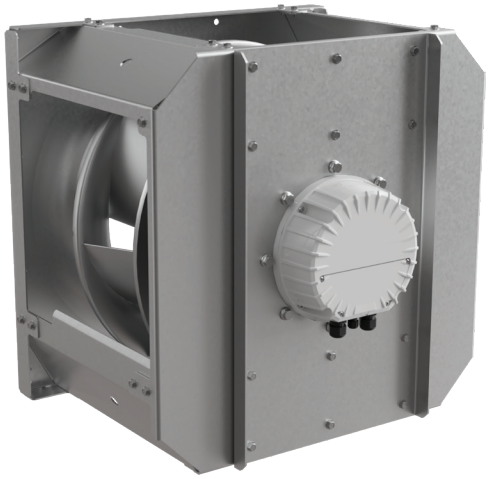
GREENHECK
Building Value in Air.

Document 488346
Model CPF
Compact Plenum Fan

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.



Model CPF
Compact Plenum Fan

DANGER
Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.
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.
DANGER
Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien.
ATTENTION
Lors de toute intervention sur la soufflante, le moteur peut être suffisamment chaud pour provoquer une douleur voire une blessure. Laisser le moteur refroidir avant toute maintenance.
ATTENTION
Faire preuve de précaution dans les atmosphères explosives.

Table of Contents

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 Electric Code (CEC) in Canada.
2. The rotation of the wheel 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 wheel faster than max cataloged fan RPM. Adjustments to fan speed significantly affect 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 the 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.

Receiving

Upon receiving the product, check to ensure all items are accounted for by referencing the delivery receipt or packing list. Inspect each crate or carton for shipping damage before accepting delivery. Alert the carrier of any damage detected. The customer will make a notation of damage (or shortage of items) on the delivery receipt and all copies of the bill of lading which is countersigned by the delivering carrier. If damaged, immediately contact your sales representative. Any physical damage to the unit after acceptance is not the responsibility of the manufacturer.

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 the availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Handling

Fans are to be rigged an moved by the lifting holes cut into the frame or by the skid when a forklift is used. Location of lifting holes is in each of the struts. Handle in such a manner as to keep from scratching the fan. Fans should never be lifted by the fan housing, motor, or accessories.

Storage

- Rotate fan wheel monthly
- Energize fan motor once every three months
- Store unit in location which does not have vibration

If the storage of the fan is in a humid, dusty or corrosive atmosphere, rotate the fan once a month. Improper storage, which results in damage to the fan, will void the warranty.

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 for 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.

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 all walls should be provided to permit air circulation and space for inspection.

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 wheel 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 removed 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.

Prior to fully assembling and installing the fan and system components, inspect the fan assembly to make sure it is in working order.

1. Check all fasteners, set screws, wheel, bearings, drives, motor base and accessories for tightness.
2. Rotate the fan wheel by hand and ensure that parts are not rubbing.

General Information

To ensure a successful installation, the instructions in this manual should be read and adhered to. Failure to comply with proper installation procedures may void the warranty.

Unit and System Identification Tags

Each fan has a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number.

The tag shown is an example of an identification nameplate on the fan. The information provides general details about the fan, as well as containing specific information unique to the unit. When contacting your sales representative with future needs or questions, please have the information on this label available. Tags are mounted in an area which is clearly visible, usually on the side of the fan cabinet.

Pre-Installation Information

Before installation, it is important to be certain the mounting surface will bear the operating weight of the unit. For proper unit operation, it is also important that it be operated in a completely level position.

For further details on safety practices involving industrial and commercial fans, please refer to AMCA Publication 410.

Electrical Disconnects

All fan motors should have disconnects located in close visual proximity to turn off electrical service. Service disconnects shall be locked-out when maintenance is being performed.

Moving Parts

All moving parts must have guards to protect personnel. Refer to local codes for requirements as to the number, type and design. Fully secure fan wheel before performing any maintenance. The fan wheel may start "free wheeling" even if all electrical power has been disconnected. Before the initial start-up or any restart, check the following items to make sure that they are installed and secure.

- Do not spin fan wheel faster than the maximum cataloged fan RPM.
- Adjustments to fan speed significantly affects 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.

