GREENHECK
Building Value in Air.

Document 452954
Models VAB and VAD
Vane Axial

Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.

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General Safety Information

Only qualified personnel should install this fan. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC), the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electrical Code (CEC) in Canada.
2. The rotation of the impeller is critical. It must be free to rotate without striking or rubbing any stationary objects.
3. Motor must be securely and adequately grounded.
4. Do not spin fan impeller faster than max cataloged fan rpm. Adjustments to fan speed significantly effects motor load. If the fan RPM is changed, the motor current should be checked to make sure it is not exceeding the motor nameplate amps.
5. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces or chemicals. Replace cord immediately if damaged.
6. Verify that the power source is compatible with the equipment.
7. Never open access doors to a duct while the fan is running.

DANGER

Always disconnect power before working on or near a fan. Lock and tag the disconnect switch or breaker to prevent accidental power up.

CAUTION

When servicing the fan, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

CAUTION

Precaution should be taken in explosive atmospheres.

Receiving

Upon receiving the product check to make sure all items are accounted for by referencing the bill of lading to ensure all items were received. Inspect each crate for shipping damage before accepting delivery. Notify the carrier if any damage is noticed. The carrier will make notification on the delivery receipt acknowledging any damage to the product. All damage should be noted on all the copies of the bill of lading which is countersigned by the delivering carrier. A Carrier Inspection Report should be filled out by the carrier upon arrival and the Traffic Department. If damaged upon arrival, file claim with carrier. Any physical damage to the unit after acceptance is not the responsibility of Greenheck Fan Corporation.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Manually rotate the impeller to detect any interference between the impeller blades and the fan housing.

Handling

The fan should not be removed from its shipping crate before being moved to its final location.

Vane axial fans should be lifted by installing a clevis in the top hole of each flange (Fig. 1), or by the wooden skid if a forklift is used. Handle in such a manner to avoid scratching or chipping. Special care must be taken to avoid causing damage from stress or shock. Damaged finish may reduce ability of the fan to resist corrosion.

Fig. 1

Fans should never be lifted by the fan housing, motor or accessories.

Storage

Fans are protected against damage during shipment. If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the fan and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

All accessories must be stored indoors in a clean, dry atmosphere. Belts are to be stored flat to keep them from warping and stretching. Fans—stored indoors or outdoors—are to be placed in a vibration-free location. The impeller should be blocked to prevent free-spinning.

During the storage period, rotate the impeller monthly and energize the motor every three months. If storage will be in a clean environment and will extend beyond three months, purge grease prior to storage and every three months thereafter. If fan is stored in a humid, dusty or corrosive atmosphere, purge the grease prior to storage and monthly during the storage period.

INDOOR - The ideal environment for the storage of fans and accessories is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain, or snow. Temperatures should be evenly maintained between 30°F *(-1°C)* and 110°F *(43°C)* (wide temperature swings may cause condensation and "sweating" of metal parts). All accessories must be stored indoors in a clean, dry atmosphere.

Remove any accumulations of dirt, water, ice or snow and wipe dry before moving to indoor storage. To avoid "sweating" of metal parts, allow cold parts to reach room temperature. To dry parts and packages use a portable electric heater to get rid of any moisture build up. Leave coverings loose to permit air circulation and to allow for periodic inspection.

The unit should be stored at least 3-1/2 in. *(89 mm)* off the floor on wooden blocks covered with moisture proof paper or polyethylene sheathing. Aisles between parts and along all walls should be provided to permit air circulation and space for inspection.

OUTDOOR - Roads or aisles for portable cranes and hauling equipment are needed.

The fan should be placed on a level surface to prevent water from leaking into the fan. The fan should be elevated on an adequate number of wooden blocks so that it is above water and snow levels and has enough blocking to prevent it from settling into soft ground. Locate parts far enough apart to permit air circulation, sunlight, and space for periodic inspection. To minimize water accumulation, place all fan parts on blocking supports so that rain water will run off.

Do not cover parts with plastic film or tarps as these cause condensation of moisture from the air passing through heating and cooling cycles.

Improper storage which results in damage to the fan will void the warranty.

Inspection & Maintenance during Storage

While in storage, inspect fans once per month. Keep a record of inspection and maintenance performed.

