

Installation, Operation and Maintenance Manuals

Job Title: **ICON - Webster Univ - ISB**

Job Site: Webster University
 547 Garden Ave

Saint Louis, MO 63119
United States

Customer PO#: Webster ISB 5768

Contractor: ICON MECHANICAL

Elevation: (ft) 709

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Submitted By: Mark Haas

Agent Order#: 1610111B

H C SHARP COMPANY INC
8301D CREST INDUSTRIAL DRIVE
SAINT LOUIS, MO 63123
US

Phone: 3143516900

Fax: 13143516901

Email Address: karen@hcsharpco.com



P.O. Box 410 Schofield, WI 54476 (715) 359-6171 FAX (715) 355-2399 www.greenheck.com

Product IOMs

Mark Name	Model Name
EF1, EF3	CUBE
KEF1, EF4	CUE
EF2	LBP
VF2, VF3	SP
VF1 , VF4	SQ
EF-4 CURB	GPIP (No IOMs)

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 instructions could result in personal injury and/or property damage!

Model CUE Direct Drive

Model CUE is a direct drive upblast centrifugal exhaust fan. These fans are specifically designed for roof mounted applications. Performance capabilities range up to 6,400 cfm (10,874 m³/hr) and up to 3 in. wg (747 Pa) of static pressure. The maximum continuous operating temperature for fan sizes 098-200 is 400°F (204°C) and for fan sizes 060-095 is 160°F (71°C). CUE fans are available in twenty sizes with nominal wheel diameter ranging from 9 to 20 inches (229 to 508 mm) (060-200 unit sizes). Each fan shall bear a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number.



Model CUBE Belt Drive

Model CUBE is a belt drive upblast centrifugal exhaust fan. These fans are specifically designed for roof mounted applications. Performance capabilities range up to 30,000 cfm (50,970 m³/hr) and up to 5.0 in. wg (1240 Pa) of static pressure. The maximum continuous operating temperature is 400°F (204°C).

CUBE fans are available in twenty-seven sizes with nominal wheel diameter ranging from 10 to 48 inches (254 to 1219 mm) (099-480 unit sizes). Each fan shall bear a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number.

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) and the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electrical 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 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.
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, 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

Receiving, Unpacking, Handling	2-3
Storage.	3
Inspection and Maintenance during Storage	3
Removing from Storage	3
Dimensional Data	4
Installation	
General Ventilation Installation	4
Sidewall Mounting Installation	5
Commercial Kitchen Installation	5
Grease Trap Installtion	6
Hinge Installation.	6
UL Listed Emergency Smoke Control Installation	6
Mounting for Severe Duty Installation	6-7
Pre-Starting Checks	7-8
Operation.	8
Inspection	8
Maintenance	9
Tapered Bushing Hub Installation and Removal.	9-10
Busing Installation	10
Belt and Bearing Maintenance.	10
Bearing Lubrication Schedule	10
Fan Inlet Connections	11
Parts List	11
Troubleshooting	12
Our Commitment.	12

Receiving

Upon receiving the product, check to ensure all items were 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 Greenheck Representative. 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.

IMPORTANT

Do not lift by the fan hood. Avoid lifting fans in a way that will bend or distort fan parts. Never pass slings or timbers through the venturi of fan. Fans with special coatings or paints must be protected in handling to prevent damage.

Handling

CUE Direct Drive

Lift unit on to the roof utilizing hooks under the horizontal supports. Evenly space the hooks using a minimum of four lifting straps. Use a spreader bar to ensure the straps do not come in contact with the unit, see *Figure 1*.

Figure 1

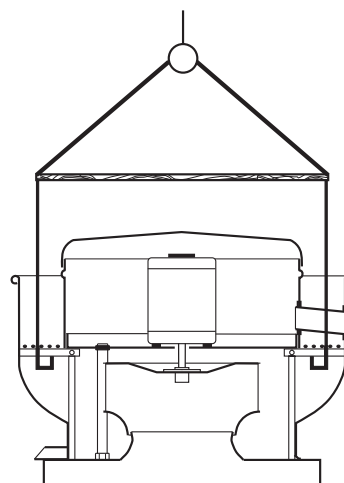


Figure 2

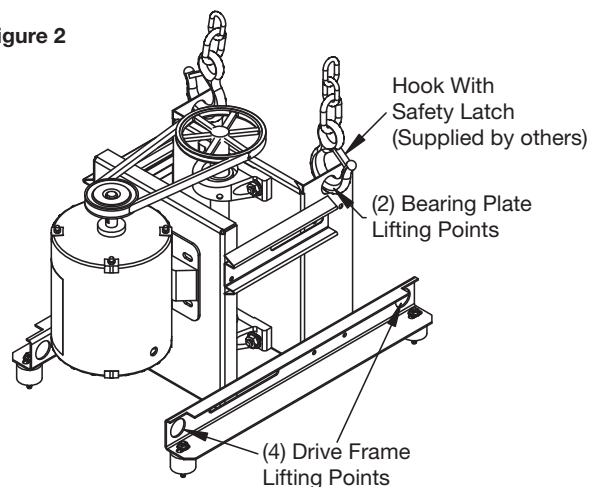
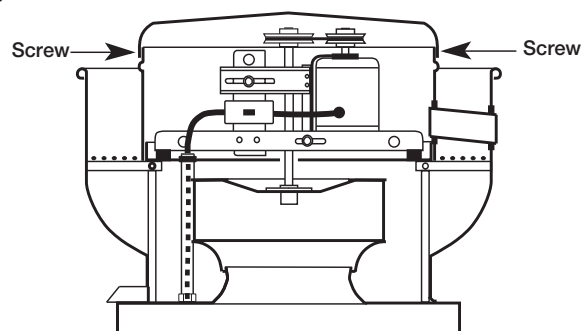


Figure 3



CUBE Belt Drive

When lifting the unit onto the roof, use either the four lifting points on the drive frame or the two lifting points on the bearing plate if present, see *Figure 2* for lifting points. Access to the drive frame is accomplished by removing the screws pointed out in *Figure 3*. The cover can then be removed and placed on a flat surface in an area protected from strong winds.

When CUE/CUBE unit is on the roof, move fan to desired location using lifting points and fasten securely through mounting holes in base. Shims may be necessary depending upon roofing material thickness.

The motor amperage and voltage ratings must be checked for compatibility to supply voltage prior to final electrical connection. For CUE/CUBE installations, the electrical supply should be routed through the conduit chase located between the curb cap and the bottom of the motor compartment or through the breather tube. Wiring must conform to local and national codes.

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.

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° to 110°F (-1° to 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 buildup. Leave coverings loose to permit air circulation and to allow for periodic inspection.

The unit should be stored at least 3½ 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

Fans designed for outdoor applications may be stored outdoors, if absolutely necessary. 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.

Fan wheels should be blocked to prevent spinning caused by strong winds.

Inspection and 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. Thoroughly wipe clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive, 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.

IMPORTANT

Installation, troubleshooting and parts replacement is to be performed only by qualified personnel. Consult and follow all applicable national, state and local codes. They will supercede this document.

Dimensional Data

CUE - Direct Drive

Model	Curb Cap	Damper	Roof Opening	*Approx. Weight
CUE 060, 065, 070, 075	17 (432)	8 (203)	10½ (267)	29 (13)
CUE 080, 085, 090, 095	19 (483)	10 (254)	12½ (318)	40 (18)
CUE 099, 101, 121, 131	19 (483)	12 (305)	14½ (368)	67 (30)
CUE 141, 161	22 (559)	16 (406)	18½ (470)	90 (41)
CUE 180, 200	30 (762)	18 (457)	20½ (521)	142 (64)

- All dimensions are in inches (millimeters). *Approximate weight shown in lbs. (kg.) is the largest cataloged Open Drip Proof motor.
- The roof curb should be 1½ in. (38 mm) less than the curb cap to allow for roofing and flashing.

CUBE - Belt Drive

Model	Curb Cap	Shaft Bearings	Damper	Roof Opening	*Approx. Weight
CUBE 099, 101, 101HP, 121, 131	19 (483)	¾ (19)	12 (305)	14½ (368)	66 (30)
CUBE 141, 141HP, 161, 161HP	22 (559)	¾ (19)	16 (406)	18½ (470)	87 (39)
CUBE 161XP	22 (559)	1 (25)	16 (406)	18½ (470)	87 (39)
CUBE 180	30 (762)	¾ (19)	18 (457)	20½ (521)	126 (57)
CUBE 180HP	30 (762)	1 (25)	18 (457)	20½ (521)	126 (57)
CUBE 200	30 (762)	¾ (19)	18 (457)	20½ (521)	142 (64)
CUBE 200HP	30 (762)	1 (25)	18 (457)	20½ (521)	142 (64)
CUBE 220, 220HP, 240, 240 HP, 240 XP	34 (864)	1 (25)	24 (610)	26½ (673)	175 (79)
CUBE 300, 300HP, 300XP	40 (1016)	1 (25)	30 (762)	32½ (826)	313 (142)
CUBE 360, 360HP, 360XP	46 (1168)	1¼ (32)	36 (914)	38½ (978)	440 (200)
CUBE 420	52 (1321)	1¼ (32)	42 (1067)	44½ (1130)	578 (262)
CUBE 480	58 (1473)	1½ (38)	48 (1219)	50½ (1283)	675 (306)

- All dimensions are in inches (millimeters). *Approximate weight shown in lbs. (kg.) is the largest cataloged Open Drip Proof motor.
- The roof curb should be 1½ in. (38 mm) less than the curb cap to allow for roofing and flashing.

Installation

General Ventilation Installation

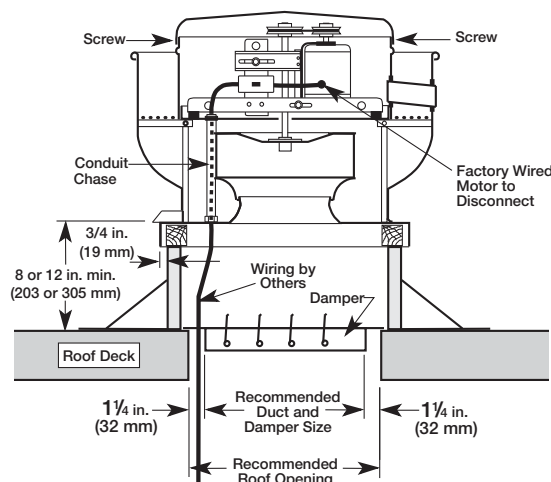


Figure 4 - Typical Roof Mounting Installation

- On the roof surface, cut an appropriate sized hole and follow manufacturer's instructions on curb installation. Caulk and flash the curb to ensure a water tight seal.

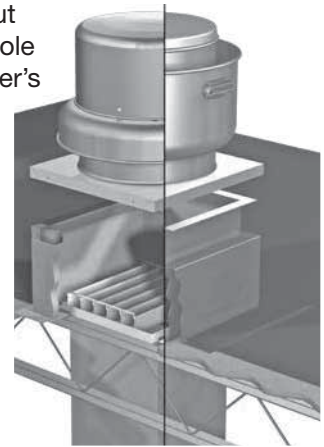


Figure 5 - Roof Curb Installation

- If unit is equipped with a backdraft damper, it should be installed now.
- Remove motor cover. Access to the motor compartment is accomplished by removing the screws as shown in Figure 3, page 2.
- On CUBE belt drive fans, use the lifting lugs on the drive frame or bearing plate to lift and place the unit on top of roof curb. Refer to Figure 2, page 2.
- On CUE direct drive fans, lift and place the unit on top of roof curb using hooks under the horizontal supports. Refer to Figure 1, page 2.
- Secure fan to curb using a minimum of eight lag screws, metal screws or other suitable fasteners. Shims may be required depending upon curb installation and roofing material.
- Verify power line wiring is de-energized before connecting fan motor to power source.
- For commercial kitchen and UL Listed emergency smoke control applications, the electrical supply must enter the motor compartment through the breather tube. For other non-flammable applications, the electrical supply can be routed through the conduit chase between the curb cap and the bottom of the motor compartment.
- Connect power supply wiring to the motor as indicated on the motor nameplate or terminal box cover. Check the power source for compatibility with the requirements of your equipment.
- Check fan wheel for free rotation, recenter if necessary. Check setscrew(s) for tightness.
- Check all fasteners for tightness.
- Mount and wire safety disconnect switch under motor cover. Wire control switches at ground level, refer to Figure 6.

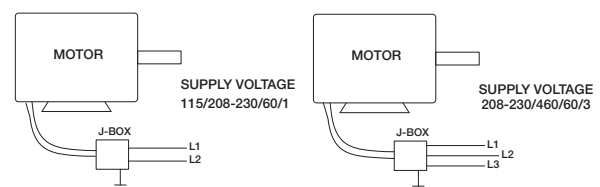


Figure 6 - Typical Wiring Diagram

- Replace motor cover.

Sidewall Mounting Installation

1. Cut an appropriate sized hole in the wall and follow manufacturer's instructions on curb installation. Mount the curb to the interior of the wall with a minimum of eight 3/8-inch fasteners around the flange. Caulk and flash the curb to ensure a water tight seal.
2. If unit is equipped with a backdraft damper, it should be installed now.
3. Lift the fan into place. Do NOT support the unit by the hood band during installation.
4. Orient fan so the grease trough is downward and secure fan to curb using a minimum of eight lag screws, metal screws, or other suitable fasteners.
5. Follow steps 7 through 13 of General Ventilation Installation instructions on page 4.

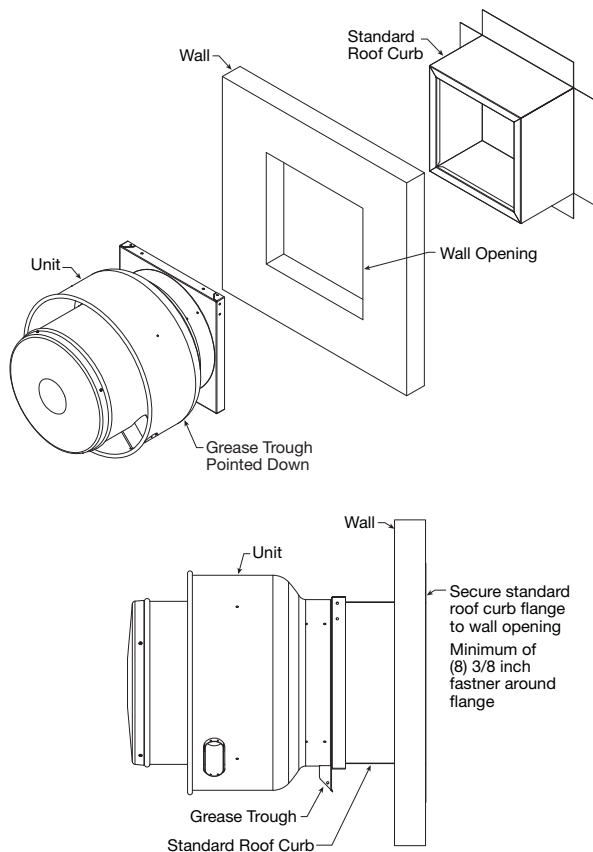
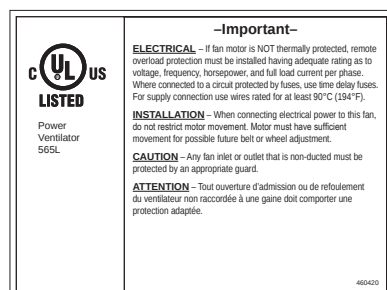


Figure 7 - Typical Sidewall Mounting Installation

Representation of
UL Listed
Power Ventilator
label



Commercial Kitchen Installation

Commercial kitchen installations must comply with NFPA 96. Check local and national codes for these installations, and consult local code authorities for other specific requirements.

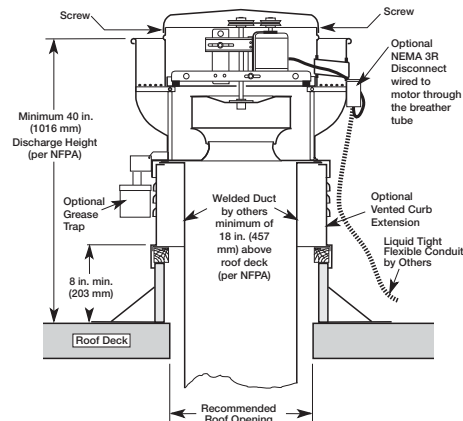


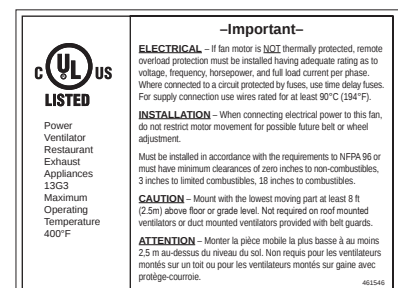
Figure 8 - Typical Roof Mounting Installation

1. The size of the duct must be equal to or larger than the inlet opening of the fan.
2. Secure fan to curb using a minimum of eight lag screws, metal screws or other suitable fasteners.
3. To comply with NFPA 96, the fan discharge must be a minimum of 40 in. (1016 mm) above the roof surface and a minimum of 10 ft. (3048 mm) from any building air intake.
4. Per NFPA 96, ductwork to an upblast discharge exhaust fan must be constructed of and supported by carbon steel not less than No. 6 MSG (1.52 mm) or stainless steel not less than No. 18 MSG (1.21 mm) in thickness. Duct must also extend a minimum of 18 in. (457 mm) above the roof surface.
5. Ensure that a minimum of 500 ft/min of air velocity through the duct is maintained per NFPA 96, clause 8.2.1.1, 2014 edition and UL 762, Issue #7, clause 6.2, October 14, 2013.
6. The following accessories may be required by NFPA 96 depending upon installation: Grease Trap, Hinge Kit or Hinged Base, Clean-Out Port, and Vented Curb.

IMPORTANT

Minimum duct velocities must be maintained in kitchen exhaust applications. If a speed controller is used, ensure compliance with all applicable codes.

Representation of
UL Listed
Power Ventilator
Restaurant
Exhaust
Appliances
label



Grease Trap Installation

Polypropylene grease trap is designed to collect grease residue and avoid drainage onto roof surface. Follow all local codes, as well as the National Fire Protection Agency (NFPA) where applicable.

NFPA 96: Upblast fans shall have a drain directed to a readily accessible and visible grease receptacle not to exceed 1 gal. (3.8L)

Refer to Document 476370 - Grease Trap Installation, Operation and Maintenance Manual for parts list and specific installation instructions.

Grease Trap Maintenance

Regular inspection of grease trap is recommended. Depending on the amount of grease discharged through the fan, the grease trap should be cleaned regularly to ensure proper operation.

- Check grease absorber (if included) every month. Replace grease absorber after every cleaning and/or as needed between cleanings.
- Replacement grease absorbers (P/N 476084) can be ordered from your local Representative.

Hinge Installation

NFPA 96: Upblast exhaust fans shall be supplied with a hinge.

Refer to Document 481366 - Bracket Hinge Kit or Document 462865/462866 - Hinge Kit Installation, Operation and Maintenance Manual for parts list and specific installation instructions.

UL Listed Emergency Smoke Control Installation

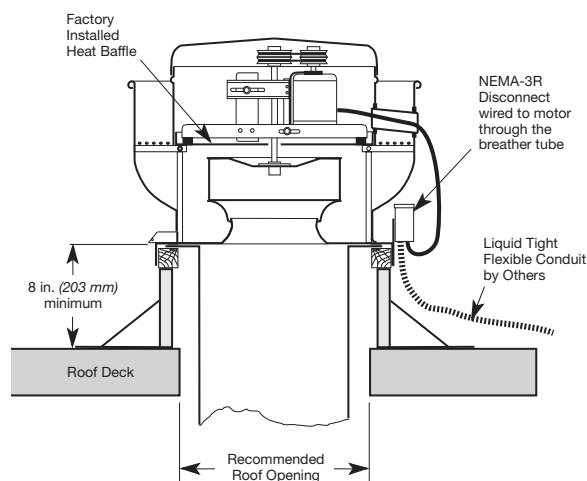


Figure 9 - Typical Roof Mounting Installation

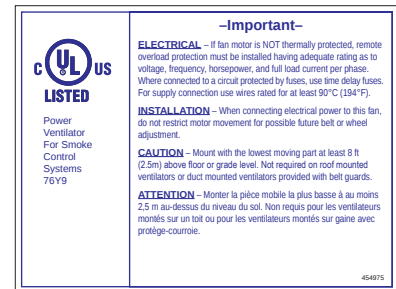
Electrical Connection

For belt drive units in emergency smoke removal installations, the motor's amperage and voltage rating must be checked for compatibility to the supply voltage prior to final electrical connection. Also, the motor itself cannot have thermal overload protection.

The electrical supply must enter the motor compartment through the breather tube and the disconnect must be mounted outside the fan's motor compartment. Emergency smoke removal fans may also require an isolated power supply so that if power is cut to the building in the event of a fire, the fan will continue to operate.

Check the local and national electrical codes for emergency smoke removal fans. Consult local code authorities for your specific requirements.

Representation of
UL Listed
Power Ventilator for
Smoke Control Systems
label



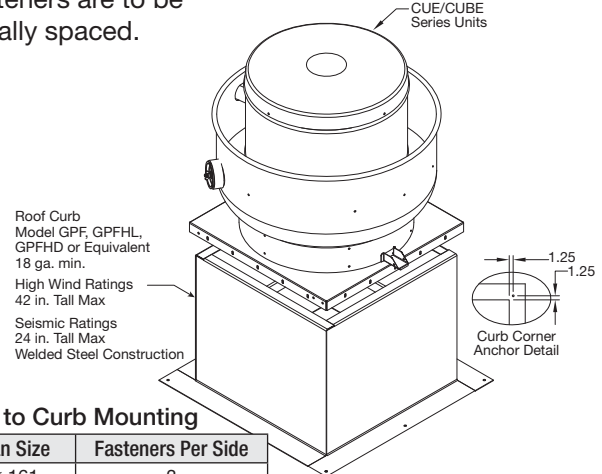
Mounting for Severe Duty Installation

IMPORTANT

Only qualified installers should perform this work. Manufacturer assumes no liability for damages resulting from installation.

Installation instructions for seismic ratings are only recommendations. Final design must be determined by Structural Engineer of Record (SEOR) including requirements for curb construction, mounting of unit to curb and mounting of curb to structure.

Fan to Curb Mounting: 5/16-inch (7.9 mm) self-drilling fasteners are to be installed on each side of fan with one fastener 4-inches (102 mm) from each edge and one fastener in the center. Figure 10. Fasteners are to be equally spaced.



Fan to Curb Mounting

Fan Size	Fasteners Per Side
≤ 161	3
180 to 240	5
≥ 300	9

Figure 10 - Fan to Curb Mounting

Optional Hinged Base Mounting: For installations that include the optional hinged base accessory, the fan must be secured to the hinged base and curb using the correct number of fasteners as shown in the “Fan to Curb Mounting” section. All fasteners must be installed through the curb cap of the fan, the hinged base, and the curb. All fasteners must be reinstalled after each time the fan is hinged open. Refer to

Figure 11.

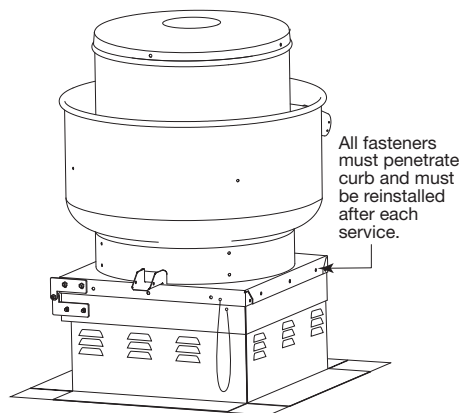


Figure 11 - Fasteners

Curb to Deck Mounting: Fasteners need to be located on all four sides of the curb, *Figures 12a & 12b*.

Figure 12a

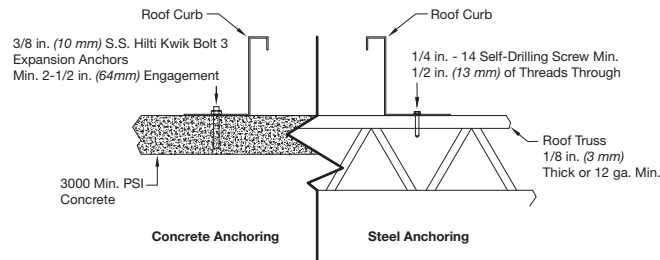
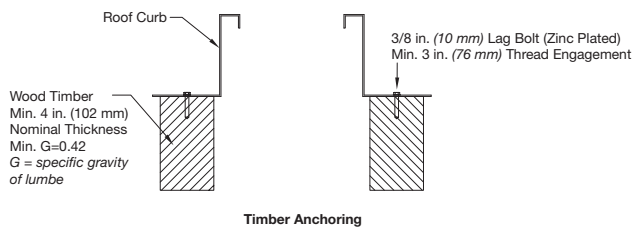


Figure 12b



High Wind Ratings				Seismic Ratings		
	Fan Size	Curb Cap Size inches (millimeters)	Fasteners		Fan Size	Fasteners
			Per Side	Total		Per Side
Steel	≤ 161	17x17 to 22x22 (432x432 to 559x559 mm)	3	12	060-240	2
	> 161	26x26 to 40x40 (660x660 to 1016x1016 mm)	4	16	300-360	3
					420-480	5
Concrete	≤ 161	17x17 to 22x22 (432x432 to 559x559 mm)	3	12	060-240	2
	> 161	26x26 to 40x40 (660x660 to 1016x1016 mm)	3	12	300-360	3
					420-480	5
Wood	≤ 161	17x17 to 22x22 (432x432 to 559x559 mm)	3	12	060-240	2
	> 161	26x26 to 40x40 (660x660 to 1016x1016 mm)	4	16	300-360	3
					420-480	5

All dimensions are in inches (millimeters).

