Vane Axial Fans Models VAB and VAD

Belt and Direct Drive





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High Performance Vane Axial



Greenheck vane axial fans are designed for commercial and industrial applications where large volumes of air are required at moderate to high pressures. These fans are an excellent choice for HVAC systems using variable air volumes, cleanrooms, parking garage exhaust, tunnel ventilation and other high volume requirements.

The tubular design, high efficiency rotor and integral straightening vanes provide high performance using minimal space. These fans can be mounted in a variety of configurations and are available with a complete line of accessories.

Performance Information								
Specifications:	Belt Drive	Direct Drive						
Fan Sizes	18-72	18-72						
Hub Sizes	14, 17, 21, 26 and 30	14, 17, 21, 26 and 30						
Consoition	2,000 – 145,000 cfm	1,200 – 240,000 cfm						
Capacities	3,400 – 246,400 m³/hr	2,000 – 407,800 m³/hr						
Static	Up to 7.5 in. wg	Up to 10 in. wg						
Pressure	Up to 1,870 Pa	Up to 2,490 Pa						

Vane Axial Advantages

Models VAB and VAD offer several advantages over centrifugal fans – lower size and weight and higher efficiency.

Centrifugal fans are large, heavy and must be base mounted. Vane axial fans are compact and relatively light allowing for much greater mounting flexibility. In addition to base mounting, vane axial fans can be ceiling mounted or suspended, mounted horizontally, vertically or at any angle.

A higher efficiency results from axial airflow directly through the fan housing, eliminating the 90° turn required for centrifugal fans. Higher operating efficiency translates to lower costs over the long term.

Most sound from centrifugal fans is produced in the lower octave bands. Vane axial fans generate sound mainly in the higher octave bands. Sound in the higher octave bands is more easily attenuated, making vane axial fans less costly to silence.





Certified data may be found in Greenheck's Computer Aided Product Selection program (CAPS[®]). FEI - Fan Energy Index





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Greenheck offers added value to our wide selection of top performing, energy-efficient products by providing several unique service programs.



- Our Quick Delivery program ensures shipment of in-stock products within 24 hours of placing your order. Our Quick Build made-to-order products are manufactured in 1-3-5-10-15-20 or 25-day production cycles, depending upon its complexity.
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- Greenheck's free Computer Aided Product Selection program CAPS[®], rated by many as the best in the industry, helps you conveniently and efficiently select the right products for the challenge at hand.
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 3D drawings for many of our ventilation products.

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Vane Axial Models & Features



Belt Drive Model

Model VAB (Adjustable Pitch)

These models offer the advantages of final system balancing, easier access to the motor, economical future system upgrading, and the capability to operate in airstream temperatures up to $200^{\circ}F$ ($93^{\circ}C$).

Direct Drive Model

Model VAD (Adjustable Pitch)

Adjustable pitch fans offer low maintenance and compact size. Direct drive vane axials have a maximum operating temperature of $110^{\circ}F$ (43°C) with standard motors.



- Cleanrooms
- Parking garage exhaust
- Tunnel ventilation
- High volume



AIRFLOW -







Vibration Testing

Before shipment, every vane axial fan is vibration tested as a complete assembly. The maximum allowable vibration on a VAB at the fan bearings are 0.15 in/sec peak velocity, filter-in, for the specified fan RPM. VAD maximum vibration is 0.08 in/sec peak, filter-in, on the fan housing for the specified RPM. A record of any vibration test result is available upon request.

By performing the vibration test, we are able to provide more than simply trim balancing; it is also a diagnostic tool for finding potential problems. A defective bearing or motor, bent shaft or misaligned sheaves may cause excessive vibration. A complete vibration test will find these problems before the fan leaves the factory.

