3.4.7 Rim gear assembly

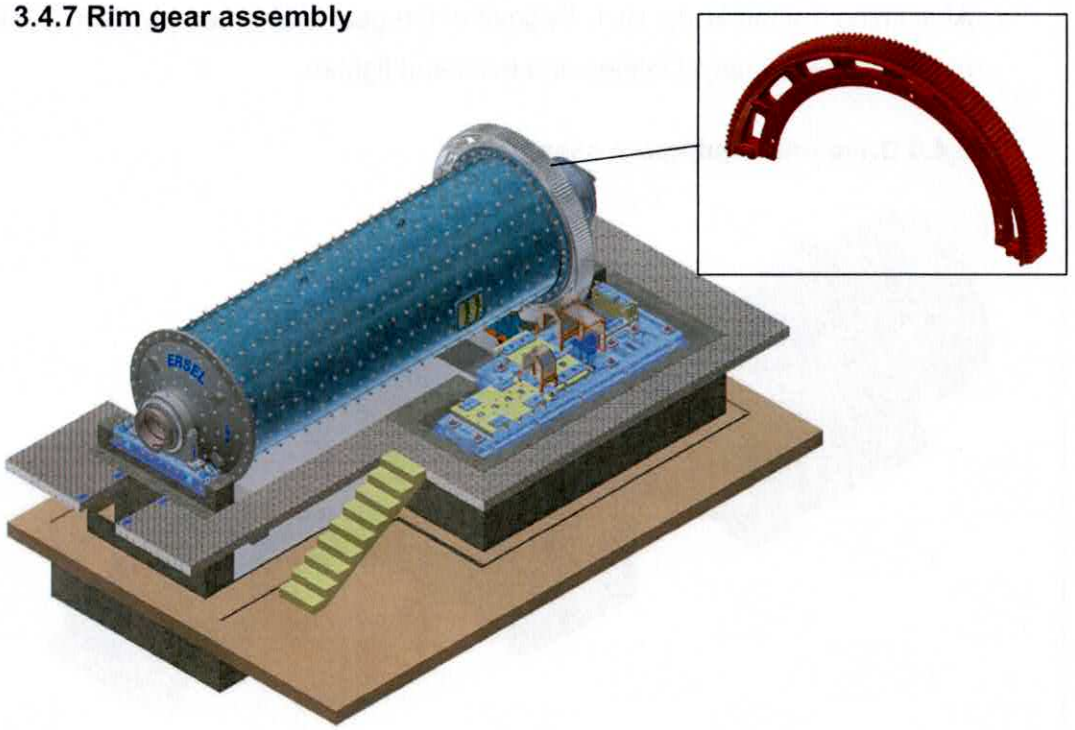

Figure 27. Assembly of first segment gear

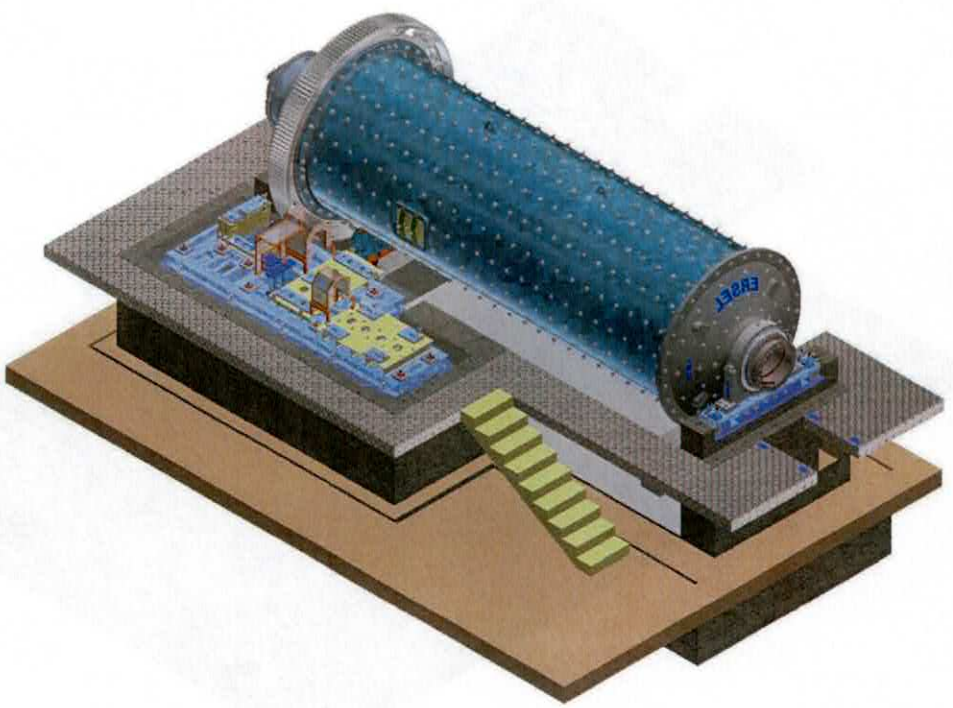

Figure 28. Assembly of second segment gear

After lifting the mill body, lift 1. Segmet of the gear and assembly, then 2. Segment of mill then assembly. Connect the bolts and tighten.

