



- PROJECT: AVANTE 2200
- SHIPYARD: NAVANTIA S.A.
- SYSTEM: HVAC



ISO 9001
ISO 14001
OHSAS 18001
BUREAU VERITAS
Certification



PROJECT: AVANTE 2200

SHIPYARD:



Navantia

SYSTEM: HVAC

MAIN AXIAL FANS FOR ENGINE ROOMS AND DIESEL GENERATOR ROOM

REF.: D-MO5462-004

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TABLE OF CONTENTS

1. TECHNICAL AND FUNCTIONAL DESCRIPTION:	4
2. TRANSPORT AND HOISTING	5
2.1 SAFETY PRESCRIPTIONS	5
2.2 SCOPE OF DELIVERY	5
2.3 PACKAGING	5
2.4 TRANSPORT – HOISTING INSTRUCTIONS	6
2.5 PRESERVATION METHODS	6
3. MAINTENANCE	7
3.1 PREVENTIVE MAINTENANCE	7
6.1.1 Quarterly maintenance (every 2.160 operating hours)	8
6.1.2 Motor bearing replacement (every 30.000 operating hours) (PM-2)	9
6.2 CORRECTIVE MAINTENANCE	12
6.2.1 Replacing the motor (CM-5)	12



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TABLE OF FIGURES

Figure 1 Axial fan schematic.....	9
Figure 2 Loosening the cooling fan clamping screw	10
Figure 3 Tapping the end motor cover lightly.....	10
Figure 4 Using the bearing puller	11
Figure 5 Required tools	11
Figure 6 Required tools	12

1. TECHNICAL AND FUNCTIONAL DESCRIPTION:

RECIRCULATION VENTILATION SYSTEM FOR ENGINE ROOMS :

Two (2) fans powered by an electric motor + two (2) sea water / air heat exchangers for air recirculation and heat dissipation of the room.

Fans operating under all conditions of ship operation. Fans shall only be closed or stopped for repair purposes.

<u>TAG</u>	<u>OPERATION</u>	<u>CLASS.</u>
FAN-VES01009	RECIRCULATION	W
FAN-VES01010	RECIRCULATION	W
FAN-VES02011	RECIRCULATION	W
FAN-VES02012	RECIRCULATION	W

RECIRCULATION VENTILATION SYSTEM FOR DIESEL GENERATOR ROOMS

Two (2) fans powered by an electric motor + two (2) sea water / air heat exchangers for air recirculation and heat dissipation of the room.

Fans operating under all conditions of ship operation. Fans shall only be closed or stopped for repair purposes.

<u>TAG</u>	<u>OPERATION</u>	<u>CLASS.</u>
FAN-VES01003	RECIRCULATION	W
FAN-VES01004	RECIRCULATION	W
FAN-VES02005	RECIRCULATION	W
FAN-VES02006	RECIRCULATION	W

2. TRANSPORT AND HOISTING

2.1 SAFETY PRESCRIPTIONS

In this section, general safety prescriptions are indicated for carrying out transport operations of the equipment. Other safety prescriptions are indicated in different sections of this document.



- *Danger due to improper transport!*
- *Risk of damage to the unit. If the unit has been damaged or dropped, check that it works correctly.*
- *Take care when transporting the unit!*

WARNING



- *Danger due to overhead loads!*
- *It is extremely dangerous to stand under overhead loads.*
- *Make sure that no-one is standing under an overhead load!*

2.2 SCOPE OF DELIVERY

As soon as the unit has been delivered, remove the packaging and check the unit for any damage caused in transit (if so, submit a complaint to the carrier), and check that the shipment is complete and correct. To do so, compare the details of the unit nameplate with the details on the delivery note.

This also applies to all accessories. Missing parts or damage in transit can only be claimed against the transport insurance if the damage has been confirmed by the carrier.

2.3 PACKAGING

The unit is shipped on pallets and packaged in shrink wrap the protective cap on the unit discharge port should only be removed when the unit is installed.

