

## Installation, Operation and Maintenance Manual

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

### Mixed Flow Hooded Exhaust and Supply Fans

Fans are direct-driven with mixed flow wheels and feature rigid construction, high efficiency, and low sound levels. These fans are designed for roof supply or exhaust applications. The fans are available in twelve sizes and feature a hinged fabra hood and optional 1-inch washable aluminum filters in supply applications.

**! IMPORTANT:** For high wind rated fans, see instructions starting on page 9.



### 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. 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. This could cause catastrophic wheel failure. 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 or fan while the fan is running.
8. Never remove covers protecting electrical components while fan is energized.

#### 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

Motors and variable frequency drives may be hot enough to cause pain or injury. Allow both to cool prior to servicing.

#### 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.

## 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 local representative. Any physical damage to the unit after acceptance is not the responsibility of the manufacturer.

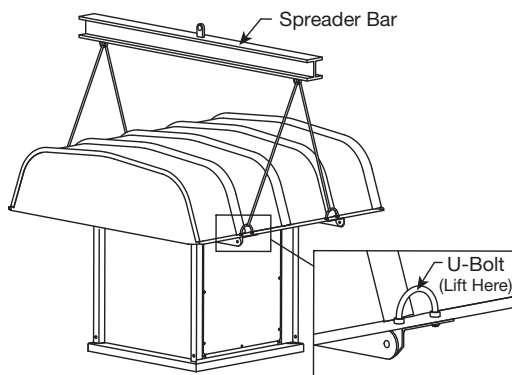
## Unpacking

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

## Handling

**IMPORTANT:** Hoods are shipped knocked down and packaged separately from the fan. Hood assembly instructions can be found on pages 4 through 7. Base fans are shipped assembled in a horizontal orientation and must be rotated vertically for final installation. The manufacturer is not liable for any damages that may occur during this process.

Lifting the fan must be done with care to avoid damaging the housing. Use the holes located in the (4) corners of the base fan inlet (for supply) or outlet (for exhaust) as lifting points to assist with rotating the unit. The fans can also be moved via the skid when a forklift is used. Use proper equipment, lifting techniques, and safety measures to avoid injury or damage to the fan or surroundings. Fans with the hood installed should be lifted from the U-bolts located above the hinge brackets on the hood. Use a minimum of four lifting straps. Handle in such a manner as to keep from scratching or chipping the coating (if applicable). Damaged finish may reduce the ability of the fan to resist corrosion.



Move fan to desired location and determine position of access panels, discharge, disconnect switch, and motor. In ducted applications, make sure the inlet/outlet (depending on configuration) has at least 3 times the

wheel diameter of straight duct before any obstructions like an elbow or transition. See Dimensional Data (page 3) for physical dimensions. The motor's amperage and voltage ratings must be checked for compatibility to supply power prior to final electrical connection. All 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.

### Storage Environment

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.

The unit should be stored at least 3-1/2 inches 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.

### Inspection and Maintenance During Storage

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

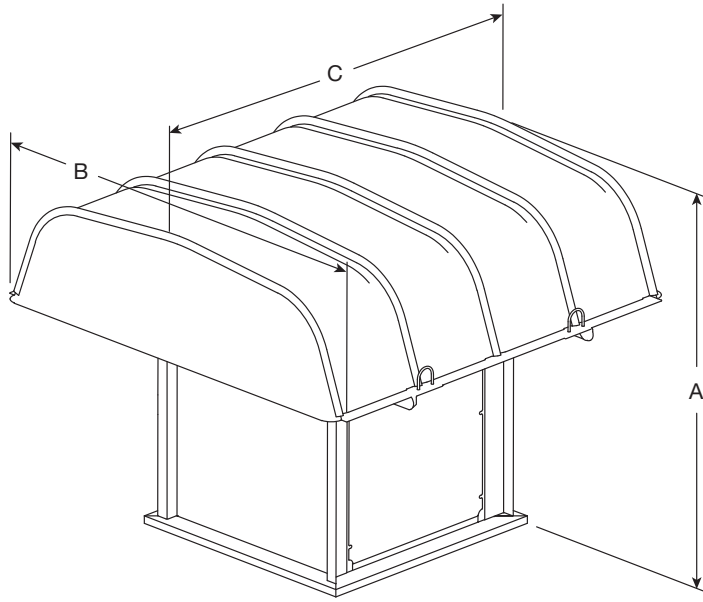
If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the wheel by hand ten to fifteen revolutions to distribute lubricant in motor. If paint deterioration begins, consideration should be given to touch-up or repainting. Fans with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

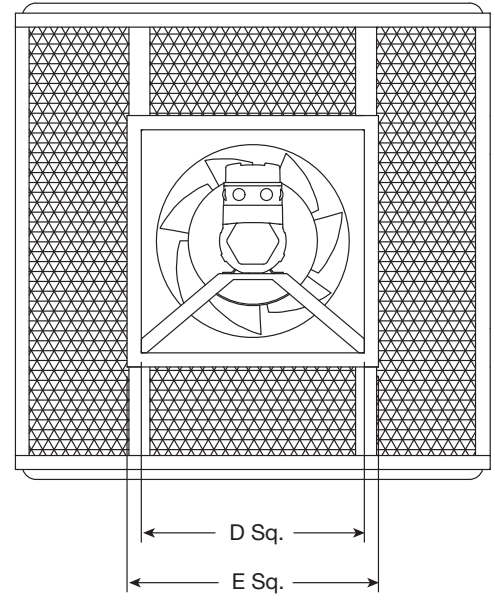
### Removing From Storage

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.

# Dimensional Data



SUPPLY OR EXHAUST



BOTTOM VIEW

Fan Size	Supply or Exhaust					Max. Fan Weight <sup>^</sup>
	A	B	C	D Sq.	E Sq.	
7	25	30-1/4	27-1/8	11-3/8	15-7/8	109
9	27	34-7/8	39-1/8	15-1/8	19-5/8	141
12	35-1/2	40-1/4	39-1/8	18-1/4	22-3/4	183
15	40	42-3/4	51-1/8	22	26-1/2	253
16	41	51	51-1/8	24	28-1/2	282
18	42-1/8	50-1/8	63-1/8	26-5/8	31-1/8	355
20	44-3/4	61-3/8	63-1/8	29-1/4	33-3/4	481
22	47-1/2	61-1/2	75-1/8	32	36-1/2	544
24	55	74-1/2	75-1/8	35-1/2	40	617
27	58-1/2	76	87-1/8	39	43-1/2	832
30	64-1/2	89-3/8	87-1/8	43	47-1/2	929
33	69-3/4	93-7/8	99-1/8	47-1/4	51-3/4	1049

All dimensions in inches and weight is shown in pounds. <sup>^</sup>Weight shown is filtered galvanized construction and largest cataloged totally enclosed EC motor.

