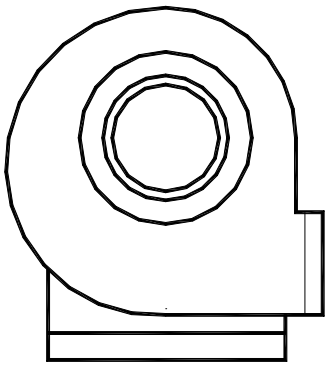
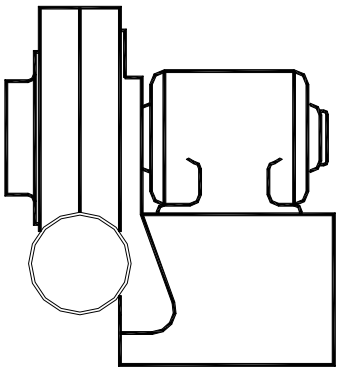
NSGV SERIES "AF" PRESSURE BLOWER

I, O & M MANUAL

NSGV Direct Drive Pressure Blower (AF) Aluminum Housing & Wheel





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RECEIVING AND INSPECTION

All shipments are F.O.B. factory, Decatur, Illinois. It is, therefore, in the interest of the buyer to carefully inspect all shipments before they are accepted from the freight carrier. Upon delivery, be sure that all items listed on the bill of lading and packing list (inserted in the plastic envelope attached to the shipment) have been received.

Units are usually completely assembled except when specifications call for unit less motor. The units are skidded and boxed to fully comply with trucking requirements for shipment. Accessories are sometimes shipped separately due to handling space requirements.

Although all equipment is carefully inspected and prepared for shipment at the factory, damage to the fan and/or drive parts may occur due to rough handling during shipment.

Any shortage, breakage or damage noticed at the time of delivery should be indicated to the carrier's representative at the time of delivery. Damage noticed after delivery should be reported to carrier at once. Request their inspection of the shipment and fill out a concealed damage inspection report.

EXTENDED STORAGE

Units that will be held in storage for a period of time, should have special provisions so operation-readiness can be maintained. Motors should be equipped with internal space heaters kept on continuously. Units should be crated and covered with polyethylene film. In addition, impellers should be hand-rotated once a month. For best results, keep units sheltered in a cool, dry location.

HANDLING

Small units should be handled carefully and lifted only by the base, **NEVER** by the shaft, coupling, motor or housing. Large units should be lifted by the base or lifting eyes. Precaution should be taken to avoid dropping or jarring the equipment as this can cause damage to the shaft or wheel, which is not visibly noticeable, but can cause vibration problems.

INSTALLATION

Fans and motors should be mounted on structurally sound foundations. Concrete is the best, however, other types designed properly are acceptable. Equipment should be leveled on the foundation and shimmed or grouted in place. This will prevent putting the fan structure into a bind by bolting down on an uneven surface.

As a general rule, if vibration isolators are used, the fan should first be bolted to a structural steel base and the isolation takes place between the structural steel base and the foundation. This prevents the fan base from floating due to an uneven weight distribution and/or drive forces when mounted directly to vibration isolators.

BLOWER MOUNTING PROCEDURE

1. Motor and coupling should be mounted with the blower resting on a level, flat surface, but not bolted to the surface.
2. After the blower is situated in its final mounting location, feeler gauges should be used between the mounting feet and the mounting surface at each bolt hole to determine the thickness of the shims required. Since the blower base is welded, it will be warped to some degree. If it is not shimmed to the foundation properly when bolted down, a bind in the frame will result. This may cause a bent shaft, coupling, motor and/or bearing misalignment, resulting in high vibration levels and premature failure of the drive components.
3. After the shimming is done, each frame mounting bolt should be finger tightened. Then, going from bolt to bolt, progressively tighten each one with a torque wrench until the proper torque value is achieved for the size of the foundation bolt used.
4. After the unit is completely tightened down to the foundation, coupling alignment should be rechecked. If the coupling is now mis-aligned, loosen the foundation bolts and recheck the coupling alignment. If after loosening the foundation bolts, the coupling is aligned, a bind was introduced in the bolt-down procedure. It will then be necessary to re-shim so that the bind is no longer present.

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BLOWER MOUNTING PROCEDURE cont.

5. Once the unit is tightened down to the foundation and the coupling alignment is maintained, replace the guards and check the duct-work, etc. The unit is now ready for start-up.
6. Jog the motor to make sure the unit is rotating in the proper direction. If so, bring the unit up to speed and check the amperage to the motor to make sure there is enough static pressure in the system to prevent the motor from overloading.
7. Vibration levels should be checked, if they are above values shown in the table on page 4, a qualified balancing technician should trim the balance of the unit to achieve these levels.

