.50" SP		.75" SP		1" SP		1.25" SP		1.50" SP		1.75" SP		2" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
700	805	801	0.056	993	0.096	1141	0.139	1276	0.184								
800	920	848	0.069	1042	0.112	1189	0.163	1314	0.211	1432	0.263						
900	1034	907	0.083	1091	0.136	1237	0.186	1362	0.244	1472	0.298	1577	0.355	1680	0.416	1807	0.526
1000	1149	972	0.101	1138	0.161	1286	0.213	1410	0.274	1520	0.338	1619	0.398	1713	0.460	1843	0.578
1100	1264	1043	0.123	1184	0.187	1335	0.249	1458	0.306	1567	0.375	1667	0.447	1758	0.512		
1200	1379	1115	0.149	1238	0.214	1383	0.287	1507	0.349	1616	0.416	1715	0.491	1806	0.569	1891	0.641
1300	1494	1187	0.177	1299	0.244	1427	0.324	1556	0.399	1665	0.465	1763	0.539	1854	0.621	1939	0.705
1400	1609	1260	0.210	1364	0.280	1476	0.365	1603	0.449	1713	0.523	1812	0.594	1902	0.677	1987	0.765
1500	1724	1335	0.248	1435	0.322	1535	0.407	1647	0.498	1763	0.588	1860	0.663	1951	0.739	2035	0.829
1600	1839	1410	0.289	1507	0.370	1596	0.453	1696	0.552	1807	0.648	1909	0.737	1999	0.818	2084	0.900
1700	1954	1485	0.334	1579	0.422	1661	0.506	1753	0.607	1853	0.711	1957	0.814	2049	0.905	2132	0.990
1800	2069	1561	0.384	1651	0.479	1731	0.567	1814	0.667	1901	0.778	2000	0.887	2098	0.996	2181	1.087
1900	2184	1638	0.440	1724	0.541	1803	0.636	1876	0.732	1960	0.849	2048	0.965	2141	1.079	2231	1.192
2000	2299	1715	0.502	1797	0.610	1875	0.710	1944	0.808	2021	0.923	2098	1.048	2187	1.168	2275	1.287
2100	2414	1792	0.569	1872	0.685	1946	0.788	2014	0.892	2082	1.002	2158	1.132	2235	1.261	2320	1.388
2200	2529	1870	0.645	1946	0.763	2019	0.875	2086	0.984	2148	1.093	2219	1.222	2290	1.359	2368	1.492
2300	2644	1947	0.726	2022	0.849	2092	0.969	2158	1.083	2218	1.195	2281	1.318	2350	1.458	2417	1.603
2400	2759	2025	0.816	2097	0.940	2165	1.068	2230	1.188	2289	1.305	2346	1.425	2411	1.565	2477	1.714
2500	2874	2103	0.912	2173	1.039	2239	1.176	2302	1.300	2361	1.424	2416	1.546	2473	1.678	2538	1.832
2600	2989	2181	1.016	2250	1.147	2313	1.289	2374	1.419	2433	1.549	2487	1.677	2539	1.805	2599	1.956
2700	3103	2260	1.129	2327	1.262	2388	1.409	2447	1.547	2505	1.683	2559	1.816	2610	1.949	2661	2.088
2800	3218	2338	1.248	2404	1.384	2463	1.536	2521	1.685	2577	1.824	2630	1.962	2680	2.099	2729	2.239
2900	3333	2417	1.377	2481	1.515	2539	1.672	2595	1.831	2650	1.974	2702	2.117	2752	2.261	2799	2.403
3000	3448	2496	1.515	2558	1.654	2615	1.817	2669	1.981	2723	2.134	2774	2.281	2824	2.431	2870	2.577
3100	3563	2575	1.662	2635	1.805	2691	1.970	2744	2.140	2796	2.301	2847	2.456	2896	2.610	2942	2.762
3200	3678	2654	1.819	2713	1.967	2768	2.134	2819	2.307	2870	2.480	2919	2.636	2968	2.798	3013	2.954

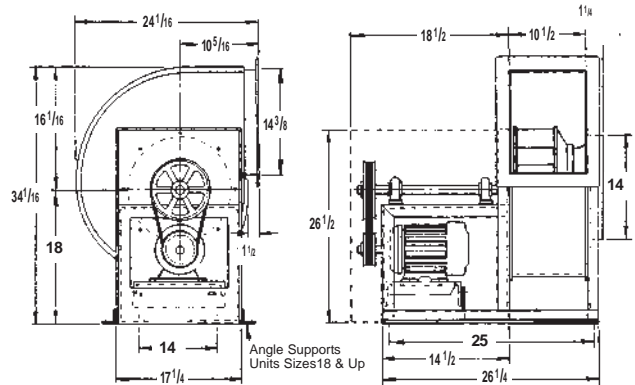
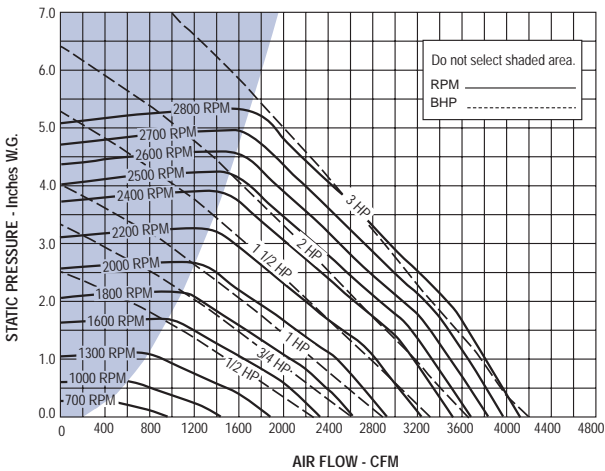
CFM	OV (FPM)	2.25" SP		2.50" SP		2.75" SP		3" SP		3.50" SP		4" SP		4.50" SP		5" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1379	1971	0.713	2050	0.789	2128	0.868	2206	0.950								
1300	1494	2019	0.785	2094	0.862	2166	0.941	2240	1.026	2384	1.200						
1400	1609	2067	0.855	2143	0.945	2214	1.027	2283	1.112	2418	1.289	2551	1.474				
1500	1724	2115	0.824	2190	1.019	2262	1.117	2331	1.208	2460	1.388	2586	1.578	2711	1.777		
1600	1839	2163	0.996	2238	1.096	2310	1.199	2379	1.302	2508	1.499	2628	1.691	2746	1.893	2864	2.106
1700	1954	2212	1.077	2287	1.179	2358	1.284	2426	1.391	2556	1.612	2676	1.818	2789	2.022	2900	2.236
1800	2069	2260	1.178	2336	1.271	2407	1.376	2475	1.488	2603	1.714	2724	1.949	2837	2.165	2944	2.382
1900	2184	2309	1.287	2384	1.384	2455	1.479	2523	1.586	2651	1.823	2772	2.067	2885	2.313	2991	2.538
2000	2299	2359	1.404	2433	1.505	2504	1.606	2572	1.707	2700	1.938	2819	2.188	2932	2.444		
2100	2414	2404	1.514	2482	1.632	2553	1.740	2620	1.845	2749	2.058	2868	2.318	2980	2.581		
2200	2529	2448	1.625	2528	1.756	2602	1.880	2669	1.991	2797	2.213	2917	2.452				
2300	2644	2495	1.740	2572	1.879	2649	2.019	2719	2.146	2846	2.379	2965	2.610				
2400	2759	2544	1.863	2618	2.005	2692	2.150	2765	2.295	2895	2.552	3014	2.795				
2500	2874	2599	1.985	2667	2.140	2738	2.290	2809	2.441	2945	2.734						
2600	2989	2660	2.116	2719	2.278	2786	2.435	2854	2.591	2990	2.905						
2700	3103	2721	2.252	2779	2.418	2836	2.589	2903	2.751								
2800	3218	2783	2.396	2840	2.566	2896	2.741	2951	2.914								
2900	3333	2846	2.549	2901	2.721	2956	2.899	3010	3.082								
3000	3448	2916	2.727	2963	2.885	3018	3.070										
3100	3563	2986	2.914														

