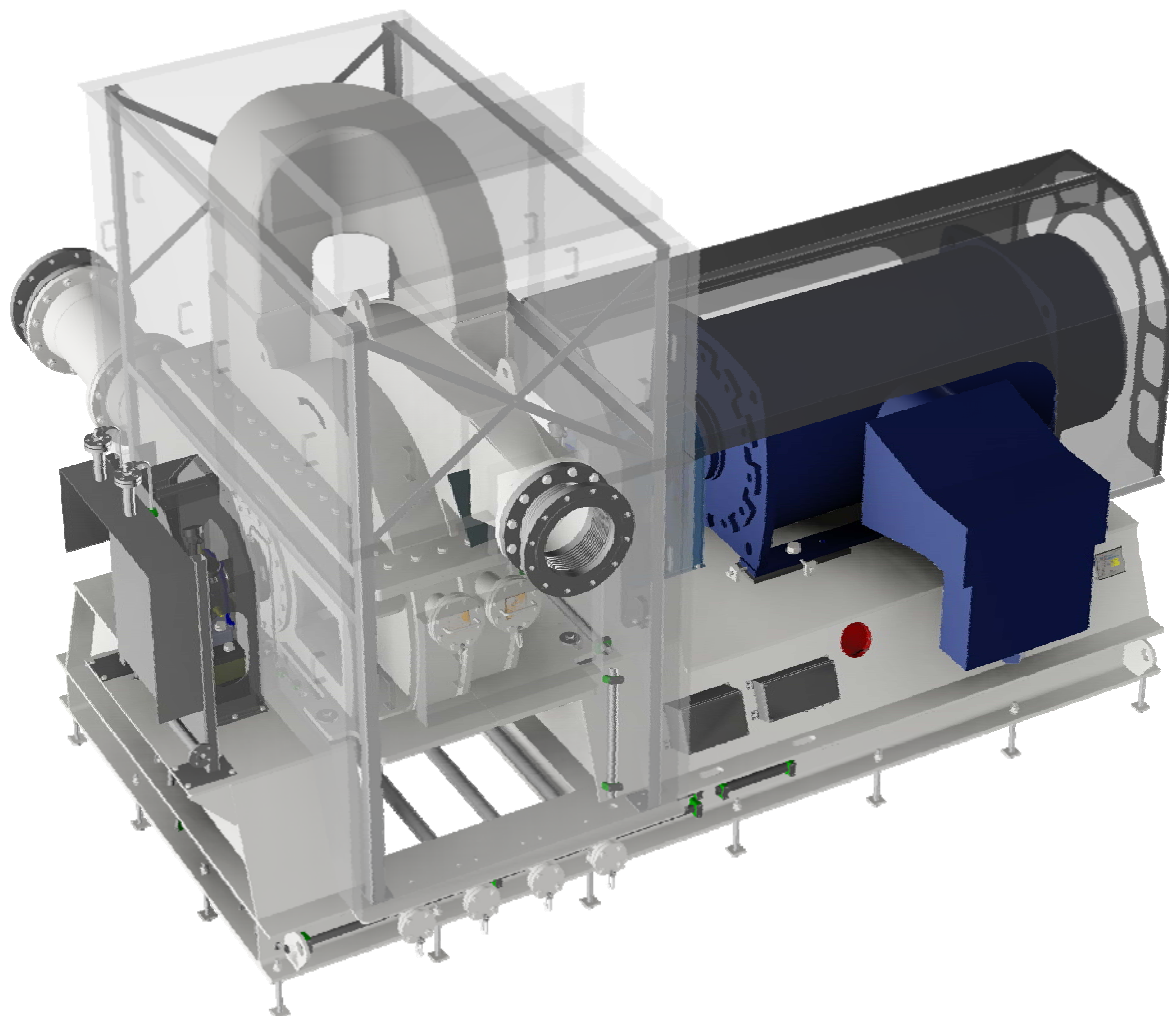


INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS



Item : LTS Start-up blower
 Blower Type : HD2 407/1230/T16B
 Tag Number : 173-J
 Project Title : Ammonia & Urea Fertilizer Project
 Location : Aswan City – Upper Egypt
 Client : Tecnimont ICB Pvt Ltd
 Client Ref. : P.O. 7500056721
 VTK Ref. : 16.0078

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About this manual

This manual for the centrifugal blower is drawn up in accordance with the requirements and recommendations ensuing from the CE / ATEX directives.

