



GAUSSMAGNETI

MAGNETIC EQUIPMENT FOR MATERIAL HANDLING
AND RECYCLING TECHNOLOGY

<p><i>EDDY CURRENTS SEPARATOR</i> ECS</p>



MAINTENANCE MANUAL

Manual Code: S10-80-ECS-e-rev16.docx – Rev.16, 25-06-2021

6 - MAINTENANCE


6.1 Safety Precautions


Safety precautions contained in this paragraph shall always be strictly observed during maintenance in order to avoid injury to personnel and the separator.

	The personnel involved in the separator maintenance must be well trained, have read this publication and have a thorough knowledge of safety regulations.	
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	Unauthorized personnel must remain outside of the work area during operations.	
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These precautions are repeated and further detailed in this chapter, every time that a procedure is required that risks damage or injury, through the notes of **WARNING** and **DANGER**:



	WARNING notes prior to an operation that, if not correctly followed, could result in damage to the separator.	
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	DANGER notes prior to an operation that, if not correctly followed, could result in injury to the operator.	
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6.1.1 Cautions and warnings



	Attention to the following during the maintenance of the separator!	
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	Before trying to operate the separator, after a failure, you must carefully check the separator by qualified personnel and must repeat the procedure for commissioning - test as described in section 4.5.	
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	Never work, unless specifically required for the elimination of failure and adjustment and positioning of safety devices: manipulations can cause serious damage to the separator.	
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6.1.2 Danger notes



	Attention to the following hazards during maintenance of the separator!	
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	Always exclude all sources of energy separator before performing maintenance and wait at least 5 minutes after switching off, for the complete shutdown of the magnetic rotor. Affix the sign with the words: MACHINE MAINTENANCE - DO NOT PLUG IN THE POWER	
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	Never remove safety devices and protective devices installed on the separator: if necessary, report it with appropriate warning signs and operate with the utmost caution, verifying the absence of uninformed people, who could be exposed to risks to their health.	
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	Always make sure of the presence of ground connections and their relevance legislation. Not grounding of electrical equipment can cause serious injury.	
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	Avoid the use of flammable or toxic solvents (petrol, ether, alcohol, etc..). Avoid prolonged contact with solvents and inhalation of their vapours. Avoid use near an open flame, ensure adequate ventilation.	
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	Always make sure, before starting the separator, the maintenance staff is at a safe distance and tools or materials that may have been left on the machine or equipment.	
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	Always use protective gloves during maintenance operations.	
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	All moving parts and the transmission must be protected against accidental contact. Therefore, make sure that all guards are properly relocated before trying to operate the separator.	
	Never use water jets in case of fire; disconnect all power and use appropriate fire extinguishers.	
	Make sure the tools to be used are in perfect condition and are fitted with insulating handles, where required.	



6.2 Qualification of maintenance personnel

To be able to solve any problem in the field of maintenance of the separator the maintenance personnel must:

- * Know the laws in force relating to the prevention of accidents during work carried out on machines with motor drive and be able to apply them;
- * Have read and understood the chapter 3 "Safety and Security";
- * Know how to use and refer to these documents;
- * Be interested in the operation of the separator;
- * Note irregularity of operation and if necessary, take appropriate action.

Upon customer request, the Gauss Magneti Srl may provide the necessary training.

The professionals appointed and authorized to act in the separator are:

	Operator assigned to the use of the plant, which include the separator.	
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* **Typical activities:**

- * Use of the separator in its normal state of operation (automatic operation) and repair work after the emergency intervention;
- * Taking the necessary measures to maintain quality of the service;
- * Cleaning and lubrication of the parts of the separator which is normally in contact (buttons) and performing maintenance tasks simple realization (lubrication);
- * Collaboration with the staff responsible for maintenance and repair activities.

* **Technical skills required:**

- * Knowledge of the functions and the use of the separator;
- * Knowledge of the lubricant used in the separator and the hazards associated with their use.

* **Qualification required:**

- * Ability to work in relation to the specific operational and environmental characteristics.

	Maintenance Mechanic	
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* **Typical activities:**

- * Cleanliness of the separator, with particular regard to the rollers, the gear motor and the bearings;
- * Verifying the integrity of the moving parts;
- * Verifying the integrity of the belt (with the possible removal of the material penetrated in the separator);
- * Proof of normal operation;
- * Control of the mechanical play and wear of the components (shafts, bearings, etc.);
- * Any repairs mechanical units damaged.

* **Technical skills required:**


- * Good knowledge of mechanical systems with moving motor;
- * Good knowledge of the safety devices employed in the separator (skid control, etc.);
- * Basic knowledge of the techniques of control and regulation of electric moderate difficulty (high pass adjustment, replacement fuses, motor connection, etc.);
- * Knowledge of the methods of measurement and testing to determine the actual status of the conditions of the separator (check bearing wear, checks abnormal noise, etc.);
- * Logical research of not complex damage and evaluation of results;
- * Ability to organize measures to restore the separator in its capacity / performance;
- * Ability to draw up a statement of maintenance.

* **Qualification required:**

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- * Comprehensive training as an industrial mechanic with expertise and experience in maintenance of machines and material handling systems.

	Maintenance Electrician	
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- * **Typical maintenance activities:**
 - * Action on electrical equipment since the functional diagrams;
 - * Audit of the movements and electric adjustment of safety devices;
 - * Check the wear of the electrical components (contacts of the electrical equipment);
 - * Any repair damaged electrical components and accessories.
- * **Technical skills required:**
 - * Good knowledge of plants and electrical installations;
 - * Good knowledge of the electrical components and the safety devices employed in the separator (skid control, etc.);
 - * Knowledge of the techniques of control and regulation of electrical medium (replaced in accordance with the original design of motors, switches, buttons, controllers, cables, etc.);
 - * Fundamental knowledge of control techniques and mechanical adjustment of moderate difficulty (verification wear, adjustment mechanical stops, etc.);
 - * Knowledge of the methods of measurement and testing to determine the actual status of the conditions of the separator (verification efficiency and reliability of electrical equipment);
 - * Knowledge of the methods of fault finding and electrical failures and experience on electrical systems of command and control of industrial machinery;
 - * Ability to organize measures to restore the separator in its capacity / performance;
 - * Ability to draw up a statement of maintenance.
- * **Qualification required:**
 - * Comprehensive training as electric industrial specialization and experience in maintenance of machines and industrial systems.

