LES PLASTIQUES CY-BO

Servicing and maintenance manual

Plastic centrifugal and axial fans.

VCPL, VCPL-HP, VCPL-PA, VCPL-A,

VCPA, VCP, VCP-HP, VAT,

VPH- P/T/V, VL, VAC.

LES PLASTIQUES CY-BO

Content

LES PLASTIQUES CY-BO

CENTRIFUGAL FANS


VCPL ED


VCPA ED


VCPA EC


VCP HP ED


VCP HP EC


VAT


VAC


VL

AXIAL FANS


VPH P


VPH T


VPH V

The fan curves are available on our web site: www.cy-bo.com

You have just acquired a EUROP-PLAST™ fan. We congratulate you on your choice. This equipment has been studied, designed, manufactured and tested with the greatest care. To ensure it gives you full satisfaction, we invite you to read and follow the recommendations in this document.

1. Normal use

EUROP-PLAST™ fans are manufactured to displace corrosive, non-abrasive air not laden with solid particles at temperatures between 0°C and +60°C (32°F to 140°F) inclusively.

In the case of air containing solid particles, Les Plastiques Cy-Bo can propose suitable solutions based on precise data.

The maximum ambient temperature of the motor is 40°C(104°F) and the maximum altitude of the installation must not exceed 1000m (3280 foot). Above these values the motor must be derated.

These types of fans are designed by the manufacturer for industrial uses in non-explosive environments!

2. Recommendations

Before installing or using this equipment, please read these instructions carefully.

These safety instructions are intended for both the installer and the end user.

They apply to all EUROP-PLAST™ fans.

Strict compliance with these instructions will guarantee long-lasting use of your investment.

Failure to comply with the safety standards in force and the instructions in this document may lead to risk of damage to property or people and will release Les Plastiques Cy-Bo from any and all liability.

Any intervention on the equipment supplied must be done by a qualified person or by the manufacturer itself (return to our workshops in this case).

Anyone making modifications to the product shall be entirely liable for them and this will automatically render the warranty given by Les Plastiques Cy-Bo null and void.

Any intervention on the electrical network must be carried out by approved, qualified personnel.

Before connecting to the electrical mains, check the manufacturer's plates on the equipment to ensure it is compatible. Never handle the equipment without first disconnecting from the mains (electrical lockout).

WARNING! If a variable speed drive is used:

If the fan is direct drive, it is essential never to exceed the maximum impeller rotation speed indicated on the fan manufacturer's plate or in the documents provided with the product.

If the fan is belt-driven (EC), the motor frequency set does not correspond to the maximum impeller rotation speed.

It is essential that you contact the sales department of Les Plastiques Cy-Bo.

Never immerse the equipment partially or totally in liquid.
Never insert a limb or object in the fan.
Never let a child or unqualified person touch the equipment.
Never enclose the equipment in a space without sufficient ventilation to keep it cool.
Do not use the equipment if it is damaged or placed in an unsuitable position.

Failure to meet these conditions can have adverse effects on the health and safety of people!

3. Reception, handling and storage

3.1 Shipping

The equipment shipped is carefully tested and inspected in the factory, but it may be damaged during transport.

3.2 Reception

All equipment travels at the recipient's risk.

The carrier is liable for any damage that occurs during transport.

On receipt of the goods, it is necessary to proceed as follows:

Check, while the delivery driver is still present, the condition, quality, quantity of the products delivered, even if externally the packaging appears to be in good condition.

In the event of lost or damaged goods, the recipient must:
Show the delivery driver the damage, take photos and write clear, explicit and justified reserves on the transport documents (delivery note) at the time of receipt of the parcel(s). (It should be noted that reserves such as "subject to unpacking" or "subject to checking quality or quantity" will be considered as invalid and have no legal value).

Confirm the reserves to the delivering carrier within 48 hours (not including public holidays) by registered letter with acknowledgment of receipt. Also send a copy to Les Plastiques Cy-Bo.

These two provisions are obligatory to prove the liability of the carrier.

Failure to comply with these points will mean that any claim formulated for any reason whatever will be declared inadmissible, the carrier being relieved of any liability at the expense of the recipient.

3.3. Handling

Pay particular attention when handling at temperatures around or below 0°C(32°F) as most plastics will be more sensitive to impacts.

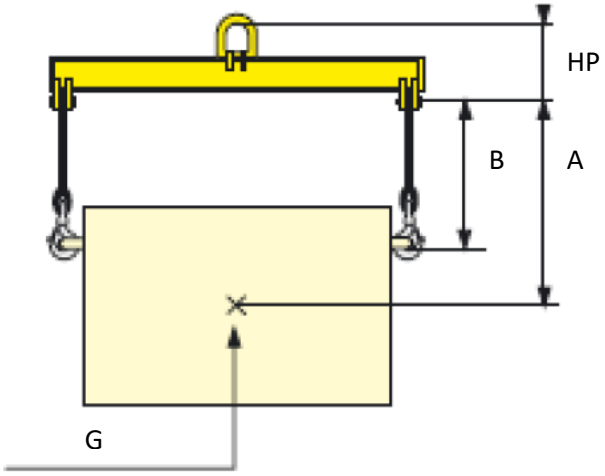
Handle the fan with care using appropriate handling equipment: lift trucks, elevators, pallet trucks with suitable forks, lifting equipment of sufficient capacity.

To handle the fan, use either the pallet provided with the fan or the lifting rings provided for the purpose.

Preferably use flexible slings of suitable capacity and length allowing the horizontal handling of the fan.

To avoid any risk, first check the mass of the fan indicated on the packing label. Never leave a load suspended in the air. Never stand underneath the fan while it is being lifted.

For large fans, we recommend the use of a lifting beam.



(Center of gravity)

<u>The stability of a lifting beam with its load depends on:</u>

-The headroom (HP). This dimension must be as large as possible.

-Dimension A, which must be as much as possible larger than dimension B.

-NB: if A is < than B, dimension HP must always be greater than B – A.

-The length of the lower slings, if there are any: the shorter they are, the less likely the load is to swing about during the movements.

Never lift the fan:

- By the motor lifting points;
- By the unused holes in its casing and/or its framework;
- By its impeller;
- By its inlet flange and/or discharge frame;
- By any of its accessories.

3.4 Storage

Fans must be stored in a place heated to about 20°C (68°F), dry (relative humidity of the air not exceeding 65% is recommended for the belts) and dust-free in order to avoid any risk of condensation.

Avoid sources of vibration.

For short-term storage (up to 1 month), no particular measures are necessary (as long as the place of storage meets the recommendations above).

For long-term storage (1 month to 1 year), grease the bearing(s) and the motor (if they are fitted with lubricators), turn the impeller over by hand to avoid it seizing up and the bearings oxidising (this operation must be done approximately every two months until the fan is finally commissioned).

If the fan is belt-driven (EC), loosen the belts.

If these storage conditions are not met, the drain holes in the motor, which may be covered by plugs, must be opened so that the windings can breathe and to avoid humidity building up.

3.5 Very long-term storage and/or export

For very long-term storage (more than 1 year), with a warranty valid "from acceptance of the installation", the "storage monitoring" form must be completed and returned to Les Plastiques Cy-Bo once a quarter (see Appendix 2).

By fax at: 450-696-4444
By e-mail to: slavoie@cy-bo.com

If this requirement is not met, Les Plastiques Cy-Bo will refuse to deal with any problems under the warranty.

4. Checking the equipment

Although the equipment is rigorously inspected and tested in the factory, the following checks must be made before starting it up: check that

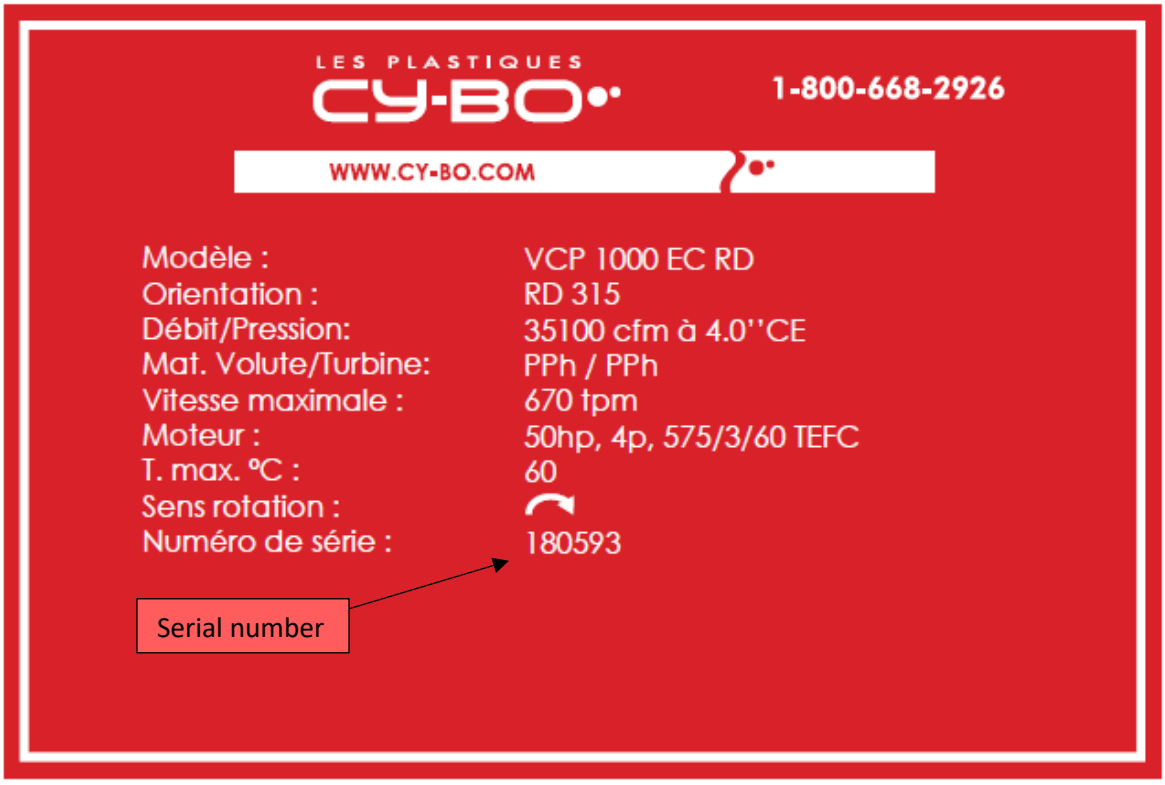
- The voltage and frequency of the mains network and the information on the motor manufacturer's plate are compatible;
- The materials the fan is made of are compatible with the fluids handled (as per your order).
- The condition and general appearance of the fan (no knocks, cracks, etc.).
- There are no foreign objects in the fan or in the circuit up and downstream of it.