The manual contains information on:

- start-up and operation
- maintenance
- troubleshooting
- disassembly
- safety

Start by carrying out one of the activities mentioned above only after reading this manual carefully. Make sure that this manual is available for both management and executive staff.

If the requirements as described in this manual, are not followed, there is a risk of:

- the safety of the executive staff
- the proper operation of the blower
- damage to the system in which the centrifugal blower is integrated

For questions and/or comments about the centrifugal blower, please contact Van Tongeren Kennemer BV. VTK has the know-how, original parts, necessary tools and her own service department to help you quickly and efficiently.

Contact information can be found in the header of each page or online at: www.vtk.nl

The following symbols and notations are used in this manual:



NOTE

Information bringing possible problems to your attention.



CAUTION

The centrifugal blower may be damaged, if instructions are not followed.



WARNING

Personnel may get (seriously) injured or (seriously) damage the centrifugal blower. Follow these instructions carefully.




DANGER

Lives of personnel are threatened.

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APPENDICES

APPENDIX A	DECLARATION OF CONFORMITY
APPENDIX B	LIFTING PLAN
APPENDIX Y1	BEARING BLOCKS
APPENDIX Y2	COUPLING
APPENDIX Y3	E-MOTOR
APPENDIX Y4	SHAFT SEAL
APPENDIX Y5	SEAL GAS SUPPLY UNIT
APPENDIX Y6	PT-100 ELEMENT ON BLOWER BEARINGS
APPENDIX Y7	VIBRATION PROBE ON BLOWER BEARINGS
APPENDIX Y8	SPEED PROBE (KEY PHASOR)
APPENDIX Y9	BLOW-OFF VALVE
APPENDIX Y10	INLET VALVE

1 Technical specifications / Operational conditions

1.1 Operating data

One (1) VTK two-stage centrifugal blower, with the impellers mounted in between the bearings and driven by means of a high voltage electric motor over a flexible spacer coupling.

The centrifugal blower design is in accordance with API 673, any deviations will be specified. In case the specifications are not conclusive, the VTK standard design will be applied.

2 Operating data

Fan type		HD2 407/1230/T16B
Fan speed (rated)	[rpm]	3000
Impeller diameter	[mm]	1230
Inlet opening	[Ø]	14" ANSI 150 Lbs
Outlet opening	[Ø]	12" ANSI 150 Lbs
Motor power / speed	[kW / rpm]	700 / 3000

Case	Unit	Maximum	Normal
------	------	---------	--------

Process data

Inlet pressure battery limit	[mbar(a)]	4000.0	4000.0
Δp inlet accessories	[mbar]	50.0	38.5
Δp inlet valve	[mbar]	0.0	82.0
Blower inlet pressure	[mbar(a)]	3950.0	3879.5
Blower outlet pressure	[mbar(a)]	5505.5	5504.2
Δp outlet accessories	[mbar]	5.5	4.2
Outlet pressure battery limit	[mbar(a)]	5500.0	5500.0

Mass flow	[kg/h]	37152	32306
Capacity	[Nm³/h]	30419	26452

Blower operating data

Suction	Volume flow	[Am³/h]	8803	7794
	Temperature	[°C]	35	35
	Pressure	[mbar (a)]	3950.0	3879.5
		[mbar (g)]	2936.8	2866.3
	Mol. Weight	[kg/kmol]	27.37	27.37
	Density	[kg/Nm³]	1.221	1.221
Discharge		[kg/Am³]	4.220	4.145
	Volume flow	[Am³/h]	7365	6468
	Temperature	[°C]	88	92
	Pressure	[mbar (a)]	5505.5	5504.2
		[mbar (g)]	4492.3	4486.8
	Density	[kg/m³]	5.044	4.995
Differential Pressure		[mbar]	1555.5	1624.7
Dynamic pressure		[mbar]	6.2	4.8
Total pressure		[mbar]	1561.7	1629.4
Shaft power		[kW]	579.7	536.3

2.1 Noise data

The sound data mentioned below are per centrifugal blower, calculated in the design point without any noise provision and in open field positioning at one meter distance from equipment surface.
Values are A-evaluated acc. DIN 45633.