	Maintenance Electromechanical: He is an operator whose professional profile includes and synthesizes the skills and technical skills required in mechanical maintenance, in addition to those typical of electrical maintenance	
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	Mechanical technician	
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- * **Typical technical activities:**
 - * Mechanical adjustment of safety devices, calibration and testing (load testing);
 - * Routine maintenance and repairs, excluded the repair of mechanical parts, complex and / or critical for safety, not listed and not explained hereunder;
 - * Repairs of structural parts with overlay welding, machining on the machine, etc.
- * **Technical skills required:**
 - * Excellent knowledge of mechanical systems used in industrial machinery;
 - * Specific knowledge, obtained by way of formation, the characteristics of the separator and of the safety devices employed in the same;
 - * Basic knowledge of techniques for controlling and regulating power;
 - * Specific expertise about the methods of measurement and testing to determine the actual status of the conditions of the separator;
 - * Specific expertise about the research methods of logic faults and evaluation of results;
 - * Ability to direct measures to bring the separator in function and performance;
 - * Ability to draw up a statement of maintenance.
- * **Qualification required:**
 - * Comprehensive training as a mechanical engineer.

	Electrical / electronic Technician	
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- * **Typical activities:**
 - * Electrical adjustment of safety devices, calibration and testing (load testing);
 - * Normal maintenance operations prior replacement of complex electrical parts and / or critical parts for the purposes of security (motors, etc.);
 - * Repair of electrical groups prior operations of extraordinary maintenance (repair of electric motors with partial substitutions, with adaptations replacement skid control, etc.).
- * **Technical skills required:**
 - * Excellent knowledge of plants and electrical installations of industrial machinery;

- * Specific knowledge obtained through training, the characteristics of the separator and safety devices used in the same;
- * Experience in the techniques of control, electric adjustments and programmable logic / PLC (ability to intervene in the original scheme for improvements or updates of control panels, software etc.);
- * Knowledge of techniques for controlling and adjusting mechanical (wear occurs, verification performance mechanical components, adjustable mechanical stops, verification noise, etc.);
- * Specific expertise about the methods of measurement and testing to determine the actual status of the conditions of the separator (verification efficiency and reliability of electrical and electronic equipment);
- * Specific expertise about research methods logic of all failures and evaluation of results on electrical and electronic equipment for command and control;
- * Ability to direct measures to bring the separator in function and performance;
- * Ability to draw up a statement of maintenance.
- * **Qualification required:**
 - * Comprehensive training as industrial electrical technician.

	Electromechanical / mechatronics Technician: He is a highly skilled operator whose professional profile includes and summarizes the skills and knowledge required of the mechanical engineer, in addition to those typical of technical electrical / electronic.	
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6.3 Recommendations for maintenance

It is well to remember that maintenance carried out properly can minimize downtime after a failure.

A repair done in a timely manner prevents further deterioration. Use original spare parts or with same characteristics.

To put in a state of maintenance, always observe the following guidelines:






- * The staff responsible for performing maintenance and extraordinary must have read and understood all the instructions contained in this chapter and in Chapter 3.
- * The actions of ordinary and extraordinary maintenance must only be carried out by authorized and qualified personnel.

	Maintenance work (except for special interventions, e.g., bearing support lubrication) must be carried out with the unit off (turn off the main switch) and safely, using appropriate equipment and appropriate personal protective equipment, as required by the regulations, and putting in the vicinity of the separator and of the control panel a signal with the warning: "MACHINE MAINTENANCE".
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	For problems that may arise or to order spare parts, refer to the manufacturer / installer.
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6.4 Plan of routine and periodic maintenance



The maintenance plan includes ordinary interventions, which include inspections, audits and verifications performed by the operator expert in the use of the separator and / or qualified service personnel for normal corporate servicing and periodic, including replacement operations, registration and lubrication carried out by expert personnel for the purpose through specific training courses or publications.





	<ul style="list-style-type: none"> * When maintenance operations are carried out at a dangerous height, relative to the ground, the personnel must have suitable means (scaffolding, platform, stairs etc.) making it possible to carry out the activity in conditions of safety. * Staff should also be equipped with appropriate personal protective equipment (DPI) required by the laws in force. 	   
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6.4.1 Routine Maintenance

Includes maintenance operations that can be performed by the operator, expert in the use of the separator, or by qualified personnel as prescribed in this publication and/or in the accompanying documentation and does not require the use of special tools and equipment.


The routine maintenance operations are divided into:

	Daily interventions by the operator expert in the use of the separator: 1. general visual inspections; 2. check the status of the conveyor belt; 3. check the status of the external surface of the dielectric cylinder;	
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	4. provide a general cleaning of the machine; 5. it is essential to remove any intrusion of ferromagnetic material from under the conveyor belt; 6. you need to replace or repair the belt every time you encounter the cuts, holes or abrasions; 7. remove from belt any intrusion of sharp materials (nails, staples, etc.), which were embedded; 8. functional tests (test engines, test buttons "start / stop" and other functions of the panel).	
	Weekly interventions by qualified personnel: <ol style="list-style-type: none"> visual inspection of each mechanism and search for possible loss of lubricant; functional control of the machine and if necessary, grease mechanisms to ensure the orderly functioning and limit the wear and tear; functionality and integrity of control panel and control devices and cables; visual inspection wear/damage of the belt; check that there is no noise and/or vibrations; if any, control sensor operation skid control (with separator stopped, manually activate the devices, controlling the ignition of the relevant alarm on panel); control functionality and integrity. 	
	Monthly interventions by qualified personnel: <ol style="list-style-type: none"> verification of efficiency of the machine; verification of the grease; verification of efficiency and integrity of the supply line and its components; check the efficiency and the state of conservation of the structure (painting, oxidation, etc.). check the efficiency of the skid control and emergency button; verification efficiency and wear of bearings; visual verification within the frameworks to ascertain the possible presence of dust. 	

6.4.2 Periodic Maintenance

Includes maintenance performed by personnel trained by means of this publication, with respect to controls, recordings and any replacements, in relation to the deadlines in the maintenance schedule as shown in Table 2 "Periodic intervention of maintenance and lubrication" (par.6.4.4).


	All operations of periodic review, control, repair, replace of structural parts, electromechanical and electronic components, <u>must be</u> performed by qualified and trained for the purpose and recommended that they be recorded in the register control. DO NOT OPEN FOR ANY REASON THE GUARD WITH THE MACHINE IN MOTION! Even pressing the emergency button , the belt motor stops immediately, but the magnetic rotor continues to rotate by inertia for a few minutes. Before opening the casing, you must wait at least for 5 minutes from the moment of stopping. Watch out for the fans! Do not manually rotate the magnetic roller as the inner rotor is dynamically balanced and with a small initial effort picks up speed and drag the fans
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6.4.3 Testing the efficiency of the parts and components of the separator

For the individual parts of the separator observe the following guidelines:



	Check the efficiency of structural elements:	
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The metallic structures, in addition to the normal deterioration due to environmental factors, may be subject, even inadvertently or during the operating phases of movement, shocks, or sliding contacts with other equipment or also to abnormal stress which can cause damage to the frames of carpentry, the welds and to the pins. Therefore, the structures, after cleaning, should be subject to regular and thorough checks to assess their suitability and, if necessary, remedy any damage.