If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the impeller by hand ten to fifteen revolutions to distribute lubricant on motor. If paint deterioration begins, consideration should be given to touch-up or repainting. Fans with special coatings may require special techniques for touch-up or repair.

Machined parts coated with rust preventive should be restored to good condition promptly if signs of rust occur. Immediately remove the original rust preventive coating with petroleum solvent and clean with lint-free cloths. Polish

any remaining rust from surface with crocus cloth or fine emery paper and oil. Do not destroy the continuity of the surfaces. Wipe clean thoroughly with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive or WD-40® or the equivalent.

Removing from Storage

As fans are moved from storage to be installed in their final location, they should be protected and maintained in a similar fashion until the fan equipment goes into operation. Purge grease before putting fan into service.

Installation

CAUTION

For units supplied or used with a Variable Frequency Drive (VFD), reference the VFD documentation for installation requirements, start-up settings, parameter adjustments and trouble shooting. VFDs provided by Greenheck are factory programmed for basic motor parameters, incoming voltage parameters and maximum operating speed (Hz).

Follow NEC and local codes for VFD wiring and installation. If the wire length between the VFD and the controlled motor exceeds 100 ft (*30.5 m*), DV/DT filters or VFD cabling may be required. Calculations and proper application of DV/DT filters and VFD cabling is by others; failing to do so may result in premature motor failure.

Service Access - Greenheck recommends all vane axial installations be provided with a means for service access. This access may be in the form of access doors in the duct system, removable duct sections, inlet and outlet cones or an optional inspection section (Fig. 2).

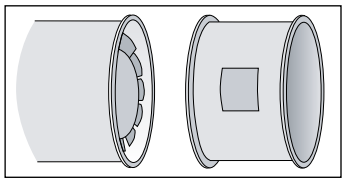


Fig. 2 Inspection section for service access

Service access is necessary to inspect and repair internal fan components, both at the inlet and outlet ends of the fan. Fans installed without consideration for service access can result in time consuming and expensive removal of connected ductwork.

Airflow Direction - Airflow through a vane axial fan enters at the impeller end and is exhausted out the end of the fan containing the motor (direct drive) or drive components (belt drive). Additionally, an arrow decal is affixed to the fan indicating direction of airflow.

Electrical Connection

Electrical connections are made to wires located in the junction box located on the fan housing for direct drive fans or in the junction box located on the motor for belt drive fans. The electrical supply must be compatible with the motor with regard to voltage, phase and amperage capacity. The electrical supply must be provided with a lockable disconnect switch, proper fusing and comply with local and national electric codes.

Greenheck recommends a vibration switch be installed in the electrical circuit to disable the fan in event of abnormal vibration. These switches are available through your nearest Greenheck representative.

Controlling Vibration

Vibration Isolators

Although vane axial fans are typically very smooth running fans, any residual vibration will be transmitted and amplified through flooring, ceilings and ductwork. To prevent a small amount of vibration from becoming a large amount of noise, vibration isolators are recommended for floor mount or ceiling hung installations.

The most common isolators are:

Isolator Type	Application
Free-Standing Spring	Permits radial and axial vibration dampening.
Housed Spring	Permits radial and axial vibration dampening where less motion can be tolerated.
Restrained Spring	Used where large weight changes or high wind loads occur. Upward vertical movement is prevented by mechanical restraints.
Seismic Control	Restricts movement of supported equipment during earthquakes while providing isolation.
Spring Hanging	Provides vibration isolation of suspended equipment. Threaded suspension rods typically are supplied by the installer.
Rubber-in-Shear	Neoprene isolators are highly effective for relatively small fans with speed of 1800 RPM and over.

Flexible Duct Connectors

Flexible duct connectors should be taut between the fan inlet and the connecting duct. Loose flexible connectors will cause “necking” of the airstream when installed on the negative pressure side of the fan. This will create non-uniform airflow into the fan inlet and starve the impeller blade tips of air. Therefore, the flexible connector should not be loose and should be just long enough for mechanical isolation. See Fig. 3 for flexible connectors.

