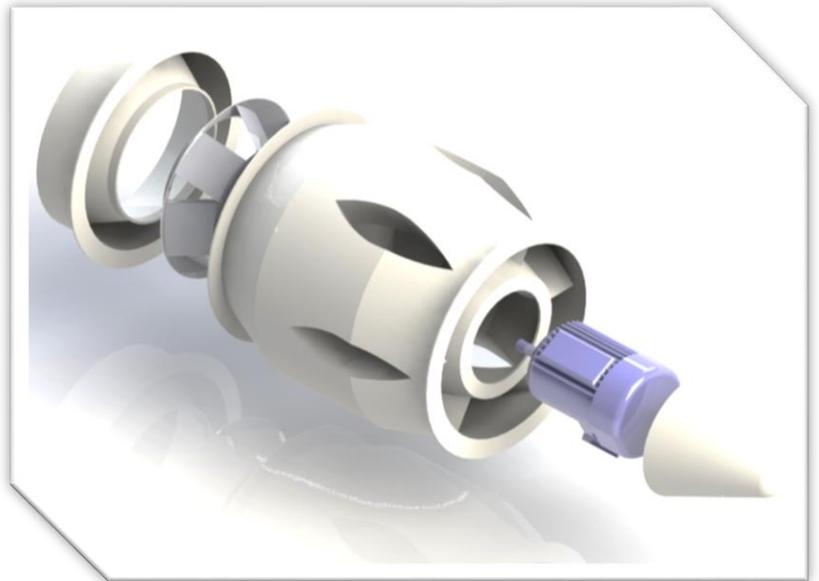
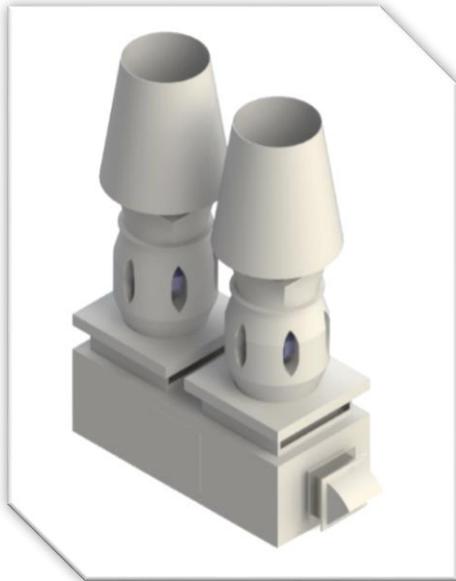


FAN INSTALLATION, MAINTENANCE & OPERATIONS GUIDE



SKYPLUME G1 EL- DMF SERIES

DIRECT-DRIVE MIXED FLOW EXHAUST FAN

MANUALS / SUBMITTAL DRAWINGS

***** Protecting the Drive and Motor *****

Input Line Reactors and Output Load Reactors may be required for proper installation of this fan motor. Installation with over 100 ft. of service wire must use a Line Reactor, and installations over 300 ft. of service wire must use both an Input Line Reactor and Output Load Reactor. No Parallel Line/Load Reactor shall be installed to service multiple motor drive combinations. With specific project power conditions known consult the project Electrical Consulting Engineer and review site power conditions to ensure motor service power is adequate.

CONDENSED PRODUCT TABLE

***** ATTENTION – PROTECTION OF MOTOR AND MOTOR DRIVE *****

Line and Load Reactors may be required for your electrical motor service conditions Consult SKYPLUME Technologies Product Manuals for Reference

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FAN INSTALLATION

All SKYPLUME Technologies fans are test run at operating speed to ensure that they pass our strict guidelines for vibration. The impeller and shaft assemblies are statically and dynamically balanced for the maximum recommended speed. For a safe and proper operation of the fan equipment requires a proper foundation that is level, rigid, and of sufficient structure and mass to support the equipment. It is always extremely important to consult a qualified structural engineer in order to design a proper foundation. A properly designed concrete base is the preferred foundation. The concrete base mass should be at least four times that of the fan equipment when the plan view area of the concrete base is no more than twice the plan view area of the fan equipment. Steel platforms or bases are common alternatives when properly designed. The steel platforms must be braced in all directions. Extra care should be taken to ensure that the natural frequency of all steel base components differs significantly from the rotating speed of the fan and driver.

SKYPLUME Technologies recommends using vibration isolators for the smoothest operation.

