



ROOF UPBLAST & SIDEWALL CENTRIFUGAL FIBERGLASS EXHAUST FAN

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

RBK FRP FAN

The *M.K. Plastics* catalog on the above corrosion resistant FRP fan, provides additional information describing the equipment, fan performance, available accessories, and specifications.

For additional safety information, refer to AMCA publication 410-96, *Safety Practices for Users and Installers of Industrial and Commercial Fans*.

For Information on special fan application requirements, contact *M.K. Plastic's* corporate office at (514) 871-9999.

Receiving and Inspection

Carefully inspect the fan and accessories for any damage and shortage immediately upon receipt of the fan.

- Turn the wheel by hand to ensure it turns freely and does not bind.
- Inspect the dampers (if supplied) for free operation of all moving parts.
- Record on the *Delivery Receipt* any visible sign of damage.

WARNING

This unit has rotating parts. Safety precautions should be exercised at all times during installation, operation, and maintenance.

ALWAYS disconnect power prior to working on fan.



Fig. 1 – The RBK Fan

Storage

If the fan is stored for any length of time prior to installation, store it in its original shipping crate and protect it from dust, debris and the weather. Rotate the wheel several revolutions every three to five days to keep a coating of grease on all internal bearing parts.

Outdoor Storage

To maintain good working condition of the fan when it is stored outdoors, follow the additional instructions below.

1. Cover the outlet to prevent the accumulation of dirt and moisture in the housing.
2. Periodically rotate the wheel and operate dampers (if supplied).
3. Periodically inspect the unit to prevent damaging conditions.

Personal Safety

Disconnect switches are recommended. Place the disconnect switch near the fan in order that the power can be swiftly cut off in case of an emergency, and in order that maintenance personnel are provided complete control of the power source.

Handling

All RBK fans come with two lifting lugs on the bearing plate for belt drive units, and two lifting lugs (eye bolts) on the fan base for direct drive units. Always use a spreader bar to ensure any straps do not come into contact with the unit. To get access to the lifting lugs, the RBK weather cover must be removed by slackening off the attachment bolts and sliding the cover off.