## Hood Assembly

Units can be installed on the roof deck prior to assembling the hood.

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

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

**NOTE:** Hood assembly process for supply and exhaust fans are the same.

**NOTE:** Hood kit components are shipped knocked down and are to be assembled and installed on the base fan in the field.

Required Loose Components (Included):

- (1) Base Fan (Supply or Exhaust)
- (1) Fastener Kit (Size 7-15 Only)
- (2) Fastener Kit (Size 16-33 Only)
- Hood Kit
  - (2) Hood End Angle
  - (1) Male Hood End Panel
  - (1) Female Hood End Panel
  - (0-6) Inner Hood Panel
  - (2) Hood Support Rail
  - (4) Hood Support Angle (Size 18-33 Only)
  - (2) Hood Z-Channel
  - (4) L-Bracket
  - (4) U-Bolt
- Birdscreen Kit
  - (2) Long Birdscreen Section
  - (2) Short Birdscreen Section
- Filtered Kit (Supply Only)
  - (2) Filter End Angle
  - (2) Long Filter C-Channel
  - (2) Short Filter C-Channel (Size 7-27 Only)
  - (4) Short Filter C-Channel (Size 30-33 Only)



Required Hardware Needed (Included):

- #12 Self-Tapping Screw (TEK)
- #12 Sheet Metal Screw (SMS)
- 5/16 in. Thread Rolling Screw (TRS)
- 5/16 in. Whiz-Lock Nut and Bolt
- 3/8 in. Whiz-Lock Nut and Bolt

Tools Needed (Not Included):

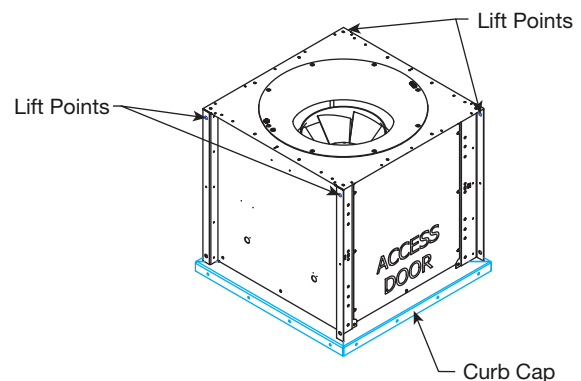
- Impact Driver
- 5/16 in. Nut Driver
- 1/2 in. Nut Driver
- (2) 1/2 in. Wrench
- (2) 9/16 in. Wrench
- Rubber Mallet
- C-Clamp (Optional)
- Awl (Optional)

1. Unpackage the knockdown hood crate, shipped separately.

**IMPORTANT:** Handle birdscreens or filters carefully to avoid damaging throughout the assembly process.

**IMPORTANT:** Ensure rotating the unit will not cause damage to the base fan, surroundings, or roof. Use proper equipment, lifting techniques, and safety measures to avoid injury or damage to the base fan or surroundings. The manufacturer is not liable for any damages that may occur during this process.

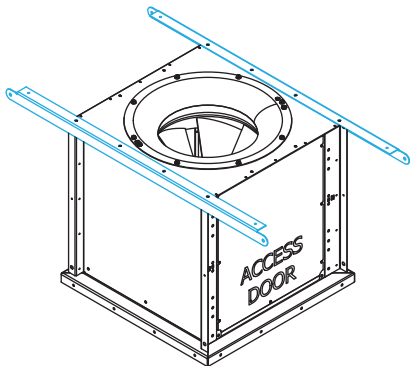
2. Ensure the base fan is in the upright position with the curb cap sitting flush on the roof curb. Use the holes located in the (4) corners of the base fan inlet (for supply) or outlet (for exhaust) as lifting points to assist in rotating the unit.



**NOTE:** Image shown is for supply configurations, with the inlet of the fan up. Exhaust configurations would have the outlet of the fan up.

- Place the hood support rails on the top edge of the base fan perpendicular to the access doors.

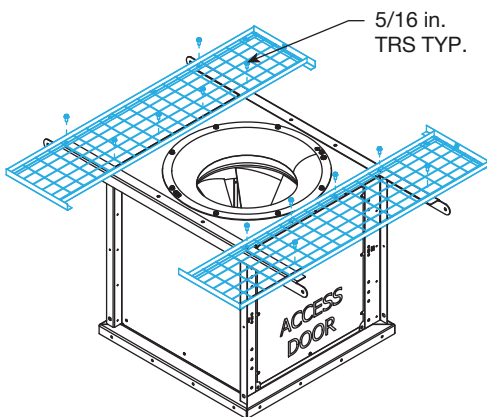
**IMPORTANT:** Do not fasten hood support rails to base fan in this step.



### STEPS 4-5 FOR FAN WITH BIRDSCREEN

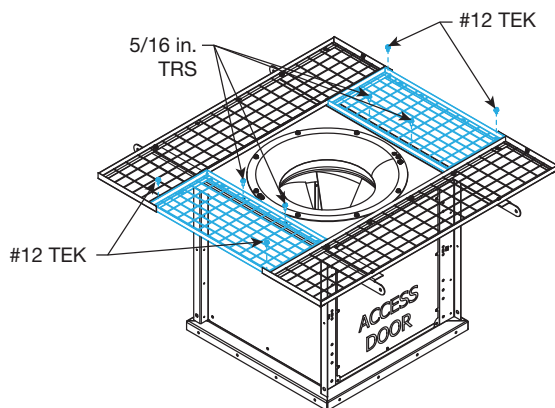
**NOTE:** For Filtered Supply Fan, birdscreen sections are not included, skip to Step 6.

- Place the long birdscreen sections across the hood support rails. Align the holes in the rails and the long birdscreen sections with the pilot holes on the top of the base fan. Secure the long birdscreen sections to the base fan and hood support rails using TRS.



