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The Composite Fan Company

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Installation & Maintenance Guide - General Instructions

Installation:

All fans should be checked to make sure correct fan was received. The proper function should be provided depending on the operation requirement. Locate proper fan position. Base angles on the fan have holes drilled to mount stationary or resilient base as required, locate and fasten firmly in place. All components should be set level.

Motor and drives are then assembled in their proper positions, if not already assembled on the fan. It is important that motor and blower pulleys be properly aligned so as to allow belts to run true and straight.

Pre-Operation Check:

Check all the set screws and bolts to make sure they have not loosened in transit. If necessary, retighten the set screws and bolts. Rotate the impeller by hand to make sure it has not shifted in transit or been damaged during shipment. If required shift the wheel in position. Check the belt tension which should have approximately ¾" to 1" deflection under 3 pounds pressure based on 2½ to 3 foot centers on drives. Check the belt and pulley alignment. On vent sets — adjustments of belt tension is done with the bolt which adjusts the motor base up and down.

Check to make sure that the fan pulley is on the fan, and motor pulley on the motor, as reversal may cause excessive speed and collapse the wheel.

Start the fan and observe the rotation of the impeller. Normally there is an arrow on the blower indicating proper rotation if impeller is rotating in the wrong direction, reverse rotation. With amp probe or ampmeter, take the amp and volt readings making sure the motor is not being overloaded.

Trouble-Shooting:

Following is a list of possible problems and their causes that may occur on start-up, or develop later during operation.

Noise: May be caused by

(a) Impeller hitting the inlet of the fan or cutoff plate, loose impeller
(b) Drives can cause noise if sheaves are not tight on the shaft, belts are too loose or too tight, wrong belt cross section, or mis-matched belts, also worn belts, oily belts or mis-aligned sheaves.
(c) If couplings are used they may be a source of noise by being unbalanced, misaligned, loose or dry of lubricant.
(d) Bad bearings are a common source of noise when defective, dry of lubricant, loose on the bearing support, loose on the shaft, seals mis-aligned, dirty lubricant, fretting corrosion between inner race and shaft, etc. See separate section on bearing care.
(e) There can be an electrical source of noise such as AC hum in motor or relay, starting relay chatter, noisy motor bearings, single phasing a 3 phase motor, etc.
(f) A bent or undersized shaft may be a noise source. *IF MORE THAN TWO BEARINGS ARE ON THE SAME SHAFT, THEY MUST BE CAREFULLY ALIGNED.*
(g) There may be other noise sources such as obstruction in high velocity air stream causing rattle or pure tone whistle, fan operating at undesirable design point, causing pulsation, cracks or holes in duct work, or whistles in fan housing.

Performance Problems:

CFM too low. These are some common sources of this problem.

Fan — forward curved impeller installed backward, fan running backwards, cutoff missing or improperly installed, impeller not centered with inlet collars, fan speed too slow.

System — more resistant to flow than expected, dampers or registers closed, leaks in supply ducts, insulating duct liner loose, clogged filters or coils.

Fan Inlets — leaks around fan inlets, elbows near the inlet, cabinet walls too close. Inlet obstructions cause more restrictive systems but do not cause increased negative pressure readings near the fan inlets. Fan speed may be increased to counteract the effect of restricted fan inlet, but check the maximum RPM for the wheel construction before increasing the speed.

Fan Outlet — most centrifugal fans are used in ducted systems and have been tested with a length of straight duct at the fan outlet, if there is no straight duct at the fan outlet, decreased fan performance will result. If it is not practical to install a straight section of duct at the fan outlet, the fan speed may be increased to overcome this pressure loss. Other sources affecting fan outlet may be sharp elbow nearby, improperly designed turning vanes or other obstructions near the outlet.

For more detail on systems trouble shooting and performance refer to AMCA Fan Application Manual, Part 1 — Fans and Systems, Part 2 — Troubleshooting, Part 3 — Field Performance Measurements. These publications may be obtained by writing to AMCA — Air Moving & Conditioning Assoc., 30 W. University Drive, Arlington Heights, Illinois 60004.

