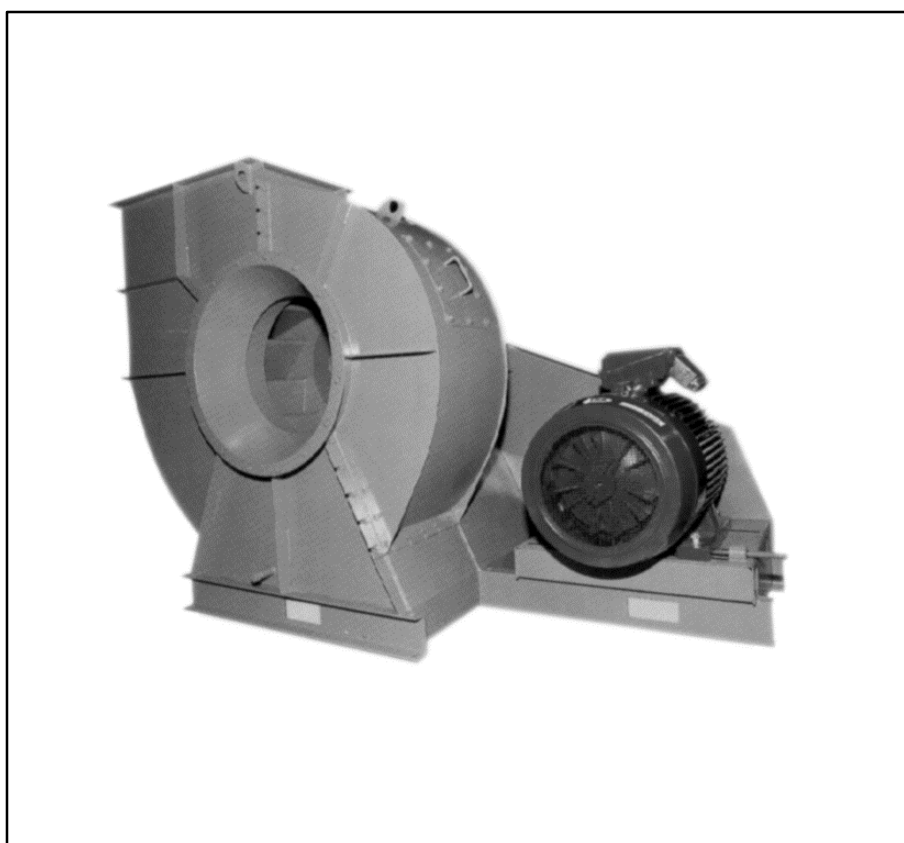


Europal



Fläkt Solyvent-Ventec

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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, ABB 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 :

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

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

For this please contact our commercial dept :

Fläkt 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 ABB 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 ABB 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 ABB 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).

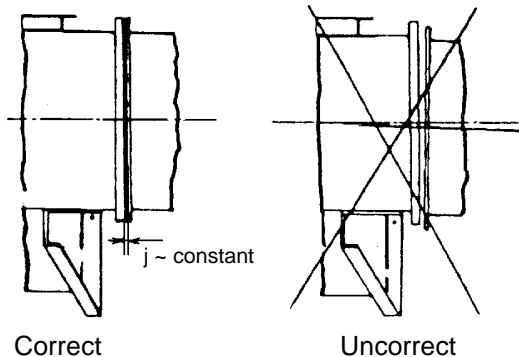
- Check by hand that the impeller turns freely, with no stiff points.
- Check the condition of the bearing housings and bearings.
- Check that the bearing housing bases and caps are sufficiently tight and retighten if necessary.
- Put back the inlet accessories if these have been removed prior to inspection.
- 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...).

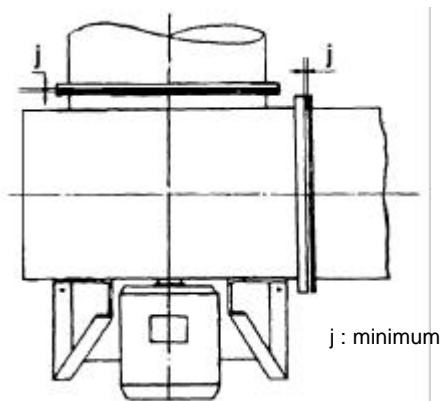
In all cases (with the fan connected up with or without flexible connection sleeves), carefully line up the ducts in relation to the fan flanges, taking special care to limit to a minimum all defects of alignment and centering at this points.

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.



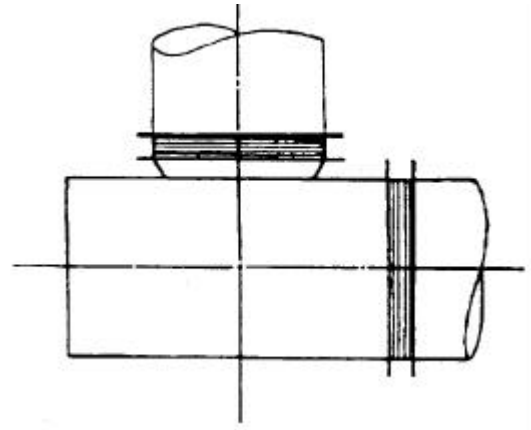
Correct

Uncorrect

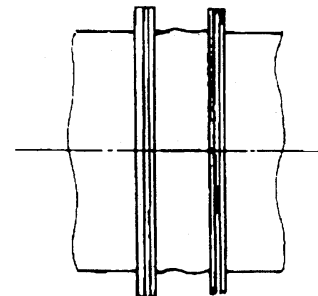


j : minimum

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, ABB Solyvent-Ventec can provide wire guards specially designed for EUROPAL's, giving low load loss : please contact us.