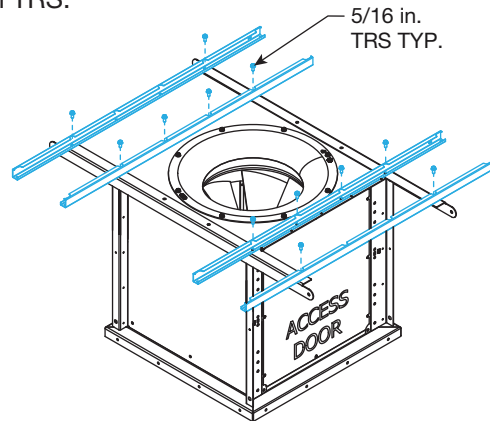
- Place the short birdscreen section over hood support rails and long birdscreen tab, align holes, then fasten TRS to hood support rails. Use TEK to secure to long birdscreen tabs.

Proceed to step 9.

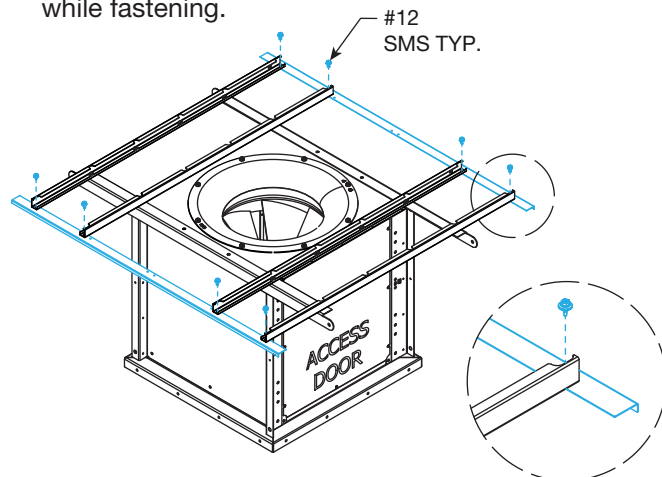


### STEPS 6-9 FOR FILTERED SUPPLY FAN ONLY

- Place long filter C-channels parallel to the access doors across the hood support rails and fasten with TRS.

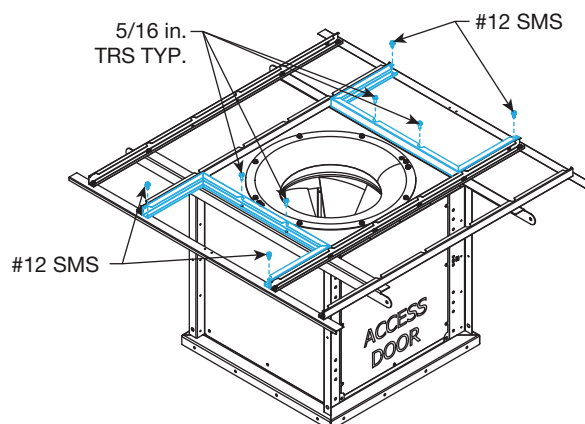


- Place filter end angle across the bottom of the long filter C-channel. Short flange should be positioned down and away from fan. Fasten with SMS. Optional C-clamp may be used to hold components in place while fastening.



**NOTE:** For fan sizes 30 and 33, short filter C-channels may have two hand formed channels per side.

- Bend the short filter C-channel 90 degrees at the notches creating an inward channel. Place the bent short filter C-channel on top of hood support rail and fasten using TRS to base fan. Fasten the outer legs of C-channel to filter end angles using SMS.



**IMPORTANT:** Handle filters carefully to avoid damaging throughout the assembly process.

**NOTE:** An airflow direction arrow is located on the side of each filter.

9. Carefully slide filters into the filter C-channel assemblies ensuring all airflow direction arrows on filters point upward. Reference the table below for filter quantity and sizing.

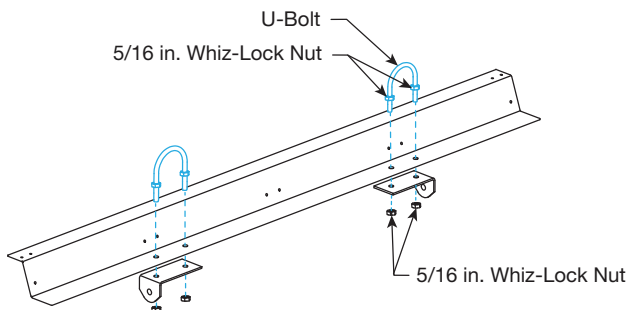
Fan Size	Short Filter		Long Filter	
	L x W	Qty.	L x W	Qty.
7	5-1/2 x 11-3/8	2	23-1/4 x 5-3/4	2
9	9-5/8 x 15	2	35-1/4 x 6-1/4	2
12	8-1/8 x 18-1/4	2	35-1/4 x 7-1/4	2
15	12-1/4 x 22	2	23-5/8 x 6-3/4	4
16	11-1/4 x 24	2	23-5/8 x 9-3/4	4
18	15-7/8 x 26-1/2	2	29-5/8 x 8-1/8	4
20	14-5/8 x 29-1/8	2	29-5/8 x 12-3/8	4
22	19-1/8 x 32	2	35-5/8 x 11	4
24	17-1/2 x 35-1/2	2	35-5/8 x 15-3/4	4
27	21-3/4 x 38-7/8	2	27-3/4 x 14-7/8	6
30	19-3/4 x 21-1/4	4	27-3/4 x 19-1/2	6
33	23-1/2 x 23-3/8	4	31-3/4 x 19-5/8	6

All dimensions in inches.

**IMPORTANT:** The arrangement of components in this step is critical.

10. Create the hinge assembly:

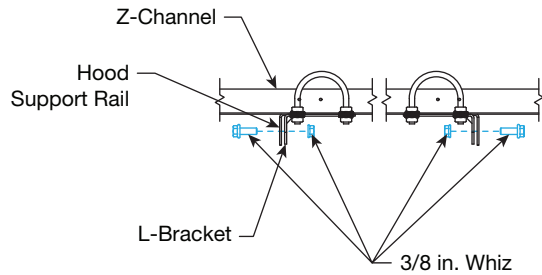
- Thread (2) 5/16-in. Whiz-Lock nuts onto each U-bolt, such that the nut flange is towards the end of the U-bolt.
- Insert U-bolt through the Z-channel and L-bracket from the top down.
- Secure using 5/16-in. Whiz-Lock nuts on each leg of the U-bolt.
- Repeat this process for remaining hinge assemblies.