Pre-Starting Checks

1. Check all fasteners and set screws for tightness. The wheel should rotate freely and be aligned as shown in *Figure 13*.

Model	G - Overlap inch (mm)	H - Gap inch (mm)
CUE 060-095	–	3/32 (2)
CUE 099-161	1/4 (6)	–
CUE 180-200	1/2 (13)	–
CUBE 099-161	1/4 (6)	–
CUBE 180-300	1/2 (13)	–
CUBE 360-480	3/4 (19)	–

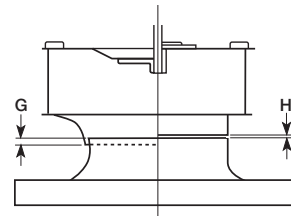


Figure 13 - Wheel Overlap and Gap Dimension

2. Wheel position is preset and the unit is test run at the factory. Movement may occur during shipment and realignment may be necessary.

CUBE unit: Centering can be accomplished by loosening the bolts holding the drive frame to the vibration isolators and repositioning the drive frame.

CUBE unit: Wheel and inlet cone overlap can be adjusted by loosening the set screws in the wheel and moving the wheel to the desired position. For both CUE and CUBE models, center wheel on inlet by loosening bolts on support pan and move support pan until properly aligned. For both CUE and CUBE models with wheel hubs and shaft pulleys utilizing a tapered bushing interface, reference page 9 for the tapered bushing removal and move the wheel to the desired position.

3. All CUE and CUBE units - Check wheel rotation (viewing from the shaft side) by momentarily energizing the unit. Rotation should correspond to the rotation decal on the unit, see *Figure 14*. If wheel rotation is incorrect, reverse two of the wiring leads or check motor wiring for single phase.

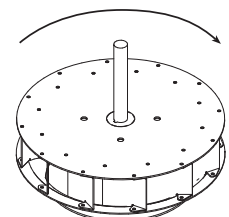


Figure 14

WARNING

Correct direction of wheel rotation is critical. Reversed rotation will result in poor air performance, motor overloading and possible motor burnout.

AVERTISSEMENT

La turbine doit impérativement tourner dans le bon sens. Une rotation en sens inverse entraînerait de mauvaises performances de soufflage, une surcharge du moteur voire un grillage du moteur.

Model CUBE Pre-Starting Belt Tension Checks

4. Always loosen tension enough to install belts without stretching. Do not force the belt(s) see *Figure 15*. Forcing belts will break the cords and cause belt failure.
5. For units with two groove pulleys, adjust so the tension is equal in both belts.
6. If adjustments are made, it is very important to check the pulleys for proper alignment. Misaligned pulleys lead to excessive belt wear, vibration, noise and power loss, see *Figure 16*.

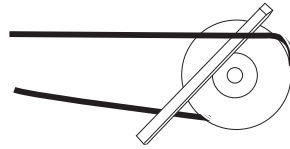


Figure 15

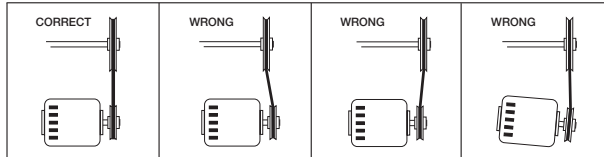


Figure 16

7. Belt tension can be adjusted by loosening four fasteners on the drive frame, see *Figure 17*. The motor plate slides on the slotted adjusting arms and drive frame angles in the same manner.

Four (4) fasteners in total.

Identical fasteners on opposing side must also be loosened.

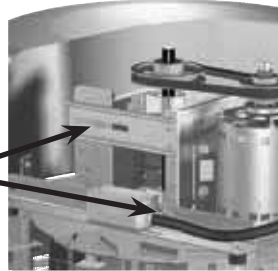


Figure 17

- 8a. **Sizes 099-161:** Belts should be tensioned just enough to prevent slippage at full load. Belts should have a slight bow on the slack side while running at full load; see *Figure 18a*.
- 8b. **Sizes 180-480:** Belt tension should be adjusted to allow 1/64 in. (0.397 mm) of deflection per inch of belt span. For example, a 15 in. (381 mm) belt span should have 15/64 in. (0.234 mm) (or about 1/4 in. (6 mm)) of deflection with moderate thumb pressure at mid-point between pulleys; see *Figure 18b*.

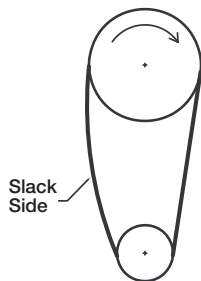


Figure 18a

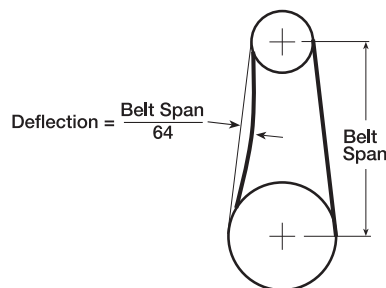


Figure 18b

9. The adjustable motor pulley is factory set for the RPM specified. Speed can be increased by closing or decreased by opening the adjustable motor pulley.
10. Any increase in speed represents a substantial increase in the horsepower required by the unit.
11. Motor amperage should always be checked to avoid serious damage to the motor when speed is varied.

IMPORTANT

The fan has been checked for mechanical noises at the factory prior to shipment. If mechanical noise should develop, suggested corrective actions are offered in the Troubleshooting section.

IMPORTANT

Over tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at startup and uneven wear.

Operation

1. Before starting up or operating fan, check all fasteners for tightness. In particular, check the setscrews in wheel hub (or the tapered bushing, and pulleys if applicable).
2. While in the OFF position or before connecting the fan to power, turn the fan wheel by hand to be sure it is not striking the venturi or any obstacle.
3. Start the fan and shut it off immediately to check rotation of the wheel with directional arrow in the motor compartment, *Reference Figure 14*.
4. When the fan is started, observe the operation and check for any unusual noises.
5. With the system in full operation and all ductwork attached, measure current input to the motor and compare with the nameplate rating to determine if the motor is operating under safe load conditions.
6. Keep inlets and approaches to fan clean and free from obstruction.

IMPORTANT

Adjust (tighten) belt tension after the first 24-48 hours of operation.

Inspection

Inspection of the fan should be conducted at the first 30 minute and 24 hour intervals of satisfactory operation.

30 Minute Interval: Inspect bolts, setscrews and motor mounting bolts. Adjust and tighten as necessary.

24 Hour Interval: Check all internal components. On CUBE unit only, inspect belt alignment and tension. Adjust and tighten as necessary.

Maintenance

DANGER

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.

DANGER

Pour écarter les risques de blessure grave ou de mort, débrancher et verrouiller l'alimentation électrique en position « Arrêt » avant tout contrôle ou entretien.

IMPORTANT

Uneven cleaning of the wheel will produce an out of balance condition that will cause vibration in the fan.

WARNING

This unit should be made non-functional when cleaning the wheel or housing (fuses removed, disconnect locked off).

AVERTISSEMENT

L'appareil doit être rendu non opérationnel lors du nettoyage de la turbine ou du caisson (fusibles retirés, sectionneur verrouillé).

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations and who are experienced with this type of equipment.

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to exterior surfaces only. Removing dust buildup on motor housing ensures proper motor cooling.

Greasing of motors is only intended when fittings are provided. Many fractional horsepower motors are permanently lubricated and should not be lubricated after installation. Motors supplied with grease fittings should be greased in accordance with manufacturer's recommendations. Where motor temperatures do not exceed 104°F (40°C), the grease should be replaced after 2,000 hours of running time as a general rule.

Wheels require very little attention when moving clean air. Occasionally, oil and dust may accumulate causing imbalance. When this occurs the wheel and housing should be cleaned to ensure smooth and safe operation.

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

- When installing fans for restaurant exhaust applications follow NFPA 96 for cleaning fans.
- Grease containers must be emptied at regular intervals to prevent overflow.

A proper maintenance program will help these units deliver years of dependable service.

Tapered Bushing Hub Installation and Removal

For wheel hubs and shaft pulleys utilizing a tapered bushing interface, follow this procedure for installation and removal. There are two possible set ups for the tapered bushing, both have the same procedure, but orientation of the hub varies.

Tapered Bushing Removal:

1. If present, loosen the setscrew holding the bushing and shaft key in place.
2. Loosen and remove the socket head cap screws which fasten the bushing to the hub as shown in the section views and examples of *Figures 19-22*.

Standard Mounting

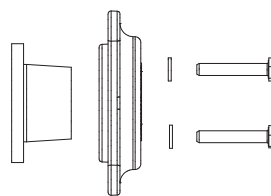


Figure 19

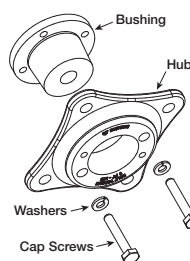


Figure 21
Standard Bushing Orientation



Reverse Mounting

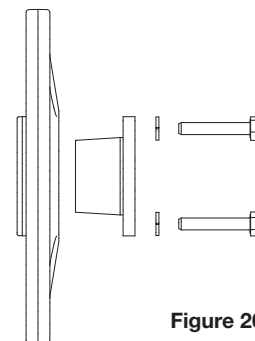


Figure 20

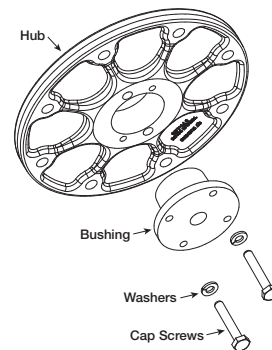


Figure 22
Reverse Bushing Orientation



3. **Standard Mounting:** Take the two socket head cap screws that were removed and install them into the visibly threaded holes on the wheel hub. **Reverse Mounting:** Install the two socket head cap screws into the visibly threaded holes of the bushing flange.

- Once both socket head cap screws are installed, tighten them an eighth of a turn at a time, alternating between the two until the hub comes loose from the bushing.

Bushing Installation:

- Clean all surfaces of hub and bushing to remove any oil or residue present and do not use any lubricant to install bushing into the hub. For both standard and reverse mounting styles, the socket head cap screws are adjustable from the inlet of the fan.
- Standard Mounting:** Slide the bushing and shaft key onto the fan shaft followed by the wheel and hub assembly. If present, use the keyway setscrew to hold the shaft key and bushing in place but DO NOT overtighten as this can damage the bushing. Align the unthreaded holes of the hub with the threaded holes of the tapered bushing.
Reverse Mounting: Slide the wheel and hub assembly onto the fan shaft followed by the bushing and shaft key. If present, use the keyway setscrew to hold the shaft key and bushing in place but DO NOT overtighten as this can damage the bushing. Align the unthreaded holes of the tapered bushing with the threaded holes of the hub.
- Install the two bushing socket head cap screws into the aligned holes by hand (or without excessive torque) until the heads of the socket head cap screws are seated against the mating surface.
- Adjust the height of the wheel in the fan relative to the inlet venturi then tighten the two socket head cap screws an eighth turn at a time in an alternating fashion and to a torque of 10 ft-lbs.

Belt/Bearing Maintenance CUBE Model

- Belts tend to stretch after a period of time. They should be checked periodically for wear and tightness. When replacing belts, use the same type as supplied with the unit.
- Matched belts should always be used on units with multi-groove pulleys.
- For belt replacement, loosen tensioning device enough to allow removal of the belt by hand.
- Once installed, adjust belts as shown in "Pre-Starting Checks."
- To ensure tightness, check pulley setscrews. Proper keys must be in keyways.
- Fan RPM should not be readjusted. Only use pulleys of identical size and type when replacing pulleys.
- Shaft bearings can be classified in two groups: relubricating and non-relubricating. All non-relubricating bearings on CUBE fans are factory lubricated and require no further lubrication under normal use (between -20° to 180°F (-29° to 82°C) in a relatively clean environment).

- On CUBE belt driven fans, the cast pillow block bearings are factory lubricated and are provided with external grease fittings. Annual lubrication is recommended, or more frequently if needed (see Table 1). Do not over-grease. Use only one or two shots of lubricant with a hand gun. Maximum hand gun rating is 40 psi. Rotate bearings during lubrication where good safety practice permits. Caution should be employed to prevent over packing or contamination.
- Units installed in hot, humid or dirty locations should be equipped with special bearings. These bearings will require frequent lubrication. Caution should be employed to prevent over packing or contamination.
- Grease fittings should be wiped clean. The unit should be in operation while lubricating bearings. Extreme care should be used around moving parts.
- Grease should be pumped in very slowly until a slight bead forms around the seal. A high grade lithium base grease should be used.
- During the first few months of operation check bearing set screws periodically to ensure tightness.
- If unit is to be left idle for an extended period, remove belts and store in a cool, dry place to avoid premature belt failure.

Recommended Bearing Lubrication Frequency in Months

NOTE: If unusual environment conditions exist (extreme temperature, moisture or contaminants) more frequent lubrication is required.

A good quality lithium base grease, conforming to NLGI Grade 2 consistency, such as those listed in Table 2 may be used.

Table 1: Suggested Fan Bearing Lubrication Intervals

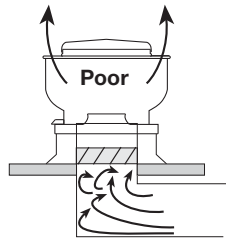
Interval (months)	Type of Service
1 to 3	Heavy duty in dirty, dusty locations; high ambient temperatures; moisture laden atmosphere; vibration.
3 to 6	12 to 24 hours per day, heavy duty, or if moisture is present
6 to 12	8 to 16 hours per day in clean, relatively dry atmosphere
12 to 18	Infrequent operation or light duty in clean atmosphere

Table 2: Grease Manufacturers

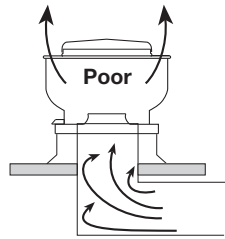
Manufacturer	Grease (NLGI #2)
U.S. Electric Motors	Grease No. 83343
Chevron U.S.A. Inc	Chevron SRI Grease #2
Mobil Oil Corporation	Mobilith
	Mobil 532
Texaco, Inc.	Premium BRB #2
	Texaco Multifak #2
Amoco Oil Co.	Ryton Premium #2
Exxon	Unirex N2
Shell	B Shell Alvania #2

Fan Inlet Connections

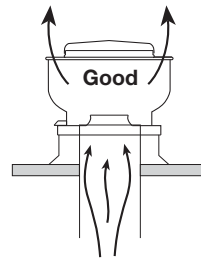
In order to assure proper fan performance, caution must be exercised in fan placement and connection to the ventilation system. Obstructions, transitions, poorly designed elbows, improperly selected dampers, etc. can cause reduced performance, excessive noise and increased mechanical stress. For performance to be as published, the system must provide uniform and stable airflow into the fan.



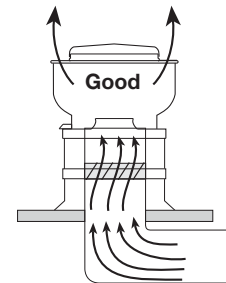
Dampers must open fully. Use motorized dampers in low airflow applications to reduce losses.



Avoid sharp turns or entrance conditions which cause uneven flow. Use turning vanes in elbows to reduce adverse effects.



Avoid sharp turns or entrance conditions which cause uneven flow. Use turning vanes in elbows to reduce adverse effects.



Provide uniform airflow at fan inlet and through the damper to assure optimum performance. Curb cap should be three wheel diameters from the radius. Use turning vanes in duct when possible.

Parts List

Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information will assist the local Greenheck representative and the factory in providing service and replacement parts. Before taking any corrective action, make certain unit is not capable of operation during repairs.

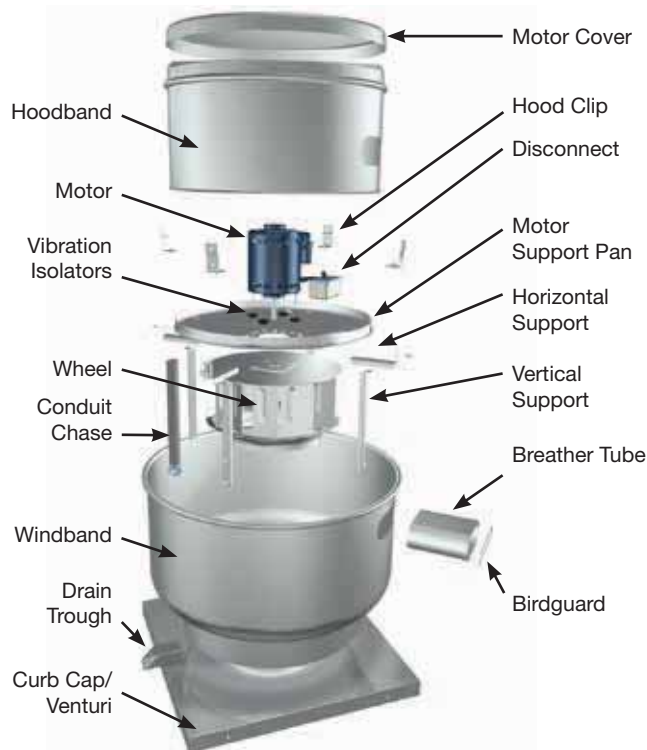
CAUTION

A fan manufactured with an explosion resistant motor does not certify the entire unit to be explosion proof. Refer to UL Listing Mark for the fans approved usage.

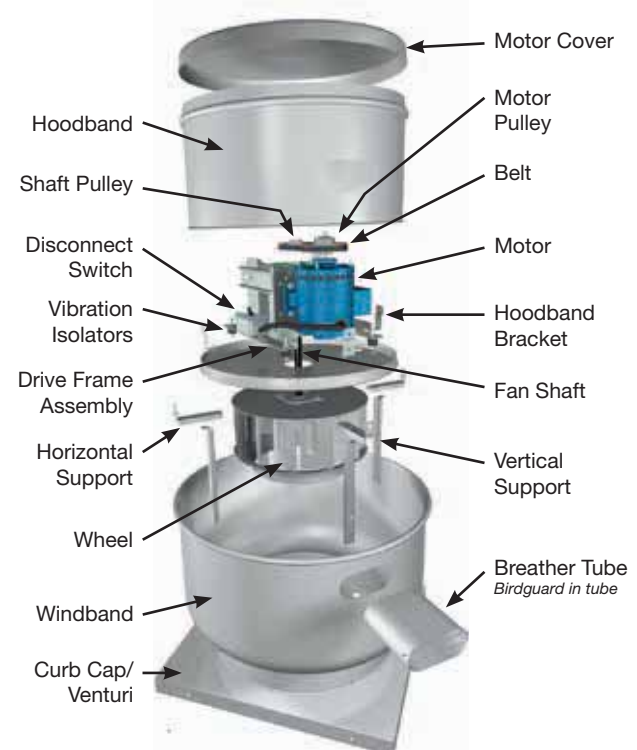
CAUTION

La présence d'un moteur antidéflagrant sur un ventilateur ne garantit pas que tout l'appareil est antidéflagrant. Pour connaître les emplois autorisés de l'appareil, voir son marquage de conformité UL.

CUE Direct Drive



CUBE Direct Drive



NOTE

For replacement, the windband, vertical supports, drain trough and curb cap/venturi come as one complete assembly.

Troubleshooting

WARNING

Before taking any corrective action, make certain unit is not capable of operation during repairs.

AVERTISSEMENT

Avant d'entreprendre toute action corrective, s'assurer que l'appareil ne pourra pas fonctionner durant les réparations.

PROBLEM	CAUSE	CORRECTIVE ACTION
Excessive noise or vibration	Wheel rubbing inlet	Adjust wheel and/or inlet cone. Tighten wheel hub or bearing collars on shaft.
	V-belt drive	Tighten pulleys on motor/fan shaft. Adjust belt tension. Align pulleys properly, see page 8, Figures 15 and 16. Replace worn belts or pulleys.
	Bearings	Replace defective bearing(s). Lubricate bearings. Tighten collars and fasteners.
	Wheel unbalance	Clean all dirt off wheel. Check wheel balance, rebalance in place if necessary.
	Bad bearings	Replace.
	Belts too tight or too loose	Adjust tension, see Figures 17, 18a and 18b.
	Wheel improperly aligned and rubbing	Center wheel on inlet, see Figure 8.
	Loose drive or motor pulleys	Align and tighten. See Pre-Starting Checks, pages 7 and 8.
	Foreign objects in wheel or housing	Remove objects, check for damage or unbalance.
	Fan base not securely anchored	Secure properly.
	Motor hood loose and rattling	Tighten fasteners to secure the motor hood.
	Defective or loose motor bearings	Replace motor with same frame size, RPM-HP
High horsepower	Fan	Check rotation of wheel, see Figure 14. Reduce fan speed.
	Duct system	Resize ductwork. Check proper operation of face and bypass dampers. Check filters and access doors.
Fan does not operate	Electrical supply	Check: fuses/circuit breakers; for switches off; for correct supply voltage.
	Drive	Check for broken belts. Tighten loose pulleys or belts.
	Motor	Assure motor is correct horsepower and not tripping overload protector.
Motor overloads or overheats	Lubrication	Check for excessive or insufficient grease in the bearing.
	Mechanical	Replace damaged bearing. Relieve excessive belt tension. Align bearings. Check for bent shaft.
	Belt slippage	Adjust tension or replace bad belts, see page 8.
	Over/Under line voltage	Contact power company.
	Incorrect wheel rotation	Check motor wiring, Figure 6. Confirm wheel rotation, Figure 9.
	Wheel RPM too high	Check drives or slow down fan by opening variable pitch pulley on motor shaft.
	Undersized motor	Check motor ratings with catalog speed and air capacity chart.
	Motor wired incorrectly	Check motor wiring to wiring diagram located on fan motor.
Reduced airflow	System resistance too high	Check system: Proper operation of backdraft or control dampers, obstruction in ductwork, clean dirty filters.
	Unit running backwards	Correct as shown in Figure 14.
	Excessive dirt buildup on wheels	Clean wheel.
	Improper wheel alignment	Center wheel on inlets, see Pre-Starting Checks and Figure 13.
	Dampers closed	Inspect and repair.
	Blocked duct/clogged filter	Clean or replace.
	Belt slippage	Replace and adjust tension.
	Speed too slow	Check for correct drives.

Our Commitment

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

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.

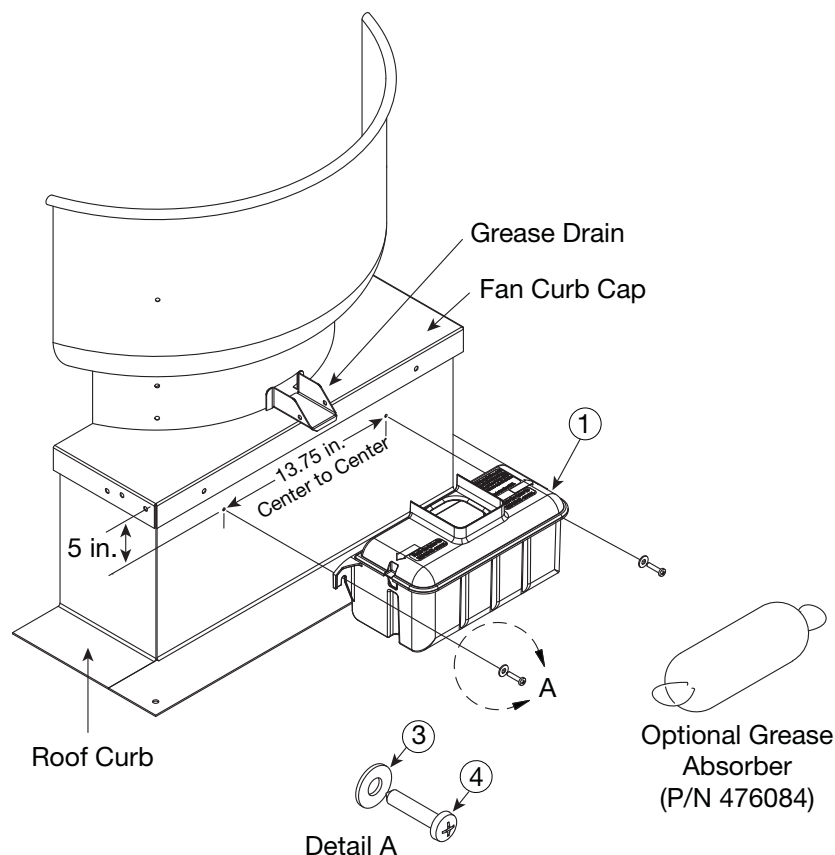
Greenheck's Centrifugal Upblast and Sidewall Exhaust catalog provides additional information describing the equipment, fan performance, available accessories, and specification data.

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.



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 instructions could result in personal injury and/or property damage!