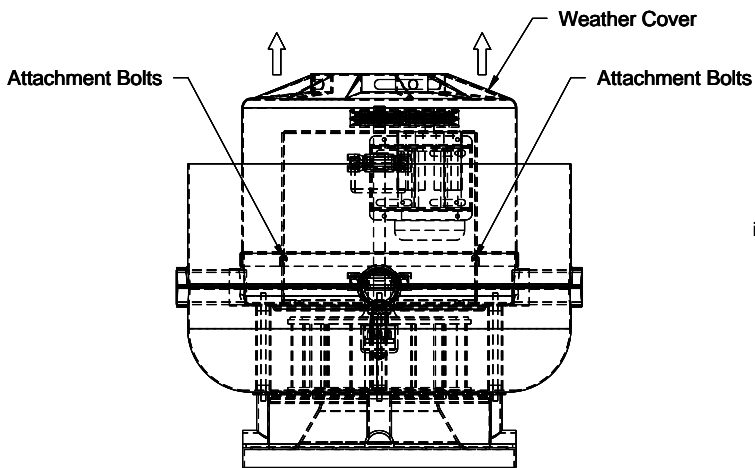


Fig. 2 – Weather Cover Removal

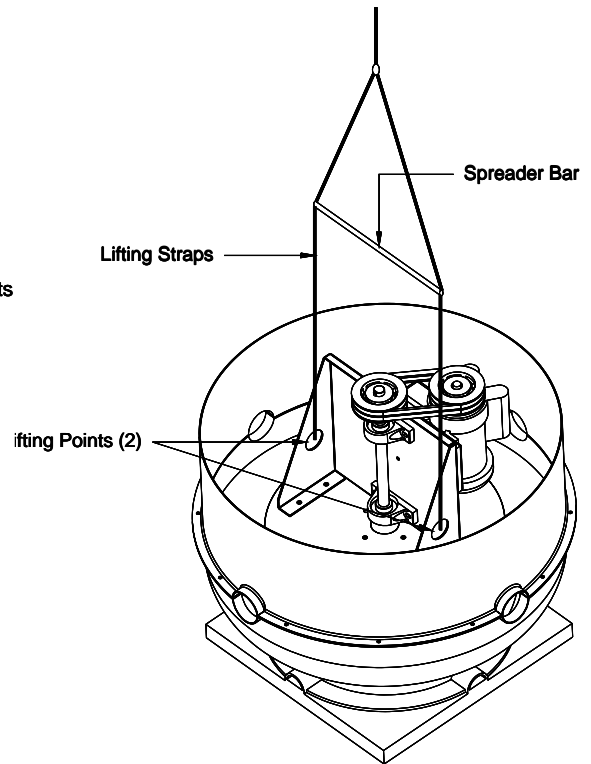


Fig. 3 – Lifting Lug Location (Belt Drive Shown)

Roof Mounted Fans

Roof mounted fans should normally be attached to equipment support curbs to keep them above the roof line by at least 12". Assuming the roof curb is in place....

1. If the unit has been supplied with a backdraft damper, now is the time to install it. The flange of the damper is square and is sized and designed to sit on the curb wood nailer strip. Fasten down with counter sunk screws.
2. Lift the fan onto the roof curb, refer to page 2. for lifting lug locations for larger size fans. Make sure there is approximately 1" gap between the inside of the curb cap and the outside of the curb, evenly spaced.
3. Secure the fan to the roof curb using a minimum of eight lag bolts, through the side of the curb cap into the curb wood nailer strip.
4. Make connection to the disconnect switch per the electrical instructions.

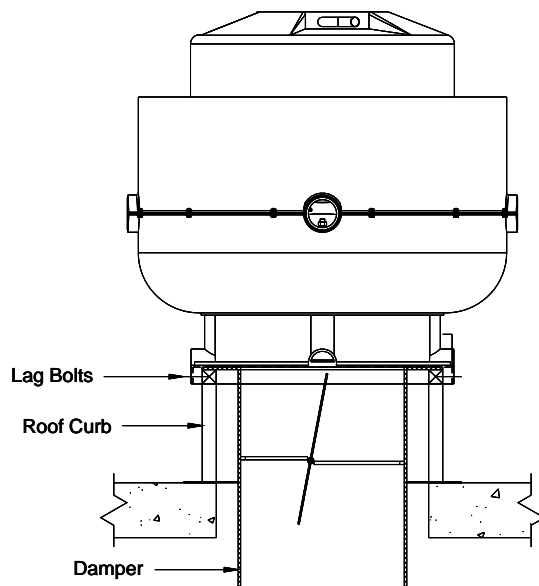


Fig. 4 – Roof Curb Mounted

Wall Mounted Fans

The fan is attached in a similar way to roof mounting, except that the curb is replaced by spacer blocks or mounting brackets, (not supplied). See Fig. 5 for details.

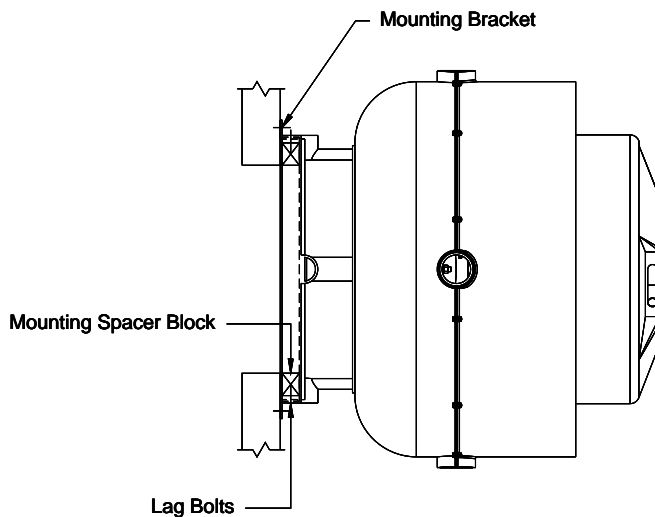


Fig. 5 – Wall Mounted

Wheel-to-Inlet Clearance/Overlap

The correct wheel-to-inlet clearance/overlap is critical to proper fan performance. This clearance should be verified before initial start-up since rough handling during shipment could cause a shift in fan components. Refer to Fig. 6.