Performance shown is for installation type B - Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream.

Performance Data

Dynamo Centrifugal Fan

D13



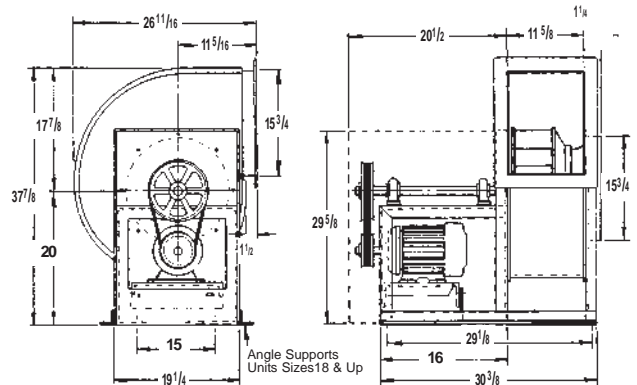
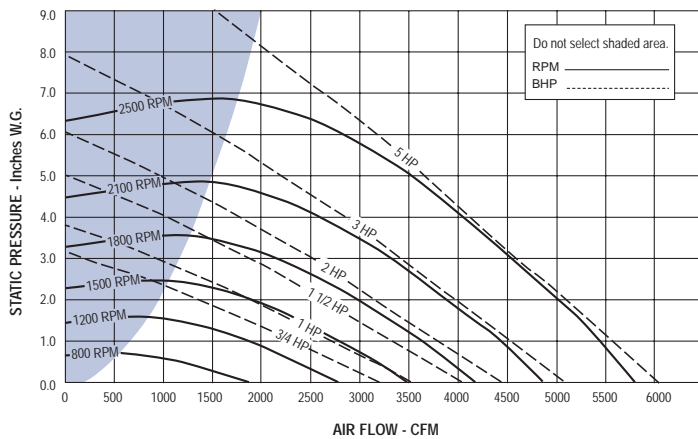
Maximum RPM: 2855	Max BHP: (RPM/1885) ³	Outlet Area: 1.05 Sq. Ft.
Wheel Diameter: 13 5/8"	Tip Speed: 3.57 X RPM	Max Motor Frame Size: 145T