!	<p>Repair facilities and hinged elements, or replace them, if they occur:</p> <ul style="list-style-type: none"> • deformation: stretching, crushing, dents, bends; • wear: worn parts, section reductions, cuts, abrasions, corrosion, oxidation, scratches, peeling paint; • broken: cracks welds, cracks, cuts or incisions, broken parts; • changes in the section, or in diameter or thickness. 	
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	Verification of the BELT PULLER:	
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The extractor belt should be checked periodically to assess the wear and make timely repairs.
If a ferromagnetic part slips into the space between belt puller and the active face of the magnet, you can have very rapid wear of the belt. Periodically, therefore, verify and ensure the cleanliness of the active face of the magnet, protecting your hands with protective gloves and, if necessary, using only non-magnetic tools (wood, brass, copper, aluminium, stainless steel AISI 320 or 340).
The check should be carried out every week.



	Verification of the GEAR MOTOR:	
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Check the level and condition of oil of gear motor, for which it is still appropriate to use the additional information provided by its manufacturer (in the case of gear motor lubricated for life, it is not necessary to lubricate).
Check that the noise of the gear does not vary in intensity.
Excessive noise or vibration results in excessive wear of the teeth or the failure of a bearing.

	In the event of a fault: * It is forbidden to intervene on gearboxes with corrective maintenance. * Any extraordinary maintenance operation on the gear must be carried out by customer service GAUSS MAGNETI Srl or persons authorized by GAUSS MAGNETI Srl.	
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	Check the efficiency of engines and power-up:	
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Clean the engine eliminating the dust that settles on the carcass.
Periodically check the good condition of the cables and their correct connection to the terminal; **check to be carried out each 6 months.**



	In the event of a fault: * It is forbidden to intervene in engine maintenance with corrective contact Srl Gauss Magneti for replacement (if under warranty) or the motor manufacturer.	
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	Check the tightness of bolted joints:	
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- After disassembly, tighten the bolted joints without exceeding the torque provided below for bolt specific category.



	Verification of bearings and supports:	
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- * Check that the bearing noise does not vary in intensity.
- * Check that the bearing temperature does not exceed 90°C.
- * Any loss of oil or grease, indicates damage to the bearing seals.

	Replace bearings: * When present: abnormal noise, uneven running, excessive play. * When hot. * When you have completed the N. ° of operating hours under the life cycle. (See the attachment, if any technical faults and remedies of bearings)	
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	Check painted parts:	
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- Check that the painted parts do not show peeling or deterioration of surfaces.

	Remove, by brushing, any rusty spots and repaint with an equivalent product.	
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	Check the electrical system:	
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- Check the integrity and performance of devices and electrical accessories.

- At least once a year clean with dry compressed air inside the cabinet, checking even the fuses and connections in the terminal, which must be well tightened.
- Check the operation of all electrical components and lamps in the panel.

 	<ul style="list-style-type: none"> • Do not hesitate to replace the electrical components, if the latter was no longer able to offer sufficient guarantees of functional reliability. • Never carry out improvise repairs. • Use compatible spare parts. 	
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	For the maintenance of specific components to trade see the technical documentation of the respective manufacturers, attached to this publication.
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6.4.4 Periodicity and schedule of maintenance

The frequency of maintenance operations which are indicated in Table 2 refer to a machine subject to a service working under normal conditions of 1 (a) daily work shift of **8 (eight) hours**.



If there are different working conditions, the frequency of maintenance should be increased in relation to the actual use. If the use of the separator is normal and correct, its revision may occur after a period of use of **20,000 hours of service at full load**, corresponding to about 10 years.

Table 2 - PERIODIC MAINTENANCE					
O = operator assigned by the use of the separator M = maintenance by specialized					
Checks and controls to be performed	Daily	Weekly	Monthly (*)	Half-yearly (*)	Change
Visual check ¹	O				
General Testing	O			M	
Control of corrosion absence		O	M		
Check tightness of bolts and screws			M		
Cleaning and lubricating	O	M			
Plates readability	O		M		If illegible
Transmission belts		O	M		If worn or damaged
Oil level and topping up (if applicable) of the gearmotor		O	M		
Belt		O		M	If worn or damaged
Internal magnetic rotor bearings		O		M	If worn or damaged
External magnetic rotor bearings		O		M	If worn or damaged
Slow bearings		O		M	If worn or damaged
Powered roller conveyor				M	
Cylinder in dielectric material	O			M	If worn or damaged
Control of electric cabinet				M	
Control of electric motors				M	

NOTE: (*) The maintenance operations, where required, shall be recorded in the control register (Chapter 7)



1 - Check the condition of the cylinder in dielectric material: if the cylinder has signs such as deep scratches, holes, small craters or blisters, bruises, it should be replaced immediately.

6.4.5 Cleaning the separator

	Cleaning can be carried out by qualified personnel and is periodically required to release the structure, mechanisms, control devices and control accumulation of dust or dirt and / or sludge caused by excessive lubricant.	
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- * Cleaning can be done simply with the use of tools, equipment and detergents commonly used in general cleaning of industrial equipment (avoiding the use of acids, solvents, or strong detergents to base such as caustic soda).
- * Clean removing any foreign substances and staining with vacuum cleaners, dish towels, etc.
- * Drain the fat and / or excess oil on the parts.


6.4.6 Lubrication

	The careful management of the lubrication of the separator mechanisms is the necessary condition to ensure effective compliance with the service to which it is addressed, as well as its duration.	
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Lubrication of moving parts is necessary to reduce wear. The most favourable conditions are obtained by using the **least quantity of lubricant** to obtain an effective lubrication.

Over time, the lubricant is consumed, so lubricants must be restored or renewed.

The lubrication of the separator is relatively simple but must be carried out by specialized personnel, scrupulously following the instructions contained in this manual and carrying out the necessary checks and top-ups, following the frequencies indicated in the following points.