L_{wS} = Sound power level in blower suction line
 L_{wD} = Sound power level in blower discharge line
 L_w = Sound power level of blower casing
 L_p = Sound pressure level at 1 meter from blower casing surface (uninsulated)

Freq.	Hz	63	125	250	500	1000	2000	4000	8000	L_wA/L_pA
L_{wS}	dB	134	135	136	135	131	128	126	122	137 dB(A)
L_{wD}	dB	142	143	143	143	135	130	131	128	143 dB(A)
L_w	dB	119	120	120	119	118	115	112	107	123 dB(A)
L_p	dB	101	102	102	101	100	97	93	89	105 dB(A)

L_pA blower with motor @ 1 meter distance is 106 dB(A) without noise reducing measures.
 The noise level will be reduced to below 85 dB(A) @ 1 meter by the close fitting acoustic enclosure

2.2 E-motor data

Make	NIDEC
Power at line duty [kW]	700
Speed synchronous [rpm]	3000
Supply [V/ph/Hz]	6000 / 3 / 50
Start-up	DOL
Ambient air temp. [°C]	+2 / +50 (design 55)
Duty type	S1
Insulation class	F (Temp. rise B)
Mounting size	IM 1001 (B3)
Internal protection rating	IP 55
Method of cooling	IC 511
Ex. proof classification	Flame proof Exde IIC T3, suitable for Gas Group IIC and temperature Class T1
Bearings	Grease lubricated AF bearings
Design standards	ISO / IEC
Included accessories :	
<ul style="list-style-type: none"> Stainless steel rating plate Witnessed routine test to manufacturer standard 3 x 2 PT-100 elements in windings, duplex type 2 PT-100 elements on bearings (one per bearing) Separate terminal box for temperature elements Anti-Condensation Heater (230 V 1 ph 50 Hz) with separate terminal box Chemical Plant Finish, color RAL 5010 SPM adapters on the bearings 	

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3 Safety

The blower meets the technical safety standards applicable in the EC at the time of delivery. The rules and regulations for the prevention of accidents applicable at the time of delivery were taken into account in the blower design. The technical design meets DIN 24166 standard "Technical delivery conditions for fans".
The operating manual and any required supplementary manuals must be available to the operator.

3.1 Summary of risks



Blower operating limitations

- Without written permission of VTK it is not allowed to deviate from the above mentioned operating ranges. (see section 1.1)
- The centrifugal blower is not suitable to be operated as a separate unit.
Operating the centrifugal blower as a separate unit for testing purposes may only be done by qualified personnel.
When operated as such it must be properly fenced off and if possible insulated.



Installation

- The user has to ensure that the blower is only connected and serviced by a qualified electrician in accordance with the rules and regulations applying to electrical equipment valid in your region.
- The power supply of the blower has to be equipped with a main switch which can be locked by means of a key. The switch must be in the direct vicinity of the blower.
- Do not touch or work on live parts.
- Damaged and/or defective electrical equipment and cables must be repaired or replaced immediately cause they represent a risk. The blower may not be put into operation before the defect is repaired.



Start up and operation

- The blower may only be put into operation (also for testing) when the inlet and outlet openings are provided with suitable guards/plate shutters or they are connected to ducting.
- Before the blower is started, the housing and all connected ducting must be checked. They must be dry and free of screws, bolts, tools and other foreign objects.
- During operation of the blower the only activities that may be performed are re-lubricating and taking measurements.
- Always use hearing protection in the vicinity of the blower if it is in operation.



Inspection

- Vibration levels of the blower must be checked regularly. If vibrations level $V_{eff} > 11$ mm/s, the blower must be taken out of operation immediately.
- Damaged and missing parts, including warning signs and labels, must be replaced immediately.
- The bearing temperature can rise above 65°C. However, there are not supplied with safe guards.
When re-lubricating or taking measurements special care must be taken not to touch bearing housings when the blower is in operation.



The following stickers and name plates and guards have been applied to inform and warn against risk of injury.

Check monthly that stickers and name plates are still readable, if necessary clean and/or replace them.