Premature Failure:

Each fan component is designed to operate satisfactorily for a reasonable lifetime. For example, bearings are selected for 40,000 hours L-10 life, which simplified means that under normal operating conditions at least 90% of the bearings would operate for 40,000 hours before they would fail from metal fatigue. However, there are many causes of premature bearing failure which we will discuss under Lubrication. Fans are designed for different classes, such as Cl. I, II, III and IV indicating difference in construction. Due to a large range of static pressure vs. volume requirements, it is necessary to operate the fans over a wide range of speeds — thus different classes of construction. Running the fan at higher speeds than design may cause the impeller to collapse. Maximum RPM of the particular fan should be obtained before speeding up for any reason. Shafts are designed to operate no closer than 70% of critical speed. Increasing the RPM arbitrarily may cause the fan to operate at or near the critical speed of the shaft causing vibration and possible damage.

Vibration Problems: All impellers are statically and dynamically balanced. After the fans are assembled, a check is made with an electronic vibration analyzer again, running the fans at operating speed or at maximum class RPM. However, shafts can get bent in shipment or during installation causing vibration. *Do not hoist fans by lifting on the shaft.* Impeller should be periodically checked as any dirt build-up on the blades can throw it out of balance. Some contaminants can wear out the blades again causing unbalance. In rare instances a large pulley on the fan shaft can be the problem source, or weak vibration base, improper foundation, system resonance, etc. All these sources must be checked out.

Lubrication:

The most common cause of premature bearing failure is improper lubrication. All fans are equipped with decals indicating relubrication intervals for normal operating conditions. However, every installation is different and the frequency of relubrication should be established accordingly.

Decal No. 1 is for ball bearings, No. 2 is for solid pillow block spherical roller bearings, and Decal No. 3 is for split pillow block spherical roller bearings. Observation of the condition of the grease expelled from the bearings at the time of relubrication is the best guide as to whether regreasing intervals and amount of grease added should be altered. This observation is particularly important when bearings operate continuously over 160°F.

Greases are made with different bases. There are synthetic base greases, lithium base, sodium base, etc. Avoid mixing greases with different bases. They could be incompatible and result in rapid deterioration or breaking down of the grease.

Puddle corrosion is often encountered in failed bearings, particularly if the fan has been shut down for a period of time. Moisture caused by condensation will accumulate in the bearings and create corrosion in the race ways. If fans are to be shut down or stored for more than 30 days, it is important that the bearings are filled with grease and the fan rotated by hand from time to time so that the grease can be

RELUBRICATION SCHEDULE (MONTHS)*
Ball Bearing Pillow Blocks

SPEED (RPM)	500	1000	1500	2000	2500	3000	3500	4000	4500
SHAFT DIAMETER									
1/2" thru 1 11/16"	6	6	5	3	3	2	2	2	1
1 15/16" thru 2 7/16"	6	5	4	2	2	1	1	1	1
2 11/16" thru 2 15/16"	5	4	3	2	1	1	1		
3 7/16" thru 3 15/16"	4	3	2	1	1	1			

*Suggested initial greasing interval—relubricate while running, if safety permits, until some purging occurs at seals. Adjust lubrication frequency depending on condition of purged grease. Hours of operation, temperature, and surrounding conditions will affect the relubrication frequency required.

1. Lubricate with a high quality NLGI No. 2 or No. 3 multi purpose ball bearing grease having rust inhibitors and anti-oxidant additives. Some greases having these properties are:
   Shell—Alvania No. 2 Mobil—Mobilgrease 532
   Gulf—Gulfcrown No. 2 American—Rykon Premium 2
2. Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid corrosion protection.

RELUBRICATION SCHEDULE (MONTHS)*
Spherical Roller Bearings— Solid Pillow Blocks

SPEED (RPM)	500	1000	1500	2000	2500	3000	3500	4000	4500
SHAFT DIAMETER									
1 3/16" thru 1 7/16"	6	4	4	2	1	1	1	1	½
1 11/16" thru 2 3/16"	4	2	1½	1	½	½	½	½	½
2 7/16" thru 3 7/16"	3	1½	1	½	½				
3 15/16" thru 4 15/16"	2½	1	½						

*Suggested initial greasing interval—relubricate while running, if safety permits, until some purging occurs at seals. Adjust lubrication frequency depending on condition of purged grease. Hours of operation, temperature, and surrounding conditions will affect the relubrication frequency required.

1. Lubricate with a multi-purpose roller bearing NLGI grade 2 grease having rust inhibitors, anti-oxidant additives, and a minimum oil viscosity of 500 SSU at 100°F. Some additives. Some greases having these properties are:
   Shell—Alvania 2 Texaco—Premium RB2
   Mobil—Mobilgrease 28 American—Rykon Premium 2
2. Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid corrosion protection.

