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User Manual

AXIAL-FLOW FANS

No. A4-63, Translation of the original instructions Malbork, December 2021

Contents

1. INTRODUCTION

1.1. Purpose of the User Manual

The present User Manual is intended to provide the users with the information on the intended use, assembly, commissioning and operation of axial fans.

Failure to read and understand the User Manual may result in fans' failure and is potentially hazardous for the personnel.

Regulations and instructions contained herein refer to standard version, heat-resistant, corrosion-resistant, gas-tight and other fans, except for explosion-proof and spark-safe centrifugal fans.

The present guidelines must be observed in order to ensure the correct, failure-free operation of fans and achieve the assumed operation parameters. Fans produced by Nyborg-Mawent S.A. are controlled for their parameters and correctness of operation; therefore, first of all, the reasons for any troubles with the installation shall be looked for in the installation itself. In case any fan's malfunction and defects are ascertained, which cannot be removed on your own using the guidelines provided below, please contact Nyborg-Mawent S.A. specifying the details of the fan (type, serial no. and year of production), operational conditions and circumstances in which the malfunction has occurred.

1.2. Recipients

The User Manual is intended for people who take care of installation and commissioning of fans, as well as of equipment's maintenance and keeping it in proper technical condition. These people must be adequately qualified to perform the above mentioned activities.

1.3. Waiver

For further fans' improvement, we reserve the right to modify the construction and technical parameters. Therefore, no liability shall be accepted for any claims resulting from data, drawings and guidelines contained in the present User Manual.

We shall not be responsible for any losses resulting from any use inconsistent with the equipment's intended use, misuse, improper operation or unauthorised repairs of the fan.

2. INTENDED USE

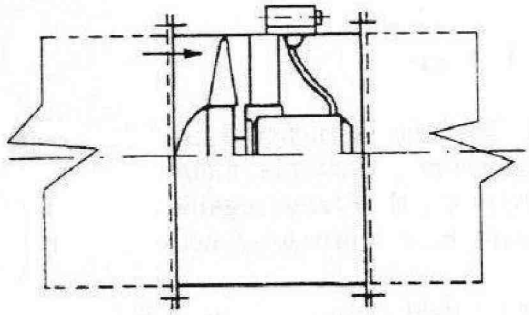
Axial-flow fans are used for moving air in installations or process lines as well as in the equipment itself.

They can be installed and operate as a suction (exhaust) or pressing (supply) fans, or suction-pressing fans (of duct type). The duct type, one-sided duct type and ductless (wall-mounted) axial flow fans with direct drive or belt transmission drive are presented in drawing 1. Depending on their version, fans may be intended for vertical or horizontal operation.

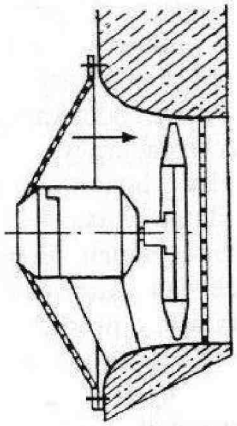
Temperature of pressed air cannot exceed 313K (+40^{o}C) for standard version fans with direct drive and 353K (+80^{o}C) for heat-resistant fans with V-belt transmission drive, with dust content not higher than 0.3 g/m^{3}.

The fans resist the temperature of 258K (-15^{o}C).

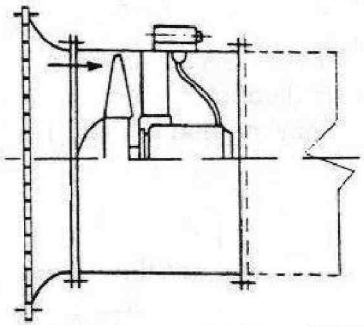
Note. Detailed operation conditions of various axial-flow fans are given in Nyborg-Mawent S.A's publications or are the subject of agreement with customers.