	<ul style="list-style-type: none"> * Lubricants, solvents and detergents are toxic / harmful to health: <ul style="list-style-type: none"> * If in direct contact with the skin may cause irritation; * If inhaled can cause severe poisoning; * If ingested can result in death. * Handle them with care using appropriate personal protective equipment (PPE). * Do not pollute the environment, dispose of them in accordance with the laws in force in local waste toxic / harmful.
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LUBRICATION OF GEARMOTORS

Generally, gear motors are permanently lubricated and do not require the replacement of lubricants; in the case of non-lubricated for life gear motors, an oil change should be done every two years for use over an 8 hours working day, using the appropriate types of lubricants and in compliance with the following recommendations:

- * Dry excess oil with a clean cloth;
- * The draining and filling plugs should not remain open any longer than necessary.

It is advisable to check the level of the oil through the spy-hole, as proper lubrication depends on the good performance and life of the motor.

	<p>CAUTION!!! Lubricate the gear motors only with the machine stopped and the panel switched off.</p>
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LUBRICATION OF BEARINGS AND SUPPORTS

The bearings of the supports are filled at source the correct amount of grease and are ready for immediate use.

In normal working conditions, the original charge of grease is sufficient for a long period of operation.

In the bearings of the UC, UK and HC series there is the possibility of periodic lubrication through the special greaser (see Fig. 13÷16), depending on the operating conditions (see table No. 3). For lubrication, use a lithium soap grease for rolling bearings, in compliance with consistency class 2 of DIN 51818 (see table No. 4).

Table 3

Work environment	Bearing temperature [°C]	Lubrication Intervals
CLEAN	<50	12÷24 months
	<70	3÷8 months
	<100	20÷90 dd
	>100	7÷15 dd
DUSTY	<70	7÷30 dd
	>70	1÷15 dd
VERY HUMID	<100	1÷15 dd

For proper lubrication:

- never lubricate during the first assembly;
- introduce, grease very slowly, with constant pressure (the quantity must not exceed 3-4cm³ at a time) possibly during operation;
- abundant greasing is harmful; preferably grease frequently and in small quantities;
- **never lubricate with oil**, but only with grease (do not mix different types of lubricants, grease with oil).

The supports are designed for operation from -15° C to +80° C.

All the supports have the greasing valves clearly visible.

Internal bearings have grease valves located on the heads of the magnetic rotor shaft.

Table 4

Recommended lubricants	
Brand	Type
Esso	Beacon 2
Aral	HL2
Mobil	Mobilix 2
Shell	Alvania R2
BP	Energrease LS2

NOTE: The measures suggested in this section assume the fact that they are taken respecting the safety rules for personnel and procedures set forth in other sections of this guide.



Figure 13 – How to grease the pair of external bearings.



Figure 14 – How to grease the pair of internal bearings.



Figure 15 – How to grease the pair of rear bearings.



Figure 16 – How to grease the bearings of brush (if any installed).

6.5 Recordings and adjustments

The separator ECS is delivered having already been run and calibrated in our factory.

It is possible that during transport, assembly, use or after a period of inactivity, the machine must be adjusted again in some points, as indicated below.

6.5.1 Belt adjustment (in the case of belt heeling)

If after starting, with the selector switch **LOCAL - REMOTE** put in **LOCAL** position, you notice a shift of the belt to the left (L) or right (R), proceed as follows:

1. stop the machine by pressing the **EMERGENCY**;
2. turn the dial **BELT CENTER - AUTOMATIC CYCLE** position of **BELT CENTRING**, the anti-skid lamp will light to indicate that the two limit switches, right and left, are inactive - in this condition the machine is not working;
3. press the **START** button and only the belt will start, then continue the belt centring operation as follows.

If the belt is correctly tightened, but in its movement heels, it is necessary to adjust the sliding support 2.4 (see Fig.2 and photos in Fig.17), loosening the nut on the threaded rod and moving the carrier same and for this purpose it is necessary to rotate 1/2 turn clockwise or counter clockwise, depending on the need to move inwards or outwards support 2.4.

If the belt moves to the right (R) move the support 2.4 towards the inside by 1/2 turn. If the belt moves to the left (L), move the support 2.4 forward by 1/2 turn. When the belt is shown in the centre position, move the support 2.4 by 1/4 of a turn in the opposite direction to the previous movement. Repeat with small movements of support 2.4, until the belt is in the centre of the rollers.



Fig. 17 - Belt adjustment.

The support 2.3 must only be moved sufficiently to stretch the belt at the time of its replacement by a new one. **NOT DRAW OVER THE BELT EXCESSIVELY**, because it would risk severe damage to the cylinder of dielectric material and the magnetic rotor. The belt should only be supported on the rollers, the tension should be as narrow as possible without slippage on the rollers.

Once centred the belt, you can bring the machine in normal operating conditions, acting as follows:

1. press the **STOP** button;
2. turn the dial **BELT CENTER - AUTOMATIC CYCLE** position Auto Cycle;
3. press the **START** button and the machine will re-start auto cycle with the settings previously set.

6.5.2 NOISY SEPARATOR

After a long period of inactivity, the separator can be noisy in starting.

Any noise should occur during the normal operation implies the requirement of immediate stop of the machine by the operator.

The most frequent cause for the occurrence of noise can be excessive tension of the belt. In such a case, it is enough to apply a small shift to the inside of the supports 2.3 and 2.4, as described in section 6.5.1.

6.5.3 QUICK WEAR OF THE BELT

The rapid wear of the belt can be caused by the impact of the process material does not adequately conveyed to the separator: excessive height from the belt can consume it quickly.

Another frequent cause is the side intrusion of the process material, which enters under the internal side of the belt and then is compressed against the rollers from the belt itself, leading to punctures, cuts, skidding, rupture of the cylinder of the magnetic rotor, etc.

6.6 Replacement of parts and components

6.6.1 Replacing the conveyor belt

The conveyor belt must be repaired / replaced at the first appearance of cuts, holes, abrasions or intrusion sharp materials (nails, staples, etc.): nothing solid, and absolutely anything metallic, must come in contact with the roller in dielectric material.

You must use a closed loop belt, or require the intervention of a company specialized in vulcanization work, which can provide a new belt and directly close the belt, with vulcanised joint.

To replace the belt, proceed as stated, depending on lifting equipment available (forklift, crane or hoist) and accessibility to the machine.



For maximum operator safety, the separator must be brought to the ground, if installed at dangerous height.

IT IS STRONGLY ADVISED TO REPLACE THE BELT AT DANGEROUS HEIGHT.



The foreseen phases are the following:

1. Remove the power supply to the control panel;
2. Remove the containment casing and the side walls (see Fig.18);
3. Retract supports tensioning belt, as far as is possible, so that the damaged belt is no longer under tension (pos. 2.3 and 2.4 Fig.2, as shown in fig.17);
4. Cut the worn belt;
5. Clean the separator, removing all intrusions present, particularly on dielectric cylinder;

Fig. 18 – ECS Separator, with part to disassemble put into evidence in green colour.