Protective Guarding

Do not operate fans without proper protective devices in place. Failure to do so may result in serious bodily injury and property damage. Check local codes to ensure compliance for all protective devices.

Air Pressure and Suction

In addition to the usual hazards associated with rotating machinery, fans also create a dangerous suction at the inlet. Special caution needs to be used when moving around a fan, whether it is in operation or not. Before start-up, make sure the inlet area is clear of personnel and loose objects.

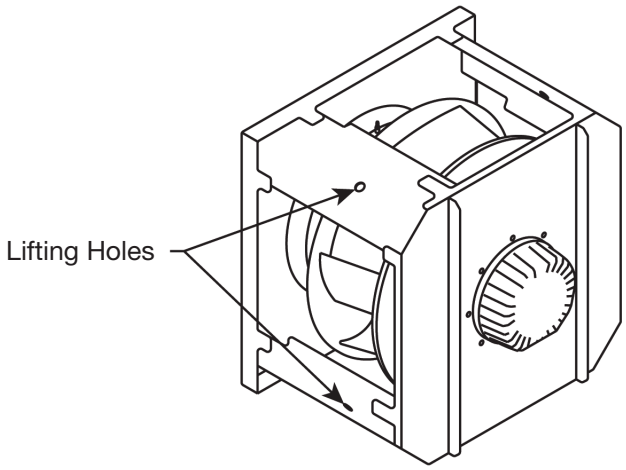
Fans - Rigging and Lifting

CAUTION

Fans should never be lifted by the shaft, motor, motor cover or accessories.

Fans are to be rigged and moved by the lifting holes provided or by the skid when a forklift is used. Location of brackets varies by model and size. Handle in such a manner as to keep from scratching the material. Damaged finish may reduce ability of fan to resist corrosion.

- Use standard lifting and rigging practices including the use of spreader bars.
- At least 2 of the 4 lifting brackets on each component must be utilized at the same time.
- Circled holes in struts to be used as lifting brackets.
- DO NOT LIFT THE FAN BY THE WHEEL, use only lifting holes shown to the right.



Mounting Fasteners

Fasten the fan inlet panel to the mounting surface utilizing the twelve (12) provided mounting holes, with 3/8 in. Grade 5 cap screws with an appropriate locking feature. These are to be torqued to industry standard.

NOTE

Sheet metal screws are not acceptable for mounting.

Inlet Opening

Please see the table below for recommended inlet openings:

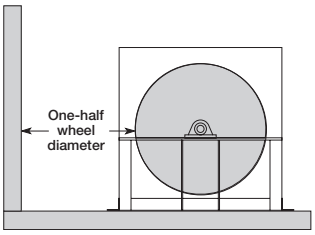
Fan Size	Inlet Opening
	Inches *(mm)*
400	16.69 *(424)*
450	19.88 *(505)*
500	22.06 *(560)*
560	22.31 *(567)*
630	24.81 *(630)*

Gasketing

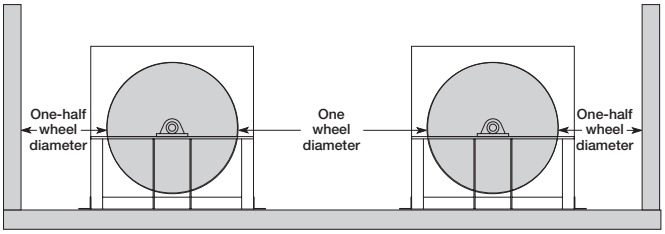
1/4 in. x 1/4 in. foam tape or gasketing should be used between the fan and mounting surface to ensure proper seal.

Spacing

Adjacent Walls – The distance between the fan and walls or ceilings will impact the performance of the fan. The recommended distance between the fan wheel and any wall is a minimum of one-half wheel diameter. Multiple walls reduce the performance even more.



Side by Side – When two or more plenum fans are in parallel, there should be at least one fan diameter spacing between the wheels. Applications with less spacing will experience performance losses.



