

This publication contains the installation, operation and maintenance instructions for standard units of the *ASP/KSP: Centrifugal Filtered Supply Fans*.



Carefully read this publication and any supplemental documents prior to any installation or maintenance procedure.

Loren Cook catalogs, *ASP/ASP-T* and *KSP*, provide additional information describing the equipment, fan performance, available accessories and specification data.

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

All of the publications listed above can be obtained from:

- lorencook.com
- info@lorencook.com
- 417-869-6474 ext. 166

For information and instructions on special equipment, contact Loren Cook Company at 417-869-6474.

Receiving and Inspection

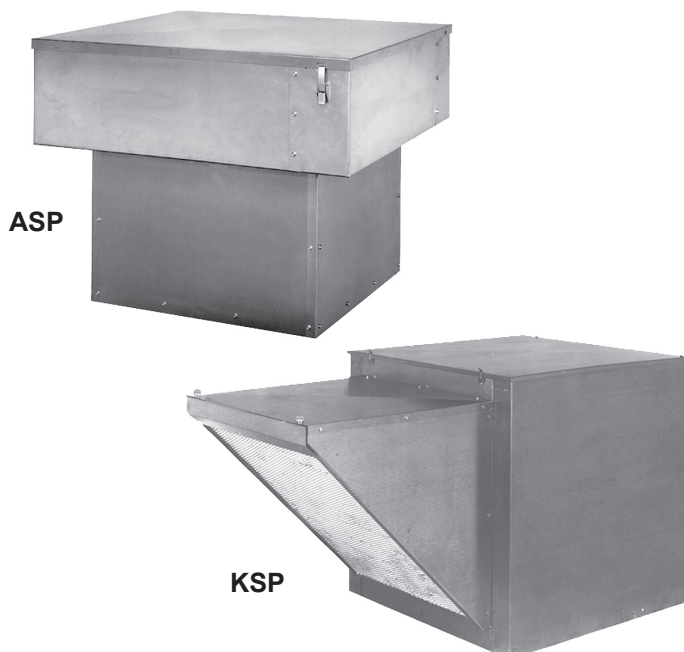
Carefully inspect the fan and accessories for any damage and shortage immediately upon receipt of the fan.

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

Handling

Lift the fan by the base or lifting eyes.

NOTICE! Never lift by the shaft, motor or housing.



⚠ WARNING

Rotating Parts & Electrical Shock Hazard:

Fans should be installed and serviced by qualified personnel only.

Disconnect electric power before working on unit (prior to removal of guards or entry into access doors).

Follow proper lockout/tagout procedures to ensure the unit cannot be energized while being installed or serviced.

A disconnect switch should be placed 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.

Grounding is required. All field-installed wiring must be completed by qualified personnel. All field installed wiring must comply with National Electric Code (NFPA 70) and all applicable local codes. Ensure the power supply (voltage, frequency and current carrying capacity of wires) is in accordance with the motor nameplate.

Fans and blowers create pressure at the discharge and vacuum at the inlet. This may cause objects to get pulled into the unit and objects to be propelled rapidly from the discharge. The discharge should always be directed in a safe direction and inlets should not be left unguarded. Any object pulled into the inlet will become a projectile capable of causing serious injury or death.

When air is allowed to move through a non-powered fan, the impeller can rotate, which is referred to as windmilling. Windmilling will cause hazardous conditions due to unexpected rotation of components. Impellers should be blocked in position or air passages blocked to prevent draft when working on fans.

Friction and power loss inside rotating components will cause them to be a potential burn hazard. All components should be approached with caution and/or allowed to cool before contacting them for maintenance.

Under certain lighting conditions, rotating components may appear stationary. Components should be verified to be stationary in a safe manner, before they come into contact with personnel, tools or clothing.

Failure to follow these instructions could result in death or serious injury.

The attachment of roof mounted fans to the roof curb as well as the attachment of roof curbs to the building structure must exceed the structural requirements based on the environmental loading derived from the applicable building code for the site. The local code official may require variations from the recognized code based on local data. The licensed engineer of record will be responsible for prescribing the correct attachment based on construction materials, code requirements and environmental effects specific to the installation.

Storage

If the fan is stored for any length of time prior to installation, store the fan in its original crate and protect it from dust, debris and weather.

