



# **“NADI” Axial Fans**

## Installation & Maintenance Manual

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## 1.0 GENERAL

**Special Note:** Prior to despatch, all fan units have been inspected and mechanically run. Due consideration is given to the smooth running of the unit, its vibration, electrical Inputs, rotational speed, Acceleration Time & temperature rise. Hence NADI expects that if handled correctly and installed professionally then the fan should give long trouble free service.

- 1.1 The Technical specification of the unit supplied is shown on the name plate attached to the fan unit. Further information is also shown on the despatch note accompanying the units. The fan will be generally as per relevant GA DRG. All information should be cross checked and if in doubt, please contact NADI Industrials or its agent.
- 1.2 All NADI FAN equipment must be installed by personnel trained in the appropriate disciplines.
- 1.3 Further a copy of this document should be placed with the fan unit before attempting installation.

1.4 A CAUTION: Being a rotating machine the fan can cause serious injuries, if operators get close to the impeller blade (when in operation) or attempt to stop the fan by hand (or by any mechanical obstruction)

If bird screens have not been ordered and if the fan is likely to operate with its blades exposed (without protective duct/guard) then the fan will quickly suck-in any part of loose clothing / dress or hair and therefore operators must be more careful in the vicinity of such fans.

- 1.5 Being a fan driven by an electric motor please ensure that the wiring / the starter & the electrical installation are in keeping with the statutory safety regulations of the Electrical Authority / Factory Inspectors. The fan & motor must be properly & individually earthed.
- 1.6 It is further paramount that all installation and maintenance instructions are correctly and fully adhered to.



## **2.0 UPON RECEIPT**

- 2.1 The fan equipment should be visually inspected for any transit damage or loss. This includes the hand rotation of the impeller within the fan casing. If damper is supplied, the free movement of the damper blades should be checked by hand and other manual tests that the customers trained personnel think appropriate should be carried out on fan accessories.

Please check the electrical terminal box of the fan for any damage.

- 2.2 Please check the motors for any sign of external damage especially the cooling fan & / or the cooling fan cover.
- 2.3 If any damage be observed or technical quarries result then NADI Industrial or its agents be contacted stating fan type, NADI Contract Number and Fan Serial Number (\*please see Section 8.0 for any additional considerations).
- 2.4 In the case of fans with integral silencers please ensure that the perforated sheet wire mesh holding the glass wool are not damaged in transit.
- 2.5 **When axial fans are supplied without motor**, the fans are run tested with our own motor to ensure fitment at site. But please ensure (a) Same Frame size of motor. (b) If the fan casing has been damaged/deformed in transit which will result in impeller Fouling with the casing when assembled.

**INSURANCE CLAIM:** In case of transit damage please inform the insurance company within 48 hours of receipt.

## **3.0 STORAGE**

- 3.1 If the fan is not to be used immediately then it should be stored in a clean dry place.
- 3.2 If the unit is going to be subjected to any vibration in its stored location or is going to remain stored for longer than one month, then NADI or its agent should be consulted for special instructions in writing.(see section 8)
- 3.3 Fan units generally incorporate motor bearings that are 'sealed for life'. Should this not be the case then NADI Industrial or its agents will give special storage instructions with the equipment. (see section 8).



#### 4.0 **INSTALLATION**

- 4.1 The fan and accessories should be visually inspected to check that they have not suffered damage in transit / or at site damage. The impeller should again be rotated by hand to ensure smooth running without Fouling with the casing Tip clearance should be minimum 2to5 mm at the tip depending on the fan size.
- 4.2 The electrical supply for the fan unit must be in accordance with the fan name plate stamping and subject to normal supply tolerances and design conditions.
- 4.3 If the fan unit incorporates an external terminal box on its casing, then flexible conduit should be used for connection to the box.

**NOTE:** The flexible conduit must not be used as an earth conductor. The wiring diagram within this terminal enclosure or the motor terminal box if appropriate will contain an electrical connection diagram - **IF IN DOUBT CONTACT NADI FOR CLARIFICATION.**

If the Fan is mounted in the open (without a shelter) please ensure that the fan Terminal Box is located above the center line in the Horizontal plane. This will prevent water sea page into the Terminal Box.