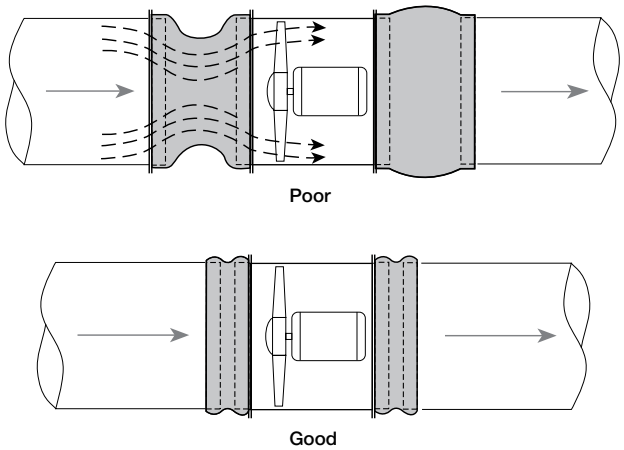


Fig. 3 Flexible Duct Connectors

Effects of Installation on Performance

System Effect - Inlet and outlet conditions greatly affect the air performance of a vane axial fan. The Air Movement and Control Association (AMCA) defines system effect as “a pressure loss which recognizes the effect of fan inlet restrictions, fan outlet restrictions, or other conditions influencing fan performance when installed in the system”.

System effect is very difficult to quantify and correct. Frequently, the only means to correct the resulting poor performance is to increase fan speed or blade pitch in the hope of overcoming the additional pressure loss. This may result in overloading the motor and require motor replacement. In extreme cases, the entire fan may need to be replaced if the system effect is severe.

The following diagrams show common inlet and outlet conditions. Minimum recommended distances are shown to minimize system effect on the ducted and non-ducted installations.

Non-Ducted Inlets - Greenheck recommends inlet bells on all non-ducted inlets. An inlet bell smooths airflow into the impeller blade tips providing uniform impeller blade loading. An inlet without an inlet bell creates non-uniform airflow resulting in poor performance, vibration and noise.

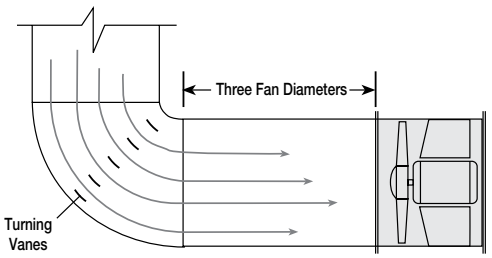
Inlets in Proximity to Walls - Vane axial installations with a non-ducted inlet too close to a wall or other obstruction may create reduced fan performance. Greenheck recommends a minimum of one fan diameter between a wall and the fan inlet.

Ducted Inlets - Inlet ducts must provide smooth non turbulent airflow into the impeller blades. Any elbows, transitions, dampers or other disruptions close to the fan inlet will create system effect and reduce fan performance.

Non-Ducted Outlets - Greenheck recommends an outlet cone be attached to all non-ducted outlets. An outlet cone reduces velocity pressure losses resulting in lower brake horsepower and higher efficiency.

Outlets in Proximity to Walls - Vane axial outlets should be no closer than two fan diameters from any wall. Fans with less than this distance will experience significant performance losses.

Ducted Outlets - Ducted outlets require a straight, uniform diameter length of ductwork immediately after the fan outlet. Sharp turns or elbows close to the outlet will create system effect losses and poor air performance. Greenheck recommends a minimum of three fan diameters between the fan outlet and any duct turn.



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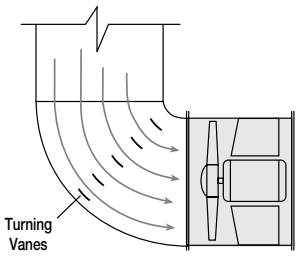

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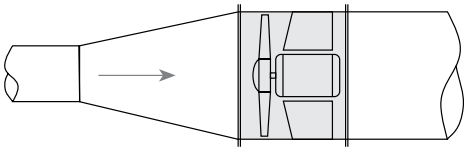

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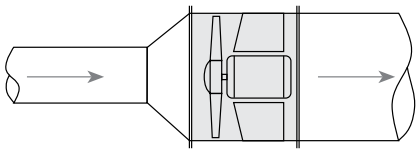