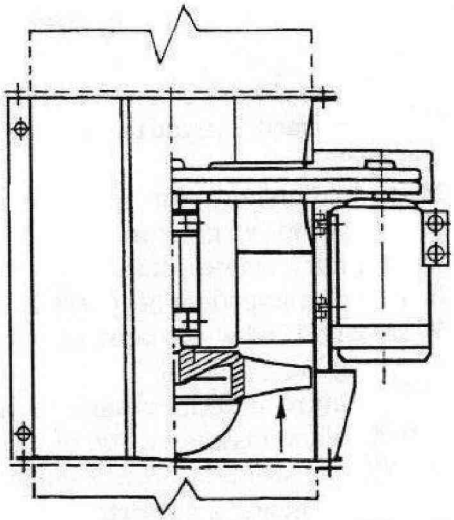
DUCT TYPE



DUCTLESS



ONE-SIDED DUCT TYPE



WITH BELT DRIVE

Figure 1 Constructional versions of fans

3. TRANSPORTATION AND STORAGE

Axial-flow fans are screwed to pallets. Use only appropriate equipment to transport the fans. Never lift a fan using connection cables, electric cabinet or motor. Upon delivery, check whether a fan has not been damaged in transport. Before the assembly fans shall be stored in dry and well-ventilated rooms. The storage temperature shall not drop below 5°C and shall not exceed 40°C, relative humidity shall not exceed 70%. Fans shall be handled and transported on pallets, using covered means of transport, without excessive bumping. Fans shall be firmly and reliably screwed to a pallet. During transport and storage, fans shall be protected against mechanical damage. Period of storage shall not exceed one year. Do not store fans in places, where they can be exposed to adverse atmospheric conditions. While storing, fan's connection stubs shall be so protected to prevent any contaminations from entering the fan.

Special lugs for ropes, welded to the fan's body, shall be used in order to lift a fan.

NOTE:

After the prolonged period of fan's storage or downtime, inspection is absolutely required, every 6 months at minimum. Not-painted surfaces shall be covered with easily removable corrosion protection agent.

4. INSTALLATION

Before installation, check whether a fan has not been subject to damage or contamination during transport or storage. Before the fan's installation, perform the following procedure:

- check whether screw connections have not loosened, and first of all, check screws fastening a motor and a screw securing the impeller's fastening on the shaft of electrical motor.
- manually check whether the fan's impeller and motor's shaft turns freely and does not chafe against the casing or other fan's components,
- remove any foreign objects and contamination from a fan's interior,
- check the resistance of the motor's insulation and in case it is wet – dry it up.

The fan must be firmly and securely located on appropriate foundation or base.

While connecting pipelines, pay attention they not to introduce additional load into the fan - in these points flexible connections are recommended.

In order to achieve the assumed parameters of fan's operation, the following is recommended:

- check whether internal diameters of ducts fastened to the fan's casing correspond to respective diameters of a fan, and pay attention, the internal diameter of gaskets between flanges correspond to internal diameter of a casing.
- before fan's installation into ducts, check whether an arrow „→" marked on a fan indicated the flow direction compliant with the fan's intended use (supply, exhaust).
- with belt drive, check the correctness of alignment of fan and electrical motor. Axes of fan's and electrical motor's shafts shall be parallel to each other, and grooves in pulleys must match in order to locate V-belts in planes perpendicular to the axes of shafts. Allowable deviation of parallel alignment of grooved pulleys' faces shall not exceed 1 mm/m of distance between pulleys and the tolerance of mutual dislocation of pulleys' grooves shall not exceed 0,2mm/m of the distance between pulleys. Depending on the intensity of fan's operation, periodical inspection of V-belts is recommended (tension, surface condition, etc.) (Fig.2). Such inspection shall be performed always before the first or each subsequent start-up of a fan after a prolonged downtime period. The first inspection of belts tension shall be carried out after a few days from the commissioning and then once a year, unless the conditions require otherwise. V-belts tension shall be compliant with generally available recommendations and standards of V-belts' producers.

NOTE!
Do not exceed allowable belts tension .

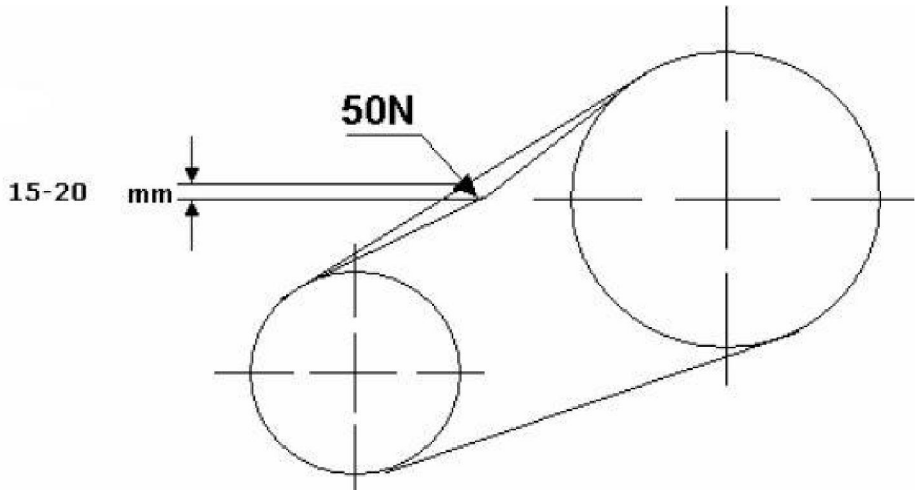


Figure 2. Measurement of belt's tension

- check, by rotating the fan's impeller, whether elements of belt transmission operate without any friction against the transmission's cover.

