FAN TROUBLE SHOOTING

1.0 GENERAL

Problem	*Possible Cause*	*Recommended Action*
1.1 Motor Noise	Firstly determine if the noise is electrical or mechanical.	If the noise doesn't stop instantly, but runs down with the motor, the problem is more likely to be mechanical, generally the bearings; see Mechanical section below: If the motor is switched off and the noise stops instantly the problem is more likely to be electrical; see Electrical section pages *N-14/16*

2.0 MECHANICAL

Problem	*Possible Cause*	*Recommended Action*
2.1 General Fan Noise	The fan could be running in stall.	Check the actual fan performance against the fan curve to determine where on the curve it is operating. If it is to the left of the peak pressure point the fan is generally in stall. If in stall see if the ductwork can be modified to eliminate high pressure loss sections. Low amps could indicate the fan is in stall. Reduce the pitch angle.
2.2 Bearing noise varying from a 'dry' rumble to a squeal	Improper greasing.	Check the bearings are packed with the correct grade and amount of grease. If the bearings are of the sealed-for-life type replace them.
	The bearings may be loose on the shaft or bearing support.	Tighten the adaptor sleeve or collar.
	The bearings have not been properly tensioned	Re-tension as required
2.3 Rough lumpy sound.	The bearings may have brinelled. Brinelling occurs when the fan is vibrated during transit or through ground vibration when stored. This causes the bearing to vibrate at a single point and therefore indenting the bearing race. Problems with brinelling usually occur shortly after a fan is installed.	Replace the bearings. To avoid brinelling the fan impeller should be rotated frequently, at least daily.
	Excessive belt tension.	Check and adjust the belt tension.
2.4 Shaft seal squeal	The seals may have dried out.	The seals may require lubrication or may be misaligned.
2.5 Air noise	Air noise can be generated from a number of sources such as grilles, bends, badly designed duct fittings, excessive duct velocities etc.	Check the duct design is such it does not generate turbulence and therefore noise. An attenuator may be needed to resolve the problem.
2.6 Vibration	The impeller may be out of balance.	Site balancing may be practical but, if not, remove the impeller and balance.
	The shaft may be bent.	The shaft will have to be replaced.
	Impeller may be worn as a result of handling abrasive or corrosive materials.	The impeller will have to be replaced.
	Material such as dust or grease could be sticking to the fan blades.	Clean the impeller blades. This should be done on a regular basis if dust and/or grease is constantly present in the air being handled.
	The impeller may have been damaged by loose material in the duct system.	Depending on the level of damage the impeller may have to be replaced.

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2.0 MECHANICAL (Cont.)

Problem	*Possible Cause*	*Recommended Action*
2.6 Vibration (Cont.)	Vibration being transmitted through the building structure.	Check vibration isolators have been fitted and, if fitted, check they are correctly positioned. Vibration isolators are fitted but not strong enough. If bottoming, adjust if possible or replace with more suitable mounts. Fit flexible connectors between the fan and ductwork.

3.0 IMPELLERS

NOTE: If there is any doubt about the impeller contact the supplier, do not run the fan.
Refer to Do's and Don'ts section of this catalogue for design advice.

Centrifugal

Problem	*Possible Cause*	*Recommended Action*
3.1 Impeller excessively noisy	The impeller may be striking the fan casing or inlet cone, check for the following causes:-	
	Impeller may be loose on the motor or drive shaft.	Tighten the fixings.
	Impeller incorrectly mounted onto the shaft	Re-install the impeller onto the shaft with the key installed correctly
	Impeller not centred in the casing	Adjust to the correct position.
	Casing inlet cone may be damaged	Repair the damage.
	Bent motor or drive shaft	Replace the shaft
	Impeller not centred on the inlet cone.	Check and re-align as required.
	The inlet cone has been damaged	Repair or replace.
	Shaft loose in bearings.	Tighten the bearing rings.
	Bearing loose on its support.	Tighten the fixing bolts.
	The cut-off in the fan discharge has been damaged.	Repair or replace.
	Cut-off is insecure.	Refit securely.
3.2 Damaged Impeller	Impeller bulging. This could be caused by the impeller being built from lighter than specified materials or the fan is running above its recommended speed.	Replace the impeller but also check the fan speed. Advise supplier of the problem.

