AEROVENT AUSTRALIA

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Fan Model: **Belt Drive Centrifugal**
Fan Arrangement: **1**

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SECTION 1 DESCRIPTION

1.1 Equipment Specification

The equipment against this order is comprised of AEROVENT, HEAVY DUTY CENTRIFUGAL FANS manufactured in accordance with respective users' specifications.

The fan supplied is of single width, single inlet design and is:

Belt drive arrangement 1.

1.2 CONSTRUCTION DETAILS

1.2.1 Fan Casing

. Fan casings are manufactured from suitable mild steel, to suit the mechanical performance & environmental properties required by the individual fan duties.

. The fan casings & flanges have been adequately stiffened to prevent drumming & distortion.

. Impeller removal is through the opened casing front.

. Inspection doors allow access to the casing interior for inspection and cleaning.

. Where required, a drain plug is provided at the lowest point of the housing for drainage, terminating in a socket and plug.

1.2.2 Impeller Assembly

The impellers are of laminar blade construction. The impellers are fabricated from suitable high-grade mild steel to suit the mechanical performance and environmental properties required by the individual fan duties. The design is such as to prevent distortion and imbalance at designated operating speed.

1.2.3 Balancing

The impeller is statically and dynamically balanced together according to ISO 1940 Grade 2.5 or better.

1.2.4 Fan Shaft

Shaft is accurately machined from CS1030 mild steel to specified tolerances.
Critical speed will be at least 30% greater than operating speed. Shaft entry into the fan casing is through a copper shaft seal.

1.2.5 Fan Bearings

All fans with bearings are fitted with SN, split plummer blocks. These are already supplied with grease and should not require lubrication until the fans reach their recommended lubrication intervals. The only exception to this being where the bearings are operating in a high temperature environment other than their designed duty and subsequent oxidation of the grease would necessitate more frequent changes.

For bearing assembly procedure, please contact Aerovent Australia.

For lubrication procedure. please contact Aerovent Australia.

1.2.6 Fan Pedestal

A fabricated steel pedestal is designed to accommodate and support the bearing and shaft assembly, which is suitably guarded.

1.2.7 Electric Motor

Since the continued running of a fan depends largely on the reliable operation of the electric motor, care should be taken to ensure that the motor is kept clean and free from dust, dirt and oil at all times. The motor should therefore be regularly inspected and wiped clean as necessary with a dry cloth. Cotton waste should not be used.

1.3 Coating

Mild steel surfaces of the fans have been prime coated internally and externally. The external surfaces have been finished with epoxy.

1.3.1 General

- Suitable guards protect all rotating components.
- All components have been dowelled and matchmarked where necessary.

1.3.2 Drives

For **Belt drives Fitting and Adjustment**, please contact Aerovent Australia.

1.3.3 Spare Parts

Replacement parts should be kept on hand for all surfaces such as bearing races, seals etc. Complete items such as shaft and impeller assemblies should be kept if the installation, or production requirements warrants such. Please contact Aerovent Australia for exact part descriptions.

SECTION 2 INSTALLATION

Thoroughly read these installation instructions before commencing any assembly.

2.1 Preliminary

Before leaving our factory fans were carefully inspected and passed for workmanship and dimensional accuracy.

Parts to be transported in sections or in a disassembled condition were carefully match marked to ensure ease of assembly.

On arrival to site, each item should be inspected for damage that may have occurred during transit. In the event of any such damage, no rework should be undertaken without the written approval of Aerovent Australia.

2.2 SITE REQUIREMENTS

2.2.1 Site Handling

Take care in handling sections of the fan casing work, lifting only from the lifting lugs provided.

2.2.2 Foundations

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. The foundation drawing shows the position of the Anti-Vibration Mounts (if applicable) to be fitted to the fan.

. The actual foundation bolt spacing will vary according to the size of the mounts (if applicable).

. A pocket is to be cast into the concrete around each foundation bolt to allow for some adjustment of bolt positioning.

. The completed foundations should be dimensionally checked to ensure that they comply with the general arrangement drawings prior to commencement of the fan assembly. Any alterations necessary should be made at the same time.