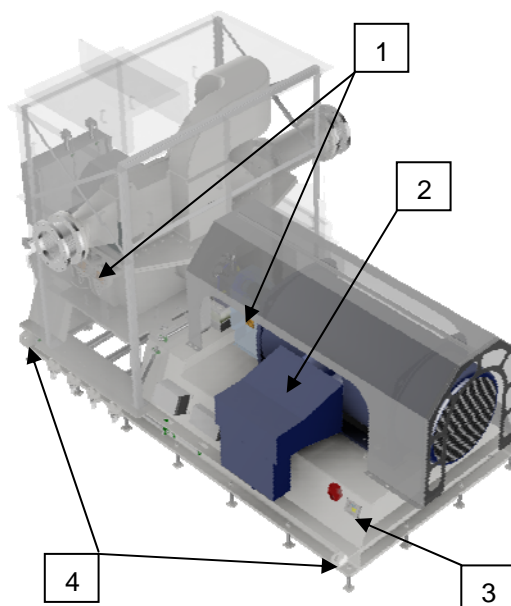
1. Warning sticker "Do not remove while in operation"
2. ID plate E-motor
3. Name plate VTK
4. Lifting point sticker



Nr. 1



Nr. 4



Shut down and maintenance

- Before performing any activities on the centrifugal blower, interrupt the power supply to the blower with the main switch and lock it. Use a voltage tester to check the circuit is dead.



- Connect the centrifugal blower to an earth point, and check the circuit.

- The run-out time for large centrifugal blowers can be considerably.

Only remove or open safety guards, protective devices and inspection doors if necessary.

- The impeller and motor / blower drive must have come to a complete standstill before its allowed to performing any activities on the blower.

- When blower has come to standstill close valves in ducting or disconnect/open ducting from the blower in order to prevent draught / air flow though the blower. Air flow though the blower will drive the impeller!

After servicing, verify that no foreign objects (tools, fasteners, etc.) are left behind. All guards, protective devices and inspection doors must reinstalled and closed. All bolts and nuts must be tightened to the correct amount of torque.

Check that all following parts are in place and not damaged:

- safety guards and protective devices
- inspection doors
- junction box and motor terminal box covers
- warning signs and labels

3.2 Residual Risks



There is a risk of burning hands when touching the bearing housings. The bearing temperature can rise above 65°C. However, they are not supplied with safe guards (in compliance with ISO 12499). When working on the blower special care must be take not to touch bearing housings when the blower is in operation.

Residual risk's	Possible injury	Action
1: Transport	Crushing of limbs with permanent injuries.	Follow lifting instructions / lifting plan acc. chapter 3.1 and appendix B
2: Mechanical strength of blower house and pedestal	Risk of serious injuries	Do not operate the blower above the operating data as described in section 1.
3: Mechanical strength of impeller	Risk of serious injury or death	Cleaning instructions see chapter 5.3. Periodically inspect vibration in bearing block, see Chapter 5.2
4: Mechanical strength of the connection between the impeller and the shaft	Risk of serious injury or death	Do not operate the blower above the operating data as described in section 1.
5: Rotating coupling and shaft of motor and impeller.	Risk of serious injuries	Sticker instructions, see chapter 2.1 Guard should not be removed while in operation.
6: Rotating impeller	Risk of serious injury or death	Sticker instructions, see chapter 2.1 Inspection hatch should not be removed while in operation.
7: E-motor	Risk of serious injury or death	Follow electrical instructions, see chapter 4.2 and the e-motor manual instructions appendix E
8: High level noise	Risk of hearing damage	Hearing instructions, see chapter 1.2
9: Thermal risk	Risk of serious injuries	Sticker instructions, see chapter 2.1 Periodically inspect insulation. See chapter 4.3
10. Exceeding operating data	Risk of serious injuries	Do not operate the blower above the operating data as described in section 1.
11. Faulty installation of blower	Risk of serious injury or death	Warn and instruct in the user manual: Section 4 and 5.
12: Explosion	Risk of serious injury or death	All earthing devices and cables should be checked periodically for damages and/ or mechanical wear.

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4 Transport and storage

4.1 Lifting



It is important that, during lifting operations with the centrifugal blower, the below mentioned points are followed up.