- The impeller can be turned freely by hand (the running in of the casing/impeller is done on our test bench).
- Belt tensions (for belt-driven fans).
- The alignment of the shafts between the bearings and the motor for the flexible coupling (for direct drive fans).
- All the fasteners are correctly tightened.

5. Manufacturer's plate

Each fan has a manufacturer's plate detailing its specific characteristics.

If you need to contact us, please have the fan serial number ready to quote.

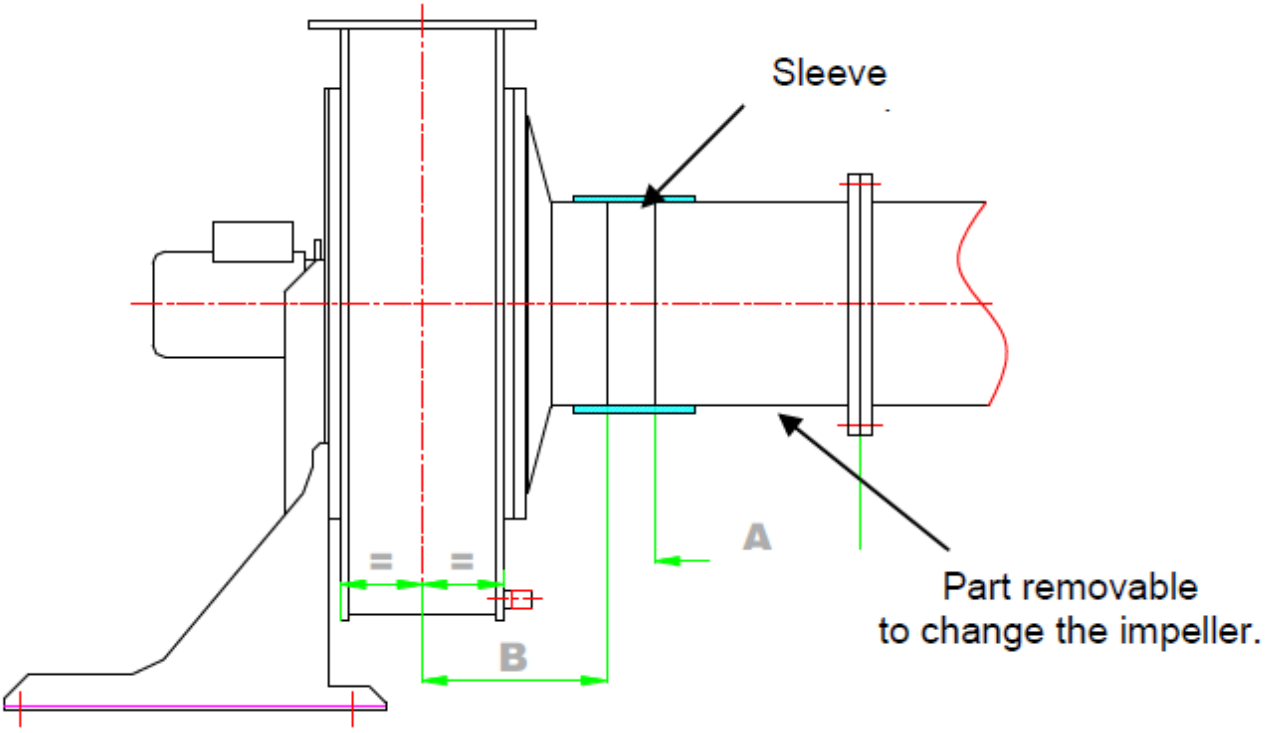


6. Installation

The fan must be positioned with a guaranteed minimum space around it to ensure correct operation and allow easy access for handling and maintenance operations.

If the inlet opening is connected, space must be left to enable the impeller to be changed.

For this, a removable part will be necessary that meets this rule: A = B + 300 mm.



If the fan is not connected, leave a distance between the fan and the obstacle equal to or greater than the diameter of the inlet.

Whatever the type of nature of structure, it must be able to bear the dynamic load of the fan.

6.1 Foundations

Various mounting solutions are possible, the most common being on the floor or on the steel building frame.

Fixing to the floor:

The most common solution is a concrete foundation. This must have a perfectly flat surface to guarantee solid anchoring and avoid generating any abnormal vibration.
It is strongly recommended that the fan be mounted on anti-vibration mounts or spring boxes.

Fastening on a steel frame (to be specified when placing your order):

The risk of resonance with the natural frequencies of the bearing structure must be considered as well as the risk of transmission of the vibration. The client must define the natural frequency of its structure and communicate it to us so that we can validate the appropriate technical solution.

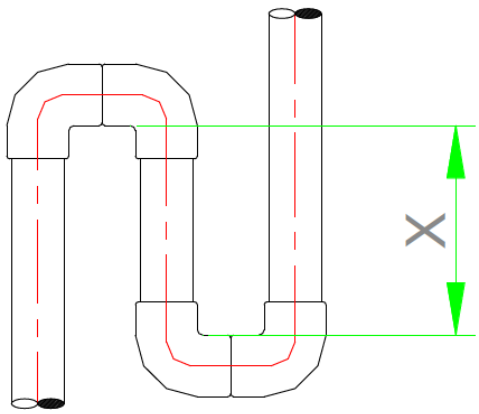
To reduce the risk of transmission of vibration, it is strongly recommended that the fan be mounted on anti-vibration mounts or spring boxes.

6.2 Connection to ducting

The fan must not bear the weight and dilation of ducting or chimneys.
Likewise, to avoid the transmission of the vibration to the circuit, it is imperative to isolate the fan using flexible sleeve connectors on the inlet and discharge.
To avoid any tensile stress on the sleeve connectors, the distance between the flange or the fan frame and its connecting duct must be 10 to 15 mm less than the nominal length of the flexible sleeve connector.

6.3 Connection of the drain

The fans are equipped with a drain to evacuate condensate (except VCPL, VCPLA, VCPL PA, VCPL HP and VPH, where it is optional).



In order to avoid reducing the fan's performance, and depending on the potentially dangerous nature of the condensate, we recommend that the drain be connected to a drain conduit including a device acting as a trap whose dynamic head X will be equal to at least twice the static pressure of the fan at its operating point.

6.4 Protection against mechanical risks

If the fan is not connected to ducting, it is imperative to install protective screens on the fan's inlet and discharge. The purchaser must specify the method of connection so that Les Plastiques Cy-Bo can offer appropriate safety fittings.

The end user must protect the impeller from the penetration of foreign bodies (agglomerate, objects, etc.), and in this case, must consider the extra loss of pressure.

Fans installed in areas where personnel access regularly must systematically be fitted with a splinter guard.

6.5 Protection against electrical risks

The electrical installation must comply with current standards and be installed by qualified personnel.

For motors over 7.5 kW, starting must be progressive (start-delta starter, electronic starter or frequency variator).

Take care to couple up the motor correctly and to connect the earth.

For two-speed motors, check the coupling (Dahlander or 2 separate windings). Adapt the connection accordingly.

Check the motor protection rating.

For fans coupled with a variable frequency drive, check that the variable frequency drive parameters are correct and the maximum impeller rotation speed.

The fan does not have a power disconnecting switch allowing the emergency stopping or electrical lockout of the equipment.

These features, which must be integrated in the general power supply, are the responsibility of the purchaser (see motor manufacturer's instructions provided with this manual).

6.6 Protection against thermal risks

In normal operation, certain components in the fan are liable to reach a surface temperature of over 70°C(158°F). This is the case of the motor housings, the bearings and even the casing when the fluid handled is hot.

It is the responsibility of the installer to decide what the appropriate safety perimeter is around these parts and to put up the regulatory notices in order to avoid any risk of contact with personnel nearby.

To ensure normal cooling of the rotating parts, never lag or enclose the motor, the bearing(s) and the transmission. Check that fresh air intake is sufficient.

7. Electrical connections diagram

All electrical connections must be made by a certified electrician.