2.2.3 Duct Connections

Flexible duct connections must be used in conjunction with Anti-Vibration Mounts.
It must be emphasised that fan casings are not designed to withstand external loadings imposed by adjoining ductwork beyond our supply.

This is critical where temperatures either by gas being handled or the surrounding ambient air causes the ductwork to expand or contract

It is recommended that an expansion or flexible connection be provided between the fan casing and adjoining ductwork.

When fitting the expansion joint ensure that it is not forced onto the fan. If it does not fit exactly then the adjoining ductwork must be moved or the expansion joint modified so that it does. Otherwise undue vibration of the fan and/or ductwork may result.

2.3 INSTALLATION PROCEDURE

To be read in conjunction with supplied drawings.

The complete fan and base was assembled in our workshop and shipped to site fully assembled.

1. Packers are to be suitably sized and are to be placed adjacent to the foundation bolts to avoid distortion of the base flanges.

2. Make all necessary duct connections. If they cannot be moved to make exact connections they must be modified to suit.

3. When satisfied with total assembly, grout underneath base flanges allowing sufficient time for grout to harden.

4. Make all necessary electrical connections, **remove shaft-locking devices (if applicable)**, and ensure that the fan rotates freely by hand. Motor rotation is correct to fan handing, as viewed from the drive end.

5. Touch up paintwork where necessary and fit guards.

6. The fan is now ready for commissioning.

SECTION 3 OPERATION

3.1 Commissioning

Once the fan has been assembled to the satisfaction of the Site Engineer and all proprietary equipment individually checked and operated, the fan can now be commissioned.

Following initial commissioning, checks should be made after the first following week of operation. These should entail bearing temperatures, vibration levels, belt tension and motor winding temperatures.

3.2 Bearing Temperatures

When first put into service or after re lubrication it is quite normal for the temperature of the bearings to increase rapidly. This is only a temporary effect however, for as soon as the excess grease/oil has been flung out of the working space and the grease/oil in the housing has settled, the temperature should fall to the normal level. If the temperature does not fall after a day or so then the fan should be stopped and the bearings allowed to cool. If on restarting the temperature again rises unduly this may be a result of over packing in which case some of the excess grease/oil must be removed from the bearing housing.

3.3 Vibration

A fan running in an unbalanced condition gets steadily worse and causes serious trouble such as bearing damage, weakening of the motor supports, loosening piping, surrounding equipment springing, motor shaft damage and possible damage to the impeller itself.

The most common cause of vibration is wear, dirt build up on blades or hub, bent shaft, worn bearings and misalignment of components.

A vibration-monitoring device is used to measure the amount of unbalance. No hard and fast rule can be made due to individual site and operating conditions however the table below gives the suggested vibration tolerances.

3.3.1 SUGGESTED FAN VIBRATION TOLERANCES

Condition	Vibration Velocity (mm/sec.)
Smooth	0.0 to 2.0
Fair	2.0 to 4.5
Rough	4.5 to 11.0
Very rough	above 11.0

NOTE

1. Vibration displacement valid for up to 2930 rpm.
2. Fair is not bad but could be improved.
3. Rough should be balanced as soon as possible.
4. Very rough is too rough to operate.

If the impeller requires adjustment, correction weights can be bolted or welded, but if the balance weights are metal welded on it is essential to earth the impeller immediately adjacent to the weld area and not to the fan casing. Failure to adopt this procedure may result in damage to bearings due to the passage of welding current through the bearing to earth.

3.4 ALARM AND TRIP SETTINGS

3.4.1 Bearing Temperatures

Detailed below are the recommended initial settings for bearing temperatures.

Alarm	90 deg. C
Trip	100 deg. C

As individual bearings run at individually temperatures these values are only indicative and be subject to site variations to suit the operating conditions.

3.4.2 Vibration Levels

Detailed below are the recommended initial settings for vibration level detectors. If fitted measured as vibration velocity.

Alarm	6 mm/sec.
Trip	8 mm/sec.

These values are only indicative and will be subject to suit the operating conditions.