11. Install the hinge assembly:

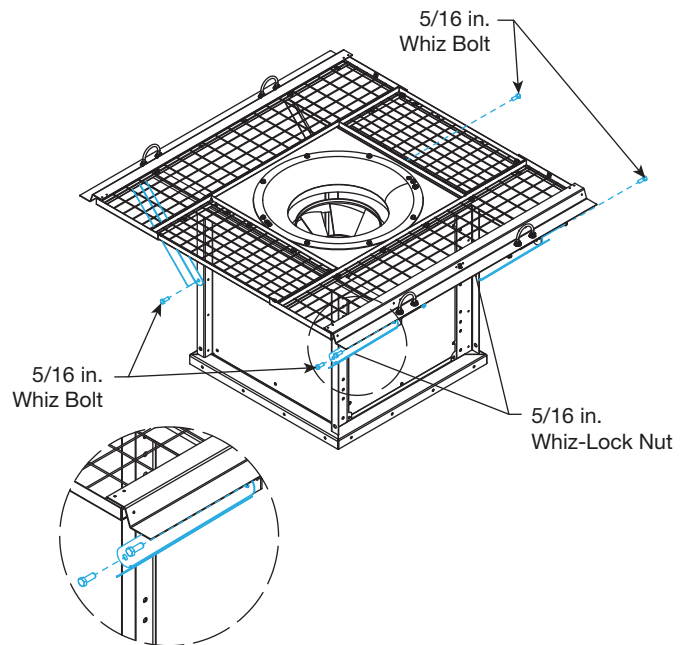
a. Sizes 7-16:

Attach hinge assemblies to the hood support rails using 3/8-in. Whiz-Lock nuts and bolts.

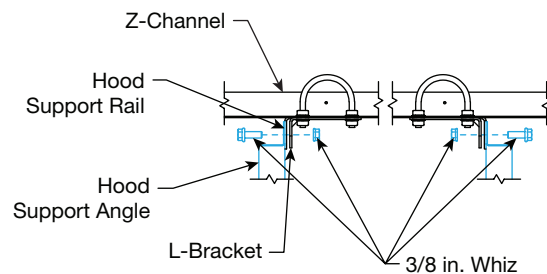


b. Sizes 18-33:

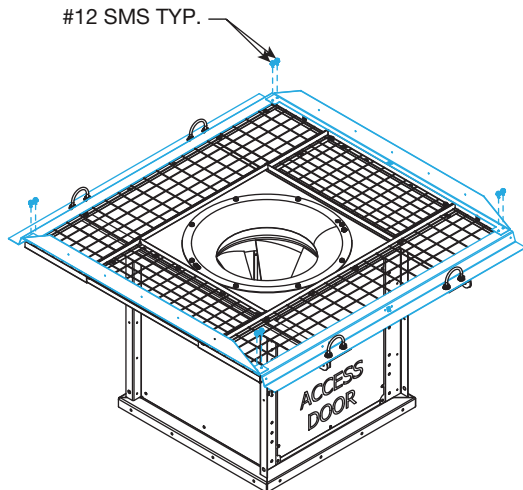
Install hood support angle to the base fan using 5/16-in. Whiz-Lock nut and bolt through the hole located halfway down the corner of the base fan.



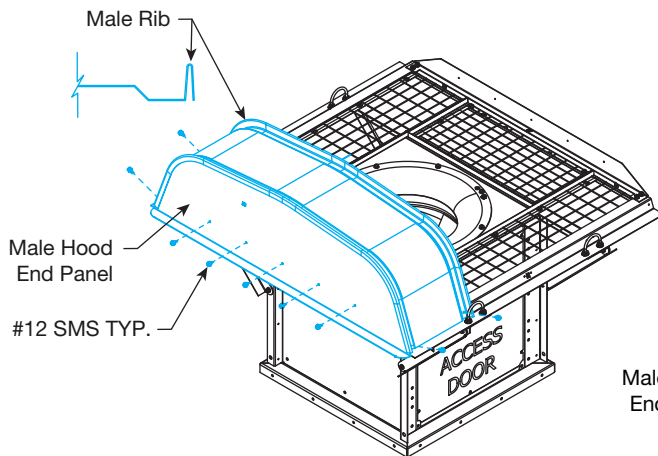
Align the hole in the L-bracket of the hinge assembly with the hole at the end of the hood support rail and the hood support angle. Secure using 3/8-in. Whiz-Lock nut and bolt.



12. Place hood end angles on top of Z-channels. Fasten in each corner from above using SMS.



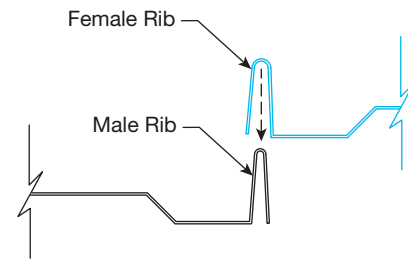
13. Start with the male hood end panel and place it over either hood end angle, across the Z-channels. Attach the male hood end panel to the hood end angle and Z-channels using SMS.



14. Refer to the table for the required quantity of hood panels.

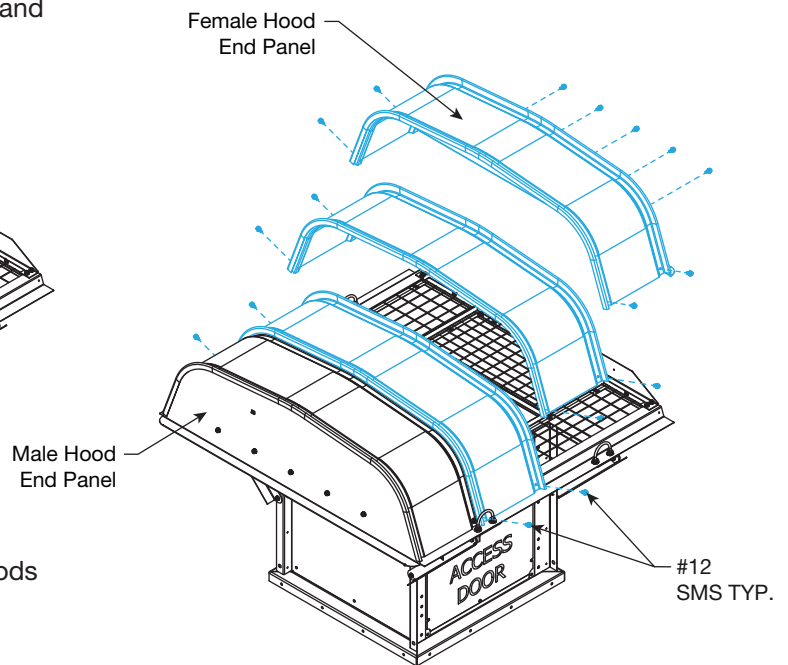
Fan Size	Number Of	
	Hood End Panels	Inner Hood Panels
7	2	0
9	2	1
12	2	1
15	2	2
16	2	2
18	2	3
20	2	3
22	2	4
24	2	4
27	2	5
30	2	5
33	2	6

15. Align inner hood panels by overlapping the female rib of the panel on top of the male rib of the previously installed panel. Be careful not to damage the panels. Use a rubber mallet to help interlock the hood panels together.



