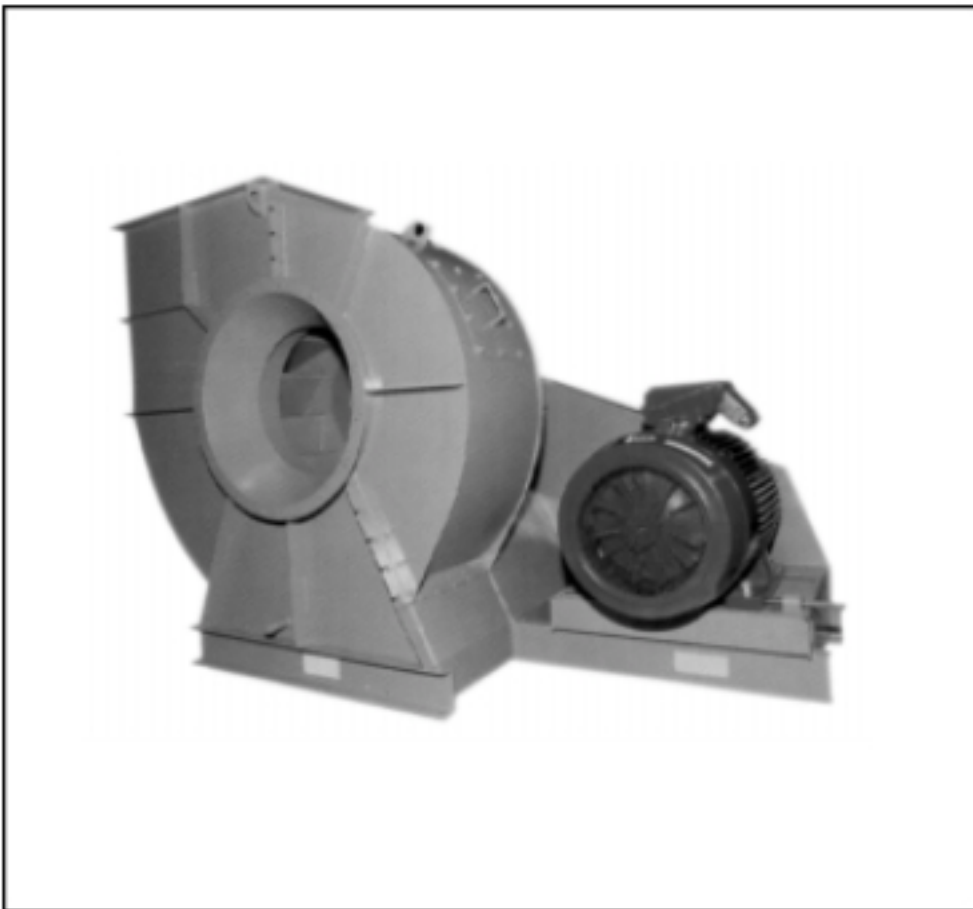


Europal



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Create by :	Checked by :	Approved by :
J.L. SACARD	P. GRASSI	A. GODICHON

GENERAL INSTRUCTIONS

The purchaser will verify that the fan technology described (fan data, general drawing) complies with the objectives and fan environment constraints (driving system, bearings, supporting, foundations, duct design)..

The purchaser will commit himself :

- ♦ to verify inlet and outlet sections, their locations, and rotational direction of the impeller
- ♦ to install the fan for good operating conditions, in particular :

The foundation structure must be of sufficient mass and stiffness. We recommend to have the first vibration mode of the structure at a frequency at least 40% higher than the fan rotation frequency.

- ♦ to take all necessary measures to prevent vibrations, in particular :

The structure stiffness must be sufficient to keep the alignment of the shaft line components.

The fan must be free of any duct reaction.

- ♦ to follow the instructions given in the assembly and maintenance manual.
- ♦ to modify the installation according to the specifications given in the documents by the fan supplier.
- ♦ to verify that all other components attached to the fan are in good operating conditions when only a new rotor or a new fan is installed.