Parts List (per diagram)		
Number	Description	Quantity
1	Grease Trap Assm. without Absorber (475538)	1
2	** Grease Trap Assm. with Absorber (476085)	1
3	Flat Washer 1/4-inch x 0.75-inch	2
4	Sheet Metal Screw 1/4-inch x 1-inch	2

**This item not shown on drawing (grease trap assembly with absorber)

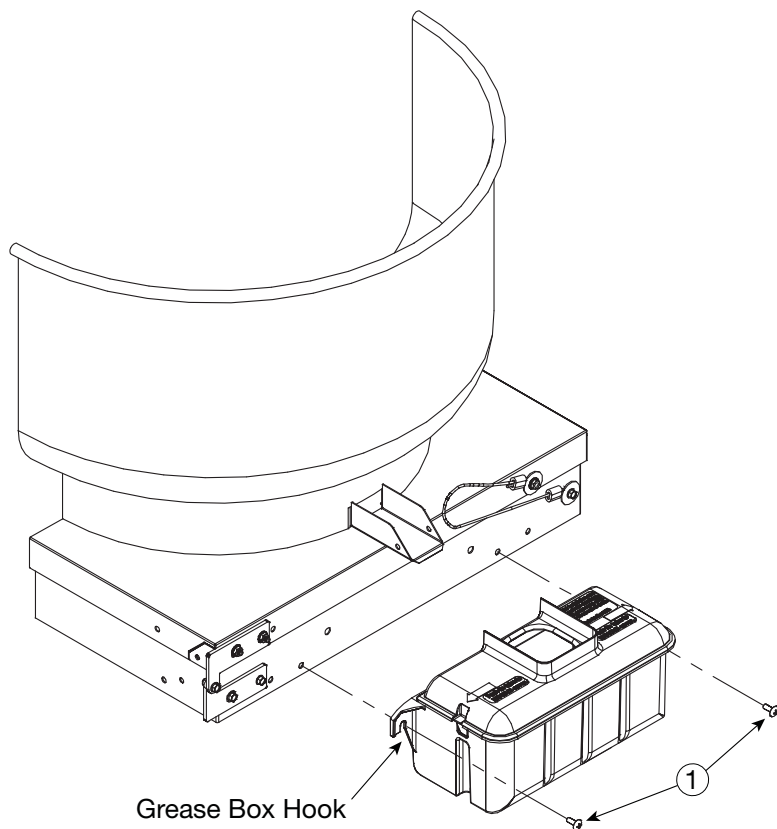
General Safety Information

Follow all local codes, as well as the National Fire Protection Agency (NFPA), where applicable.

NFPA 96: Upblast fans shall have a drain directed to a readily accessible and visible grease receptacle not to exceed 3.8 L (1 gal.)

Installation on Roof Curb

1. Install grease absorber in grease trap (if included) then snap cover into grease trap.
2. Locate and mark the container mounting holes on the extended base or roof curb.
3. Drill 3/16-inch diameter holes in the curb at the marked locations as shown.
4. Attach container with the two supplied 1/4-inch x 1-inch sheet metal fasteners. See detail "A". If extended base is a vented type, allow vent projections to hold trap away from curb.
5. Fill container with water (after installation and after each cleaning) until it flows out the drain hole. The water will not affect the grease absorbers performance. The unit is now ready for use.
6. Check grease absorber (if included) every month. Replace grease absorber after every cleaning and/or as needed between cleanings. Grease absorber safely holds a 1/2 gallon of grease.
7. Replacement grease absorbers (P/N 476084) can be ordered from your local Greenheck Representative.



Grease Trap Installation on Hinged Base

1. Locate two welded nut inserts on the lower portion of the hinged base as shown in the figure. Holes may be located on either the front or hinge side of the hinged base.
2. Insert two supplied 1/4-20 x 5/8-inch phillips truss head screws into nut inserts and start the threads.
3. Position grease trap hooks over the screws and tighten.

Parts List (per diagram)

Number	Description	Quantity
1	1/4-20 x 5/8 MS PTH (415729)	2

Polypropylene Grease Trap Material Properties

Property	Nominal Value (English)	Nominal Value (SI)
Operating Temperature Range	-40 to 200°F	-40 to 93°C
Melting Temperature Range	320 to 329°F	160 to 165°C
Impact Strength	9.0 ft-lb/in ²	19 kJ/m ²
UV Resistance	Min. 10 Year Life	Min. 10 Year Life
Flammability and Smoke	UL 94 Rated	UL 94 Rated

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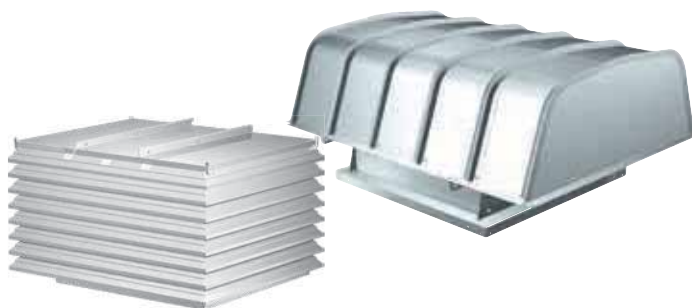


Installation, Operation and Maintenance Manual

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Series L Exhaust Fans

Greenheck's Series L, low silhouette, models LD, LB, LDP, and LBP centrifugal roof exhaust fans provide the industry's best performance and durability for general clean air applications. Series L exhaust fans have the broadest performance in the industry, up to 1.25 in. wg (311 Pa) and 37,500 cfm (63,713 m³/hr).



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) and the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electrical 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 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, 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.

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 notification 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 Greenheck Representative. 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.

Handling

When lifting the unit to the roof, securely fasten straps to the drive frame located in the motor compartment. Access to the motor compartment is accomplished by removing bolts securing the hood to the base. The hood cover will need to be removed for access to the drive frame. The cover can then be removed and placed on a flat surface in an area protected from strong winds.

When unit is on the roof, move fan to desired location and fasten securely through mounting holes in base. Shims may be necessary depending upon roof material thickness.

The motor amperage and voltage ratings must be checked for compatibility to supply voltage prior to final electrical connection. Electrical lead-in wires should be run through the conduit provided between the curb and the bottom of the motor compartment. Wiring must conform to local and national codes.

IMPORTANT

Do not lift by the fan hood. Avoid lifting fans in a way that will bend or distort fan parts. Never pass slings or timbers through the venturi of fan. Fans with special coatings or paints must be protected in handling to prevent damage.

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.

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° to 110°F (-1° to 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 remove any moisture build up. Leave coverings loose to permit air circulation and to allow for periodic inspection.

The unit should be stored at least 3½ inches (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

Fans designed for outdoor applications may be stored outdoors, if absolutely necessary. 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 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 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. Fan wheels should be blocked to prevent spinning caused by strong winds.

Inspection and Maintenance During Storage

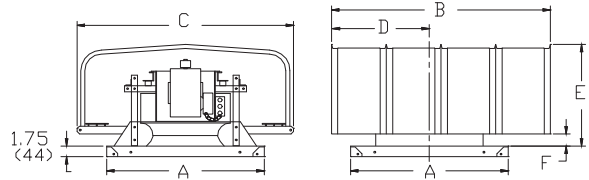
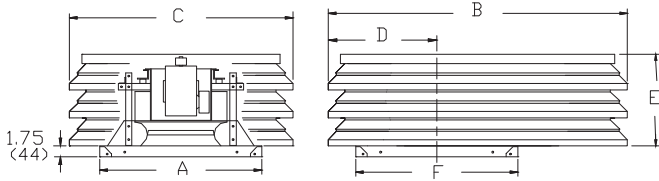
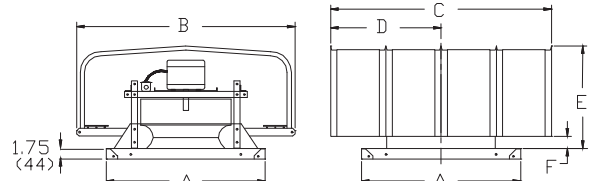
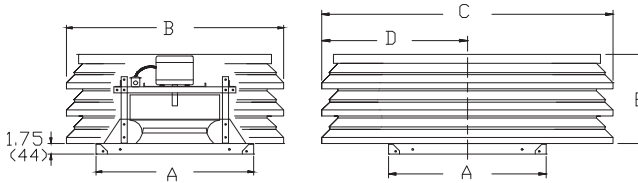
While in storage, inspect fans once per month. Keep a record of inspection and maintenance performed.

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. Thoroughly wipe clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive, WD-40® or the equivalent.

Series L Dimensions

Model LB		Size	A	B	C	D	E	F	Damper Size	Roof Opening	Weight Galv.
	10	22 (559)	39 (991)	28 (711)	17¼ (438)	17 (432)	3¼ (85)	12 (305)	14½ (368)	56 (25)	
	14	26 (660)	39 (991)	35 (889)	17½ (445)	18 (457)	4 (102)	16 (406)	18½ (470)	81 (37)	
	18	30 (762)	39 (991)	40 (1016)	17½ (445)	21 (533)	4½ (114)	18 (457)	20½ (521)	135 (61)	
	21	30 (762)	51 (1295)	43 (1092)	23 (584)	23 (584)	6 (152)	18 (457)	20½ (521)	145 (66)	
	24	34 (864)	51 (1295)	45½ (1156)	20½ (521)	23½ (597)	6¾ (171)	24 (610)	26½ (673)	188 (85)	
	30	40 (1016)	63 (1600)	50 (1270)	29½ (749)	26⅝ (676)	8½ (216)	30 (762)	32½ (826)	249 (113)	
	36	46 (1168)	63 (1600)	60 (1524)	27 (686)	32⅝ (829)	9¾ (248)	36 (914)	38½ (978)	338 (153)	
	42	52 (1321)	75 (1905)	70⅝ (1794)	33½ (851)	37⅝ (949)	11½ (292)	42 (1067)	44½ (1130)	396 (180)	
	48	58 (1473)	87 (2210)	70⅝ (1788)	41 (1041)	41½ (1054)	11⅝ (295)	48 (1219)	50½ (1283)	430 (195)	
	54	64 (1626)	87 (2210)	79½ (2019)	38 (965)	45⅝ (1153)	12½ (318)	54 (1372)	56½ (1435)	596 (270)	
Model LBP		Size	A	B	C	D	E	F	Damper Size	Roof Opening	Weight Alum.
	10	22 (559)	38½ (978)	28 (711)	14 (356)	17 (432)	32⅝ (829)	12 (305)	14½ (368)	99 (45)	
	14	26 (660)	40 (1016)	32 (813)	16 (406)	17 (432)	26 (660)	16 (406)	18½ (470)	116 (53)	
	18	30 (762)	46 (1168)	36 (914)	19 (483)	24½ (622)	30 (762)	18 (457)	20½ (521)	179 (81)	
	21	30 (762)	46 (1168)	36 (914)	19 (483)	24½ (622)	30 (762)	18 (457)	20½ (521)	191 (86)	
	24	34 (864)	49½ (1257)	40 (1016)	20 (508)	23½ (597)	34 (864)	24 (610)	26½ (673)	239 (108)	
	30	40 (1016)	58 (1473)	46 (1168)	23 (584)	26½ (673)	40 (1016)	30 (762)	32½ (826)	318 (144)	
	36	46 (1168)	63 (1600)	51¾ (1314)	26 (660)	34⅝ (873)	46 (1168)	36 (914)	38½ (978)	444 (201)	
	42	52 (1321)	70½ (1791)	58 (1473)	29 (737)	38¼ (972)	52 (1321)	42 (1067)	44½ (1130)	530 (240)	
	48	58 (1473)	76½ (1943)	64 (1626)	32 (813)	40⅝ (1026)	58 (1473)	48 (1219)	50½ (1283)	579 (263)	
	54	64 (1626)	83½ (2121)	70 (1778)	35 (889)	43⅝ (1108)	64 (1626)	54 (1372)	56½ (1435)	780 (354)	
Model LD		Size	A	B	C	D	E	F	Damper Size	Roof Opening	Weight Galv.
	60-75	17 (432)	23 (584)	27 (686)	13½ (343)	13 ⅝ (340)	2 (51)	8 (203)	10½ (267)	37 (17)	
	80-95	19 (483)	28 (711)	27 (686)	13½ (343)	16 (406)	4 (102)	10 (254)	12½ (318)	45 (20)	
	100-120	22 (559)	31½ (800)	27 (686)	13½ (343)	23¼ (591)	4 (102)	12 (305)	14½ (368)	57 (26)	
Model LDP		Size	A	B	C	D	E	F	Damper Size	Roof Opening	Weight Alum.
	60-75	17 (432)	23 (584)	11½ (292)	14 (356)	—	8 (203)	10½ (267)	49 (22)		
	80-95	19 (483)	25 (635)	12½ (318)	17 (432)	—	10 (254)	12½ (318)	63 (29)		
	100-120	22 (559)	28 (711)	14 (356)	19¼ (489)	—	12 (305)	14½ (368)	82 (37)		

All dimensions given in inches (millimeters). Weights given in pounds (kilograms).

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.

Prestart-up Checks

1. Check all fasteners for tightness. The wheel should rotate freely and be aligned as shown in Figure 1.

WHEEL OVERLAP AND GAP DIMENSIONS

Model	G - Overlap in. (mm)	H - Gap in. (mm)
LD/LDP 60-095	–	3/32 (2)
LD/LDP 100-120	–	1/4 (6)
LB/LBP 10-14	1/4 (6)	–
LB/LBP 18-24	3/8 (10)	–
LB/LBP 30-54	1/2 (13)	–

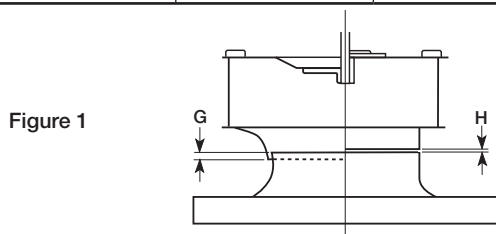


Figure 1

Wheel position is preset and the unit is test run at the factory. Movement may occur during shipment, and realignment may be necessary.

3. Centering can be accomplished by loosening the bolts holding the drive frame to the shock mounts and repositioning the drive frame.
4. Wheel and inlet cone overlap can be adjusted by movement of the wheel. See Tapered Bushing Hub Installation and Removal (pg. 5) for directions on repositioning.
5. Check wheel rotation by momentarily energizing the unit. Rotation should be clockwise as shown in Figure 2 and correspond to the rotation decal on the unit. Rotation is determined when the unit is viewed from the motor or shaft pulley side.

WHEEL ROTATION

All Series L fans have clockwise (CW) wheel rotation when viewed from top of fan.

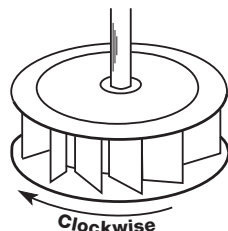


Figure 2

WARNING

Correct direction of wheel rotation is critical. Reversed rotation will result in poor air performance, motor overloading and possible motor burnout.

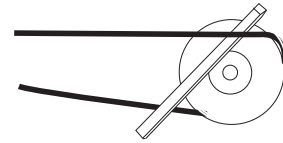
AVERTISSEMENT

La turbine doit impérativement tourner dans le bon sens. Une rotation en sens inverse entraînerait de mauvaises performances de soufflage, une surcharge du moteur voire un grillage du moteur.

Prestart-up Belt Tension Checks

6. Always loosen tension enough to install belt without stretching, see Figure 3.

BELTS



Do not force belt(s). Forcing the belt(s) will break the cords and cause belt failure

Figure 3

7. If adjustments are made, it is very important to check the pulleys for proper alignment. Misaligned pulleys lead to excessive belt wear vibration, noise and power loss (see Figure 4).

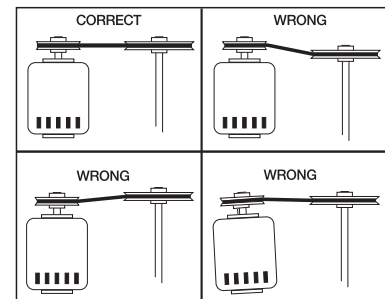


Figure 4

8. Belt tension can be adjusted by loosening four fasteners (marked “R” in Figure 5) on the drive frame. This allows the motor plate to slide on the drive frame angles for proper positioning.

FASTENERS

Identical fasteners on opposing side must also be loosened.

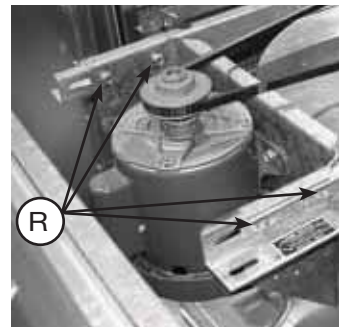


Figure 5

9. Belt tension should be adjusted to allow 1/64 in. (0.397 mm) of deflection per inch of belt span. For example, a 15 in. (381 mm) belt span should have 15/64 in. (0.234 mm) (or about 1/4 in. (6 mm)) of deflection with moderate thumb pressure at mid-point between pulleys (see Figure 6).

IMPORTANT

The fan has been checked for mechanical noises at the factory prior to shipment. If mechanical noise should develop, suggested corrective actions are offered in the Troubleshooting section.

IMPORTANT

Over tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at start-up and uneven wear.

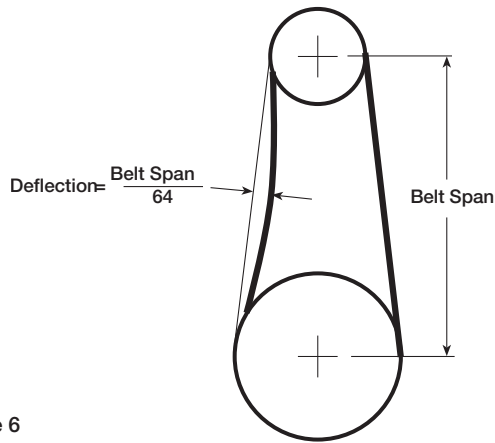


Figure 6

10. The adjustable motor pulley is factory set for the RPM specified. Speed can be increased by closing or decreased by opening the adjustable motor sheave.
11. Two groove variable pitch pulleys must be adjusted an equal number of turns open or closed.
12. Any increase in speed represents a substantial increase in the horsepower required by a unit.
13. Motor amperage should always be checked to avoid serious damage to the motor when speed is varied.

IMPORTANT

Adjust (tighten) belt tension after the first 24-48 hours of operation.

Maintenance

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to exterior surfaces only. Removing dust buildup on motor housing ensures proper motor cooling.

Greasing of motors is only intended when fittings are provided. Many fractional hp motors are permanently lubricated and should not be lubricated further. Motors supplied with grease fittings should be greased in accordance with manufacturers' recommendations. Where motor temperatures do not exceed 104°F (40°C), the grease should be replaced after 2000 hours of running time as a general rule.

Wheels require very little attention when moving clean air. Occasionally, oil and dust may accumulate causing imbalance. When this occurs, the wheel and housing should be cleaned to ensure smooth and safe operation.

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

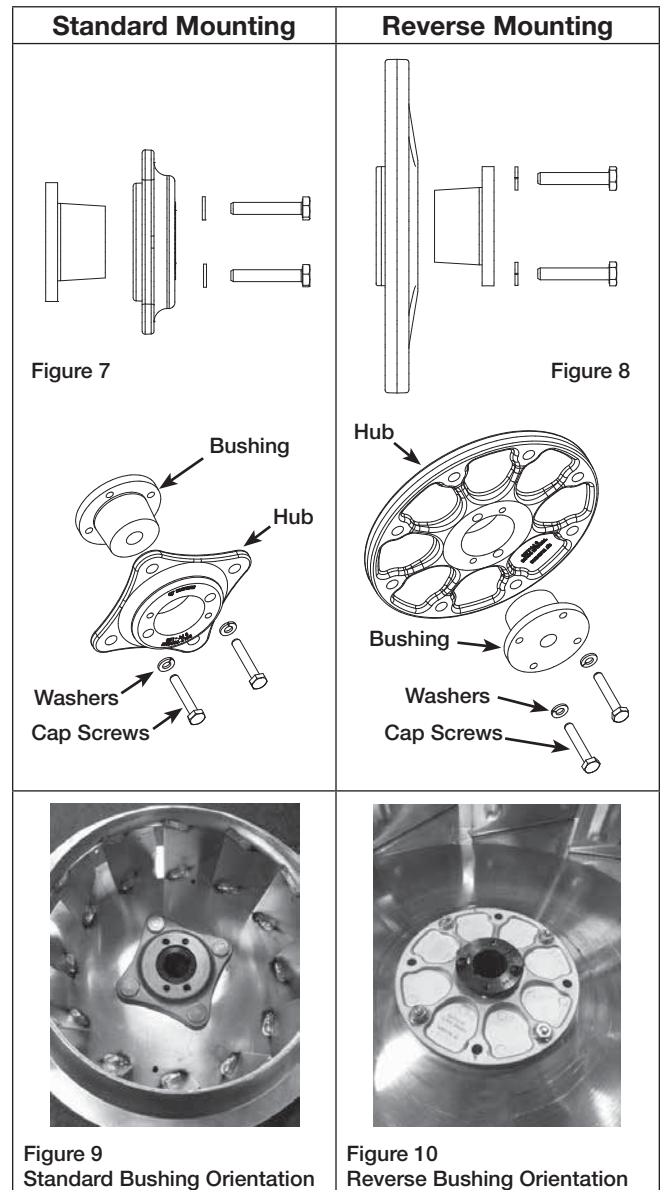
A proper maintenance program will help these units deliver years of dependable service.

Tapered Bushing Hub Installation and Removal

For wheel hubs and shaft pulleys utilizing a tapered bushing interface, follow this procedure for installation and removal. There are two possible setups for the tapered bushing, both have the same procedure but orientation of the hub varies.

Tapered Bushing Removal:

1. (If present): Loosen the setscrew holding the bushing and shaft key in place.
2. Loosen and remove the socket head cap screws fastening the bushing to the hub as shown in the section views and examples of Figures 7-10.



3. **Standard Mounting** - Take the two socket head cap screws that were removed and install them into the visibly threaded holes on the wheel hub.

Reverse Mounting - Install the two socket head cap screws into the visibly threaded holes of the bushing flange.

4. Once both socket head cap screws are installed, tighten them an eighth of a turn at a time, alternating between the two until the hub comes loose from the bushing.

Bushing Installation:

1. Clean all surfaces of hub and bushing to remove any oil or residue present and do not use any lubricant to install bushing into the hub. For both standard and reverse mounting styles the socket head cap screws are adjustable from the inlet of the fan.
2. **Standard Mounting** - Slide the bushing and shaft key onto the fan shaft followed by the wheel and hub assembly. If present, use the keyway setscrew to hold the shaft key and bushing in place but DO NOT overtighten as this can damage the bushing. Align the unthreaded holes of the hub with the threaded holes of the tapered bushing.
Reverse Mounting - Slide the wheel and hub assembly onto the fan shaft followed by the bushing and shaft key. If present, use the keyway setscrew to hold the shaft key and bushing in place but DO NOT overtighten as this can damage the bushing. Align the unthreaded holes of the tapered bushing with the threaded holes of the hub.
3. Install the two bushing socket head cap screws into the aligned holes by hand (or without excessive torque) until the heads of the socket head cap screws are seated against the mating surface.
4. Adjust the height of the wheel in the fan relative to the inlet venturi then tighten the two socket head cap screws an eighth turn at a time in an alternating fashion and to a torque of 10 ft-lbs.

Belt/Bearing Maintenance

WARNING

Always disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury.

AVERTISSEMENT

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'entretien.

IMPORTANT

Uneven cleaning of the wheel will produce an out of balance condition that will cause vibration in the fan.

WARNING

This unit should be made non-functional when cleaning the wheel or housing (fuses removed, disconnect locked off).

AVERTISSEMENT

L'appareil doit être rendu non opérationnel lors du nettoyage de la turbine ou du caisson (fusibles retirés, sectionneur verrouillé).

1. Belts tend to stretch after a period of time. They should be checked periodically for wear and tightness. When replacing belts, use the same type as supplied with the unit.
2. Matched belts should always be used on units with multi-groove pulleys.
3. For belt replacement, loosen the tensioning device far enough to allow removal of the belt by hand. Do not force belts on or off. This may cause cords to break, leading to premature belt failure.
4. Once installed, adjust belts as shown in "Prestart-up Checks."
5. Shaft bearings can be classified in two groups: relubricating and non-relubricating. All bearings are factory lubricated and require no further lubrication under normal use (between -20°F and 180°F (-29° to 82°C) in a relatively clean environment).
6. Units installed in hot, humid, or dirty locations should be equipped with special bearings. These bearings will require frequent lubrication. Caution should be employed to prevent overpacking or contamination.
7. Grease fittings should be wiped clean. The unit should be in operation while lubricating. Use extreme care around moving parts.
8. Grease should be pumped in very slowly until a slight bead forms around the seal. A high-grade lithium base grease is recommended.
9. Direct drive units require little maintenance except for cleaning, wheel alignment, and oiling according to motor label instructions.