The following points should be considered prior to fan operation:

1. Avoid fan operation under conditions which would lead to the build-up of solids on the fan blades. This could lead to an unbalanced condition and cause a premature failure.
2. Fan equipment must be level prior to operation. Do not twist or distort during mounting. Shim fan support points before tightening foundation bolts make sure distortion does not occur.
3. Access door must be securely closed (if any) in order to avoid equipment damage and personal injury.
4. Owner/installer is solely responsible to make sure the fan is adequately secured to its supports.
5. Protection of Drive and Motor:

Input line reactors & output load reactors may be required for proper installation of this fan motor installation with over 100 ft. of service wire must use a line reactor, and installations over 300 ft. of service wire must use both and input Line reactor and output

load reactor. No parallel line / load reactor shall be installed to service multiple motor drive combinations. With specific project power conditions know consult the project electrical consulting Engineer and review site Power Conditions to ensure motor service power is adequate.

VIBRATION ISOLATORS

If the SKYPLUME Technologies fan is shipped with hanging spring vibration isolators the following procedures should be followed, SKYPLUME Technologies recommends that hanging isolators be mounted close to the fan to avoid excessive swinging of the fan:

1. Threaded support rods must be properly attached to ceiling directly above fan location (rods by others).
2. Attach mounting bracket to bottom end of rod above final fan location.
3. Drill fan mounting brackets to match location of rods.
4. Double bolt, with flat washers and lock washers, separate pieces of rod to mounting brackets.
5. Raise fan into position and attach rods from fan mounting brackets to isolators.
6. Once mounted, level the fan by adjusting the point where the fan mounting brackets connects with the lower rod.
- 7. TIGHTEN LOCK NUT AGAINST FAN MOUNTING BRACKETS.**

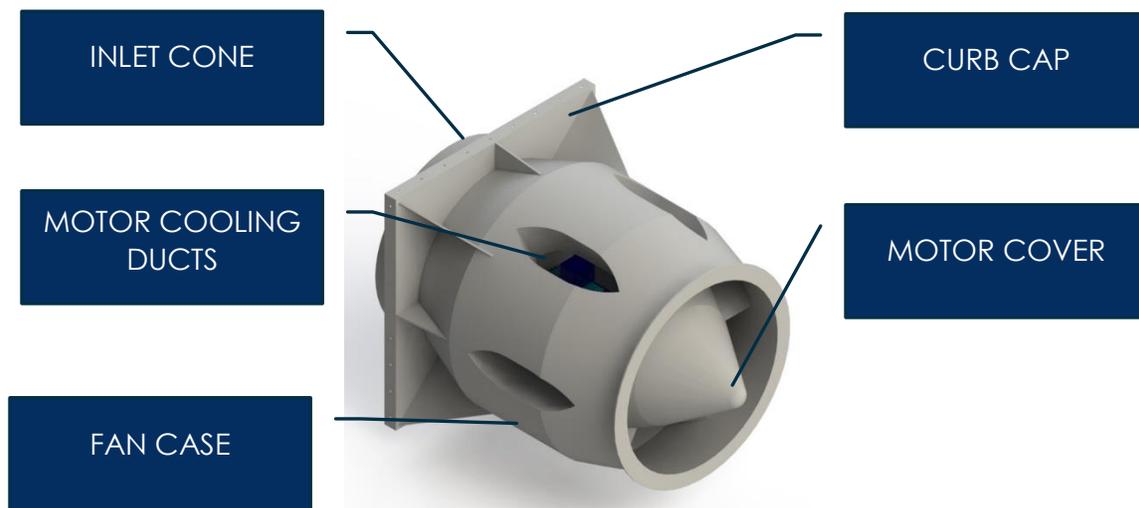
DUCT CONNECTIONS

All ducting attached to the fan should be independently supported. The fan case should not be placed under excessive loads. This may cause the case to distort and rub against the impeller and cause damage to the fan. SKYPLUME Technologies recommends using flexible connections to isolate the fan. All SKYPLUME Technologies fans equipped with drains should be plugged or connected to a P-trap.

ELECTRICAL CONNECTIONS

All fans should have an independent disconnect switch to isolate the fan motor from the electrical supply. Electrical disconnect should be near the fan. The maintenance personnel should be able to lock the disconnect switch in the off position while servicing the fan.