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

10 - ELECTRICAL CONNECTION

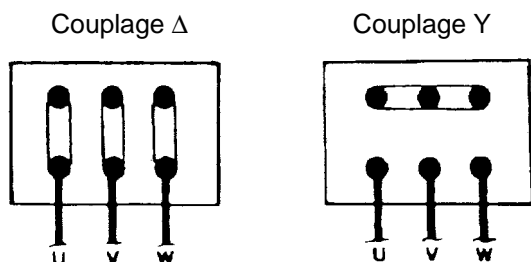
The fan must never be connected to the electrical network without including one or more circuit breaking devices enabling human intervention for examination or maintenance to be carried out in safety.

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.



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..

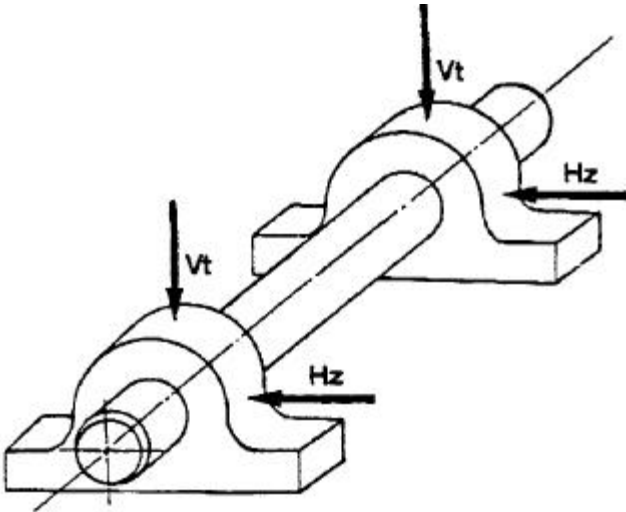
In case of belt pulley transmission, first check that the pulleys have not been changed round. If so, strip down the drive unit, change over the pulleys and put them back properly (see "drive unit appendix"). If not, refer to the "troubles shooting" appendix.

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 is 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 applicale.
- Finally, clean the outside of the fan.

Warning : Take care never lo 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 describep 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.

TROUBLE SHOOTING

COMMENTS

The aim of this list is merely to help you to find the possible origins of a problem or incident to help you either to quickly solve it or take the necessary steps. Although this list is by no mean exhaustive, we hope that it will be satisfactory for your needs.

Caution : When the material is under guarantee, do nothing to the fan : call our Customer Service Department.

Problem	Possible causes	Remedies
Motor no longer turns	Electrical failure in the motor	Have the motor checked by an electrician
Abnormal insulation resistance	Dampness in the motor	Take down the impeller and let the motor turn alone with ventilation blocked off for several hours
Motor will not start up	Motor insulation defect	Have the motor checked by an electrician
	Loss of voltage at the motor terminals	Check electric supply on the upstream en of the motor
	High torque resistance at start up	Check whether the motor is not under rated Contact us if necessary
	One of the upstream phases is cut off (motor makes a growling sound)	Check the voltage on the other phases Check the protection devices on each of the supply phases.
	Mistake in lectric connections	Check the motor wiring
	Loose contact on the motor terminal block	Check the crimping and tightening of the connection lug
	Voltage supply too low	Check the voltage at the motor terminals Check the on-line current Check the on-line losses electrical safety system triggered off at start-up
The in-rush current is too high at start up	Check the start up current	Reinforce the safety systems Use a solow fuse
	Start up time is too long	Either use another motor or a different start up procedure
Motor heats up	Mistake in electrical connection Loose contact on the motor terminal	Check the crimping and the tightness of the connection lugs
	Voltage supply too high or too low	Check the voltage at the motor terminals when on-load Check the on-line current
	Power demand too high	Reduce the fan speed Increase circuit resistance
The fan turns too quickly	The drive and receptrice pulleys have been inversed	Change the pulleys over
	Drive unit is unsuitable	Change the drive unit
	Motor speed is badly adusted	Change the motor