Electrostatic Powder Paint and Protective Coatings

All internal and external steel components are electrostatically powder painted prior to assembly with an industrial polyester urethane, Permatector[™]. This finish is excellent for both indoor and outdoor applications and has added resistance to many common chemicals. An advantage of powder coatings is that they offer a uniform, durable and high quality finish that uses a one-coat process applied over a phosphatized surface. Charged paint particles are able to penetrate and fill voids in hard to reach locations like joints or mating pieces, areas often not covered by sprayed-on wet paint. For increased chemical resistance or special applications, Greenheck offers a number of other powder coatings. Consult Greenheck's Product Application Guide, Performance Coatings for Ventilation Products for a complete listing of coatings and relative resistance.



Belt Drive Features



Drives

Premium cast iron sheaves are keyed to motor and fan shafts. Variable pitch motor sheaves can be adjusted to increase or decrease fan speeds (within horsepower and RPM limitations). Constant speed fixed pitch sheaves are also available and highly recommended for motors over 25 hp.

Shafts

Precision-ground and polished solid steel shafts are sized so that the first critical speed is at least 25% over the maximum operating speed.

Bearings

Standard bearings are air handling quality, grease lubricated, self-aligning ball or roller type, selected for a minimum (L_{50}) life in excess of 200,000 hours of operation at maximum cataloged conditions for each pressure class.

Extended Lubrication Lines

Pre-filled nylon lubrication lines extend from the fan shaft bearings to grease fittings on the exterior of the fan housing.

Motor Supports

Heavy-gauge steel supports are welded to the fan housing. Motor plates with jack screws provide belt tension adjustment.

Motors

Heavy-duty motors are carefully matched to the fan load. Greenheck can supply any voltage, phase or enclosure that is commercially available. Optional high efficiency motors are recommended for maximum energy savings.

Motor Mounting Positions



Standard motor position for horizontal ceiling hung and base mount.

Motor positions available for horizontal base mount.

Motor positions available for horizontal ceiling hung.

Note: Motor positions B, C, D, F, G and H require special consideration for sizing vibration isolators. Consult the factory. Motors on vertical mount fans are centered between the mounting brackets.



Direct Drive Features



Extended Lubrication Lines

Pre-filled copper lubrication lines extend from each motor bearing to external grease fittings on the exterior of the fan housing.

Electrical

Leads from the motor are enclosed in a conduit and extended to the exterior of the fan housing. Leads terminate in an electrical junction box.

Rotors

Direct drive models are available with manually adjustable blade pitch. The adjustment of the preset-set blade pitch angle provides a means for system balancing during the installation or for future requirements.

Motors

Direct drive vane axial motors have an advantage of being located in the airstream and are cooled by the airflow. Greenheck can supply standard or highefficiency motors of any voltage, phase or enclosure commercially available. Check motor frame size limitations in the Vane Axial Performance Data brochure when making selections.







Rotor Construction Features

- 1. Hub and blades are constructed of aircraft quality heat treated A356-T6 cast aluminum.
- 2. Blade sockets are precision machined into the rotor hub.
- 3. Blade bases are precision machined for an exact fit.
- 4. Steel blade studs are threaded into the blade base and secured to the rotor hub with self-locking nuts.
- 5. One blade base is stamped with blade pitch graduations and indexed to the hub. All blades can be field adjusted (within horsepower limitations) using this master blade as a reference.

Half-Bladed Construction

Models with half-bladed rotors offer higher efficiency at lower pressures using half the standard number of blades.



Vane Axial Accessories Affecting Air Performance

Inlet Bell

Uniform airflow into the vane axial rotor is a prerequisite of cataloged performance. A non-ducted vane axial inlet, without the aid of an inlet bell, does not provide for the smooth airflow required. High velocity airflow drawn over an abrupt edge of the vane axial housing creates a phenomenon known as "vena-contracta". In other words, the airflow is diverted away from the walls of the fan housing, slightly reducing the effective inlet area and creating little or no loading of the rotor blade tips. This results in poor performance, vibration and excessive noise. An inlet bell streamlines the housing of a non-ducted vane axial fan assuring cataloged performance.