1 - INTRODUCTION

You have just acquired an EUROPAL fan.

This is a compact fan, designed to be integrated into an industrial-type installation and fitted in-factory with an access door, a casing drain, guards etc...

Further accessories for making the fan easier to install and to operate can be added on request.

For further details concerning this point, please refer to paragraph 2 in this maintenance manual.

Characteristics of the l'EUROPAL	
Air volume	up to 100 m ³ /s
Pressure	up to 26 kPa
Temperature	from -20°C to 350°C

NB : Before fitting your fan and running it, read this maintenance manual carefully

2 - SERVICES

During fitting, commissioning, operating and maintenance phases, Flakt Solyvent-Ventec is at your disposal for any further information or services which you may require, whether this be simply requests for information or the performance of the entire range of operations listed above.

For this, please contact our Customer Services Department at the following number :

**Flakt Solyvent-Ventec
Customer Services
Department France
Phone : +33 3 85 41 73 11**

Flakt Solyvent-Ventec can also offer further accessories, spare parts and complete fans.

For this please contact our commercial dept :

**Flakt Solyvent-Ventec
Phone : +33 3 85 41 73 11
Fax : +33 3 85 41 73 22**

Important : When calling, please give your fan series number and the type of equipmet, so that we can locate your fan quickly.

You will find this information on the identification plate fastened to the casing back plate of the fan. In order to avoid problems arising should this plate become lost or damaged, we suggest that you store the identification sheets attached to this maintenance manual.

3 - DESCRIPTION

3.1 - Belt driven

Belt driven fans are single block fans featuring an impeller directly mounted on the shaft.

NB : These fans do not require any base frame, as it is already integrated in fan structure.

They are composed of :

- An impeller
- A pedestral
- A casing stand
- An inlet cone
- A motor (following request)
- A set of bearings/shaft.
- A drive unit or transmission
- A cooling disk and guard following temperature
- A shaft line guard
- A drive guard

Warning : These **appliances must not be used above nominal speed**, otherwise set of bearings/shaft and/or impeller damage may ensue.

Please consult us if any other information necessary.

3.2 - Direct drive

Direct drive fans are single block fans featuring an impeller mounted on a shaft line directly coupled with the motor shaft. Composition is the same as describe one § 3-1, transmission is realised with an elastic coupling.

In the case of a direct drive fan, please refer to the particular manual of the coupling provide, joint at the end of this manual, please do not take in account in this notice all the parts concerning belt and pulley.

In the case of a shaft line with oil bearing that you can easily recognize with oil level control on the bearing, please refer to the particular manual "**Control start up0. and Maintenance of oil bearing**"

Your fan can also be fitted with special accessories like special sealing, temperature control, vibration control, filter. For all these accessories please refer to the specific annexes at the end of this manual.

4 - PACKING

All EUROPAL fans are delivered (unless otherwise requested) fixed on to standardized pallets or free on truck, for easy handling with a fork-lift truck or pallet transporter.

5 - INSPECTION ON DELIVERY

As soon as the equipment is delivered, check the general condition carefully, paying particular attention to parts which are likely to have suffered during transport (motor, inlet flange, outlet flange, guards, etc...)

In case of damage, make all due reserves to the carrier and inform Flakt Solyvent-Ventec immediately for action and/or information.

Check next that the fan as delivered is suitable for the intended application (inlet diameter, outlet sizes, speed of rotation, desired characteristics etc...) and check that the information on the identification plate corresponds to the order receipt acknowledgement in your possession.

Check that all accessories have been delivered.

NB : If you are taking the fan directly from our factory, please make any necessary reserves to our Dispatching Service when the equipment is handed over.

6 - HANDLING

Handle the fan carefully, using appropriate handling equipment :

- Fork-lift trucks or pallet transporters fitted with the appropriate forks.
- Lifting devices with adequate capacity.

To do this, use either the pallet supplied with the fan or the principle lifting points (marked yellow) found on the main casing.

Use preferably flexible slings of suitable capacity and length, enabling the fan to be held as horizontally as possible.