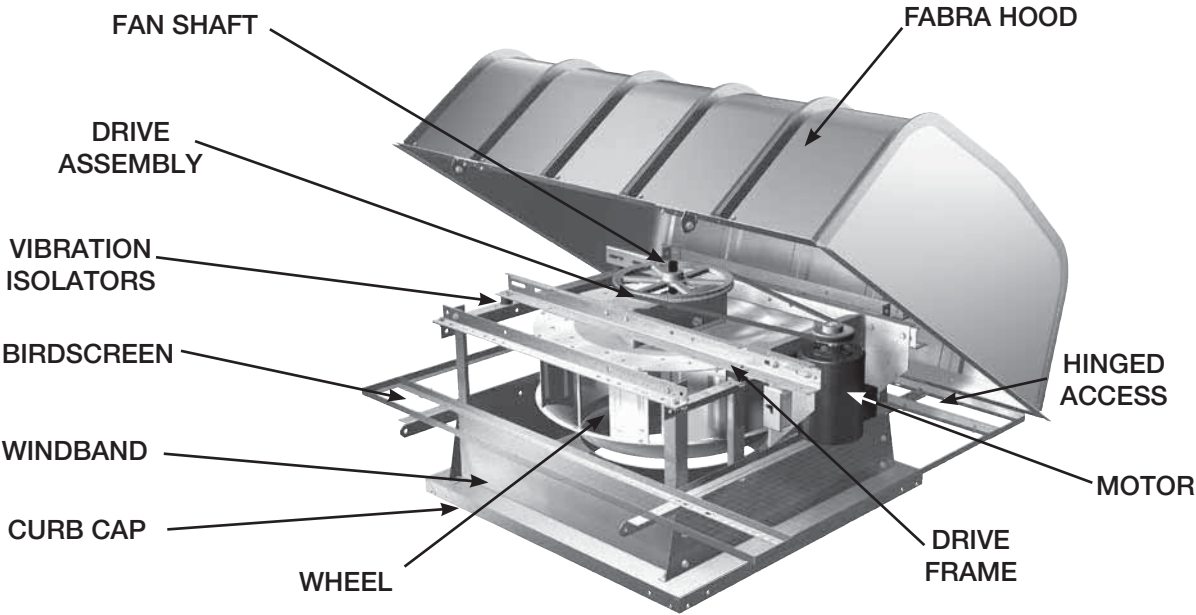
Parts List

Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information will assist the local Greenheck representative and the factory in providing service and replacement parts. Before taking any corrective action, make certain unit is not capable of operation during repairs.

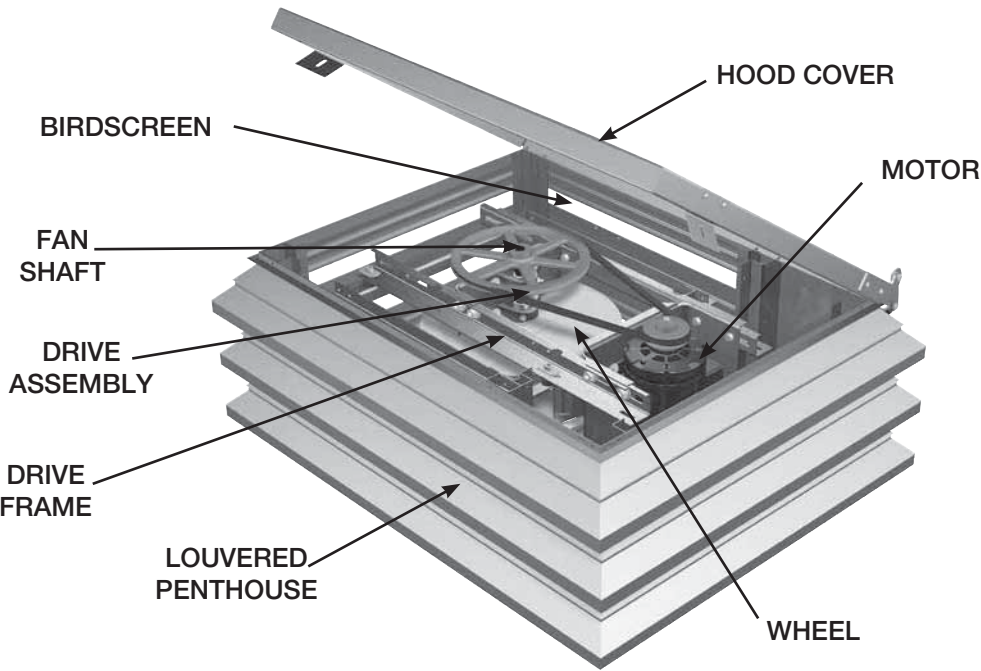
CAUTION
A fan manufactured with an explosion resistant motor does not certify the entire unit to be explosion proof. Refer to UL Listing Mark for the fans approved usage.

CAUTION
La présence d'un moteur antidéflagrant sur un ventilateur ne garantit pas que tout l'appareil est antidéflagrant. Pour connaître les emplois autorisés de l'appareil, voir son marquage de conformité UL.

Model LB



Model LBP



Troubleshooting

WARNING

Before taking any corrective action, make certain unit is not capable of operation during repairs.

AVERTISSEMENT

Avant d'entreprendre toute action corrective, s'assurer que l'appareil ne pourra pas fonctionner durant les réparations.

PROBLEM	CAUSE	CORRECTIVE ACTION
Reduced Airflow	System resistance too high	Check system for proper operation of backdraft or control dampers; remove obstructions in ductwork, etc.
	Unit running backwards	See Prestart-up Checks.
	Fan speed too low	Increase fan speed.
	Excessive dirt buildup on wheel	Clean wheel.
	Improper wheel alignment	Center wheel on inlets.
Excessive Noise or Vibration	Bad Bearings	Replace.
	Belts too tight or too loose	Refer to Figure 6 and adjust tension.
	Wheel improperly aligned and rubbing	Center wheel on inlets. See Figure 1.
	Loose drive or motor pulleys	Align and tighten. See Prestart-up Checks.
	Foreign objects in wheel or housing	Remove objects, check for damage or unbalance.
	Unbalance of wheel caused by excessive dirt and grease buildup	Remove buildup.

Our Commitment

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

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.

Greenheck Series L 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.



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 instructions could result in personal injury and/or property damage!

Model SP

Model SP is a direct drive ceiling exhaust fan designed for clean air applications where low sound levels are required. Many options and accessories are available such as lights, motion detectors, ceiling radiation dampers and speed controls. Capacities range from 25 to 1,600 cfm (42 to 2,718 m³/hr) and 1 in. wg (248 Pa). AMCA Licensed for Sound and Air Performance.



ENERGY STAR® Certified models include:
 SP-A, 50, 70, 90, 200, 250, 290 and 410;
 SP-B, 50, 70, 80 and 90.

WARNING!

To reduce the risk of fire, electric shock, or injury to persons, observe the following:

- Suitable for use with solid state speed controls.
- Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.
- Before servicing or cleaning unit, switch power off at service panel and lock service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
- Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
- Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent back drafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) and the local code authorities.
- When cutting or drilling into wall or ceiling, do not damage electrical wiring or other hidden utilities.
- Acceptable for use over a bathtub or shower when installed in a GFCI protected branch circuit. (Up through size SP-A390)
- Never place a switch where it can be reached from a tub or shower.
- Ducted fans must always be vented to the outdoors.
- These fans are not recommended for cooking exhaust applications. They are designed primarily for low temperature, clean air applications only. The diagram shows the minimum distance these fans should be placed in relation to cooking equipment.
- Fan/Light combination not to be installed in a ceiling thermally insulated to a value greater than R40.

CAUTION!

- For general ventilating use only. Do not use to exhaust hazardous or explosive materials and vapors.

Model CSP

Model CSP is a direct drive inline exhaust fan designed for clean air applications where low sound levels are required. Capacities range from 70 to 3,800 cfm (119 to 6,456 m³/hr) and 1 in. wg (248 Pa). AMCA Licensed for Air Performance.



AVERTISSEMENT!

Pour réduire le risque d'incendie, de choc électrique ou de blessure corporelle, respecter ce qui suit:

- Appareil pouvant être utilisé avec un régulateur de vitesse à semi-conducteurs.
- Utiliser cet appareil exclusivement comme prévu par le fabricant. En cas de questions, communiquer avec le fabricant à l'adresse ou au numéro de téléphone figurant dans la garantie.
- Avant tout entretien ou nettoyage de l'appareil, couper l'alimentation sur le tableau électrique et verrouiller le dispositif de sectionnement pour empêcher toute mise sous tension accidentelle. Si le dispositif de sectionnement ne peut pas être verrouillé, attacher un moyen de mise en garde bien visible, tel qu'un panneau, au tableau électrique.
- La pose et le câblage électrique doivent être effectués par des personnes qualifiées en conformité avec les codes et normes en vigueur, y compris pour la résistance au feu du bâtiment.
- Une quantité d'air suffisante est nécessaire pour la bonne combustion et l'extraction des gaz brûlés par le conduit d'évacuation (cheminée) d'appareils à combustible afin d'éviter le refoulement. Veiller à suivre les indications du fabricant du matériel de chauffe, les normes de sécurité telles que celles publiées par la National Fire Protection Association (NFPA) et l'American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) et la réglementation en vigueur.
- Lors de la découpe ou du perçage de murs ou plafonds, ne pas endommager les câbles électriques et autres conduites masquées.
- Pose admissible au-dessus d'une baignoire ou d'une douche sous réserve de raccordement à un circuit de dérivation à protection GFCI (disjoncteur différentiel). (Jusqu'à la taille SP-A390 incluse)
- Ne jamais placer d'interrupteur à un emplacement à portée d'une baignoire ou d'une douche.
- Les caissons d'extraction à gaine doivent toujours être évacués vers l'extérieur.
- Ces caissons ne sont pas conseillés pour les applications d'aspiration de vapeurs de cuisson. Ils sont conçus essentiellement pour l'aspiration d'air propre à basse température. Le schéma indique la distance minimale de placement de ces caissons par rapport à l'équipement de cuisson.
- Le combiné ventilateur/luminaire ne devra pas être installé dans un plafond ayant une isolation thermique d'une valeur supérieure à R40.

ATTENTION!

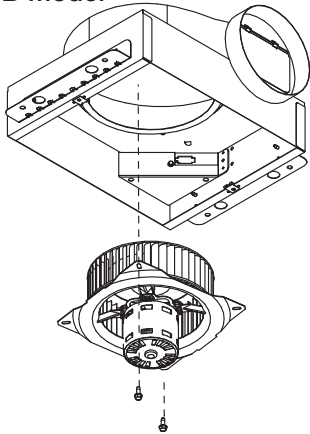
- À utiliser pour la ventilation générale uniquement. Ne pas utiliser pour l'aspiration de matières et vapeurs dangereuses ou explosives.

Prepare the fan

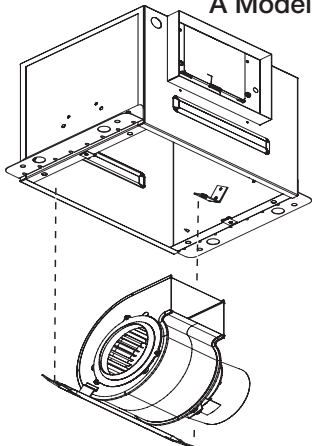
Power Assembly

If power assembly (motor, wheel, and scroll) is not installed in housing, insert the electrical plug into fan socket, then slide scroll end of power assembly into fan housing. Attach by using two sheet metal screws provided.

B Model

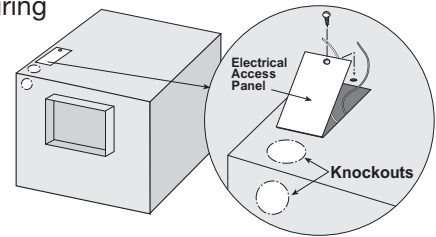


A Model



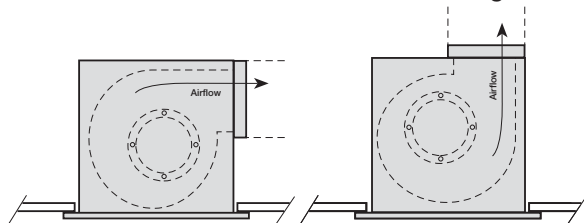
Remove Wiring Knockout

Remove either top or side wiring knockout, depending on wiring direction, by bending it back and forth to break tabs.



Ductwork

Check ductwork to see if the fan's discharge requires rotation from horizontal to vertical discharge.

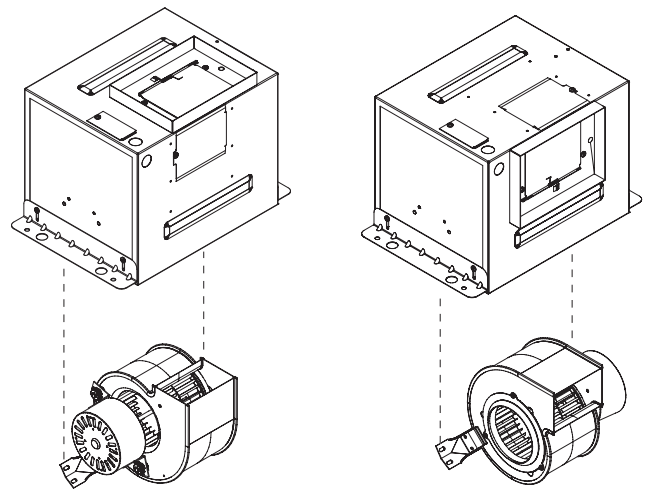


Fan Rotation

To rotate from horizontal to vertical discharge
A-Models Only

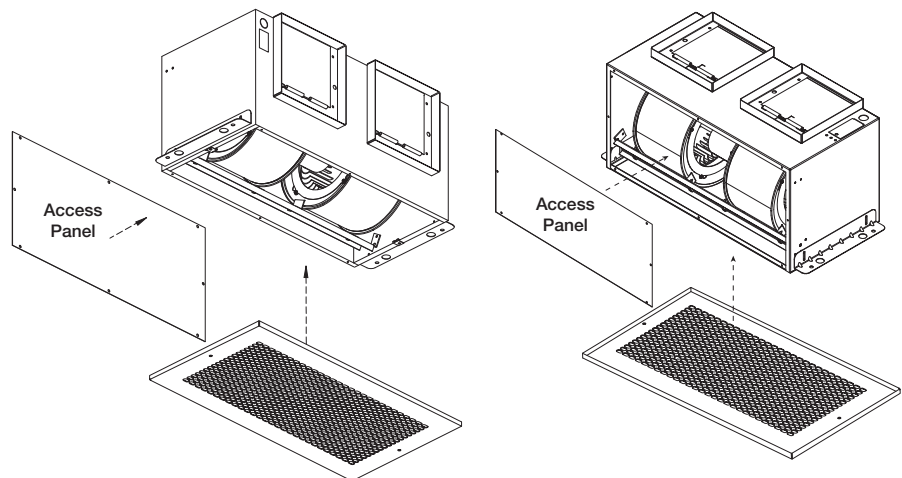
A-50-500, 710, 780 Models

Remove the two screws holding the power assembly in and pull power assembly out. Rotate power assembly 180 degrees and put back into fan. Use the same screws to reattach power assembly to fan housing. Flip fan over and remove the four screws holding the discharge duct and damper assembly. Exchange the assembly with plate mounted on top of fan, as shown in these illustrations.



A-700, 900-1500 Models

Remove the eight screws holding the access panel or collar as shown in picture. Rotate the fan housing so the discharge is facing up. Replace access panel or collar and screws.



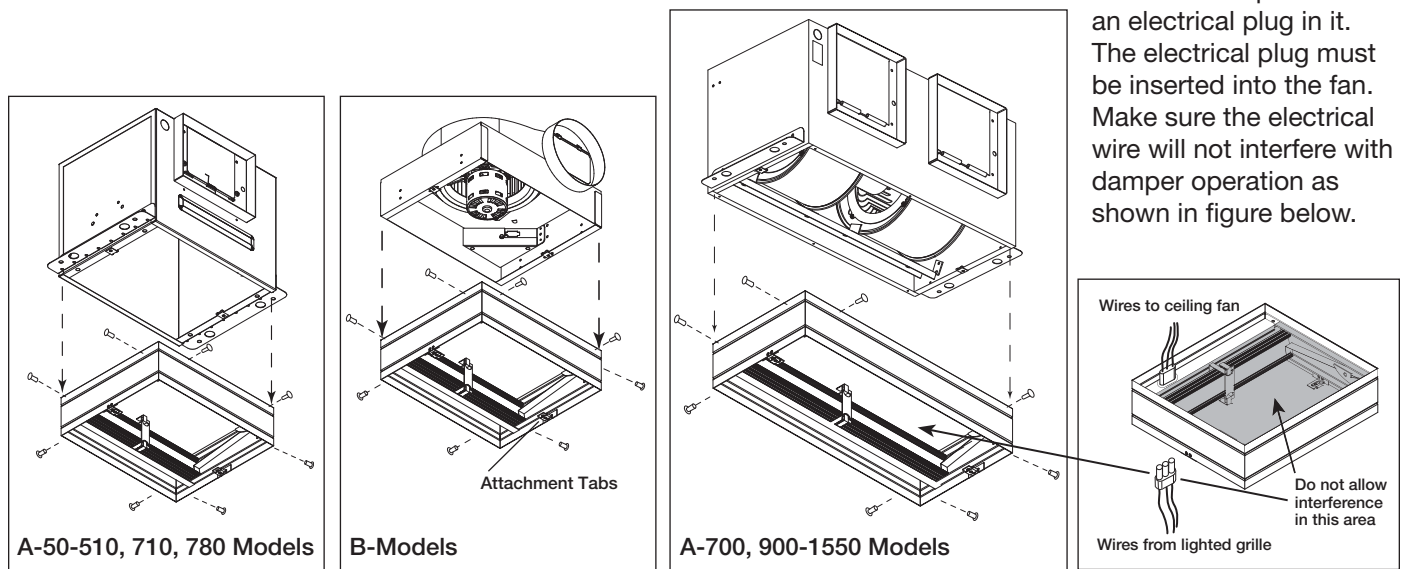
Ceiling Radiation Damper (CRD)

If fan is to be used in a fire resistive membrane ceiling, a ceiling radiation damper must be used.

If the ceiling radiation damper is already mounted to the fan from the factory, proceed to Install the Fan.

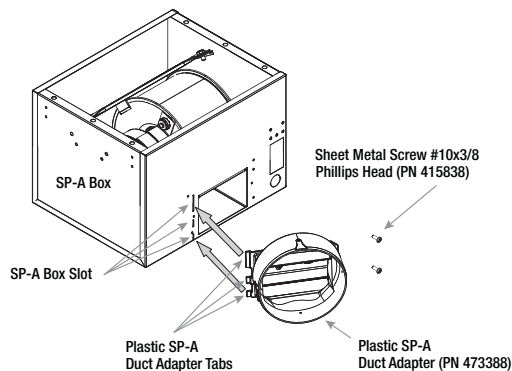
To mount the ceiling radiation damper to fan, make sure grille attachment tabs are facing down. Then place the inlet part of the fan into the ceiling radiation damper collar, and use self-tapping sheet metal screws (by others) to screw through the damper collar and into the fan housing. If the fan/light combination is being used, make sure ceiling

radiation damper has an electrical plug in it. The electrical plug must be inserted into the fan. Make sure the electrical wire will not interfere with damper operation as shown in figure below.

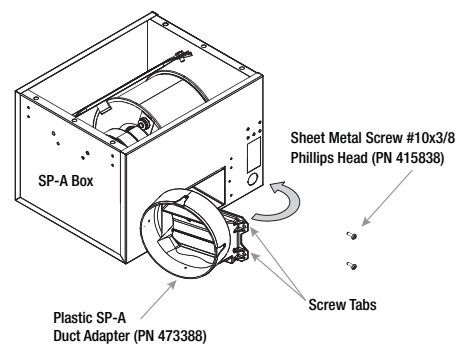


Discharge Installation SP-A 50-90 Models

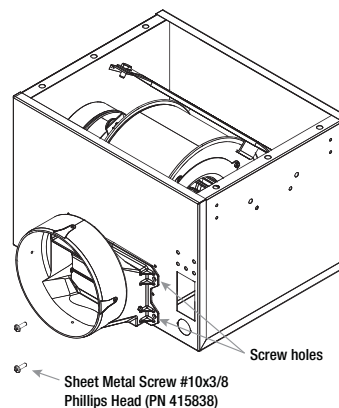
1 Insert plastic duct tab into SP-A box slots.



2 Rotate plastic SP-A duct adapter (PN 473388) until the screw tabs meet SP-A box.

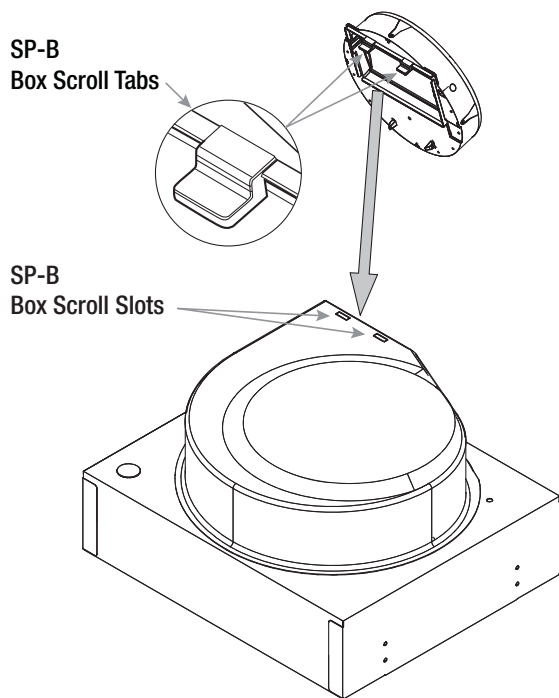


3 Install screws provided to secure discharge.

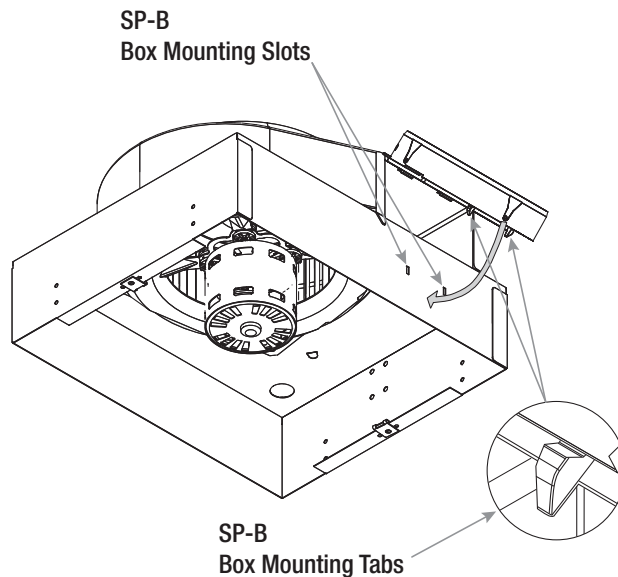


Discharge Installation SP/CSP-B 50-200 Models

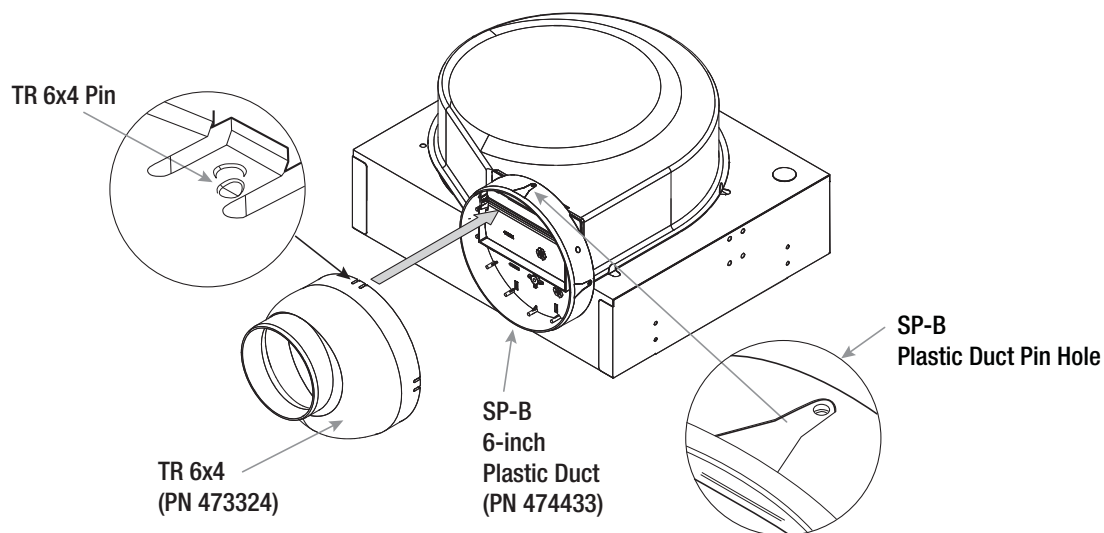
- 1** Insert SP-B box scroll tab into SP-B box scroll slots.



- 2** Rotate plastic SP-B duct adapter (PN 474433) until the two SP-B mounting tabs fully engage into the two SP-B box mounting slots.



- 3** **OPTIONAL**
- Align the pins on the TR 6x4 adaptor to the duct pin hole on the SP-B 6-inch duct. Push until the adaptor snaps into place.



Install the Fan

1. For best performance, choose a location with the shortest possible duct run and minimum number of elbows. Do not mount near cooking equipment, as shown in Fig. 1.