Single speed motors

Motors single phase - single voltage 115V or 230V with permanent split capacitor
PSC = Permanent-split capacitor

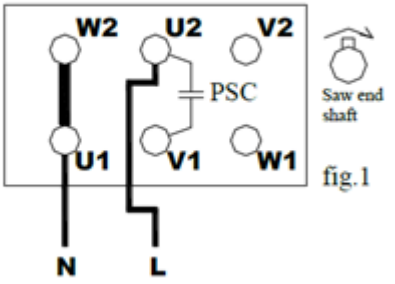


fig.1

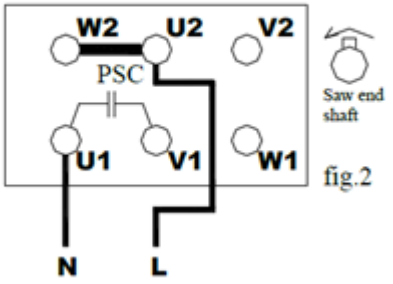


fig.2

Motors three phases - dual voltage 230/460V
Delta connection

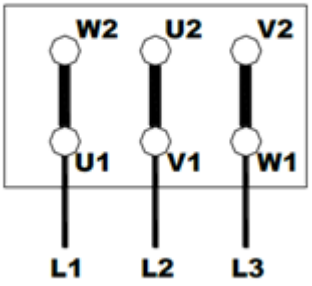


fig.3

Star connection

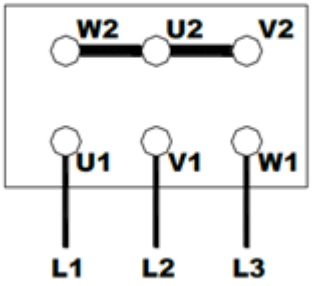


fig.4

Two speed motors

Motors three phases - single voltage 230V or 575V
Low speed connection

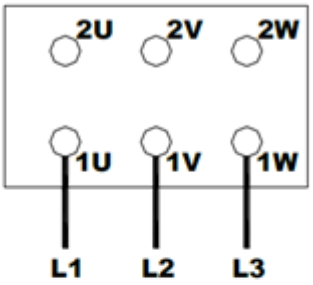


fig.5

High speed connection

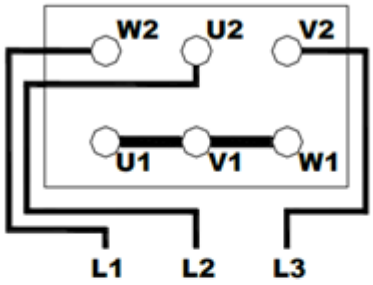


fig.6

Motors three phases - dual voltage 230V or 575V 2 separate windings
Low speed connection

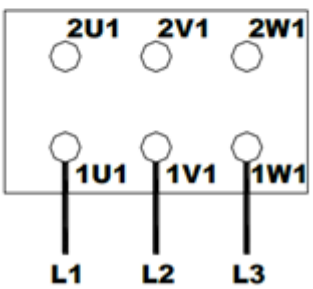


fig.7

High speed connection

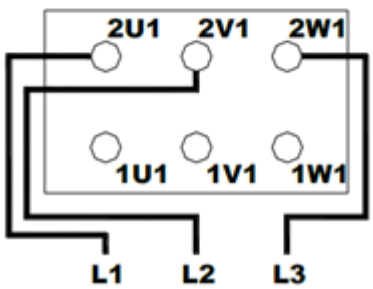
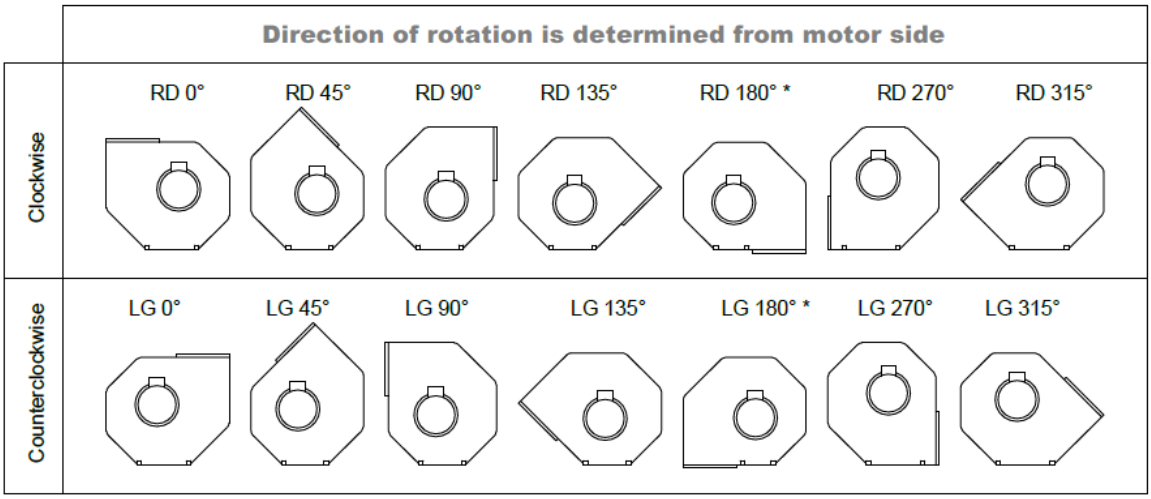


fig.8

8. Standard orientations

These diagrams concern centrifugal fans.



*RD 180° and LG 180° direction of rotation are not standard and are subject to extra fees.

9. Commissioning

The fans have been manufactured for “normal use" (paragraph 1 Normal use).

As the fan and the motor's installed power are defined for a specific operating point, ensure that the aeraulic circuit is appropriate.

Balancing of the aeraulic circuit is indispensable by measuring flow and pressure at the fan inlet and outlet.

Les Plastiques Cy-Bo can provide you with a commercial offer for commissioning and aeraulic balancing of the circuit.

9.1 Before start up

Once the fan is installed in its final configuration, its inlets are connected, and the electrical connections made, check that:

- All the fasteners are correctly tightened;
- The bearings have been greased or the automatic lubricators on certain fans have been struck;
- The motor is connected correctly;
- The impeller turns freely (paragraph "4 Checking the equipment");
- The safety guards and access covers are in place;
- No objects have been left inside the fan or the ducting;
- Starting or operating the fan does not risk damaging the installation connected to it;
- To do this, get the agreement of the site manager or worksite coordinator before starting up the fan.

On new equipment that is under warranty, do not make any adjustments or remove any parts without prior written instructions from our technical department. Otherwise, the contractual warranty of the equipment will be null and void.

9.2 During start-up

The first time the fan is started, check immediately that the impeller is turning in the right direction (direction shown by a label stuck on the casing).

If the impeller is turning the wrong way, stop the fan immediately, cut off the power supply (electrical lockout) and swap two of the three supply phases to the motor to re-establish the right direction of rotation.

In the case of a two-speed motor, do this check on "PV" (low speed) and on "GV" (high speed), stopping the fan between the two (risk of inversion of the direction of rotation of the motor).

Do not stand close to or in the peripheral area around the casing.

In the case of a fan used with a variable frequency drive (VFD), refer to the technical instructions of the VFD before swapping the phases. On certain types of VFD, the identification of the phases is necessary to the correct operation of the safety devices and/or the optimisation of magnetic fields.

9.3 After start-up

Certain checks need to be made after starting up to confirm that your fan is operating correctly or to identify any problems connected to its installation.

Measure the line current upstream of the motor and compare it to the rated current on the motor plate. If the value measured is higher, stop the fan immediately.

Measure the impeller rotation speed. If the value measured is higher than the maximum speed indicated on the fan manufacturer's plate, stop the fan immediately.

Measure the temperature of the pillow block bearings and the motor bearings as follows:

- every quarter of an hour for 1 hour
- every hour for 6 hours

Temperatures up to 80°C(176°F) are acceptable, during the running-in or re-lubrication period; above 80°C(176°F), stop the fan and let it cool to the ambient temperature.

Then restart it and repeat the temperature measurements.

In normal operation, values between 40°C(104°F) and 60°C(140°F) inclusively are common.

If the measurements taken are between 70°C(158°F) and 80°C(176°F) inclusively, be sure to make periodic checks.

Measure the vibration velocity in the 3 directions at each pillow block bearing and motor bearing. In accordance with standard ISO 14694, the values obtained must be equal to or lower than the following limits on starting up:

Seismic vibration limits for tests conducted in situ:

STATUS	Rigid supports (mm/s)	Flexible supports (mm/s)
Start-up	4,5	6,3
Alarm	7,1	11,8
Stop	9	12,5

The vibration level of a fan in situ does not only depend on the quality of balancing. Factors linked to the installation, mass and rigidity of the support system have an effect on the vibration level in situ. Unless specified otherwise in the purchase contract, the fan manufacturer cannot therefore be held liable for the vibration level in situ. The vibration levels given in the table above are the recommended acceptable operating values for the fans for various categories of application.

Fan installations are classified by vibration severity according to the flexibility of their support.

For the rigid support category, the fan and its support system have a fundamental natural frequency (the lowest) higher than the operating speed.

For the flexible support category, the fan and its support system have a fundamental natural frequency lower than the operating speed.

As a general rule, a wide concrete base is considered as a rigid support, whereas a fan mounted on vibration isolators is classified in the flexible support category. Fans mounted on a steel frame may belong to either category, depending on the design of the structure. In doubt, an analysis or tests may be necessary to determine the fundamental natural frequency. It should be noted that, in some cases, a fan may be classified as having a rigid support in one direction of measurement, and as having a flexible support in another.

On new equipment that is under warranty, if one of the checks above proves to be negative, contact our technical department immediately.

9.4. After the running-in period (approx. 1 week)

The fan needs a running-in period during which its performances will stabilise.

Checks must be carried out after this period. The results found will serve as the reference for future diagnosis or to draw up a preventive maintenance plan.

Measure the line current upstream of the motor. The value obtained may be higher than that measured in the checks after start-up, but on no account must it exceed the value on the motor plate.