Installation

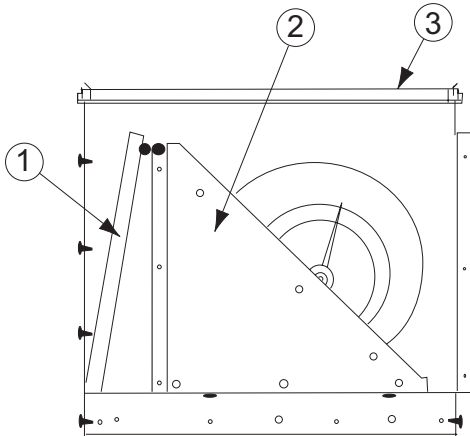
Motor Installation

To prevent damage to the fan during shipping, motors 5HP and larger and extremely heavy motors (cast iron or severe duty) are shipped loose and must be field mounted by bolting the motor on the motor mounting plate in the existing mounting slots.

KSP Assembly

NFPA 96 installation guidelines for KSP fans are shown in Figures 1 and 2.

1. Remove the top cap (item 3) from the fan.
2. Remove the intake hood (item 2) and the filter(s) (item 1) from the inside of the fan.
3. Replace the topcap.
4. Slide the intake hood over the flange on the fan and secure with the nine screws provided.
5. Remove the two thumb screws and the filter retainer.
6. Slide the filter(s) down between the angles inside the intake hood and the flange on the front of the hood.
7. Replace the filter retainer and secure with the two thumb screws.
8. Caulk the top of the intake hood where the hood meets the fan. Use an appropriate caulk for exterior use.



View 1 - KSP Shipping Arrangement

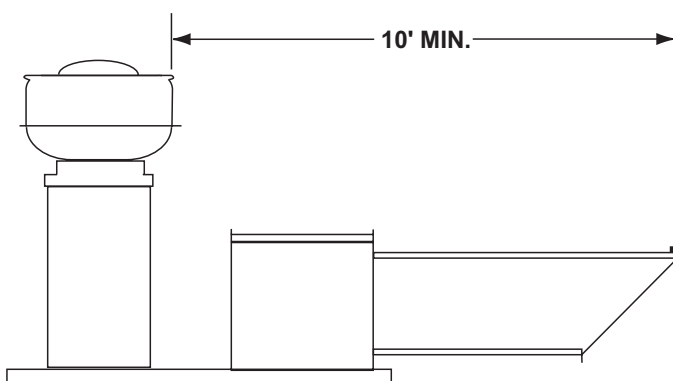


Figure 1 - NFPA 96 Standard Installation

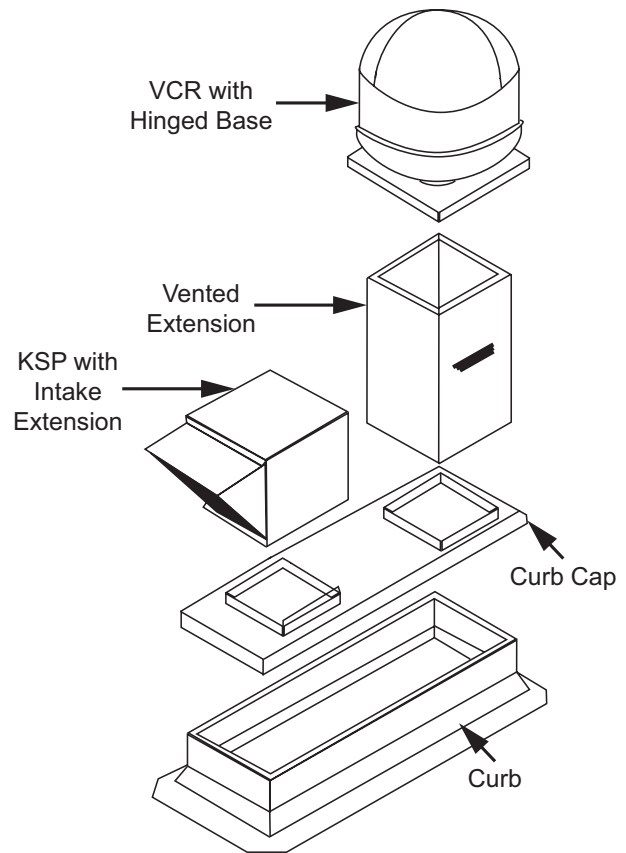
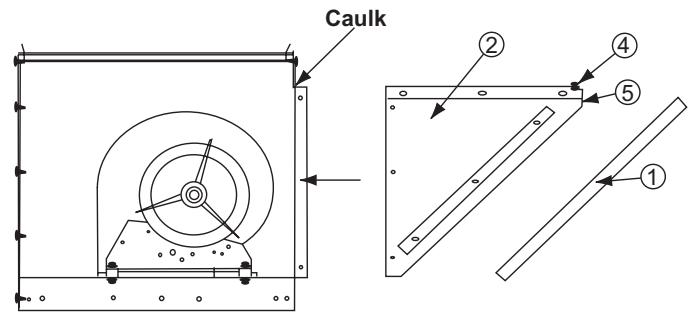