Electrical Connections

CAUTION

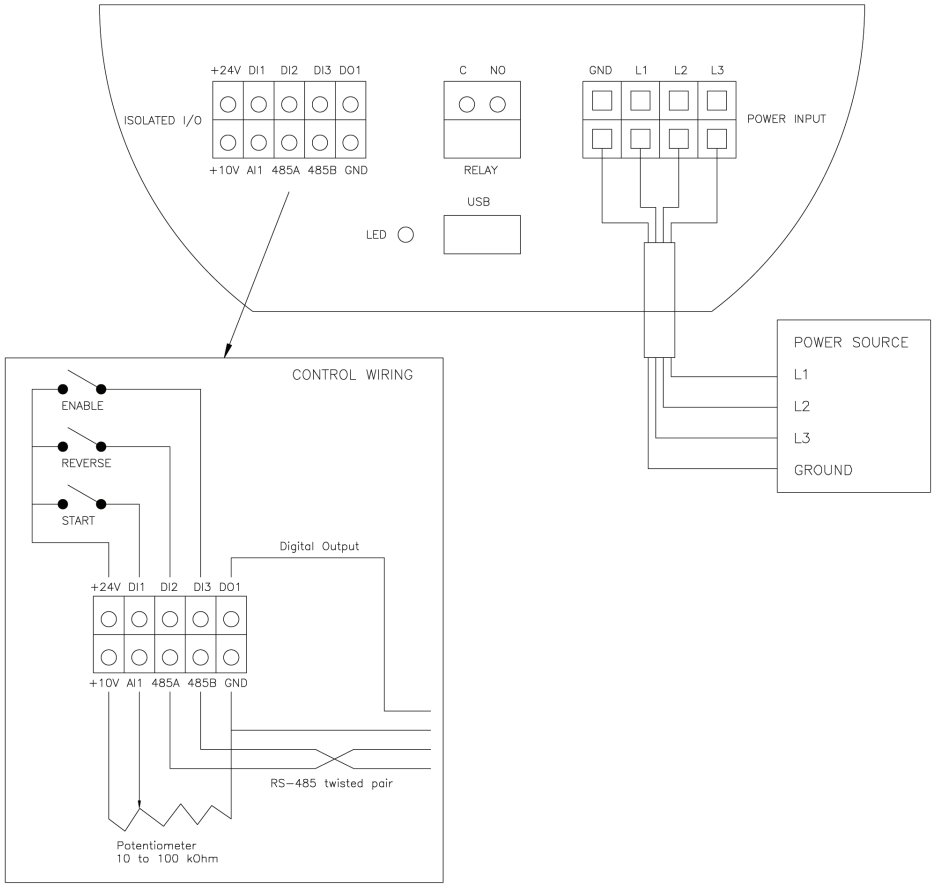
When installing a fan, ensure the proper protective devices are used to protect personnel from moving parts and other hazards. An inlet guard is available from the manufacturer as a protective accessory.

Before electrical connections are made, the supply voltage, phase and ampere capacity must be checked for compatibility with the fan motor. In addition, the supply wiring must be properly fused and conform to local and national electrical codes. If the unit is supplied with a safety disconnect switch, ensure proper wiring to the fan motor. Be sure the disconnect is switched to the “OFF” position before connecting supply wires. If no disconnect is supplied, ensure the supply wire is not live before connection. Supply wires are then connected to the optional safety disconnect switch (if supplied) or motor. For more information regarding electrical connections, please see the link below for the motor technical manual and user’s guide.

ABB ERH Variable-speed, exterior-rotor Integrated Motor Drive

ABB Technical manual and user’s guide
https://search.abb.com/library/Download.aspx?DocumentID=MN458&LanguageCode=en&DocumentPartId=&Action=Launch

Wiring Diagram



Unit Start-Up

CAUTION

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.

Visual Inspection of Equipment

The equipment type and arrangement should be verified as ordered at once when it arrives at the jobsite. When a discrepancy is found, the local sales representative must be notified immediately so that corrective action may be investigated. Also, verify electrical conformance to specifications. Unauthorized alterations and unauthorized back charges will not be recognized by the manufacturer.

After the fan has been assembled, installed and all utilities have been connected, the unit is now ready for operation.