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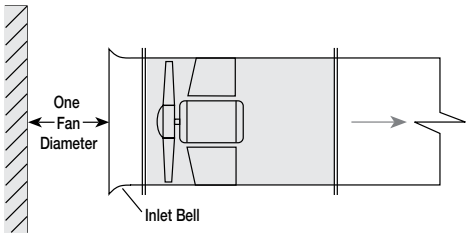
Ducted Inlet Conditions



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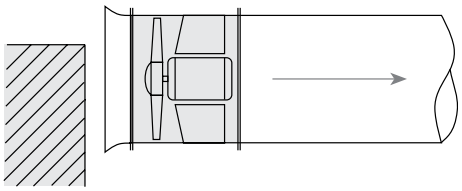

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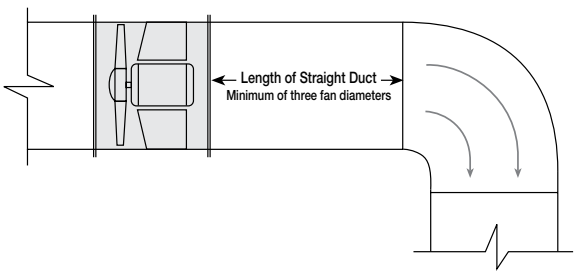
Non-Ducted Inlet Conditions



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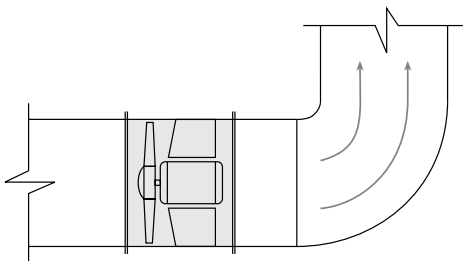

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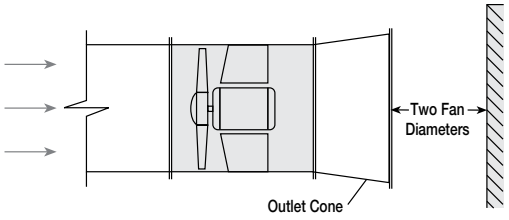
Ducted Outlet Conditions



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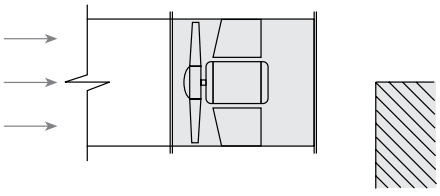

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Non-Ducted Outlet Conditions

Unit Start-Up

DANGER

High voltage electrical input is needed for this equipment. This work should be performed by a qualified electrician.

WARNING

Disconnect and secure to the “OFF” position all electrical power to the fan prior to inspection or servicing. Failure to comply with this safety precaution could result in serious injury or death.

1. Disconnect and lock-out all power switches to fan.
2. Check all fasteners, set screws and locking collars on the fan, impeller, bearings, drive, motor base and accessories for tightness.
3. Rotate the fan impeller by hand and assure no parts are rubbing.
4. Check for bearing alignment and lubrication. (VAB)
5. Check the V-belt drive for proper alignment and tension. (VAB)
6. Check all guarding (if supplied) to ensure that it is securely attached and not interfering with rotating parts.
7. Check all electrical connections for proper attachment.
8. Check housing and ductwork, if accessible, for obstructions and foreign material that may damage the fan impeller.

Routine Maintenance

When performing any service to the fan, disconnect the electrical supply and secure fan impeller.

Once the unit has been put into operation, a routine maintenance schedule should be set up to accomplish the following:

1. Lubrication of bearings and motor (see below).
2. Impeller, housing, bolts and set screws on the entire fan should be checked for tightness.
3. Any dirt accumulation on the impeller or in the housing should be removed to prevent unbalance and possible damage.
4. Isolation bases should be checked for freedom of movement and the bolts for tightness. Springs should be checked for breaks and fatigue. Rubber isolators should be checked for deterioration.
5. Inspect fan impeller and housing looking for fatigue, corrosion, or wear.

Motors

Motor maintenance is generally limited to cleaning and lubrication. Cleaning should be limited to exterior surfaces only. Removing dust and grease build up on the motor housing assists proper motor cooling. Never wash-down motor with high pressure spray. Many fractional motors are permanently lubricated for life and require no further lubrication. Motors supplied with grease fittings should be greased in accordance with the manufacturer’s recommendations.