Inlet Cone

Inlet cones accomplish the same purpose as inlet bells, but are for ducted inlet applications. The inlet cone is an excellent transition from a larger duct diameter to a smaller vane axial housing. It allows for a smooth, gradual reduction in duct size and uniform airflow into the vane axial rotor.

Outlet Cone

Outlet cones, also known as diffuser sections, improve vane axial efficiency by providing for static regain. Vane axial fans are typically high volume air moving devices with relatively high outlet velocities. These high outlet velocities, and their resultant velocity pressure losses, rob a vane axial of a significant portion of its total efficiency. An outlet cone installed on the discharge end of a vane axial fan allows high velocity airflow to expand when two vane axials with high outlet velocities are selected, one without an outlet cone and one with an outlet cone. The fan selected with the outlet cone will require considerably less horsepower to deliver the same CFM and static pressure. An important point to remember is that an outlet cone must discharge into a duct diameter the same size as the large end of the outlet cone and this duct must not be reduced in size immediately after the cone.

Vane Axial Discharge Configurations



Best - Ducted outlet with outlet cone



Best - Free discharge with outlet cone



Good - Ducted outlet



Poor - Free discharge

Mounting Options



Horizontal Mounting Legs

Heavy gauge steel support legs welded to the fan are punched to accept base vibration isolators.



Horizontal Suspension Brackets

Brackets welded to the fan housing for horizontal ceiling hung applications are punched to accept hanging spring isolators.



Vertical Base or Suspension Brackets

Brackets welded to the fan housing for vertical base mount or vertical ceiling hung applications are punched to accept vibration isolators. Customer must specify one of the mounting arrangements shown below.





UBFM







DBCH

Options and Accessories



The VAB and VAD are available with optional accessories to improve the ease of installation, enhance performance and provide safety during operation. Accessories supplied by Greenheck conform to our high standards of quality.

Companion Inlet and Outlet Flanges

Available to aid the connection of the fan casing flange to ductwork. Companion flanges are prepunched to match the bolt hole dimensions.

Inlet Bell

Minimizes entry losses into the fan from free (nonducted) inlet conditions to ensure rated performance. Inlet bell guards are supplied to prevent accidental contact with the fan propeller.

Inlet and Outlet Guards

Protect personnel and equipment in ducted or non-ducted installations. Guards are heavy gauge expanded steel and are removable for routine fan maintenance.

Inspection Section with Access Door

Highly recommended to provide access to internal fan components of ducted fans when inlet or outlet cones are not installed. The bolted access door allows visual inspection only. Hinged access doors are available.

Inlet/Outlet Cone

Recommended on all ducted and non-ducted outlets with high velocities. Provides higher fan efficiency by allowing gradual expansion of high velocities converting energy-wasting velocity pressure into usable static pressure. Inlet and Outlet cones are available with bolted access doors for visual inspection.

Guard for Inlet/Outlet Cone

Expanded steel screen sized for the large end of an outlet cone. Recommended for all non-ducted inlets and outlets.

Belt Guard

Three-sided or totally enclosed belt guards protect motor pulley and drive belts, as well as personnel from rotating drive components. Cannot be used when a motor cover is installed.

Motor Cover

A vented steel cover installed over the motor and drive on belt drive units provides protection from weather, dust and dirt while protecting personnel from rotating drive components.

Isolators

Both base mount and hanging style are available in spring mounts. The isolators are furnished in sets of four and are sized to match the total weight of each fan, motor and accessory combination.

Vibration Switch

This is an adjustable switch that shuts the fan off immediately in event of excessive vibration. The switch can be preset to any level of vibration amplitude and provides continuous vibration monitoring. An audible or visual signal may also be wired to the switch. Designed for maintenance free service in permanent installations.