16. Once all inner hood panels are aligned, install the female hood end panel. Fasten the female hood end panel to the hood end angle with SMS.

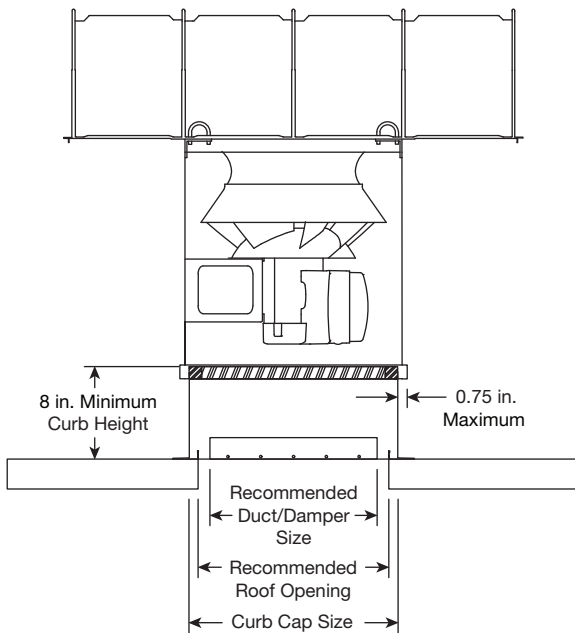
17. Secure all inner hood panels to Z-channels using SMS.



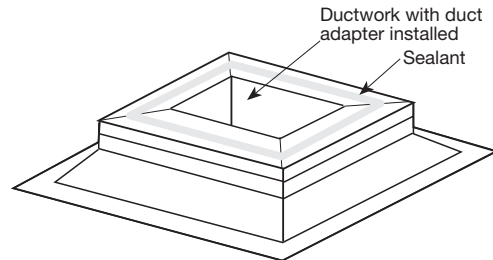
## Typical Installation

Good duct practices should be followed in accordance with SMACNA and AMCA guidelines, NFPA 96 and any local codes. The discharge should have approximately three duct diameters of straight duct to achieve cataloged performance (see table below).

The ductwork should extend far enough above the roofline to meet the supply unit once it is installed. A duct adapter is recommended for bottom discharge to align ductwork with the unit. The duct adapter is only a guide and is not to be used as a support for the ductwork. Fans may be configured with a damper, and the ductwork may not be able to run up to the bottom of the supply unit. In this case, mount the ductwork beneath the damper.



1. Cut an appropriately sized hole in the roof surface.
2. Position curb on the roof and install curb per manufacturer's instructions. Caulk and flash the curb to ensure a watertight seal.
3. Before installing the unit, apply sealant around the perimeter of the supply duct to isolate the fan and minimize vibration.



**NOTE:** Always use all four U-bolts when using a sling.

4. Use a crane and set of spreader bars hooked to the U-bolts located on the hood to lift and center the unit on the curb in the correct orientation. Use self-tapping sheet metal screws to fasten the unit to the curb through provided holes in the curb cap. Electrical connections can be made at this time.
5. If applicable, determine an ideal location for the disconnect switch.
6. Install disconnect per manufacturer's suggestions.
7. Install conduit.
8. Route the wiring from the junction box to the disconnect switch through all conduit, fittings, and conduit leads.

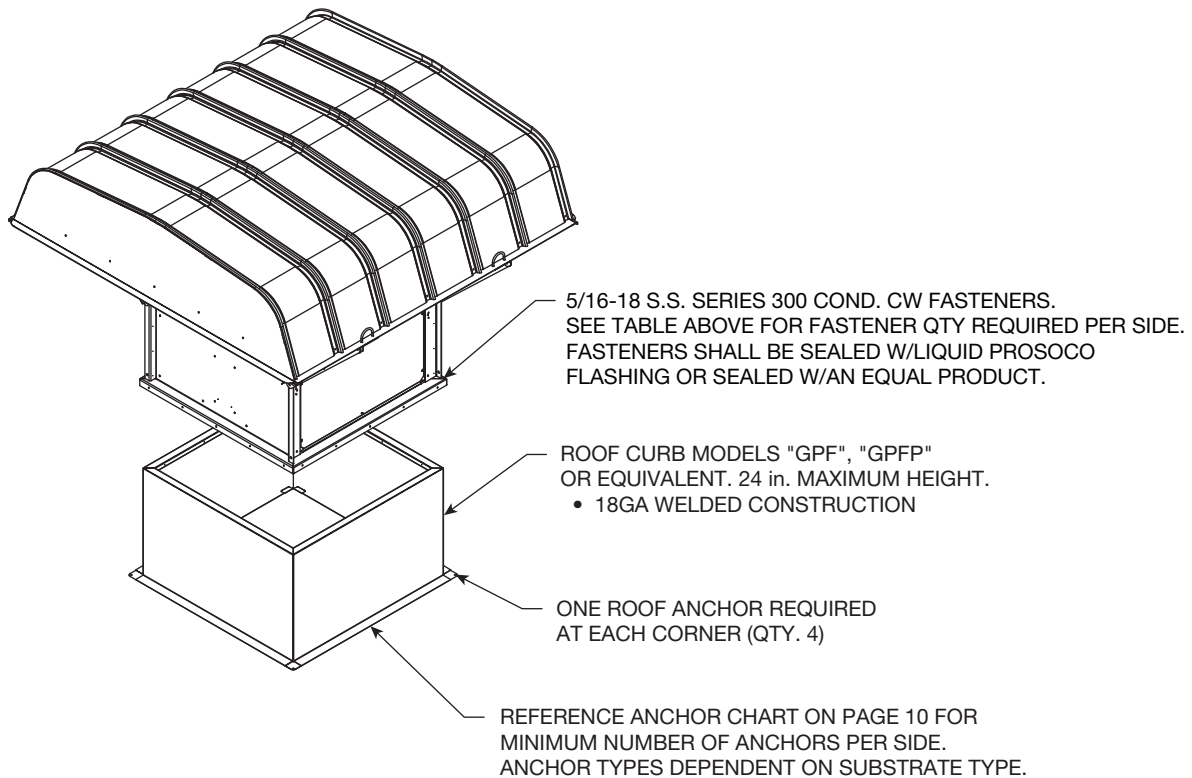
Fan Size	Recommended Duct/Damper Size	Recommended Roof Opening	Curb Cap Size
7	11-1/4 x 11-1/4	13-3/4 x 13-3/4	15-7/8 x 15-7/8
9	15 x 15	17-1/2 x 17-1/2	19-5/8 x 19-5/8
12	18-1/4 x 18-1/4	20-3/4 x 20-3/4	22-3/4 x 22-3/4
15	22 x 22	24-1/2 x 24-1/2	26-1/2 x 26-1/2
16	24 x 24	26-1/2 x 26-1/2	28-1/2 x 28-1/2
18	26-1/2 x 26-1/2	29 x 29	31-1/8 x 31-1/8
20	29-1/4 x 29-1/4	31-3/4 x 31-3/4	33-3/4 x 33-3/4
22	32 x 32	34-1/2 x 34-1/2	36-1/2 x 36-1/2
24	35-1/2 x 35-1/2	38 x 38	40 x 40
27	39 x 39	41-1/2 x 41-1/2	43-1/2 x 43-1/2
30	43 x 43	45-1/2 x 45-1/2	47 1/2 x 47 1/2
33	47-1/4 x 47-1/4	49-3/4 x 49-3/4	51-3/4 x 51-3/4