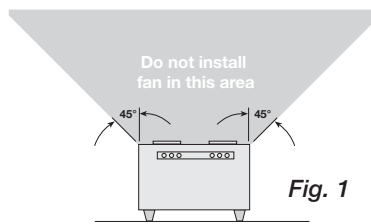


Fig. 1

2. Attach adjustable mounting brackets to fan, but leave the screws loose until proper height is determined, shown in Fig. 2. Cut hole to dimensions shown in table below:

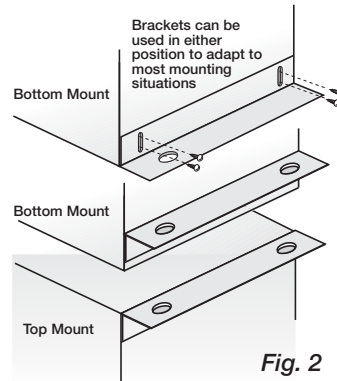


Fig. 2

Ceiling Openings		
Sizes	Fan or Fan/Light	Fan/CRD
SP-A50, A70, A90 SP-A110, A125, A190	10 ⁷ / ₈ x 13 ³ / ₈	11 ¹ / ₈ x 13 ⁷ / ₁₆
SP-A200, A250, A290, A390	12 ¹ / ₈ x 14 ¹ / ₄	12 ¹ / ₄ x 14 ³ / ₈
SP-A700	23 ³ / ₄ x 11 ³ / ₄	24 ¹ / ₈ x 12 ¹ / ₄
SP-A410, A510, A710, A780	14 ³ / ₄ x 18 ³ / ₈	14 ⁷ / ₈ x 18 ⁷ / ₁₆
SP-A900, A1050, A1410, A1550	14 ³ / ₄ x 24	14 ⁷ / ₈ x 24 ¹ / ₈
SP-B 50 - 200	14 ¹ / ₈ x 11 ³ / ₄	14 ³ / ₈ x 12 ¹ / ₄

NOTE

Model SP-A 50-90 are standard with a round duct. Should Model SP-A 110-190 require a round duct, Model RDC (Round Duct Connector) may be ordered from Greenheck for field installation.

For Frame Construction:

Position unit between joists. Position brackets such that bottom edge of housing will be flush with finished ceiling, and tighten the adjustable mounting brackets, shown in Fig. 3.

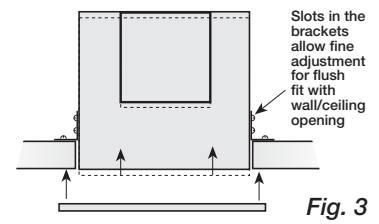


Fig. 3

For Hanging Installations:

Use Greenheck's optional vibration isolator kit Part Number VI Kit. Using the fan's standard adjustable mounting brackets and 10 by 32 threaded rod (by others), hang unit as shown in Fig. 4.

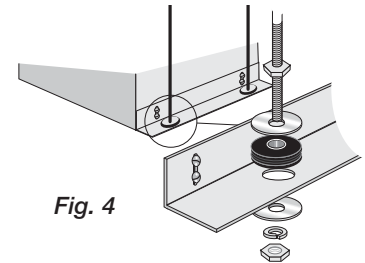
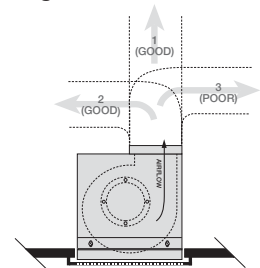


Fig. 4

3. Installation of ductwork is critical to the performance of the fan, shown in Fig. 5. Straight ductwork (1) or ductwork that turns in the same direction as the wheel (2) is recommended. Ductwork turning opposite the wheel direction (3) will cause turbulence and back pressure resulting in poor performance.

Fig. 5



4. Slide ductwork over the fan's discharge collar and securely attach it with sheet metal screws.

Make sure the screws do not interfere with damper operation. Check damper to make sure it opens freely.

Wire the Fan

1. If installed, remove wiring cover. If fan/light combination is being used, make sure the fan plug is connected to the fan receptacle and the light plug is connected to the light receptacle, shown in Fig. 6. Using proper wire connectors, wire the fan as shown in Fig. 7a. For wiring of light proceed to Fig. 7b.

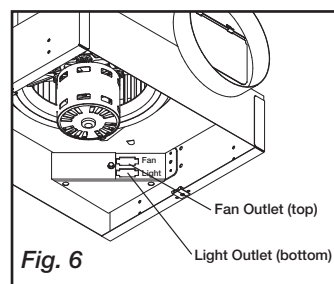


Fig. 6

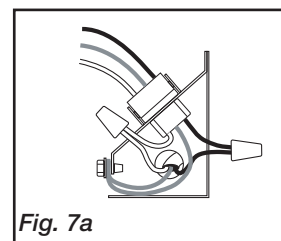


Fig. 7a

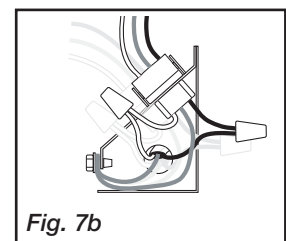


Fig. 7b

115 & 277 Volt

Black wire is "Hot"
White wire is "Neutral"
Green wire is "Ground"

220 - 240 Volt

Black wire is "Hot"
White wire is "Hot"
Green wire is "Neutral/Ground"

2. Push all wiring into the unit's cover and replace wiring cover.

Attach the Grille

1. If lighted grille is being used, plug wire into fan socket.
If lighted grille and ceiling radiation damper are being used, plug wire from lighted grille into ceiling radiation damper socket. Do not plug wire directly into the fan socket. Make sure the wire does not interfere with the ceiling radiation damper operation.
2. Attach grille with two screws provided. Make sure not to over tighten; over tightening will damage grille.
3. Slide attachment screw covers over the attachment screws, shown in Figure 8 and 9.
4. If lighted grille is being used, install light bulb(s) into light socket(s). For incandescent lights, use maximum 100 watt bulb (by others). For fluorescent lights, use 27W GU24 bulbs. Greenheck has replacement 27W GU24 bulbs call 1-800-355-5354 to order.
5. If lighted grille is being used, snap lens into place, by pushing on the outside edges of lens, shown in Fig. 9. To remove lens, use small screw driver and pry on one side of lens.
6. Turn on power and check fan and light operation.

Fig. 8

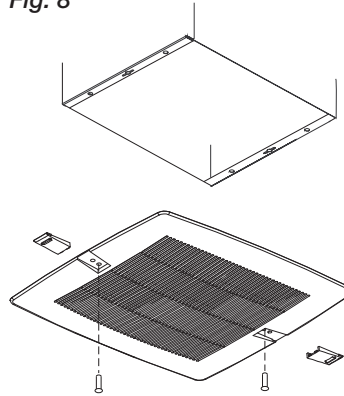
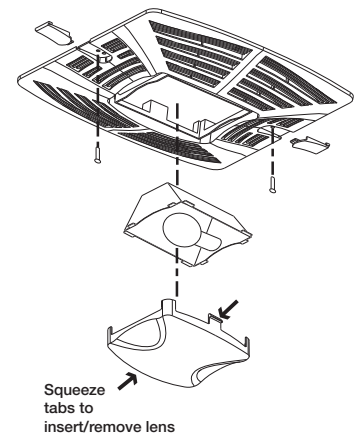


Fig. 9



Converting from ceiling to cabinet design for Model SP fans

All SP convertible sizes will be shipped with grille and duct collar cover.

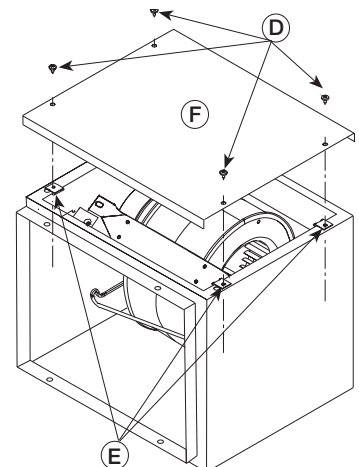
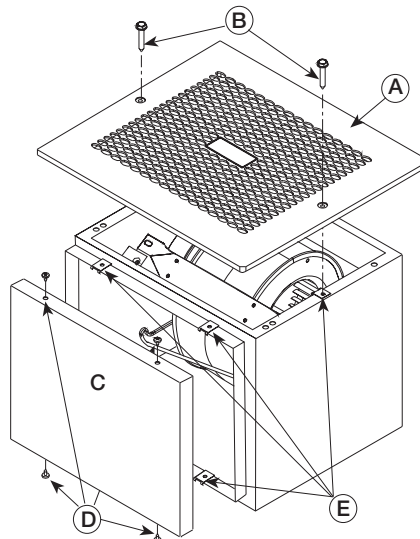
Conversion Kit Parts List

- Qty. of 1 Blower Box Cover

Tools Required

- Phillips Head Screwdriver

- Step 1: Remove grille (A) by removing the two grille screws (B).
- Step 2: Remove duct collar cover (C) by removing the four duct collar screws (D).
- Step 3: Discard grille (A), two grille screws (B), and duct collar cover (C).
- Step 4: Remove the six (6) tinnerman clips (E) by twisting them to one side and pulling straight out. Discard two of the six tinnerman clips.
- Step 5: Insert the remaining four tinnerman clips (E) on grille opening side.
- Step 6: Place blower box cover (F) over tinnerman clips (E), which were inserted in step 5.
- Step 7: Screw the blower box cover (F) into place with four blower box cover screws (D).



SP/CSP models shown are
UL and cUL listed E 33599

Other Installation Considerations

Ductwork and Noise

Fiberglass ductboard is a better choice than metal ductwork for reducing fan noise and is highly recommended for low sound applications. Where metal duct is used, sound transmission can be reduced with flexible duct connections between the fan and the duct.

Sound and Location

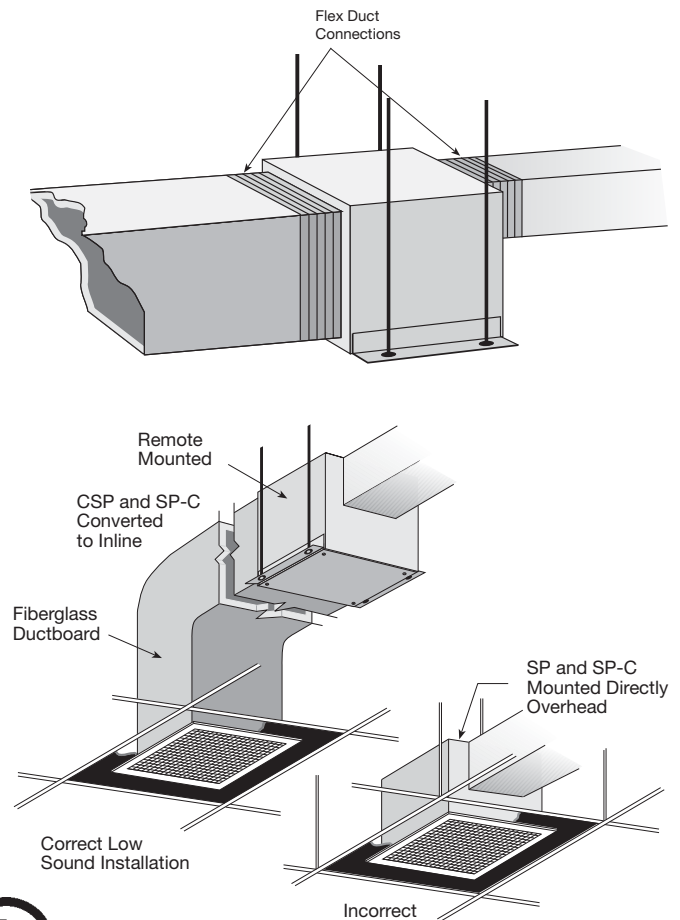
The location of these fans must be taken into consideration before installation. In critical sound installations, insulated ductwork, flexible duct connections or placing the fan in a remote section of ductwork are solutions to meeting the required fan sound levels.

Filters

The addition of an intake filter is highly recommended for these fans, even in clean air environments excess dirt can accumulate on wheels and motors causing reduced performance and imbalance.

Filters, once installed, should be checked and cleaned periodically to maintain performance.

Greenheck offers washable aluminum mesh filters specifically designed for these fans. Please consult our SP/CSP catalog for more information.



SP/CSP models shown are
UL and cUL listed E 33599

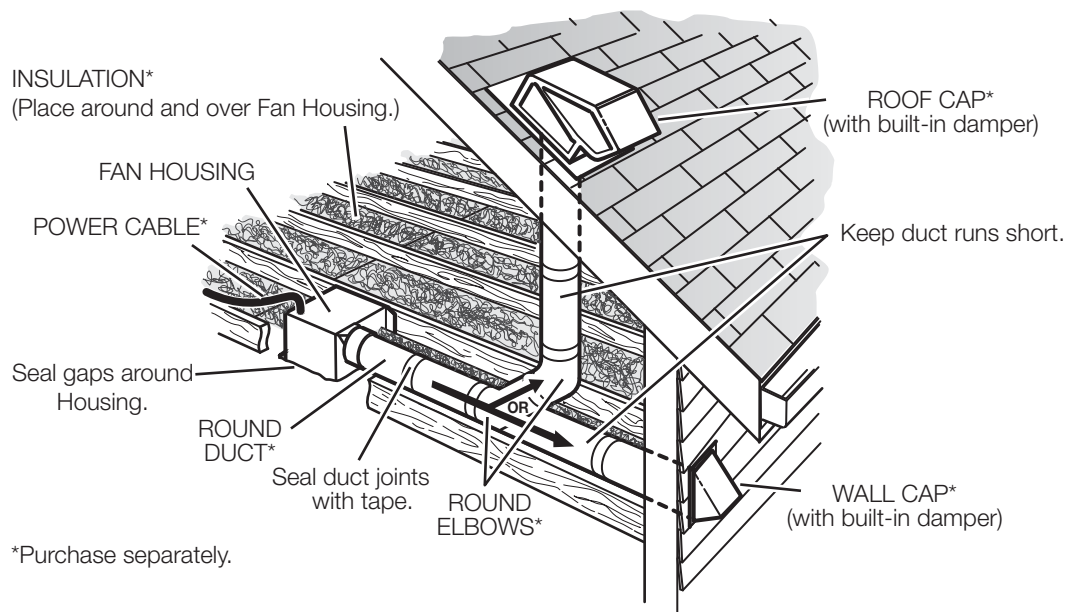
General Maintenance Suggestions

Model SP/CSP ceiling exhaust fans require very little maintenance. But since small problems over time left unchecked could lead to loss of performance or early motor failure, we do recommend that the unit be inspected periodically (once or twice a year).

The fan motor and wheel should be checked for dust and dirt accumulations. Dirt buildup can lead to loss of performance and motor overheating. Cleaning can be accomplished by brushing off any dust that may have accumulated. Even filtered units can accumulate build-up and should be checked when cleaning filters.

The motor should be checked for lubrication at this time. Lubricate only those motors which have an oil hole provided. A few drops of all purpose oil (SAE 20) will be sufficient.

Typical Installation



Our Commitment

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

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.

Greenheck's Centrifugal Ceiling and Cabinet Exhaust 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.

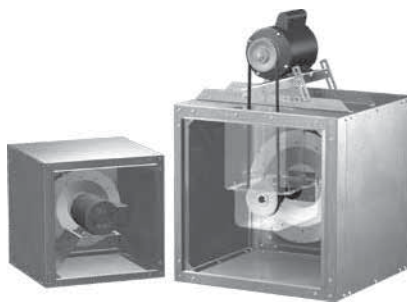


Installation, Operation and Maintenance Manual

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 instructions could result in personal injury and/or property damage!

Model SQ Direct Drive

Model SQ is a direct drive centrifugal inline exhaust fan. These fans are specifically designed for inline applications. Performance capabilities range up to 5,000 cfm (8,500 m^3/hr) and up to 2.0 in. wg (498 Pa) of static pressure. SQ fans are available in thirteen sizes with nominal wheel diameter ranging from 6 to 16 inches (152 to 406 mm) (060 to 160 unit sizes). Each fan shall bear a permanently affixed manufacturers engraved metal nameplate containing the model number and individual serial number.



Model BSQ Belt Drive

Model BSQ is a belt drive centrifugal inline exhaust fan. These fans are specifically designed for inline applications. Performance capabilities range up to 27,200 cfm (46,200 m^3/hr) and up to 4.0 in. wg (996 Pa) of static pressure. BSQ fans are available in fourteen sizes with nominal wheel diameter ranging from 7 to 42 inches (178 to 1067 mm) (070 to 420 unit sizes). Each fan shall bear a permanently affixed manufacturers engraved metal nameplate containing the model number and individual serial number.

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 seismic activity is 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) and 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 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.
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, 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

Receiving, Unpacking, Handling, Storage 2

Inspection and Maintenance During Storage 3

Removing from Storage 3

Redesigned BSQ Dimensions Statement 3

Dimensional Data SQ/BSQ 4

Redesigned BSQ Dimensions 5

Mounting SQ/BSQ 6

Mounting Redesigned BSQ 6

Discharge & Isolator Information SQ/BSQ 8

Redesigned Isolator Information BSQ 9

Redesigned Discharge Information BSQ 10

Pre-Starting Checks 10

Operation. 11

Inspection 11

Maintenance 12

 Tapered Bushing Hub Installation & Removal . . 12

 Recommended Bearing Lubrication 13

Parts Lists 14-15

Troubleshooting. 16

Our Commitment. 16

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 Greenheck Representative. 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.

Handling

Move fan to desired location and determine position of access panels, discharge and motor. Make sure the inlet and outlet have at least 2½ times the wheel diameter (duct diameter) before any obstructions like an elbow or transition. Attach the fan to a suitable framework as specified; hanging or base vibration isolators are recommended. See the SQ & BSQ Fan Dimensions table on pages 4 and 5 for physical dimensions, utilizing Figures 1 and 2. Mounting dimensions and vibration isolator centerline information is provided on pages 6 thru 9. The motor’s amperage and voltage ratings must be checked for compatibility to supply voltage prior to final electrical connection. Electrical lead-in wires are then connected to the factory supplied safety disconnect switch. All wiring must conform to local and national codes.

Fan 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.

Indoor Storage: 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° to 110°F (-1° to 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 buildup. Leave coverings loose to permit air circulation and to allow for periodic inspection.

The unit should be stored at least 3½ inches (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 Storage: Fans designed for outdoor applications may be stored outdoors, if absolutely necessary. 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.

Fan wheels should be blocked to prevent spinning caused by strong winds.

Inspection and 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. Thoroughly wipe clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive, 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.

Redesigned BSQ Dimensions

In early 2015, the BSQ was redesigned. The redesign changes some mounting dimensions of the fan for sizes 70 through 240. All BSQ fans ordered after July 20th, 2015 will be moving over to this new design, with two exceptions that will still utilize the old design:

1. Any orders prior to July 20th, 2015.
2. Any orders for OSHPD seismic rated units.

Both versions of the fan have their dimensions listed, so it is recommended dimensions be confirmed on these models before the unit is installed. Contact your local sales representative for clarification on ordering information.

SQ & BSQ Fan Dimensions

Model	A	B	C	*D	E	*F	*G	*H	Damper	SQ Weight [^]	BSQ Weight [^]
SQ 60-75	12 (305)	13 (330)	12 (305)	8 $\frac{7}{8}$ (225)	1 (25)	-	-	-	9 (229)	26 (12)	-
SQ 80-95	15 (381)	16 (406)	15 (381)	11 $\frac{7}{8}$ (302)	1 (25)	-	-	-	12 (305)	41 (19)	-
SQ 97,98,99	15 (381)	21 (533)	15 (381)	11 $\frac{7}{8}$ (302)	1 (25)	-	-	-	12 (305)	49 (22)	-
BSQ 70-80	15 (381)	21 (533)	15 (381)	11 $\frac{7}{8}$ (302)	1 (25)	15 $\frac{1}{2}$ (394)	14 (356)	12 $\frac{1}{2}$ (318)	12 (305)	-	76 (34)
BSQ 90	15 (381)	21 (533)	15 (381)	11 $\frac{7}{8}$ (302)	1 (25)	15 $\frac{1}{2}$ (394)	14 (356)	12 $\frac{1}{2}$ (318)	12 (305)	-	84 (38)
SQ-BSQ 100	17 (432)	21 (533)	17 (432)	13 $\frac{3}{8}$ (352)	1 (25)	15 $\frac{1}{2}$ (394)	14 (356)	12 $\frac{1}{2}$ (318)	14 (356)	56 (25)	83 (38)
SQ-BSQ 120	19 (483)	21 (533)	19 (483)	15 $\frac{7}{8}$ (403)	1 (25)	17 $\frac{7}{8}$ (454)	16 (406)	12 $\frac{1}{2}$ (318)	16 (406)	67 (30)	97 (44)
SQ-BSQ 130 (HP)	21 (533)	21 (533)	21 (533)	17 $\frac{7}{8}$ (454)	1 (25)	17 $\frac{7}{8}$ (454)	16 (406)	12 $\frac{1}{2}$ (318)	18 (457)	67 (35)	97 (44)
SQ-BSQ 140 (HP)	23 (584)	22 (559)	23 (584)	19 $\frac{7}{8}$ (505)	1 (25)	17 $\frac{7}{8}$ (454)	16 (406)	12 $\frac{1}{2}$ (318)	20 (508)	104 (47)	111 (50)
SQ-BSQ 160 (HP)	26 (660)	26 (660)	26 (660)	22 $\frac{7}{8}$ (581)	1 (25)	20 $\frac{1}{2}$ (521)	17 (432)	13 $\frac{3}{8}$ (340)	23 (584)	160 (73)	208 (94)
BSQ 180 (HP)	28 (711)	28 (711)	28 (711)	23 $\frac{3}{8}$ (606)	1 $\frac{1}{2}$ (38)	24 $\frac{3}{8}$ (619)	18 (457)	13 $\frac{3}{4}$ (349)	24 (610)	26 (12)	245 (111)
BSQ 200 (HP)	32 (813)	32 (813)	32 (813)	27 $\frac{1}{8}$ (708)	1 $\frac{1}{2}$ (38)	28 (711)	20 (508)	16 (406)	28 (711)	26 (12)	314 (142)
BSQ 240 (HP)	39 (991)	34 (864)	39 (991)	34 $\frac{3}{8}$ (886)	1 $\frac{1}{2}$ (38)	32 $\frac{1}{8}$ (835)	22 (559)	19 (483)	35 (889)	26 (12)	415 (188)
BSQ 300 (HP)	46 (1168)	38 (965)	46 (1168)	41 $\frac{7}{8}$ (1064)	1 $\frac{1}{2}$ (38)	34 (864)	22 (559)	18 (457)	42 (1067)	26 (12)	537 (244)
BSQ 360 (HP)	52 (1321)	42 (1067)	52 (1321)	47 $\frac{7}{8}$ (1216)	1 $\frac{1}{2}$ (38)	34 (864)	22 (559)	18 (457)	48 (1219)	26 (12)	686 (311)
BSQ 420 (HP)	58 (1473)	50 (1270)	58 (1473)	53 $\frac{3}{8}$ (1368)	1 $\frac{1}{2}$ (38)	34 (864)	22 (559)	18 (457)	54 (1372)	26 (12)	789 (358)

All dimensions in inches (millimeters) and weight is shown in pounds (kilograms). *May be greater depending on motor.

[^]Weight shown is largest cataloged Open Drip Proof motor.

Filter Option Dimensions

Model	A	B	C	D	WT.	Filter Size	Filter Quantity
SQ 60-75	22 $\frac{7}{8}$ (562)	12 (305)	8 $\frac{7}{8}$ (225)	1 (25)	40 (18)	10 x 12 (254 x 305)	1
SQ 80-95	45 $\frac{5}{8}$ (1159)	15 (381)	11 $\frac{7}{8}$ (302)	1 (25)	74 (34)	14 x 25 (356 x 635)	1
SQ 97,98,99	50 $\frac{5}{8}$ (1286)	15 (381)	11 $\frac{7}{8}$ (302)	1 (25)	80 (36)	14 X 25 (356 X 635)	1
SQ 100	47 $\frac{1}{4}$ (1200)	17 (432)	13 $\frac{3}{8}$ (352)	1 (25)	88 (40)	16 x 20 (406 x 508)	2
SQ 120	52 $\frac{3}{16}$ (1326)	19 (483)	15 $\frac{7}{8}$ (403)	1 (25)	114 (52)	16 x 25 (406 x 635)	2
SQ 130	46 $\frac{3}{8}$ (1178)	21 (533)	17 $\frac{7}{8}$ (454)	1 (25)	120 (54)	20 x 20 (508 x 508)	2
SQ 140	52 $\frac{3}{16}$ (1330)	23 (584)	19 $\frac{7}{8}$ (505)	1 (25)	174 (79)	20 x 25 (508 x 635)	2
SQ 160	51 $\frac{3}{8}$ (1305)	26 (660)	22 $\frac{7}{8}$ (581)	1 (25)	246 (112)	20 x 20 (508 x 508)	4
BSQ 70-80-90	50 $\frac{5}{8}$ (1286)	15 (381)	11 $\frac{7}{8}$ (302)	1 (25)	117 (53)	14 x 25 (356 x 635)	1
BSQ 100	47 $\frac{1}{4}$ (1200)	17 (432)	13 $\frac{3}{8}$ (352)	1 (25)	120 (54)	16 x 20 (406 x 508)	2
BSQ 120	52 $\frac{3}{16}$ (1326)	19 (483)	15 $\frac{7}{8}$ (403)	1 (25)	144 (79)	16 x 25 (406 x 635)	2
BSQ 130 (HP)	46 $\frac{3}{8}$ (1178)	21 (533)	17 $\frac{7}{8}$ (454)	1 (25)	140 (64)	20 x 20 (508 x 508)	2
BSQ 140 (HP)	52 $\frac{3}{16}$ (1330)	23 (584)	19 $\frac{7}{8}$ (505)	1 (25)	181 (82)	20 x 25 (508 x 635)	2
BSQ 160 (HP)	51 $\frac{3}{8}$ (1305)	26 (660)	22 $\frac{7}{8}$ (581)	1 (25)	294 (133)	20 x 20 (508 x 508)	4
BSQ 180 (HP)	55 $\frac{1}{16}$ (1399)	28 (711)	23 $\frac{3}{8}$ (606)	1 $\frac{1}{2}$ (38)	344 (156)	20 x 25 (508 x 635)	4
BSQ 200 (HP)	66 $\frac{1}{16}$ (1694)	32 (813)	27 $\frac{7}{8}$ (708)	1 $\frac{1}{2}$ (38)	441 (200)	12 x 25 (305 x 635)	3
						16 x 25 (406 x 635)	3
BSQ 240 (HP)	68 $\frac{7}{8}$ (1749)	39 (991)	34 $\frac{7}{8}$ (886)	1 $\frac{1}{2}$ (38)	573 (260)	20 x 25 (508 x 635)	4
						16 x 25 (406 x 635)	4
BSQ 300 (HP)	72 $\frac{3}{8}$ (1832)	46 (1168)	41 $\frac{7}{8}$ (1064)	1 $\frac{1}{2}$ (38)	759 (344)	20 x 25 (508 x 635)	8
BSQ 360 (HP)	79 $\frac{1}{4}$ (2013)	52 (1321)	47 $\frac{7}{8}$ (1216)	1 $\frac{1}{2}$ (38)	957 (434)	16 x 25 (406 x 635)	10
						20 x 25 (508 x 635)	5
BSQ 420	93 $\frac{3}{8}$ (2365)	58 (1473)	53 $\frac{3}{8}$ (1368)	1 $\frac{1}{2}$ (38)	1185 (538)	16 x 25 (406 x 635)	5
						20 x 25 (508 x 635)	10

Note: 24-inch side clearance is recommended for accessing and removing filters.
All dimensions in inches (millimeters) and weight (WT.) in pounds (kilograms).