Note. Never operate a fan with the cover of a belt transmission removed.

It is recommended to use roofing protecting against direct impact of rain or snow and sunlight onto the fan's motor.

The final assembly operation is the installation of an electrical motor.

Before connecting the unit, make sure that the parameters of the existing power grid correspond to those on the motor nameplate. If they differ, no connection can be made. Motors can be directly connected to public power grid of the voltage of 400V in case of lower power ratings or using the star/triangle switch in case of higher power ratings. Any restrictions depend on local power conditions.

Connection of the device to the power supply shall be performed by the user on his own, selecting the appropriate type and cross-section of power cables, as well as short-circuit and overcurrent protection devices according to local conditions.

The power supply connection must be made by a qualified person, in accordance with the applicable regulations, according to the diagram supplied with the motor. Before starting the fan, check that the motor is connected to the PE protective conductor and that the electrical connections are correct (the direction of impeller rotations should match the arrow on the housing, if it is not - change the phase connection order).

When a fan is installed in a location remote from the operating personnel, a switch (available for special order) must be installed in the neighbourhood of a fan.

5. COMMISSIONING AND OPERATION OF A FAN

Before the first fan's start-up, perform the following procedure:

- check the tightness of screw connections,
- check the insulation resistance of the electrical motor winding. Motor, in case it is wet or stays idle for a period longer than a week, shall be dried first. Check the grounding condition, operation of switch, meters and other auxiliary and protection devices. If the inspection proves to be satisfactory, connect the motor to power supply.
- clean the interior of fan and pipelines,
- check the correctness of connecting the installation to motor's terminals taking into account the grid's voltage and connection of motor's winding on the terminal plate equipped in six winding's terminals, allowing for star or triangle connection.

- check the motor's trip switch for proper operation in case of power failure in one of the phases.

Fan shall be commissioned with installation's dampers (throttles) completely open.

During the first start up (about 1 minute) check whether the direction of impeller's rotations complies with the direction indicated by an arrow „→" marked on the fan's casing and assess whether the fan operates steadily, without excessive vibration and noise.

If the trial start up is considered satisfactory, then start the fan up for the period of 8 to 12 hours. During that time the motor's temperature increase cannot exceed the allowable temperature increase for the insulation class stipulated in the motor's nameplate, and the temperature increase for rolling bearings shall not exceed **60 K (60°C)**, in relation to ambient temperature.

Fan with belt drive shall be turned off after approx. 2 hours of operation and the tension of V-belts adjusted (in accordance with clause 4).

Steady and even whir of fan's bearing mounting and motor indicates the correct operation of roller bearings; whereas, the noise of scraping, chafing or whistle indicate the damage or insufficient lubrication of bearings. Fan indicating such symptoms shall be turned immediately off and the reason of the failure removed. Fan cannot be turned on again unless all the reasons of malfunction are eliminated.

Fans with direct drive do not require any maintenance during operation, their operation shall be periodically monitored. In case any excessive vibrations, impeller's chafing against the casing, uneven whir are noticed, turn a motor off immediately, perform the fan's inspection and remove any failures.

Fans with belt drive require an appropriate tension of V-belts to be maintained. The bearings' temperature and lubrication shall be controlled as well as loose screw connections shall be tightened on a regular basis.

Note. Never operate a fan without the following covers, adequate for its version, type of drive and connection to installation: belt transmission's cover, inlet's or outlet's cover, coupling's cover, bearing mounting shaft's cover.

Operation and maintenance of electrical motor shall be performed in accordance with the motor's Operation and Maintenance Manual.

Note: Never operate a fan without appropriate grounding!

Basic maintenance ensures the correct and failure-free operation of a fan. Therefore, fan's operation shall be monitored, and in case any excessive vibrations, impeller's friction against the casing, uneven whir are noticed, turn a fan off immediately, perform the inspection and remove any failures. Vibrations shall be measured. Allowable efficient speed of vibrations was presented in the table 1 in accordance with ISO 14694:2003.