All dimensions in inches.

# High Wind Installation

1. Model RSQ has been successfully tested in accordance with Miami Dade test protocol TAS-201 (large missile impact) and TAS-202 (static loading).
2. Roof structure must be designed to withstand the weight and loading transmitted by roof fans. Fasteners shall be as specified and installed as detailed.
3. Design, testing, and installation conforms to Florida Building Code.
4. Tested for areas including high velocity hurricane zones.
5. These fans have not been tested for wind driven rain test per Florida Building Code, TAS-100(A)-95.
6. This approval is for the structural capacity and impact rating of the exterior housing only, it does not include any interior mechanism or electrical component.

Fan Size	Fan to Curb Minimum Fasteners	
	Per Side	Total Fasteners
7	3	12
9	3	12
12	3	12
15	3	12
16	4	16
18	4	16
20	4	16
22	4	16
24	5	20
27	5	20
30	5	20
33	6	24



# High Wind Rating Anchoring

Fan Size	Timber Deck				Steel Deck				Concrete Deck			
	Option #1 (Lag Screws)		Option #2 (Thru Bolts)		Option #3 (Self-Drill Screws)		Option #4 (Thru Bolts)		Option #5 (Screw Anchors)		Option #6 (Thru Bolts)	
	Per Side	Total	Per Side	Total	Per Side	Total	Per Side	Total	Per Side	Total	Per Side	Total
<b>90 PSF RATING</b>												
7	4	12	3	8	5	16	3	8	3	8	3	8
9	4	12	3	8	6	20	3	8	3	8	3	8
12	5	16	3	8	7	24	3	8	4	12	3	8
15	5	16	3	8	8	28	3	8	4	12	3	8
16	6	20	3	8	8	28	3	8	4	12	3	8
18	6	20	4	12	9	32	4	12	5	16	4	12
20	6	20	4	12	9	32	4	12	5	16	4	12
22	7	24	4	12	10	36	4	12	5	16	4	12
24	7	24	4	12	11	40	4	12	6	20	4	12
<b>40 PSF RATING</b>												
27	4	12	4	12	6	20	4	12	4	12	4	12
30	5	16	5	16	6	20	5	16	5	16	5	16
33	5	16	5	16	7	24	5	16	5	16	5	16

<sup>1</sup> Unless noted, anchors to be 300 series stainless steel cond. cw (Fy=65ksi min.).

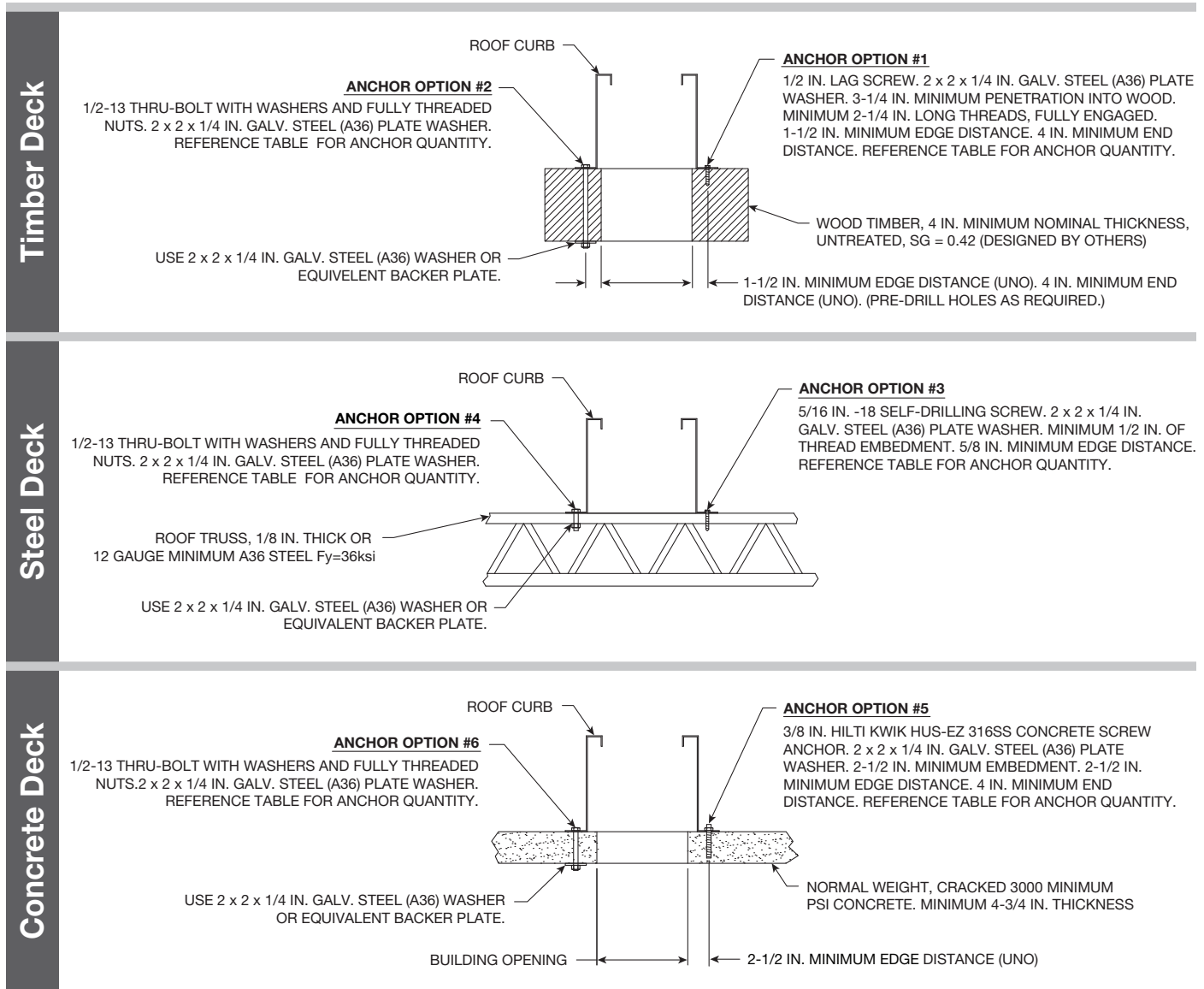
<sup>2</sup> All anchors to be installed per the manufacturer's recommendations.