CAUTION

When operating conditions of the fan are to be changed (speed, pressure, temperature, etc.), consult Greenheck to determine if the unit can operate safely at the new conditions.

Variable Frequency Drive Operation

WARNING

For operation with Variable Frequency Drive (VFD), always check motor amps when adjusting the operating frequency. Motor may be sized for the original selected operating speed under 60 Hz. Bypassing the VFD or increasing the speed from this original selection, even if less than 60 Hz, may cause motor overload or failure. Consult factory with fan serial number before increasing the upper limiting frequency.

Always check the fan rpm when adjusting the operating frequency. Do not exceed maximum fan rpm stated on the unit identification nameplate.

Shaft Bearings

The bearings for Greenheck fans are carefully selected to match the maximum load and operating conditions of the specific class, arrangement, and fan size. The instructions provided in this manual and those provided by the bearing manufacturer, will minimize any bearing problems. Bearings are the most critical moving part of the fan, therefore special care is required when mounting them on the unit and maintaining them.

Refer to the table and the manufacturer's instructions for grease types and intervals for various operating conditions. Never mix greases made with different bases. This will cause a breakdown of the grease and possible failure of the bearing.

Recommended Bearing Lubrication Schedule
Relubrication Schedule in Months*

Standard Grease								
Fan RPM	Bearing Bore (inches)							
	½ - 1	1⅛ - 1½	1⅝ - 1⅞	1 15/16 - 2 3/16	2 7/16 - 3	3 3/16 - 3½	3 15/16 - 4½	4 15/16 - 5 7/16
To 250	12	12	12	12	12	12	10	8
500	12	12	11	10	8	7	5	4
750	12	9	8	7	6	4	3	2
1000	12	7	6	5	4	3	2	1
1250	12	6	5	4	3	2	1	.5
1500	12	5	4	3	2	1	.75	-
2000	12	3	3	2	1	.5	.25	-
2500	12	2	2	1	.5	.25	-	-
3000	12	2	1	.5	.25	-	-	-
3500	12	1	.5	.25	-	-	-	-
4000	12	.5	.25	-	-	-	-	-
5000	12	.25	-	-	-	-	-	-
Number of shots**	4	8	8	10	16	25	41	57

* Lubrication interval is based on 12 hour per day operation and maximum 160˚F housing temperature.

For 24 hour per day operation, the interval should be cut in half.

** Lubricant should be added with the shaft rotating and until clean grease is seen purging from the bearing. The lubrication interval may be modified based on the condition of the purged grease. If bearing is not visible to observe purged grease, lubricate with number of shots indicated for bore size.

- For conditions including high temperatures, moisture, dirt or excessive vibration, consult the factory for a specific lubrication interval for your application.
- Lubricant should be a high quality lithium complex grease conforming to NLGI Grade 2. Factory recommends Mobilux EP-2.
- The use of synthetic lubricants will increase lubrication intervals by approximately three times.
- Storage periods of three months or longer require monthly rotation of the shaft and purging grease prior to start-up.

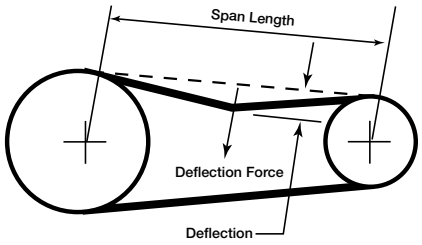
V-Belt Drives

V-belt drives should be checked for wear, tension, alignment and dirt accumulation on a regular basis. Premature belt failure is frequently caused by improper belt tension (excessively tight or loose) or misaligned sheaves. Excessive belt tension creates high bearing loads which reduce bearing life. Belts which are too loose may cause squealing on start-up, belt flutter, slippage and overheating of the sheaves. Belts which are overly tight or loose may cause vibration and noise.

When replacing V-belts on multiple groove drives, all belts should be changed to provide uniform drive loading. Do not pry belts on or off the sheave. Loosen belt tension until belts can be removed by simply lifting the belts off the sheaves. After replacing belts, ensure that slack in each belt is on the same side of the drive. Belt dressing should never be used. Do not install new belts on worn sheaves. If the sheaves have grooves worn in them, they must be replaced before new belts are installed.