Figure 2 - NFPA 96 Alternate Installation



View 2 - KSP Field Assembly

Wiring Installation

Leave enough slack in the wiring to allow for motor movement when adjusting belt tension. Some fractional motors have to be removed in order to make the connection with the terminal box at the end of the motor. To remove motor, remove bolts securing motor base to power assembly. Do not remove motor mounting bolts.



NOTICE! 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).



NOTICE! Do not allow the fan to run in the wrong direction. This will overheat the motor and cause serious damage. For 3-phase motors, if the fan is running in the wrong direction, check the control switch. It is possible to interchange two leads at this location so that the fan is operating in the correct direction.

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.

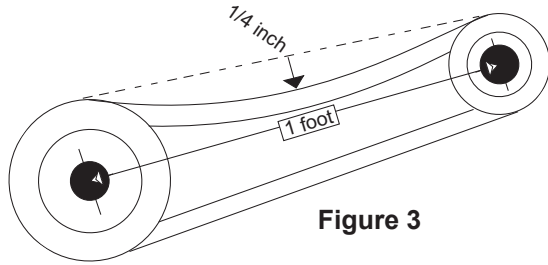


Figure 3

Do not change the pulley pitch diameter to change tension. This will result in a different fan speed.

1. Loosen motor plate adjustment bolts and move motor 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 1/4" per foot of center distance should be obtained by firmly pressing the belt. Refer to Figure 3.
3. Lock the motor plate adjustment bolts in place.
4. Ensure pulleys are properly aligned. Refer to Figure 4.

Tolerance

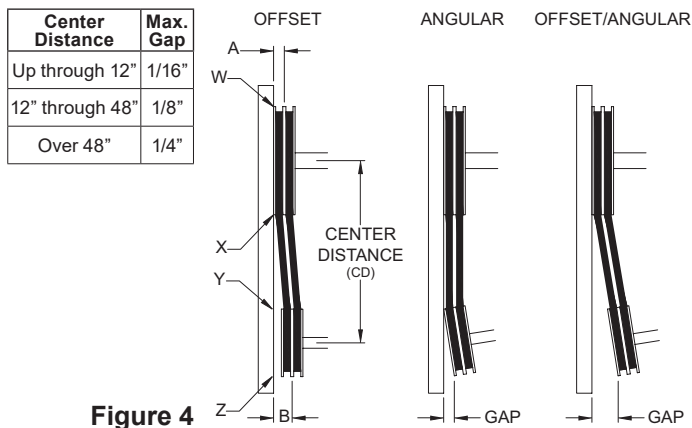


Figure 4

Pulley Alignment

Pulley alignment is adjusted by loosening the motor pulley setscrew and by moving the motor pulley on the motor shaft.

Figure 4 indicates where to measure the allowable gap for the drive alignment tolerance. All contact points (indicated by WXYZ) are to have a gap less than the tolerance shown in the table. When the pulleys are not the same width, the allowable gap must be adjusted by half of the difference in width. Figure 5 illustrates using a carpenter's square to adjust the position of the motor pulley until the belt is parallel to the longer leg of the square.

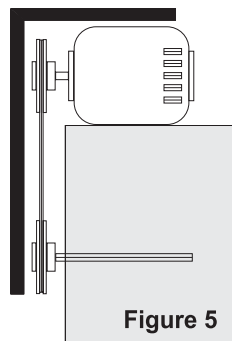
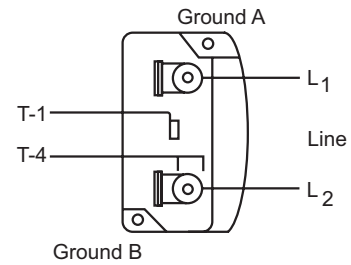