FAN STARTUP

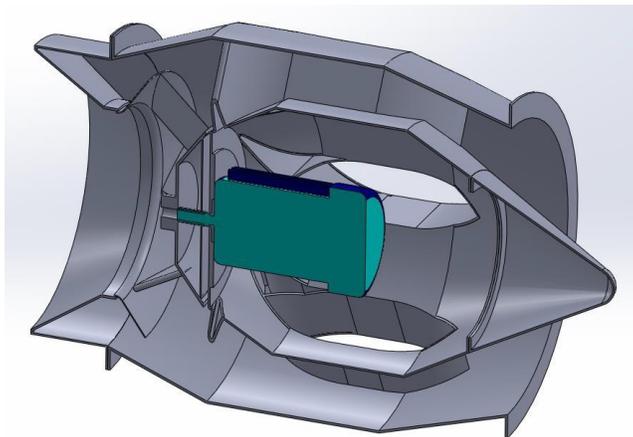


1. **Do not exceed the maximum recommended speed of fan.**
2. Ensure that the fan is free of loose objects. The duct to the fan inlet should also be free from loose objects. Loose objects in the fan can become fast moving projectiles and may cause damage to equipment, or cause injury to personnel.
3. Check the impeller to inlet cone and impeller to fan housing clearance to ensure that there is no interference of any kind. Turn the impeller by hand (with the fan power off) to ensure that it rotates freely.
4. Check that all the bolts and fasteners are properly tightened.
5. Close and secure all access doors.
6. Check motor wiring and voltage.
7. "Bump" start the fan to verify the correct impeller rotation. The proper rotation is clearly labeled on the fan. Rewire motor if necessary.
8. Turn on the fan and observe for unusual noises and vibration during this time. **Shut the fan down immediately if either of these conditions is observed.** If problems occur perform the start-up procedure again to ensure that all the steps were followed correctly.
9. Use extreme caution if the fan is operating while disconnected from the ductwork. The

inlet should be screened to prevent objects from being sucked in. It should also be partially blocked off to avoid overloading the motor.

10. There is no prevention of rain falling into housing while the fan is operation, therefore it's then sole responsibility of others to avoid weather entering to the building

FAN MAINTENANCE

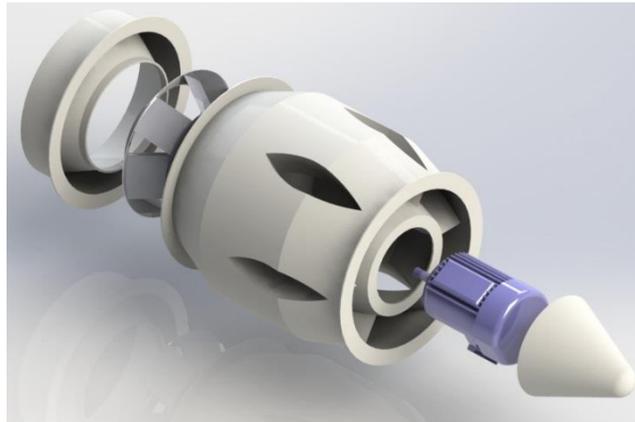


As with any piece of machinery, fans require regular maintenance and service to ensure trouble free service and long life. The fan should be turned off using disconnect on the motor and be locked in the off position. Allow the impeller to come to a complete stop before performing any maintenance on the fan. The following items should be checked as part of a regular maintenance program.

1. Check and record the vibration levels on the fan bearings regularly. This will usually give advance warning of trouble. Increased vibration over short periods of time can mean impeller imbalance. The impeller should be removed, cleaned, and rebalance if required. This will prevent permanent damage to fan components.
2. Check the impeller for damage and wear. **An impeller with visible signs of damage should be pulled from service immediately.** Detection of structural weakness is necessary in order to avoid catastrophic failure, which may result in significant damage to the fan, near-by equipment and personnel. The impeller should also be examined for build-up of material that may cause imbalance. Clean the wheel, being careful not to damage the laminated surface. Rebalance as required.
3. Check the shaft seal for damage and replace as required.

4. Lubricate grease-packed seals at the same interval as the bearings. The re-lubrication period should be reduced if there is any evidence of gas leakage from the seal.
5. Check all bolts and fasteners. If required, tighten to the recommended torque.
6. For FRP (fibreglass reinforced plastic) components, check for visible damage and exposed glass. Damaged parts should be replaced or repaired immediately.