- The centrifugal blower, depending on the performance, is equipped with lifting lugs. These points are marked with lifting point stickers as shown on drawing: 16.0078-T4000-LFT "LIFTING DRAWING". When the lifting lugs are too small for a sling they must first be attached to a lifting shackle.
- For lifting the centrifugal blower it is not allowed to fasten hoisting equipment to any other parts than the lifting lugs.
- The lifting should always be performed with approved lifting equipment.
- All lifting equipment will be fastened in places to prevent deformation of the centrifugal blower and/or to prevent shifting of the load.
- The total weight of the centrifugal blower is displayed on the lifting plan.
- Check the anticipated area or path of the lifting operation. These areas should be cleared of any obstructions and/or personnel, before hooking the load to the lifting equipment.
- Only qualified personnel should operate the lifting equipment.
- Ensure adequate supervision (competent staff) during lifting.
- Place the blower in the desired position and ensure that it is secured before any lifting equipment is removed.

WARNING: DO NOT LIFT THE CENTRIFUGAL BLOWER WITH OTHER PARTS MOUNTED TO IT.

4.2 Packing

At delivery, the centrifugal blower unit is packed in a seaworthy case packing. The following precautions have been taken by VTK:

1. The unpainted or rust sensitive parts are properly protected / greased.
2. Bearings :
 - a. Blower bearings are filled with oil.
 - b. Motor bearings are filled with grease.
3. Flanges are provided with a cardboard blind plate

Equipment shall be handled with care and with adequate and good quality equipment, in such a way that damage to materials and equipment is prevented.

4.3 Precautions when unpacked or during idle period

Precautions and facilities for storage must ensure that no rain, snow, hail or any other fluid or particles can enter the blower casing, inlet vane control (if installed), bearings or any other part of the blower.

When the unit is unpacked and stored separately or when the blower is installed and is not operated for a period exceeding two months, the following precautions will have to be taken to ensure a smooth and problem free start or restart:

- All unpainted or rust sensitive parts must be properly protected, greased, sealed or packed.
- The moving parts of the centrifugal blower and E-motor shall be rotated at least once per week to prevent the bearings from damaging (blockage or circumference groove). (Circa 10 turns, begin and end position shall not be the same)
- In case of storage, exceeding two months, the oil and grease of the bearing blocks and motor must be replaced prior to start up. (see vendors instruction manuals)

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4.4 Removal and demolition



Removal, disassembly and demolition has to be performed by qualified personal only.
The following steps have to be performed in order as displayed:

1. The electrician will disconnect all power cables and the main switch.
Let the electrical work always be performed by qualified personnel. Check and make sure that there is no voltage on the electric motor.
2. Check and make sure the fuses are removed from the fuse cabinet. Now, start the disassembly of the centrifugal blower.
3. The centrifugal blower must be properly cleaned by authorized personnel.
4. Remove the suction and discharge piping, channels and flexible expansions joints.
5. Remove, when installed, all process measure instrument cables.
6. Loosen and remove the foundation bolts.
7. Move the blower into a stable position for damage or danger free lifting.
8. Lift and transport the blower according to the guidelines as found in chapter 3.1.



If the blower is not reused, then all materials should be removed in accordance with the applicable environmental laws and/or norms valid in your region.

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5 Installation, start up and operation

Installation and alignment of the centrifugal blower has to be performed by suitably trained personnel, preferably under supervision of a representative of VTK.

The installation site must be level and must have a sufficient load bearing capacity. There must be sufficient space for assembly and maintenance work. The impeller must be easily accessible.

5.1 Placement of blower

The complete blower has been aligned during construction at VTK works in Beverwijk. This procedure has been performed while the blower was placed on a flat surface, to ensure that the frame would not be twisted or deformed in any way by other forces than the own weight of the blower.

5.1.1 Base frame leveling.



Leveling shall be carried out with the complete blower, including the weight of the upper blower housing and the E-motor.

The base frame shall be leveled as good as possible, tolerance ± 0.3 mm/m.