Status	Vibration rate V_{ef} [mm/s]	
	Rigid fastening	Flexible fastening
Start-up	**4.5**	**6.3**
Alarm	**7.1**	**11.8**
Switch off	**9.0**	**12.5**

Table 1. Allowable efficient values of speed of vibrations for centrifugal fans.

In case malfunctions cannot be removed on its own, contact Nyborg-Mawent S.A., specifying fan's details and malfunctions that occurred.

6. PERIODICAL INSPECTIONS, MAINTENANCE AND OVERHAULS

Inspections, maintenance and overhauls of a fan can be performed only after turning the fan's motor off and complete stopping the fan's impeller and motor.

Each time before starting inspections, maintenance and overhauls, ensure that motor is isolated from any live cables and it cannot be started.

In case the fan's surface is hot, wait until it cools down to the temperature allowing for safe work. In case fan presses media hazardous for human's health, apply adequate personnel's protective measures during the inspections, maintenance and overhauls of the fan.

Intervals between fan's inspections and overhauls depend on fan's operational conditions and are determined in the warranty terms and conditions; the maintenance personnel is, however, required to adapt the inspection intervals to actual conditions present in the specific installation. Fans are reliable machinery subject to their proper operation and maintenance. Each operating fan shall be subject to periodical inspections, not less often, however, than.

- **After every 500 hours of fan's operation, carry out the following:**
  - check the condition of the impeller and clean it from sediment, if necessary,
  - check and tighten screws fastening the elements of a fan (table 2),
  - check the tension of belts (2 drive).
- **After every the approx. 1500 hours of fan's operation:**
  - check the condition of impeller,
  - clean it from any possible sediments,
  - check and tighten screws fastening the elements of a fan (table 2),
  - measure the fan's vibrations,

In case any damage or malfunctions are noticed, stop the fan's operation immediately. In case malfunctions cannot be removed on its own, contact Nyborg-Mawent S.A., specifying fan's rated data and malfunctions that occurred.

Thread size	Tightening torque [Nm]	Deviations [%]	
		Lower limit	Upper limit
M 5	5.9	0	+ 10
M 6	10.6		
M 8	26.9		
M 10	46.3		
M 12	79		
M 16	169.7		
M 20	331.6		
M 24	575.9		
M 30	1450		

Table 2 Tightening torques for screws.

Before starting any lubrication top up operations, lubrication nozzle and area around bearing mounting unit shall be well cleaned. Never use for that purpose high pressure cleaning jets.

Roller bearing shall be lubricated during the operation through M10x1 lubrication inlet from the impeller's side and from the drive's side with the specified quantity and type of lubricant.

Top up lubrication schedule, quantity and quality of lubricant are specified in the table 3.

Waste lubricant shall be disposed of in accordance with relevant environment protection laws and regulations.

Temperature of a bearing increases after the top up lubrication and lowers to normal value after the lubricant reaches operational consistency.

Table 3. Top up lubrication schedule of bearings

Roller bearing	**Housing**	**Top up lubrication schedule of brings (man hours)**			**Quantity of lubricant[1]**	**Amount of top up lubricant per a roller bearing**	**Lubricant**
	SNV	**n=3000rpm**	**n=1500rpm**	**n=1000rpm**	**(g)**	**(g)**	
1307K-C3	**080**	2640	3120	3240	80	10	Arcanol MULTI3 FAG
1309K-C3	**100**	1680	2000	2080	180	15	
1311K-C3	**120**	1260	1440	1560	270	20	
1315K-C3	**160**	1080	1320	1440	650	40	
22218-E1-K-C3	**160**	800	1320	1800	650	40	Arcanol MULTITOP FAG
22318-E1-K-C3	**190**	-	1400	1760	950	60	

[1] Quantity of lubricant at the first installation or top up lubrication.

In order to warrant fresh lubricant reaches all rolling components of a bearing during the top up lubrication, it is necessary to use the amount of lubricant specified in the table.

Always perform top up lubrication:

- on warmed and rolling bearing,
- before downtime,
- before long iddle periods.

Notes to the top up lubrication schedule

The schedule of top up lubrication depends on the degree of lubricant degradation through bearing friction, rotational speed, load and bearing's temperature.

The presented top up lubrication schedule refers to bearing's temperature of 75°C. In case of any deviations, adjust the top up lubrication schedule in accordance with the table.