Figure 5

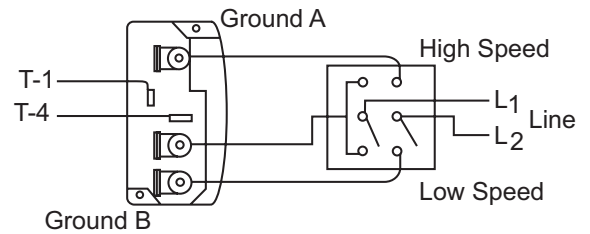
Wiring Diagrams

Single Speed, Single Phase Motor



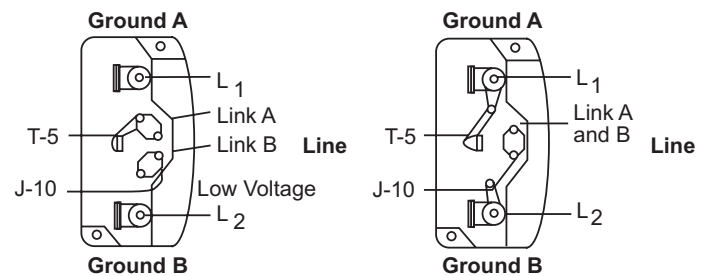
When ground is required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-1 and T-4.

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.

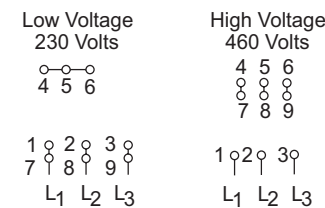
Single Speed, Single Phase, Dual Voltage



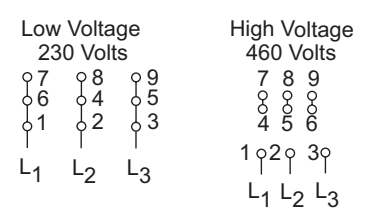
When ground is required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-5 and J-10 leads.

3 Phase, 9 Lead Motor

Y-Connection

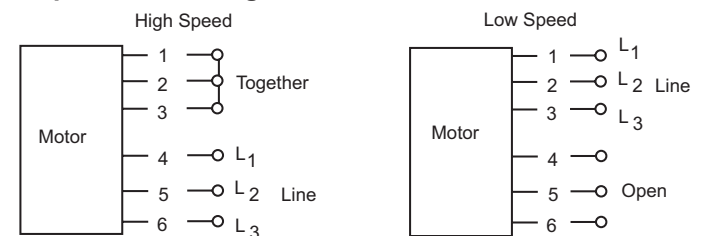


Delta-Connection



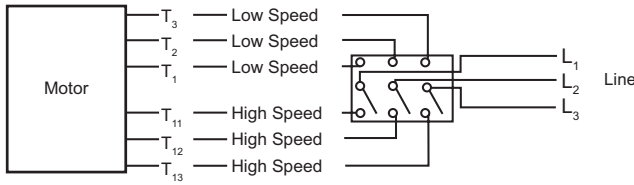
To reverse, interchange any two line leads.

2 Speed, 1 Winding, 3 Phase Motor



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

2 Speed, 2 Winding, 3 Phase



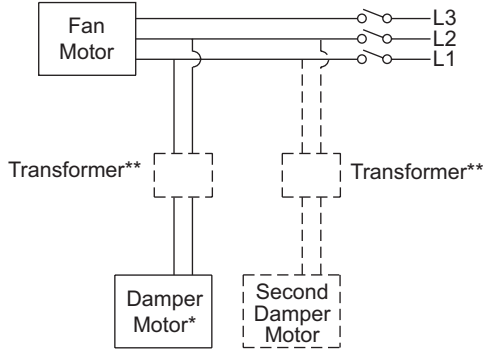
To reverse:

High Speed - interchange leads T_{11} and T_{12} .

Low Speed - interchange leads T_1 and T_2 .

Both Speeds - interchange any two line leads.

Typical Damper Motor Schematic

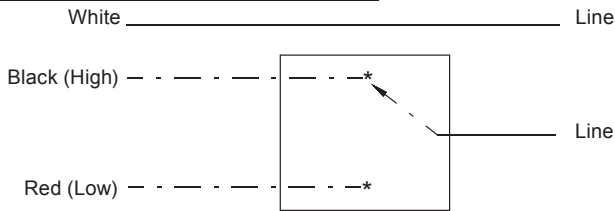


For 3-Phase, damper motor voltage should be the same between L_1 and L_2 . For single phase application, disregard L_3 .

*Damper motors may be available in 115, 230 or 460 volt models. The damper motor nameplate voltage should be verified prior to connection.