TROUBLE SHOOTING

Problem	Possible causes	Remedies
Rubbing noises	Impeller is rubbing against the inlet cone	Reset the inlet cone
	Shaft seal plate rubs against the hub barrel (grinding in)	Allow grinding in to continue until there is no further rubbing noises. Recentre the shaft seal plate if the noise continues
	A moving part rubs against a static part	Find the source of the noise Eliminate the fault Check that the fan is not bent. (flanging)
Belts are rubbing	Slightly slacken the belts	Check the tension and belt alignment
	One of the belts is worn out	Change the whole belt
Fan turns more slowly	Belts are slack	Check the belt tension
	Worn belts	Change the whole belt
Belts slip at start up	Belts are slack	Check the belt tension
	Start up torque too high	Get in contact with us to change the transmission
A motor or fan bearing heats up	Bearing is grinding in	Stop the fan Let it cool down and then start up again Begin this procedure again if necessary
	Incorrect mounting	Check that the bearings are properly mounted Check that they are not too tight
	Too little grease	Grease as necessary
	Grease being used is unsuitable	Clean down the bearing housings and the bearings Grease with a suitable product
A noisy motor or fan bearing	Too little grease	Grease as necessary
	Worn bearing	Change bearings
Abnormal vibrations	Deterioration in balancing Impeller wear	Check the fouling and or the amount of impeller wear Clean it down or change it if necessary Rebalance, eventually
	Worn bearing	Change the bearings
	Pumping caused by a highly reduced air volume Incorrect drive set mounting	Modify the circuit, the fan is working in an unstable area
	Excessive effort on the belts	Check belt tension Modify if necessary Please consult us
	Fan bending	Undo anchoring Wedge fan Retighten

TROUBLE SHOOTING

Problem	Possible causes	Remedies
Abnormal vibrations	Fan badly tightened (play under the anchoring)	Undo the fan Move and wedge it to the right of all the anchoring Retighten
	Natural frequency of the support structure or of the ducts	Look for the cause of the problem Reinforce the support structure or the ducts Get in touch with us
	Natural frequency due to the fan structure	Get in touch with us for an on-site analysis

DRIVE UNIT

I - INTRODUCTION

Usually all our fans are delivered with their drive units assembled and their belts tightened.

After checking alignment on site and after a wearing in time of 24 to 48 hours, it is only necessary to ensure that the recommended operating tension is respected.

2 - REMINDERS

Correct belt tension is important for the drive unit and consequently the fan, to operate properly.

If tension is too slack, this will lead to the belts slipping, which in turn leads to overheating and their rapid deterioration. This could prevent the fan from starting up (belts slipping at start up).

If the tension is too great, this will lead to an increase on the induced load by the drive unit on the shaft line and will significantly limit both the belts' life-span and that of the bearing fitted to the fan.

Make sure that the pulleys are properly lined up and parallel.

This type of fault causes belt overheating as well as symmetrical wearing and rapid deterioration. Added to this it can cause low frequency vibrations which can damage the shaft line, anchorage and the structure to which the fan is connected.

3 - TAKING DOWN

If you have to take down your fan drive unit to stock it for an extended period, change the pulleys around, replace the belts etc, and then proceed as follows :

3.1 - Belts

- Remove the drive guard cover
- Undo the access door fixing screws located behind the drive pulley
- Undo the motor fixing screws
- Move the motor using the two bolts located on the side of the motor mounting support, so that the belts are slack enough to be removed from their pulley groove
- Take off the belts without forcing them

Note : Never use a lever to force the belts out of their grooves. This could subject the steel cables to undue loads, which would lead to the lengthening and ultimate destruction of the belts.

If necessary the whole drive unit can be dismantled as follows :

3.2 - Pulleys

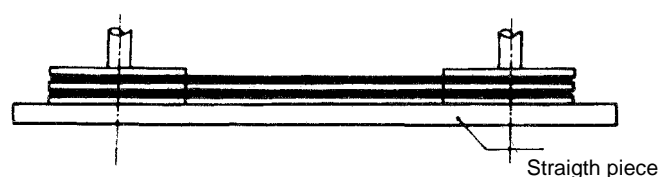
- Undo, then take out the two conical plug tightening screws on the drive pulley
- Put one of the screws into the plug extraction hole and tighten it until the plug is released.
- Dismantle the pulley/plug assembly sliding it over the shaft
- Do the same thing for the fan pulley

4 - REASSEMBLY

If the pulleys have been dismantled proceed as follows :

4.1 - Pulleys

- Slide the drive/pulley plug system over the motor shaft extension
- Block the two threaded pulley holes with the two smooth plug holes
- Slightly tighten the two tightening screws in the holes
- Position the pulley as closely as possible to the drive guard so as to restrict its overhanging (so that the fastening screws for the access door are easily accessible)
- Tighten the fastening screws so that the drive pulley on the motor shaft extension is immobilized
- Do the same thing for the fan pulley but without jamming it on the end of the shaft extension
- Provisionally align the pulleys, using a ruler flush against the bigger pulley rim as shown below :
- At the same time make sure that the motor and fan shafts are parallel
- If necessary adjust the two shaft lines so that they are parallel, altering the motor position with the two bolts located on the side of the motor support
- Then put the belts in place



4.2 - Belts

After preliminary alignment and having brought the pulleys into parallel, proceed as follows :

- Check that the pulley grooves are smooth and clean (no flaws, no rust, no warping, no impurities etc.)
- If necessary shorten the setting distance between the two shafts by adjusting the motor position.
- Put the belts into their grooves by hand, without forcing them (never use a lever : see note for paragraph 3)
- Tighten the belts slowly by adjusting the motor position using the two bolts located on the side of the motor support
- Check that the belts are properly tightened (see paragraph 6)
- Adjust the motor position to make sure that the pulleys and the two shafts lines are parallel
- Check that the pulleys are properly aligned
- Correct the alignment, but remember to take into account the fan pulley's final position after tightening
- Tighten the fastening screws on the receptrice pulley so that the fan pulley on the end of the shaft extension is immobilized
- Check the new belt tension
- Correct the tension by adjusting the motor position
- Tighten the fastening screws on the motor
- Check once again that the belts are parallel and aligned correctly
- If necessary, adjust them by loosening the motor fastening screw
- Adjust and readjust until the belt tension, the shaft line parallel and the pulley alignment are in harmony
- Tighten the motor fastening screw and reassemble the drive guard cover

Important : Take great care while carrying out these procedures as correct operation of your fan depends on them.