5.1.2 Alignment



- Check E-motor alignment according to E-motor manual, realign if necessary. See appendix Y-3
- Check bearing alignment, realign if necessary. See appendix Y-1
- Place coupling spacer and check coupling alignment, realign if necessary. See appendix Y-2

For alignment instructions see vendor manuals

In case the final alignment would give unacceptable values due to possible extensive distortion or twisting of the frame, the blower base frame must be realigned/leveled. After that the E-motor, bearings and coupling must be checked/realigned again.

5.2 Electrical connection



The centrifugal blower may only be connected to the electrical system by a qualified electrician.

The operating instructions of the motor manufacturers must be studied and applied.

The motor must be connected in accordance with the circuit diagram inside the terminal box. The customer has to check that his power network, electric components and monitoring devices are sufficiently dimensioned to cope with the transient behavior and current peaks. It must be ensured that the supply of cooling air to the electric motor is not hindered.



- The power supply cable for the centrifugal blower must be installed in accordance with VDE regulations or any locally applicable legal stipulations.
- Compare the local mains voltage with the voltage indicated on the rating plate of the blower.
- Connect the centrifugal blower as shown on the circuit diagram inside the terminal box.
- Earth the centrifugal blower in accordance with the regulations issued by the local power supply company.
- Check the speed and direction of rotation.
- Check the transient behavior and starting time.

The motor must have an over current/thermal protection

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5.3 Special attention prior to start-up

First time start-up



1. Read instrument list and control narratives (Doc. No. 3698- GP- VD-IL11156721001 & 3698- GP- VD-BO11156721002) See section Q Manufacturing data book
2. Removal of the transport provisions of the blower shaft / bearings (if installed)
3. Replacement of the lubricating greases / oil.
4. Check alignment of blower / coupling / motor.
5. Check if the seal gas supply unit is working correctly.

Before any start-up, the following must be checked:



1. Read instrument list and control narratives (Doc. No. 3698- GP- VD-IL11156721001 & 3698- GP- VD-BO11156721002) See section Q Manufacturing data book
2. The presences of water or foreign objects in the blower casing internals. If any, drain water or remove objects.
3. Free rotation of the centrifugal blower and motor rotor. If the rotation is blocked or non-continuous, check the tolerances of labyrinth and shaft seal and inspect the blower and motor bearings.
4. Grease / oil levels of the bearings of blower and motor.
5. All possible access openings of the internal centrifugal blower are well secured.
6. In case of hot medium (see section 1) check the state of protective insulation. If potentially hot surfaces are uncovered, first restore insulation. Check the state of insulation periodically.

5.4 Blower start-up, commissioning.



In case the test run has to be performed when the ducting is not completely mounted, the following precautions have to be taken:

- Cover the blower suction nearly completely with a steel sheet.
- Make sure nobody can reach the suction and/or discharge opening; mount protection screens if needed.
- Make sure, airflow cannot damage the area round the blower.
- Make sure nothing will be sucked up into the blower suction.
- In case the motor current permanently is too high, this can be caused by the following: The temperature of the inlet air is far below the design operating temperature.
- Due to the fact that the ducting is not completed yet, the ducting resistance is too little.

In both cases blower capacity should be throttled in suction or discharge line.

If needed, the blower suction or discharge opening can be partially covered with a steel sheet

When initially starting the blower, smooth running of the blower should be checked.

If there is no noticeable vibration detected on bearing housing and pedestal, the blower can be put in full operation. In case of doubt measure the vibration.

At delivery, machine vibrations, measured on bearing surfaces, filtered at 10- 1000 Hz, were lower than 2.8 mm/s r.m.s. velocity.

6 Maintenance and repairs



Prior to any maintenance or repairs other then bearing lubrication the blower must be shut down:

- Switch off the supply voltage of the electric motor with the main switch and lock the switch with a key.
- If possible, shut suction and/or discharge valves to prevent rotation of the impeller by an airflow through the ducting.
- Disconnect the air supply for the inlet vane control. (if installed)
- Check if the impeller has come to a complete standstill before starting working on the blower.

NOTE: Only in case repairs are performed by V guarantees stays valid.

6.1 Lubrication



The blower and motor bearings must be checked at regular intervals (depending on the operating conditions)

Lubrication blower bearings.