Belt Tension

The proper tension for V-belts is the lowest tension at which the belts will not slip at peak load conditions. For initial tensioning, the belt should deflect 1/64 inch for each 1 inch of belt span. For example, a belt span of 32 inches should deflect 1/2 inch with moderate thumb pressure at midpoint of the drive. Check belt tension after 24 hours of operation and periodically thereafter.

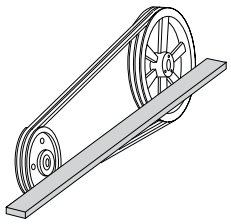


V-Belt Drives - *continued*

V-Belt Replacement

The V-belt drive components, when supplied by Greenheck Fan Corporation, have been carefully selected for this unit's specific operating condition. Changing V-belt drive components could result in unsafe operating conditions which may cause personal injury or failure of fan components.

1. Remove the protective coating from the end of the fan shaft using mineral spirits or another similar solvent. Check to ensure that the shaft is free of nicks and burrs.
2. Slide sheaves on shafts. Do not drive sheaves on as this may result in bearing damage.
3. Align fan and motor sheaves with a straight-edge or string and tighten.
4. Place belts over sheaves. Do not pry or force belts, as this could result in damage to the cords in the belts.



Aligning sheaves with a straight edge

5. Adjust the tension until the belts appear snug. Run the unit for a few minutes (refer to unit start-up section) and allow the belts to "set" properly.
6. With the fan off, adjust the belt tension by moving the motor pivot plate. (Belts are adjusted by raising or lowering the motor pivot plate). When in operation, the tight side of the belts should be in a straight line from sheave to sheave with a slight bow on the slack side.

Blade Pitch Adjustment for Belt and Direct Drive

Note
Blade pitch adjustment can be accomplished using either Master Blade or Pitch Protractor. Follow steps 1-10 to use Master Blade. If using Pitch Protractor, replace step 3 with instructions found on protractor. Other steps are identical.
• Print Pitch Protractor on page 9 using 1-to-1 scale.

1. Disconnect all electrical power to the fan and lock in the "off" position. See warning on front cover of this manual.
2. Remove the aluminum nose cone on the impeller assembly. Record the location of all balancing weights located under the nose cone bolts.

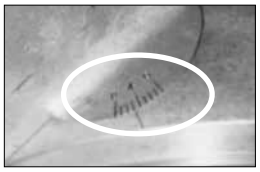


Fig. 4

3. Locate the blade with blade pitch graduations stamped into the blade base and index line on the impeller (Fig. 4). This is the master blade.

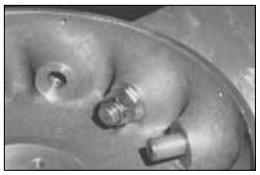


Fig. 5

4. Loosen the self-locking nut (Fig. 5) attaching the blade until it can be rotated by hand.
5. Set the new blade pitch by aligning the desired blade pitch number with the index mark or angle on Pitch Protractor. Tighten the self-locking nut slightly to prevent the master blade from moving.