Thrust Restraints

Recommended on installations where the fan thrustto-weight ratio may result in fan movement. Thrust restraints are typically installed in pairs at the fan discharge.



Thrust Restraint Installation (Typical)

Electrical Wiring Options

Electrical wiring is standard on VAD fans and brings the electrical connections from the motor to the exterior of the fan casing. Extended Motor Leads are an extension of the actual motor wires from within the motor housing to an externally mounted junction box on the fan casing. Extended Wiring can be provided to route electrical leads from the standard motor junction box to the exterior of the fan casing. In both cases the leads are enclosed in a protective conduit.

Exploded View





Model Number Code

The model number code consists of a number of separate elements that completely describe a vane axial fan for ordering purposes. The sequence of elements serves as a specifying and ordering checklist to ensure all elements are correctly identified.



Dimensional Data





Fan Size	Α	В	С	D	Е	F	G	н	J	к	L (inches sq.)
18	18 ³ / ₈	21 ¾	13 ½		23 ¹ / ₂	4½	23	26 ¹ / ₄	16	14	7
20	20 ³ / ₈	23 ³ ⁄4	15		26	4 ¾	25	28 ¹ / ₄	18	14	7
24	24 %	27 ¾	17 ½	S	30	5 ¾	30 ¾	33 ¹ / ₂	21	14	7
30	30 ¾	33 ¾	21 ¹ / ₄	H	36	6 5⁄%	36 ¾	39 ¹ / ₂	26	14	7
36	36 ¾	39 ¾	25	CH	46	8 ½	44	47 ¹ / ₄	31	14	7
42	42 ¹ / ₂	47	29	RT	54 %	10 ½	52	56 ¹ / ₄	36	17	10
48	48 ½	53	34	BE	60 ⁵ ⁄16	11 ½	61 ¼	66 ¹ / ₂	42	17	10
54	55	59 ½	37	LO I	68	12	67 ¼	72 ¹ / ₂	47	22	15
60	61	66 ¹ / ₂	41	٤	78	1 4¼	75	80 ³ / ₈	52	22	15
66	67	72¹/ 2	44 ¹ / ₂		85	15 ³ ⁄ ₄	82	88 ³ / ₈	57	22	15
72	73	78 ½	48 ¹ / ₂		93	17	89	95 %	62	22	15



Optional Inspection Section with Access Door

Dimensions shown are in inches. For direct drive fans, Dimension D varies with motor frame size.

D Housing Length

_		Belt Drive				
Fan Size		VAD				
	182T - 215T	254T - 286T	324T - 365T	404T - 405T	444T - 445T	VAD
18	32	36	-	-	-	32
20	32	36	-	-	-	32
24	32	36	40	-	-	36
30	32	36	40	-	-	40
36	32	40	44	48	52	40
42	32	40	44	48	52	44
48	32	40	44	48	52	48
54	32	40	44	48	52	48
60	-	40	44	48	52	52
66	-	40	44	48	52	52
72	-	40	44	48	52	52

Dimensions shown are in inches.



Fan Weights (lbs.)

Fan Size			Housing				
	182T - 215T	254T - 286T	324T - 365T	404T - 405T	444T - 445T	VAB	Material Thickness
18	169	181	-	-	-	213	10 ga.
20	189	200	-	-	-	237	10 ga.
24	239	254	268	-	-	419	10 ga.
30	334	352	369	-	-	477	10 ga.
36	473	597	627	656	685	776	³∕₁₀ inch
42	626	703	737	772	805	942	³∕₁₀ inch
48	730	833	872	911	949	1190	³∕16 inch
54	-	1220	1280	1340	1400	1830	1/4 inch
60	-	1370	1440	1510	1580	2160	1/4 inch
66	-	1470	1550	1620	1700	2360	1/4 inch
72	-	1690	1780	1860	1940	2690	1/4 inch

Motor Weights (lbs.)

