

## General Installation, Operation and Maintenance Instructions For Aerovent Products

Throughout this manual, there are a number of HAZARD WARNINGS that must be read and adhered to in order to prevent possible personal injury and/or damage to equipment. The signal word "CAUTION" is used to indicate the severity of a hazard and is preceded by the safety alert symbol.


 **CAUTION**

Used when minor or moderate injury or product / equipment damage MAY result from misuse or failure to follow specific instructions.

**NOTICE**

Indicates information considered important, but not hazard-related.

It is the responsibility of all personnel involved in installation, operation and maintenance to fully understand the

 Caution procedures by which hazards are to be avoided.

## 1.0 GENERAL DESCRIPTION

The AXIAD II axial flow fan comes in various configurations that offer flexibility to meet the needs of the end user.

### 1.2 DEFINITIONS

An axial fan consists of a propeller type rotor, motor driven and ducted or shrouded so that the blades are enclosed to increase operating efficiency.

A vaneaxial fan is an axial fan with a downstream vane section. The vane section transforms the whirling energy from the rotor into useful pressure energy, increasing the static pressure capability of the fan.

An adjustable pitch rotor is one where the blade angle can be changed, but only when the rotor is stationary.

#### 1.2.1 Arrangements

AXIAD fans are available in two different configurations, defined as follows:

Arrangement 4, Type 2 — The rotor is mounted directly on the motor shaft, and the motor is upstream of the rotor, with both rotor and motor enclosed in the fan tube.

Arrangement 4, Type 3 — The rotor is mounted directly on the motor shaft, and the motor is upstream of the rotor, but supported outside the fan tube.

### 1.3 APPLICATION

If the application requires that the inlet to the fan be ducted, Arrangement 4 Type 3 cannot be used. The Arrangement 4 Type 2 fan is furnished with an inlet duct flange to which an inlet duct or an inlet bell can be fastened.

Arrangement 4 Type 3 fans are ideally suited for plenum applications with a free inlet condition as this arrangement can permit the fan to be placed much closer to the coils or filters upstream.

### 1.4 ACCESSORIES

Various accessories are available for AXIAD II fans.

- Inlet bell and screen (standard on Arrangement 4 Type 3)
- Inlet cones
- Vane section
- Discharge diffusers (two types)
- Acoustic discharge diffusers
- Flexible duct connections and band clamps
- Gravity backdraft dampers
- Vibration isolation

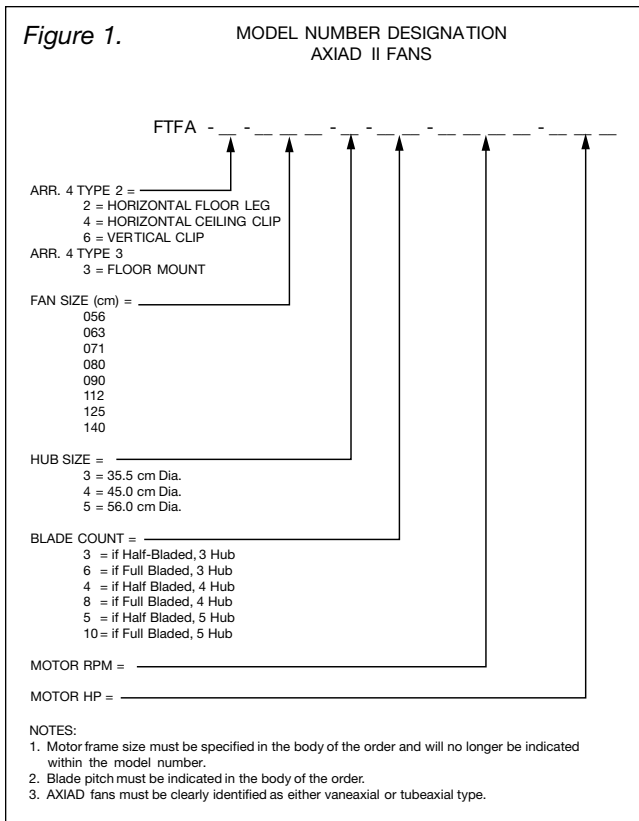
### 1.5 OPTIONS

AXIAD II fans may be furnished with various options to meet job requirements:

- Legs for floor mounting
- Brackets for vertical or horizontal support from the floor or ceiling.