RECOMMENDED 'SKF' GREASES FOR 'SKF' BEARINGS

FIXED PILLOW BLOCK — LGMT2
SPLIT PILLOW BLOCK — LGMT3
} FANS RUNNING BELOW 80°C (176°F)

FANS RUNNING ABOVE 80°C THRU 150°C — LGHT3

WARNING

1. This equipment must not be operated without proper guarding of all moving parts. While performing maintenance be sure remote power switches are locked off. See AMCA Publication 410 for recommended safety practices.
2. Before starting: Check all set screws for tightness, and rotate wheel by hand to make sure it has not moved in transit.

RELUBRICATION SCHEDULE (MONTHS)*
Spherical Roller Bearings — Split Pillow Blocks

SPEED (RPM)	500	750	1000	1500	2000	2500	3000	3500	4000	Grease To Be Added At Each Interval
SHAFT DIAMETER										
1 7/16" thru 1 15/16"	6	4½	4	4	3½	2½	2½	1	1	0.50 oz.
2 3/16"	5	4½	4	2½	2½	1½	½			0.75 oz.
2 15/16" thru 3 15/16"	4½	4	3½	2½	1½					2.00 oz.
4 7/16" thru 4 15/16"	4	4	2½	1						4.00 oz.
5 7/16" thru 5 15/16"	4	2½	1½							7.00 oz.

*Suggested initial greasing interval—remove bearing cap and observe condition of used grease after lubricating. Adjust lubrication frequency as needed. Hours of operation, temperature, and surrounding conditions will affect the relubrication frequency required. Clean and repack bearings annually. Remove old grease, pack bearing full and fill housing reservoirs on both sides of bearing to bottom of shaft.

1. Lubricate with a multi-purpose roller bearing NLGI grade 2 grease having rust inhibitors, anti-oxidant additives, and a minimum of viscosity of 500 SSU at 100°F. Some greases having these properties are:
   Shell—Alvania 2 Texaco—Premium RB2
   Mobil—Mobilgrease 28 American—Rykon Premium 2
2. Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid corrosion protection.

STATIC OIL LUBRICATION

1. Use only highest quality mineral oil with a minimum viscosity of 100 SSU at the oil's operating temperature. The oil's operating temperature is approximately 10° greater than the bearing's housing. SAE values having this viscosity at the following operating temperatures are: 150°F.—SAE 20; 160°F.—SAE 30; 180°F.—SAE 40.
2. Static oil level should be at the center of the lowest most roller (Do not overfill).
3. Complete lubricant change should be made annually.

spread on bearing components. All bearings are filled with grease before leaving the factory. When the fans are started the bearings may discharge excess grease through the seals after a short period of operation, but do not replace this initial discharge because leakage will cease when the excess grease has worked out. Sometimes the bearing has a tendency to run hotter during this period and one should not get alarmed unless it lasts over 48 hours or gets very hot. When relubricating use sufficient amount of grease to purge the seals. Rotate bearings during relubrication where good safety practice permits. For temperatures over 200°F. special Hi-Temperature grease should be used.

In special cases, where the atmosphere is very contaminated, special bearings should be used. In these cases the customer should contact the factory or bearing manufacturer for recommendation.

When a bearing failure occurs, it is important that the failed bearing be preserved as well as possible and returned to the factory for examination so that the cause of failure can be established and corrective measures taken. The only way to know the cause of failure is to supply as much information as possible about the operating condition. Before installing a new bearing on the existing shaft a check must be made to ensure that the shaft has not been worn down below commercial tolerances, which would cause a rapid failure of the new bearings.

For bearings with oil lubrication sight gauges are installed so that a proper level can be viewed and maintained.

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WARNINGS AND SAFETY INSTRUCTIONS

1. Do not operate the fan in excess of maximum limit shown on fan assembly drawing.
2. Do not permit any object to enter the fan inlets or outlets; provide a screen covering.
3. Do not operate the fan without adequate guards over rotating parts; provide drive belt, coupling, and shaft guards.
4. Provide a disconnect switch, with a padlock, to prevent fan switch use during maintenance.
5. Locate a disconnect switch at the fan for use of personnel working on the fan.
6. Provide vibration limiting switches to detect sudden changes in the operation of the fan, especially when operating a fan under high temperatures or in an extremely corrosive atmosphere, such as fly ash.
7. Lubricate and service bearings regularly. See lubrication schedule.

For additional information, see the booklet "Recommended Safety Practices for Air-Moving Devices" published by AMCA, 30 West University Drive, Arlington Heights, Illinois 60004.

Important.
This guide is subject to UFBL terms of sale as per our order acknowledgement