CFM	OV (FPM)	.25" SP		.50" SP		.75" SP		1" SP		1.25" SP		1.50" SP		1.75" SP		2" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	857	832	0.081	1004	0.137	1146	0.200	1267	0.268	1374	0.341	1480	0.418				
1000	952	879	0.098	1047	0.158	1187	0.224	1308	0.296	1414	0.372	1509	0.453	1606	0.538		
1100	1048	925	0.117	1094	0.182	1229	0.252	1348	0.327	1455	0.406	1551	0.491	1638	0.580	1725	0.672
1200	1143	976	0.138	1142	0.208	1272	0.282	1389	0.361	1495	0.445	1592	0.532	1680	0.624	1761	0.720
1300	1238	1034	0.163	1189	0.238	1317	0.316	1431	0.399	1536	0.486	1632	0.578	1722	0.673	1804	0.772
1400	1333	1094	0.190	1237	0.272	1365	0.354	1475	0.441	1578	0.532	1673	0.627	1761	0.726	1844	0.827
1500	1429	1155	0.221	1283	0.309	1413	0.395	1521	0.487	1620	0.581	1714	0.680	1802	0.783	1884	0.889
1600	1524	1216	0.257	1329	0.349	1460	0.441	1568	0.536	1664	0.635	1757	0.738	1843	0.844	1925	0.954
1700	1619	1278	0.296	1381	0.392	1507	0.491	1616	0.590	1711	0.694	1800	0.800	1885	0.910	1966	1.023
1800	1714	1340	0.340	1439	0.440	1554	0.546	1664	0.650	1759	0.758	1845	0.867	1928	0.981	2008	1.098
1900	1810	1403	0.389	1498	0.492	1600	0.605	1711	0.714	1807	0.826	1892	0.940	1972	1.057	2051	1.179
2000	1905	1466	0.442	1559	0.549	1648	0.668	1758	0.783	1855	0.899	1940	1.018	2019	1.139	2094	1.263
2100	2000	1531	0.501	1620	0.611	1702	0.732	1804	0.857	1901	0.978	1988	1.100	2067	1.228	2140	1.354
2200	2095	1596	0.565	1681	0.680	1760	0.805	1850	0.935	1949	1.063	2036	1.190	2115	1.321	2188	1.454
2300	2190	1662	0.635	1742	0.753	1819	0.882	1897	1.019	1995	1.152	2083	1.286	2163	1.419	2236	1.558
2400	2286	1728	0.711	1804	0.834	1879	0.965	1951	1.104	2041	1.248	2130	1.387	2210	1.525	2284	1.667
2500	2381	1794	0.793	1867	0.921	1940	1.055	2009	1.200	2087	1.348	2177	1.494	2257	1.638	2332	1.783
2600	2476	1860	0.882	1929	1.013	2001	1.150	2067	1.299	2137	1.455	2222	1.606	2304	1.756	2379	1.908
2700	2571	1926	0.976	1992	1.112	2062	1.254	2127	1.406	2191	1.563	2269	1.726	2351	1.882	2426	2.038
2800	2667	1992	1.078	2055	1.218	2124	1.366	2187	1.519	2249	1.683	2315	1.850	2397	2.014	2473	2.175
2900	2762	2059	1.188	2120	1.333	2185	1.483	2248	1.640	2307	1.807	2369	1.979	2443	2.152	2519	2.318
3000	2857	2126	1.305	2185	1.454	2248	1.610	2309	1.768	2367	1.940	2424	2.113	2489	2.295	2655	2.469
3100	2952	2193	1.429	2250	1.583	2310	1.743	2370	1.905	2427	2.079	2482	2.258	2541	2.445	2611	2.627
3200	3048	2260	1.562	2316	1.721	2373	1.885	2432	2.053	2488	2.228	2541	2.412	2595	2.597	2658	2.793
3300	3143	2327	1.702	2381	1.865	2436	2.035	2493	2.205	2549	2.384	2601	2.572	2653	2.764	2709	2.963
3400	3238	2394	1.851	2447	2.020	2499	2.192	2555	2.368	2610	2.549	2661	2.740	2711	2.937		

CFM	OV (FPM)	2.25" SP		2.50" SP		2.75" SP		3" SP		3.50" SP		4" SP		4.50" SP		5" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1143	1841	0.820	1920	0.921	2000	1.026										
1300	1238	1880	0.875	1952	0.982	2026	1.090	2100	1.201								
1400	1333	1922	0.933	1994	1.044	2062	1.156	2130	1.272	2267	1.509						
1500	1429	2962	0.998	2036	1.109	2105	1.227	2170	1.346	2297	1.593	2425	1.848				
1600	1524	2002	1.067	2076	1.183	2146	1.301	2213	1.425	2335	1.678	2454	1.942	2574	2.214		
1700	1619	2042	1.139	2116	1.261	2186	1.383	2253	1.508	2378	1.769	2492	2.040	2604	2.321	2717	2.611
1800	1714	2083	1.217	2156	1.342	2226	1.469	2293	1.599	2419	1.862	2534	2.141	2642	2.431	2747	2.727
1900	1810	2126	1.303	2197	1.428	2266	1.559	2333	1.693	2459	1.967	2577	2.249	2684	2.544	2786	2.851
2000	1905	2169	1.393	2240	1.523	2308	1.656	2374	1.794	2499	2.076	2616	2.365	2727	2.664	2828	2.976
2100	2000	2212	1.486	2282	1.621	2350	1.759	2415	1.899	2539	2.188	2656	2.487	2767	2.795		
2200	2095	2257	1.587	2326	1.727	2393	1.869	2457	2.012	2580	2.307	2696	2.614	2806	2.929		
2300	2190	2305	1.698	2371	1.839	2436	1.983	2500	2.131	2622	2.434	2737	2.748	2846	3.070		
2400	2286	2352	1.811	2418	1.958	2481	2.106	2543	2.256	2664	2.567	2778	2.886				
2500	2381	2400	1.931	2465	2.082	2528	2.236	2588	2.389	2707	2.708	2820	3.035				
2600	2476	2449	2.059	2513	2.214	2575	2.372	2635	2.531	2751	2.857						
2700	2571	2496	2.194	2562	2.354	2623	2.515	2682	2.678	2795	3.010						
2800	2667	2543	2.337	2610	2.500	2671	2.665	2730	2.834								
2900	2762	2590	2.487	2656	2.653	2720	2.823	2778	2.996								
3000	2857	2637	2.642	2703	2.816	2767	2.992										

Performance shown is for installation type B - Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream.

D15



Maximum RPM: 2600	Max BHP: (RPM/1446) ³	Outlet Area: 1.30 Sq. Ft.
Wheel Diameter: 15 7/8"	Tip Speed: 4.16 X RPM	Max Motor Frame Size: 184T