### 1.6 NAMEPLATE NOMENCLATURE

The model number information on each fan nameplate is explained in Figure 1 on page 2.



## 2.0 INSTALLATION

### 2.1 CRATING

AXIAD fans are shipped on a wooden pallet. Each fan is normally covered with plastic for weather protection. The fan should remain on the pallet until installation.

Carefully inspect the fan upon arrival for damage incurred during shipment. Immediately report any damage to both the factory and the carrier.

### 2.2 LIFTING

AXIAD fans should be lifted using slings. Note that on AXIAD fans the slings should be placed under the skids, and the spreader bars used as required. Under no circumstances should the vane section be used for lifting.

### 2.3 MOUNTING

Depending on the type of fan support specified, the fan can either be horizontally floor mounted on legs, horizontally supported on a structural frame, horizontally ceiling hung with clips or support brackets, vertically floor mounted on a frame, or vertically ceiling hung.

#### 2.3.1 Vibration Isolators

The fan is dynamically balanced to reduce vibration to a low level. However, it is recommended that the fan be supported on vibration isolators. Isolators should be selected for each installation in accordance with individual requirements.

The weight distribution between mounts is not equal on AXIAD II fans. Consult the factory for

isolator selection or mount loads. Isolators should be selected to support the unequal load with equal deflection. A subbase can be used to equally distribute the load to the isolators. Concrete inertia pads are generally not required on axial fans.

#### 2.3.2 Fan Reactions

It is essential to minimize fan movement due to starting torque and air thrust force. These forces must be resisted to maintain duct alignment and prevent damaging the flexible connectors. Isolators must be selected with adequate stiffness to resist these forces. Snubbers may be required in some installations to limit the fan movement.

### 2.4 DUCT CONNECTIONS

All fans should be closely aligned with the ductwork. A flexible connection should be provided between the fan and duct to prevent structure-borne noise from being transmitted to the ductwork. Use band clamps and seal with Borden's Arabol, or equal, to insure mechanical security and prevent leakage on all flexible connections.

## NOTICE

**Provide a 1-inch to 2-inch gap between the fan and duct to allow for fan movement.**

#### 2.4.1 Diffuser and Cone Connection

On AXIAD II fans, the discharge cone and diffuser can be directly connected to the fan and thus become a part of the load to be isolated. On Arrangement 4 Type 2 AXIAD fans inlet cones can be directly connected and they also become part of the load to be isolated.

#### 2.4.2 Inlet Bell Connection

The inlet bell may be mounted in a plenum wall with a flexible connection between the outer edge of the bell and a hole in the partition. Provide a 2-inch to 3-inch gap to allow for fan movement.

The inlet bell may be installed protruding into the plenum where space is limited. A metal ring should be installed between the inlet bell and the case flange and a flexible connection installed between the ring and the plenum wall.

### 2.5 ELECTRICAL

All wiring should conform to local electrical codes and the job specification. In NEMA standard MG-2, NEMA addressed the phenomena of transient torques. We advise that measures be taken to protect your equipment from transient torque and power interruptions.

#### 2.5.1 Power Connection

The motor leads terminate in the conduit box. The leads are factory connected for the voltage specified for the job. Motor leads for wye-delta and part-winding starts are not connected. Rigid conduit should be run from the motor starter to the fan with a short section of flexible conduit at the conduit box to allow for fan movement.

Wire size and motor overloads should be sized in accordance with the fan nameplate electrical data. The conduit box is located on the outside of the case on all ducted, direct driven fans. If the motor is outside the fan case, connection will be made directly to the motor.

### 2.5.2 Motor Rotation

Check motor rotation by jogging the motor. The rotation should be clockwise when viewed from the inlet of the fan. Reverse any two motor leads to change rotation.

#### NOTICE

**It is important that correct motor rotation be established on ducted fans as the rotor will not be visible after an inlet duct is installed.**

### 2.5.3 Electrical Data

The fan should be started in accordance with Section 2.5.4 and the electrical data measured and compared to motor nameplate ratings.