Check

Before starting the fan, check the following:

1. Confirm that building supply voltage matches the voltage for which the unit is wired.
2. Disconnect and lock-out all power switches to the fan. See warning above.
3. Check all piping and wiring penetrations made by contractors for water tightness. All penetrations must be made watertight to prevent water damage to the unit and building.
4. Check all fasteners, set screws and locking collars on the fan, bearings, drive, motor base and accessories for tightness.
5. Rotate the wheel by hand and ensure no parts are rubbing. Remove any dirt or debris that may have accumulated during installation.
6. Check all guarding (if supplied) for being securely attached and not interfering with rotating parts.
7. Check all electrical connections for proper attachment.
8. Check for obstructions and foreign material that may damage the wheel.

Additional Steps for Initial Start-Up

1. Check for proper wheel rotation by momentarily energizing the fan. Rotation is always determined by viewing the wheel from the drive side and should correspond to the rotation decal affixed to the unit.

NOTE

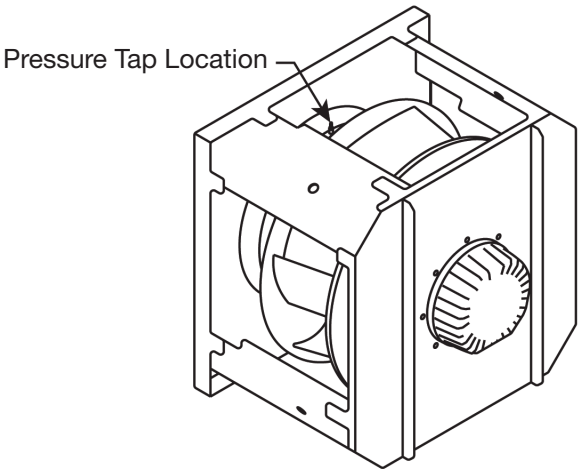
Motor rotation is set at the factory and can only be changed via programming inside the motor.

2. Fans should be checked at a low speed during initial start-up.
3. Check for unusual noise, vibration or overheating of bearings. Refer to the “Troubleshooting” section of this manual if a problem develops.

Installation

Pressure Differential Tubing

A pressure differential tap is pre-mounted to the fan in the inlet cone located at the top of the center of the fan(s). The recommended tubing to connect the pressure tap is 1/4 in. nylon tubing.



Vibration

In Situ Vibration/Resonance Analysis

Resonance characteristics of the fan must be checked in operation once field installed to determine interaction with the environment, and if necessary, modified.

The vibration level of the fan must be determined, and regions above the limit value, avoided. Resonance must be identified and avoided during normal operation.

Regular observation of resonance points is necessary, at the very least, at the intervals demanded in the operating instructions.

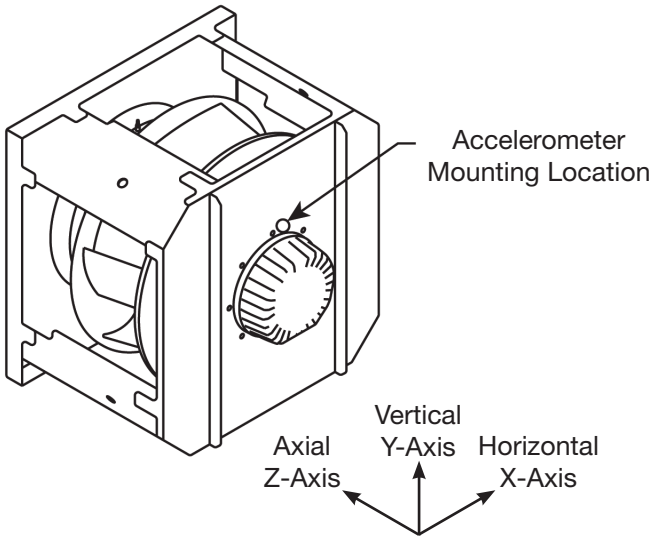
The vibration characteristics must be determined at least in the axial direction and transversely throughout. Measurement of the vibration in all three axis is recommended and should be performed over the entire speed range to obtain a complete picture of the vibrations occurring in the application.

- Repetition of measurements: Every 6 months
- Increase the speed gradually, by 5 Hz for example, and note the readings in a table.