CFM	OV (FPM)	.25" SP		.50" SP		.75" SP		1" SP		1.25" SP		1.50" SP		1.75" SP		2" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1150	885	667	0.09	800	0.16	916	0.23	1020	0.30	1116	0.39	1205	0.47	1289	0.56	1369	0.66
1375	1058	744	0.13	864	0.20	971	0.28	1069	0.36	1159	0.45	1243	0.55	1323	0.65	1399	0.75
1600	1231	823	0.17	935	0.26	1034	0.34	1125	0.43	1210	0.53	1290	0.63	1366	0.74	1438	0.85
1825	1404	905	0.23	1011	0.32	1102	0.42	1187	0.52	1267	0.62	1343	0.73	1416	0.84	1485	0.96
2050	1577	988	0.30	1089	0.40	1175	0.51	1255	0.62	1330	0.73	1402	0.84	1471	0.96	1537	1.08
2275	1750	1073	0.38	1169	0.50	1251	0.61	1327	0.73	1398	0.85	1465	0.97	1531	1.10	1594	1.23
2500	1923	1159	0.47	1250	0.61	1330	0.74	1402	0.86	1469	0.99	1533	1.12	1595	1.26	1656	1.39
2725	2096	1247	0.59	1332	0.73	1410	0.87	1479	1.01	1543	1.15	1605	1.29	1664	1.44	1721	1.58
2950	2269	1337	0.72	1416	0.87	1490	1.03	1558	1.18	1620	1.33	1679	1.48	1736	1.64	1790	1.79
3175	2442	1428	0.87	1501	1.03	1572	1.20	1638	1.37	1698	1.53	1755	1.70	1810	1.86	1862	2.02
3400	2615	1520	1.04	1587	1.22	1655	1.40	1719	1.58	1778	1.75	1833	1.93	1886	2.10	1937	2.28
3625	2788	1613	1.24	1674	1.42	1739	1.61	1800	1.81	1858	2.00	1912	2.18	1964	2.37	2013	2.56
3850	2962	1707	1.46	1763	1.65	1823	1.85	1883	2.06	1939	2.26	1992	2.46	2042	2.66	2090	2.86
4075	3135	1801	1.71	1852	1.91	1909	2.12	1966	2.34	2021	2.55	2073	2.77	2122	2.98	2169	3.19
4300	3308	1895	1.99	1943	2.20	1996	2.42	2050	2.64	2104	2.87	2154	3.10	2202	3.32	2248	3.55
4525	3481	1990	2.30	2034	2.51	2084	2.74	2136	2.98	2187	3.22	2236	3.46	2283	3.69	2329	3.93
4750	3654	2085	2.63	2126	2.86	2173	3.09	2222	3.34	2271	3.59	2319	3.84	2365	4.10	2410	4.35
4975	3827	2180	3.00	2219	3.24	2262	3.48	2309	3.74	2356	4.00	2402	4.26	2447	4.53	2491	4.79
5200	4000	2275	3.41	2312	3.65	2353	3.90	2396	4.17	2441	4.44	2486	4.72	2530	4.99	2573	5.27
5425	4173	2371	3.85	2405	4.10	2444	4.36	2485	4.63	2528	4.92	2571	5.20	0	0.00	0	0.00

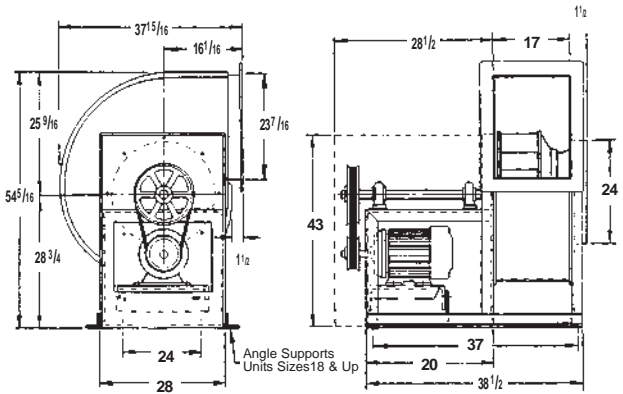
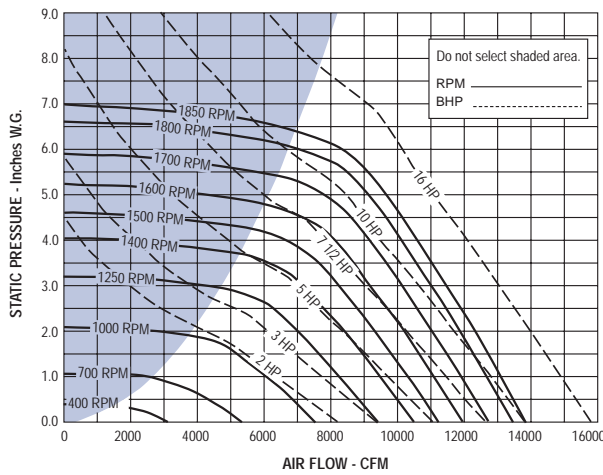
CFM	OV (FPM)	2.25" SP		2.50" SP		2.75" SP		3" SP		3.50" SP		4" SP		4.50" SP		5" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1600	1231	1507	0.96	1574	1.08	1638	1.20	1701	1.32	1820	1.58	1932	1.85	0	0.00	0	0.00
1750	1346	1536	1.04	1600	1.16	1663	1.29	1723	1.42	1840	1.68	1951	1.96	2056	2.25	2156	2.56
1900	1462	1567	1.12	1630	1.25	1691	1.38	1750	1.52	1863	1.79	1971	2.08	2075	2.37	2174	2.68
2050	1577	1601	1.21	1662	1.35	1721	1.48	1779	1.62	1890	1.91	1995	2.20	2096	2.51	2193	2.83
2200	1692	1637	1.31	1696	1.45	1754	1.59	1811	1.73	1919	2.03	2022	2.34	2120	2.66	2215	2.98
2350	1808	1674	1.42	1733	1.56	1789	1.71	1844	1.85	1950	2.16	2051	2.48	2147	2.81	2240	3.15
2500	1923	1714	1.54	1771	1.68	1826	1.83	1880	1.98	1983	2.30	2082	2.63	2177	2.97	2268	3.32
2650	2038	1756	1.66	1811	1.81	1865	1.97	1917	2.12	2018	2.45	2115	2.79	2208	3.14	2297	3.49
2800	2154	1799	1.80	1852	1.95	1905	2.11	1956	2.27	2055	2.61	2150	2.95	2241	3.31	2329	3.68
2950	2269	1844	1.95	1896	2.11	1947	2.27	1997	2.43	2093	2.78	2186	3.13	2276	3.50	2362	3.88
3100	2385	1890	2.10	1940	2.27	1990	2.44	2039	2.61	2133	2.96	2224	3.32	2312	3.70	2396	4.08
3250	2500	1937	2.27	1987	2.44	2035	2.62	2082	2.79	2174	3.15	2263	3.52	2349	3.91	2432	4.30
3400	2615	1986	2.45	2034	2.63	2081	2.81	2127	2.99	2217	3.36	2304	3.74	2388	4.13	2470	4.53
3550	2731	2035	2.64	2082	2.83	2128	3.01	2173	3.20	2261	3.58	2345	3.97	2428	4.37	2508	4.78
3700	2846	2086	2.84	2131	3.04	2176	3.23	2220	3.42	2306	3.81	2389	4.21	2469	4.62	2548	5.04
3850	2962	2137	3.06	2182	3.26	2225	3.45	2268	3.65	2352	4.06	2433	4.47	2512	4.89	2589	5.31
4050	3115	2205	3.36	2249	3.57	2292	3.78	2334	3.98	2415	4.40	2494	4.83	2571	5.26	0	0.00
4250	3269	2275	3.68	2318	3.90	2360	4.12	2401	4.34	2480	4.78	2556	5.22	0	0.00	0	0.00
4450	3423	2346	4.03	2388	4.26	2429	4.49	2469	4.72	2546	5.17	0	0.00	0	0.00	0	0.00
4650	3577	2417	4.40	2458	4.64	2498	4.88	2537	5.12	0	0.00	0	0.00	0	0.00	0	0.00

Performance shown is for installation type B - Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream.