Table 4. Change of top up lubrication schedule depending on the bearing's temperature

Bearing's temperature	Coefficient of top up lubrication schedule
75°C	x1.00
80°C	x0.8
85°C	x0.63
90°C	x0.5
95°C	x0.4
100°C	x0.32

Because of their diverse chemical composition, lubricants must not be mixed together. Roller bearings used in Nyborg-Mawent SA's fans are factory filled with adequate amount of lubricant and ready for use. The above mentioned types of lubricant are of standard type, if any other type of lubricant has been used, it is indicated on the fan's nameplate.

For the type of lubricant used, see **"Maintenance of bearings"** plate located on the fan.

In general, mixing lubricants shall be avoided. In case any non-compatible lubricants are mixed together, their composition may become significantly changed. Moreover, significant softening of mixed lubricant is possible; thus, lubrication conditions may deteriorate.

In general, the applied lubricant can be stored for three years, in the following conditions:

- closed room (warehouse),
- temperature from 0°C through +40°C,

- relative air humidity below 65%,
- without any exposure to chemicals (vapours, gasses, liquids),
- sealed bearings.

Lubricants are subject to aging as a result of environmental impact and operation.

Use of lubricants of any other types than recommended by Nyborg- Mawent S.A. is unacceptable in the warranty period.

Limit values of bearings' temperature

- **warning at 80°C** – reduce the intervals between top up lubrication by applying the index specified in the table "Change of top up lubrication schedule with regard to the bearing's temperature"
- **tripping at 100°C.**

Temperature is a "long life detector" for machine load. Overload of bearing, interrupted lubrication film, changes of rotational speed cause bearing's temperature increase. Constant bearing's temperature will be kept in constant operational conditions, on condition that a roller bearing is used in compliance with its intended use and in accordance with design assumptions. If temperature changes without any change of rotational speed or load, it means that a bearing is improperly lubricated. Any change of load as a result of disturbed operation of loose bearing can be diagnosed based on bearing's temperature diagram. Temperature control allows early diagnose of any damages of bearing caused by interrupted lubrication film. Damages caused by ageing and fatigue cannot be detected this way.

Temperature shall be measured using electrical temperature sensor directly at bearing's external ring.

Total replacement of lubricant

In general, during installation the bearing shall be totally filled with lubricant and any free space in the housing shall be filled in amount specified in the table "Top up lubrication schedule of bearings" which corresponds to approx. 50% of free space in the housing.

The whole amount of lubricant in a bearing shall be replaced when free space in housing is not enough to embrace additional lubricant, which corresponds to more than 75% of free space of the housing.

Too high amount of lubricant causes quick increase of bearing's operational temperature, especially at high rotational speed. If operation is started at maximum speed, wait until excess

lubricant locates in housing. By the end of lubricant "running-in" process, the bearing's temperature decreases which confirms proper location of lubricant in a bearing-mounting.

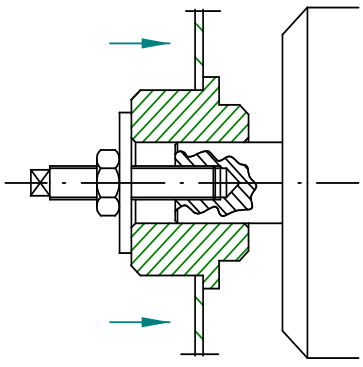
During the lubricant replacement after the calculated period of operation or after a defined number of top up lubrication operations, the whole amount of waste lubricant shall be removed and then replaced with a fresh lubricant.

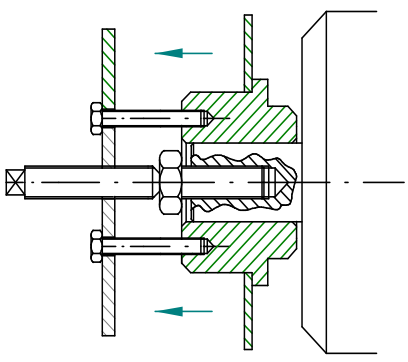
The lubricant replacement depends on easy access to the housing and its opening. Covers of split housings can be removed with ease to reveal the bearing. Removable upper part of split housing aligned with the lower part using expansion pins facilitates installation and maintenance. Upper parts shall not be exchanged with each other. After removing waste lubricant, fresh lubricant shall be applied between rolling elements first. Please, pay attention not to let any contaminations to penetrate inside the bearing and keep lubricant free of any contaminations. Use of protective gloves is recommended to avoid possible allergic skin reactions to the lubricant.

In case of planned fan's downtime shorter than 3 months, bearings' top up lubrication is recommended during the fan's operation or during the downtime by rotating the impeller.