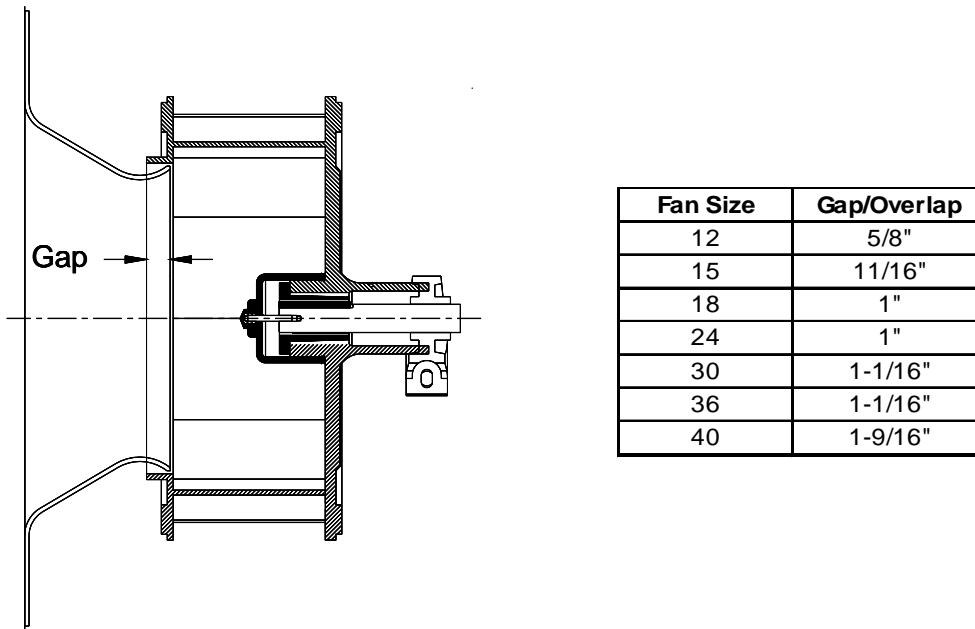


Fig. 6 – Wheel/Inlet Clearance

Belt and Pulley Installation

Belt tension is determined by the sound the belts make when the fan is first started. Belts will produce a loud squeal, which dissipates after the fan is operating at full capacity. If the belt tension is too tight or too loose, lost efficiency and possible damage can occur. Do not change the pulley pitch diameter to change tension. This will result in a different fan speed than desired.

1. Loosen motor plate adjustment nuts and move the motor plate in order that the belts can easily slip into the grooves on the pulleys. Never pry, roll, or force the belts over the rim of the pulley.
2. Slide the motor plate back until proper tension is reached. For proper tension a deflection of approximately $\frac{1}{4}$ " per foot of center distance should be obtained by firmly pressing the belt. Refer to Fig. 7.
3. Lock the motor plate adjustment nuts in place.
4. Ensure pulleys are properly aligned. Refer to Fig. 8

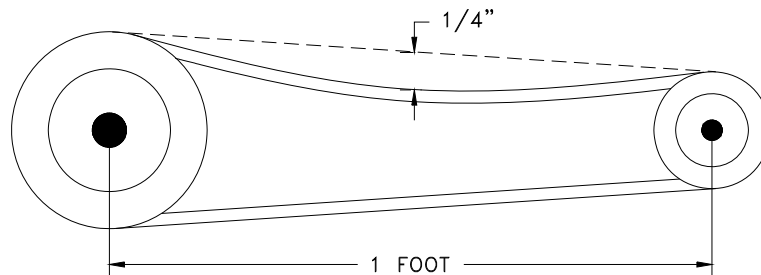


Fig. 7 – Belt & Pulley Tension

Pulley Alignment

Pulley alignment is adjusted by loosening the motor pulley setscrew and by moving the motor pulley on the motor shaft, or by moving the entire motor along the motor mounting bracket. Fig. 8 illustrates correct and incorrect pulley alignment.