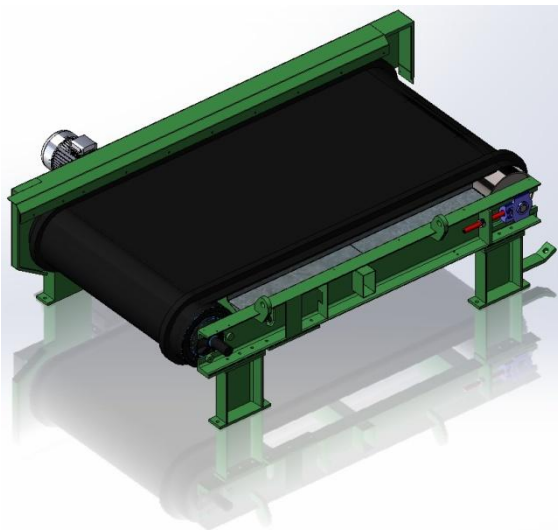
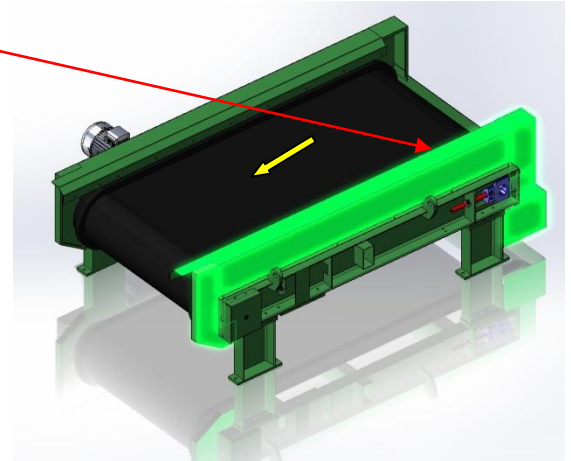
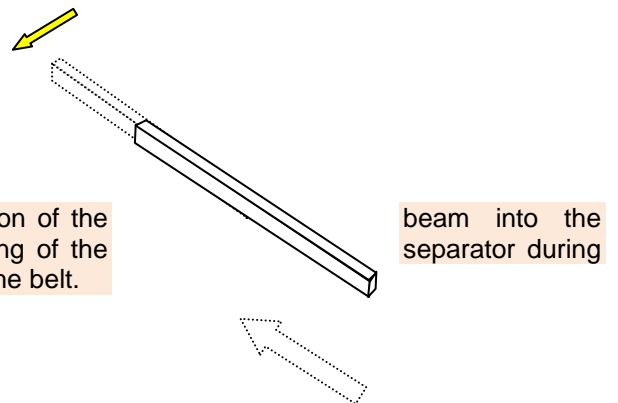


Fig. 19 – Insertion of the beam into the hole, for the lifting of the separator during the replacement of the belt.



6. Insert a beam profile (long at least twice the width of the belt), of adequate size and able to support the weight of the machine, into the rectangular hole on the opposite shoulder to the motor side, inserting at least up to half the width of the belt (see Fig.19);
7. Unscrew the fixing screws of the separator to the legs of the structure from the opposite side to the motor side and loosen the screws that fix the separator to the legs at the motor side (to avoid bending stresses on them and on the shoulder – at motor side);
8. Let pass the new tape along the beam, as in Figure 20, bringing it close to the machine in order to allow the beam to protrude from the tape for a sufficient length hooking equipment ready for lifting;

Fig. 20 - Preparation of the belt on the beam.

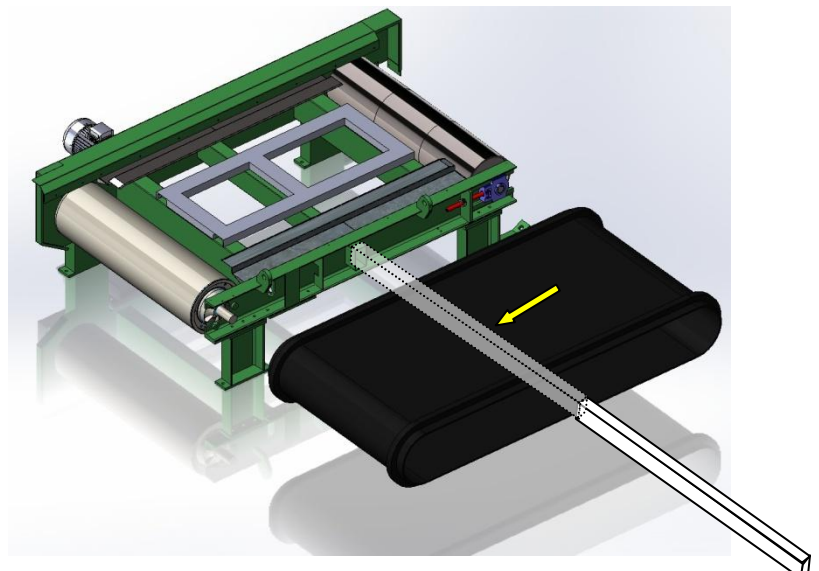
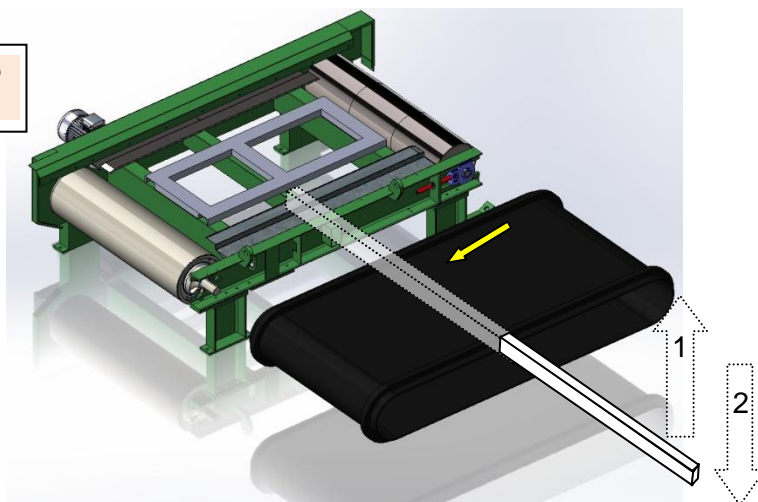


Fig. 21 - Lifting (1) and lowering (2) of the SEPARATOR through the H-beam.