For longer downtime periods (longer than 3 months) and in case motor is equipped with condensate drain valves, drain the accumulated water condensate and close the valves. Fill 100% of spaces between housing covers and roller bearings with lubricant and manually turn the shaft a few times. Before re-starting, remove upper covers of bearing housing and check the level of lubricant amount. If the inspection reveals any loss of lubricant or lubricant's contamination (ingress of condensate causes change of lubricant's consistency), the lubricant shall be replaced. In case lubricant's consistency has not changed or no contaminations were found, remove excess lubricant before starting the fan.

Fan's components shall be disassembled carefully, not to damage machined parts and surfaces. In order to disassemble an impeller, clutches, pulleys and bearings use a puller or other auxiliary devices (Fig. 11). Never apply one-sided levering, stroking, etc.





Impeller's assembly using a device Proper impeller's disassembly using a puller

Fig. 2 Assembly and disassembly of fan's impeller.

Operation and maintenance of electrical motor shall be performed in accordance with the motor's User Manual.

7. WORK HEALTH AND SAFETY REGULATIONS

Operators of fans shall carefully read the User Manual and acquaint themselves with user manual of electrical motor, its construction, proper operation as well as Health and Safety regulations related to the operation of electrical equipment.

Moreover:

- fans shall be installed in place ensuring free access, safe operation and sufficient lighting,
- never turn the motor on without prior inspection of electrical installation and without prior checking the firmness of screw fastening between a motor and a fan.
- all operations related to a motor and electrical installation shall be performed by an electrician, appropriately qualified for the operation of electrical equipment,
- never use loose aprons, scarves and similar clothes,
- never lean against an operating fan and never touch any rotating parts,
- never leave any parts, tools, etc. on a fan,

Before starting any repair etc., stop the fan. Disconnect wires from a terminal box, provide a fan with relevant information or warning plates.

8. POSSIBLE MALFUNCTIONS AND TROUBLESHOOTING

TYPE OF MALFUNCTION	POSSIBLE REASONS	TROUBLESHOOTING
Fan (electric motor) - cannot start	**Incorrect power supply**	**Check whether power supply is compliant with data on the nameplate of the electric motor**
	Incorrect connection to power supply	**Check the connection with the diagram delivered with electric motor**
	Damaged switch	**Replace the switch**
	Damaged electric motor	**Replace the electric motor**
Fan – excessive vibration	**Loosened threaded connections**	**Tighten and secure threaded connections**
	Damaged or unbalanced impeller	**Replace or balance the impeller**
	Contamination of impeller	**Clean the impeller**
	So called 'pumping' phenomenon	**Suppress the medium (mixture) flow in the suction line**
		Select suitable fan
	Damaged bearings of electric motor	**Replace the bearings of electric motor**
Impeller – strokes, friction against fixed elements of a fan	**Loose threaded connections**	**Tighten and secure threaded connections**
	Deformation of impeller	**Replace the impeller**
	Deformation of housing	**Replace the housing**
	Deformation of inlet stub	**Replace the inlet stub**
Fan – insufficient pressure and capacity	**Incorrect direction of impeller's rotation**	**Check the electrical connection in the terminal box of the electric motor**
	Contaminated inlet guard	**Clean the inlet guard**

	Contaminated outlet guard	**Clean the outlet guard**
	Contamination inside the fan	**Clean fan's internal surfaces**
	Contamination of fan's electric motor	**Clean the electric motor**
	Short-circuit between the winding of the electric motor's stator	**Check the winding of the electric motor's stator**
		Replace the electric motor
	Damaged bearings of electric motor	**Replace the bearings of electric motor**
	Incorrect fan selection	**–**
	Damaged bearings of electric motor	**Replace the bearings of electric motor**