Performance Data

Dynamo Centrifugal Fan

D22



Maximum RPM: 1865	Max BHP: (RPM/806) ³	Outlet Area: 2.80 Sq. Ft.
Wheel Diameter: 22 7/8"	Tip Speed: 5.99 X RPM	Max Motor Frame Size: 256T

CFM	OV (FPM)	.25" SP		.50" SP		.75" SP		1" SP		1.25" SP		1.50" SP		1.75" SP		2" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2900	1036	496	0.226	580	0.370	661	0.536	745	0.746								
3200	1143	529	0.271	608	0.429	679	0.429	757	0.798								
3500	1250	563	0.323	639	0.493	705	0.664	771	0.857								
3800	1357	598	0.383	670	0.563	733	0.751	793	0.941								
4100	1464	633	0.449	701	0.639	763	0.843	819	1.043								
4400	1571	670	0.527	735	0.730	794	0.942	848	1.162								
4700	1679	706	0.610	768	0.825	825	1.049	878	1.285								
5000	1786	743	0.704	803	0.935	857	1.168	908	1.412								
5300	1893	780	0.808	837	1.052	890	1.298	939	1.551								
5600	2000	818	0.926	872	1.182	923	1.437	971	1.705								
5900	2107	856	1.055	908	1.323	957	1.591	1003	1.868								
6200	2214	894	1.195	944	1.474	992	1.761	1036	2.044								
6500	2321	932	1.347	981	1.642	1026	1.937	1070	2.237								
6800	2429	971	1.516	1018	1.822	1061	2.131	1104	2.443								
7100	2536	1010	1.699	1055	2.015	1097	2.339	1138	2.661								
7400	2643	1049	1.897	1092	2.222	1133	2.559	1173	2.899								
7700	2750	1088	2.110	1129	2.443	1169	2.792	1208	3.152								
8000	2857	1128	2.344	1167	2.685	1206	3.048	1243	3.418								
8300	2964	1167	2.589	1205	2.943	1243	3.318	1279	3.700								
8600	3071	1206	2.850	1243	3.218	1280	3.605	1315	3.997								
8900	3179	1246	3.137	1281	3.509	1317	3.908	1351	4.310								
9200	3286	1286	3.442	1319	3.817	1354	4.227	1388	4.649								
9500	3393	1325	3.757	1358	4.153	1392	4.575	1425	5.006								
9800	3500	1365	4.101	1397	4.507	1429	4.930	1462	5.381								
10100	3607	1405	4.465	1436	4.882	1467	5.315	1499	5.776								
10400	3714	1445	4.851	1475	5.277	1505	5.720	1536	6.189								
10700	3821	1484	5.247	1514	5.693	1543	6.145	1573	6.622								
11000	3929	1524	5.676	1553	6.131	1581	6.591	1611	7.089								
11300	4036	1564	6.128	1593	6.603	1620	7.071	1649	7.577								
11600	4143	1604	6.603	1632	7.087	1659	7.573	1686	8.073								
11900	4250	1644	7.103	1672	7.607	1698	8.100	1724	8.606								

CFM	OV (FPM)	2.25" SP		2.50" SP		2.75" SP		3" SP		3.50" SP		4" SP		4.50" SP		5" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5000	1786	1145	2.784	1195	3.134	1243	3.497	1290	3.868								
5300	1893	1160	2.923	1208	3.273	1256	3.646	1302	4.030								
5600	2000	1181	3.104	1223	3.427	1268	3.790	1314	4.184								
5900	2107	1206	3.321	1245	3.636	1285	3.977	1327	4.351								
6200	2214	1234	3.568	1269	3.868	1307	4.207	1345	4.563								
6500	2321	1262	3.827	1297	4.142	1331	4.463	1367	4.816								
6800	2429	1291	4.103	1326	4.438	1359	4.764	1391	5.095								
7100	2536	1322	4.384	1355	4.747	1387	5.077	1419	5.423								
7400	2643	1352	4.667	1385	5.048	1416	5.416	1448	5.777								
7700	2750	1383	4.973	1415	5.358	1446	5.750	1476	6.132								
8000	2857	1414	5.292	1446	5.693	1477	6.101	1506	6.500								
8300	2964	1446	5.637	1477	6.042	1507	6.453	1537	6.880								
8600	3071	1478	5.996	1508	6.405	1538	6.831	1567	7.261								
8900	3179	1510	6.368	1540	6.796	1570	7.239	1598	7.671								
9200	3286	1543	6.763	1572	7.203	1601	7.648	1629	8.095								
9500	3393	1577	7.188	1605	7.633	1633	8.088	1661	8.551								
9800	3500	1611	7.631	1638	8.079	1665	8.542	1692	9.009								
10100	3607	1645	8.092	1672	8.557	1698	9.022	1724	9.499								
10400	3714	1679	8.572	1706	9.054	1732	9.535	1757	10.015								

Performance shown is for installation type B - Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in the airstream.

Sound Power Levels

Since any mechanical device generates some sound energy into the air, fans will create some noise. Because of the great number of factors influencing sound output it is invalid to compare fans based on RPM, tip speed or outlet velocity. The only accurate basis of comparison is the sound power level generated by the fan at the required point of operation.

Having sound power levels for a specific fan at a specific operating point allows the system designer to determine the theoretical sound pressure level at any point in the occupied space. AMCA Publication 303 and the ASHRAE Guides provide more information on this process. Another typical application of sound power levels is to compare similar fans. Generally differences of 6 dB in the 63 Hz band and 3 dB in all other bands are considered insignificant.