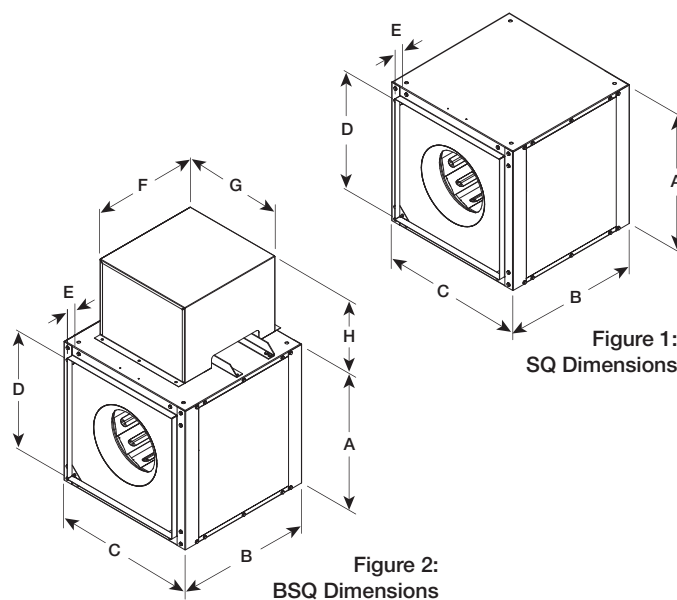


Figure 1:
SQ Dimensions

Figure 2:
BSQ Dimensions

Figure 3: Model SQ - Filter Options

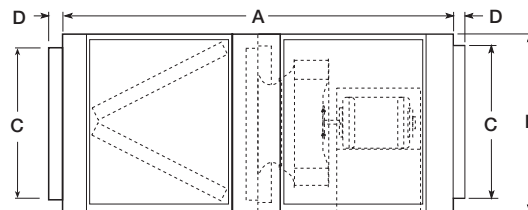
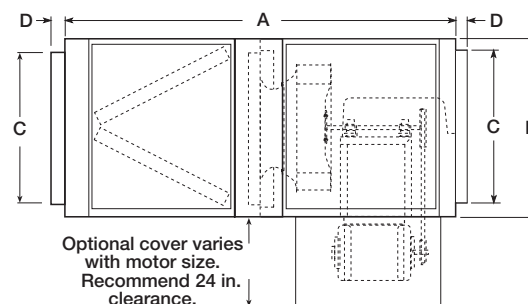


Figure 4: Model BSQ - Filter Options



Redesigned BSQ Dimensions (refer to page 3 for details)

BSQ Fan Dimensions										
Model	A	B	C	*D	E	*F	*G	*H	Damper	BSQ Weight [^]
BSQ 70-90	17 $\frac{1}{8}$ (435)	21 (533)	17 $\frac{1}{8}$ (435)	11 $\frac{1}{8}$ (302)	1 $\frac{1}{2}$ (37)	17 $\frac{3}{4}$ (451)	13 (330)	13 $\frac{1}{4}$ (337)	12 (305)	106 (48)
BSQ 100	17 $\frac{1}{8}$ (435)	21 (533)	17 $\frac{1}{8}$ (435)	13 $\frac{3}{8}$ (352)	1 $\frac{1}{2}$ (37)	17 $\frac{3}{4}$ (451)	13 (330)	13 $\frac{1}{4}$ (337)	14 (356)	107 (48)
BSQ 120	19 $\frac{1}{8}$ (486)	21 (533)	19 $\frac{1}{8}$ (486)	15 $\frac{5}{8}$ (403)	1 $\frac{1}{2}$ (37)	20 (508)	17 (432)	13 $\frac{1}{4}$ (337)	16 (406)	124(56)
BSQ 130 (HP)	21 $\frac{1}{8}$ (537)	21 (533)	21 $\frac{1}{8}$ (537)	17 $\frac{7}{8}$ (454)	1 $\frac{1}{2}$ (37)	20 (508)	17 (432)	13 $\frac{1}{4}$ (337)	18 (457)	131 (59)
BSQ 140 (HP)	23 $\frac{1}{8}$ (587)	22 (559)	23 $\frac{1}{8}$ (587)	19 $\frac{7}{8}$ (505)	1 $\frac{1}{2}$ (37)	20 (508)	17 (432)	13 $\frac{1}{4}$ (337)	20 (508)	146 (66)
BSQ 160 (HP)	26 $\frac{1}{8}$ (664)	26 (660)	26 $\frac{1}{8}$ (664)	22 $\frac{7}{8}$ (581)	1 $\frac{1}{2}$ (37)	20 (508)	17 (432)	13 $\frac{1}{4}$ (337)	23 (584)	188 (85)
BSQ 180 (HP)	27 $\frac{1}{8}$ (689)	28 (711)	27 $\frac{1}{8}$ (689)	23 $\frac{7}{8}$ (606)	1 $\frac{1}{2}$ (37)	20 (508)	17 (432)	13 $\frac{1}{4}$ (337)	24 (610)	195 (88)
BSQ 200 (HP)	31 $\frac{1}{8}$ (791)	32 (813)	31 $\frac{1}{8}$ (791)	27 $\frac{7}{8}$ (708)	1 $\frac{1}{2}$ (37)	30 (762)	20 (508)	16 (406)	28 (711)	246 (111)
BSQ 240 (HP)	38 $\frac{1}{8}$ (968)	34 (864)	38 $\frac{1}{8}$ (968)	34 $\frac{7}{8}$ (886)	1 $\frac{1}{2}$ (37)	30 (762)	20 (508)	16 (406)	35 (889)	350 (159)

All dimensions in inches (millimeters) and weight is shown in pounds (kilograms). *May be greater depending on motor.

[^]Weight shown is largest cataloged Open Drip Proof motor.

Filter Option Dimensions							
Model	A	B	C	D	WT.	Filter Size	Filter Quantity
BSQ 70-80-90	53 $\frac{5}{8}$ (1368)	17 $\frac{1}{8}$ (435)	11 $\frac{1}{8}$ (302)	1 $\frac{1}{2}$ (37)	168 (76)	16 x 20 (406 x 508)	2
BSQ 100	53 $\frac{5}{8}$ (1368)	17 $\frac{1}{8}$ (435)	13 $\frac{3}{8}$ (352)	1 $\frac{1}{2}$ (37)	169 (77)	16 x 20 (406 x 508)	2
BSQ 120	58 $\frac{3}{4}$ (1492)	19 $\frac{1}{8}$ (486)	15 $\frac{5}{8}$ (403)	1 $\frac{1}{2}$ (37)	194 (88)	16 x 25 (406 x 635)	2
BSQ 130 (HP)	53 $\frac{3}{4}$ (1353)	21 $\frac{1}{8}$ (537)	17 $\frac{7}{8}$ (454)	1 $\frac{1}{2}$ (37)	197 (89)	20 x 20 (508 x 508)	2
BSQ 140 (HP)	59 (1500)	23 $\frac{1}{8}$ (537)	19 $\frac{7}{8}$ (505)	1 $\frac{1}{2}$ (37)	231 (105)	20 x 25 (508 x 635)	2
BSQ 160 (HP)	58 $\frac{3}{4}$ (1492)	26 $\frac{1}{8}$ (664)	22 $\frac{7}{8}$ (581)	1 $\frac{1}{2}$ (37)	285 (129)	20 x 20 (508 x 508)	4
BSQ 180 (HP)	60 $\frac{3}{4}$ (1543)	27 $\frac{1}{8}$ (689)	23 $\frac{7}{8}$ (606)	1 $\frac{1}{2}$ (37)	293 (133)	20 x 25 (508 x 635)	4
BSQ 200 (HP)	69 $\frac{3}{8}$ (1762)	31 $\frac{1}{8}$ (791)	27 $\frac{7}{8}$ (708)	1 $\frac{1}{2}$ (37)	361 (164)	12 x 25 (305 x 635)	3
						16 x 25 (406 x 635)	3
BSQ 240 (HP)	71 $\frac{1}{2}$ (1816)	38 $\frac{1}{8}$ (968)	34 $\frac{7}{8}$ (886)	1 $\frac{1}{2}$ (37)	496 (225)	20 x 25 (508 x 635)	4
						16 x 25 (406 x 635)	4

Note: 24-inch side clearance is recommended for accessing and removing filters.
All dimensions in inches (millimeters) and weight (WT.) in pounds (kilograms).

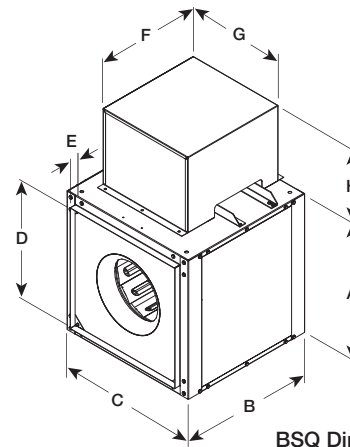
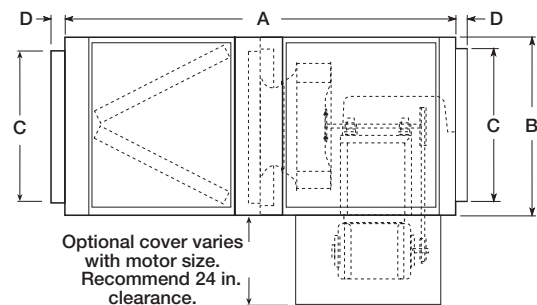


Figure 2:
BSQ Dimensions

Figure 4: Model BSQ - Filter Options



Mounting: SQ /BSQ

All SQ and BSQ fan models can be mounted horizontally, vertically or at an angle. For ease of installation, knockouts are provided at each location where mounting brackets are shown in Figures 5, 6 and 7. Optional brackets are universally adjustable to mount in any of these locations.

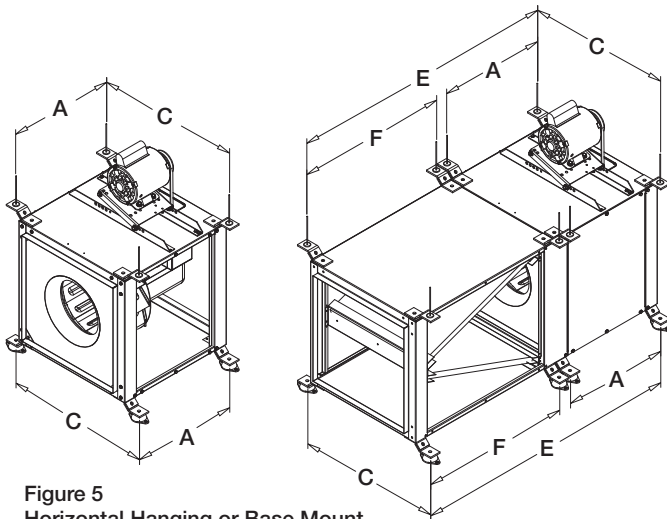


Figure 5
Horizontal Hanging or Base Mount

With either a hanging or base mount the motor may be located on either side. The base mount allows top access panels only.

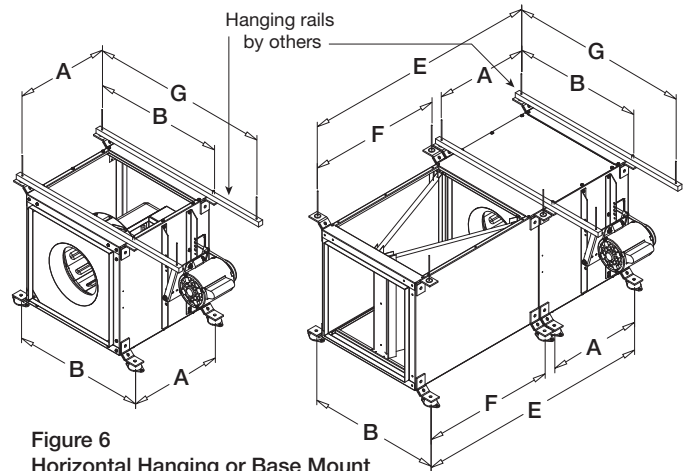


Figure 6
Horizontal Hanging or Base Mount

With a hanging mount, the motor may be located on either top or bottom. The base mount allows top motor location only. Both options provide access panels on two sides.

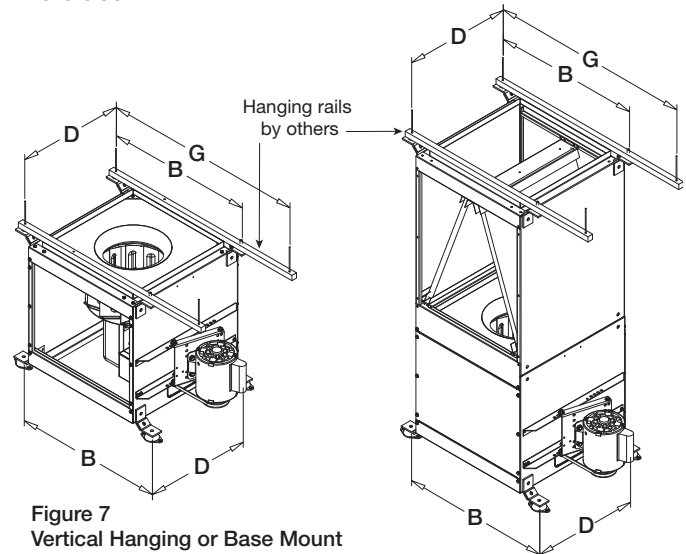


Figure 7
Vertical Hanging or Base Mount

Mounting brackets are turned 90° for vertical mounting. Access panels are located on the two sides adjacent to the motor.

Mounting Dimensional Data							
Model	A	B	C	D	E	F	G
SQ 60-75	10 $\frac{3}{8}$ (269)	16 $\frac{3}{4}$ (424)	14 $\frac{5}{8}$ (372)	8 $\frac{7}{8}$ (225)	19 $\frac{7}{8}$ (504)	6 $\frac{7}{8}$ (176)	Hanging rails not included. Supplied by others.
SQ 80-95	13 $\frac{1}{4}$ (338)	19 $\frac{3}{4}$ (500)	15 $\frac{1}{8}$ (384)	9 $\frac{3}{8}$ (238)	43 (1093)	27 $\frac{3}{8}$ (695)	
SQ 97,98,99	18 $\frac{5}{8}$ (473)	19 $\frac{3}{4}$ (500)	15 $\frac{1}{8}$ (384)	9 $\frac{3}{8}$ (238)	48 $\frac{3}{8}$ (1228)	27 $\frac{3}{8}$ (695)	
BSQ 70-90	18 $\frac{5}{8}$ (473)	19 $\frac{3}{4}$ (500)	17 $\frac{7}{8}$ (448)	11 $\frac{1}{8}$ (301)	48 $\frac{3}{8}$ (1228)	27 $\frac{3}{8}$ (695)	
SQ-BSQ 100	18 $\frac{5}{8}$ (473)	21 $\frac{1}{4}$ (551)	19 $\frac{7}{8}$ (499)	13 $\frac{7}{8}$ (352)	43 $\frac{3}{4}$ (1112)	22 $\frac{3}{4}$ (579)	
SQ-BSQ 120	18 $\frac{5}{8}$ (473)	23 $\frac{3}{4}$ (602)	21 $\frac{7}{8}$ (549)	15 $\frac{1}{8}$ (403)	49 $\frac{7}{8}$ (1247)	28 $\frac{1}{8}$ (715)	
SQ-BSQ 130	18 $\frac{5}{8}$ (473)	25 $\frac{3}{4}$ (653)	23 $\frac{3}{8}$ (600)	17 $\frac{7}{8}$ (454)	44 (1118)	23 (585)	
SQ-BSQ 140	19 $\frac{7}{8}$ (498)	27 $\frac{3}{4}$ (704)	25 $\frac{7}{8}$ (651)	19 $\frac{7}{8}$ (505)	50 (1271)	28 (713)	
SQ-BSQ 160	23 $\frac{1}{2}$ (596)	31 (789)	28 $\frac{3}{4}$ (730)	22 $\frac{1}{8}$ (581)	49 $\frac{1}{2}$ (1257)	23 $\frac{3}{8}$ (601)	Hanging rails not included. Supplied by others.
BSQ 180	25 $\frac{1}{2}$ (646)	33 (840)	28 $\frac{5}{8}$ (727)	22 $\frac{3}{4}$ (578)	52 $\frac{5}{8}$ (1336)	24 $\frac{1}{2}$ (623)	
BSQ 200	29 $\frac{1}{4}$ (742)	37 (941)	32 $\frac{3}{4}$ (832)	26 $\frac{7}{8}$ (683)	64 $\frac{1}{8}$ (1629)	32 $\frac{1}{4}$ (818)	
BSQ 240	31 $\frac{1}{8}$ (803)	44 (1119)	39 $\frac{3}{4}$ (1010)	33 $\frac{3}{8}$ (860)	66 $\frac{1}{2}$ (1689)	32 $\frac{1}{8}$ (816)	
BSQ 300	35 (889)	51 (1297)	46 $\frac{3}{4}$ (1188)	40 $\frac{7}{8}$ (1038)	69 $\frac{3}{8}$ (1755)	31 $\frac{3}{8}$ (797)	
BSQ 360	39 $\frac{3}{8}$ (1000)	57 (1449)	52 $\frac{5}{8}$ (1337)	46 $\frac{3}{4}$ (1187)	76 $\frac{3}{8}$ (1948)	34 $\frac{3}{4}$ (881)	
BSQ 420	47 (1195)	63 (1602)	58 $\frac{5}{8}$ (1488)	52 $\frac{3}{4}$ (1338)	90 $\frac{1}{4}$ (2292)	40 $\frac{5}{8}$ (1031)	

All dimensions in inches (millimeters).

Redesigned BSQ Dimensions

Mounting: BSQ

All BSQ fan models can be mounted horizontally, vertically or at an angle. For ease of installation, knockouts are provided at each location where mounting brackets are shown in Figures 5, 6 and 7. Optional brackets are universally adjustable to mount in any of these locations.

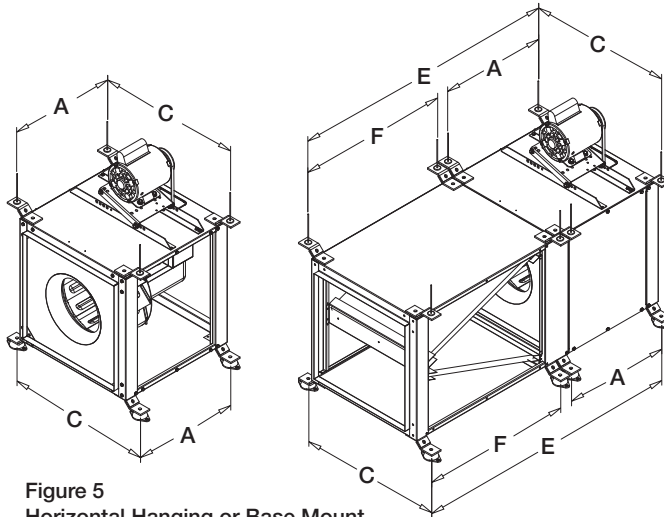


Figure 5
Horizontal Hanging or Base Mount

With either a hanging or base mount the motor may be located on either side. The base mount allows top access panels only.

NOTE

Flex duct is recommended for mounting to the inlet of the fan to allow for fitting adjustments.

If the inlet venturi requires adjustment, it can be detached from the unit via the fasteners located on the inlet panel.

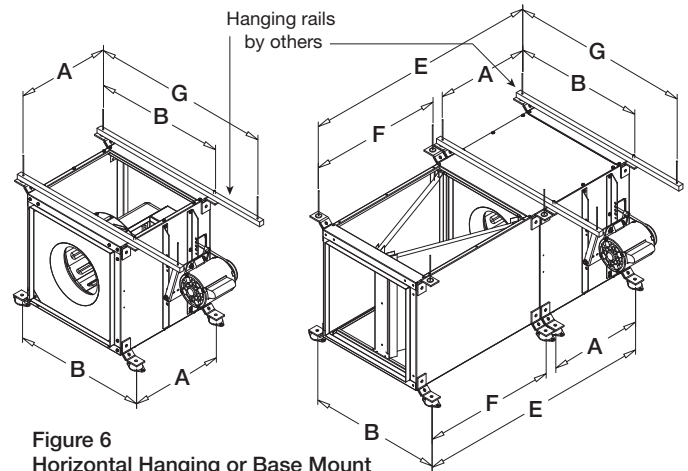


Figure 6
Horizontal Hanging or Base Mount

With a hanging mount, the motor may be located on either top or bottom. The base mount allows top motor location only. Both options provide access panels on two sides.

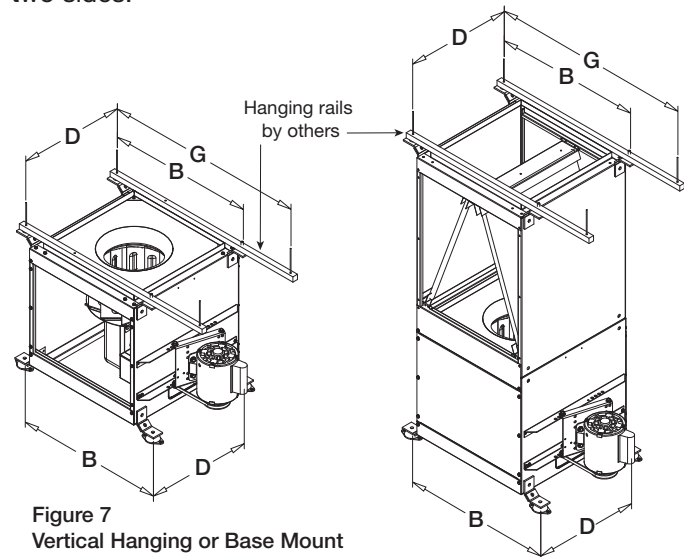


Figure 7
Vertical Hanging or Base Mount

Mounting brackets are turned 90° for vertical mounting. Access panels are located on the two sides adjacent to the motor.

Mounting Dimensional Data							
Model	A	B	C	D	E	F	G
BSQ 70-100	18 (457)	21 ¹³ / ₁₆ (554)	19 ¹⁴ / ₁₆ (505)	14 ¹ / ₈ (359)	50 ¹⁴ / ₁₆ (1292)	29 ¹⁴ / ₁₆ (758)	Hanging rails not included. Supplied by others.
BSQ 120	18 (457)	23 ¹³ / ₁₆ (605)	21 ¹⁴ / ₁₆ (556)	16 ¹ / ₈ (410)	55 ³ / ₄ (1416)	34 ³ / ₄ (883)	
BSQ 130	18 (457)	25 ¹³ / ₁₆ (656)	23 ¹⁴ / ₁₆ (607)	18 ¹ / ₈ (460)	50 ¹ / ₄ (1276)	29 ¹ / ₄ (743)	
BSQ 140	19 (483)	27 ¹³ / ₁₆ (707)	25 ¹⁴ / ₁₆ (657)	20 ¹ / ₈ (511)	56 (1424)	34 (865)	
BSQ 160	23 (584)	31 ¹ / ₈ (792)	29 (737)	23 ¹ / ₈ (587)	55 ³ / ₄ (1416)	29 ³ / ₄ (756)	Hanging rails not included. Supplied by others.
BSQ 180	25 (635)	32 ³ / ₁₆ (817)	30 (762)	24 ¹ / ₈ (613)	57 ³ / ₄ (1467)	29 ³ / ₄ (756)	
BSQ 200	29 (737)	36 ³ / ₁₆ (919)	34 (864)	28 ¹ / ₈ (714)	66 ³ / ₈ (1686)	34 ³ / ₈ (873)	
BSQ 240	31 (787)	43 ³ / ₁₆ (1097)	41 (1042)	35 ¹ / ₈ (892)	68 ¹ / ₂ (1740)	34 ¹ / ₂ (876)	

All dimensions in inches (millimeters).

Duct Length: The inlet and outlet duct length should be approximately two to three wheel diameters long before and after the fan to achieve cataloged performance.