9. Raise a few cm ($1 \div 3$) the separator via the beam on the opposite side to the motor with the lifting equipment provided (fig. 21 - phase 1);
10. Unscrew the screws, anchoring the structure of the two supporting legs on the opposite side to the engine and remove them;
11. Insert the new belt;
12. Put back in their seat the support legs on the opposite side to the engine and tighten the screws anchoring the structure;
13. Lower the separator via the beam until it rests on the support legs, set in position (fig. 21 - Phase 2);
14. Secure with screws previously removed the separator to the support legs;
15. Tighten the cover screws on the legs on the motor side;
16. Replace the casing and edges;
17. Slightly stretch the belt before with the support pos.2.3, then with the support pos.2.4 (Fig.2 and Fig.17);
18. Proceed to the centring of the belt as described in paragraph 6.5.1.

6.6.2 Replacing the dielectric cylinder and the magnetic roller

The replacement of the roller in the dielectric material is very delicate and must be accomplished in a mechanical workshop equipped. The operation must be carried out by trained personnel following the given instructions.

The following equipment is request:

1. Lifting equipment with a minimum range of 1.000 kg;
2. nr. 2 lifting polyester slings $\cong 1,5$ m long and each with range ≥ 500 kg;
3. nr. 2 wooden joists from 110x110x500 mm in length;
4. nr. 1 steel pipe inner diameter 61 mm for shaft diameter 60 mm, diam. 56 mm for shaft diameter 55 mm, length $\cong 1,8$ m;
5. nr. 2 extraction screws with cylindrical head, with hexagon socket M8x80;

6.6.2.1 REMOVAL OF MAGNETIC ROTOR

WARNING: DO NOT APPROACH THE MAGNETIC ROTOR WITH FERROMAGNETIC OBJECTS OR TOOLS, THAT MAY BE ATTRACTED BY ROTOR AND CAUSE DAMAGE TO PROPERTY AND PEOPLE.

A- In the case of only the dielectric cylinder is damaged, replace it as stated in the following:

1. Remove the protective cover and edges;
2. Disassemble the conveyor belt, without cutting it, if it is not worn, following the instructions in paragraph 6.6.1;
3. Loosen the transmission belts, an operation that is performed by means of the bolt of motor support slide (Figure 2 - pos. 2.19);
4. Remove the belt from the pulley of the magnet rotor (Figure 2 - pos. 2.13);
5. Unscrew and remove the screws that hold the tube in the dielectric material to the flanges;
6. Suspend the magnetic rotor with the lifting straps as illustrated in Figure 22;
7. Remove the screws that secure the supports 2.8 (Fig. 22) to the frame of the machine;
8. Transport the magnetic rotor, wrapped in a sheet of polyethylene, in a suitable place, where, however, is not present ferrous material.

B-In the case of **magnetic rotor damaged**, replace it with an original (please request from Gauss Magnets), disassembling according to steps 1 to 8 (except for the stage 5) described above; for the assembly, perform the steps listed in paragraph 6.6.2.4.

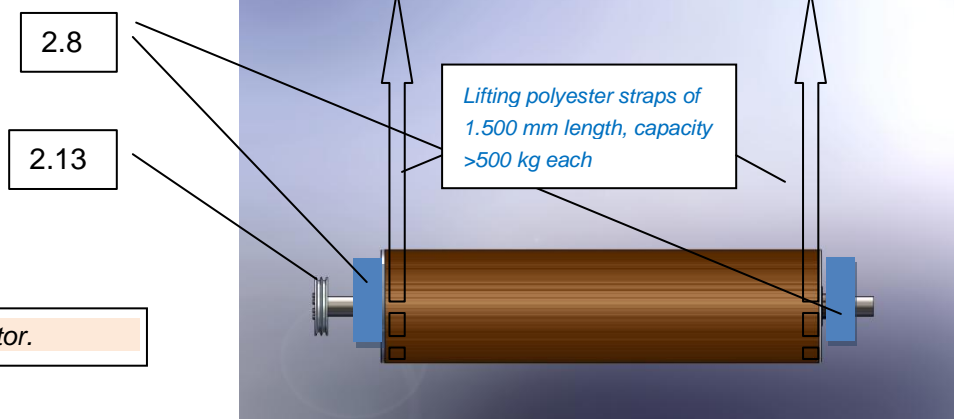


Fig. 22 - Removing the magnetic rotor.

6.6.2.2 REMOVAL OF THE DIELECTRIC CYLINDER

1. Place the rotor on the two logs of wood (fig. 22);
 2. Loosen the screws on the hub of the pulley SPB2 (2 races in B, see 2-13, fig.2);
 3. Remove the pulley SPB2 from the rotor shaft;
- The following operations are to be performed only on the flange on the motor side:
4. Unscrew and remove the 6 screws M8 flange TCE decomposed, placed on the transmission shaft;
 5. Tighten the 2 screws M8x80 extraction into the threaded holes on the same free flange;
 6. Screwing in depth the two screws M8x80 you will get the extraction of the support ring;
 7. When the ring top is fully extended, remove the 2 screws M8x80 the same are no longer required;
 8. Insert the shaft into the head tube steel $\varnothing = 71$, $\varnothing = \varnothing = 61$ or 56 mm (depending on the model: 71 for ECS 2000, ECS 1500 and ECS 61 for 1300, 56 for 1000 ECS, ECS 750 and ECS 500), placing it at the bottom as far as you can;
 9. Lift the rotor magnetic hooking the ends of the steel pipe;
 10. Remove the support ring and cylinder made of dielectric material, bringing them closer to the sling (see Fig.18);
 11. Support again the magnetic rotor to the two wooden logs;
 12. Unhook the sling;
 13. Withdraw from tube steel support ring and the cylinder of dielectric material worn.

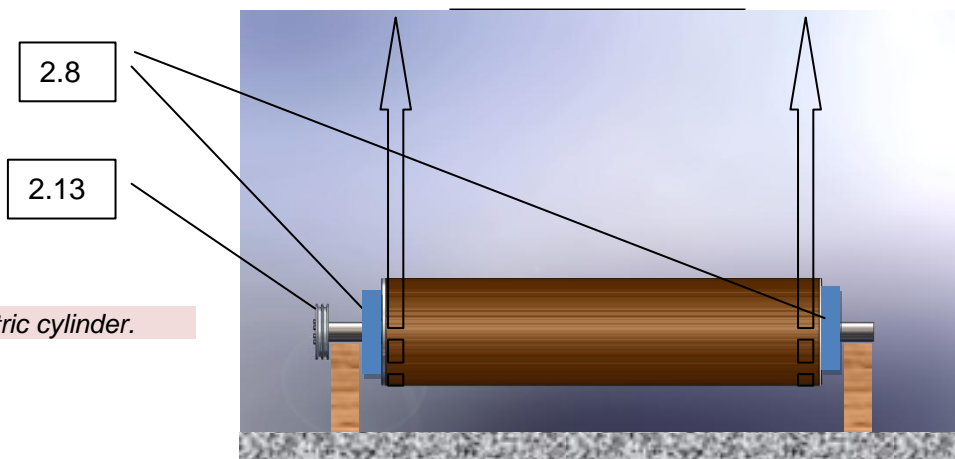


Fig. 22 - Removing the dielectric cylinder.