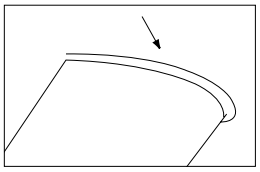
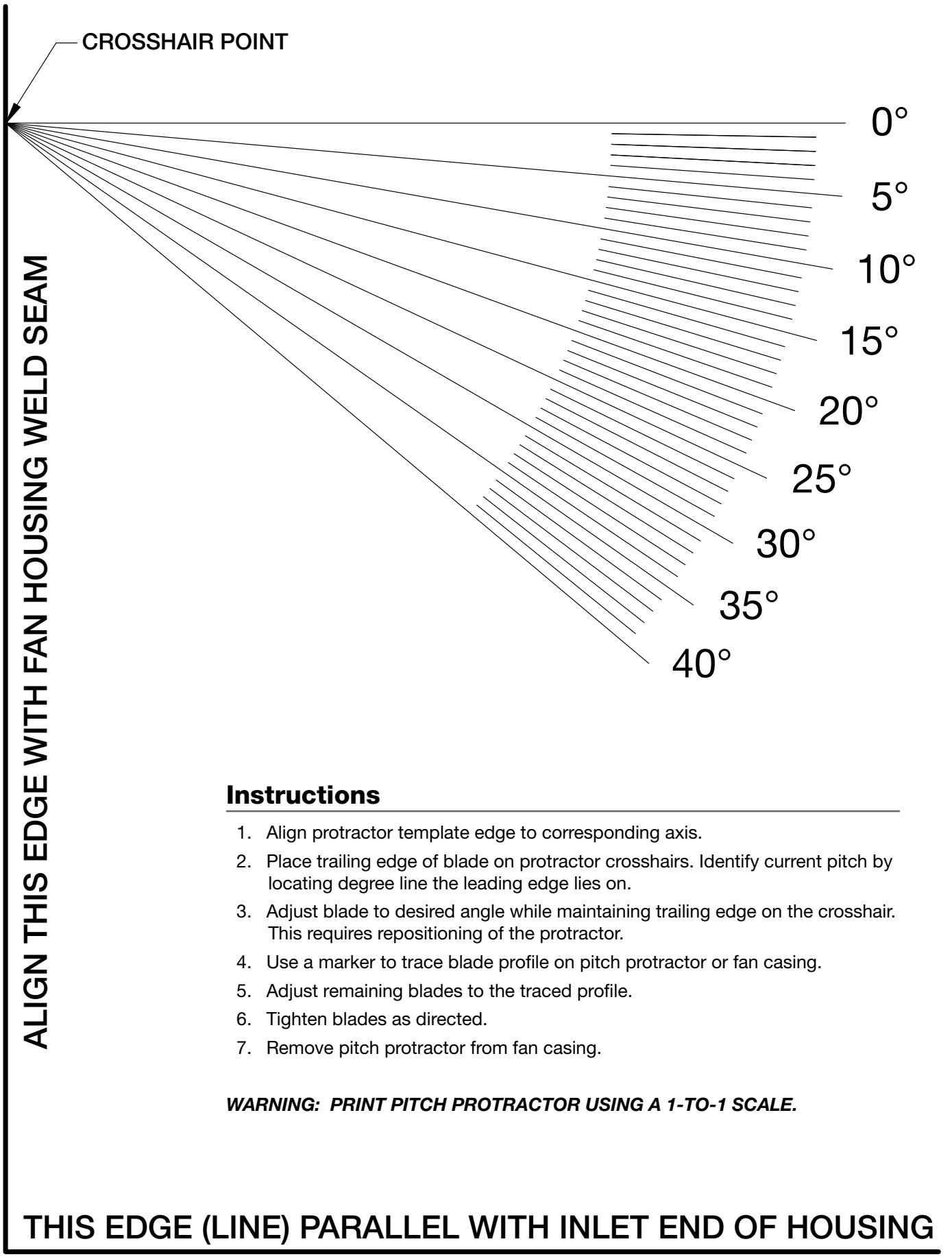


Fig. 6

6. At the tip of the blade, use a thin marker pen to scribe the blade profile on the interior of the fan housing from the leading to the trailing edge of the blade tip (Fig. 6).
7. Loosen the self-locking nuts on the remainder of the blades and set each blade to align with the blade profile scribed on the fan housing. Tighten the self-locking nut slightly to prevent blade from moving.
8. After all blades are adjusted to the proper setting, tighten the self-locking nuts to 125 ft lbs. of torque. Verify that all the blades tips follow the profile on the fan housing.
9. Replace the nose cone and any balancing weights removed earlier. All fasteners and washers must be reinstalled in the exact spot they were removed.
10. **IMPORTANT:** Motor load amperes must be checked and compared to the nameplate rating before returning the fan to service. Increasing blade pitch beyond the capacity of the motor will result in motor burn-out and void the warranty.

Pitch Protractor



Instructions

1. Align protractor template edge to corresponding axis.
2. Place trailing edge of blade on protractor crosshairs. Identify current pitch by locating degree line the leading edge lies on.
3. Adjust blade to desired angle while maintaining trailing edge on the crosshair. This requires repositioning of the protractor.
4. Use a marker to trace blade profile on pitch protractor or fan casing.
5. Adjust remaining blades to the traced profile.
6. Tighten blades as directed.
7. Remove pitch protractor from fan casing.

WARNING: PRINT PITCH PROTRACTOR USING A 1-TO-1 SCALE.