Lifting points exist both on the motor and the removable part of the casing. They can be used with extreme care only with a part charge in the placing of the flexible slings. In this case, be careful not to strain the outlet frame.

Very important : **Neither** lifting points **nor** the fan accessories **must be used** to directly handle the fan

After handling, make sure that none of the parts making up the impeller has suffered shock and/or bending. If this is not the case, balancing may be defective : please consult us.

If the fans is ultimately to be transported, leave it on its pallets or original packing and respect these instructions for the other handling operations.

7 - STORAGE

If the fan is to be stored between the date of delivery and the time when it is to be used, store it in a cool, dry room, after plugging its inlets and outlets to avoid any objects accidentally falling inside (this could damage the impeller and throw it off balance).

NB : If it is not possible to store the fan inside, store it in a sheltered place and carry out the conservation operations recommended for long term storage.

Before any long period of storage carry out the following operations :

- Fill the end bearing housings with grease to protect the bearings from corrosion.
- Grease the invarnished mechanical parts likely to rust.
- Slacken off the belts and remove them if necessary (in this case store them in a cool dry place).
- Cover the fan with a tarpaulin or a plastic sheet.

NB : Humidity and heat are damageable for the good behaviour of belts.

8 - INSPECTION BEFORE INSTALLATION

Before setting up the fan in the place where it is to operate, check that :

- The electrical characteristics of the motor are compatible with the power supply voltage and/or the intended start-up mode.
- The resistance insulation and winding continuity are normal.

NB : If one of the motor windings is not sufficiently continuous , or if the resistance (in ohms) does not exceed 1 000 ohms per power supply volt, or at least 400 to 500 000 ohms, please refer to the "Trouble-shooting" appendix.

9 - INSTALLATION

9.1 - Rigid fastening

When it is intended to fix the fan in this way, the ideal solution is to use a base of reinforced concrete equal to at least 10 times the mass of the fan.

If this is not possible, ensure that the surface on which the fan is to be placed is sturdy, flat and rigid. The concrete slab or metal structure which is to receive the fan must meet with these criteria.

Important : An insufficiently rigid structure tends to bend under the weight of the fan, which can lead to serious vibrational problems owing to the sympathetic resonance of the structure, and eventually to fan damage.

Before fixing the fan to the ground, allow if necessary for linking up inlet and outlet ducts.

If these are already fitted mount the fan in relation to the duct flanges and/or frames, taking care to ensure correct centering and alignment.

NB : At this stage, do not connect the fan to the upstream ducts (do not bolt in place)

As far as possible, remove or do not mount the duct sections immediately adjacent upstream and downstream of the fan so as to be able to carry out the inspections detailed in § 9.3.

If the surface on which the fan is to be placed is not flat, chock up the fan at each of these fixing points before it is bolted up permanently.

Important : Take care not to deform the fan structure when bolting up, as the high internal strains set up could cause serious vibrational problems when the fan is put into operation.

If the fan is to be sealed to the ground, offer up the fan and chock it so as to obtain satisfactory horizontal alignment along two orthogonal axes. Next, place the bolts in the fitting holes, without tightening the nuts. Seal the bolts and allow 24 to 28 hours for the cement to set.

Warning : The use of "quick-setting cement" is prohibited. Wait until the cement is completely set before switching on the fan.

When the anchoring bolts are completely set, make any necessary adjustments to the chocks, taking care not to deform the structure.

9.2. - Mounting on A.V. pads.

If the fan is to be mounted on anti-vibration pads, use only pads recommended or calculated by Flakt Solyvent-Ventec.

Proceed as described in paragraph 9.1 for preparing the surface and mounting the fan in relation to the ducts.

Important : For this set up, the fan must be connected up to the ducts via flexible connection sleeves.