System designers use many methods to predict acoustic acceptability of an occupied space.

The A-weighted sound pressure level provides a single number that corresponds well to the human judgement of relative loudness. OSHA bases their requirements regarding exposure to noise on A-weighted sound pressure levels. The disadvantage of this method is that A-weighted sound pressure levels do not provide information as to the quality of the sound. Noise Criteria (NC) curves are also widely used. To determine the NC level, the sound power spectrum is compared to defined limits. Other methods include RC curves, Sones, SIL and Noise Rating Curves.

Each method relies on sound pressure level information because the human ear “hears” sound pressure fluctuations, not sound power (watts). Sound pressure is a function of the

attenuation of the space and the distance from the source. Consider a 100 watt light bulb. It provides adequate light for a closet, but not for a classroom, and in a stadium it would be imperceptible. While the light source was the same power (100 watts), the brightness level changed dramatically. Similarly, the same sound power level (acoustical energy) produces greatly different sound pressure levels (noise).

Sone Ratings

PennBarry has provided sone ratings to allow designers to make an educated judgment as to the noise level a fan will develop in a space. Sone ratings are a loudness index developed from sound power level data. The calculation is at 5' from the fan inlet and in front of a reflecting plane (hard wall). Sones are weighted similarly to the A-weighting scale in that more weight is given to frequencies that people can hear “well” and less weight to frequencies that people do not hear “well”. A significant feature of the sone scale is that it is linear rather than logarithmic. This means that 40 sones is 33% louder than 30 sones, as opposed to 40 dB being twice as loud as 30 dB.

Since the sone rating is determined from well defined assumptions and is linear in nature, it is ideal for comparing different fans moving air at the same CFM and SP. When using sones for this purpose, differences of 3 sones are considered negligible. The suggested loudness level chart below is a practical guideline for acceptable installed performance.

The sone values shown in this catalog are based on the sound power levels determined above, and calculated in accordance with AMCA Standard 301 “Methods for Calculating Fan Sound Ratings from Laboratory Test Data.”

Sound Classification Guide

Suggested Loudness Level			Types of Areas	
Area Sone Levels	Noise Criteria NC	dBA (1)		
Up to 9	32 to 54	35 to 60	Bingo Hall, Auction Room, Hotel Ballroom, Social Club, Reception Room, Apartment House, Professional Office, Supervisor Office, Courtroom, School and Classroom, Hospital Ward, Operating Room, Correction Facility.	Moderately Quiet Sound
9.1 to 13	55 to 59	61 to 65	Lobby/Corridor, Spectator Area, Chicken House, Greenhouse, General Open Office, Restaurant, Night Club, Department Store, Ticket Sales Office, Casino, Spa, Control Room, Rail, Bus, Plane, Bowling Alley, Print Shop, Drafting Office, Convention Hall	Average
13.1 to 18	60 to 64	66 to 70	Washroom & Toilet, Retail Shop, Bus Terminal Lounge, Foreman's Office, Cocktail Lounge, Office Hall & Corridor, Tabulation & Computation Office, Kitchen Cafeteria, Hotel Garage, Computer Room, Warehouse, Battery Charging Room	Commercial
18.1 to 50	65 to 78	71 to 84	General Storage Area, Restaurant Banquet Room, Swimming Pool, Supermarket, Hotel Kitchen and Laundry, Welding Booth, Department Store Main Floor, Paint Booth, Heat Treating Plant, Tool Maintenance Area	High Sound
50.1 Plus	78.1 to 85+	84.1 to 90+ (2)	Manufacturing Area, Heavy Machine Foundry, Assembly Line, Machine Shops, Punch Press Shop, Light Machine Area, Boiler Room, Emergency Generator Room, Pump House, Power Plant, Transformer, Steel Mill, Engine Test Room, Compressor Room, Steel Stamping	Ext. Heavy Industrial

Notes: (1) dBA range of A-weighted sound levels, in decibels.

(2) Sound levels this high are subject to OSHA Standards for safety, as well as state and local ordinances. Sound attenuation provisions should be considered.

Source: ASHRAE, AMCA Publications.

Sound Power Data

Dynamo Centrifugal Fan

D24

CFM	SP	RPM	Sound Power Levels (dB re 10-12)							
			Octave Band Center Frequency (hz)							
			63	125	250	500	1000	2000	4000	8000
2900	0.250	408	75	71	69	65	63	54	47	40
2900	1.250	741	84	81	76	72	72	67	62	57
2900	2.250	972	74	79	84	77	75	72	67	64
4025	0.500	572	80	80	76	73	70	63	57	50
4025	2.500	1046	77	80	86	79	78	75	70	66
4025	5.000	1444	82	83	90	84	83	81	77	72
5150	1.000	772	85	83	79	75	73	68	65	57
5150	2.750	1120	79	81	87	81	80	77	72	69
5150	5.000	1467	84	84	91	85	84	82	78	73
6650	1.500	969	77	83	87	81	79	75	69	65
6650	3.000	1206	82	82	91	83	82	80	75	71
6650	5.000	1506	85	85	93	86	85	83	79	74
8150	0.500	935	78	84	84	80	79	76	68	63
8150	2.250	1187	83	84	92	84	84	81	75	70
8150	5.000	1539	86	86	94	87	86	84	81	75
9650	1.250	1180	86	86	93	86	87	84	77	71
9650	2.250	1297	85	86	94	87	87	84	78	72
9650	4.000	1501	87	87	95	88	88	86	82	76
10775	1.000	1251	86	85	94	86	87	84	78	71
10775	2.000	1366	88	88	95	89	89	87	81	74
10775	3.000	1466	89	88	96	89	89	87	83	76
11525	0.750	1293	85	85	92	85	86	84	77	70
11525	1.750	1406	89	89	96	89	90	88	82	75
11525	2.500	1482	90	89	96	90	90	88	83	76
13025	0.250	1387	83	83	90	84	84	82	76	69
13025	1.250	1491	89	88	95	89	89	87	82	74
13025	2.000	1556	91	90	97	91	92	90	85	77