6.6.2.3 INSTALLATION OF THE NEW DIELECTRIC CYLINDER

1. View the inside of the magnet rotor: if there is a particular concentration of iron dust accumulated on permanent magnets, you must carry out a thorough cleaning of the entire interior of the rotor; these piles if left can create mismatches harmful to the proper functioning;
2. Slide on the steel pipe the new dielectric cylinder and subsequently the support ring;
3. Raise the magnetic rotor, hooking the end of the steel tube (fig. 23);
4. Fit the dielectric cylinder on the magnetic rotor, until reaching the abutment of the fixed flange on the opposite side of the rotor itself;

5. Bootees support ring positioning, as well as in abutment with the end of the dielectric cylinder, so as to put in correspondence with the threaded holes with counter bores of the ring itself;
6. Place the rotor to the two logs of wood;
7. Replace the 6 screws M8 in their homes and tighten them thoroughly;

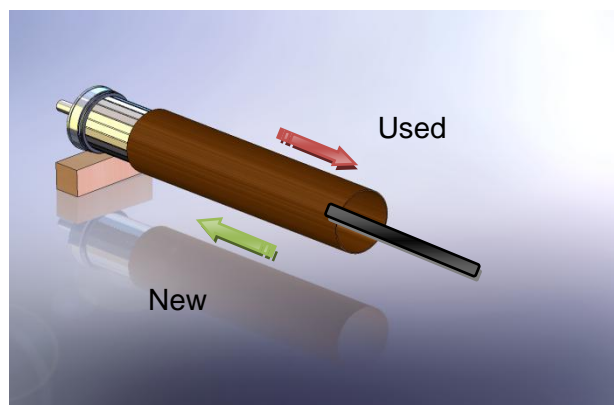
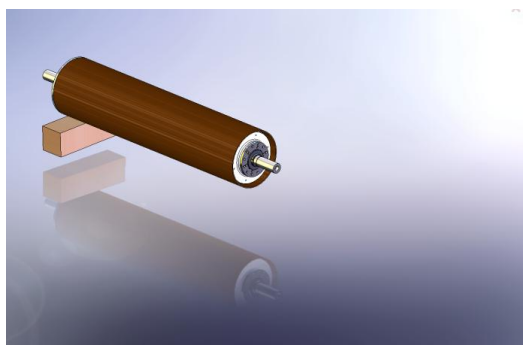


Fig. 24 - Installing / removing the cylinder in dielectric material

6.6.2.4 REPLACEMENT OF THE REPAIRED MAGNETIC ROTOR ON THE MACHINE

After removing the steel tube from the shaft, sling the magnetic rotor as shown in Figure 22 and place it on the machine.

During handling, DO NOT APPROACH WITH FERROMAGNETIC OBJECTS TO THE MAGNETIC ROTOR.

1. Holding the magnetic rotor in suspension inside the machine replace screwing, the fixing screws of the supports 2.8 (see Fig.2).
2. Release the rotor by lifting slings.
3. Slightly loosen the screws of the supports 2.8, allowing the magnetic rotor placed in its correct position.
4. Retighten the fixing screws of the supports 2.8.
5. Refit the pulley on the shaft of the magnetic rotor, positioning it so that it is perfectly aligned with the corresponding pulley, fixed to the shaft of the motor.
6. Secure the pulley to the magnet rotor, turning the screws of the clamping proceeding on the cross.
7. Replace V-belts and pull them properly, acting on the adjusting screw located on the slide door motor.
8. Remount the conveyor belt then executing the instructions in section 4.7.3.1 of this manual.
9. Replace covers and edges.
10. Check again the separator, to verify proper operation as described above par.4.5.2;
11. Perform the operation of centring of the belt.

6.6.3 Replacement of bearings

6.6.3.1 Replacing bearings and their seals

Depending on the type of bearings, use, maintenance and lubrication carried out, the useful life of the bearings can also vary greatly. When worn, provide for its replacement, including their seals on the rotor magnetic, even if they have not yet shown any abnormalities.

Replacing internal bearings

To do this, you must remove the entire roller from the machine.

You must proceed as follows:

- 1- Remove the protective cover of V-belts;
- 2- Remove the cover on the opposite side;
- 3- Loosen the belts, acting on the main engine support slide (Figure 2 - pos.2.19);
- 4- Remove the belts;
- 5- Loosen the screws with hex hub of the pulley attached to the shaft of the rotor magnetic, so you can pull out;
- 6- Remove the cover of the triangle support and open;
- 7- Gently suspend the rotor magnetic, using 2 bands (see fig. 22);
- 8- Loosen the three screws that secure the supports;
- 9- Loosen the clamp and remove it from the conical taper, beating inward with a chisel aluminium, to allow slippage, up to free the bearing from the shaft;
- 10- Slightly away from the support frame of the machine;

- 11- Pull out the support from the shaft and then pull out the worn bearing;
12. Remove the elastic rings (seeger) from the fans;
13. loosen the grains on the fans and remove them from the shaft;
14. Loosen the 12 screws M8 Pos. A (see Figure 25) of the bearing hub - bearing fixed to the head of the magnet rotor;
15. Remove two of the six M10 screws Pos B (see Figure 25) of the bearing hub - bearing;
16. Screw the premises of the two screws Pos B, thus released, No. 2 threaded rods M10, 300mm long about;
17. Joining the same with a crossbar (e.g., flat 40x20) with a central threaded hole and two through holes of diam. 11 mm, lateral distance 130 mm;
18. Lock the two M10 threaded rods through the two holes of diam. 11 mm with dices;
19. Insert a screw into the central threaded hole that, doing fulcrum shaft on the cylinder head, as by inserting an appropriate thickness of the washer diameter of 60 mm, allows the escape of the bearing hub bearing;
20. After removing the hub bearing from the shaft door, complete removal of the screws Pos B;
21. Open the hub, remove the bearing and the gaskets, clean the hub and replace the bearing and its oil seals;
22. Close the hub;
- 23- Screw the 6 screws M10 Pos B;
- 24- Insert the bearing hub onto the shaft and press him to beat, beating inward with a round aluminium / copper / brass tool; to verify the correct location, slide the fan up to the stop on the ring of fat distribution, place inside the bearing and verify that the fan is visible outside the seat of the snap ring, then extract again the fan;
- 25- Tighten the 12 bolts M8 item A in the head of the rotor;
- 26- Refitting the ring fat distribution / spacer;
- 27- Reassemble the fan and lock it on the shaft with the grain and with the elastic ring (seeger);
- 28- Fill the hub with grease SKF LGMT 2 or equivalent;
- 29- Replace the rotor on the machine;
- 30- Refitting supports;
- 31- Then follow the procedure indicated in paragraph 6.6.1 for the belt replacement.