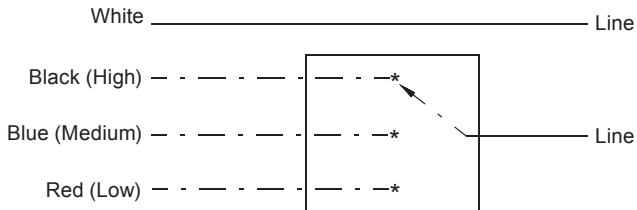
**A transformer may be provided in some installations to correct the damper motor voltage to the specified voltage.

KSPD 94 - 97 and 103-106 Series



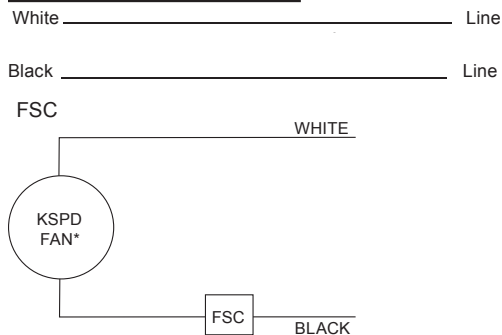
NOTE: Insulate Unused Lead

KSPD 122 - 127 Series



NOTE: Insulate Unused Leads Separately

KSPD 98 and 99 Series



*See KSPD Wiring Diagram for correct lead.

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.
4. If applicable, ensure fan is secured to ductwork.

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 ductwork are clean and free of debris.
7. Close and secure all access doors.
8. Restore power to fan.

Start-Up

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

- Direction of rotation
- Excessive vibration
- Unusual noise
- Bearing noise
- Improper belt alignment or tension (listen for squealing)
- Improper motor amperage or voltage



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

Recommended Torque for Setscrews/Bolts (IN-LB)

Setscrews				Hold Down Bolts	
Size	Key Hex Across Flats	Recommended Torque		Size	Recommended Torque
		Min.	Max.		
#8	5/64"	15	21	3/8"-16	324
#10	3/32"	27	33	1/2"-13	780
1/4	1/8"	70	80	5/8"-11	1440
5/16	5/32"	140	160	3/4"-10	2400
3/8	3/16"	250	290	7/8"-9	1920
7/16	7/32"	355	405	1"-8	2700
1/2	1/4"	560	640	1-1/8"-7	4200
5/8	5/16"	1120	1280	1-1/4"-7	6000
3/4	3/8"	1680	1920	-	-
7/8	1/2"	4200	4800	-	-
1	9/16"	5600	6400	-	-

Inspection

Inspection of the fan should be conducted at the first **30 minute, 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. Adjust and tighten as necessary.

Filters

Filter inspection and cleaning intervals can vary from once a week to twice per year depending on contaminant present and acceptable pressure drops across the filter. Under most conditions filters may be cleaned with hot water and a mild soap solution (such as dish washing liquid) or steam. Some caustic cleaners will damage the filter. If in doubt, please consult the factory for a compatibility list.

High pressure spray washers should be limited to 2,000psi operating pressure. Every attempt should be made to remove the contaminants from the filter in a "back-wash" flow (note airflow arrow on the filter frame). Once the filter is dry, it may be returned to the appropriate filter racks in the same orientation (airflow direction) as they were removed.

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 abrasives) should be inspected every three months.

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
- Inspect belt wear and alignment. Replace worn belts with new belts and adjust alignment as needed. Refer to *Belt and Pulley Installation*, page 3
- Bearings should be inspected as recommended in the *Conditions Chart*
- Inspect filters. Filters should be cleaned at regular intervals (frequency will depend on the environment in which the fan is located). To remove, loosen the thumb-screws and remove the filter retainer
- Inspect springs and rubber isolators for deterioration and replace as needed
- 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 prevent imbalance and damage

Lubrication

Fan Bearings

NOTICE! The fan bearings are provided prelubricated. Any specialized lubrication instructions on fan labels supersedes information provided herein. Bearing grease is a petroleum lubricant in a lithium base conforming to an NLGI #2 consistency. If user desires to utilize another type of lubricant, they take responsibility for flushing bearings and lines, and maintaining a lubricant that is compatible with the installation.

Bearings should be relubricated in accordance with the following *Conditions Chart*.

For best results, lubricate the bearing while the fan is in operation. Pump grease in slowly until a slight bead forms

around the bearing seals. Excessive grease can damage seal and reduce life through excess contamination and/or loss of lubricant.