Measure the temperature of the motor housing and the pillow block bearings. Repeat this measurement one hour later. At constant ambient temperature, the temperature of the housing must not have increased by more than 2°C.

Measure the vibration velocity in the 3 directions at the motor bearings and the pillow block bearings. The values obtained must be equal to or lower than the alarm limits (paragraph "9.3 After starting up").

If one of the checks above proves to be negative, this may be due to a malfunction and/or incorrect installation. In this case, please contact our technical department.

10. Operation

The design, choice and manufacturing of the impeller and other parts constituting the fan are determined by the conditions of operation specified by the end user and communicated at the time of seeking a quote (the client must provide us with the flow, the pressure, the temperature, nature and concentrations of the gases). Les Plastiques Cy-Bo may not be held liable for the effects of corrosion, erosion, clogging, incorrect use and operation above the acceptable vibration level.

Likewise, Les Plastiques Cy-Bo may not be held liable if the maximum operating temperatures of the materials specified in the order are exceeded.

The fluids handled, defined at the design stage and in particular their composition, must not be changed on any account without checking the chemical resistance of the plastics used.

Plastic fans are not suitable for handling solid particles or liquids.

Potentially, the fans may become charged with **static electricity**. If this represents a risk, we can offer a more suitable material (electro-conductive material).
These fans made of standard plastics are not suitable for use with explosive fluids or zones.

In the event of significant and regular clogging, Les Plastiques Cy-Bo is able to offer a technical solution.

During the years of operation, the vibration velocity will change as the rotating parts become worn.

When the alarm threshold is reached (paragraph “9.3 After starting up”), schedule a complete inspection of the fan and if necessary change the bearings (motor and other).

For safety reasons, stop and lock out the fan if the vibration level on one of the bearings exceeds the stop threshold (paragraph “9.3 After starting up”).

If the alarm or stop thresholds are reached, it is recommended that a complete analysis of the fan be conducted to determine the causes (unbalance, misalignments, defective bearings, etc.).

For uses in the food, cosmetics and pharmaceutical industries, the methods of cleaning, disinfecting and rinsing as well as the products used must be approved jointly with Les Plastiques Cy-Bo.

The materials used in the fans do not resist all types of cleaning products.

10.1 Noise emissions

The noise level generated by the fans may exceed 70 dB(A) in normal operation (fan connected on both sides). The exact values at the impeller rotation speed are given in our offers and sales literature.

10.2 Balancing

The impellers of centrifugal fans are dynamically balanced.

They meet the balance quality grade "G6.3" for impellers in accordance with ISO 14694 (except for VCPL and VCPA fans, whose impellers are machined from solid).

The blades of axial fans are statically balanced to balance quality grade "G6.3".

11. Servicing

After the running-in period, the fan must be checked over.

For the extended warranty, you must submit the table (in Appendix 1) duly completed every 6 months. Failure to do so releases Les Plastiques Cy-Bo from its obligations under the warranty.

Depending on installations, deposits can occur on the impeller blades, thus creating unbalance problems that can lead to damage to the impeller and its shaft line (bearings (EC: belt-driven) or the motor (ED: direct drive)).
For this reason, we recommend periodic inspection of the impeller through the access cover (fan stopped and electrical lockout), particularly if there is any vibration. Deposits on the impeller must be removed using a synthetic brush and water jet.

Do not forget to close the access cover before restarting!

11.1 Fan in operation

Only specialised personnel should carry out work on fans in operation.

The appropriate safety instructions must always be followed.

- Check that the fan is operating without any abnormal noises (noise in the bearings, clacking of belts, discontinuous noise). A motor controlled by a VFD will tend to whistle;
- Check that the fan does not vibrate more than the alarm threshold (paragraph "9.3 After starting up");
- Check whether the operating temperature of the bearings and motor is normal (paragraph "9.3 After starting up");
- Follow the manufacturer's general instructions.

11.1.1 Lubrication of the bearings

As part of the maintenance operations, it is recommended that the quantity and condition of the grease in the bearings be checked.
The grease can be topped up while the machine is operating.

11.1.2 Re-lubrication intervals

These are determined according to:

- size and type of bearing
- rotation speed
- operating temperature
- quality of the grease

The following diagram gives the lubrication intervals for temperatures of 70°C max. taken on the external ring of the bearing.

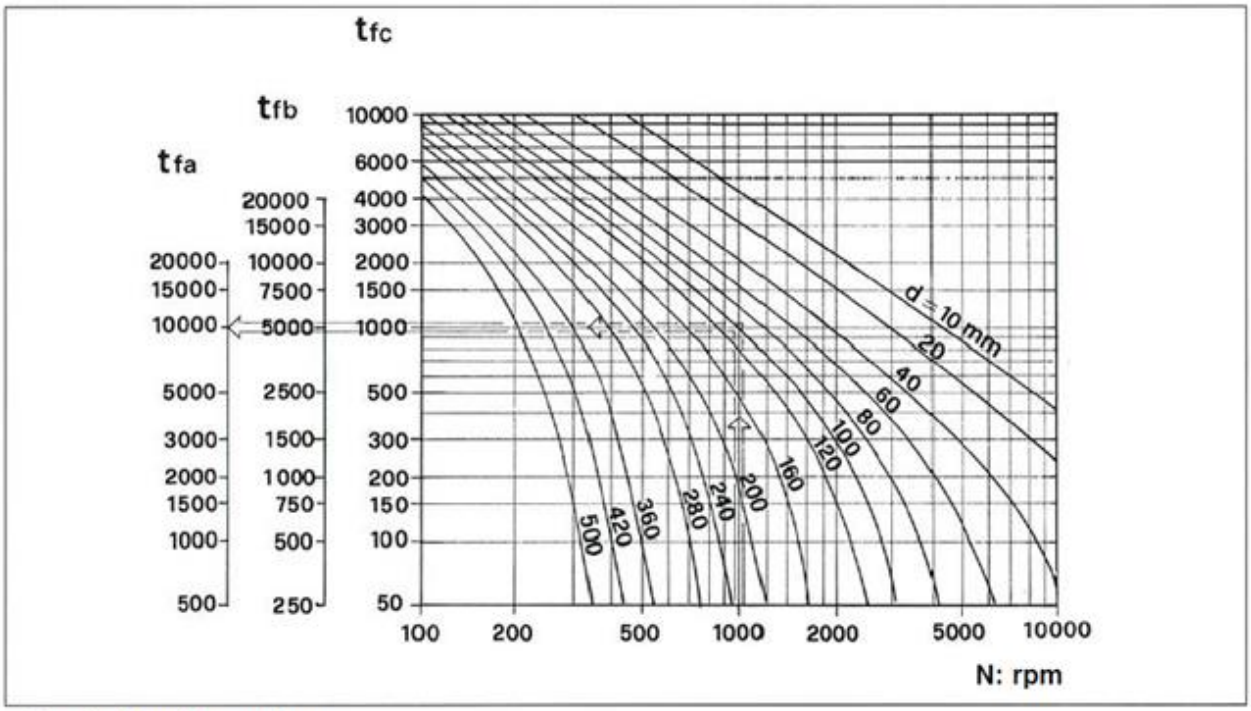
For each further 15°C, the result must be divided by two.

LES PLASTIQUES
CY-BO

Lubrication interval
Hours' operation

Example:
A radial ball bearing with a nominal diameter of 100 mm (d) rotates at 1000 rpm and the operating temperature is between 60 °C and 70°C inclusively. What lubrication interval should be applied?

If we draw a vertical line from the value 1000 on the x-axis on the diagram to point d = 100 mm and if we draw a horizontal line from the point of intersection to the y-axis with the ball bearings, we find the value 10 000, which corresponds to the lubrication interval in hours



t_{fa} : Radial ball bearings
t_{fb} : Cylindrical roller and roller bearings
t_{fc} : Self-aligning roller bearings, tapered roller bearings, registers.

11.1.3 Quantity of grease

The quantity of grease for re-lubrication is determined by this formula:

G = 0.005 x D x B

with:
G = quantity of grease in gram
D = external diameter of the bearing in mm
B = width of the bearing in mm

The table below summarises the quantities of grease for each type of bearing installed.

TYPE of bearing block	Type of bearing		Lubrication		
	impeller side	transmission side	Type	Quantity grease (g)	
	single-row bearing	*single-row bearing*		initial	top-up
DFL 205	6305 2RS C3	6305 2RS C3	life (25,000 hrs)		
DFL 206	6306 2RS C3	6306 2RS C3	life (25,000 hrs)		
DFL 208	6308 2RS C3	6308 2RS C3	life (25,000 hrs)		
PDNI 308	6308 C3	6308 C3	to be greased	110	10,4
PDNI 309	6309 C3	6309 C3	to be greased	140	12,5
PDNI 310	6310 C3	6310 C3	to be greased	190	14,9
PDNI 313	6313 C3	6313 C3	to be greased	390	23,1
PDNI 314	6314 C3	6314 C3	to be greased	480	26,3
PDNI 317	6317 C3	6317 C3	to be greased	830	36,9
	self-aligning ball bearing	*two-row self-aligning roller bearing*			
SN 522	2222 KC3	22222 EKC3	to be greased	1200	53

11.1.4 Type of grease

On flanged bearings, type DFL, the ball bearings are greased "for life" (25 000 h).

On double bearings, type PDNI, the ball bearings are pre-lubricated with ALVANIA R3 made by SHELL.

On pillow block bearings, type SN, the grease used is LGMT 2 made by SKF for operating temperatures from -30°C(86°F) to 120°C(248°F).