9.3. - Inspections before connecting up

The shaft is blocked during transport with a strap you have to remove it before inspection. If the fan has been stored over a long period and has been prepared for this storage as indicated in paragraph 7, first carry out the following operations :

- Clean the bearing housings and the bearings.
- Replace the grease used for corrosion protection with new grease (see "Greasing" appendix).
- Clean the unvarnished mechanical parts and protect them from rust (oil).
- Refit the belts if they have been removed (replace them if they show signs of damage or wear).
- Retighten them in accordance with Flakt Solyvent-Ventec instructions.
- Check the alignment of the drive pulleys and correct if necessary.
- Check the belt tension and correct if necessary.

NB : For more details about all these operations, refer to the "drive unit" appendix.

Then proceed as follows :

- Dismantle any inlet accessories.
- Check the centering and the positioning of the inlet cone and adjust where necessary (see "Inlet cone adjustment" appendix).
- Check that there are no foreign bodies inside the casing.
- Check that none of the constituent parts of the impeller has been damaged (see paragraph 6 in case of damage).
- Check by hand that the impeller turns freely, with no stiff points.
- Check the condition of the bearing housings and bearings.
- Check that the bearing housing bases and caps are sufficiently tight and retighten if necessary.
- Put back the inlet accessories if these have been removed prior to inspection.
- Check that the bolts of all accessories which may be fitted to the fan are tight. Tighten where necessary.

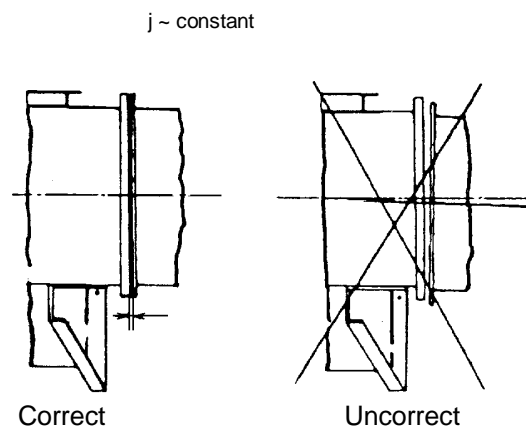
- Check the position on the inlet vane if the fan is provided with one and put it in closed position if necessary.

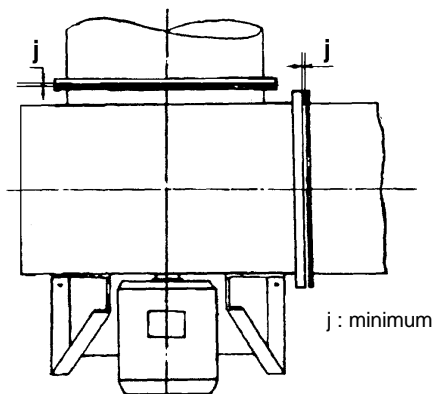
9.4. - Connection

Before connecting up the fan to the upstream and/or down-stream ducts, check that these do not place any excessive strain on the casing (through weighing down, dilating etc...).

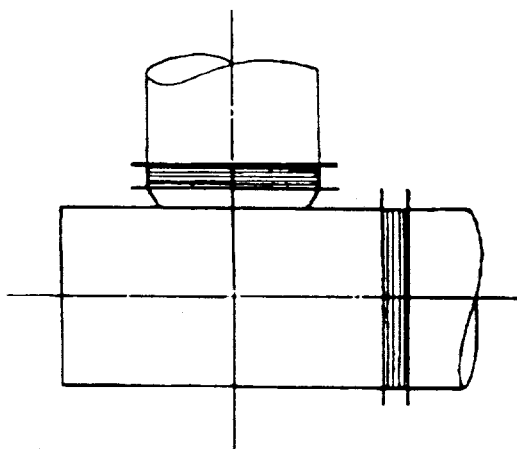
In all cases (with the fan connected up with or without flexible connection sleeves), carefully line up the ducts in relation to the fan flanges, taking special care to limit to a minimum all defects of alignment and centering at this points.

In no case should the attachment bolts be used to stretch the ducts into place. First reduce the gap to the absolute minimum before assembling between flanges of the fan and of the ducts.