5 - ASSEMBLY

If you decide to assemble your drive unit yourself, it would be wise to use off the shelf belts and pulleys with conical plugs, which will make the drive unit assembly easier

Caution : In all cases have your drive unit ratified by ABB Solyvent-Ventec so as to avoid premature deterioration of the shaft line.

Proceed as follows :

- Remove drive guard cover
- Loosen access foot screws located on the motor side
- Assemble the pulleys and the belts as set out in paragraph 4.

6 - BELTS TENSION

6.1 - Measuring methods

The recommended measuring methods to set up or to check the belt tension consists of indirectly measuring the tension on one of the strands of the whole belt with a tensiometer.

To check the load F, which has to be applied by the tensiometer to obtain on one of the drive unit strands a given deflexion f.

F being directly linked to the tension per strand T_0 in the relation of,

$$F = A T_0 \text{ (in daN)}$$

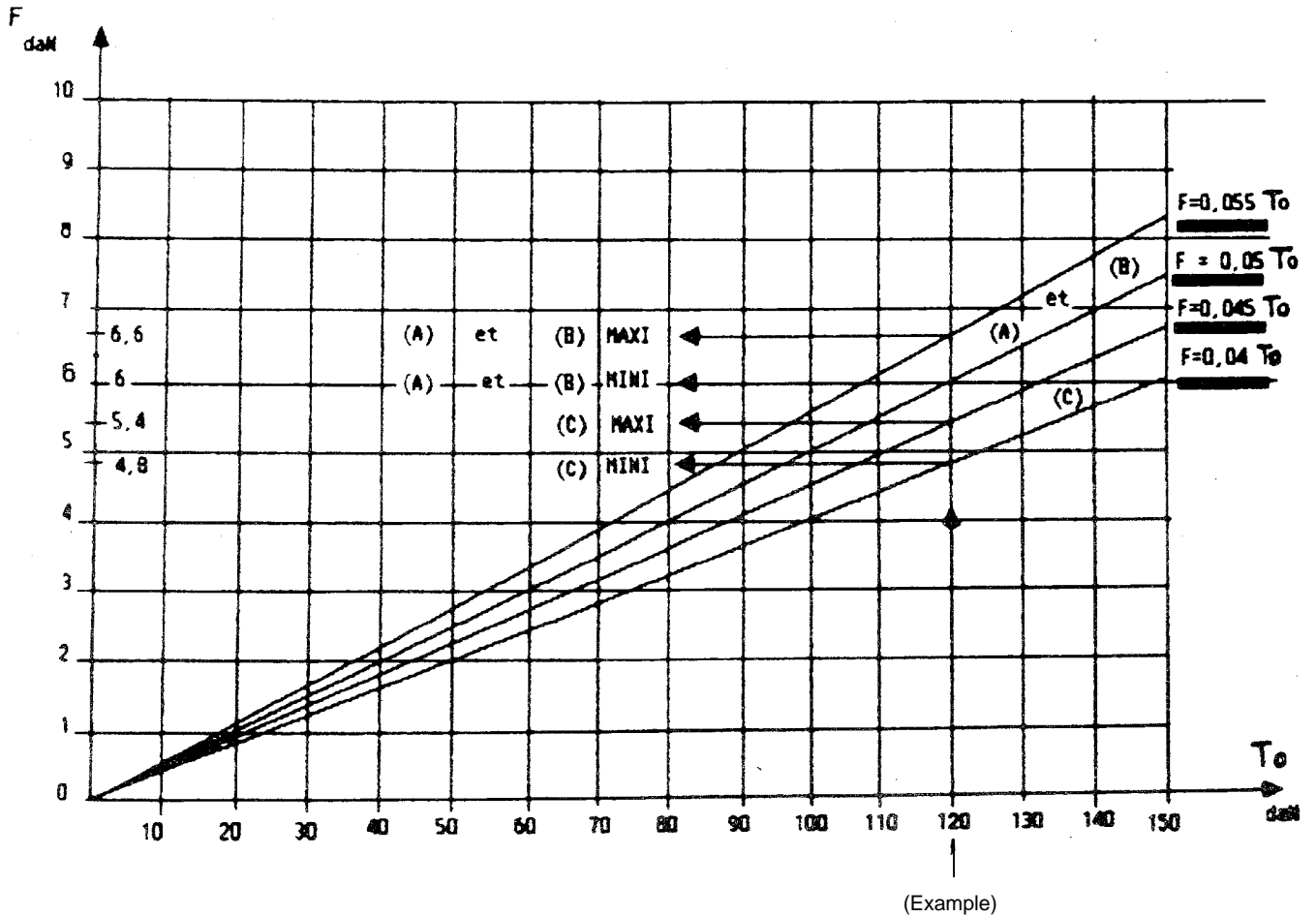
we can easily increase the tension value per strand needed in the whole belt and can adjust this value little by little following the procedure below :

- While assembling the new belts
- While checking the belt tension before commissioning the fan
- While checking the tension after grinding in or during operation
- Etc.....