In the event that the bearing cannot be seen, use no more than three injections with a hand operated grease gun.

Conditions Chart

RPM	Temp °F	Greasing Interval
Up to 1000	-30 to 120	6 months
	120 to 200	2 months
1000 to 3000	-30 to 120	3 months
	120 to 200	1 month
Over 3000	-30 to 120	1 month
	120 to 200	2 weeks
Any Speed	< -30	Consult Factory
Any Speed	> 200	1 week

For moist or otherwise contaminated installations; divide the interval by a factor of three. For vertical shaft installations divide the interval by a factor of two.

Motor Bearings

Motors are provided with prelubricated bearings. Any lubrication instructions shown on the motor nameplate supersede instructions below.

Direct Drive 1050/1075, 1200, 1300 and 1500 RPM units use a prelubricated sleeve bearing that has a oil saturated wicking material surrounding it. The initial factory lubrication is adequate for up to 10 years of operation under normal conditions. However, it is advisable to add lubricant after three years. Use only LIGHT grade mineral oil or SAE 10W oil up to 30 drops. If the unit has been stored for a year or more it is advisable to lubricate as directed above. For VCR direct drive units and other units in severe conditions, lubrication intervals should be reduced to half.

Motors without sleeve bearings (as described above) will have grease lubricated ball or roller bearings. Motor bearings without provisions for relubrication will operate up to 10 years under normal conditions with no maintenance. In severe applications, high temperatures or excessive contaminants, it is advisable to have the maintenance department disassemble and lubricate the bearings after three years of operation to prevent interruption of service.

For motors with provisions for relubrication, follow intervals of the table below.

Relubrication Intervals

Service Conditions	NEMA Frame Size					
	Up to and Including 184T		213T-365T		404T and Larger	
	1800 RPM & Less	Over 1800 RPM	1800 RPM & Less	Over 1800 RPM	1800 RPM & Less	Over 1800 RPM
Standard	3 yrs.	6 months	2 yrs.	6 months	1 yr.	3 months
Severe	1 yr.	3 months	1 yr.	3 months	6 months	1 month

Motors are provided with a polyurea mineral oil NLGI #2 grease. All additions to the motor bearings are to be with a compatible grease such as Exxon Mobil Polyrex EM and Chevron SRI.

The above intervals should be reduced to half for vertical shaft installations.

Motor Services

Should the motor prove defective within a one-year period, contact your local Loren Cook representative or your nearest authorized electric motor service representative.

Maximum RPM

ASP/ASP-T Size	Maximum RPM	KSP Size	Maximum RPM
90	1665	90	1672
100	1519	100	1534
120	1223	120	1297
150	1075	150	1052
180	978	180	979
200	844	200	835

Changing Shaft Speed

All belt driven fans with motors up to and including 5HP (184T max) are equipped with variable pitch pulleys. To change the fan speed, perform the following:

1. Loosen setscrew 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.

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.

Pulley and 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 burrs from the pulleys and shafts.
5. Remove burrs from shaft by sanding.
6. Place fan pulley on 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.

Bearing Replacement

The fan bearings for the 200 ASP, ASP-T and KSP are pillow block ball bearings. Bearings should be replaced individually for each side of fan.

An emery cloth or file may be needed to remove imperfections in the shaft left by the setscrews.

1. Remove topcap.
2. Loosen motor plate adjustment bolts, then move the motor plate so the belt will easily slip off. Remove driven pulley by loosening the setscrews.
3. Remove the bearings from shaft.
4. Slide new bearings onto shaft to desired location and mount bearings loosely onto support base. Bearing bolts and setscrews should be loose to allow shaft positioning.
5. Position the wheel properly and tighten the bearing bolts securely to the support base.

6. Align setscrews bearing to bearing and tighten against the shaft securely.

Never tighten both pairs of setscrews before securing bearing mounting bolts. This may damage the shaft.