Axial Flow

Problem	*Possible Cause*	*Recommended Action*
3.3 Impeller excessively noisy	Impeller blades may be loose and could be striking the fan casing.	Contact the supplier.
	The motor may have moved.	Check the alignment of the motor, relative to the casing, and tighten the fixing bolts. Contact the supplier.
	The blade tip clearance may be insufficient.	Trim the blades to suit, check with the supplier for advice.
3.4 Bent blades	The blades may have been damaged during transit or by loose material in the duct system.	Check the condition of the fan and impeller on receipt and for debris in the duct. Replace the impeller if damaged.
	Bent blades can be caused by the fan running in stall or the air entry/discharge conditions to the fan creating excessive vibration.	Check the air entry conditions to the impeller do not generate excessive turbulence. Replace the impeller.

Axial Flow (Cont.)

Problem	Possible Cause	Recommended Action
3.5 Disintegrated Impeller	Possibly caused by the blades being struck by loose material in the duct system.	Ensure the ducts are clear of all debris. Replace the impeller.
	Excessive impeller speed.	Check the motor speed and, if belt-driven, the pulley ratios. Replace the impeller.

4.0 BELT-DRIVES

Problem	Possible Cause	Recommended Action
4.1 Various problems	The belts are loose and striking the belt-guard.	Adjust the belts to the correct tension.
	Belts are wearing out too quickly and/or the belts are too tight.	Adjust the belts to the correct tension. Also check the belts are a matched set, if they are not replace the complete set.
	The pulleys are worn.	Replace both the pulleys and belts.
	The belt may be the wrong cross-section for the pulley.	Check and replace the belts as necessary.
	The pulleys may be incorrectly aligned.	Check the pulleys and realign as necessary.
	The drive selection may be incorrect.	Check and change as necessary.
	The fan, motor or its base may not be securely fastened.	Check and secure as necessary.

5.0 ELECTRICAL

Problem	Possible Cause	Recommended Action
5.1 Fan running the wrong way.	Incorrect wiring.	To reverse the rotation of a three-phase motor interchange any two supply leads. If a VSD is installed, the two leads must be interchanged on the output side of the VSD. To reverse the rotation of a single-phase motor interchange leads on the start winding. Refer to the directions in the motor junction box. This note applies to single-speed motors only. For 2-speed motors refer to the supplier.
5.2 Fan won't run	Wrong electrical supply.	Check the electrical supply matches the motor nameplate.
	Electrical connections in the motor terminal box or starter are not tight.	Check and tighten as necessary.
	For single-phase motors the capacitor is not wired in or is faulty.	If a capacitor is fitted check with a multimeter or replace.
	Fuses are blown	Before replacing fuses check the motor circuit for any faults.
	Belts on belt-driven units have broken.	Replace the belts and re-align the drive.
	Overloads have tripped out.	Check the motor before resetting the overloads.
	If a variable speed drive (VSD) has been fitted incorrect installation can cause an electrical 'spike' causing the motor windings to fail.	Check the motor windings and if failed replace the motor. Check the installation is in accordance with the VSD supplier's recommendations.
5.3 Fan runs in alternate direction.	The capacitor is not in circuit or it could be faulty.	Check with multimeter or replace.
	Alternatively, the connections could be poor or incorrect.	Check all connections and ensure there are no loose terminals.

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5.0 ELECTRICAL (Cont.)