- 4.4 Any fuse ratings should be sufficient to withstand the starting current however they should not be used for the purpose of overload protection.
- 4.5 Motor must be protected by an appropriate starter with appropriate rating of overload relay and a no volt coil.

#### 5.0 **ACCESSORY INSTALLATION**

- 5.1 DAMPERS** – Damper blades should be rotated to ensure operation. If not bolted to the fan unit at works, its orientation and operation should be checked carefully before installation.
- 5.2 FLEXIBLE CONNECTIONS** – Care must be taken to ensure that they are not fitted to systems where duct misalignment is present. They should be installed and adjusted so that they are not ‘over taut’ yet not over slack - please ensure that upon fan operation they are not drawn in to the fan/duct **as this can break the fan blades.**
- 5.3 ANTI-VIBRATION MOUNTING** – These will be of rubber or spring type in compression and placed under the feet attached to the fan unit.

- 5.4** Sometimes fan blades may brake due to Resonance caused by adverse vibrations from adjoining Equipment (like EOT have Etc.) So that the fan equipment does not receive such adverse condition it is recommended that full unit isolation is employed.
- 5.5** The fan units must not receive any external forces such that deformation or undue load is imparted upon it that may affect its safe operation or limit its life. Whilst fans are in some instances 'hard connected' to adjacent structures/plenums, if the fan unit is expected to carry a load in excess of its own weight then NADI or its agents must be contacted and agreement obtained.
- 5.6** If concern exists as to resulting sound levels, then attenuation of fan and / or acoustic jackets for site fitment can be supplied.
- 5.7** It is paramount that when the fan unit is installed, due attention is paid to the arrows indicating the airflow direction & direction of rotation.
- 5.8** The ducts must be fully cleaned of debris of any kind (especially pieces of stone) concrete, wood, cloth etc as these could damage the blades or even break them when the fan is started.
- 6.0 START UP**
- 6.1 Once all electrical circuits have been checked with the supplied connection diagram, power can be supplied to the starter. Sometimes the fan casing might have become out of shape in transit. If that happens then the ovality will have to be removed before further running.
- 6.2 a) Switch on initially for a few seconds & check the direction of rotation of the impeller as well as the direction of the airflow. Should impeller foul with casing or flexible canvass (at the inlet) then the unit should not be run until a check has been made of the running clearance between the impeller and casing/inlet and this is made as even as possible. If the impeller needs centralizing within the casing, then this must be carried out prior to any further running.
- 6.3 At sites where there are lot of birds (especially Pigeons) care must be taken before starting the fan that any Bird droppings settled on the blades are removed as this may cause unbalance and result in excess vibration / breakage of blades. (Particular GRP Blades)
- 6.4 A further run of about 30 minutes' duration should be made so as to ensure smooth, trouble free operation.



6.5 Once these check runs have been satisfactorily carried out and the equipment checked as a total installation, then it may be considered to be adequately installed and operational if paragraph 6.4 is met.

## **7.0 FAN MAINTENANCE**

7.1 Due to different conditions of operation, no rigid inspection and maintenance schedule can be recommended. It is suggested therefore that inspection and, if necessary fan cleaning (by non-abrasive means) is carried out at regular intervals of at least 2000 running hours or every 3 months, whichever is sooner.

7.2 All fastenings, of whatever type should be checked for tightness. The integrity of the rotating items should be checked.

7.3 Bearings are normally sealed for life type hence will not need detailed inspection. Motor cleanliness must be checked especially in relation to its cooling fan.

7.4 If it becomes necessary on AXIAL FANS to change the blade angle then NADI Industrial or its agents should be contacted and detailed instructions received together with any limitations of change/use.

7.5 If it should be necessary to remove the impeller take care that no undue force is applied. By removal of the central hub bolt and washer the impellers can be removed by pulling on the outside diameter of the hub. Not the blades – which may Break) A Puller can also be used.

7.6 Fan accessories should be checked, cleaned and replaced as necessary. Contact NADI Industrial or its agents for clarification if required.

## **8 ADDITIONAL CONSIDERATIONS**

8.1 Appendix 1- Extended warranty and preservation procedures.

8.2 VISUAL INSPECTION- visually inspect each piece for equipments for outward Signs of damage. Record any evidence of possible damage.