Type of a operation to be undertaken	New belt tensioning	Check before commissioning	Check after grinding in and then during operation
A	0,05 to 0,055	0,05 to 0,055	0,04 to 0,045

$$F = A To$$

(F and To in daN)



Choice of To :

Belt type	A	SPA	SPB	SPC
To (daN)	24	55	90	120

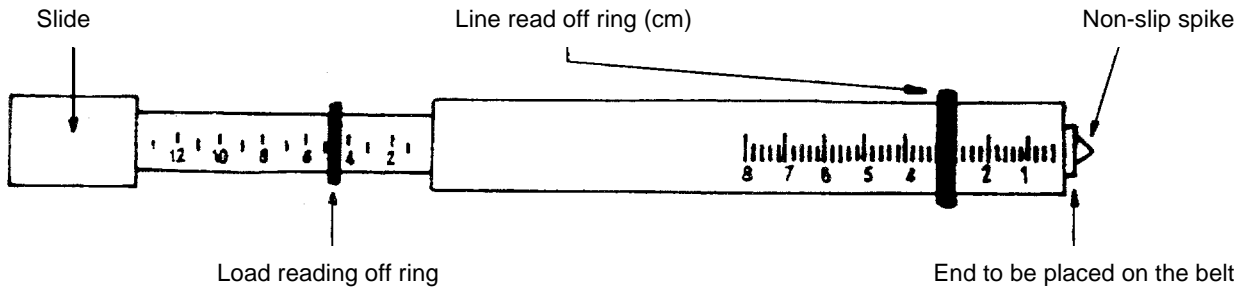


Fig 1

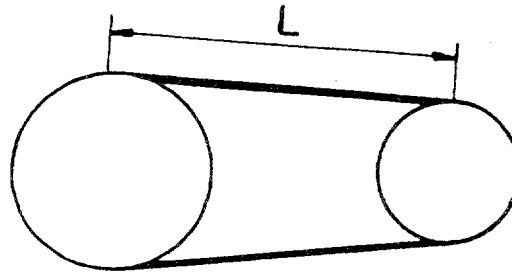


Fig 2

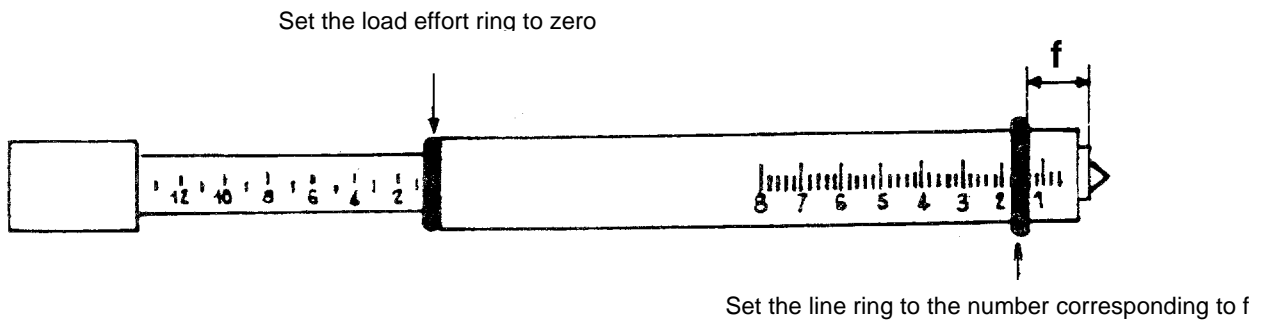


Fig 3

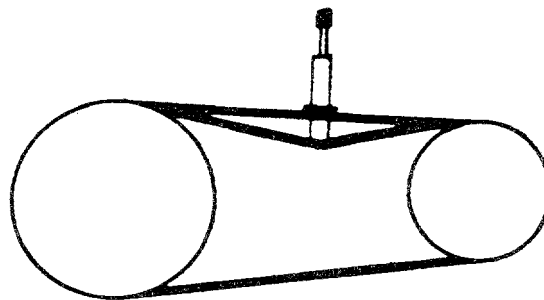


Fig 4

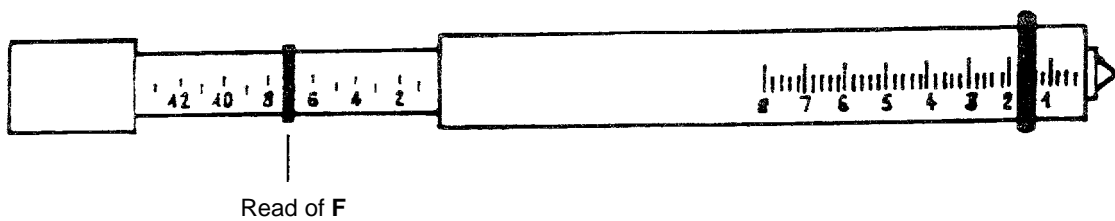


Fig 5

The different values of A, having taken into account the type of operation undertaken, are set out in the table below.

The abacus under this table will enable you to read off F according to the value of A retenue and the recommended tension per strand To

This value is valid for each of the four types of belts which can be fitted to our fans. It is shown in the table located under the abacus.