Problem	Possible Cause	Recommended Action
5.4 Electrical hum	Electronic speed-controllers can generate an electrical hum.	If the electronic controller is not faulty explore using a SSC single-phase 2-speed switch in its place. Alternatively, use an auto-tranformer speed controller.
	If a variable speed drive (VSD) is fitted incorrectly it can cause a high level of harmonics in the supply.	Check the installation conforms to the VSD supplier's recommendations.
	Phase imbalance on three-phase motor.	Check and correct the supply.
	Motor is not designed for the electric supply ie. wrong voltage or frequency.	Check the electrical supply matches the motor nameplate.
	Motor is overloaded and drawing greater than the nameplate amps.	Check the correct motor is fitted. If correct check the pitch-angle if an axial fan or the belt-drive details if a belt-driven fan. If these are correct contact the supplier.
	Motor has excessive clearance between stator and rotor. In this situation the motor will run slower than the normal speed. ie. have excessive slip.	Check motor speed, if slow contact the supplier.
5.5 Motor overheating or high current draw.	Faulty instruments.	Ensure all instruments are accurate and calibrated where necessary.
	Incorrect power supply	Check the electrical supply matches the motor nameplate.
	Three-phase motor running with one phase disconnected. This is called single-phasing. When single-phasing, the motor will draw uneven current on each phase and will generally not start from standstill.	If single-phasing, check if it is the power supply or the motor windings. If a winding has failed the motor may need to be replaced. Fitting correct overloads or phase protection will prevent this problem.
	Impeller has too much inertia for the motor power and does not achieve full speed.	Check the inertia of the load and reduce as necessary. Alternatively, fit a larger motor.
	Excessive dirt on the motor cooling fins so the heat is not able to dissipate.	Remove the dirt and dust on the motor body and between the cooling fins. Increase the maintenance frequency.
	If the motor is out of the airstream either the cooling fan is not fitted or the air inlet to the motor cooling fan is obstructed.	Fit the motor cooling fan if not fitted and remove any obstructions from the air inlet to the motor.
	Excessive stopping or starting - 10 starts/hour is generally acceptable.	Check the control system and reduce the number of starts/hour as recommended.
	A conventional three-phase motor is connected in Delta when it should be in Star, or vice-versa.	Check the motor nameplate and re-wire correctly.
	The fan impeller is jammed resulting in a locked rotor situation. The motor will draw 6-10 times the rated current in this situation.	Check to ensure the impeller can rotate freely.
	A 2-speed motor, when switching from high to low speed, can generate heat if the supply is not switched off.	Switch off the power first and allow the motor to run down before engaging low speed. Alternatively, use a time delay interlock.
	Backward-curved centrifugal impellers may be running in the wrong direction. When running in the wrong direction they will tend to overload the motor. Airflow capacity will be down to approximately 30-40% of full flow.	Check and correct the direction of rotation of the impeller if necessary.

5.0 ELECTRICAL (Cont.)

Problem	Possible Cause	Recommended Action
5.5 Motor overheating or high current draw. (Cont.)	If the fan is a forward-curved centrifugal there may be insufficient system resistance.	Ensure the duct system is installed correctly and, if necessary, lower the fan speed. Alternatively, increase the system resistance by fitting perforated metal on the fan inlet but note that this is inefficient.
	Axial fan impeller overpitched.	Re-pitch to the correct angle.
	Error in the motor selection for the required duty.	Check the motor nameplate and change as necessary.
	With belt-drive units incorrect pulley selection or pulleys on the wrong shafts	Check the pulley ratio and that the pulleys are on the correct shafts.
	Gas density greater than design.	Increase the motor size to suit.

6.0 DUAL & TAP WOUND MOTORS

Problem	Possible Cause	Recommended Action
6.1 High current draw and/or 'growling' bearings	Tap-wound motors can create problems if the 'star point' contactor is not connected. The motor will be fine in low speed but in high speed will have a high current draw and a severe electrical noise that sounds like noisy bearings. The motor will not last long when run in this condition. Dual-wound motors are rarely a problem.	Faulty wiring in the switchboard, check the correct contactor is connected.