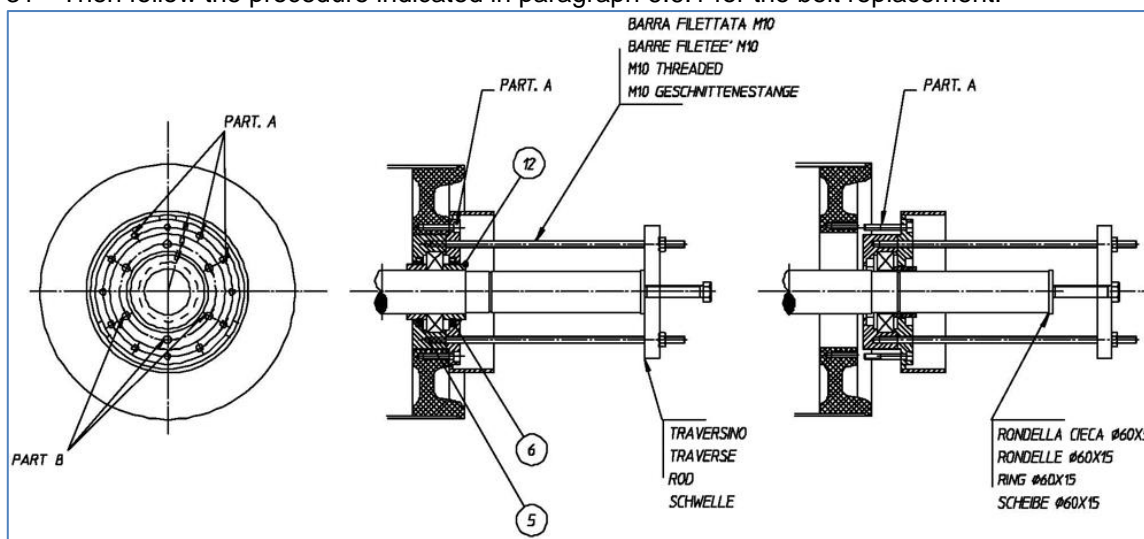


Figure 24 – Detail of the hub inner bearing.

Replacing external bearings

NB: Use bearings with C3 backlash plus.

For the extraction of these bearings, no need to remove the rotor from the machine: should, however, act first on one and then the other, according to the following procedure:

1. Remove the protective cover of V-belts;
2. Remove the guard on the opposite side;
3. Loosen the transmission belts, acting on the shoe main engine (Figure 2 - pos.2.19);
4. Remove the transmission belts;
5. Loosen the screws with hex hub of the pulley attached to the shaft of the rotor magnetic, so you can pull out;
6. Remove the cover of the triangle support and open;
7. Gently suspend the rotor magnetic using 2 bands, at the fan guards;
8. Loosen the three screws that hold the supports;

9. Loosen the lock nut and detaching it from the conical sleeve, tapping it inwards with a chisel aluminium, to allow its extraction, up to free the bearing from the shaft;
10. Slightly away from the support frame of the machine;
11. Completely remove the support from the shaft and then the worn bearing;
12. Refit the new bearing and oil seals on.

To mount the bearing with the rotor magnetic suspended, proceed as follows:

1. Insert the support with the new bearing on the shaft;
2. Secure the bracket with the three screws to the frame of the structure;
3. Screw the ring nut of the conical sleeve up to a radial internal clearance of approximately 0,05 mm (see Fig.26 for the verification of the radial clearance).



Figure 26 - Checking Radial backlash of roller bearings.

Adjustments of axial and radial backlash of external bearing

- 1- Start adjusting the bearing on the motor side;
- 2- **Check that the bearing is in line in the bottom of the support**, gently tap the top ring of the bearing with a chisel, if the chisel tends to bounce back, the bearing is in contact, in this case, loosen the lock nut and beat, so that the entire bearing slides inward until they stop at the bottom of the support;
- 3- Adjust the radial backlash by tightening the ring nut and by rotating the shaft, so that the rolling bodies move within the bearing; to measure the clearance of the bearing, it is necessary with a feeler 0,05 mm gauge strip, by performing the measures between the outer ring and an unloaded roller (see Fig. 25); before measuring, you must turn the rotor magnet for a few turns to ensure that the rollers assume a correct position;
- 4- **You must act on the ring nut to obtain a clearance between the outer ring and the rolling bodies of 0,05 mm:**
- 5- Lock nut by bending the tab of the washer;
- 6- Fill with suitable lubricant (grease SKF LGMT 2 or equivalent);
- 7- Fit the stop ring FRB, close support;
- 8- Adjust the bearing opposite side;
- 9- **Check that the bearing is not in line in the bottom of the support**, proceeding as described above, it is sufficient that there is a gap of 0.05 mm between the bearing and the bottom of the support and at the same time remains before enough space to fit the cover;
- 10- Close the support.

6.6.3.2 Replacing sliding supports

When worn or damaged, replace the sliding supports, Fig.2 pos. 2.3 and 2.4 of the guide roller of the conveyor belt. This can be easily done, if done at the same time to change the belt and requires no special care other than those of common practice related to the changing of bearings, as described in the previous paragraph.

6.6.3.3 Replacing the drive belts

Every 30 days check the status of V-belts and replace them at the first sign of deterioration, but at least once a year. It is advisable to keep in stock the replacement belts.

6.7 Parts and materials wear



The belt magnetic separators made by GAUSS MAGNETI SRL are designed and constructed so as to have a long life, if used properly with proper maintenance as described in this manual. The belt is considered a wearing part, the duration of which depends on factors related to the specific conditions of use. Parts or components subject to normal wear or deterioration due to the use can be obtained from the manufacturer for a minimum period of 10 years and are specified in the following list.

The parts subject to wear can be inferred from the foregoing in this manual are the following:

1. conveyor belt;
2. transmission belts;
3. rotating brush;
4. belt to the rotating brush;
5. external bearings;
6. dielectric cylinder.