6.2 - Operation modes

To check the tension per strand in a whole belt, using a tensiometer, (figure 1) proceed as follows :

- To measure the free strand length L (figure 2) : for example 1200 mm
- To calculate the deflexion $f=L/100$ to be obtained perpendiculary at the free strand during the measurement : for example

$$F = 1200/100 = 12 \text{ mm}$$

- To set the tensiometer (see figure 3) : for example lower ring on 12 mm, upper ring on OdaN (or kgf depending on the models)
- Turn the drive unit by hand for about a minute, so as to put the belts in place and to spread the loads
- Place the tensiometer in the middle of the free strand on which the measurement is to be taken (perpendicular to the strand : see figure 4)
- Apply pressure on the end of the tensiometer until the calculated deflexion is reached (the lower ring must be flush to the non-sagging bent strand).
- Take the tensiometer away and let the belt take up its place
- Read off F on the second scale to the right of the second ring : for example 7 daN

For a SPC belt whose To is 120 daN, we should have found F between 6 and 6.6 daN. Under these conditions the belts would have to be slightly slackened.

Depending on the result obtained, you will have to carry out the same procedure or to slightly retighten the belts.

Systematically carry out this procedure after all modifications in tension until obtaining a value for F in the required margin.

Note : If you take down a drive unit and reassemble it without changing the belts take

$0,04 \leq A \leq 0,045$: these belts have been ground in.

If the drive unit has only one strand, put a ruler at a tangent to the two pulleys to measure off f.

7 - MAINTENANCE

Make sure that the belts and pulley grooves are always clean.

Never use products which could enhance belt adherence.

They are of no use and often harmful.

Make sure that the belts are regularly replaced by systematically changing the whole belt system each time.

INLET CONE SETTING

1 - INTRODUCTION

So as to ensure the best air supply possible to the impellers by the inlet cones, the radius clearance and the penetration required by these two parts.

2 - RADIUS CLEARANCE

The radius clearance must be as uniform as possible and it should be checked that the inlet cone outlet is concentric with the impeller shroud.

The radius clearance is set in our factory and must not be modified. If it has been modified accidentally please correct as follows :

- Undo the inlet cone fixing screw.
- Slide it around either by hitting it with the palm of your hand or with a mallet.
- Check that the clearance is equally distributed.
- If necessary go through this operation again and again until the two parts are in the correct position relative to each other.

Retighten the inlet cone fixing screws.

In case of fan with hot gaz the inlet is adjusted when cold in a bottom position allowing expansion.

3 - PENETRATION

On the EUROPAL impellers, the inlet cones must slightly penetrate the impeller interior.

To ensure the best air supply as possible to the impeller, the relative penetration between the two parts is set in our factory and must not be modified.

MOTOR

I - INTRODUCTION

The electric motor fitted to our fans as well as the fan itself, needs complete and regular periodic maintenance, so as to ensure that operates as well as possible and to guard against any possible breakdown of one of its components.

2 - GREASING

Most of our electric motors are not fitted with greasing devices, have bearings which are lubricated for life and need no extra greasing.

However, all the motors fitted with greasing devices, need an application of new grease from time to time. It is difficult to lay down a timetable for greasing a priori for the whole range of motors on the market. It is best to refer to the motor maintenance booklet when possible, or to get in touch with the manufacturer.

Important : In all cases, greasing periods should never be more than one year even if the recommended term has not been reached.

3 - MAINTENANCE

It is important to eliminate excess grease which could accumulate in the motor bearings after several greasing applications.

When motors have a grease drainage outlet the new grease will expel the old grease which has accumulated around the drainage outlet.

If this case you need only eliminate the purged grease from time to time.

On other motors the greasing drainage outlets are blocked off.

It is imperative to eliminate the excess grease after ten or so applications.

To do this, dismantle the sealing plates fitted to these motors. You may need to dismantle the ventilation cover.

Important : When applying grease, never mix grease, which are not compatible. Always use greases with the same references.

In case of mistake or doubt about the compatibility of greases being used, do not hesitate to dismantle the whole of the bearing units and their accessories and clean them with paraffin to eliminate all traces of old grease, before applying the new grease.

Important : If motors are not used for six months or more, always apply new grease before start up.

Remember that excess grease can lead to overheating and thus to bearing deterioration if the old grease cannot drain away.

Important : During greasing check the seals protecting the bearings for all impurities

4 - SUPERVISION

Motor bearings must be inspected from time to time. The inspection frequency will depend on the fan operating conditions, but should never be more than one year.

If a bearing which has been correctly assembled and greased, begins to heat up, make abnormal noises or show greater than usual radial clearance, it means that it is worn out and should be replaced as quickly as possible.

GREASING

I - INTRODUCTION

Because of the operating conditions, EUROPAL fans are all lubricated with grease.

The grease used during factory assembly is SKF type LGMT 2/15 brand.

This is a multi-purpose lithium grease for general and industrial use suited to the small and average bearings used in our fans.

It is water and rust resistant, which means it keeps its lubricating properties and can continue to ensure efficient protection against corrosion in wet conditions, for example accidental water infiltration into the bearing housing

2 - FACTORY LUBRIFICATION

During factory assembly the bearing housings are partly coated in grease (30 to 50% of available en shield volume.)