7.0 PERFORMANCE

NOTE: Refer to Do's and Don'ts section of this catalogue for design advice.

Problem	Possible Cause	Recommended Action
7.1 Low air flow	Faulty instruments	Ensure instruments are accurate and calibrated where necessary.
	The wrong size fan has been installed.	Check the fan specifications are correct for the particular system.
	The fan is running backwards.	Check rotation of the impeller. If the rotation is wrong refer to the 'Electrical' section above.
	Pitch-angle of an axial fan may be wrong.	Check the pitch-angle against the schedule, if wrong contact the supplier. Site adjustment may be practical.
	Fan speed is too slow.	Check the motor speed and, if belt-driven, the pulley ratios. If wrong change to suit.
	The ductwork is undersized.	Check the ductwork and grilles are the correct size. If smaller than design this will increase the system resistance.
	If a centrifugal fan check the cut-off position.	Contact the supplier.
	Bad installation.	Check the entry and discharge conditions to the fan are of a good design. If the fan is mounted close to bends on the intake or discharge this will impact on the fans' performance. Check there are no duct obstructions on the intake or discharge of the fan. Internal duct lining may have come loose, check and repair.

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7.0 PERFORMANCE (Cont.)

Problem	*Possible Cause*	*Recommended Action*
7.2 High air flow	Faulty instruments	Ensure instruments are accurate and calibrated where necessary.
	The wrong size fan has been installed.	Check the fan specifications are correct for the particular system. If an axial fan check the pitch angle and, if wrong, adjust.
	The ductwork is oversized.	Check the ductwork and grilles are the correct size. If larger than design this will decrease the system resistance.
	Fan speed is too high.	Check the motor speed and, if belt-driven, the pulley ratios. If wrong change to suit.
7.3 System resistance is greater than estimated.	The ducting and/or the grilles, coils etc. may be smaller than design, which will increase the system resistance.	Check that the ductwork and system components are the correct size. Check that all dampers are open. Check that all registers and grilles are open. Check the ducting is clear of rubbish. Check flexible connectors are installed correctly. Check if filters are dirty, clean or replace as necessary. Check if coils are dirty and clean them if necessary. Check duct take-offs and general duct fittings are correctly installed and of good design.
7.4 System resistance is lower than estimated.	If the duct system and associated components are larger than design this will reduce the system resistance.	Check the ductwork and associated components are the correct size. Check for leaks around flexible connections.
	There may be leakage from the ductwork.	Check the ductwork for leakage and rectify as necessary.
	Leakage around the base of Roof Ventilators.	Ensure there is a proper seal between the unit base and the up-stand. If there is no seal then install one.

8.0 MOTOR PROTECTION

It is important to note the summary of the following regulations that form part of AS/NZS 3000:2018 Electrical Installations (known as the Australian/New Zealand Wiring Rules. For complete details refer to AS/NZS 3000:2018. Failure to comply with these regulations would void warranty.

8.1 Section 4.13.1

Protection against injury from mechanical movement
Every motor shall be provided with a switching device capable of performing starting and stopping the motor, emergency stopping, and isolating the motor for mechanical maintenance'.

8.2 Section 4.13.2

Protection against overload
Each electric motor having a rating exceeding 370W shall be provided with control equipment incorporating means of protection against overload of the motor. This clause does not apply to motors incorporated in an item of electrical equipment that complies with an appropriate standard'.

8.3 Section 4.13.3

Protection against overtemperature
Electric motors shall be provided with overtemperature protective devices where they are required to run unattended and have a rating higher than 480VA for shaded-pole or 240VA for other motor types, or have a rating greater than 2250W'.

8.4 Section 4.13.3

Overtemperature protective devices
Protection of motor windings against excessive temperatures shall be provided by thermal overload protective devices complying with AS/NZS 60947.4.1, built-in thermal protection in accordance with AS/NZS 60947.8, or a device that affords an equivalent degree of protection'.

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