Speed in Hz	Speed in RPM	Vibration velocity in axis direction in in./sec (rms value)	Vibration velocity perpendicular to axis direction in in./sec (rms value)
20 Hz			
35 Hz			
... .			
... .			
60 Hz			

Vibration Measurement

An appropriate method is measurement at the motor fastening diameter on the motor support plate in the direction of the motor axis of rotation, and perpendicular to this.



Action to be taken in the event of excessive vibration loading

- Pass through point of resonance quickly on start-up.
- Always avoid resonant operation.
- Modify the design of the device/installation, e.g., using reinforcement braces.

Installation

Excessive vibration is the most frequent problem experienced during initial start-up.

Left unchecked, excessive vibration can cause a multitude of problems, including structural and/or component failure.

Common Sources of Vibration

1. Wheel Unbalance
2. Bearing
3. Mechanical Looseness
4. Foundation Stiffness

Many of these conditions can be discovered by careful observation. Refer to the troubleshooting section of this manual for corrective actions. If observation cannot locate the source of vibration, a qualified technician using vibration analysis equipment should be consulted. If the problem is wheel unbalance, in-place balancing can be done providing there is access to the fan wheel. Any correction weights added to the wheel should be attached securely.

Manufacturer performs a vibration test on all centrifugal fans before shipping. Three vibration readings are taken on each bearing in the horizontal, vertical, and axial directions.

The maximum allowable vibration for model CPF is 0.15 in/sec. peak velocity filter-in at the fan RPM per AMCA Standard 204.

These vibration signatures are a permanent record of how the fan left the factory and are available upon request.

Generally, fan vibration and noise is transmitted to other parts of the building by the ductwork. To eliminate this undesirable effect, the use of heavy canvas connectors is recommended. If fireproof material is required, Flexweave™ 1000, Type FN-30 can be used.

Routine Maintenance

CAUTION

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. Wheel and housing fasteners of the entire fan should be checked for tightness.
2. Any dirt accumulation on the wheel or in the housing should be removed to prevent unbalance and possible damage.
3. Inspect fan impeller and housing looking for fatigue, corrosion, or wear.

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

Fan Operation

All fans should be run every thirty (30) days, or at least “bumped” every thirty days. It is preferred that each fan is run as this causes all electrical and mechanical components to get up to temperature, displacing any formed condensation, and redistributes grease in the bearings (motor and shaft).

CAUTION

- Always check the fan RPM when adjusting the operating frequency. Do not exceed maximum class fan RPM of the wheel.
- When operating conditions of the fan are to be changed (speed, pressure, temperature, etc.), consult manufacturer to determine if the unit can operate safely at the new conditions.

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 with proper motor cooling. Never wash-down motor with high pressure spray. Many fractional motors are permanently lubricated for life and require no further lubrication.

Troubleshooting

Problem	Cause	Corrective Action
Excessive Noise	Wheel rubbing (inlet)	Adjust wheel and/or inlet cone. Tighten wheel hub or bearing collars on shaft.
	Wheel unbalance	Clean all dirt off wheel. Check wheel balance, rebalance in place if necessary..
	Fan	Check wheel for correct rotation. Increase fan speed.*
	Duct system	Check duct installations with poor inlet or discharge configurations.
Low CFM	Fan	Decrease fan speed.
	Fan	Check rotation of wheel. Increase fan speed.
High CFM	Electrical supply	Check fuses/circuit breakers. Check for switches turned off or disconnected. Check for correct supply voltage.
Fan Doesn't Operate	Motor	Assure motor is correct horsepower and not tripping overload protector.
	Mechanical	Replace damaged bearing. Relieve excessive belt tension. Align bearings. Check for bent shaft.
	Electrical	Verify the run/enable signal is present, the voltage at the fan is correct, and the 0-10V speed reference is present.

*Always check motor amps and compare to nameplate rating. Excessive fan speed may overload the motor and result in motor failure. Do not exceed the maximum cataloged RPM of the fan.

NOTE: Always provide the unit model and serial numbers when requesting parts or service information.

Maintenance Log

Date _____Time _____ AM/PM
Notes:_____

Date _____Time _____ AM/PM
Notes:_____

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 CPF flyer 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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