3.4.8 Drive unit equipment assembly

Figure 29. Drive unit (gearbox,motor, couplings and pinion gear goup)

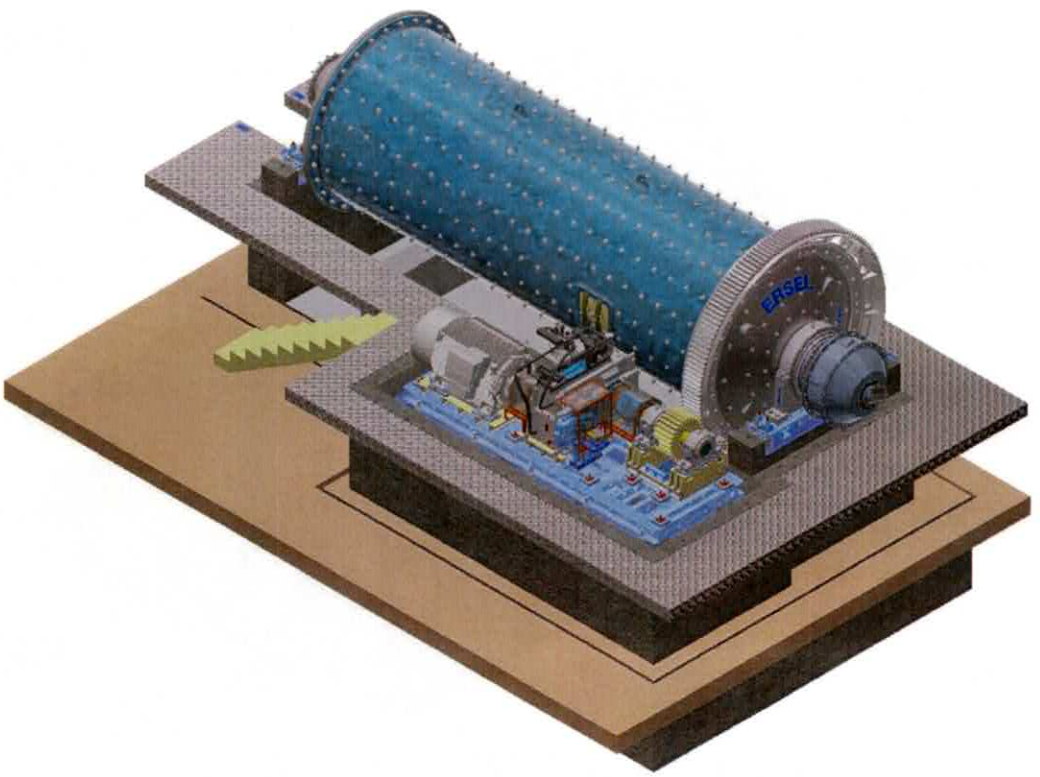

Figure 30. Assembly of drive unit

3.4.9 Pinion group assembly

Lift the pinion to the frame and adjust the backlash according to following condition.