<sup>3</sup> All anchors and substrates are by others.

<sup>4</sup> Corner fasteners are included in the above "Per Side" quantities and "Total" quantities.

<sup>5</sup> Each install is to utilize four (4) corner fasteners. No exceptions.

<sup>6</sup> Tabulated data generated from 90psf for fan sizes 7 through 24 or 40psf for sizes 27 through 33. Uplift and lateral loads are applied independently.



# Pre Start-Up Checks

## Before Fan Start-Up

Before starting up or operating fan, check all fasteners for tightness. In particular, check the cap screws in wheel bushing.

### Wheel Alignment

1. Rotate the fan wheel by hand and ensure no parts are rubbing. The wheel should rotate freely and be aligned as shown in Figure 1. Wheel position is preset and the unit is tested at the factory.
2. Movement may occur during shipment, and realignment may be necessary.

**Radial Gap** - If necessary, adjust inlet cone position such that the radial gap between the wheel cone and inlet cone is evenly distributed around the wheel.

**Alignment** - If necessary, adjust wheel position by loosening the wheel hub (see Tapered Bushing Hub, Removal and Replacement, on page 12) from the motor shaft so that a straight edge held tight to the wheel cone just touches the inlet cone. Refer to Figure 1.

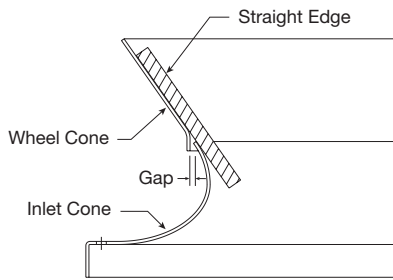


Figure 1

## Recommended Fastener Torque

Size	Type	Recommended Torque in-lb (ft-lb)		Application
		Min.	Max.	
#12	Sheet Metal Screw	25 (2)	30 (2.5)	Hood Panels
1/4 in.	Hex Bolt	96 (8)	108 (9)	Ductwork and Accessory Mounting
1/4 in. x 20	Cap Screw	120 (10)	120 (10)	QT Bushing (Size 7-24)
1/4 in. x 20	Cap Screw	108 (9)	108 (9)	SD Bushing (Size 27-33)
5/16 in.	Semi-Gimlet Bolt	132 (11)	144 (12)	Fan Construction
3/8 in.	Serrated Flange Bolt/Nut	252 (21)	288 (24)	Motor Mount
1/2 in.	Serrated Flange Bolt/Nut	564 (47)	636 (53)	Motor Mount

## Operation

**IMPORTANT:** The fan has been checked for mechanical noise at the factory prior to shipment. If mechanical noise should develop, suggested corrective actions are offered in the Troubleshooting section, see page 16.

1. After the fan is installed, disconnect and lock-out all power switches to fan.
2. Before connecting the fan to power, turn the fan wheel by hand to be sure it is not striking the inlet cone (venturi) or any obstacle.
3. Start the fan and shut it off immediately to check rotation of the wheel, see Figure 2.

**Wheel Rotation** - Direction of wheel rotation is critical. Reversed rotation will result in poor air performance, motor overloading and possible burnout. Rotation should be counterclockwise when viewed from the fan inlet as shown in Figure 2. If wheel rotation is incorrect, switch two of the wiring leads for 3 phase power supply or check motor wiring for single phase power supply. Fan RPM should be checked and verified with a tachometer.

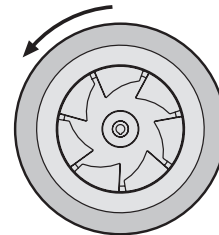


Figure 2

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

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.

# Maintenance

## DANGER

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

## WARNING

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

## 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.

## 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.

## Fan

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.

## Filters

One-inch washable aluminum mesh filters are an optional replacement to bird screen. Filters should be cleaned and/or replaced on a regular basis for optimum efficiency. To remove the filters, disconnect the hinge brackets on one side of the hood and tilt the hood upward. Then slide the filters out of the filter tracks. Aluminum filters can be washed in a mild detergent solution. If desired, an adhesive spray available at most filter distributors can be applied to increase filter efficiency.

## Motor

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. As a general rule where motor temperatures do not exceed 104°F (40°C), the grease should be replaced after 2,000 hours of running time.

## Wheel

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.

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

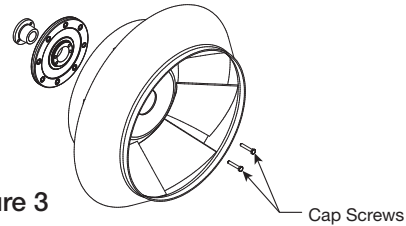
## Tapered Bushing Hub

For wheel hubs utilizing a tapered bushing interface, follow this procedure for installation and removal.

### 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 Figure 3.
3. Take the socket head cap screws that were removed and install them into the visibly threaded holes on the wheel hub.
4. Once socket head cap screws are installed, tighten them an eighth of a turn at a time, alternating until the bushing comes loose.

### Bushing Replacement



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.
2. 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.
3. The socket head cap screws are adjustable from the inlet of the fan. Install the bushing socket head cap screws into the aligned holes by hand (or without excessive torque).
4. Adjust the axial location of the wheel in the fan relative to the inlet cone (venturi) as shown in Figure 1, page 11. Then tighten the socket head cap screws an eighth turn at a time in an alternating fashion and to a torque of 10 ft·lbs for QT bushings and 9 ft·lbs for SD bushings.