BEFORE START-UP

1. Fasteners - all foundation bolts, wheel hub screws, wheel locking bolts and bearing locking collars should be checked to make sure they are tight.
2. Bearings – Check bearing alignment and make certain they are properly lubricated.
3. Fan Wheel – Turn over rotating assembly by hand to see that it turns free and does not bind or strike the fan housing. If the wheel strikes the housing the wheel may have to be moved on the shaft or the pillow blocks moved and re-shimmed.
4. Motor – Check the electrical wiring to the motor. The current characteristics of the supply line must agree with the motor nameplate rating. The motor should be wired and fused in accordance with the National Electric Code and Local Codes.
5. V-Belt drives must be in alignment with the belts at proper tension.
6. Duct Connections from the fan to the duct-work must not be distorted. Ducts should never be supported by the fan. Expansion joints between the duct-connections should be used where expansion is likely to occur or where the fan is mounted on vibration isolators. All debris should be removed from the duct-work and the fan before start-up.

START-UP

1. “Jog” the motor to check for proper wheel rotation. The motor should be started in accordance with NSGV recommendations. Arrows on the fan indicate the proper direction of rotation and airflow.
2. The fan may now be brought up to speed. Watch for anything unusual such as vibration, overheating of the bearings or motor, etc. Check the fan speed on the V-Belt driven units and adjust the motor sheave (on adjustable drives) to give the desired RPM.
3. Check the motor amperage against the nameplate amperage on the motor to make sure the motor is not overloading.

BALANCE AND VIBRATION

All fan impellers are dynamically balanced prior to installation in the fan assembly. After assembly, the fans are test ran and fine-tune balanced to reduce vibration levels to acceptable limits as shown in the table below (from AMCA Standard 204-96). After field installation, fans will need to be checked prior to commissioning, to assure that the vibration levels do not change significantly from those achieved at the factory. It is recommended that the velocity values in the table below are not exceeded by more than 10% when field installed.

Fan Application Category	**Rigid Mounted**		**Flexible Mounted**	
	Mm/sec.	(in./sec.)	mm/sec.	(in./sec.)
BV-3	3.8	(0.15)	5.1	(0.20)

The installed vibration level of any fan is not solely dependent on the balance grade. Installation factors such as the mass and stiffness of the supporting system, will influence the “as installed” vibration level (Refer to AMCA Publication 202, *Troubleshooting*). Therefore, the “as installed” fan vibration level is not the responsibility of the fan manufacturer unless specified in the purchase contract.

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START-UP OF HIGH TEMPERATURE CONSTRUCTION BLOWERS

1. The blower should be brought to speed between 40ºF and 150ºF. It may be necessary to throttle back the air entering the blower and slowly bleeding in heated air to accomplish this. (Note: If the motor horsepower is sized for high temperature operation conditions and not cold start-up, throttling the inlet air will be mandatory to prevent motor overloading). It is recommended motor amperage be monitored during this procedure.
2. The maximum recommended rate of temperature rise is 15ºF per minute.
3. The reverse situation of blower shut-off also applies. That is the temperature must be lowered slowly before turning the blower off to prevent damage.

MOTOR MAINTENANCE

Lubricate motor bearings to the manufacturer's recommendations listed below.

A. Fractional Horsepower Sleeve Bearing Motors:

Under normal operation at ordinary temperatures and clean surroundings, these motors will operate for three years without re-lubrication. Then lubricate annually with electric motor oil or SAE10 oil. Under continuous operation higher temperatures (but not to exceed 104ºF ambient) re-lubricate annually.

B. Fractional Horsepower Ball Bearing Motors:

Under normal conditions, ball bearing motors will operate for five years without re-lubrication. Under continuous operation at higher temperatures, (but not to exceed 104ºF ambient) re-lubricate after one year. To re-lubricate where motors are not equipped with pressure fittings, disassemble the motor and clean the bearings thoroughly. Repack each bearing one-third full with bearing grease.

C. Integral Horsepower Ball Bearings Motors:

Motors having pipe plugs or grease fittings should be re-lubricated while warm and at standstill. Replace one pipe plug on each end shield with grease fitting. Remove other plug for grease relief. On low pressure, grease, run and lubricate until new grease appears at grease relief. Allow motor to run for ten minutes to expel excess grease. Replace pipe plugs. Motors not having pipe plugs or grease fittings can be re-lubricated by removing end shield, cleaning grease cavity and refilling three0-fourths or circumference of cavity.

Recommended Re-Lubrication Intervals (General Guide Only)

H.P. Range	Standard Duty 8Hr. Day	Severe Duty 25Hr. Day / Dirty-Dusty	Extreme Duty Very Dirty / High Ambients
1 1/2 – 7 1/2	5 Yrs.	3 Yrs.	9 Mos.
10 – 40	3 Yrs.	1 Yr.	4 Mos.
50 – 150	1 Yr.	9 Mos.	4 Mos.

Recommended Motor Greases

Polyrex EM – Exxon Oil Company

SRI #2 – Chevron Oil Company

V-BELT DRIVE MAINTENANCE

If belts squeal at start-up, they are too loose and should be tightened. Periodically check belt and sheave wear, alignment, and tension. When bolts show wear, replace all belts at once with a new matched set of belts. New belts will not work properly in conjunction with used belts due to difference in length. Belts and sheaves should be clean and free from grease. After installing new belts, check tension midway between sheaves. Belts should deflect about 1/64" per inch of span length with approximately 20-pounds force. Allow unit to run for 4 – 6 hours, then it will be necessary to re-tighten the belts again because the new belts tend to stretch initially.