Troubleshooting

Your motor service and any troubleshooting must be handled by qualified persons who have proper tools and equipment.

Problem	Cause	Corrective Action
Motor fails to start	Blown fuses	Replace fuses with proper type and rating.
	Overload trips	Check and reset overload in starter.
	Improper power supply	Check to see that power supplied agrees with motor nameplate and load factor.
	Improper line connections	Check connections with diagram supplied with motor.
	Open circuit in winding or control switch	Indicated by humming sound when switch is closed. Check for loose wiring connections. Also verify all control contacts are closing.
	Mechanical failure	Check to see if motor and drive turn freely. Check bearings and lubrication.
	Short circuited stator	Indicated by blown fuses. Motor must be rewound.
	Poor stator coil connection	Remove end bells, locate with test lamp.
	Impeller defective	Look for broken bars or end rings.
	Motor may be overloaded	Reduce load.
Motor stalls	One phase may be open	Check lines for open phase.
	Wrong application	Change type or size. Consult manufacturer.
	Overload motor	Reduce load.
	Low motor voltage	See that nameplate voltage is maintained. Check connection.
	Open circuit	Fuses blown, check overload relay, stator and push buttons.
Motor runs and then dies down	Power failure	Check for loose connections to line, to fuses, and to control.
Motor does not come up to speed	Not applied properly	Consult supplier for proper type.
	Voltage too low at motor terminals because of line drop	Use higher voltage on transformer terminals or reduce load. Check connections. Check conductors for proper size.
	Starting load too high	Check what load motor is supposed to carry at start.
	Broken impeller blade(s) or loose impeller	Look for cracks near the rings. A new impeller may be required as repairs are usually temporary.
	Open primary circuit	Locate fault with testing device and repair.
Motor takes too long to accelerate	Excess loading	Reduce load.
	Poor circuit	Check for high resistance.
	Defective motor	Replace with new motor.
	Applied voltage too low	Get power company to increase power tap.
Wrong rotation	Wrong sequence of phases	Reverse connections at motor or at switchboard.
Motor overheats while running under load	Overloaded	Reduce load.
	Frame or bracket vents may be clogged with dirt and prevent proper ventilation of motor	Open vent holes and check for a continuous stream of air from the motor.
	Motor may have one phase open	Check to make sure that all leads are well connected.
	Grounded coil	Locate and repair.
	Unbalanced terminal voltage	Check for faulty leads, connections and transformers.

Troubleshooting - *continued*

Problem	Cause	Corrective Action
Motor vibrates after corrections have been made	Motor misaligned	Realign.
	Weak support	Strengthen base.
	Coupling out of balance	Balance coupling.
	Driven equipment unbalanced	Rebalance driven equipment.
	Defective ball bearing	Replace bearing.
	Bearings not in line	Line up properly.
	Balancing weights shifted	Rebalance motor.
	Polyphase motor running single phase	Check for open circuit.
	Excessive end play	Adjust bearing or add washer.
Unbalanced line current on polyphase motors during normal operation	Unequal terminal volts	Check leads and connections.
	Single phase operation	Check for open contacts.
Scraping noise	Fan rubbing air shield	Remove interference.
	Fan striking insulation	Clear fan.
	Loose on bedplate	Tighten holding bolts.
Noisy operation	Airgap not uniform	Check and correct bracket fits or bearing.
	Impeller unbalanced	Rebalance.
Hot bearings general	Bent or sprung shaft	Straighten or reshaft.
	Excessive belt pull	Decrease belt tension.
	Pulleys too far away	Move pulley closer to motor bearing.
	Pulley diameter too small	Use larger pulleys.
	Misalignment	Correct by realignment of drive.
Hot ball bearings	Insufficient grease	Maintain proper quantity of grease in bearing.
	Deterioration of grease or lubricant contaminated	Remove old grease, wash bearings thoroughly in kerosene and replace with new grease.
	Excess lubricant	Reduce quantity of grease, bearing should not be more than 1/2 filled.
	Overloaded bearing	Check alignment, side and end thrust.
	Broken ball or rough races	Replace bearing, first clean housing thoroughly.

Maintenance Log

Date _____Time _____ AM/PM
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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.

Greenheck's Vane Axial Fans catalog provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.

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