**NOTE:** QT or SD is labeled on the outer edge of the bushing. QT bushings have two cap screws and SD bushings have three cap screws.

# Maintenance Log

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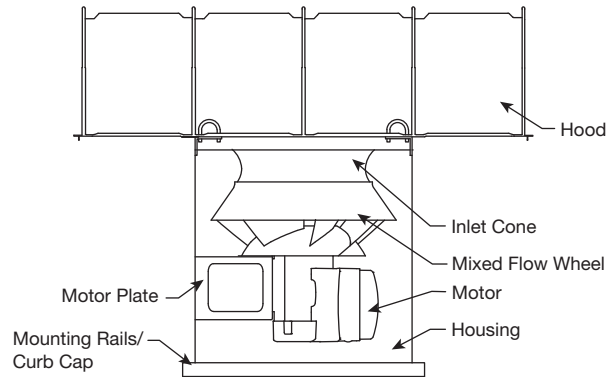
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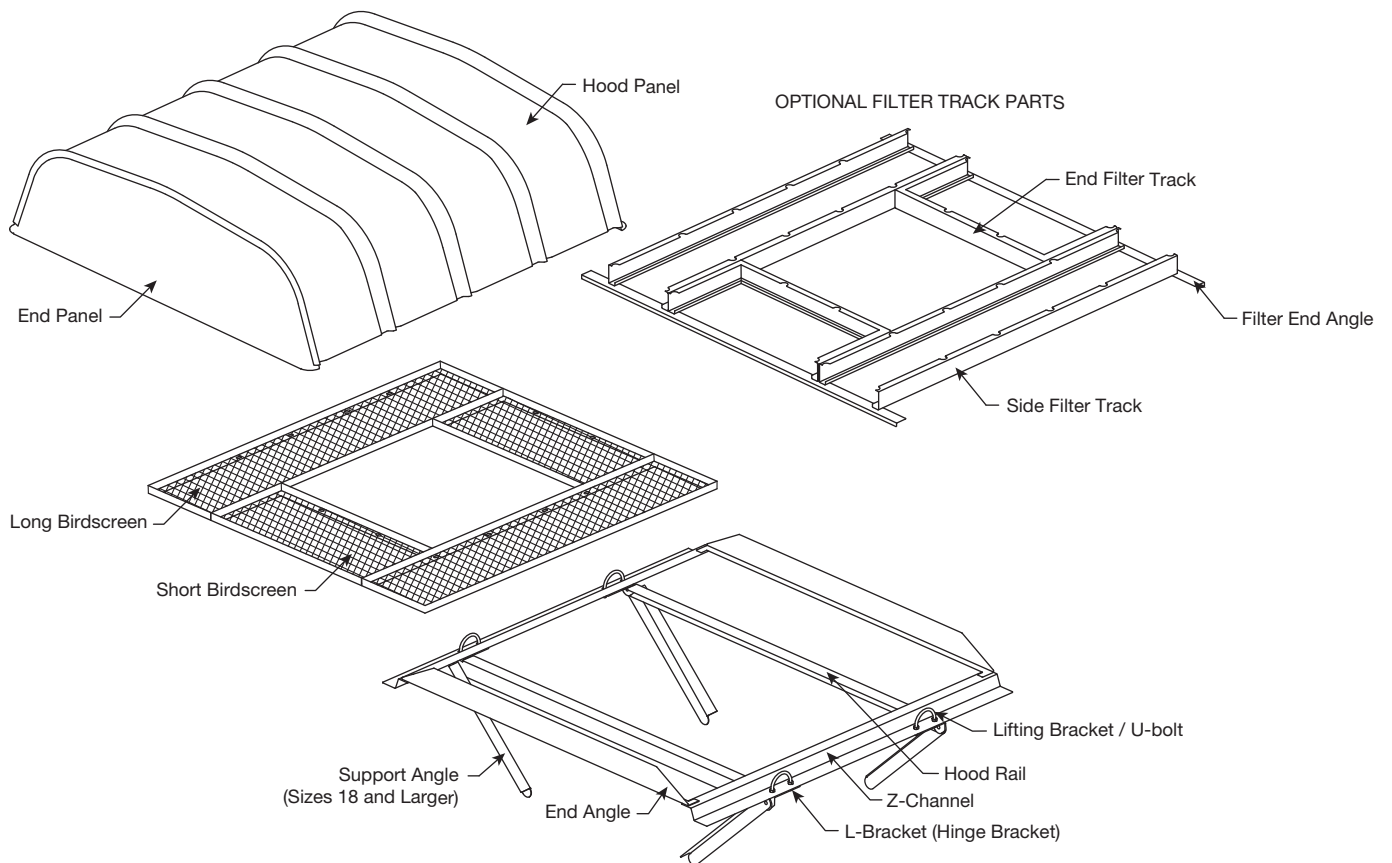


## Parts List

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



**NOTE:** Fan size 18 and larger have additional internal and external structural supports.



## 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
Ventilator Inoperative	Blown fuse or breaker	Replace or repair
	Incorrectly wired	Shut power OFF and check wiring for proper connections
	Defective motor	Replace or repair
Insufficient Airflow	Clogged filters	Clean or replace
	Incorrect wheel rotation	Correct wheel rotation, see page 11, Operation step 3
	Excessive dirt build up on wheel	Clean wheel
	Improper wheel alignment	Center wheel on inlet cone, see page 11 and Figure 1
	Fan RPM too slow	Adjust speed with Vari-Green® control or VFD (if applicable)
	Damper closed	Inspect/repair damper
	Loose fitting duct sections permitting air loss	Check for secure connection where duct sections are joined (suggest duct tape at seams for sealed closure)
System resistance too high	Check system: proper orientation and operation of backdraft or control dampers, obstructions in ductwork.	
Excessive Noise or Vibration	Accumulation of material on wheel	Clean wheel
	Loose wheel	Tighten set screws
	Wheel improperly aligned and rubbing	Center wheel on inlet cone, see page 11 and Figure 1
	Wheel out of balance	Check wheel balance, rebalance in place if necessary
	Foreign objects in wheel or housing	Remove objects and check for damage or imbalance
	Ventilator base not securely anchored	Secure properly
Motor Overloads or Overheats	Incorrect wheel rotation	Check motor wiring
	Shorted motor winding	Replace motor
	Over/Under line voltage	Contact power company

For Vari-Green® motor troubleshooting, refer to the Vari-Green Motor Installation, Operation, and Maintenance Manual.

## Our Commitment

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

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

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](http://www.amca.org).