It is possible to use other types of grease:

Manufacturer	Type	Base	operating T°C
ESSO	BEACON 2	Mineral oil-based grease - Lithium	-30°C to 120°C
SNR	LUB MS 2	Mineral oil-based grease - Lithium	-30°C to 110°C
MOBIL	MOBILUX 2	Mineral oil-based grease - Lithium	-20°C to 130°C
SHELL	ALVANIA RL 2	Mineral oil-based grease - Lithium	-30°C to 130°C

11.2 Fan stopped

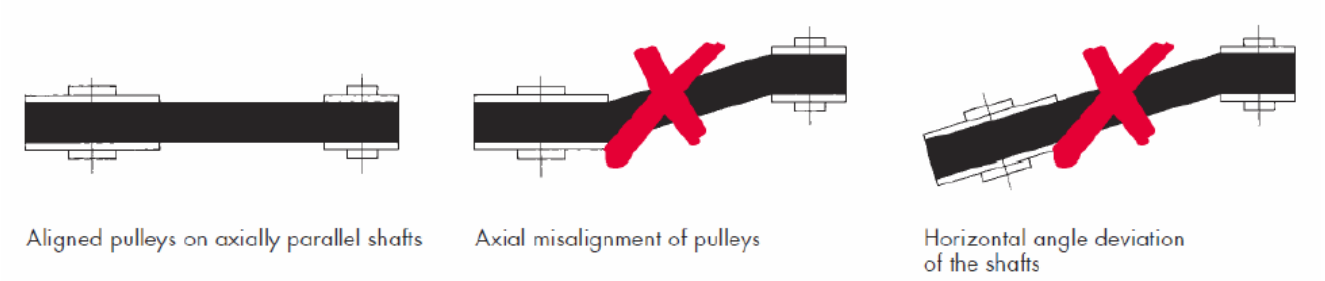
Any intervention on the electrical network must be carried out by approved, qualified personnel.

Never handle the equipment without first disconnecting from the mains (electrical lockout).

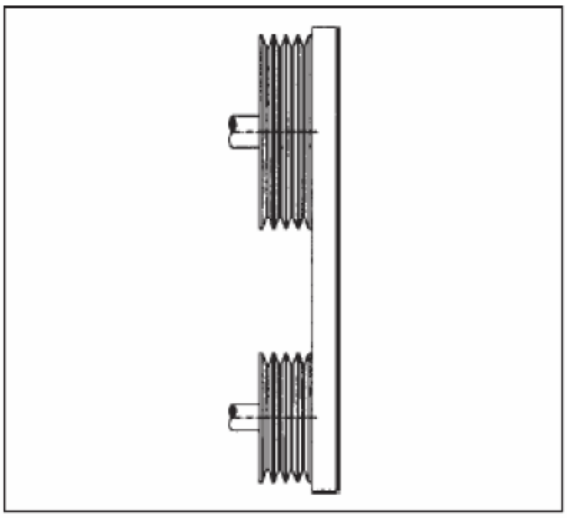
If harmful or hazardous products are transported, apply the safety measures necessary before opening the access cover, the flexible sleeve connector or the inlet cone.

- Check the general condition of the fan;
- Check for and carefully eliminate any deposits on the impeller and in the casing;
- Check that all the fasteners are correctly tightened;
- Check the wear on the pulleys and belts.

11.2.1 Check the alignment of the V-belts (EC)



The alignment of the V-belt pulleys can be checked using a ruler or taut piece of string before and after tightening the removable hubs (see drawing below).



11.2.2 Check the tension of the V-belts (EC)

Correct fitting of the V-belts is indispensable to obtain perfect transmission of the power and ensure an acceptable belt life.

They may be the cause of malfunctions (paragraph "19.3 Problems on V-belts").

After commissioning, the final customer must check the tension of the belts after 8 hours' operation at full load (see the 2 methods described below).
Or for an installation:

After the final or provisional acceptance, the operator must check the tension of the belts after 8 hours operation at full load (see the 2 methods described below).

This allows the initial elongation of the belts to be adjusted.

It is recommended that the transmission be checked regularly, every 3 or 6 months for example.

<u>Simplified tension checking method (OPTIBELT)</u>
Determine the tension of the belts thanks to the pulley diameters and check using a tension gauge such as the OPTIKRIK 0, I, II or III.

Section	Diameter of the small pulley d_e [mm]	Static belt tension [N]					
		RED POWER II		Standard wrapped		Super X-POWER M=5 SUPER TX M=5	
		Initial installation up new belts	New installation existing belts	Initial installation	Operation after start-up	Initial installation	Operation after start-up
SPZ; 3V/9N; XPZ; 3VX/9NX	≤ 71	250	200	200	150	250	200
	> 71 ≤ 90	300	250	250	200	300	250
	> 90 ≤125	400	300	350	250	400	300
	>125 *						
SPA; XPA	≤100	400	300	350	250	400	300
	>100 ≤140	500	400	400	300	500	400
	>140 ≤200	600	450	500	400	600	450
	>200 *						
SPB; 5V/15N; XPB; 5VX/15NX	≤160	700	550	650	500	700	550
	>160 ≤224	850	650	700	550	850	650
	>224 ≤355	1000	800	900	700	1000	800
	>355 *						
SPC; XPC	≤250	1400	1100	1000	800	1400	1100
	>250 ≤355	1600	1200	1400	1100	1600	1200
	>355 ≤560	1900	1500	1800	1400	1900	1500
	>560 *						

* Tension values for these pulleys must be calculated.

Tension gauges:

Optikrik 0	Range:	70 – 150 N
Optikrik I	Range:	150 – 600 N
Optikrik II	Range:	500 – 1400 N
Optikrik III	Range:	1300 – 3100 N

The tension values (static belt tension) shown are guideline values when accurate drive data is not available. They are calculated for maximum power transmission capability per belt.

Calculation basis

Wedge belts	belt speed v = 5 to 42 m/s
Classical V-belts	belt speed v = 5 to 30 m/s

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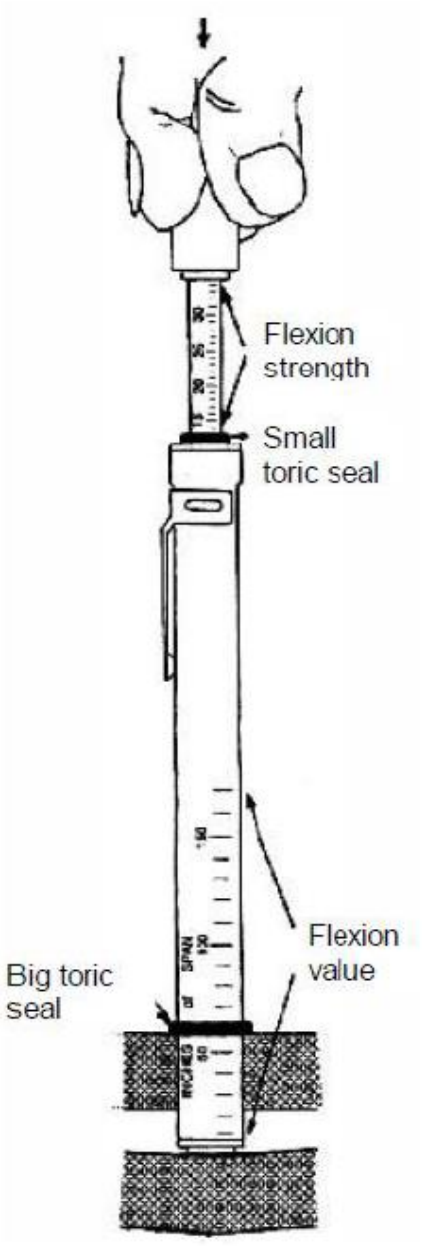
Checking method (COLMANT CUVELIER)

Use of the STYLOTESTER.
1. Measure the centre distance K.
2. Calculate the flexion value f = 0.0156 x K (mm).
3. Place the arrow cursor (big toric seal) on the calculated value.
4. Place the strength cursor (small toric seal) on the zero position.
5. Place the STYLOTESTER on the half way mark on the belt centre distance, press to obtain the flexion value required, then release.
6. Read the flexion strength value obtained on the strength cursor.
7. Compare this strength value with the values in the table.

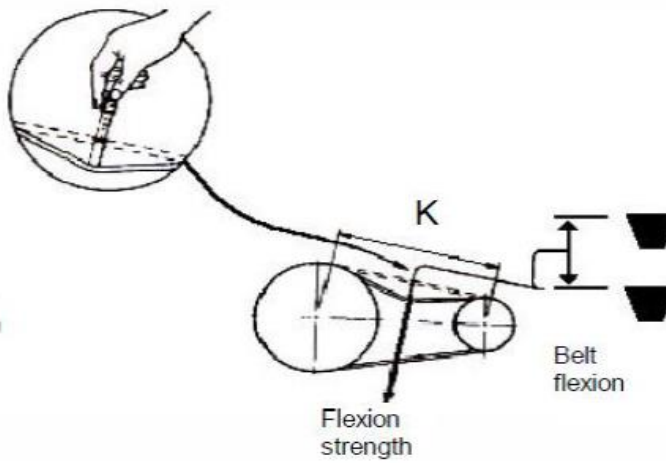


The result must be between the minimum and the maximum.