8.3 ALL BEARINGS- To reduce the risk of Brine ling of the bearing, rotate fans each week by hand. Leave impeller in a different position.

- 8.4 STORAGE- Equipment must be stored in dry dust free area at a constant temperature of 20-degree C with relative humidity of not more than 65%RH. If in India & stored at higher humidity the motor should be heated & subjected to Insulation test before startup
- 8.5 In the event of a claim under warrantee, evidence must be produced that, on Commissioning, a qualified engineer established that: -
- a) The bearings and bearing grease were in good condition and showing no signs of deterioration
  - b) The insulation resistance was above 1 megohm.
  - c) A record is produced as evidence that all procedures have been carried out.

## **9 BEARING**

Fan motors should be stored in an area free from any source of vibration since this can cause premature bearings failure due to static indentation (BRINELLING)

Motor shafts should be rotated weekly by hand.

## **10 LUBRICATION**

Motor bearings are lubricated at the factory for the shelf life of the grease (approximately 4 years)

## **11 CONDENSATION**

Motors should be stored in a warmed, ventilated store to minimize the risk of condensation.

- a. If motor is provided with drain holes. The drain holes should be kept open and clean. In storage the motors should be stood such that the drain holes are at the lowest point so that any condensation which does occur will escape.



- b. Motor without drain holes provided that the environment is warmed and ventilated no action is necessary, although a periodic insulation test is advisable (approximately every 3 months) to ensure it is maintained above 1 megohm.

If motors are to be used or stored in cold and / or damp environments, we recommend the fitting of anti-condensation heaters: the heaters should be permanently energized if stored in these conditions.

N.B. Heater circuit to be isolated before inspection. Periodically, the insulation resistance to earth should be checked using a 500-volt insulation tester.

IF IN A HAZARDOUS AREA USE AN "EX" MEGGER.

DO NOT USE A TEST VOLTAGE IN EXCESS OF 500 VOLTS

DO NOT APPLY TEST TO THERMISTORS (IF FITTED)

(When checking for continuity of thermistors, voltage must not exceed 6v)

If the insulation resistance has fallen below 1 megohm, the motor will need to be dried out. This can be carried out as follows:

It is preferable to dismantle the fan to the point where the motor can be removed.

Note: NO HAZARDOUS AREA MOTOR SHOULD BE DISMANTLED BY PERSONS OTHER THAN THOSE AUTHORISED TO DO SO. UNAUTHORISED DISMANTLING / ASSEMBLY MAY INTRODUCE THE RISK OF EXPLOSION DUE TO INCORRECT ASSEMBLY AND WILL INVALIDATE THE BASEEFA Flame Proof GMS CERTIFICATE.

- (i) Place the stator and rotor in a warm air stream (fan or convector heater) or in an oven with a temperature not exceeding 80 deg.c (This method is better if the motor is dismantled)
- (ii) Inject a low voltage 3 phase supply so that 50 to 60% of full load current is circulated through the windings :

If this is carried out on an assembled motor, it is possible although unlikely that the rotor will turn. If so, the rotor will have to be locked.



- (iii) Connect two phases in parallel end with these in series with the third, inject a low voltage D.C supply so that 50 to 60% of full load current flows. Whichever method is used the temperature must be limited and not exceed 80 deg.c

It should be borne in mind that the cage rotor will require drying out as well as the stator windings and if the drying process is carried out in the assembled state, the windings will dry out more quickly than the rotor and so due allowance should be made.

## **12. COMMISSIONING**

It is important that final check is made just prior to commissioning to ensure that:

- A. The bearings and grease are in satisfactory condition and showing no sign of deterioration.
- B. The insulation resistance is above 1 megohm
- C. Ventilation slots in the motor fan cover (including the openings between the cover and the stator ribs) are not blocked.

In the event of a claim under guarantee, NADI would require evidence in the form of a commissioning certificate, and that a qualified engineer had carried out the necessary procedures and established that the motor was in satisfactory condition on commissioning.

## **13. STORAGE OF MOTORS**

When motors are to be stored in packing cases in an outside environment and / or subject to variation in ambient temperature and humidity it is important that the motors are packed by specialist packers, in suitable cases with silica gel to meet the specific conditions.

It is important that the storage area is free from any source of vibration.

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