First filling:

At delivery the bearing house is filled with oil. The following lubricant should be used:

OIL TYPE : SHELL TURBO ISO VG 100

When oil level in bearing housing is too low, please add oil (fill block) till specified oil level. (see Section Y1). In case of re-lubrication with an equal lubricant type of another make, always remove the original lubricant completely.

Manufacturer	: HFB
Fixed bearing block / bearing	: GOS 320 BF / 2320M.C3
Floated bearing / bearing	: GOS 320 AL / 2320M.C3
Oil quantity	: 1.8 ltr / bearing housing

OIL CHANGE INTERVAL : 1 YEAR (renew completely)

Every year clean, check and treat again as described above.

E-motor bearings.

See instructions on E-motor and the instruction manual of motor supplier (see Section Y3).



There is a risk of burning when touching the bearing housings. The bearing temperature can rise above 65°C. Wear suitable protection measures to avoid injury.

6.2 Vibrations

Blower vibrations should be checked frequently.

- GOOD	$V_{eff} = 2.8 \text{ mm/s}$ r.m.s. velocity, 10-1000Hz
- SHUTDOWN	$V_{eff} = 11.0 \text{ mm/s}$

When the vibration velocity exceeds the maximum the blower has to be stopped immediately. The impeller

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needs to be cleaned or rebalanced, or blower parts must be re-aligned.

6.3 Impeller

In case the operating medium contains sticky contaminants, they can adhere to the impeller. This can cause a severe unbalance which results in unacceptable vibrations. The impeller must be cleaned.

- Take notice of safety precautions
- Open the inspection door on the centrifugal blower casing.
- Block the impeller with a beam.
- Clean the impeller.
- Take care no cleaning agents can enter the bearings (centrifugal blower and vane control bearings).
- Remove possible obstructions.
- Close the inspection door.

6.4 E-Motor

See Section Y-3: E-Motor manual

6.5 Bearings

For bearing replacement follow the instructions of the bearing/housing supplier, See section Y-1

6.6 Coupling

Basically the coupling requires no maintenance. The flexible intermediate rings should be replaced each time the drive motor is overhauled. Re-align the coupling each time the rings are replaced

- Take notice of safety precautions.
- Remove coupling guard
- Replace coupling or coupling parts according the coupling manual see section Y-2. (The coupling can be replaced without removing the E-motor or impeller shaft)
- Place the coupling guard back onto its original position.

6.7 Shaft seal replacement

For shaft seal replacement follow the instructions of the shaft seal supplier, See section Y-4

7 Troubleshooting

Malfunction	Possible cause	Action
Unsteady operation of blower.	<ul style="list-style-type: none"> Material sticking to impeller blades. Worn impeller Impeller deformed by heat. Blower distorted because of uneven foundation. Incorrect setting of rubber-metal buffers or spring isolators. Strain exerted by connected pipes Damaged races and rolling elements Excessive bearing clearance Wear caused by dirt or insufficient lubrication. Coupling flanges don't stay optimal Flexible elements are nagged 	<ul style="list-style-type: none"> Carefully clean impeller. Replace impeller Replace impeller. Remove blower from foundation and level foundation. Fasten blower to foundation again. Correct setting. Use flexible pipe connections (compensators). Replace bearing. Protect bearing against dirt. Use clean grease. Look over alignment Change flexible elements
Medium escapes at the shaft seal.	<ul style="list-style-type: none"> Seal is faulty or worn. 	<ul style="list-style-type: none"> Replace seal.
Blower produces a grinding noise	<ul style="list-style-type: none"> Impeller rubs against nozzle. Motor noise. 	<ul style="list-style-type: none"> Loosen housing cover and re-align inlet, check and correct pipe if necessary. Check if bearings are damaged and replace bearings if necessary.
The power input indicated on the rating plate is constantly exceeded.	<ul style="list-style-type: none"> Too much air. Different speed with 60 Hz mains. 	<ul style="list-style-type: none"> Reduce air volume using a choking element until the permissible power input is reached Check frequency.
Blower does not accelerate.	<ul style="list-style-type: none"> Improper connection of drive motor. Motor does not change from star to delta connection. Blower operates against insufficient plant resistance. Motor protection system is not strong enough. Starting time is too long. Faulty drive motor. Starting/re-starting when blower is hot Starting current too high. 	<ul style="list-style-type: none"> Check connection. Shorten change-over time from star to delta. Close choking elements or install additional plate shutters. Cable cross section and protective system must withstand starting current during acceleration. Close choking elements, check starting torque of MA/MN motor. Check motor and replace if necessary. Switching frequency too high, let motor run through (control via choking element). Wrong voltage. Provide star-delta starting, local mains not strong enough.