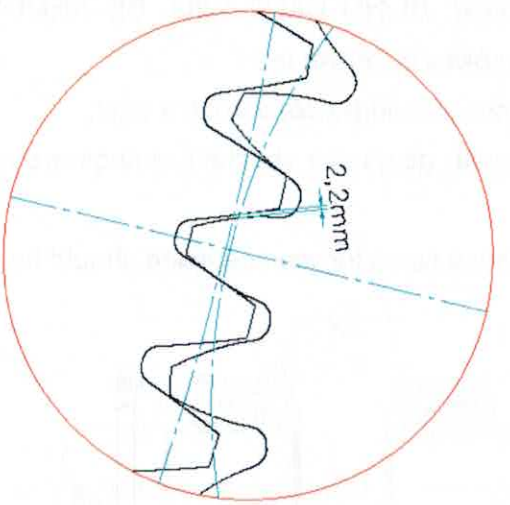

Figure 31. Backlash

1- Move the gear till it touches each other.

2- Measure the backlash between tooth sides.

3.4.9.1 Elastic coupling assembly

- Elastic coupling is used between electric motor and gearbox.
- If rubber of the elastic coupling is damaged, it must be replaced with a new one.

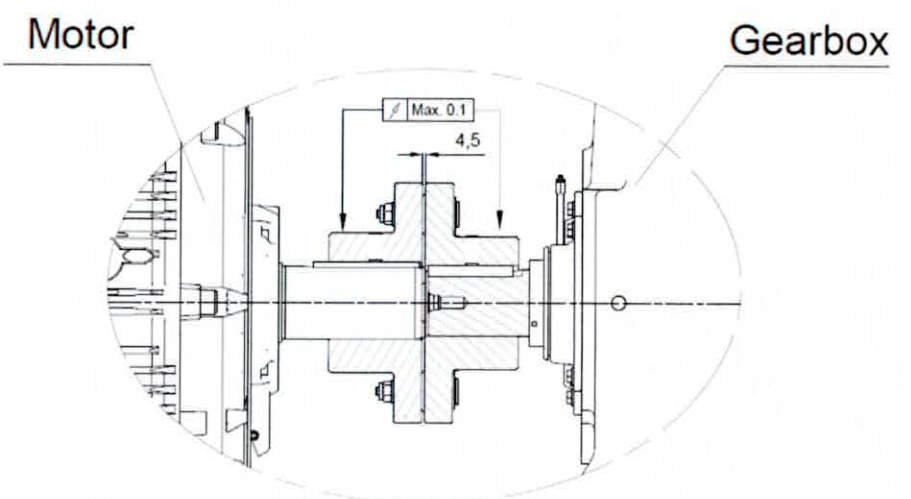

Figure 32. Elastic coupling assembly

- Run out of the elastic coupling should be maximum 0,1 mm.

3.4.9.2 Gear coupling assembly

- Once in every 3 months grease should be fed from grease nipples.
- While feeding grease; BLIND CAPS WILL BE REMOVED and feeding will continue till the old grease is thrown out.
- General maintenance should be done once a year.

In general maintenance; gears are checked, o-rings are changed and grease is refilled.

- Recommended grease types for gear coupling should be used.

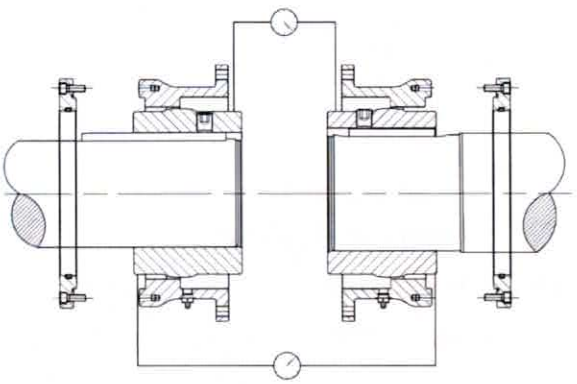

Figure 33. Gear coupling assembly

- Run out of gear coupling should be max. 0,1 mm. :

After installation of the gearbox,motor and couplings, then the alignment is done.