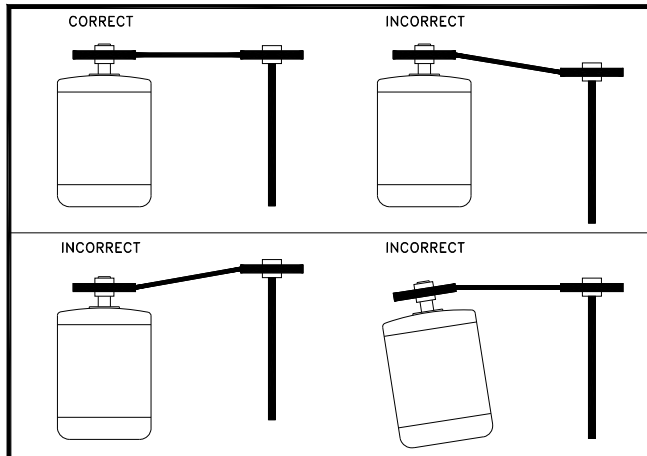


Fig. 8 – Pulley Alignment

A recommended method of inspecting the pulley alignment is shown in Fig. 9. With the shorter leg of a carpenter's square or other straight edge lying along the case of the motor, adjust the position of the motor pulley (or the motor) until the longer leg of the square is parallel to the belt. For more accuracy – use a laser alignment tool, if available. Read the instructions that come with the kit.

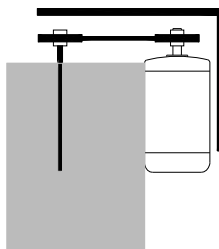


Fig. 9 – Pulley Alignment Method

Wiring Installation

All wiring should be in accordance with local ordinances and the National Electrical Code, NFPA 70. Ensure the power supply (voltage, frequency, and current carrying capacity of wires) are in accordance with the motor nameplate.

Lock off all power sources before unit is wired to power source.

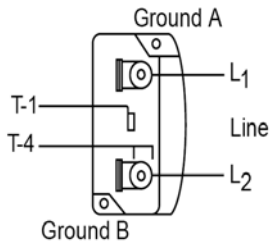
1. Remove the weather cover as described on page 2. to get access to the motor.
2. Disconnect switch will normally be mounted on the exterior of the fan housing, so the fan should be positioned with the junction box towards the power supply.
3. Connect supply wiring to the disconnect switch (non-fused standard). Check the wiring diagrams on the motor for connections. The power leads must be protected at the point of distribution in accordance with the fan data plate.
4. Run the wires from the disconnect switch through the fans cooling tubes on the side and complete the wiring to the motor.
5. Supply voltage to the power ventilator should not vary by more than 10% of the value indicated on the unit data plate. Phase unbalance must not exceed 2%.

WARNING: Failure of motor due to operation on improper line voltage or with excessive phase unbalance constitutes product abuse and may cause severe damage to the unit's electrical components.

Follow the wiring diagram in the disconnect switch and the wiring diagram provided with the motor. Correctly label the circuit on the main power box and always identify a closed switch to promote safety (i.e. red tape over a closed switch).