2.4 TRANSPORT – HOISTING INSTRUCTIONS

WARNING



- *Danger when transporting the unit!*
- *Improper transport can cause injury to the personal.*
- *Ensure that at least two people carry the unit. Secure the load during transit to prevent it from tipping or falling. In the case of palletized deliveries, use only lifting and transport vehicles with sufficient carrying capacity.*

CAUTION



- *Danger when transporting the unit!*
- *Improper transport can cause damage to the unit.*
- *Ensure the load during transit to prevent it from tipping or falling. In the case of palletized deliveries, use only lifting and transport vehicles with sufficient carrying capacity.*

2.5 PRESERVATION METHODS

When storing the unit for a temporary period, the following points must be noted:

- Store the unit in its original packaging.
- The storage location must be protected from the elements, dry and free of dust.

CAUTION



- *Danger from impacts and vibrations.*
- *Risk of damage to the unit.*
- *The unit must be protected from impacts, vibrations etc.*

3. MAINTENANCE

The supplied axial fans are high-quality and reliable units. However, to guarantee the permanent functioning and performance of the units, regular maintenance and inspection by technical experts is necessary.

NOTE

Maintenance must only be performed by trained technical personnel in observance of this operation manual and the regulations in force.

WARNING



- Rotating fan wheels
- Risk of injury!
- Before performing any work on the unit, ensure that it is powered down. Ensure that the unit is secured against being switched back on at an appropriate point of the on-site power supply.



- High voltage installed
- Risk of electric accident!
- Disconnect the heater from the power supply before attempting any maintenance work. Ensure that the unit is secured against being switched back on at an appropriate point of the on-site power supply.

NOTE

The warranty will be invalidated by damage which is attributable to the non-performance of regular essential inspections.

3.1 PREVENTIVE MAINTENANCE

The following maintenance tasks must be performed at the indicated time intervals.

Task Code	Task	Frequency	Task duration	Skill of personnel	Required tools	Remarks	Action Reference
PM-1	Check the unit	Quarterly (2.160 operating hours)	1 hour	Mechanic / electrician	Insulated screwdriver, laser thermometer	--	PM-2
PM-2	Replace bearings	Every 30.000 operating hours	2 hours	Mechanic	Deep groove ball bearing extraction kit, teflon hammer, screwdriver set	--	--

6.1.1 Quarterly maintenance (every 2.160 operating hours)

6.1.1.1. Check the unit (PM-1)

WARNING



- Power supply voltage 3x440V.
- Risk of electric accidents.
- Before performing the following work, you must ensure that the unit is powered down and that the mains voltage is secured against being switched back on. Before finishing with the unit, ensure that the electrical terminal box is properly closed.



- Rotating fan wheels
- Risk of injury!
- Before performing any work on the unit, ensure that it is powered down. Ensure that the unit is secured against being switched back on at an appropriate point of the on-site power supply.

1. Check for obstructions or debris in fan.
2. Inspect fan impeller for dust or dirt accumulation; clean if necessary with a cotton cloth.
3. Inspect fan impeller for cracks. If found, remove fan from service immediately.
4. Check fan impeller for proper rotation.
5. Check and tighten all bolts and set screws.
6. Check all bearings for excessive temperature with the laser thermometer.
7. Check that all surfaces, coatings or paint are in good condition.
8. Check the alignment of impeller, inlet cone, bearings and shafts.
9. Check that motor is not overloaded.

Required tools: insulated screwdriver and laser thermometer.

6.1.2 Motor bearing replacement (every 30.000 operating hours) (PM-2)

Every 30.000 operating hours it is recommended to replace the motor bearings. The motor bearings references are indicated in Section 6.3 "Recommended Spare Parts / Special Tools".

Read all instruction steps below before performing any maintenance.



- Power supply voltage 3x440V.
- Risk of electric accidents.
- Before performing the following work, you must ensure that the unit is powered down and that the mains voltage is secured against being switched back on. Before finishing with the unit, ensure that the electrical terminal box is properly closed.