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GENERAL MAINTENANCE

1. A definite time schedule for inspecting all rotating parts and accessories should be established. The frequency of inspection depends on the severity of operation and the locality. Inspections might be weekly at first in order to set up the schedule.
2. Alignment – shaft must not be cocked in the bearings. Misalignment can cause overheating, wear to dust seals, bearing failure and vibration.
3. Hardware – check tightness of all bolts and setscrews.
4. Lubrication – check fan and motor bearings and add lubricant if necessary. Be careful not to over grease as this can damage bearing seals.
5. Air Flow – make sure there is no debris and no unnecessary obstructions to airflow in the outlet or inlet ductwork.
6. Bearings on high-speed fans tend to run hot. Therefore, do not replace a bearing because it feels hot to the touch. Place a pyrometer or contact thermometer against the pillow block and check the temperature. Pillow block and flange mount bearings can have housing surface temperatures of 200ºF before the cause of overheating be investigated.
7. Wheel-inspect wheel blades for accumulation of dust or dirt. Clean thoroughly with steam or water-jet, compressed air or a wire brush. This will help prevent an unbalanced condition. If blades are aluminum, be careful not to damage them. Cover the bearings so water won't enter the pillow block. The wheel should have proper clearances to prevent the blades from striking the housing. Make sure the wheel is rotating in the proper direction. Never run the fan at a higher speed or temperature than is shown on the fan nameplate. Contact NSGV with any questions.

FAN BEARING MAINTENANCE

For most applications, a lithium base grease (such as Mobilith AW2) conforming to a NLGI Grade 2 consistency should be used. This type of grease inhibits rust, is water resistant, and has a temperature range of -30ºF to +200ºF with intermittent highs of 250ºF. For extreme duty and higher temperature applications, use Mobilith SHC220, synthetic hydrocarbon grease.

Because oil lubricated bearings are usually used on high-speed or high temperature applications, refer to NSGV factory for type of oil you should use in your particular application.

When greasing the bearings, it is important not to over-grease. This is especially true if the bearings are equipped with an extended grease lines and the bearings are not visible. In this case, more bearing failures occur due to over-greasing than under-greasing. It is best to give the bearing just one "shot" of grease periodically if the bearings are not visible. When the bearings are visible, pump the grease until a small bead of grease forms around the bearing seals. It is very important that the fan bearing greasing take place while the fan is operating.
Caution should be taken while working on and near rotating equipment to avoid personal injury.

When oiling oil-lubricated bearings, oil should be poured into a cup at top of the bearing until it reached the overflow point at the lower oil cup.

VIBRATION LEVEL OF REPLACEMENT IMPELLERS

All replacement impellers are dynamically balance at the factory prior to shipment. Occasionally, an impeller that has been factory-balanced will yield poor balance/vibration results when installed and operated. This does not mean that the impeller was incorrectly balance at the factory. It can result from differences between test-stand conditions and operating conditions. A factory test stand has different bearings, bearing spans, structural response, stiffness, mechanical impedance, and by necessity, running speed. The test stand cannot duplicate the actual "fan system" and its response. For these reasons, the "fan system" vibration levels must be checked after installing a replacement impeller. Refer to page 2 for acceptable vibration levels.

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PROBLEM TROUBLESHOOTING

In the event that trouble is experienced in the field, listed below are the most common fan difficulties. These points should be hecked in order to prevent needless delay and expense of factory service.

1. CAPACITY OR PRESSURE RATING

A. Total resistance of system higher than anticipated.
B. Speed too low.
C. Dampers or variable inlet vanes not properly adjusted.
D. Poor fan inlet or outlet conditions.
E. Air leaks in system.
F. Damaged wheel.
G. Incorrect direction or rotation.
H. Wheel mounted backwards.

2. VIBRATION & NOISE

A. Misalignment of bearings, couplings, wheel, or V-Belt drive.
B. Unstable foundation, fan bolted to uneven foundation, not shimmed or grouted.
C. Foreign material in fan causing unbalance.
D. Worn bearings.
E. Damaged wheel or motor.
F. Broken or loose bolts and setscrews.
G. Bent shaft.
H. Worn coupling.
I. Fan wheel or driver unbalanced.
J. 120 cycle magnetic hum due to electrical input. Check for high or unbalanced voltage.
K. Fan delivering more than rated capacity.
L. Loose dampers or variable inlet vanes.
M. Speed too high or fan rotation in wrong direction.
N. Vibration transmitted to fan from some other source.

3. OVERHEATED BEARINGS

A. Too much grease.
B. Poor alignment.
C. Damaged wheel or driver.
D. Bent shaft.
E. Abnormal end thrust.
F. Dirt in bearings.
G. Excessive belt tension.

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