3.4.10 Rim gear guard assembly

Complete the rest of the piece of rim gear and the felt is adjusted.

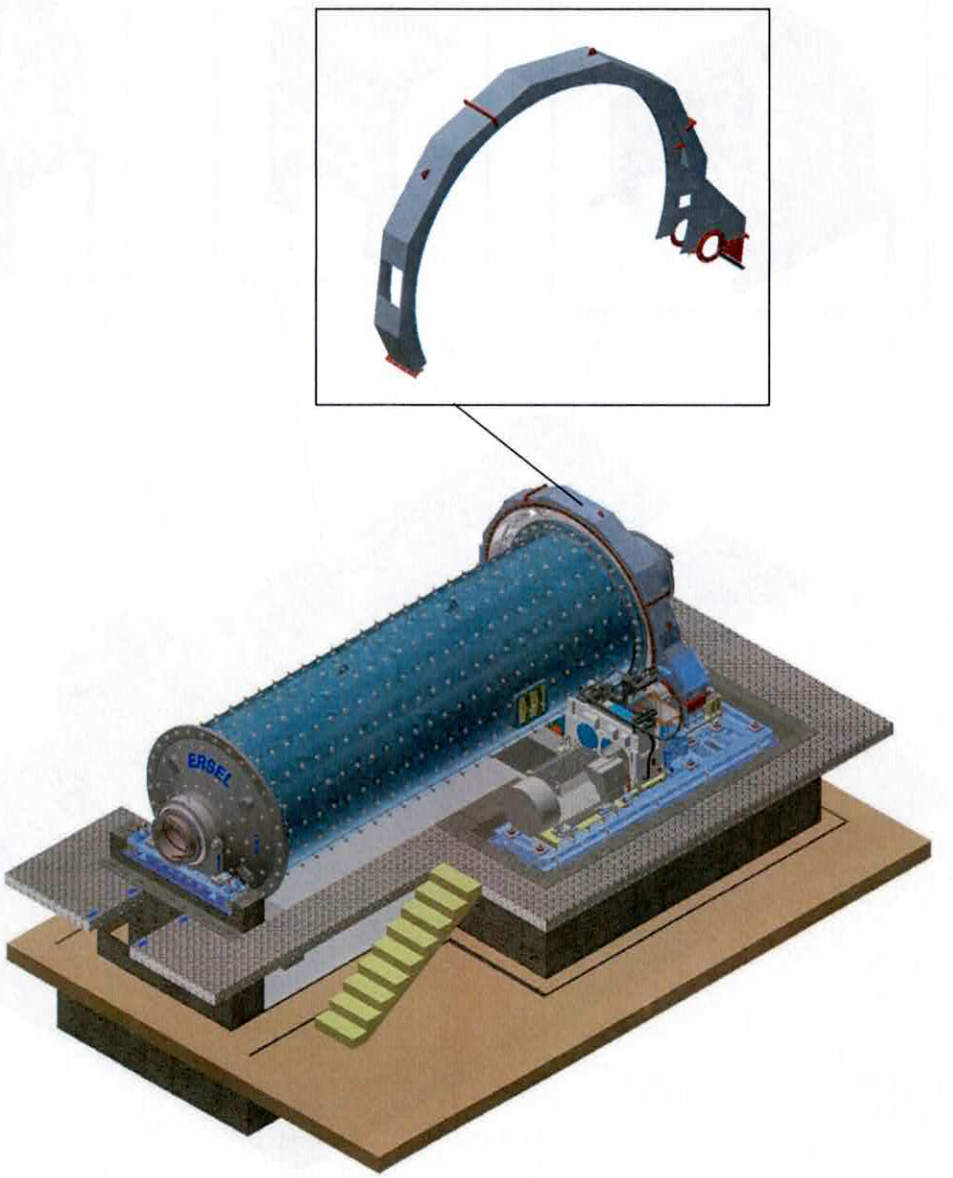

Figure 34. Assembly of gear guard