IMPELLER REMOVAL



1. Remove the impeller hub cover to expose the taper lock bushing. Be careful not to damage the gasketing so it can be re-used.
2. Remove the screws from the bushing and thread into alternate holes. Progressively tighten until bushing is free and slide impeller from the shaft.
3. Reinstall in reverse order and ensure that the impeller is not rubbing against anything.

MOTOR BEARING & LUBRICATION INTERNAL

1. Motors, properly selected and installed, are capable of operating for many years with a reasonably small amount of maintenance.
2. Before servicing a motor and motor-operated equipment, disconnect the power supply from motors and accessories. Use safe working practices during servicing of the equipment.
3. Clean motor surfaces and ventilation openings periodically, preferably with a vacuum cleaner. Heavy accumulations of dust and lint will result in overheating and premature motor failure.

LUBRICATION PROCEDURE

Motors 10 HP and smaller are usually lubricated at the factory to operate for long periods under normal service conditions without re-lubrication. Excessive or too frequent lubrication may actually damage the motor. Follow instructions furnished with the motor, usually on the nameplate or terminal box cover or on a separate instruction. If instructions are not available, re-lubricate according to the following chart. Use high quality ball bearing grease. Grease consistency should be suitable for the motor's insulation class. For Class B, F or H use a medium consistency polyurea grease such as Shell Dolium R.

If the motor is equipped with lubrication fitting, clean the fitting tip and apply grease gun. Use 1 to 2 full strokes on NEMA 215 frame and smaller motors. Use 2 to 3 strokes on NEMA 254 through NEMA 365 frame. Use 3 to 4 strokes on NEMA 404 frames and larger. For motors that have grease drain plugs, remove the plugs and operate the motor for 20 minutes before replacing the plugs.

For motors equipped with slotted head grease screws, remove the screw and insert a two to three-inch long grease string into each hole on motors in NEMA 215 frame and smaller.

Insert a three to five-inch length on larger motors. For motors having grease drain plugs, remove the plug and operate the motor for 20 minutes before replacing the plugs.

Hours of Service Per Year	HP Range	Hours of Re-lube Value
5000	1/18 to 7 1/2	5 years
	10 to 40	3 years
	50 to 100	1 years
Continuous Normal Applications	to 7 1/2	2 years
	10 to 40	1 years
	50 to 100	9 months
Seasonal Service - Motor is idle for 6 months or more	ALL	1 year beginning of season
Continuous high ambient, high vibration or where shaft end is hot	1/8 to 40	6 months
	50 to 150	3 months

Caution: Keep grease clean. Lubricate motors at a standstill. Do not mix petroleum grease and silicone grease in motor bearings.

RECOMMENDED SPARE PART LIST

SKYPLUME Technologies highly recommends that end users keep spare parts for the fan. This is especially true for critical service that cannot afford a long down time. The following parts should be stocked:

1. A balanced impeller
2. Shaft seals

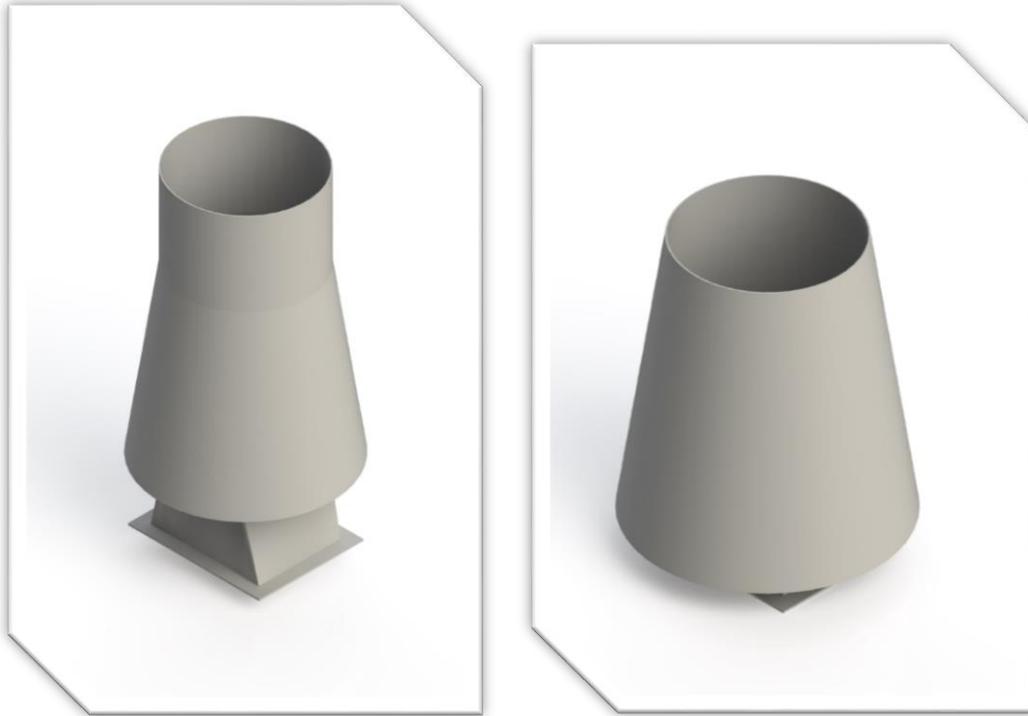
TROUBLE SHOOTING

PROBLEMS	POSSIBLE CAUSES
LOW AIR FLOW	<ul style="list-style-type: none"> • Duct elbow too close to fan inlet or outlet • Restricted fan inlet or outlet • Incorrect direction of rotation. Ensure the fan rotates in same direction as the rotation arrow on the fan housing. • Fan speed lower than design • Static pressure is higher than design • Dampers are shut • Filters or coils are clogged • Incorrect duct work • Inlet or outlet screens are clogged
HIGH AIR FLOW	<ul style="list-style-type: none"> • Static pressure is less than design • Fan RPM is too high • Dampers are not adjusted correctly • Filters are missing • Registers or grilles are not installed
HIGH VIBRATION & NOISE	<ul style="list-style-type: none"> • Accumulated material on wheel • Worn or corroded wheel • Wheel or sheaves are loose on shaft • Unbalanced motor • Unbalanced wheel • Loose bearing or fan mounting bolts • Weak, un-level or resonant foundation • Structure not secured correctly • Unstable operating conditions
INOPERATIVE FAN	<ul style="list-style-type: none"> • Blown fuse • Damaged or broken belts • Loose sheaves • Small motor HP • Wrong electrical wiring • Wrong voltage
OVER HEATED MOTOR	<ul style="list-style-type: none"> • Incorrect motor wiring • Wrong rotation • Diverted or blocked cooling air

SKYPLUME™ EXHAUST STACKS

US Patent No. 6,676,503 B2

Other Patents Pending



GENERAL

The SKYPLUME Technologies SKYPLUME™ Exhaust Stack is designed to safely exhaust laboratory effluent well above the roof line. This minimizes the risk of polluted air being drawn back into building make-up air intakes without the use of tall exhaust stacks the pollutants are diluted by the induction of ambient air into the exhaust stream through a conical windband. This addition of air also assists in generating the high plume effect. The stack is constructed of solid FRP. The entire inner surface exposed to the corrosive gas stream is complete with a resin-rich corrosion barrier consisting of C-Veil and a smooth finish. Exterior surfaces have a heavy UV stabilized gel coat finish.

INSTALLATION

The stack is designed to fit directly to the discharge flange of the exhaust fan. The stack flange should be match drilled to the fan discharge flange. Use stainless steel bolts to secure the stack to the fan.

WARRANTY

SKYPLUME Technologies Inc. warrants all their products against defects in workmanship and materials for 12 months from the original date of installation, but not greater than 15 months from the original date of shipping. If within this warranty period any items prove to be defective, the defective part or parts shall be repaired or replaced at SKYPLUME Technologies option. Parts not manufactured by SKYPLUME Technologies but installed by SKYPLUME Technologies in equipment sold to any customer shall carry the original manufacturer's warranty only

Contact SKYPLUME Technologies for prior authorization (PS#) before sending back any part(s) or equipment. Defective part(s) must be shipped to SKYPLUME Technologies with a written explanation of the defect. All shipping, duties and tax charges for the defective part(s) shall be paid by the customer. SKYPLUME Technologies will not be responsible for any special, incidental or subsequent damage arising from these defective parts, including the removal and reinstallation of them. This warranty does not cover defects due to improper assembly, misuse, alterations, and normal wear and tear.