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Powerful shocks on attempt	<ul style="list-style-type: none"> • Flexible elements to soft • Flexible elements are nagged • Starting power of motors to tall MA/MN 	<ul style="list-style-type: none"> • Use flexible elements with higher shore-hardness • Change flexible elements • Use star-delta-wiring
Unusual running noises: Whining or whistling noise. Rattling or irregular noise.	<ul style="list-style-type: none"> • Insufficient internal clearance. • Excessive internal clearance, damaged rolling surfaces, dirt. • Wrong lubricant 	<ul style="list-style-type: none"> • Use bearing with sufficient internal clearance. • Replace bearing. • Use correct lubricant.
Running noise is changing gradually.	<ul style="list-style-type: none"> • Change of internal clearance caused by temperature changes, damaged raceway (e.g. by dirt or fatigue.) 	<ul style="list-style-type: none"> • Protect bearing against heat/cold.

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APPENDIX A Declaration of conformity

APPENDIX B Lifting plan

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APPENDIX Y-1 Blower bearings

Supplier : HFB
Fixed bearing block / bearing : GOS 320 BF / 2320M.C3
Floated bearing / bearing : GOS 320 AL / 2320M.C3
Oil quantity : 1.8 ltr / bearing housing

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APPENDIX Y-2 Coupling

Supplier	John Crane
Type	TLKS-0500-0377-1800
Spacer length	180 mm

For coupling drawing see chapter M-2 of the Manufacturer Date Book.

For manual see attached sheets

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APPENDIX Y-3 E-Motor

Supplier	NIDEC
Type	ET 500W2
Power	700 kW
Speed	2980 r.p.m.

For motor drawing and connection diagram see Section P of the Manufacturer Data Book.

For motor manual see attached sheets

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APPENDIX Y-4 Shaft seal

Supplier	ABACUS
Type	Multi carbon ring type incl. connection for N ₂ seal gas
Shaft diameter	140 mm
Shaft sleeve diameter	140 / 160mm

For shaft seal drawing see chapter M-2 of the Manufacturer Date Book.

For manual see attached sheets

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APPENDIX Y-5 Seal gas supply unit

Supplier	ABACUS
Type	Barrier gas panel : SVP – 30
Pressure transmitter	Emerson/Rosemount 2088 Series. Type : 2088G2S22A2M5I1Q4Q8C4S5
Pressure regulator	Multifix F12
Flow meter	Krohne / H250 / RR / M40

For seal gas supply unit drawing see chapter Q-14 of the Manufacturer Date Book.
For instrument manuals see attached sheets

APPENDIX Y-6 PT-100 Elements on bearings

Supplier	Thermo Electric
Type	XPS3 (DWG 530111)

For manual see attached sheets

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APPENDIX Y-7

Vibration probes on blower bearings

Supplier
Type

Bently Nevada
XA Velomitor Type 330525-02
Cable for velomitor XA 106765

For manual see attached sheets

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APPENDIX Y-8 Speed probe (key phasor)

Supplier Bently Nevada
Type 3300 XL Proximitor Type 330180-51-05
Probe 3300 8mm Bently M10x1 Arm Type 330104-00-10-50-02-05

For manual see attached sheets

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APPENDIX Y-9 Blow-off valve

Supplier	Transmark
Valve Type	CV322 PFB 1113 L2 300/260-100
Actuator	Flowserve Type PB 503 BVCOZB
E/P Positioner	Emerson / Fisher DVC6200

For details blow-off valve see chapter M-2 of the Manufacturer Date Book.

For manual see attached sheets

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APPENDIX Y-10 Inlet valve

Supplier	Transmark
Valve Type	Dynaxe 14" ANSI 150# RF
Actuator	GT - Model GTW 300-10
E/P Positioner	Emerson / Fisher DVC6200

For details blow-off valve see chapter M-2 of the Manufacturer Date Book.

For manual see attached sheets