Belt profile	Pitch Small pulley	Flexion strength (daN)	
		min.	max.
SPZ	63 to 90	1,7	2,5
	95 to 150	2,3	3,4
	160 to 250	2,5	3,8
SPA	80 to 125	2,2	3,2
	132 to 200	3	4,4
	224 to 250	3,8	5,5
SPB	106 to 212	5	7,6
	224 to 300	6	9
	315 to 400	6,5	9,8
SPC	180 to 335	9	13,3
	355 to 530	10	14,7

The frequency of servicing will be determined by the result of the first check.

At least one service per year must be carried out.



11.3 Return to service

The fans must be returned to service in accordance with paragraph "9. Commissioning".

11.4 Replacement of wear parts

To guarantee the correct operation of your fan, the wear parts must be replaced with original parts available from Les Plastiques Cy-Bo.

12. Motors

See motor manufacturer's instructions.

Technical information on the motors is available on request.

13. Bearings (flanged, double or pillow block)

Pillow block bearings, type SN, have a drain hole in the bottom to drain off excess grease.

PDNI and SN type bearings are also pinned to keep their positions after removal.

See manufacturer's instructions.

Type DFL
(flanged bearing)

Type PDNI
(double bearing)

Type SN
(pillow block bearings)

14. Splinter guard

There are 2 types of splinter guards:

Type 2-PV-920: High tenacity polyester coated with multilayer PVC on both sides, varnished finish (2-ply). Standard version for VCPA 125 to 400 and VCP HP 75 to 200 type fans.

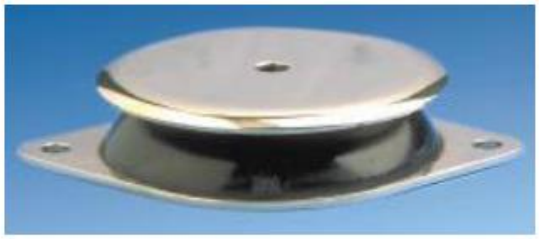
DEFENDER type: High tenacity polyester coated with multilayer PVC on both sides, varnished finish calendered with a textile incorporating very high-resistance tempered steel cables with an anti-corrosion treatment. Reinforced version for VCP 450 to 1250 and VCP HP 250 to 1120 type fans.

The ø 6 cables and cable ties for fitting the splinter guard on the casing are made of 316 grade stainless steel.
A visual inspection is necessary to check the general condition of the splinter guard. If it is damaged in any way, it is imperative that it be changed to ensure it fulfills its function.

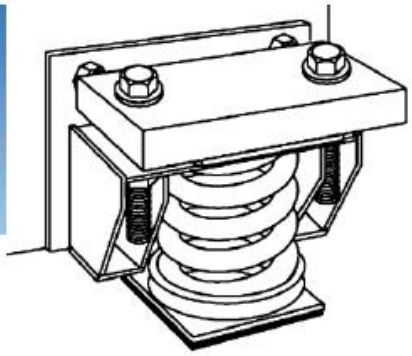
15. Anti-vibration mounts or spring boxes

See manufacturer's instructions.

Mount type 30/33 or 50/33



Mount type BECA 100 and 150



Spring box

16. Flexible coupling (EA: direct drive)

See manufacturer's instructions.

Example: REXNORD OMEGA

17. Interventions on the fan (VCPL, VCP, VCP HP)

Under the warranty, no intervention should be carried out without the written agreement of Les Plastiques Cy-Bo. If such agreement is given:
- Any intervention on the electrical network must be carried out by approved, qualified personnel.
- Never handle the equipment without first disconnecting from the mains (electrical lockout).
- Depending on the fluids handled, wear appropriate protective clothing in accordance with the standards in force.

17.1 Motors Direct coupling (ED)

The fan supplied is direct drive (ED), meaning the impeller is mounted on the end of the motor shaft.

Also possible, the fan supplied is direct drive with a flexible coupling (EA), meaning that the impeller is mounted on a shaft between pillow block bearings. Between the motor and the shaft there is a semi-flexible coupling.

Removing the motor

1st case: ED
a. Remove the impeller (paragraph "17.4 Impeller").
b. Loosen the screws used to adjust the motor alignment slightly.
c. Remove the motor, by unscrewing the 4 nuts on the chassis.

2nd case: EA (semi-flexible coupling)
a. Remove the flexible coupling guard.
b. Remove the flexible coupling.
c. Loosen the screws used to adjust the motor alignment slightly.
d. Remove the motor, by unscrewing the 4 nuts on the chassis.

17.2 Motors Pulley/belt coupling (EC)

The fan supplied is belt-driven (EC) meaning that the impeller is mounted on a bearing, with pulley-belt transmission, and the motor fitted on a chassis shared with the fan.

REMOVING THE MOTOR

a. Remove the cover from the belt/pulley guard.
b. Unscrew the lock nuts and nuts on the eye bolts.
c. Underneath the motor mount, unscrew the eye bolt nuts to loosen the belts.
d. Remove the belts.
e. Remove the motor, by unscrewing the 4 nuts on the motor mount.

17.3 Bearings (flanged, double or pillow block)

The fan supplied is either belt-driven (EC) or direct driven by flexible coupling (EA).

REMOVAL OF THE FLANGED BEARING, type DFL

(fans VCP HP 75 to 250 – VCPA 200 to 400).

a. Remove the impeller (paragraph "17.4 Impeller").
b. Remove the cover from the belt/pulley guard.
c. Unscrew the lock nuts and nuts on the eye bolts.
d. Underneath the motor mount, unscrew the eye bolt nuts to loosen the belts.
e. Remove the belts.
f. Remove the motor, by unscrewing the 4 nuts on the motor mount.
g. Remove the bearing, by unscrewing the nuts.

REMOVING THE DOUBLE BEARING, type PDNI

(fans VCP HP 315 to 900 – VCPA 450 to 1250).

a. Remove the impeller (paragraph "17.4 Impeller").
b. Remove the cover from the belt/pulley guard.
c. Unscrew the lock nuts and nuts on the eye bolts.
d. Underneath the motor mount, unscrew the eye bolt nuts to loosen the belts.
e. Remove the belts.
f. Remove the belt/pulley guard.
g. Remove the bearing, by unscrewing the 4 nuts on the chassis.

REMOVING THE SHAFT AND type SN PILLOW BLOCK BEARING ASSEMBLY

1st case: EC (pulley-belt transmission)
a. Remove the impeller (paragraph "17.4 Impeller").
b. Remove the cover from the belt/pulley guard.
c. Unscrew the lock nuts and nuts on the eye bolts.
d. Underneath the motor mount, unscrew the eye bolt nuts to loosen the belts.
e. Remove the belts.
f. Remove the belt/pulley guard.
g. Remove the bearing, by unscrewing the 4 nuts on the chassis.

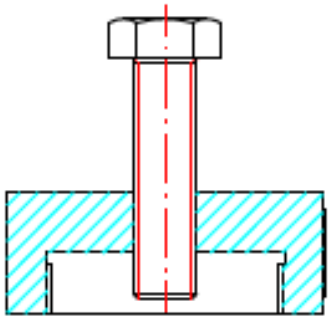
2nd case: EA (flexible coupling)
a. Remove the impeller (paragraph "17.4 Impeller").
b. Remove the flexible coupling guard.
c. Remove the flexible coupling.
d. Unscrew the 4 nuts on the pillow block bearings.
e. Remove the shaft between pillow block bearing assembly.

17.4 Impeller

Removing and remounting the impeller

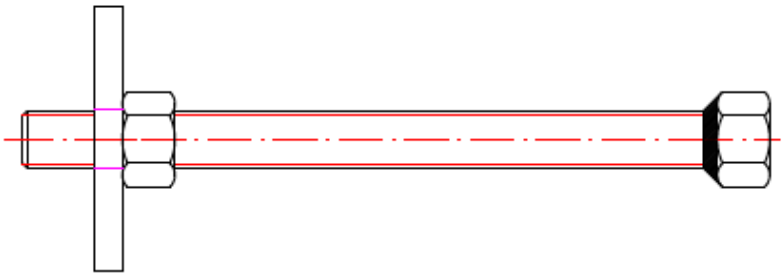
Removal

a. Disconnect the fan from the upstream part of the circuit (inlet side).
b. Remove the inlet cone. Note the position marking on the top of the flanges.
c. Unscrew the impeller sealing cap.
d. Unscrew the impeller tightening screw.
e. Before taking out the impeller, open the lifting trapdoor on the top of the casing, pass a sling through the opening and over several of the impeller blades.
f. Slip the 2 sides of the sling onto the hook on the hoist.
g. Lift the hoist to tighten the sling and hold the weight of the impeller.
h. Extract the impeller using a hub remover of a suitable size (see diagram on the right).



Remounting

a. Lubricate with standard grease the casing/impeller seal, as well as the back of the impeller hub.
b. Place the impeller inside the casing.
c. Pass a sling through the trapdoor again and over several of the impeller blades (remember to orient the shaft keyway and key vertically).
d. Slip the 2 sides of the sling onto the hook on the hoist.
e. Lift the hoist to position the axis of the impeller on the axis of the shaft.
f. Push on the impeller to engage it on the shaft and align the keyway on the shaft key.
g. Slide the impeller into place using a special tool (see diagram below).
h. As the nut is tightened against the washer, the impeller will advance up to the shaft shoulder.
i. Take out the tool, by loosening the nut welded onto the threaded rod.
j. Place the impeller tightening screw with a washer and some medium strength thread lock on the end of the shaft.
k. Screw on the impeller sealing cap, checking that its seal is not damaged. Change it if necessary. Apply a weld bead to avoid it coming loose.
l. Put back the inlet cone, lining up the position mark and checking that its seal is not damaged. Change it if necessary.



The table below gives the different sizes and references of hub remover.