### 2.5.4 Final Check Before Putting Fan Into Operation

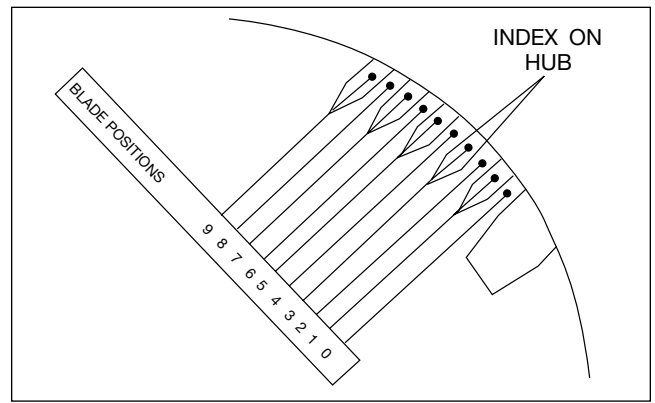
1. Check for correct supply voltage and motor overloads.
2. Insure that all loose debris is removed from fan, fan room, plenum and/or all ducts.
3. Check that motor bolts are tight and rotor is centered in fan case with adequate blade tip clearance all-around.
4. Hand rotate and then bump the fan starter to check rotation.
5. Start the fan and verify that the vibration is acceptable.

## 3.0 AXIAD II FAN BLADE ADJUSTMENT

### 3.1 GENERAL

The AXIAD II FTFA fan is an adjustable pitch fan. The blade pitch has been factory set to meet the airflow requirement of the job specification. The pitch may be changed to meet other airflow requirements on the jobsite. Each blade has cast into it a number of raised marks with grooves in between and the fairing has a register mark machined into it at each blade opening. See Figure 2, which identifies each of the ridges and grooves with a number from 0 to 9. These numbers correspond to the performance curve numbers shown in the AXIAD II design performance manual.

Figure 2. Blade Positions For AXIAD II



### 3.1.1 Blade Pitch Adjustment

On Arrangement 4 Type 3 fans, the blade angle can be adjusted by removing the inlet screen. On ducted fans, the case is provided with an 8-inch square door in the fan tube. To set the blade pitch, proceed as follows:

#### NOTICE

**A  $\frac{5}{16}$ " key with a square drive adaptor fitted to a torque wrench is required. In most cases, a universal joint will also be needed.**

1. After access has been obtained to the rotor, loosen the two blade bolts until the blade is free to rotate.
2. Rotate the blade to line up the register mark on the fairing with the desired blade angle mark on the blade.



#### CAUTION

**Do not exceed blade position 9.**

3. Tighten the two bolts evenly until a torque level of 65 ft-lb is reached.



#### CAUTION

**It is important that the blade bolts are torqued to the specified value. Do not hand-tighten the bolts.**

4. Repeat steps 1 through 3 for all blades. Make sure all blades are set at the same mark.
5. After all blades are set at a new angle, run the fan for a few minutes and then re-torque all blade bolts.



#### CAUTION

**The motor current should be checked not to exceed the nameplate rating when blade pitch has been increased.**

## 4.0 MAINTENANCE

### 4.1 GENERAL

AXIAD fans are a quality product designed and manufactured for minimum maintenance and long operating life. They should provide years of trouble-free service if the following maintenance procedures are followed.

AXIAD fans are balanced at the factory to the following standards. NEMA has set standards for motor balance which are also shown. Bearing life and lubrication requirements are based on the NEMA standard. The more stringent AXIAD standards allow for normal build-up of dirt on rotors; use, evaporation and/or shifting of lubricants; and normal wear. If a fan appears to be out of balance, it is wise to clean and grease before attempting to balance as this may resolve the situation in the simplest manner.

### 4.2 MOTOR LUBRICATION

Motor bearings do not require initial lubrication unless the fan has been in storage over six months. If this is the case, the motor should be lubricated initially.

RPM	AXIAD STANDARD	NEMA	SHUT-DOWN	MILS ALARM
3600	0.6 Mils Peak/Peak	1.0	2.20	1.42
1800	0.8 Mils Peak/Peak	1.5	4.40	2.84
1200	1.2 Mils Peak/Peak	2.0	6.70	4.26
900	1.6 Mils Peak/Peak	2.5	8.90	5.60

Lubricate motor bearings with grease gun at the following intervals and numbers of strokes:

### NOTICE

Normal amount of grease delivered by a hand cartridge type grease gun.