7. Check wheel position again. If necessary, readjust by loosening the bearing bolts and setscrew and repeat step 5.

Troubleshooting

Problem and Potential Cause

Low Capacity or Pressure:

- Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly
- Poor fan inlet conditions. There should be a straight clear duct at the inlet
- Improper wheel alignment

Excessive Vibration and Noise:

- 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 belt drive assembly
- Bearings need lubrication or replacement
- Fan surge or incorrect inlet or outlet conditions

Overheated Motor:

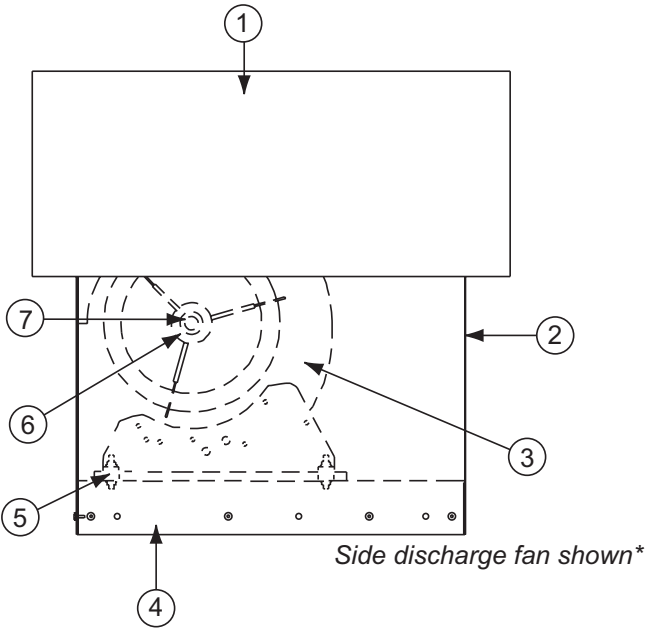
- Motor improperly wired
- Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly
- Cooling air diverted or blocked
- Improper inlet clearance
- Incorrect fan RPMs
- Incorrect voltage

Overheated Bearings:

- Improper bearing lubrication
- Excessive belt tension

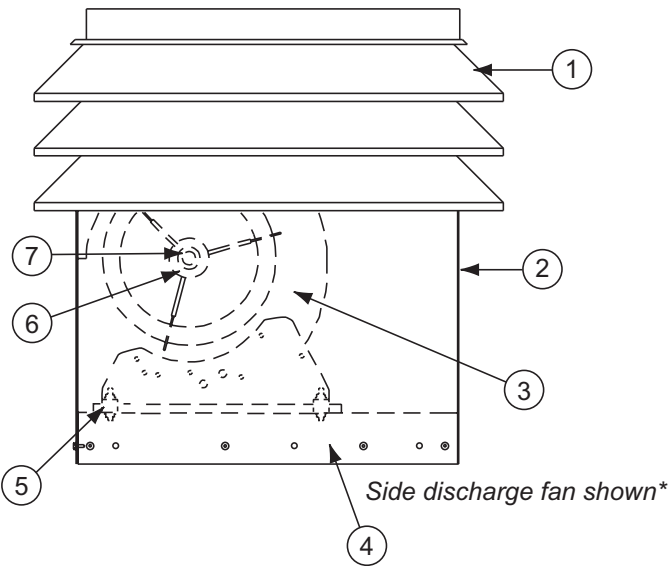
Parts List

ASP



Part No.	Description (Sizes 90–200)
1	Hood
2	Housing
3	Blower
4	Base
5	Isolators (4)
6	Driven Sheave
7	Bearings (2)
Not Shown	Ludwig Clip
	Filter Retainer (8)
	Driver Sheave
	Filter (4)
	Lower Retainer (4)
	Corner Post (4)
	Insulation
	Motor Plate
	Belts
	Motor
	Topcap

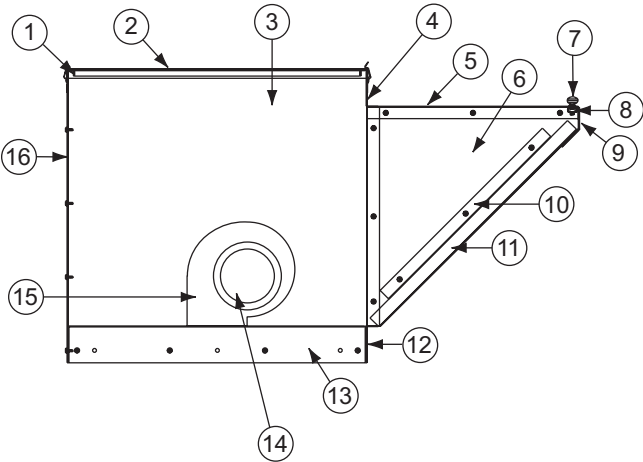
ASP-T



Part No.	Description (Sizes 90–200)
1	Tiered Hood
2	Housing
3	Blower
4	Base
5	Isolators (4)
6	Driven Sheave
7	Bearings (2)
Not Shown	Ludwig Clip
	Filter Retainer (8)
	Driver Sheave
	Filter (4)
	Lower Retainer (4)
	Corner Post (4)
	Insulation
	Motor Plate
	Belts
	Motor
	Topcap