For the small sizes of standard fan (up to 400 in PPH) the hubs are made of reinforced plastic.

The impellers can therefore be removed by hand.

Above this size, the hubs are made of steel or aluminium. In this case, a hub remover is needed to remove the impeller. These hub removers can be ordered from Les Plastiques Cy-Bo.

Fan type	Hub size	Hub remover reference
VCPA 125-160-200	G1"	AR-MO-M10-G1"
VCPA 225-250-315-400	G2"	AR-MO-M12-G2"
VCP HP 75-90-125-160	G1"¼	AR-MO-M12-G1"¼
VCP 450 à 560 - VCP HP 200 à 355	G2"	AR-MO-M16-G2"
VCP 630 à 800 – VCP HP 400 à 630	G3"	AR-MO-M16-G3"
VCP 900 à 1120 – VCP HP 710	G3"½	AR-MO-M20-G3"½
VCP 1250 – VCP HP 800 et 900	G4"	AR-MO-M20-G4"
VCP HP 1000 et 1120	G4"½	AR-MO-M20-G4"½

17.5 Belts

Removing v-belts
a. Remove the cover from the belt/pulley guard.
b. Unscrew the lock nuts and nuts on the eye bolts.
c. Underneath the motor mount, unscrew the eye bolt nuts to loosen the belts.
d. Remove the belts.

17.6 Flexible coupling

This is a torsionally flexible coupling, non-lubricated, with no wear parts.
Its angular, axial and radial flexibility is due to its polyurethane membrane.
It consists of only four components: two flexible half-parts separated axially, fastening screws and two hubs.
All the versions can be adjusted to meet the ISO, DIN and ANSI standards for shaft end space specifications up to 250 mm without using any extra parts.

Replacing the flexible coupling
a. Remove the flexible coupling guard.
b. Remove the 12 screws from the coupling.
c. Remove the two damaged flexible half-parts.
d. Put back two new flexible half-parts.
e. Tighten the screws with some medium strength thread lock.
f. Check the alignment and the angular positioning again
g. Put back the flexible coupling guard.

18. Interventions on the fan (VAT, VPH V, VPH T)

Under the warranty, no intervention must be carried out without the written agreement of Les Plastiques Cy-Bo.

If such agreement is given, any intervention on the electrical network must be carried out by approved, qualified personnel. Never handle the equipment without first disconnecting from the mains (safety isolation).

Depending on the fluids handled, wear appropriate protective clothing in accordance with the standards in force.

18.1 Motors (ED)

These types of fan are only supplied as direct drive (ED), meaning the impeller is mounted on the end of the motor shaft.

Removing the motor

On VAT and VAC:
a. Remove the impeller (paragraph "18.2 Impeller VAT and VAC").
b. Unscrew the screws in the motor disc coupling.
c. Remove the disc coupling and motor assembly (beware the total mass of the assembly).
d. Remove the motor by unscrewing the 4 nuts.

On VPH T and VPH V (F – motor in the flow – size 630 to 1250):
a. Remove the impeller (paragraph "18.3 Impeller VPH T and VPH V").
b. Unscrew the screws in the motor disc coupling.
c. Remove the disc coupling and motor assembly (beware the total mass of the assembly).
d. Remove the motor by unscrewing the 4 nuts.

On VPH V (HF – motor out of flow – size 250 to 560):
a. Remove the impeller (paragraph "18.3 Impeller VPH T and VPH V").
b. Remove the motor by unscrewing the 4 screws and nuts.

18.2 Impeller VAT and VAC

Removing and remounting the impeller

Removal
a. Disconnect the fan from the upstream and downstream part of the circuit.
b. Remove the complete fan and place it gently on the ground.
c. Remove the inlet cone.
d. Unscrew the impeller sealing cap.
e. Unscrew the impeller tightening screw.
f. Extract the impeller, either by hand or using a hub remover of a suitable size (VAT 450 to 710) (see diagram in paragraph "17.4 Impeller").

Remounting
a. Lubricate the back of the impeller hub with standard grease.
b. Place the impeller inside the casing.
c. Push on the impeller to engage it on the shaft and align the keyway on the shaft key.
d. Slide the impeller into place using a special tool (see diagram in paragraph "17.4 Impeller").
e. As the nut is tightened, the impeller will advance up to the shaft shoulder.
f. Remove the tool, place the impeller tightening screw with a washer and some medium strength thread lock on the end of the shaft.
g. Screw on the impeller sealing cap, checking that its seal is not damaged. Change it if necessary. Apply a weld bead to avoid it coming loose.
h. Put back the inlet cone, checking that its seal is not damaged. Change it if necessary.
i. Put the complete fan back on its support.

18.3 Impeller VPH T and VPH V

Removing and remounting the impeller

Removal
a. Disconnect the fan from the upstream part of the circuit.
b. Unscrew the impeller tightening screw.
c. Extract the impeller, either by hand or using a hub remover of a suitable size (see diagram in paragraph "17.4 Impeller").

Remounting
a. Lubricate the back of the impeller hub with standard grease.
b. Push on the impeller to engage it on the shaft and align the keyway on the shaft key.
c. Slide the impeller into place using a special tool (see diagram in paragraph "17.4 Impeller").
d. As the nut is tightened, the impeller will advance up to the shaft shoulder.
e. Take out the tool, by loosening the nut welded onto the threaded rod.

f. Place the impeller tightening screw with a washer and some medium strength thread lock on the end of the shaft.

19. Analysis of malfunctions and solutions

The following list of possible malfunctions is not exhaustive.

19.1 Mechanical problems

PROBABLE CAUSES	SOLUTIONS
Fan does not start	
- Poor electricity supply	- Check the connection of the motor - Check the electrical cabinet
- Motor damaged	- Check the motor winding
- " 19.4 Motor problems"	
- Flexible coupling broken	- Replace the flexible coupling
- Belts broken	- Replace the belts
- Belts slack	- Re-tighten the belts
- Object blocking the rotation of the impeller	- Remove the object
- Frozen condensate blocking the impeller	- Thaw and drain the condensate
- Polyfusion of the impeller with the seal (bad initial running-in)	- Dismantle the assembly to take out the impeller
Abnormal vibration and noise	
- Impeller loose	- Re-tighten impeller tightening screw. "17.4"
- Impeller dirty, clogged	- Clean the impeller
- Impeller unbalanced	- Balance the impeller
- Impeller damaged	- - Replace the impeller
- Impeller turns the wrong way	- Change the polarity at the motor terminals
- Drain obstructed, water in the casing	- Free the drain hole
- Belts damaged	- Replace the belts
- Belts slack	- Re-tighten the belts
- Pulleys out of alignment - 19.5 "Problems on V-belts"	- Re-align the pulleys
- Fasteners loose	- Re-tighten all the screws
- Bearing block(s) defective	- Change the complete bearing blocks(s)
- Bearings defective	- Change the bearings
- Lack of lubrication	- Grease the bearing block(s) and the motor (if automatic lubricators, strike them)
- Flexible coupling out of alignment	- Re-align the motor on the shaft
- Foundations unstable	- Check the supports
- If the vibration persists	- Carry out a vibration analysis

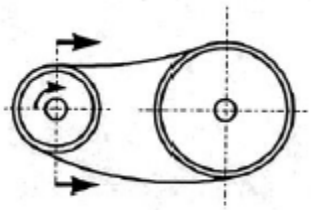
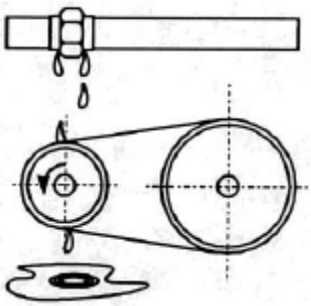
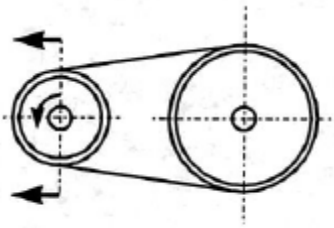
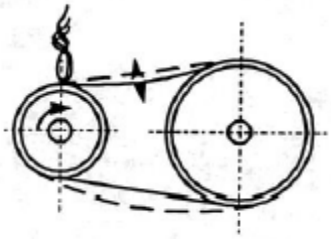
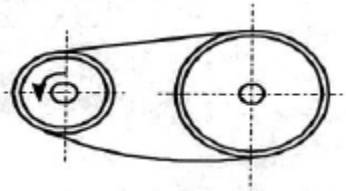
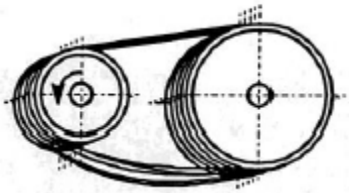
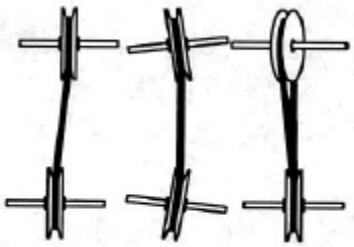
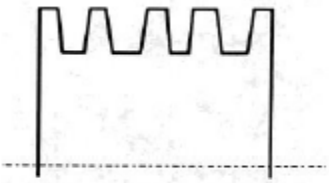
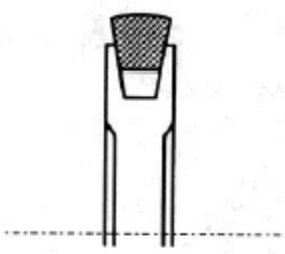
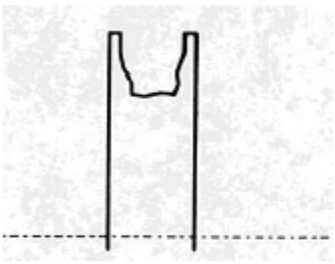
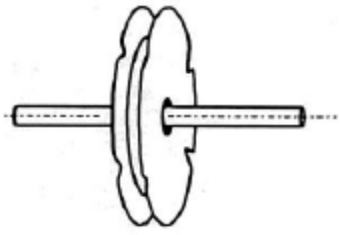
19.2 Problems on the network