3.4.11 Coupling guard assembly

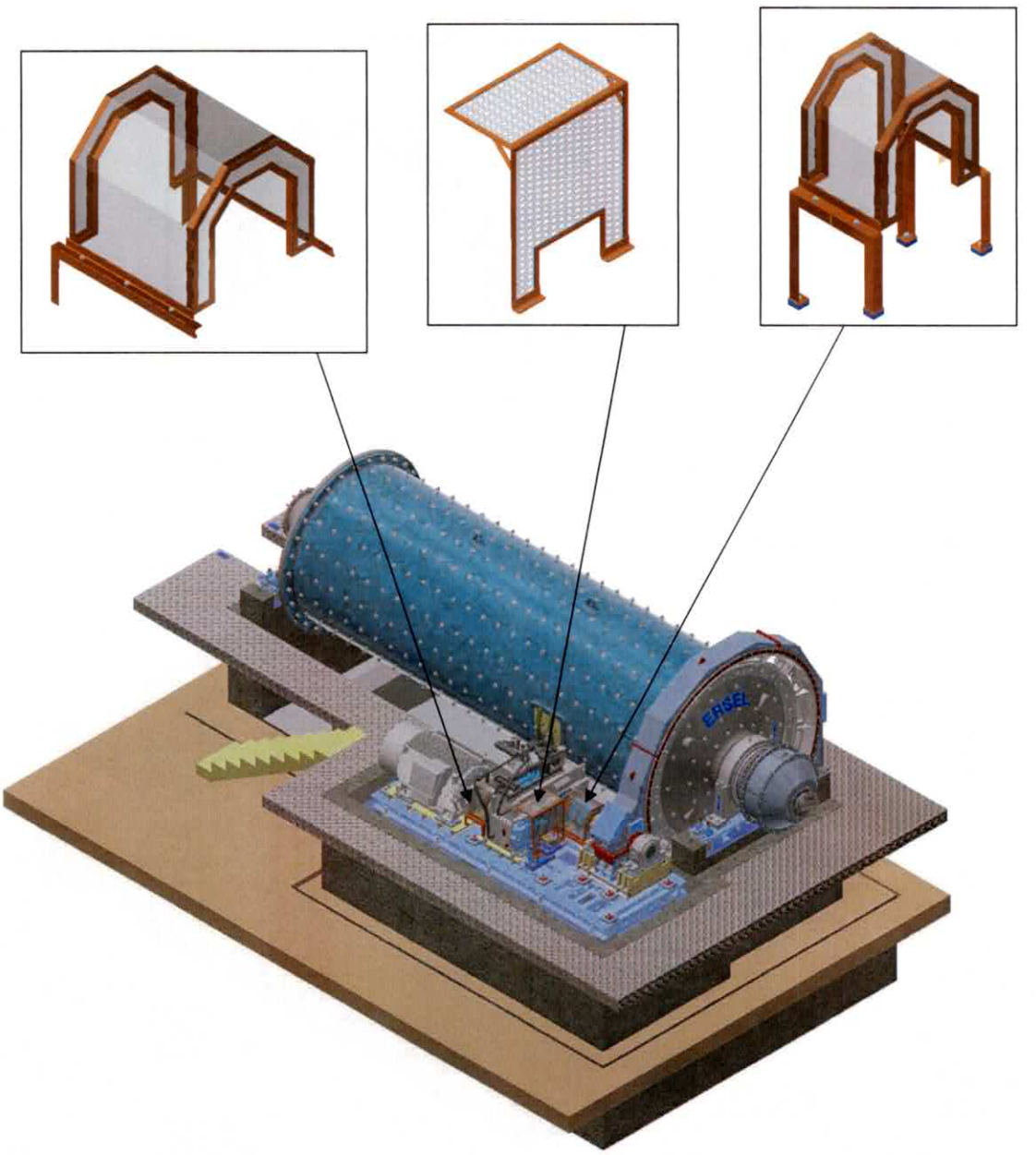

Figure 35. Assembly of coupling guard

3.4.12 Feeding group assembly