Use only the following lubricants or their equal:

HORSEPOWER	PERIOD	STROKES (SEE NOTE)
5 to 7½	12 Month	1
10 to 40	6 to 12 Month	3
50 to 150	6 Month	3

Chevron SR-2	A.F. No.2
Precision No. 2	Gadus S2 V100 2
Starfak H, M and No. 2	Mobilux No.2
Polyrex EP2	Mobil Grease #77

The grease fittings must be clean to prevent contamination. The fittings are located as follows:



### CAUTION

Do not over lubricate bearings or use a grease other than specified.

### 4.3 VIBRATION

TYPE FAN	LOCATION
Arrangement 4, Type 2	Fan case adjacent to conduit box
Arrangement 4, Type 3	End of motor base

If excessive vibration develops, the following points should be checked as possible sources of trouble:

- With the rotor stopped, determine whether the vibration is produced by an external source.
- All anchor bolts on fan must be secure.
- The rotor must be tight on the motor shaft.
- Disconnect the motor from the rotor and run it alone to determine if it produces vibration.
- Thoroughly clean the rotor and interior of housing and check the rotor for out-of-balance due to erosion or damage.

### 4.4 MOTOR BOLT TORQUE

Motor bolts should be torqued to the following specifications. Remember that it is not possible to check a torqued bolt unless it is loosened first, as torque must be applied evenly until the desired torque is reached. To tighten further after a given torque value has been reached requires much more torque to get the nut started than will be required to keep tightening it, so the desired final torque must be reached in one movement. All bolts are grade 5.

BOLT SIZE	TORQUE FT-LBS
5/16-18	13
3/16-16	27.5
1/2-13	75
5/8-11	150
3/4-10	240
7/8-9	380

### 4.5 MINIMUM BLADE TIP CLEARANCE

The following dimension is the minimum clearance between the tip of any blade in the fan case.

FAN SIZE	MINIMUM TIP CLEARANCE (IN.)
056	.030
063	.030
071	.030
080	.030
090	.034
100	.038
112	.043
125	.049
140	.055

## 4.6 INSTRUCTIONS FOR LONG TERM STORAGE

**4.6.1** If a fan is not installed immediately upon receipt, it is the responsibility of the purchaser/user to see to it that proper procedures are followed in order to minimize deterioration which may result from idle storage.

**4.6.2** Fan equipment should be stored indoors or in a well sheltered location. The storage area must be clean and dry, well above any maximum anticipated water level. The equipment should be left crated/skidded, and not stacked over or under other equipment. Unpainted machined parts should be given a protective coating of Sprayon #322 or equal; this coating should be renewed periodically per the manufacturer's instructions. For fans equipped with vane sections, the core end cover should be removed to gain adequate access to the interior and reach the impeller hub. These interior areas require the same rust inhibitor application and renewal as given above. The cover should be replaced for storage, but each may be fastened with a minimum of assembly hardware to facilitate access. Remaining fastener hardware should be bagged and tagged, and attached to the fan to prevent loss of these items. (It is recommended that the fan be tagged indicating that all fasteners must be replaced before operation.)

**4.6.3** Each impeller blade should be numbered in sequence with a felt-tipped marker. The blade marked No. 1 should be rotated to top center. The blade number and date should be recorded in a log book which is to be stored in a protective pouch attached to the fan. During storage, the fan impeller should be

rotated by hand at least 10 revolutions every 30 days to circulate the lubricant in the bearings in the motor. After the tenth revolution, stop with a blade at top center which is not the same one as is listed for the previous date in the log book.

**4.6.4** If the fan motor is equipped with internal heaters, the heaters must be energized throughout the storage period to prevent condensation which might damage bearings or electrical components. For motors not equipped with internal heaters, the motor should be enclosed in heavy-duty polyethylene, wrapped as tightly as possible.

Enclose bags of dessicant (such as Silicagel) with the motor to minimize moisture problems. Check the dessicant regularly and replace it periodically as dictated by climate requirements. In addition, it is strongly suggested that the motor manufacturer be contacted for specific long term storage instructions.

**4.6.5** The bearings in the fan motor or on the fan shaft should require only minimum lubrication during storage. Follow lubrication instructions in the instruction manual enclosed with the fan.

**4.6.6** After an extended period of storage, it is advisable to have the fan motor thoroughly checked before the fan is installed. Motor bearings, lubricant and electrical condition should be given special consideration. Reassemble cover to fan and follow AXIAD instruction manual for installation and start-up.



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