D36

CFM	SP	RPM	Sound Power Levels (dB re 10-12)							
			Octave Band Center Frequency (hz)							
			63	125	250	500	1000	2000	4000	8000
9000	0.250	360	80	70	62	58	54	51	48	47
9000	1.500	565	89	89	81	74	72	68	65	64
11600	0.500	475	84	84	73	66	63	59	55	54
11600	1.750	633	91	92	83	77	76	72	69	68
11600	2.750	760	97	96	88	82	80	77	75	74
14200	0.750	582	88	92	81	75	72	67	64	61
14200	2.000	712	93	94	86	80	79	75	71	69
14200	3.000	814	97	98	91	84	82	78	76	73
14200	4.000	918	100	100	95	87	85	81	78	76
16800	1.000	684	92	96	87	81	79	74	70	68
16800	2.250	794	95	98	90	83	81	77	73	70
16800	4.000	945	100	101	97	88	86	82	78	76
19400	0.250	700	88	92	84	78	75	70	66	64
19400	1.250	783	94	98	90	83	81	79	73	70
19400	2.250	857	96	99	93	85	83	78	75	72
19400	5.000	1066	102	103	102	91	89	85	81	78
22000	1.000	846	96	99	93	85	83	78	74	71
22000	2.250	930	97	99	96	87	84	80	76	73
22000	4.500	1084	102	102	102	91	89	85	81	78
24600	0.750	908	95	98	94	85	82	77	73	71
24600	2.000	993	98	99	97	87	84	80	76	73
24600	3.500	1079	101	101	101	90	87	84	80	77
27200	0.500	982	95	96	96	85	82	77	73	70
27200	1.500	1044	100	100	101	90	86	82	78	75
27200	2.500	1100	100	100	99	89	86	82	79	75
29150	0.250	1036	94	95	95	84	81	76	72	69
29150	1.750	1120	101	101	103	92	88	84	80	77

D30

CFM	SP	RPM	Sound Power Levels (dB re 10-12)							
			Octave Band Center Frequency (hz)							
			63	125	250	500	1000	2000	4000	8000
6000	0.250	430	75	73	68	63	59	53	47	42
6000	1.250	643	84	83	75	71	69	66	61	58
8500	0.500	609	80	86	78	75	72	68	63	59
8500	1.500	776	82	89	83	79	76	73	69	66
8500	2.500	909	86	89	83	78	74	72	70	67
11000	0.250	707	82	86	80	77	74	70	66	63
11000	0.750	777	86	91	85	82	79	6	71	68
11000	1.750	913	82	86	82	76	73	70	68	65
11000	2.750	1029	89	87	90	80	77	74	73	69
11000	4.500	1210	97	92	93	85	81	78	77	73
13500	0.250	853	85	89	86	80	78	75	70	67
13500	1.000	939	81	83	81	74	71	68	66	63
13500	2.000	1051	88	84	89	79	76	73	72	68
13500	3.000	1158	92	86	92	82	80	76	75	71
13500	5.000	1335	98	91	94	86	84	80	79	75
16000	0.250	1001	78	77	81	71	68	64	63	59
16000	0.750	1049	83	80	85	75	72	68	67	63
16000	1.750	1144	90	83	89	80	77	73	72	68
16000	2.750	1240	93	87	92	83	80	77	76	72
16000	4.500	1397	97	91	95	87	84	81	79	76
18500	0.500	1171	85	79	85	75	73	69	68	64
18500	1.500	1255	90	84	89	80	78	74	73	69
18500	2.500	1335	94	87	92	83	81	78	76	73
18500	3.500	1419	97	90	95	86	84	80	79	75
20500	0.250	1269	85	79	84	76	73	70	68	64
20500	1.000	1327	90	84	88	80	77	74	72	69
20500	1.750	1384	93	87	91	82	80	77	75	72

The sound power level ratings shown are in decibels, referred to 10-12 watts calculated per AMCA Standard 301. Values shown are for inlet Lwi sound power levels for installation Type B: free inlet, ducted outlet. Ratings do not include the effects of duct end correction.

Sample Specifications

Dynamo Centrifugal Fan

Centrifugal exhaust or supply blowers shall be Dynamo, general purpose, belt driven utility fans with non-overloading, backwardly inclined aluminum wheels, as manufactured by PennBarry, 1401 North Plano Road, Richardson, Texas 75081. Fans shall be single inlet, single width, AMCA arrangement 10 with clockwise (or CCW) rotation. Air discharge position shall be THD unless specified otherwise.

Fan housing shall be heavy gauge galvanized steel for maximum corrosion protection, with Weld-Lock™ construction. Housings shall be field rotatable to any of eight 45° incremental air discharge positions. Fan scrolls shall be equipped with a bolted, gasketed (quick release if specified) access door for cleaning and inspection.

The bearing supports shall be constructed of welded structural steel members to prevent vibration and rigidly support the shaft and bearings, bearings shall be heavy duty, self aligning pillow block ball bearings, grease lubricated and selected for minimum life (L₅₀) of 200,000 hours at maximum operating speed. Shafts shall be turned, ground, polished and rust protected. Shafts shall be sized so the first critical speed is at least 20% over the maximum operating speed. Close tolerances shall be maintained along the length of the shaft.

The fan wheel shall be aluminum, non-overloading backward inclined type. The wheels shall be statically and dynamically balanced. The wheel and inlet shall be aerodynamically designed and constructed to provide maximum performance and efficiency.

Pulleys shall be adjustable (through 20 HP) cast iron, machined, keyed and securely attached. Belts and pulleys shall be sized for 165% of the installed motor horsepower. Motors shall be heavy duty ball bearing open drip proof (totally enclosed or other type if specified) motors. After assembly the entire unit, with drive train installed and set to specified RPM, shall have a computerized vibration analysis performed. Vibration shall be measured in the horizontal, vertical and axial directions at each bearing to assure quality and smooth operation. The computerized print out shall be filed and made available upon customer request.