3.5 Functional Checks

1. Test run fan for 24 hours.
2. Check bearing temperatures during test run.
3. Check vibration.

SECTION 4 MAINTENANCE

4.1

Proper care and maintenance is indispensable in the successful operation of any heavy-duty fan. The amount of maintenance depends upon the kind of operation and care given, the duty the fan performs and how essential a part in functioning of other equipment in the plant. Since this is precise engineered equipment the following instruction should be closely adhered to, as any negligence could lead to extensive damage to the unit.

4.2 Periodic Inspection

The fan will require periodic inspection and should be kept within conditions such as the amount of wear, balance, lubrication and paintwork. When the fans is 'shut down' check and clean all components. Special attention should be paid to parts in the airstream, especially the impeller since build-up on these could adversely affect balance and bearing life. Check all parts for wear and alignment, and repair or replace as necessary.

4.3 Lubrication

The bearing housings are fitted with grease nipples and grease relief valves, grease may be pumped into the bearing housing until the old grease has been expelled from the release valve and new grease appears. The bearing housings must not be over-packed with grease, as this will cause the bearings to overheat. The free space around the bearings should be no more than half filled with grease. In fact for fans running at higher speeds, the quantity of grease in the free space may be reduced to just under one third filled.

For lubrication procedure. please contact Aerovent Australia.

The recommended lubricants or their equivalent are to be used at all times

4.4 Shaft Bearing

Bearings fitted to fans where a breakdown would have serious consequences should be checked regularly. However in less critical conditions the bearings may normally be given only occasional attention.

4.5 Drive

The Belt drive was correctly fitted and aligned before leaving our factory. However, should you need to disassemble the drive, we strongly recommend that the manufactures' assembly instructions be adhered to and that the work be carried out by a qualified tradesperson.

Incorrect assembly of the drive will cause a loss in efficiency and performance. This over time will result in premature failure of the drive, motor and/or fan bearings due to excessive vibrations and stress through the drive.

4.6 IMPELLER AND SHAFT REMOVAL

Important

Before attempting any maintenance of the fan, or other ancillary items ensure that all items are isolated from the main power supply.

All fans

1. Remove bolts from housing inlet and remove inlet. Loosen impeller hub (a puller may be required) and remove impeller through casing front plate.

NOTE: DO NOT LIFT DIRECTLY ON THE SHAFT UNLESS IT IS PROTECTED WITH HEAVY CANVAS!

4.7 IMPELLER AND SHAFT REPLACEMENT

The impeller and shaft assembly can be assembled into the fan in the reverse order as it was previously removed.

SECTION 5 FAN TROUBLES AND CORRECTION

In the event that trouble is experienced, the notes listed below are the most common fan difficulties. These points should be checked to prevent needless delay and expense to our service departments.

5.1 Capacity or Pressure Below Rating

1. Incorrect direction of rotation.
2. Speed too low.
3. Poor fan inlet or outlet conditions.
4. Air leaks in system.
5. Damaged impeller.
6. Total resistance of system higher than anticipated.

5.2 Vibration and Noise

1. Misalignment of bearings, pulleys or impeller.
2. Unstable foundation.
3. Foreign material in fan causing unbalance.
4. Damaged impeller or motor.
5. Broken or loose bolts and set screws.
6. Bent shaft.
7. Fan impeller or driver unbalanced.
8. Fan delivering more than rated capacity.
9. Speed too high or fan rotating in wrong direction.
10. Vibration transmitted to fan from another source.
11. Worn drive.

5.3 Overheated Bearings

1. Too much grease in bearing housings.
2. Vee drive incorrectly aligned or installed.
3. Damaged impeller or driver.
4. Bent shaft.
5. Abnormal end thrust.
6. Dirt in bearings.

5.4 Overload On Driver

1. Speed to high.
2. Discharging over capacity due to the system resistance being lower than the original rating.
3. Specific gravity or density of gas above design value.
4. Wrong direction of rotation.
5. Shaft bent.
6. Vee drive incorrectly aligned or installed.
7. Impeller binding or wedging on inlet cone.
8. Bearings improperly lubricated.
9. Motor improperly wired.