9. TERMS AND CONDITIONS OF WARRANTY

1. Nyborg-Mawent S.A. grants the User a guarantee for the products sold on the terms and conditions provided in detail below.
2. Nyborg-Mawent S.A. guarantees the efficient operation of the product provided that the product is installed, maintained and operated in accordance with the Nyborg-Mawent S.A. guidelines set out in this document, hereinafter referred to: the "Operation Manual".
3. The warranty period is 24 (twenty four) months, starting from the date of delivery of the product – the fan - to the User.
4. The User has the option to extend the warranty, which requires individual arrangements between Nyborg-Mawent S.A. and the User and it is effected upon concluding an appropriate agreement and paying a warranty fee.
5. The warranty is applicable at the territory of the Republic of Poland.
6. Nyborg-Mawent S.A. may perform warranty service outside the territory of the Republic of Poland. The User should note the fact (possibility) of installation and operation of the product outside the territory of the Republic of Poland in the order, otherwise the possibility of using the warranty service outside the territory of the Republic of Poland in the future shall be excluded. In this case, the User shall bear the costs of, in particular, travel, accommodation and meals of the Nyborg-Mawent S.A. service technicians. Such service shall be based on separate arrangements between Nyborg-Mawent S.A. and the User, concluded in an appropriate agreement.
7. After the expiration of the warranty period, Nyborg-Mawent S.A. may perform post-warranty maintenance services for the User. In this case the provisions of clause 6, sentence 4 above shall apply accordingly.
8. Under the warranty Nyborg-Mawent S.A. shall be liable only for defects revealed in the warranty period and arising from product-related causes. The warranty does not cover the defects of the product resulting from other causes, i.e.:
   a) installation and use of the product which is not in accordance with the intended use and/or engineering practice and the operation manual;
   b) installation of the product by persons who are not appropriately qualified;
   c) installation of the product not in compliance with the wiring diagram, powering the product with a voltage other than the one specified on the nameplate and/or in the operation manual;
   d) unauthorised repairs or changes to the product's design without the consent of Nyborg-Mawent S.A;
   e) damage to the product caused by external factors (mechanical, thermal, chemical, water damage, etc.);
   f) damage caused by improper transport or storage of the product;
   g) unauthorised use involving operation of the product under conditions inconsistent with the intended use and design of the product and inconsistent with the operating conditions laid down in the operation manual;
   h) chemical corrosion of the product's elements, e.g. as a result of condensation of aggressive compounds from the conveyed medium;
   i) failure to carry out the mandatory inspections described in the operating instructions;
   j) product damage resulting from vibration caused by erosion, clogging of the impeller, damage to the impeller or any other cause;
   k) product damage caused by ingress of any object or component likely to cause such damage into the installation;
   l) errors in the design of the installation or incorrect selection of the product;
   m) product damage resulting from the use of non-original parts, accessories and materials not compliant with the Nyborg-Mawent S.A. recommendations;
   n) product damage resulting from fortuitous events, force majeure (fire, flood, lightning, etc.);

o) malfunction of other installations (e.g. electricity, heating, etc.) and/or equipment affecting the operation of the product (e.g. inverters, relays, humidifiers, coolers, heaters, etc.).

9. The warranty does not cover defects resulting from normal wear and tear of the product and consumable parts, i.e.: bearings, filters, V-belts, oils, greases, etc.
10. The User shall lose their warranty rights (loss of warranty), in case of:
    a) any modification of the product;
    b) tampering with the product by unauthorised persons;
    c) any unauthorised attempt to repair the product;
    d) failure to carry out mandatory periodic inspections;
    e) failure to carry out appropriate maintenance work when required;
    f) the payment for the product is more than 30 days overdue from the due date.
11. Product which has been found defective should be taken out of use immediately after the defect has been found, otherwise the warranty will be invalidated.
12. Warranty claims are examined based on, in particular:
    a) a complaint filed by the User, which should include: the User's details, the description and serial number of the product and its year of manufacture indicated on the nameplate, a detailed description of the product defect and the date on which it was detected. The complaint should be sent by email to: reklamacje@nyborg-mawent.com - not later than within 5 days from the date the defect was detected;
    b) the above mentioned complaint shall be accompanied by the invoice for the purchase of the product and the proof of timely, i.e. compliant with the operation manual, periodic inspections (a completed inspection form can be found in the operation manual).
13. Nyborg- Mawent S.A is not obliged to disassemble elements of installation inherently belonging to the product. If the aforementioned disassembly is necessary for Nyborg-Mawent S.A. to carry out service work, it should be carried out by the User.
14. After the User has carried out the activities referred to in clause 12 above, then - taking into account previous arrangements with Nyborg-Mawent S.A.:
    a) the User shall deliver the product personally to the registered office of Nyborg-Mawent S.A. or deliver it by express delivery to the registered office address of Nyborg-Mawent S.A., shipping at the risk of the User. Nyborg-Mawent S.A. shall not be responsible for any damage or destruction of the product during transportation, in particular resulting from improper packaging or securing the product by the User.
    or
    b) Nyborg-Mawent S.A. will send its service team to the place of assembly (installation) of the product in order to diagnose the problem (ascertain the defects reported) and then, if the complaint is found to be justified, undertake further activities referred to in clause 17 below. The User is obliged to ensure free access to the product and enable the Nyborg-Mawent service team to carry out maintenance activities in accordance with any and all work health and safety regulations, and in particular to ensure adequate preparation of the place where the maintenance activities will be carried out, i.e. to organise scaffolding, platform, ladders, lifting equipment, if necessary, and to provide access to power sources etc. Otherwise, the Nyborg-Mawent S.A. service team has the right to refuse to carry out the maintenance service and the User will be charged for the costs of travel by the Nyborg-Mawent S.A. service team.
15. Nyborg-Mawent S.A. is obliged to examine the warranty complaint, respond to it within 14 (fourteen) days from the date it was filed (response to the complaint).
16. In case the complaint is found justified, Nyborg-Mawent S.A. is obliged to repair (remove quality defects of the product) or replace the product with a product free from quality defects, if the repair of the product appears to be impossible or the cost of repairing the product is disproportionately high compared to the price of a new product. Nyborg-Mawent S.A. is solely responsible for deciding how to perform the warranty obligations.