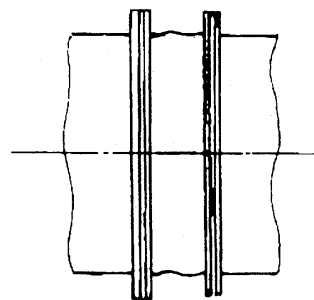




Where possible, use flexible connection sleeves to isolate the fan from the duct network and vice versa. This will be beneficial to the whole installation.



If sleeves are used, avoid any form of assembly which puts them under tension : they must be mounted slack.



Important : For the upstream and down-stream ducts, provide supports and collars necessary for taking up the weight, forces and dilation which the ducts might transmit to the fan (risk of damage to the windings).

9.5 - Safety Protection

Depending on operating conditions, regulation requires that safety equipment be provided to ensure efficient protection against mechanical risks due to moving parts.

EUROPAL fans are fitted with shaft line guards, cooling disk guards and drive guards as standard. If your fan is not connected up on either the inlet or the outlet side, it must be provided with safety wire guards as required by regulation.

If your fan is not fitted with wire guards and must operate in such a way as to make such devices necessary, Flakt Solyvent-Ventec can provide wire guards specially designed for EUROPAL's, giving low load loss : please contact us.

Warning : In case of accident, Flakt Solyvent-Ventec cannot be held liable if the equipment delivered is not fitted with the safety wire guards required by regulation..

10 - ELECTRICAL CONNECTION

The fan must never be connected to the electrical network without including one or more circuit breaking devices enabling human intervention for examination or maintenance to be carried out in safety.

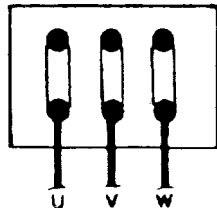
In the same way, electrical protection must be provided for the motor to prevent overloading or two-phases operation in the event of an incident occurring.

Isolator switches, differential circuit-breakers, heat relays, fuses (etc..) should be used to achieve this.

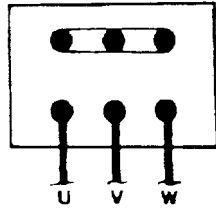
In all cases, use adequately sized power cables having an external dimension compatible with the size of the motor terminal box cable glands.

Depending on the network voltage, consult the diagram inside the motor terminal box before deciding on the required wiring and position of the connecting strips.

Couplage Δ



Couplage Y



If it is planned to use a star-up device, consult the instructions supplied with the switching box.

Important : The motor must be connected to earth. Never touch the internal motor connections (damage to the windings may ensue). If power is to be supplied via long cables, take on-line losses into account when dimensioning the cable.

11 - COMMISSIONING

Caution when you stop a fan transporting hot gaz :

- The stopping could be done only when the gaz temperature will be below 200°C.

11.1 - First-time fan rotation.

When the fan is switched on for the first time, check immediately that the impeller is rotating in the right direction (this is shown by the arrow on the casing back plate.)

If the impeller turns the wrong way, stop the fan immediately and change the motor cabling.

Remove the draining plug

11.2 Inspection after switching on

If the fan is fitted with an inlet vane, open it progressively and then carry out the following inspections :

- Check the on-line amperage upstream of the motor and compare it with the rated voltage shown on the motor plate.

- Check the fan rotation speed and compare it with the value shown on the documents relating to the order.

Warning : If the amperage or the rotation speed is higher than the expected values, stop the fan immediately..

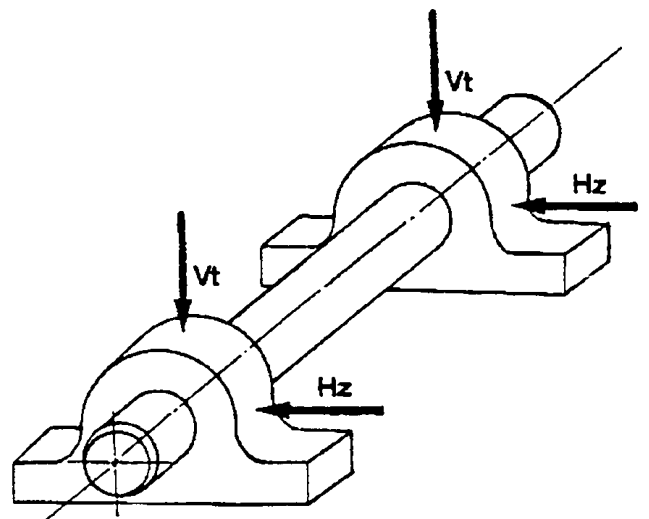
In case of belt pulley transmission, first check that the pulleys have not been changed round. If so, strip down the drive unit, change over the pulleys and put them back properly (see "drive unit appendix"). If not, refer to the "troubles shooting" appendix.