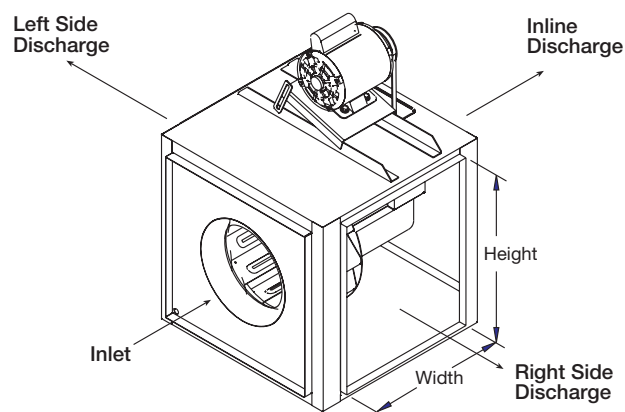


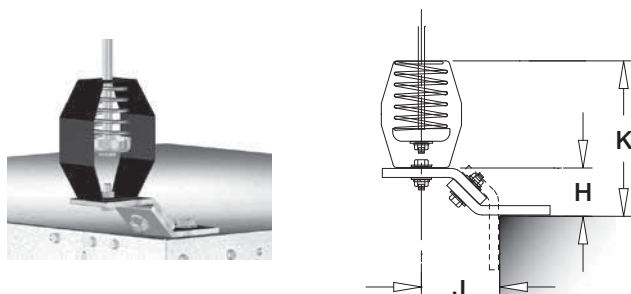
Figure 8

Side Discharge: Make sure discharge is orientated in the same direction as originally ordered, performance will change with different discharge positions. Refer to Figure 8 for proper side discharge definition and the Side Discharge chart for dimensions. Refer to the CAPS program or consult factory for performance corrections.

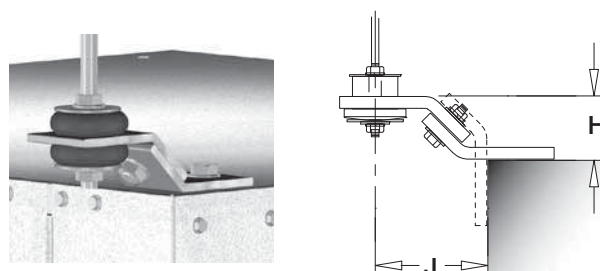
Side Discharge Duct Openings		
Unit Size	Width	Height
BSQ 70-80-90	11 ¹ / ₈ (302)	11 ¹ / ₈ (302)
SQ 60-75	9 ⁷ / ₈ (251)	8 ⁷ / ₈ (225)
SQ 80-95	12 ⁷ / ₈ (327)	11 ¹ / ₈ (302)
SQ 97-98-99	13 ⁷ / ₈ (352)	11 ¹ / ₈ (302)
SQ 100/BSQ 100	13 ⁷ / ₈ (352)	13 ⁷ / ₈ (352)
SQ 120/BSQ 120	15 ¹ / ₈ (403)	15 ¹ / ₈ (403)
SQ 130/BSQ 130 (HP)	17 ⁷ / ₈ (454)	17 ⁷ / ₈ (454)
SQ 140/BSQ 140 (HP)	19 ⁷ / ₈ (505)	19 ⁷ / ₈ (505)
SQ 160/BSQ 160 (HP)	22 ⁷ / ₈ (581)	22 ⁷ / ₈ (581)
BSQ 180 (HP)	23 ⁷ / ₈ (606)	23 ⁷ / ₈ (606)
BSQ 200 (HP)	27 ⁷ / ₈ (708)	27 ⁷ / ₈ (708)
BSQ 240 (HP)	28 ⁷ / ₈ (733)	34 ⁷ / ₈ (886)
BSQ 300 (HP)	31 ¹ / ₈ (810)	41 ⁷ / ₈ (1064)
BSQ 360 (HP)	32 ⁷ / ₈ (835)	37 ⁷ / ₈ (962)
BSQ 420	34 ⁷ / ₈ (886)	43 ⁷ / ₈ (1114)

All dimensions in inches (millimeters).

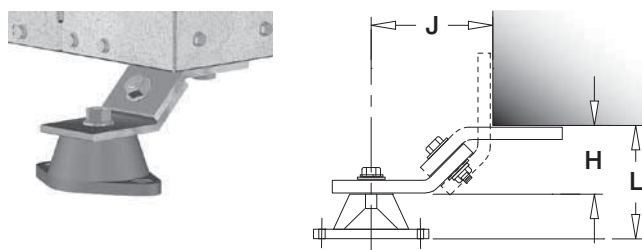
Hanging Spring Isolator



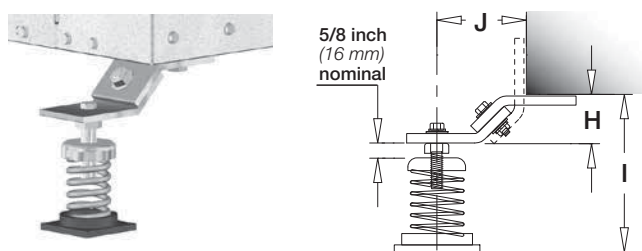
Hanging Neoprene Isolator



Standing Neoprene Isolator



Standing Spring Isolator

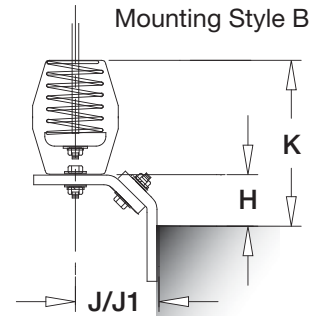
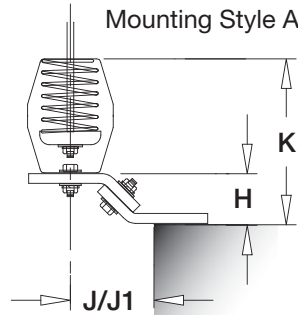
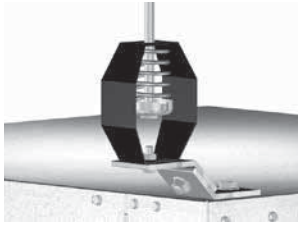


Isolator Dimensional Data					
Model	H	I	J	K	L
SQ 60-75					
SQ 80-95					
SQ 97-99					
BSQ 70-90	1 ³ / ₈	5 ¹ / ₂	2	6 ³ / ₄	2 ⁵ / ₁₆
SQ-BSQ 100	(35)	(140)	(51)	(171)	(59)
SQ-BSQ 120					
SQ-BSQ 130					
SQ-BSQ 140					
SQ-BSQ 160					
BSQ 180					
BSQ 200					
BSQ 240	1 ³ / ₈	5 ¹ / ₂	2	6 ³ / ₄	2 ⁵ / ₈
BSQ 300	(35)	(140)	(51)	(171)	(67)
BSQ 360					
BSQ 420					

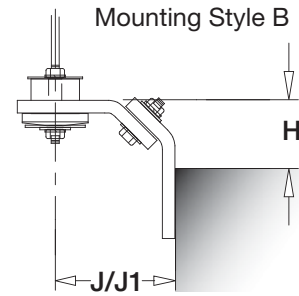
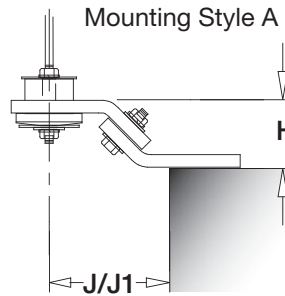
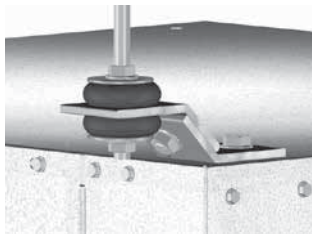
All dimensions in inches (millimeters).

Redesigned BSQ Dimensions

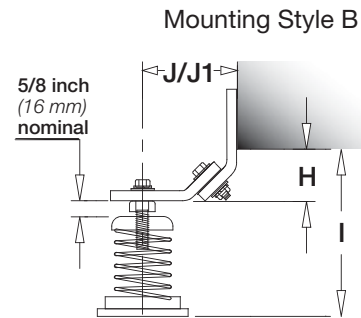
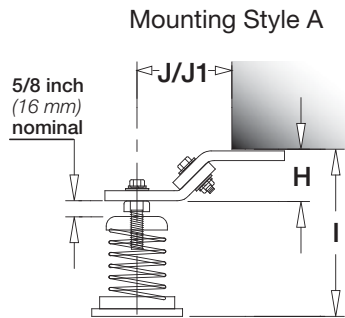
Hanging Spring Isolator



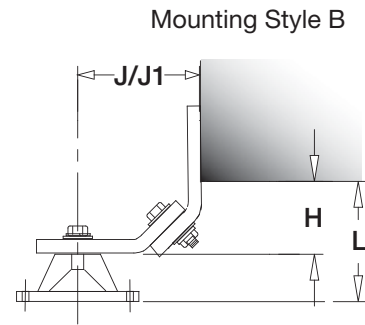
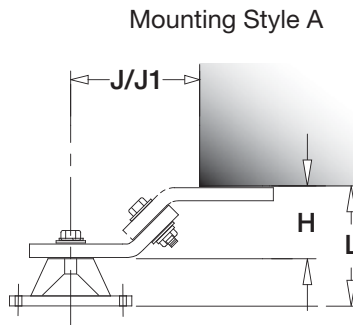
Hanging Neoprene Isolator



Standing Spring Isolator



Standing Neoprene Isolator



Isolator Dimensional Data

Model	H	I	J*	J1**	K	L
BSQ 70-90						
BSQ 100						
BSQ 120	1 $\frac{3}{8}$	5 $\frac{1}{2}$	1 $\frac{3}{8}$	2 $\frac{3}{8}$	6 $\frac{3}{4}$	2 $\frac{1}{3}$
BSQ 130	(35)	(140)	(35)	(60)	(171)	(59)
BSQ 140						
BSQ 160						
BSQ 180	1 $\frac{3}{8}$	5 $\frac{1}{2}$	1 $\frac{3}{8}$	2 $\frac{1}{2}$	6 $\frac{3}{4}$	2 $\frac{5}{8}$
BSQ 200	(35)	(140)	(35)	(64)	(171)	(67)
BSQ 240						

All dimensions in inches (millimeters).

*Use dimension J while utilizing Mounting Style A

**Use dimension J1 while utilizing Mounting Style B

Redesigned BSQ Dimensions

Duct Length: The inlet and outlet duct length should be approximately two to three wheel diameters long before and after the fan to achieve cataloged performance.

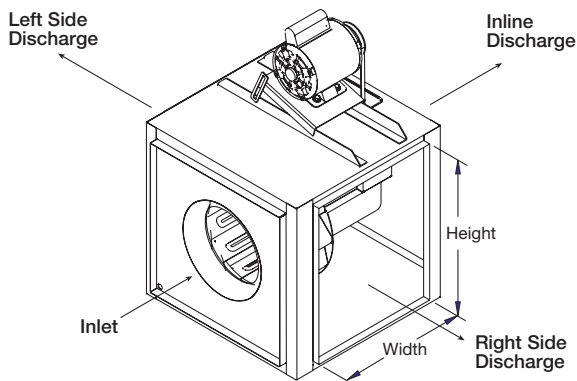


Figure 8

Side Discharge: Make sure discharge is orientated in the same direction as originally ordered, performance will change with different discharge positions. Refer to Figure 8 for proper side discharge definition and the Side Discharge chart for dimensions. Refer to the CAPS program or consult factory for performance corrections.

Side Discharge Duct Openings		
Unit Size	Width	Height
BSQ 70-100	12½ (317)	13⅞ (352)
BSQ 120	12½ (317)	15⅞ (403)
BSQ 130 (HP)	12½ (317)	17⅞ (454)
BSQ 140 (HP)	13½ (342)	19⅞ (505)
BSQ 160 (HP)	17½ (444)	22⅞ (581)
BSQ 180 (HP)	19½ (494)	23⅞ (606)
BSQ 200 (HP)	23½ (596)	27⅞ (708)
BSQ 240 (HP)	25½ (647)	34⅞ (886)

All dimensions in inches (millimeters).

Pre Start-Up Checks

- 1. Check all fasteners for tightness.** The wheel should rotate freely and be aligned as shown in Figure 9. Wheel position is preset and the unit is tested at the factory. Movement may occur during shipment, and realignment may be necessary. Centering can be accomplished by loosening the bolts holding the inlet (venturi) panel and repositioning. Wheel and inlet cone overlap can be adjusted by loosening the setscrews in the wheel and moving the wheel to the desired position.

Wheel Overlap Dimensions

Model	G - Overlap in. (mm)	H - Gap in. (mm)
SQ 60-95	-	1/8 (3)
SQ 100-160	1/4 (6)	-
BSQ 70-160	1/4 (6)	-
BSQ 180-240	3/8 (10)	-
BSQ 300-420	1/2 (13)	-
SQ 97-98-99	1/4 (6)	-

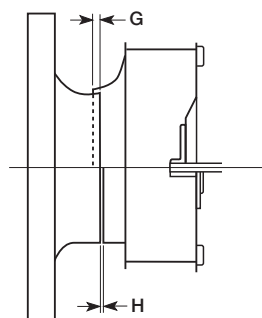


Figure 9

2. Wheel Rotation:

Direction of wheel rotation is critical. Reversed rotation will result in poor air performance, motor overloading and possible burnout. Check wheel rotation by momentarily energizing the unit (all SQ and BSQ fans

have clockwise wheel rotation when viewed from top of fan). Rotation should be clockwise as shown in Figure 10 and correspond to the rotation decal on the unit.

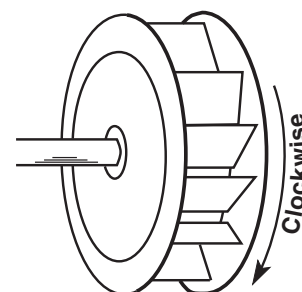


Figure 10

WARNING

Correct direction of wheel rotation is critical. Reversed rotation will result in poor air performance, motor overloading and possible burnout.

AVERTISSEMENT

La turbine doit impérativement tourner dans le bon sens. Une rotation en sens inverse entraînerait de mauvaises performances de soufflage, une surcharge du moteur voire un grillage du moteur.

- 3. Vibration Isolators:** After fan is moved to desired location, punch out the four knockout holes which are located on the unit top and bottom panels. Assemble the brackets to the unit according to the appropriate drawings on pages 8 and 9 and refer to respective parts list on page 15. Make certain all connectors are tight and that all washers are in.
- 4. For BSQ Fans:** If adjustments are made, it is very important to check the pulleys for proper alignment. Misaligned pulleys lead to excessive belt wear, vibration, noise, and power loss. (see Figure 11 on next page).

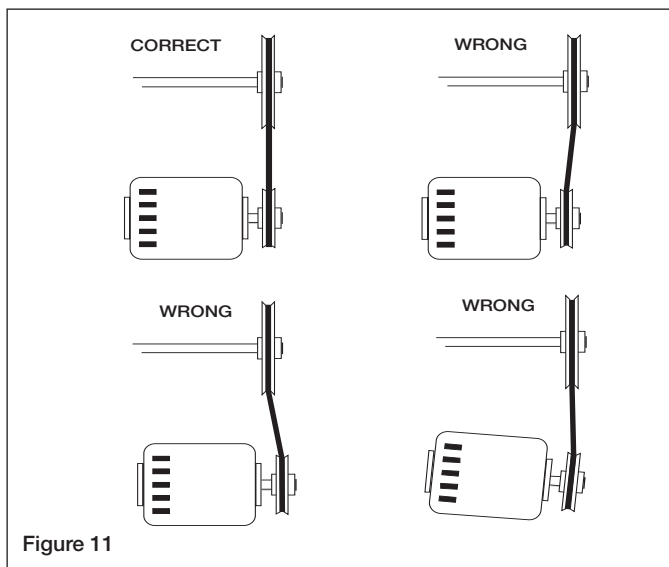


Figure 11

5. **For BSQ Fans:** Belt tension can be adjusted by loosening four fasteners marked “R” on the drive frame. (refer to Figure 13). The motor plate slides on the slotted adjusting arms. Belt tension should be adjusted to allow 1/64 inch of deflection per inch of belt span. For example, a 15 inch belt span should have 15/64 inch (or about 1/4 inch) of deflection with moderate thumb pressure at mid-point between pulleys (see Figure 12). Over-tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at start-up and uneven wear.

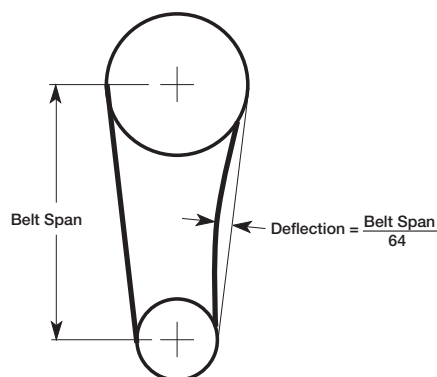


Figure 12

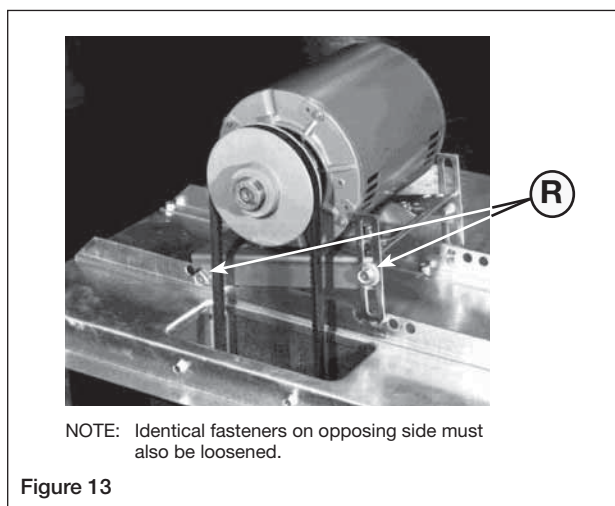


Figure 13

6. The adjustable motor pulley is factory set for the RPM specified. Speed can be increased by closing or decreased by opening the adjustable motor sheave. Two groove variable pitch pulleys must be adjusted an equal number of turns open or closed. Any increase in speed represents a substantial increase in the horsepower required by a unit. Motor amperage should always be checked to avoid serious damage to the motor when speed is varied.

IMPORTANT

The fan has been checked for mechanical noises at the factory prior to shipment. If mechanical noise should develop, suggested corrective actions are offered in the Troubleshooting section.

IMPORTANT

Over-tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at start-up and uneven wear.

IMPORTANT

Adjust (tighten) belt tension after the first 24-48 hours of operation.

Operation: SQ / BSQ

1. Before starting up or operating fan, check all fasteners for tightness. In particular, check the setscrews in wheel hub (and pulleys, if applicable).
2. While in the OFF position or before connecting the fan to power, turn the fan wheel by hand to be sure it is not striking the venturi or any obstacle.
3. Start the fan and shut it off immediately to check rotation of the wheel with directional arrow in the motor compartment, see Figure 10.
4. When the fan is started, observe the operation and check for any unusual noises.
5. With the system in full operation and all ductwork attached, measure current input to the motor and compare with the nameplate rating to determine if the motor is operating under safe load conditions.
6. Keep inlets and approaches to fan clean and free from obstruction.

Inspection: SQ / BSQ

Inspection of the fan should be conducted at the first 30 minute and 24 hour intervals of satisfactory operation.

30 Minute Interval

Inspect bolts, setscrews and motor mounting bolts. Adjust and tighten as necessary.

24 Hour Interval

Check all internal components. On BSQ unit only, inspect belt alignment and tension. Adjust and tighten as necessary.

Maintenance: SQ / BSQ

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations and who are experienced with this type of equipment.

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to exterior surfaces only. Removing dust buildup on motor housing ensures proper motor cooling.

Greasing of motors is only intended when fittings are provided. Many fractional horsepower motors are permanently lubricated and should not be lubricated after installation. Motors supplied with grease fittings should be greased in accordance with manufacturers' recommendations. Where motor temperatures do not exceed 104°F (40°C), the grease should be replaced after 2,000 hours of running time as a general rule.

Wheels require very little attention when moving clean air. Occasionally, oil and dust may accumulate causing imbalance. When this occurs the wheel and housing should be cleaned to ensure smooth and safe operation.

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

A proper maintenance program will help these units deliver years of dependable service.

DANGER

Always disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury.

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.

IMPORTANT

Uneven cleaning of the wheel will produce an out of balance condition that will cause vibration in the fan.

WARNING

This unit should be made non-functional when cleaning the wheel or housing (fuses removed, disconnect locked off).

WARNING

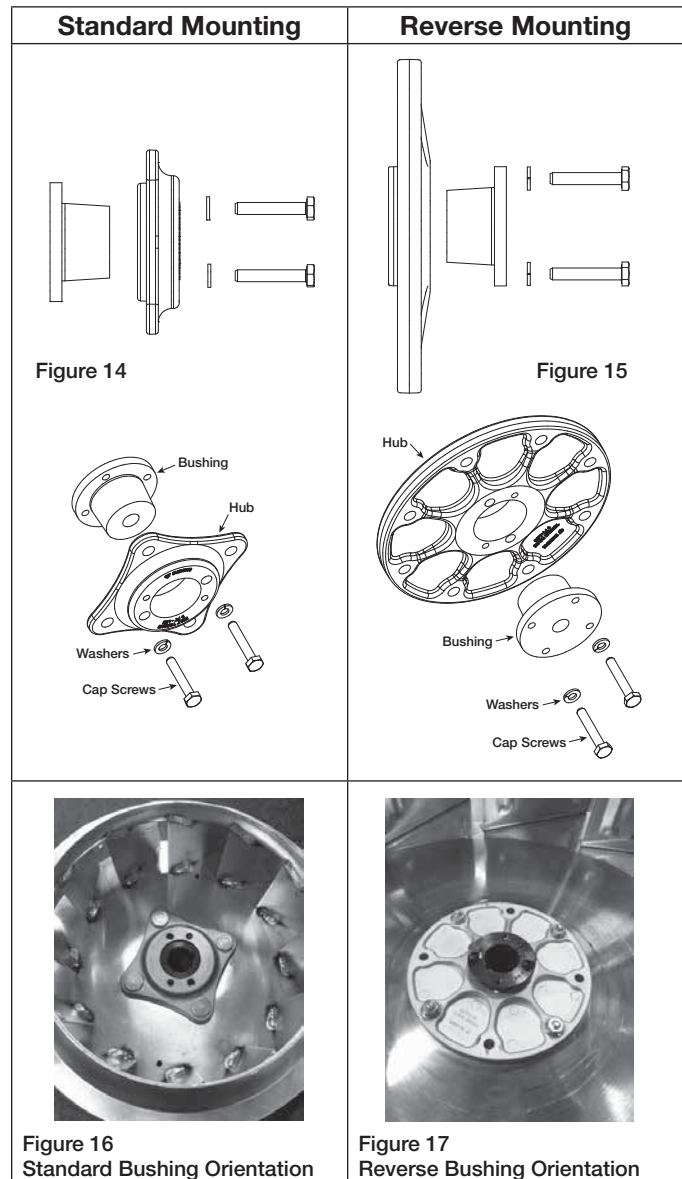
L'appareil doit être rendu non opérationnel lors du nettoyage de la turbine ou du caisson (fusibles retirés, sectionneur verrouillé).

Tapered Bushing Hub Installation and Removal

For wheel hubs and shaft pulleys utilizing a tapered bushing interface, follow this procedure for installation and removal. There are two possible set ups for the tapered bushing, both have the same procedure, but orientation of the hub varies.

Tapered Bushing Removal:

1. If present, loosen the setscrew holding the bushing and shaft key in place.
2. Loosen and remove the socket head cap screws which fasten the bushing to the hub as shown in the section views and examples of Figures 14-17.



3. **Standard Mounting** - Take the two socket head cap screws that were removed and install them into the visibly threaded holes on the wheel hub.
Reverse Mounting - Install the two socket head cap screws into the visibly threaded holes of the bushing flange.
4. Once both socket head cap screws are installed, tighten them an eighth of a turn at a time, alternating between the two until the hub comes loose from the bushing.

Bushing Installation:

1. Clean all surfaces of hub and bushing to remove any oil or residue present and do not use any lubricant to install bushing into the hub. For both standard and reverse mounting styles, the socket head cap screws are adjustable from the inlet of the fan.
2. **Standard Mounting:** Slide the bushing and shaft key onto the fan shaft followed by the wheel and hub assembly. If present, use the keyway setscrew to hold the shaft key and bushing in place but DO NOT overtighten as this can damage the bushing. Align the unthreaded holes of the hub with the threaded holes of the tapered bushing.
Reverse Mounting: Slide the wheel and hub assembly onto the fans shaft followed by the bushing and shaft key. If present, use the keyway setscrew to hold the shaft key and bushing in place but DO NOT overtighten as this can damage the bushing. Align the unthreaded holes of the tapered bushing with the threaded holes of the hub.
3. Install the two bushing socket head cap screws into the aligned holes by hand (or without excessive torque) until the heads of the socket head cap screws are seated against the mating surface.
4. Adjust the height of the wheel in the fan relative to the inlet venturi then tighten the two socket head cap screws an eighth turn at a time in an alternating fashion and to a torque of 10 ft-lbs.