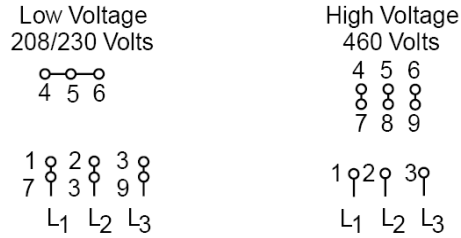
Wiring Diagrams

Single Speed, Single Phase Motor



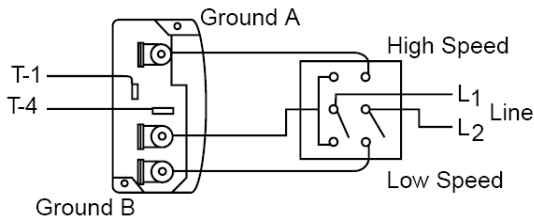
When ground is required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-1 and T-4 leads.

3 Phase, 9 Lead Motor



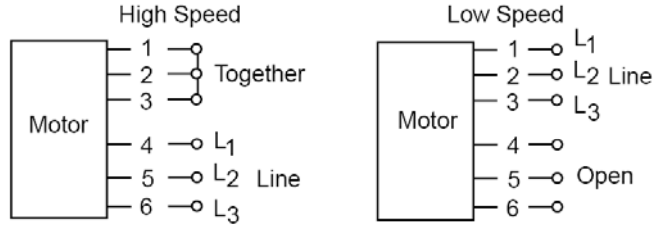
To reverse, interchange any 2 line leads.

2 Speed, 2 Winding, Single Phase Motor



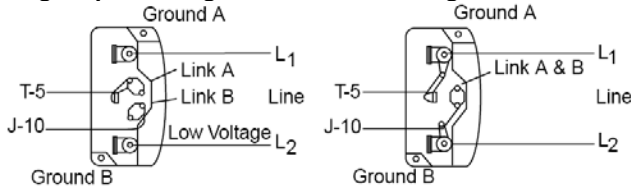
When ground is required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-1 and T-4 leads.

2 Speed, 1 Winding, 3 Phase Motor



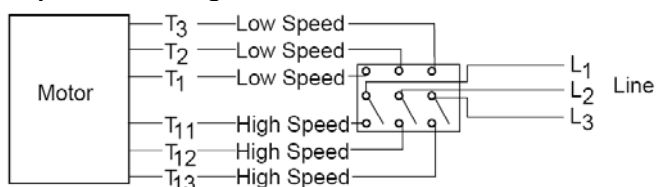
To reverse, interchange any 2 line leads. Motors require magnetic control.

Single Speed, Single Phase, Dual Voltage



When ground is required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-5 and J-10 leads.

2 Speed, 2 Winding, 3 Phase



To reverse: High speed-interchange leads T11 & T12. Low speed-interchange leads T1 & T2. Both speeds-interchange any 2 line leads.

Final Installation Steps

1. Inspect fasteners and setscrews, particularly fan mounting and bearing fasteners, and tighten according to the recommended torque shown in the table Recommended Torque for Setscrews/Bolts.
2. Inspect for correct voltage with voltmeter.
3. Ensure all accessories are installed.

Setscrews				Hold Down Bolts	
Size	Key Hex Across Flats	Recommended Torque		Size	Wrench Torque
		Min.	Max.		
No. 10	3/32"	28	33	3/8"-16	240
1/4"	1/8"	66	80	1/2"-13	600
5/16"	5/32"	126	156	5/8"-11	1200
3/8"	3/16"	228	275	3/4"-10	2100
7/16"	7/32"	29	348	7/8"-9	2040
1/2"	1/4"	42	504		
5/8"	5/16"	92	1104		
3/4"	3/8"	120	1440		

Recommended Torque for Setscrews/Bolts (IN/LB)

Operation

Pre-Start Checks

1. Lock out all the primary and secondary power sources.
2. Ensure fasteners and setscrews, particularly those used for mounting the fan, are tightened.
3. Inspect belt tension and pulley alignment.
4. Inspect motor wiring.
5. Ensure belt touches only the pulleys.
6. Ensure fan and any ductwork are clean and free of debris.
7. Inspect wheel-to-inlet clearance. The correct wheel-to-inlet clearance is critical to proper fan performance.
8. Restore power to the fan.