WARNING

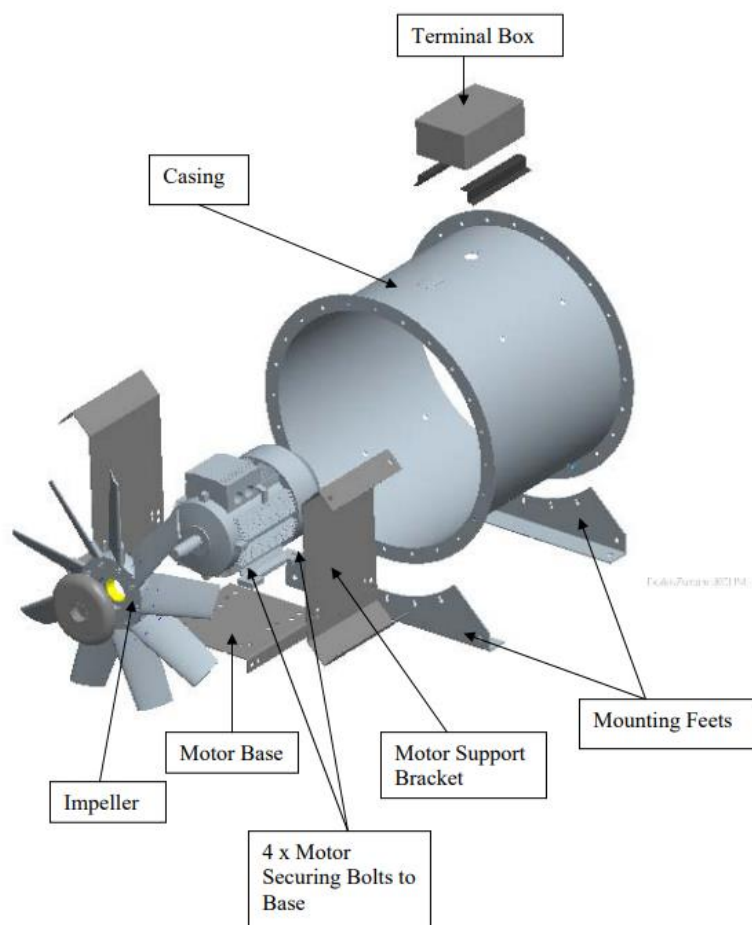


Figure 1 Axial fan schematic

1. Make sure all power to the fan is completely dis-connected or "locked out" .
2. Remove fan cover screws and remove fan cover.
3. Loosen cooling fan clamping screw.



Figure 2 Loosening the cooling fan clamping screw

4. Use a big screwdriver to jack out the cooling fan.
5. Remove the cooling fan.
6. Unscrew the nut of the 4 studs holding the motor cover.
7. Remove all 4 studs.
8. Tap the end motor cover lightly.



Figure 3 Tapping the end motor cover lightly

9. Remove both the front and end cover completely.
10. Remove the stator and use a bearing puller to remove the bearings (D-End and ND-End).



Figure 4 Using the bearing puller

11. The bearings are dismantled completely by jacking the screws on the puller.
12. Replace new bearings and tap them until they fully seat.

Required tools: Deep groove ball bearing extraction kit, teflon hammer, screwdriver set .



Figure 5 Required tools

6.2 CORRECTIVE MAINTENANCE

The following corrective maintenance tasks must be performed as indicated by the Troubleshooting indications in Section 5.

Task Code	Task Description	Task Duration	Skill of personnel	Required tools
CM-1	Replacing the motor	1h	Electrician	Wrench set, screwdriver set

6.2.1 Replacing the motor (CM-5)

- Disconnect electrical connections.
- Unbolt the four mounting bolts of the motor.
- Replace the faulty motor with the new one.
- Retighten the mounting bolts.

Required tools: wrench set, screwdriver set



Figure 6 Required tools