Once these preliminary inspections have been carried out, check the mechanical parts as follows :

- Check the sound level emitted by the motor bearings : it must be gentle and even, with no metallic noises.
- Check the operating temperature of the bearings: for an ambient temperature of 20°C, this may initially reach 80°C then decrease to stabilise at around 70°C.

If the ambient temperature around the bearing is different, take into account the difference relative to 20°C (example: ambient temperature: 40°C - stabilised temperature: 90°C - the operating temperature of the bearing is therefore correct: 50°C above the ambient temperature).

- If you have the necessary equipment available (vibrometer), check also the vibrational levels around the motor bearings.



These levels must be checked around the bearings along two vertical and horizontal directions perpendicular to the rotational axis of the motor. They must be less than or equal to the overall levels given

below (apart from specific contractual values defined when ordering).

Maximum vibration speed = 7,1 mm/s

NB : .These vibrational levels are overall RMS levels in conformity with international standard between 10 and 1000 hz.

If in doubt or if you are unable to carry out these inspections, please contact our Customer Services Department for checking.
If everything is normal; let the fan run for about 24-48 hours.

After this first operating period ("running-in"), stop the fan and visually inspect the condition of the transmission or coupling.

Important : If the drive belts show unsymmetrical wear on both side.

Replace the whole belts after looking into the cause of this defect (pulley alignment, belt tension etc...)

Carry out the above inspections a second time. If everything is normal, carry out definitive commissioning.

Warning : Never restretch the belts after running-in : damage to the bearings may ensue.

11.3 - Operating guarantees

Unless otherwise stipulated, our guarantee covers fans carrying clean air under normal temperature conditions (20°). It is only applicable if all the instructions dealt with in this manual have been respected and the fan is being used within the temperature and speed for which it has been designed.

12 - MAINTENANCE

Complete and regular periodic maintenance is recommended if your fan is to operate as efficiently as possible. This will protect you from any component failure.

A reasonable rate for stopping the fan to carry out the cleaning and maintenance operations described below is once a year.

NB : .When operating conditions require frequent greasing (high speeds, difficult operating conditions etc...) do not hesitate to change the grease several times during operation (motors controlled with greasers).

Before working on the fan, perform the electrical lock-out or even disconnect the power supply cable.

12.1 - Static parts

If possible, disconnect the fan from the duct network and dismantle the casing stand, the inlet cone, and tightness plate.

Then proceed as follows :

- Carefully clean the inner plates of the casing, the inlet cone and (if possible) the upstream and downstream ducts.
- Check that the casing drain is not blocked and unblock it if necessary.
- Clean the impeller (see paragraph 12.2) and then refit the inlet cone the casing stand and the tightness
- Reconnect the fan to the duct network where applicable.
- Finally, clean the outside of the fan.

Warning : Take care never to leave objects inside the fan (damage to the impeller may ensue).

12.2 - Impeller

A visiting door on the casing allow periodical inspection.

Proceed as follows :

- Remove any traces of clogging which could lead to significant and dangerous imbalance of the impeller.
- Check the condition of welds. Make sure there is no trace of corrosion or rubbing.

NB : If cracking, corrosion or wear is starting, note the position and the dimension of the defects, check the residual thickness of the parts concerned and contact us before undertaking any repair work..

After cleaning and/or unclogging the impeller, we recommend having the impeller balance checked in situ.