Start Up

Turn the fan on. In variable speed units, set the fan to its lowest speed and inspect for the following:

1. Direction of rotation.
2. Excessive vibration.
3. Unusual noise.
4. Bearing noise.
5. Improper belt alignment or tension (listen for squealing).
6. Improper motor amperage or voltage.

If a problem is discovered, immediately shut the fan off. Lock out all electrical power and check for the cause of the trouble. See Troubleshooting.

Inspection

Inspection of the fan should be conducted in the first **30 minutes, 8 hour** and **24 hour** intervals of satisfactory operation. During the inspections, stop the fan and inspect as per the *Conditions Chart*.

30 Minute Interval

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

8 Hour Interval

Inspect belt alignment and tension. Adjust and tighten as necessary.

24 Hour Interval

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

Maintenance

Establish a schedule for inspecting all parts of the fan. The frequency of inspection depends on the operating conditions and location of the fan.

Inspect fans exhausting corrosive or contaminated air within the first month of operation. Fans exhausting contaminated air (airborne particles) should be inspected every three months, or sooner. Regular inspections are recommended for fans exhausting non-contaminated air.

It is recommended the following inspection be conducted twice per year.

- Inspect bolts and setscrews for tightness. Tighten as necessary. Worn setscrews should be replaced immediately.
- Inspect belt wear and alignment. Replace worn belts with new belts and adjust alignment as needed. See Belt and Pulley Installation on page. 4.
- Inspect for cleanliness. Clean exterior surfaces only. Removing dust and grease on motor housing assures proper motor cooling. Removing dirt from the wheel and housing prevents imbalance and damage.

Motor Bearings

Motor bearings are pre-lubricated and sealed. Under normal conditions they will not require further maintenance for a period of 10 years. However, it is advisable to have your maintenance department remove and disassemble the motor, and lubricate the bearings after 3 years of operation in excessive heat and or in a contaminated air stream consisting of airborne particles.

Fan Bearings

Relubrication is not required. Bearings are factory charged with the correct amount grease and do not require a further grease charge.

Motor Service

Should the motor prove defective within one-year period, contact *M.K. Plastics* directly, or your nearest motor service representative.

Changing Shaft Speed

All belt driven fans with motors up to and including 3 hp (182T max.) are equipped with variable pitch motor pulleys. To change the fan speed, perform the following:

1. Loosen setscrews on driver (motor) pulley and remove key, if equipped.
2. Turn the pulley rim to open or close the groove facing. If the pulley has multiple grooves, all must be adjusted to the same width.
3. After adjustment, inspect for proper belt tension and alignment.

Speed Reduction

Open the pulley in order that the belt rides deeper in the groove (smaller pitch diameter).

Speed Increase

Close the pulley in order that the belt rides higher in the groove (larger pitch diameter). Ensure that the RPM limits of the fan and the horsepower limits of the motor are maintained, which can be read on the motor nameplate.