17. The time limit for repairing the defect of the product or its replacement, depending on the way the warranty is being carried out, shall not exceed 90 days, starting from the day of filing the complaint. In cases justified by technical, technological or other reasons beyond the control of Nyborg-Mawent S.A., the aforementioned time limit will be extended by the additional time needed for the removal of the defect or replacement of the product, but not longer than another 30 days in relation to the time limit specified in the first sentence above.
18. Replaced products and parts obtained during the repair of the product shall become the property of Nyborg-Mawent S.A.
19. In case the complaint is found justified, Nyborg-Mawent S.A. shall bear the costs of transport, including the costs of express delivery of the defective products, as well as the costs of travel and stay of the Nyborg-Mawent S.A. service technicians at the place of installation of the product at the User's premises.
20. In case the complaint is found unjustified, Nyborg-Mawent S.A. shall invoice the User for the costs incurred in connection with the complaint (expert opinion, travel, express delivery, etc.).
21. Nyborg-Mawent S.A. shall not be liable for any losses incurred by the User or any third party as a result of failure or malfunction of the product, both during the warranty period and after the warranty period, except for damages caused intentionally by Nyborg-Mawent S.A.
22. The liability of Nyborg-Mawent S.A. under statutory warranty for physical and legal defects is excluded.

10. DISASSEMBLY AND DISPOSAL

If the fan's repairs are is technically and economically unreasonable, the fan shall be disposed of.

The unit shall be disconnected from the power grid and then dismantled in the reverse order of installation, according to the clause 6, 5 ,4.

The following information should be regarded as recommendations only and is does not apply to fan design on special order. The Customer must ensure that the local regulations are observed.

In general, the materials used to produce the fan are as shown in Table 6.

Material	Material content
Steel	80-95%
Copper	1-2%
Cast iron	4-8%
Aluminium	<1%
Plastic	1-2%
Other	<1%

Table 5. Percentage content of materials used in a fan.

Lubricants from the lubrication system, bearing mountings are hazardous waste and must be disposed of in accordance with local regulations.

11. EQUIPMENT INSPECTION FORM

Each operating fan shall be subject to periodical inspections. The operations to be carried out are described in section 6 of this manual.

Number of inspection	Date of inspection	Description of activities	Stamp and signature of the inspector
1 [500mhr]			
2 [1000mhr]			
3 [1500mhr]			
4 [2000mhr]			
5 [2500mhr]			
6 [3000mhr]			
7 [3500mhr]			
8 [4000mhr]			
9 [4500mhr]			

10 [5000mhr]			
Number of inspection	**Date of inspection**	**Description of activities**	**Stamp and signature of the inspector**
11 [5500mhr]			
12 [6000mhr]			
13 [6500mhr]			
14 [7000mhr]			
15 [7500mhr]			

continued for non-standard warranty

Number of inspection	Date of inspection	Description of activities	Stamp and signature of the inspector
1 [8000mhr]			
2 [8500mhr]			
3 [9000mhr]			
4 [9500mhr]			
5 [10000mhr]			
6 [10500mhr]			
7 [11000mhr]			
8 [11500mhr]			
9 [12000mhr]			
10 [12500mhr]			

Number of inspection	Date of inspection	Description of activities	Stamp and signature of the inspector
1 [13000mhr]			
2 [13500mhr]			
3 [14000mhr]			
4 [14500mhr]			
5 [15000mhr]			
6 [15500mhr]			
7 [16000mhr]			

12. EQUIPMENT CARD

Warranty: standard/ non-standard*

Serial no. of a fan	**Type of a fan**
……	……
Date of first start-up	**Stamp of the installation company**
……	……

* delete as appropriate