12.3 - Pulleys/Drive belts

Remove the drive guard and proceed as follows

- Carefully clean the drive belts on all sides and check for signs of wear.
- Carefully clean the pulleys, paying particular attention to the grooves.
- Check pulley alignment (see "drive unit" appendix) and correct any defects which may come to light.
- Check belt tension and correct where necessary (see "drive unit" appendix).

Warning :.If belt tension has to be corrected it is essential to use the method described in the "drive unit" appendix.

- Clean the inside surfaces and the ventilation openings of the guard and its cover.
- Refit the drive guard cover, making sure to put back all the screws.

Important : Do not use any solvent which may damage the belts during these cleaning operations. In case of asymmetrical wear on the belts sides, or if one of the belts shows signs of damage (wear, aging, start of splitting etc...), change the belt completely.

12.4 - Bearing housings

12.4.1 - Grease bearing

If the fan was ordered with greasers proceed as follows :

- Remove the shaft line guard,
- Remove the excess grease which accumulates at the grease outlet hole (at the bottom of the bearing housings).
- Clean the greaser heads.
- Clean the outside of the bearing housings.
- Remove their caps.
- Remove the used grease.
- Clean the inside of the bearing housing and the bearings and inspect visually.

Warning : a polluted bearing will have a much shorter life span and could even deteriorate quickly. It is therefore important to take particular care and to use clean materials for these operations (rags,brushes etc...).

If in doubt, do not hesitate to replace the bearings of your fan. In this case, refer to the manufacturer's instructions, particularly as far as tightening the conical rings upon reassembly is concerned.

Warning : if the rings are too tight, the end shields will heat and the bearing will be damaged.

Then proceed as follows :

- Top up with new grease (see "Greasing" appendix)
- Refit the end bearing housing caps, taking care to position them correctly.
- Turn the shaft line by hand : it should turn positions freely, with no stiff points.

NB : In case of doubt, or if a problem arises after this inspection, dismantle the caps again and look for the possible cause of defect.

12.4.2 - Oil bearing

If your fan is provide with oil bearing please refer to the appendix oil bearing.

12.5 - Motor

Proceed as follows after breaking the feeding :

- Clean outside paying particular attention to the ventilation openings.
- Visually inspect the power supply cable and its cable gland.
- Remove the terminal box cover.
- Check the connections of the power supply cable on the terminal block.
- Tighten the cables if necessary
- Carefully close the terminal box, checking that the leaktight seal is in place (where fitted).

NB : Refer to the "Motor" appendix for detailed maintenance instructions..

12.6 - Miscellaneous.

Finally, retighten the bolts and grease the unvarnished mechanical parts which are likely to rust.

13 - TROUBLE SHOOTING

Should malfunctions occur on commissioning or during operation, first refer to the Trouble shooting appendix in this Maintenance manual before calling on our Customer Services Department.

In all cases, follow the suggested procedure : you will mostly be able to carry out the repair work yourself and if not you will be able to let our technicians have valuable information which will enable them to analyse the problem and to determine its cause.

14 - DISMANTLING/REFITTING

In practice, it is rare to have to dismantle a fan completely since any mechanical parts (bearings, bearing housings, pulleys, belts etc...) can usually be replaced without dismantling the casing and generally the impeller.

If it is planned to completely replace the shaft line, this can be done without having to separate the bearing housings, the bearings and the shaft. The shaft line can be withdrawn in one piece after removing the casing stand, the inlet cone and the tightness and then the access door behind the fan pulley.

NB : For more details concerning all these operations, refer to the "DISMANTLING-REASSEMBLY" appendix.

15 - MISCELLANEOUS

EUROPAL is fitted with a gastightness device limiting the rate of leakage around the hub hole in the casing back plate.

This device is made up of a brass plate which rubs against the barrel of the impeller hub, grinding against it after a few minutes of operation.

When the fan is started up, rubbing may occur at this point, quickly disappearing after the shaft seal plate has ground in : this is quite normal.

If the noise persists, stop the fan and alter the position of this plate until the rubbing disappears.