After installation on site the fan can be commissioned with no further greasing

However, if the fan has been stocked for a long period before installation, without being turned over, it is advisable to completely clean the bearing housing before replacing the factory grease by new grease.

3 - GREASING INTERVALS

Greasing intervals depend on the bearing type and size as well as the rotating speed, operating temperatures and the quality of the grease. The values, as shown in diagram 1 are applicable for the recommended grease (and the suggested substitute greases) as long as the operating temperature measured on the outer collar does not exceed 70°C.

Above this limit the greasing intervals (expressed in operating hours) must be divided by two for each 15° increase in temperature (within the limit of 110°C as previously shown), while inversely, if the operating temperature remains less than +70°C the greasing intervals can be as much as twice the values shown in diagram 1 (operating temperatures less than or equal to 50°C)

Note : If there is a possibility of the grease being polluted by foreign bodies greasing intervals could be a lot shorter.

This is also applicable should the grease have to insure protection against the wet : for example certain bearings in paper producing machines (where water flows over the endshield) have to be greased every week.

4.4 - Topping up

The quantity of grease to be supplied to each appoint must be equal to :

$$G = 0,005 D.B$$

where :

- . G is the quantity of grease supplied in grams,
- . D is the external diameter of the bearing in mm,
- . B is the total width of the bearing in mm.

If the fan is not fitted with greasing devices greasing will be done when the fan is not in use, by adding the quantity of new grease recommended between the moving parts after taking down the bearing housing cap and removing the used grease.

If the fan is fitted with greasing devices, greasing will be carried out without stopping the fan using a greasing pump.

Caution : In all cases, when the fan is fitted with greasing devices, allow for the fan shut-down, after several applications, to extract unexpelled grease, clean off the components and make a visual check of the state of bearings before regreasing.

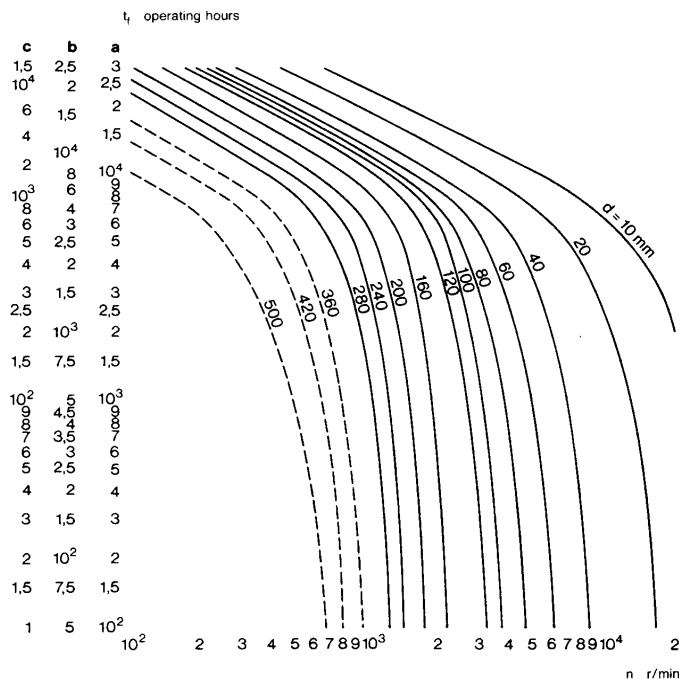
POSSIBLE SUBSTITUTE GREASES	
ELF ESSO STANDARD MOBIL OIL SHELL TOTAL	EPEXA 2 BEACON N° 2 MOBILUX GREASE N° 2 SHELL ALVANIA GREASE N°2 TOTAL MULTIS EP2

RECOMMENDED QUANTITY OF GREASE

Reference of bearing	Quantity G	
	initial amount (in gr.)	appoint (in gr.)
511	100	15
513-611	180	20
516-613	230	25
518	430	40
616	480	50
520	630	55
522	850	70
524-620	1000	80
526	1100	95

GREASING INTERVALS

Greasing intervals
(operating hours)



Scale a : radial ball bearings

Scale b : cylindrical roller bearings, needle roller bearings

Scale c : spherical roller bearings, taper roller bearings - thrust ball bearings - full complement cylindrical roller bearings (0,2 tf) - crossed cylindrical roller bearings with cage (0,3 tf) - cylindrical roller thrust bearings, needle roller thrust bearings, spherical roller thrust bearings (0,5 tf)

Caution : Never mix two greases of different compositions.

If the grease is changed, completely clean down all parts.

OIL BEARING

I – LUBRICATION

1.1 - Selection of lubricating oil

Use a mineral oil with anti-oxidation and rust inhibitors and anti-foam additive.
 Minimal viscosity at operating temperature :
 67 mm²/s
 (running speed : 1450 rpm)

1.2 - Filling

Fill the housing up to the maximum level indicated on the drawing (mm).
 Do not overfill the housing in order to avoid overheating as well as leaking along the shaft.

1.3 - Relubrication

It is advisable to change the oil after an initial trial running period of 15 to 20 hours and for a second time after 300 hours.
 Subsequent oil changes can then be made at convenient intervals and according to the oil quality but should be undertaken at least once a year.