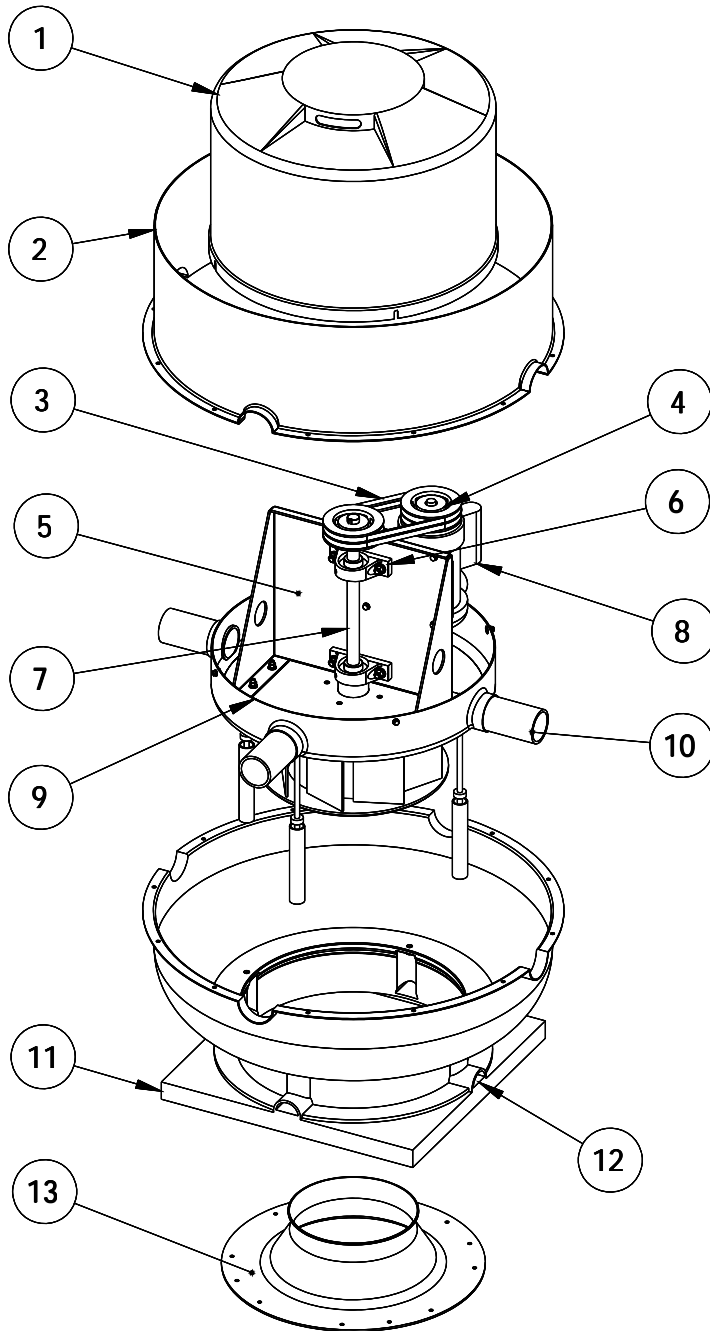
Pulley & Belt Replacement

1. Remove pulleys from their respective shafts.
2. Clean the motor and fan shafts.
3. Clean bores of pulleys and coat the bores with heavy oil.
4. Remove grease, rust, or burns from the pulleys and shafts.
5. Remove burrs from the shaft by sanding.
6. Place fan pulley on the fan shaft and motor pulley on its shaft. Damage to the pulleys can occur when excessive force is used in placing the pulleys on their respective shafts.
7. Tighten in place.
8. Install belts on pulleys and align as described in the *Belt and Pulley Installation* section.

Troubleshooting

Problem and Potential Cause
Low Capacity or Pressure <ul style="list-style-type: none">• Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or drive belt assembly.• Poor fan inlet conditions. There should be a straight clear duct at the inlet.• Improper wheel alignment.
Excessive Vibration and Noise <ul style="list-style-type: none">• Damaged or unbalanced wheel.• Belts too loose; worn or oily belts.• Speed too high.• Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or drive belt assembly.• Bearings need lubrication or replacement.• Fan surge or incorrect inlet condition.
Overheated Motor <ul style="list-style-type: none">• Motor improperly wired.• Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or drive belt assembly.• Cooling air diverted or blocked.• Improper inlet clearance.• Incorrect fan RPM.• Incorrect voltage.
Overheated Bearings <ul style="list-style-type: none">• Improper bearing lubrication.• Excessive belt tension.

Parts List



Part No.	Description
1.	Weather cover
2.	Windband
3.	Belts
4.	Pulley
5.	Bearing support
6.	Pillow block bearing
7.	Shaft
8.	Motor
9.	Assembly support set
10.	Cooling tubes
11.	Curb cap
12.	Drain trough
13.	Inlet cone

Fig. 10 – RBK Fan (typical)