Fans shall be licensed to bear the AMCA Air and Sound Certified Ratings Seal. Fan air performance ratings shall be

Heat & Smoke Removal Configuration

While Dynamo fans are commonly used for supply or exhaust applications in commercial, institutional and industrial HVAC systems, they are also designed to discharge contaminated or grease-laden air or fumes up and away from building surfaces with the Fatrap option and when equipped with the Heat and Smoke Removal option, this series of fans incorporates features exclusively designed to exhaust heat and smoke in the event of fire. During these emergencies, the fans are designed to operate at the temperature and time limits stated below. To maintain power to these fans during emergencies, special consideration must be made for field power supply. In the event of an emergency, if power is maintained, the units will operate for the times and temperatures indicated, after which they will continue to operate until they are destroyed by the extreme temperature generated during an actual fire, or their roof structure collapses. For smoke control systems, Heat and Smoke Removal configured fans are listed per UL for emergency smoke removal, referencing UL705, UL793, Industrial Risk Insurers (IRI), and Southern Building Code Congress International (SBCCI). The UL standard requires the fan to run at 500°F for 4 hours (IRI) and 1000°F for 15 minutes (SBCCI). PennBarry Heat and Smoke Removal configured Dynamo units are listed at 500°F for 4 hours and 1000°F for 41 minutes. The additional 26 minutes at 1000°F will buy precious time in the event of a fire.

Steel Wheel:

The wheel is a standard duty, all welded wheel (standard duty and high pressure belt drive). The blades are curved for improved air performance while increasing their strength and rigidity. The wheel assembly is fully welded to provide extremely durable and consistent performance. The wheel is dynamically balanced. Balancing weights are mechanically attached to the inside of the rims of both the backplate and wheel inlet. This allows a precise placement of the weights anywhere within a full 360° range on two separate planes, without the possibility of detachment.

Addition to specification:

and shall be UL (UL Std. 705, UL Std. 762 optional) and CSA listed. If specified (Fatrap option), fan shall additionally provide UL 762 Listing rated at 400° F., motor pre-wired to a weather-proof junction box, and drain connection leading into a grease collector/separator box. If specified (heat and smoke removal option), fan shall additionally provide UL listing rated for 500°F at 4-hours and 1000°F at 41 minutes, including a steel wheel.

Limited One Year Warranty

Dynamo Centrifugal Fan

What Products Are Covered

PennBarry Fans and Ventilators (each, a "PennBarry Product")

One Year Limited Warranty For PennBarry Products

PennBarry warrants to the original commercial purchaser that the PennBarry Products will be free from defects in material and workmanship for a period of one (1) year from the date of shipment.

Exclusive Remedy

PennBarry will, at its option, repair or replace (without removal or installation) the affected components of any defective PennBarry Product; repair or replace (without removal or installation) the entire defective PennBarry Product; or refund the invoice price of the PennBarry Product. In all cases, a reasonable time period must be allowed for warranty repairs to be completed.

What You Must Do

In order to make a claim under these warranties:

1. You must be the original commercial purchaser of the PennBarry Product.
2. You must promptly notify us, within the warranty period, of any defect and provide us with any substantiation that we may reasonably request.
3. The PennBarry Product must have been installed and maintained in accordance with good industry practice and any specific PennBarry recommendations.

Exclusions

These warranties do not cover defects caused by:

1. Improper design or operation of the system into which the PennBarry Product is incorporated.
2. Improper installation.
3. Accident, abuse or misuse.
4. Unreasonable use (including any use for non-commercial purposes, failure to provide reasonable and necessary maintenance as specified by PennBarry, misapplication and operation in excess of stated performance characteristics).
5. Components not manufactured by PennBarry.

Limitations

1. In all cases, PennBarry reserves the right to fully satisfy its obligations under the Limited Warranties by refunding the invoice price of the defective PennBarry Product (or, if the PennBarry Product has been discontinued, of the most nearly comparable current product).
2. PennBarry reserves the right to furnish a substitute or replacement component or product in the event a PennBarry Product or any component of the product is discontinued or otherwise unavailable.
3. PennBarry's only obligation with respect to components not manufactured by PennBarry shall be to pass through the warranty made by the manufacturer of the defective component.

General

The foregoing warranties are exclusive and in lieu of all other warranties except that of title, whether written, oral or implied, in fact or in law (including any warranty of merchantability or fitness for a particular purpose).

PennBarry hereby disclaims any liability for special, punitive, indirect, incidental or consequential damages, including without limitation lost profits or revenues, loss of use of equipment, cost of capital, cost of substitute products, facilities or services, downtime, shutdown or slowdown costs.

The remedies of the original commercial purchaser set forth herein are exclusive and the liability of PennBarry with respect to the PennBarry Products, whether in contract, tort, warranty, strict liability or other legal theory shall not exceed the invoice price charged by PennBarry to its customer for the affected PennBarry Product at the time the claim is made.

Inquiries regarding these warranties should be sent to: PennBarry, 1401 North Plano Road, Richardson, TX 75081

OTHER PENNBARRY PRODUCTS

CENTRIFUGAL PRODUCTS



Domex
Centrifugal
Roof Exhausters



Fumex Fatrap
Kitchen Hood Centrifugal
Roof Exhausters



Zephyr
Ceiling and Inline Fans



Dynamo
Centrifugal Blowers



Centrex Inliner
Centrifugal Inline Fans



LC Dynafan
Low Contour Centrifugal
Roof Exhausters

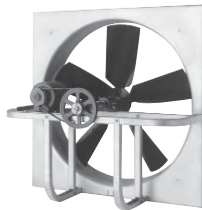


ESI
Efficient Silent
Inline Fan



Fume Exhaust
Curb Mounted
Centrifugal Fans

AXIAL / GRAVITY PRODUCTS



Breezeway
Propeller Wall Fans



HI-EX
Power Roof Ventilator



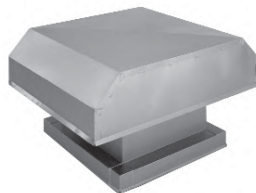
Tubeaxial
Inline Fans



Vaneaxial
Inline Fans



Powered Airette
Axial Roof Ventilators



Airette
Gravity Intake/Relief Hood



Domex Axial
Axial Roof Ventilators



Axcentrix
Bifurcator Fan

For more information contact your local PennBarry Sales
Manufacturer Representative or visit us at www.PennBarry.com