II – MAINTENANCE

2.1 - Checking list

Oil level while stationary time. During operation the oil level may sink to minimum level.
 Operating temperature :

. alarme temperature : 85°C
 . cut out temperature : 95°C

Operating noise : an abnormal noise level could indicate some damages.

2.2 - Storage

In case of long storage (more than one month) after running, should be changed by a rust preventing oil. Then, make some rotations (about one a month) in order to cover all the bearing elements with a protective film.

Before starting up or re-starting up, do not forget to drain the housing and fill it with lubricating oil.

III – MOUNTING

Mounting should be carried out in a clean room with clean bearing, housing and all components.

Heat the bearing in an oil bath to approximately 100°C (120° maximum)

Seals supplied with the plummer block should be inserted between the covers and housing.

The oil using ring must always be in position and free of its movement.

Check the coaxiality with housing.

- Fill housing up to maximum level (See 1.2)

CAUTIONS :

Do not remove the bearings from their original packages until immediately before mounting.

Slide along the shaft the sealing elements and covers that cannot be installed once the bearings have been mounted.

When mounting, place the oil-ring on to the spacing collar located at the opposite side of the level indicator.

The cover with the four slots must be placed on the side of the oil-ring.

The level indicator hole must not be blocked, otherwise air might get trapped in the tube which can result in a false reading.

IV – RECOMMENDED LUBRICANT

Oil : TELLUS 68

MAKE : SHELL

QUANTITY : 0,6

MAXI LEVEL : 65

MINI LEVEL : 45

DISMANTLING / REFITTING

1 - INTRODUCTION

This type of operation is usually rare during the fan life-span, and must be done in any case during the time of the warranty by ABB Solyvent-Ventec people.

2 - DISMANTLING

To strip the fan down completely proceed as follows :

- Disconnect the motor and identify the parts to dismount.
- Disconnect the up-stream and downstream ducts
- Take off the casing stand and the inlet cone.
- Rake off the screw at the shaft end, impeller side, and dismount the impeller using a with drawing screw.
- Dismantle the drive guard cover, the cooling disc guard and the shaft line guard
- Take off the drive unit together with two access doors located behind the drive and fan pulleys.
- Dismantle the motor and two belt tension devices.
- Remove the shaft line in one piece.

3 - REASSEMBLY

To reassemble follow the "dismantling" instructions in reverse, making sure of the following points :

- Centre the shaft line and in the drive guard in relation to the opening in the casing.
- Centre the hub barrel in the correct opening in the casing
- Reassemble the inlet cone (see the appropriate appendix)
- Reassemble the transmission (idem)
- Make sure the motor and fan shaft lines are parallel
- Tighten the belts
- Reassemble the screws and particularly the washers in their original positions,
- Tighten bolts and particularly and motor and bearing screws.

Note : Finally turn the shaft line by hand : No stiff points should be felt and no rotating part should come into contact with stactic parts.

MOUNTING OF THE SN BEARING

1 - GENERALITIES

The correct operating of the rollers will all depend before any of the competence and on the conditions of cleanliness whose will have made to the object the assemblage of the bearings

Precaution :

- Leave the rollers their packing only at the last time
- Do not remove the anti-rust product
- Make slip on the shaft the bearings elements which will not have any more an access after mounting of the rollers.

2 - MOUNTING OF THE CONE BORE ROLLERS

- Clean, check and lubricate the bright parts tolerance h9/IT5.

- Make slip the sleeves by opening the slit with a turn-screw then set up rollers and nuts
- The tightness of the rollers on sleeves is made with the nuts. It follows a dilatation of the internal ring and therefore a reduction of the rolling clearance. This reduction of clearance leaves to estimate the tightness degree of the ring in question

Self-aligning roller on rolls

The rollers being in horizontal position on the shaft, the radial clearance shall be mesured between the external ring and the lowest rollers, with the help of a set of thin plates

Reduction of the rollers clearance : see table below

Internal diameter of the roller	Reduction of the radial clearance		coaxial staving in conicity 1 : 12		mini residual and admissible clearance after fitting with normal origin clearance	
	min.	max.	min.	max.	normal	C3
above and including up to mm	mm		mm		mm	mm
40 à 50 incl.	0,025	0,030	0,4	0,45	0,020	0,030
50 à 65 incl.	0,030	0,040	0,45	0,6	0,025	0,035
65 à 80 incl.	0,040	0,050	0,6	0,75	0,025	0,040
80 à 100 incl.	0,045	0,060	0,7	0,9	0,035	0,050
100 à 120 incl.	0,050	0,070	0,75	1,1	0,050	0,065

After tightening of the roller, unscrew the nut in order to install the lock washer ; finally, block the nut by folding back the strip of the disc nearest of a notch ; if this one is not exactly opposite, do not unscrew the nut but on the contrary, tighten it a little more.

Place the rollers in the bodies of the bearings cleaned beforehand and oiled to avoid any formation of rust which would be likely to immobilize the free ring axially external of the rollers. Check the direction of the bearings compared to the sleeves, the oilers being located side opposed to the lock washers and nuts.

Place the lock ring(s) in the thrust bearing, the sealing systems in the grooves and grease the rollers, sealing joints, the lower parts of the bearings (see lubrication and maintenance instructions of the SNH bearings).

Set up the bearings caps.

Caution : it is strictly forbidden to mix up caps and bearings bodies because the roller seating is manufactured with the assembled parts.