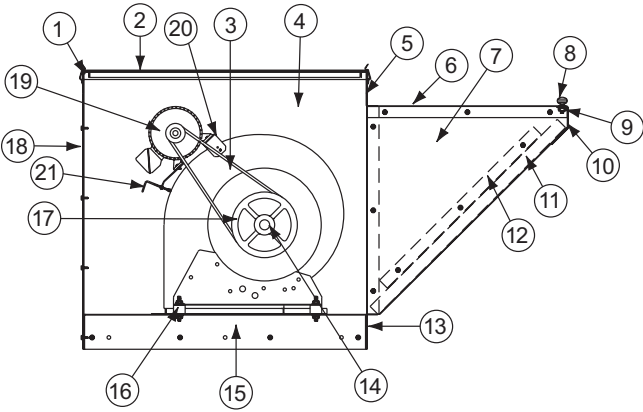
*Parts will be the same for bottom discharge units.

KSP-D



Part No.	Description	
	Sizes 90–121	
1	Ludwig Clip (4)	
2	Topcap	
3	Side Panel (2)	
4	Intake Side Top Panel	
5	Intake Top Panel	
6	Intake Side Panel (2)	
7	Thumb Screw (2)	
8	Nut Retainer (2)	
9	Filter Retainer	
10	Filter Angle (2)	
11	Filter	
12	Intake Side Bottom Panel	
13	Base	
14	Motor	
15	Housing	
16	Side Panel Opposite Intake	

KSP-B



Part No.	Description	
	Sizes 90–120	Sizes 150–200
1	Ludwig Clip (4)	Ludwig Clip (4)
2	Topcap	Topcap
3	Blower	Blower
4	Side Panel (2)	Side Panel (2)
5	Intake Side Top Panel	Intake Side Top Panel
6	Intake Top Panel	Intake Top Panel
7	Intake Side Panel (2)	Intake Side Panel (2)
8	Thumb Screw (2)	Thumb Screw (2)
9	Nut Retainer (2)	Nut Retainer (2)
10	Filter Retainer	Filter Retainer
11	Filter	Filter (2)
12	Filter Angle (2)	Filter Angle (2)
13	Intake Side Bottom Panel	Intake Side Bottom Panel
14	Bearings (2)	Bearings (2)
15	Base	Base
16	Isolator (4)	Isolator (4)
17	Driven Sheave	Driven Sheave
18	Side Panel Opposite Intake	Side Panel Opposite Intake
19	Motor	Motor
20	Motor Mount Bracket	Motor Mount Bracket
21	Motor Tension Hardware	Motor Tension Hardware

Limited Warranty

Loren Cook Company warrants that your Loren Cook fan was manufactured free of defects in materials and workmanship, to the extent stated herein. For a period of one (1) year after date of shipment, we will replace any parts found to be defective without charge, except for shipping costs which will be paid by you. This warranty is granted only to the original purchaser placing the fan in service. This warranty is void if the fan or any part thereof has been altered or modified from its original design or has been abused, misused, damaged or is in worn condition or if the fan has been used other than for the uses described in the company manual. This warranty does not cover defects resulting from normal wear and tear. To make a warranty claim, notify Loren Cook Company, General Offices, 2015 East Dale Street, Springfield, Missouri 65803-4637, explaining in writing, in detail, your complaint and referring to the specific model and serial numbers of your fan. Upon receipt by Loren Cook Company of your written complaint, you will be notified, within thirty (30) days of our receipt of your complaint, in writing, as to the manner in which your claim will be handled. If you are entitled to warranty relief, a warranty adjustment will be completed within sixty (60) business days of the receipt of your written complaint by Loren Cook Company. This warranty gives only the original purchaser placing the fan in service specifically the right. You may have other legal rights which vary from state to state. For fans provided with motors, the motor manufacturer warrants motors for a designated period stated in the manufacturer's warranty. Warranty periods vary from manufacturer to manufacturer. Should motors furnished by Loren Cook Company prove defective during the designated period, they should be returned to the nearest authorized motor service station. Loren Cook Company will not be responsible for any removal or installation costs.



LOREN COOK COMPANY

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