Motor Frame Size	Open	TEFC
143T	30	50
145T	38	54
182T	58	90
184T	84	110
213T	110	163
215T	136	193
254T	247	251
256T	300	306
284T	358	362
286T	387	409
324T	469	520
326T	516	583
364T	595	864
365T	643	968
404T	847	1091
405T	942	1222
444T	1145	1606
445T	1380	1880
447T	1748	2950

Accessory Weights (lbs.)

Fan Size	Inlet Bell	Inlet/ Outlet Cone	Inlet/ Outlet Guard	Belt Guard	Motor Cover	Inspection Section	Horizontal Base	Vertical Brackets	Horizontal Ceiling Hung Brackets
18	10	38	9	5	29	33	20	33	6
20	11	44	11	5	29	36	22	33	6
24	13	58	14	7	42	43	27	33	6
30	24	82	17	10	54	54	33	33	6
36	33	146	22	11	64	64	60	33	10
42	53	205	32	13	64	112	92	33	10
48	64	268	39	14	64	128	147	46	10
54	80	408	46	17	76	178	176	46	16
60	191	507	60	20	76	197	199	46	16
66	208	603	69	22	76	217	237	46	16
72	249	695	78	23	76	236	261	46	16

Rotor Blades per Hub Size – Full Bladed Hubs

Hub Size	14	17	21	26	30
Number of Blades	8	10	12	14	16

Specifications

Belt Drive

Vane axial fans shall be belt driven, Arrangement 9, with the motor attached to the exterior of the fan housing on an adjustable base. Turned, precision ground and polished steel shafts shall be sized so the first critical speed is at least 25% over the maximum operating speed. Bearings shall be grease lubricated, air handling quality ball or roller type selected for a minimum average (L50) life in excess of 200,000 hours at maximum operating speed. Rotor blades and hub shall be heat treated cast aluminum alloy A356-T6 with blade bases and hub sockets precision machined. Blades shall be attached to the hub with steel studs and selflocking nuts. Hub shall be positively secured with a steel taper lock bushing keyed to the fan shaft. Rotor blade pitch shall be manually adjustable within horsepower limitations. Rotor shall be statically and dynamically balanced to within 0.0785 in./sec peak vibration velocity as measured on the bearings. Fan housing shall be fabricated from heavy-gauge steel with prepunched flanges at both ends. A minimum of seven heavy-gauge straightening vanes shall be welded to the fan housing downstream from the rotor. Vane axial fans shall be model VAB as manufactured by Greenheck Fan Corporation of Schofield, Wisconsin, and shall be supplied as shown on the plans and in the fan schedule.

Direct Drive

Vane axial fans shall be direct driven. Arrangement 4, with the fan rotor secured to the motor shaft. Motors shall be located downstream from the rotor for maximum cooling. Rotor blades and hub shall be heat treated cast aluminum alloy A356-T6 with blade bases and hub sockets precision machined. Blades shall be attached to the hub with steel studs and self-locking nuts. Hub shall be positively secured with a steel taper lock bushing keyed to the motor shaft. (Add paragraph for appropriate rotor type here). Rotor shall be statically and dynamically balanced to within 0.0785 in/sec. peak vibration velocity as measured on the fan housing. Fan housing shall be fabricated from heavy-gauge steel

with prepunched flanges at both ends. A minimum of seven heavy-gauge straightening vanes shall be welded to the fan housing downstream from the rotor. Vane axial fans shall be model VAD as manufactured by Greenheck Fan Corporation of Schofield, Wisconsin, and shall be supplied as shown on the plans and in the fan schedule.

Adjustable Pitch Rotor

Blades shall be manually adjustable within horsepower limitations. A blade tip angle scale shall be machined into the base of the master blade and indexed to the hub. All blades shall be adjustable to align with the master blade pitch setting.















Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Product warranties can be found online at Greenheck.com, either on the specific product page or in the literature section of the website at Greenheck.com/Resources/Library/Literature.