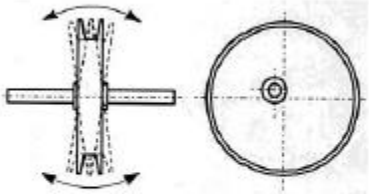
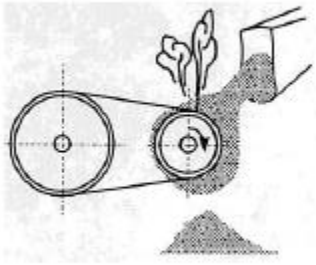
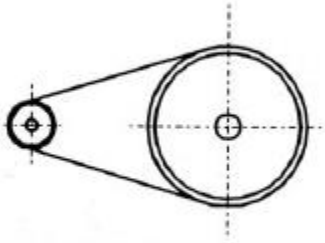
PROBABLE CAUSES	SOLUTIONS
Fan stalling	
- Too much resistance in the circuit, too much pressure loss	- Modify the circuit or change the fan
Excessive air speed	
- The circuit is under-dimensioned.	- Increase the section of the ducting
Fan outside its required operating point	
- Defective measuring equipment	- Change the batteries or re-calibrate
- The circuit is not balanced	- Balance the circuit
- The circuit is obstructed up or downstream	- Free the air passages
- Insufficient supply voltage	- Check the wiring and cable section
- Impeller turns the wrong way	- Change the polarity at the motor terminals
- Wrong impeller rotation speed	- Check the impeller rotation speed
- Belts slack	- Re-tighten the belts

19.3 Problems on V-belts

PROBABLE CAUSES	SOLUTIONS
Different spare belt	
- Not the same manufacturing batch. Belts of different makes/lengths (fig. 6)	- Replace the set of belts
- Pulleys badly aligned (fig. 7)	- Align the pulleys correctly
- Pulley grooves worn or broken (fig. 11 and 12)	- Replace the pulleys
- Initial tension insufficient (fig. 1)	- Correct the initial tension
PROBABLE CAUSES	**SOLUTIONS**
Bet slippage	
- Initial tension insufficient (fig. 1 and 4)	- Correct the initial tension
- Transmission overloaded (fig. 5 and 15)	- Re-dimension the transmission
- Pulley grooves worn (fig. 9 and 11).	- Replace the pulleys
- Presence of oil, grease, chemicals (fig. 2)	- Protect the transmission, clean the pulleys with petrol or benzene, change the set of belts
- Belt section and pulley groove different (fig. 8 and 10)	- Use the same section for both
Belts excessively elongated	
- Too tight (fig. 3)	- Correct the tension
- Transmission overloaded (fig. 5 and 15)	- Re-dimension the transmission
- Insufficient possibilities for adjusting the centre distance	- Change the adjustment possibilities

Belts torn	
- Forced when fitting	- Install the transmission according to the manufacturer's instructions
- Transmission overloaded (fig. 5 and 15)	- Re-dimension the transmission
- Belt slippage (fig. 4) - Jerky loading.	- Correct the tension
- Presence of oil, grease, chemicals (fig. 2)	- Protect the transmission, clean the pulleys with petrol or benzene, change the set of belts
- Blocked transmission.	- Remove the blockage.
The belt "jumps" in the pulley groove	
- Pulleys badly aligned (fig. 7)	- Align the pulleys correctly
- Initial tension insufficient (fig. 1 and 4)	- Correct the initial tension
- Pulleys oscillating (fig. 13)	- Change the pulleys or rigidify the support
- Excessive vibration	- Reduce the centre distance; add a tensioning roller
- Foreign object in the pulley groove (fig. 2 and 14)	- Protect the transmission, clean the pulleys
Belt oscillation	
- Resonance	- Reduce the centre distance
- Jerky loading	- Correct the tension. Re-dimension the transmission
- Pulleys not balanced	- Balance the pulleys
- Support or pins under-dimensioned	- Rigidify the support or change the pins
The belt wears too quickly	
- The belt is rubbing on adjoining parts	- Increase the distance, re-align the pulleys
- Pulley grooves worn (fig. 9 and 11)	- Replace the pulleys
- Transmission overloaded (fig. 5 and 5)	- Re-dimension the transmission
- Ambient T° too high or too low - Foreign object in the pulley groove (fig. 2 and 14)	- Increase the ventilation or fit special belts

1  **Tension too low**	2  **Wet operation**	3  **Excessive tension**
4  **Slippage**	5  **Overload**	6  **Different spare belts**
7  **Bad alignment, off centre, no parallel, skewed**	8  **Pulley grooves not the same type**	9  **Contact with the bottom of the pulley**
10  **The belt isn't adhering enough**	11  **Pulley groove worn**	12  **Pulley broken**

13	14	15
		
Oscillation Pulley eccentricity	**Dust and dirt**	**Pulleys too small**

19.4 Motor problems

See motor manufacturer's instructions.

For any other problem, before contacting us, please have the fan manufacturing number ready. It can be found on the manufacturer's plate on the back of the casing.

Other information will be necessary to identify the exact problem. This means the flow, the pressure upstream and downstream of the fan, the temperature and density of the gases, the aeraulic diagram, the voltage and current measured at the motor terminals.

20. Warranty

Unless specified otherwise, the warranty applies for a period of 12 months for normal operation 24 hours a day.

The contractual date of the beginning of the warranty will be the first delivery date of the equipment indicated on our delivery note (DN).

In the case of a warranty valid "from acceptance of the installation", send Les Plastiques Cy-Bo the acceptance report dated and signed as well as the completed "storage monitoring" table (see Appendix 2).

If these requirements are not met, Les Plastiques Cy-Bo will refuse to deal with any problems under the warranty.

To benefit from the warranty.
The installer or the end user must carry out regular maintenance of the equipment supplied in accordance with the instructions in this document.

He must also keep up to date the "post-commissioning servicing" table, indicating the name and position of the technician, the number of operating hours, the dates, the operations carried out (checking of vibration, lubrication, cleaning...) and other observations made. (see Appendix 1).

In all cases, the warranty is limited to the replacement or repair of parts or equipment recognised as defective by the technical department of Les Plastiques Cy-Bo.

The equipment to be repaired must be sent carriage paid to our factory.

If the equipment is not covered by the warranty, the cost of its return will be billed to the customer or final purchaser.

This warranty applies to equipment that is accessible and therefore does not include the removal and refitting of the equipment in the assembly in which it is incorporated.

If the equipment cannot be shipped to us for a concrete reason, a repair quotation including the cost of travel to the site will be sent to the customer or final purchaser.

Before our team can carry out the work, the quotation must be validated by a firm order corresponding to the amount of the quotation.

If the equipment is covered by the warranty, Les Plastiques Cy-Bo will cover the cost of replacing the defective parts and the customer will cover the cost of the labour and any ancillary costs.

If not, the customer will cover all the costs.

21. Appendix 1 "Post-commissioning servicing"

This table must be completed on each service or maintenance operation on the equipment.
To benefit from the warranty, this document must be sent back to us as proof, complete and up to date. In the interests of clarity, please complete 1 operation per line.

Manufacturing no.: **Type :**

Name and position of the technician	Number of hours' operation:	Nature of the intervention	Date	Observations

22. Appendix 2 "Storage monitoring"

In the case of a warranty valid "from acceptance of the installation", this table must be completed every quarter and returned to us:

- By fax: 450-696-4444
- By e-mail at: slavoie@cy-bo.com

Manufacturing no.: _____ **Type:** _____

Date of acceptance of the equipment : _____ **Name :** _____

Points to check and operations to do:	Ambient temperature:	Fact:	Observations:
After 1 day			
• Remove the belts and store them in a cool, dry place			
• Store the anti-vibrations mounts, the sleeve connectors and the seals in a cool, dry place			
After 3 months			
• Grease the bearings			
• Turn the impeller over by hand (approximately 50 turns)			
• Grease the motor			
• Turn the motor shaft over by hand (approximately 50 turns)			
• Check the general condition of the fan			
• Check the moisture content of the storage place			
• Check the vibration level of the storage place			
After 6 months			
• Grease the bearings			
• Turn the impeller over by hand (approximately 50 turns)			
• Grease the motor			
• Turn the motor shaft over by hand (approximately 50 turns)			
• Clean the complete fan			
• Check the general condition of the fan			
• Check the moisture content of the storage place			
• Check the vibration level of the storage place			

Points to check and operations to do:	Ambient temperature:	Fact:	Observations:
After 12 months			
• Grease the bearrings			
• Turn the impeller over by hand (approximately 50 turns)			
• Grease the motor			
• Turn the motor shaft over by hand (approximately 50 turns)			
• Clean the complete fan			
• Check the general condition of the fan			
• Check all the fasteners are tight			
• Check the moisture content of the storage place			
• Check the vibration level of the storage place			
Before starting up			
• Check the general condition of the fan			
• Replace all the grease in the bearings			
• Replace all the grease in the motor bearings			
• Check there are no foreign objects in the fan			
• Check the condition of the belts, sleeve connectors and seals			
• Fit and tighten the belts			
• Check the insulation resistance of the motor			