Belt/Bearing Maintenance BSQ Unit

1. Belts tend to stretch after a period of time. They should be checked periodically for wear and tightness. When replacing belts, use the same type as supplied with the unit.
2. Matched belts should always be used on units with multi-groove pulleys.
3. For belt replacement, loosen the tensioning device enough to allow removal of the belt by hand. Do not force belts on or off. This may cause cords to break, leading to premature belt failure.
4. Once installed, adjust belts as shown in "Pre-Start-Up Checks."

5. Shaft bearings can be classified in two groups: relubricating and non-relubricating. All bearings on standard model BSQ fans are factory lubricated and require no further lubrication under normal use (between -20°F and 180°F (-29°C and 82°C) in a relatively clean environment).
6. Units installed in hot, humid or dirty locations should be equipped with special bearings. These bearings will require frequent lubrication. Caution should be employed to prevent overpacking or contamination.
7. Grease fittings should be wiped clean. The unit should be in operation while lubricating. Extreme care should be used around moving parts.
8. Grease should be pumped in very slowly until a slight bead forms around the seal. A high grade lithium base grease should be used.

Recommended Relubrication Frequency in Months

NOTE: If unusual environment conditions exist (extreme temperature, moisture or contaminants) more frequent lubrication is required.

A good quality lithium base grease, conforming to NLGI Grade 2 consistency, such as those listed here may be used.

Suggested Fan Bearing Greasing Intervals	
Interval (months)	Type of Service
1 to 3	Heavy duty in dirty, dusty locations; high ambient temperatures; moisture laden atmosphere; vibration.
3 to 6	12 to 24 hours per day, heavy duty, or if moisture is present
6 to 12	8 to 16 hours per day in clean, relatively dry atmosphere
12 to 18	Infrequent operation or light duty in clean atmosphere

Grease Manufacturers	
Manufacturer	Grease (NLGI #2)
U.S. Electric Motors	Grease No. 83343
Chevron U.S.A. Inc	Chevron SRI Grease #2
Mobil Oil Corporation	Mobilith
	Mobil 532
Texaco, Inc.	Premium BRB #2
	Texaco Multifak #2
Amoco Oil Co.	Rykon Premium #2
Exxon	Unirex N2
Shell	B Shell Alvania #2

Parts List

Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information will assist the local Greenheck representative and the factory in providing service and replacement parts. Before taking any corrective action, make certain unit is not capable of operation during repairs.

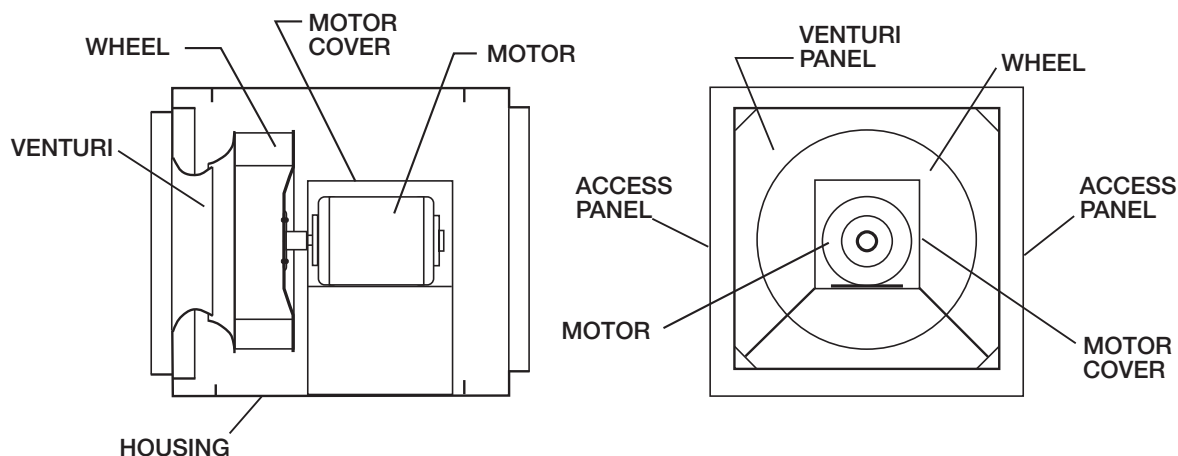
CAUTION

A fan manufactured with an explosion resistant motor does not certify the entire unit to be explosion proof. Refer to UL Listing Mark for the fans approved usage.

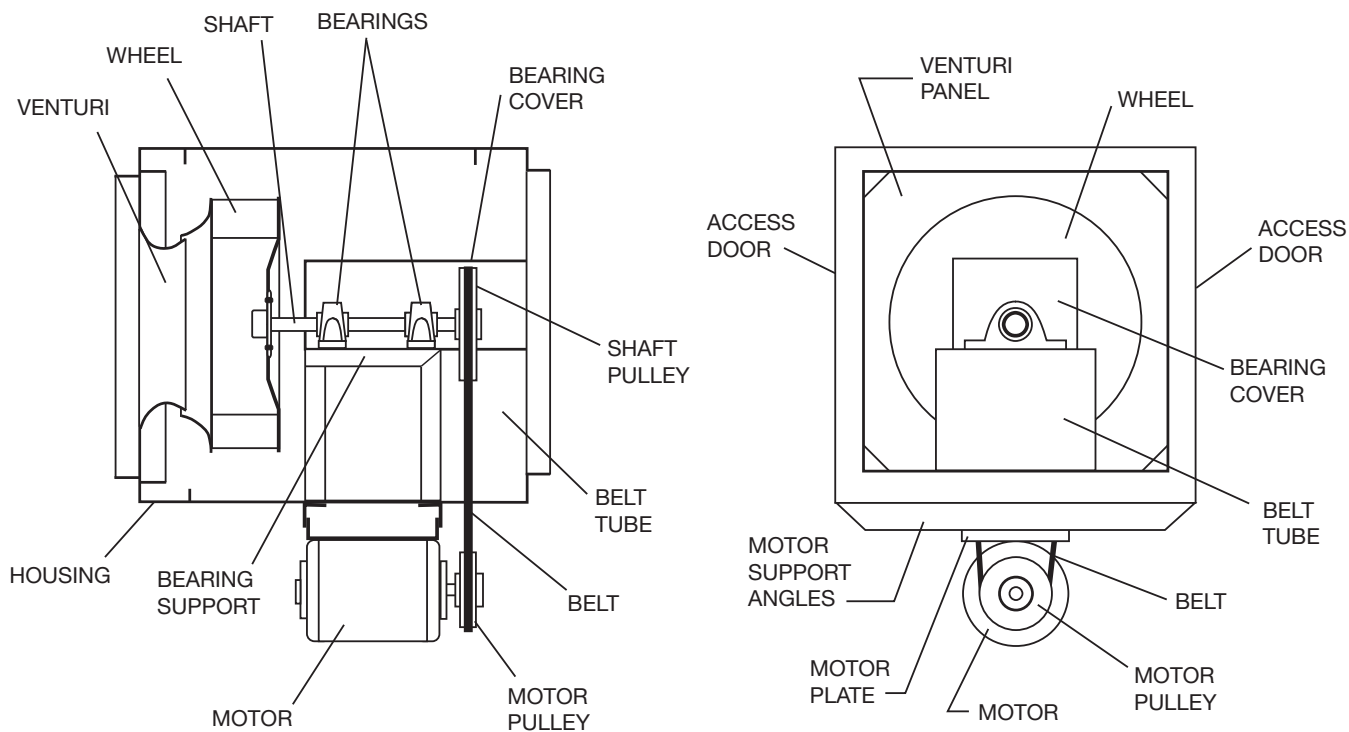
CAUTION

La présence d'un moteur antidéflagrant sur un ventilateur ne garantit pas que tout l'appareil est antidéflagrant. Pour connaître les emplois autorisés de l'appareil, voir son marquage de conformité UL.

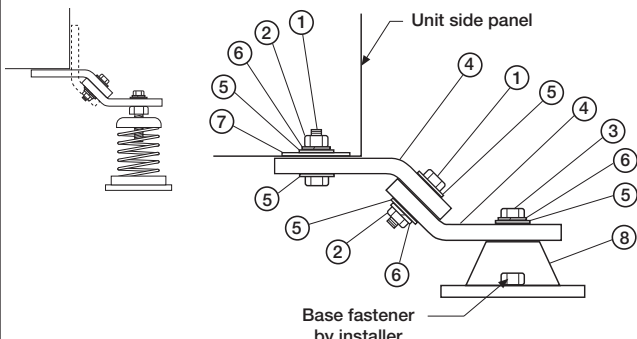
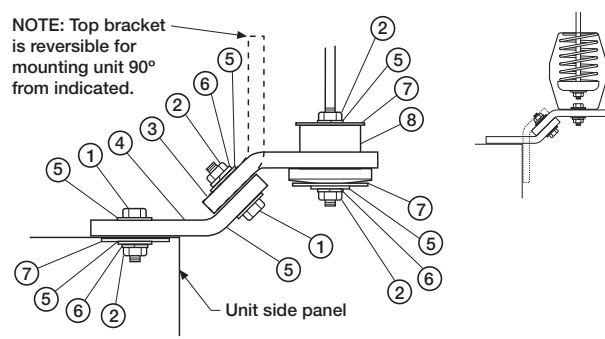
SQ Direct Drive Centrifugal Inline Exhaust Fan



BSQ Belt Drive Centrifugal Inline Exhaust Fan



Isolator Parts List

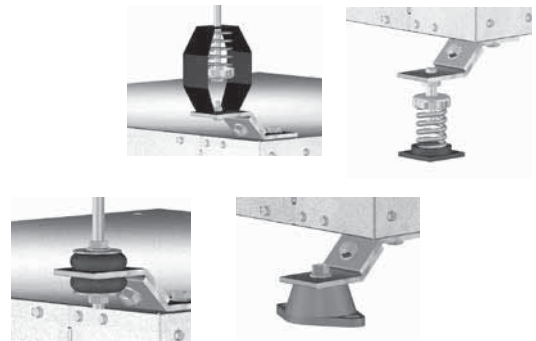
STANDING SUPPORT ISOLATOR					HANGING SUPPORT ISOLATOR				
					NOTE: Top bracket is reversible for mounting unit 90° from indicated. 				
No.	Qty.	Description	SQ-60 thru 140 BSQ-100 thru 140	SQ-160 BSQ-160 thru 420	No.	Qty.	Description	SQ-60 thru 140 BSQ-100 thru 140	SQ-160 BSQ-160 thru 420
1	8	Cadium plated hex head bolts	3/8 in. - 16 x 1 in.	3/8 in.-16 x 1 1/4 in.	1	8	Cadium plated hex head bolts	3/8 in. - 16 x 1 in.	3/8 in.-16 x 1 1/4 in.
2	8	Cadium plated hex nuts	3/8 in. - 16	3/8 in. - 16	2	16	Cadium plated hex nuts	3/8 in. - 16	3/8 in. - 16
3	4	Cadium plated hex head bolts	5/16 in. - 18 x 1 in.	3/8 in. - 16 x 1 in.	3	4	Std. mount bracket with (1) 1/4 in. hole	3/16 in.	1/4 in.
4	8	Std. mount bracket with (2) 7/16 in. holes	3/16 in.	1/4 in.	4	4	Std. mount bracket with (2) 7/16 in. holes	3/16 in.	1/4 in.
5	20	Cadium plated washer	7/8 in. O.D. x 3/8 in. I.D. x 1/16 in.	7/8 in. O.D. x 3/8 in. I.D. x 1/16 in.	5	24	Cadium plated washer	7/8 in. O.D. x 3/8 in. I.D. x 1/16 in.	7/8 in. O.D. x 3/8 in. I.D. x 1/16 in.
6	12	Cadium plated lock washer	3/8 in.	3/8 in.	6	12	Cadium plated lock washer	3/8 in.	3/8 in.
7	4	Cadium plated washer	1 3/8 in. O.D. x 9/16 in. I.D. x 3/32 in.	1 3/8 in. O.D. x 9/16 in. I.D. x 3/32 in.	7	12	Cadium plated washer	1 3/8 in. O.D. x 9/16 in. I.D. x 3/32 in.	1 3/8 in. O.D. x 9/16 in. I.D. x 3/32 in.
8	4	Neoprene or Spring Isolator	Reference appropriate table below for replacement Isolator(s)		8	4	Neoprene or Spring Isolator	Reference appropriate table below for replacement Isolator(s)	

REPLACEMENT SPRING ISOLATOR(S)

MODEL	FAN SIZES					
BSQ	----	70-130	140-180	200	240-300	360-420
SQ	60-100	120-140	160	----	----	----
BASE MOUNT	FDS-1-35 BLUE	FDS-1-70 GREEN	FDS 1-120 GRAY	FDS 1-120 GRAY	FDS-1-220 BROWN	FDS-1-370 ORANGE
HANGING	SH-1-35 BLUE	SH-1-70 GREEN	SH-1-125 GRAY	SH-1-245 BROWN	SH-1-245 BROWN	SH-1-370 ORANGE

REPLACEMENT NEOPRENE ISOLATOR(S)

MODEL	FAN SIZE		
BSQ	70-140	160-200	240-420
SQ	60-140	160	----
BASE MOUNT	R-1 GREEN	R-2 BLACK	R-2 RED
HANGING	40DUR BLACK	50DUR BLACK	50DUR BLACK



Troubleshooting

WARNING

Before taking any corrective action, make certain unit is not capable of operation during repairs.

AVERTISSEMENT

Avant d'entreprendre toute action corrective, s'assurer que l'appareil ne pourra pas fonctionner durant les réparations.

PROBLEM	CAUSE	CORRECTIVE ACTION
Excessive noise or vibration	Wheel unbalance	Clean all dirt off wheel. Check wheel balance, rebalance in place if necessary.
	Bad bearings	Replace.
	Belts too tight or too loose	Adjust tension, see Figure 12.
	Wheel improperly aligned and rubbing	Center wheel on inlet, see Figure 9.
	Loose drive or motor pulleys	Align and tighten. See "Pre Start-Up Checks", see pages 10-11.
	Foreign objects in wheel or housing	Remove objects, check for damage or unbalance.
Reduced airflow	System resistance too high	Check system: Proper operation of backdraft or control dampers, obstruction in ductwork, clean dirty filters.
	Unit running backwards	Correct as shown in Figure 10.
	Excessive dirt buildup on wheels	Clean wheel.
	Improper wheel alignment	Center wheel on inlets, see Pre Start-Up Checks and Figure 9.

Our Commitment

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

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranty.

Greenheck's Centrifugal Inline Fans catalog, Models SQ and BSQ 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.



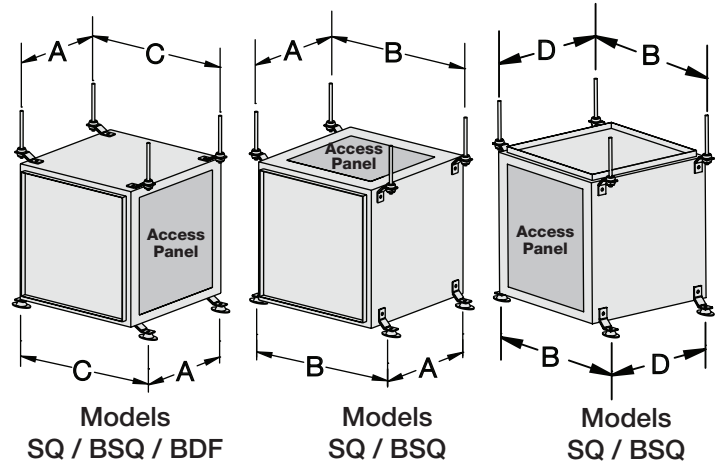
Installation, Operation and Maintenance Manual

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 instructions could result in personal injury and/or property damage!

Vibration Isolator Dimensional Data

Model	A	B	C	D
BDF-80	20 ³ / ₄ (527)	—	22 ¹ / ₁₆ (576)	—
BDF-90	21 ³ / ₄ (552)	—	25 ⁵ / ₈ (651)	—
BDF-100	23 ³ / ₄ (603)	—	27 ¹ / ₈ (689)	—
BDF-120	30 ¹ / ₂ (775)	—	31 ⁵ / ₈ (803)	—
BDF-150	32 (813)	—	35 (889)	—
BDF-180	37 ³ / ₈ (949)	—	44 (1118)	—
BDF-200	47 ⁷ / ₈ (1203)	—	51 ¹ / ₂ (1308)	—
SQ 60-75	10 ⁵ / ₈ (270)	17 (432)	15 ³ / ₄ (400)	8 ⁷ / ₈ (225)
SQ 80-95	13 ¹ / ₄ (337)	20 (508)	18 ³ / ₄ (476)	11 ¹ / ₈ (302)
SQ-100	18 ⁵ / ₈ (473)	22 ¹ / ₈ (562)	20 ³ / ₄ (527)	13 ³ / ₈ (352)
SQ-120	18 ⁵ / ₈ (473)	24 (610)	22 ³ / ₄ (578)	16 (406)
SQ-130 (HP)	18 ⁵ / ₈ (473)	26 ¹ / ₈ (664)	24 ³ / ₄ (629)	17 ¹ / ₈ (454)
SQ-140 (HP)	19 ⁵ / ₈ (498)	28 ¹ / ₈ (714)	26 ³ / ₄ (679)	19 ⁵ / ₈ (505)
SQ-160 (HP)	23 ¹ / ₂ (597)	31 (787)	29 ³ / ₄ (756)	22 ⁷ / ₈ (581)
BSQ 70-90	18 ⁵ / ₈ (473)	20 ¹ / ₈ (511)	18 ³ / ₄ (476)	11 ¹ / ₈ (302)
BSQ 100	18 ⁵ / ₈ (473)	22 ¹ / ₈ (562)	20 ³ / ₄ (527)	13 ³ / ₈ (352)
BSQ 120	18 ⁵ / ₈ (473)	24 (610)	22 ³ / ₄ (578)	16 (406)
BSQ 130 (HP)	18 ⁵ / ₈ (473)	26 ¹ / ₈ (664)	24 ³ / ₄ (629)	17 ¹ / ₈ (454)
BSQ 140 (HP)	19 ⁵ / ₈ (498)	28 ¹ / ₈ (714)	26 ³ / ₄ (679)	19 ⁵ / ₈ (505)
BSQ 160 (HP)	23 ¹ / ₂ (597)	31 (787)	29 ³ / ₄ (756)	22 ⁷ / ₈ (581)
BSQ 180 (HP)	25 ¹ / ₂ (648)	33 ¹ / ₂ (851)	29 ⁹ / ₁₆ (751)	22 ³ / ₄ (578)
BSQ 200 (HP)	29 ¹ / ₈ (740)	37 (940)	33 ³ / ₄ (857)	26 ³ / ₄ (679)
BSQ 240 (HP)	31 ⁵ / ₈ (803)	44 ¹ / ₄ (1124)	40 ³ / ₄ (1035)	33 ³ / ₈ (860)
BSQ 300 (HP)	35 (889)	51 (1295)	47 ³ / ₄ (1213)	40 ⁷ / ₈ (1038)
BSQ 360 (HP)	38 ³ / ₄ (974)	57 ¹ / ₄ (1454)	53 ¹ / ₂ (1359)	46 ³ / ₄ (1187)
BSQ 420 (HP)	47 ¹ / ₈ (1197)	63 (1600)	59 ⁷ / ₈ (1521)	59 ⁷ / ₈ (1521)

All dimensions in inches (millimeters).



Isolator Mounting

Upon receiving unit, check for any damage and report it immediately to the shipper. Also, check to see that all accessory items are accounted for.

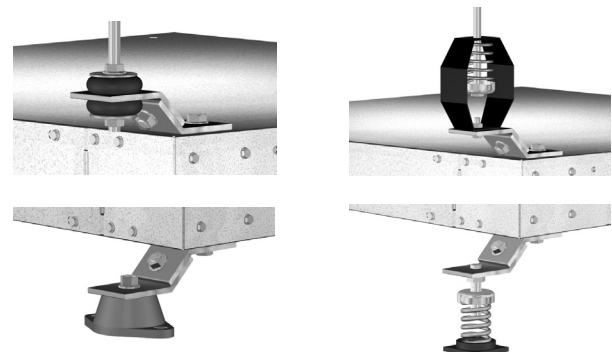
Move fan to the desired location and determine the position in which the unit is to be mounted. Punch out four (4) knock-out holes which are located on the unit top and bottom panels. Assemble the brackets to the unit according to the drawings below and refer to respective parts list (reverse side). Make certain all connectors are tight and that all washers are used.

REPLACEMENT SPRING ISOLATOR(S)

MODEL	FAN SIZES					
BDF	----	80-90	100-120	----	150-180	200
BSQ	----	70-130	140-180	200	240-300	360-420
SQ	60-100	120-140	160	----	----	----
BASE MOUNT	FDS-1-35 BLUE	FDS-1-70 GREEN	FDS 1-120 GRAY	FDS 1-120 GRAY	FDS-1-220 BROWN	FDS-1-370 ORANGE
HANGING	SH-1-35 BLUE	SH-1-70 GREEN	SH-1-125 GRAY	SH-1-245 BROWN	SH-1-245 BROWN	SH-1-370 ORANGE

REPLACEMENT NEOPRENE ISOLATOR(S)

MODEL	FAN SIZE		
BDF	80-100	120-150	180-200
BSQ	70-140	160-200	240-420
SQ	60-140	160	----
BASE MOUNT	R-1 GREEN	R-2 BLACK	R-2 RED
HANGING	40DUR BLACK	50DUR BLACK	50DUR BLACK



Pre-Starting Checks

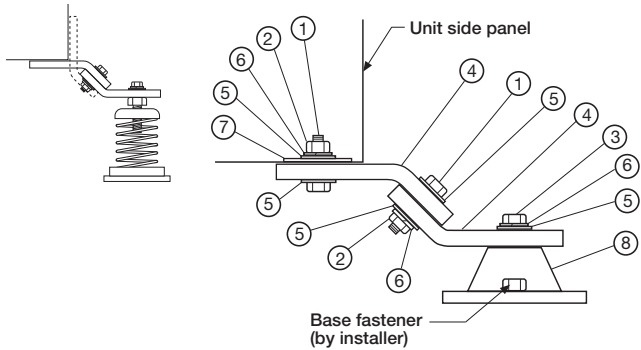
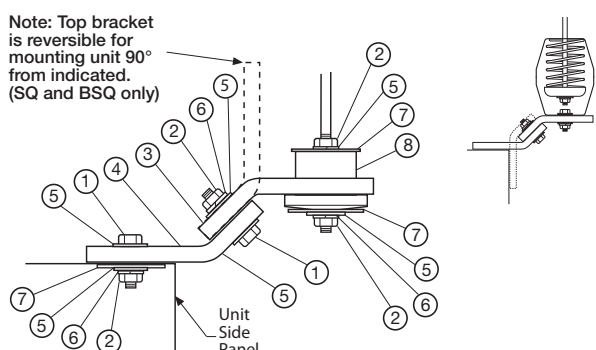
Check all fasteners for tightness.

Maintenance

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting the unit. A proper maintenance program will help these units deliver years of dependable service.

NOTE: Before taking any corrective action, make certain unit is not capable of operation during repairs.

Isolator Parts List

STANDING SUPPORT ISOLATOR					HANGING SUPPORT ISOLATOR				
									
No	Qty	Description	SQ-60 thru 140 BSQ-100 thru 140 BDF-80 thru 150	SQ-160 BSQ-160 thru 420 BDF-180 thru 200	No	Qty	Description	SQ-60 thru 140 BSQ-100 thru 140 BDF-80 thru 150	SQ-160 BSQ-160 thru 420 BDF-180 thru 200
1	8	Cadium plated hex head bolts	3/8 in. - 16 x 1 in.	3/8 in. - 16 x 1 1/4 in.	1	8	Cadium plated hex head bolts	3/8 in. - 16 x 1 in.	3/8 in. - 16 x 1 1/4 in.
2	8	Cadium plated hex nuts	3/8 in. - 16	3/8 in. - 16	2	16	Cadium plated hex nuts	3/8 in. - 16	3/8 in. - 16
3	4	Cadium plated hex head bolts	5/16 in. - 18 x 1 in.	3/8 in. - 16 x 1 in.	3	4	St. mount bracket w/1 - 1/4 in hole	3/16 in.	1/4 in.
4	8	St. mount bracket w/2 - 7/16 in. holes	3/16 in.	1/4 in.	4	4	St. mount bracket w/2 - 7/16 in. holes	3/16 in.	1/4 in.
5	20	Cadium plated washer	7/8 in. O.D x 3/8 in. I.D. x 1/16 in.	7/8 in. O.D x 3/8 in. I.D. x 1/16 in.	5	24	Cadium plated washer	7/8 in. O.D x 3/8 in. I.D. x 1/16 in.	7/8 in. O.D x 3/8 in. I.D. x 1/16 in.
6	12	Cadium plated lock washer	3/8 in.	3/8 in.	6	12	Cadium plated lock washer	3/8 in.	3/8 in.
7	4	Cadium plated washer	1 3/8 in. O.D x 9/16 in. I.D. x 3/32 in.	1 3/8 in. O.D x 9/16 in. I.D. x 3/32 in.	7	12	Cadium plated washer	1 3/8 in. O.D x 9/16 in. I.D. x 3/32 in.	1 3/8 in. O.D x 9/16 in. I.D. x 3/32 in.
8	4	Neoprene or Spring Isolator	Reference appropriate table below for replacement Isolator(s)		8	4	Neoprene or Spring Isolator	Reference appropriate table below for replacement Isolator(s)	

Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the shipment date. Any units or parts which prove to be defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

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

Greenheck Models SQ and BSQ 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.