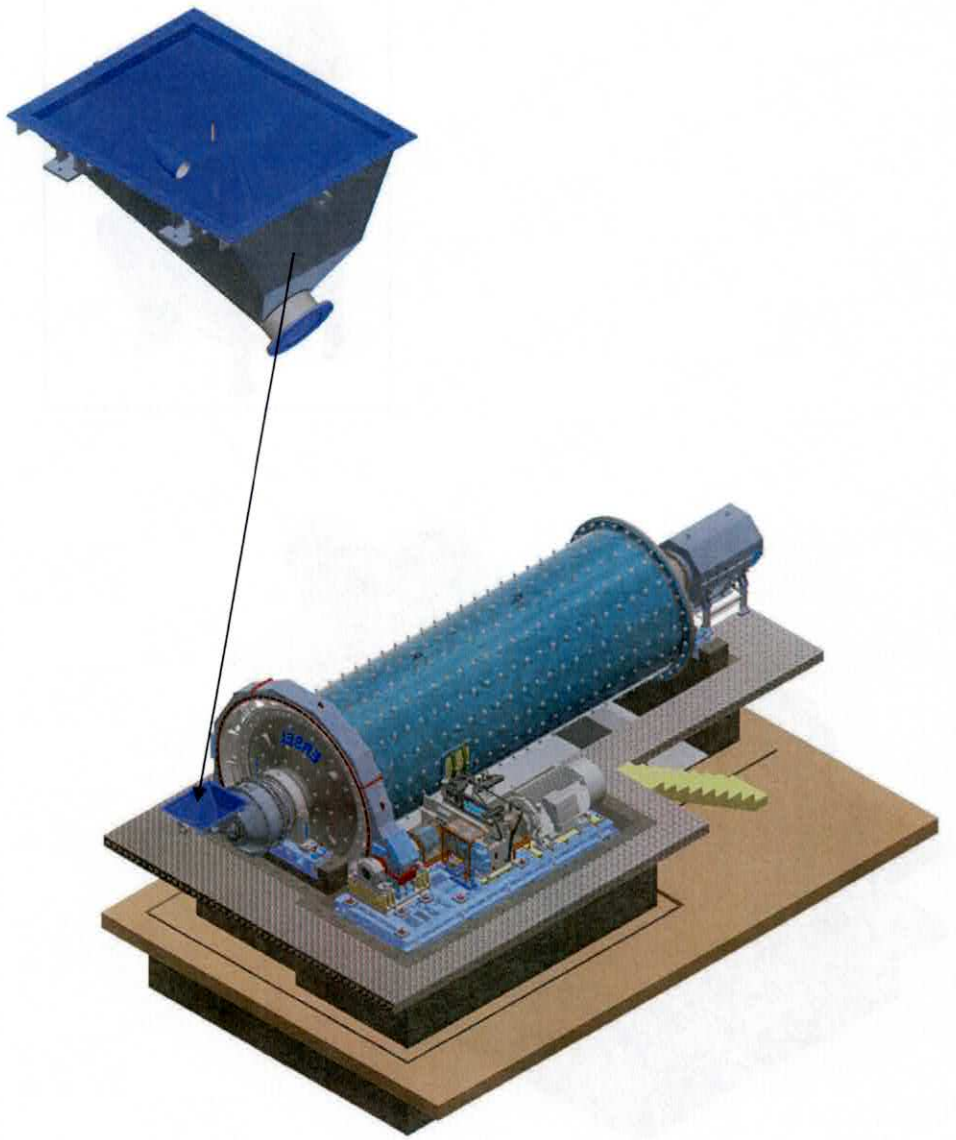

Figure 36. Feeding group assembly

3.4.13 Trommel screen and cover assembly

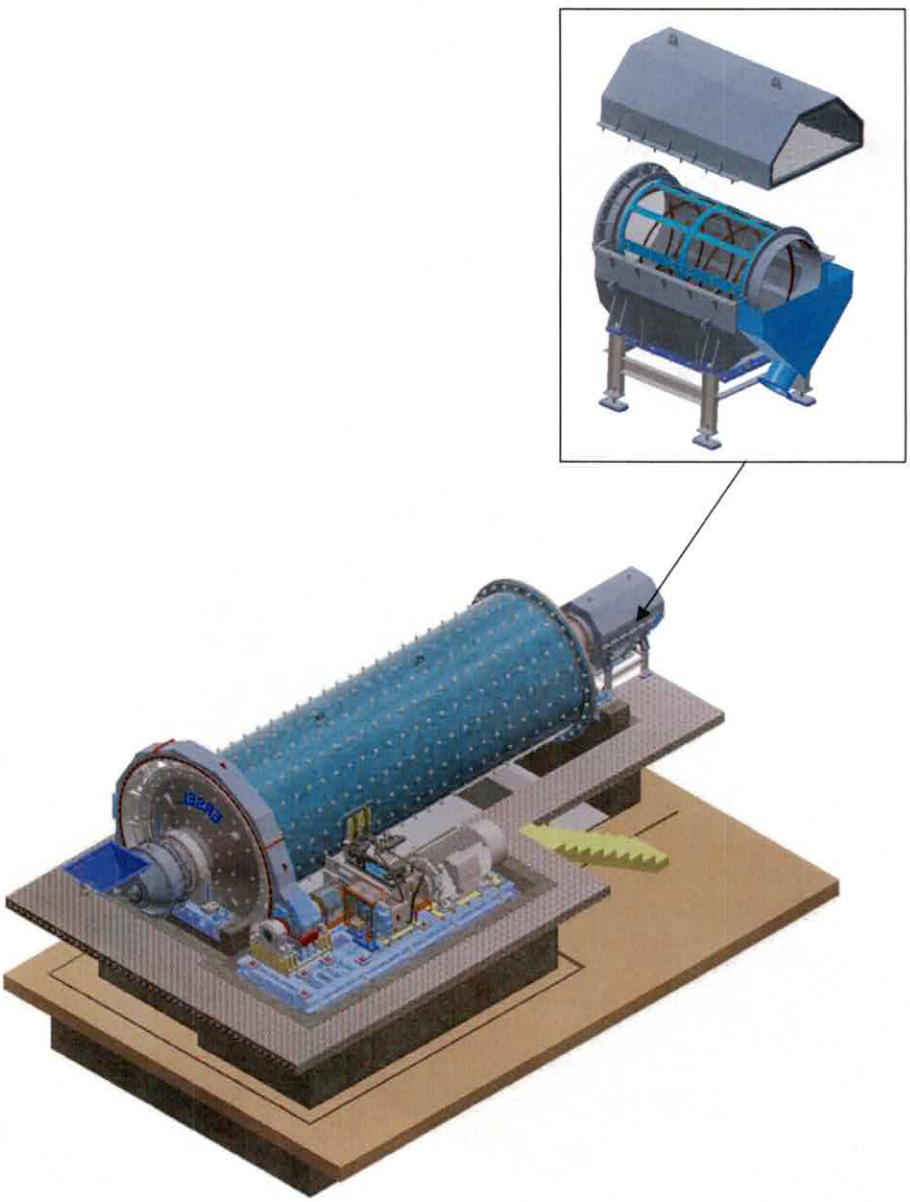

Figure 37. Assembly of trommel screen and cover

The trommel is a wear part of the screen mill. The trommel screen can be changed comletely or only the sieve panels can be disasembled.

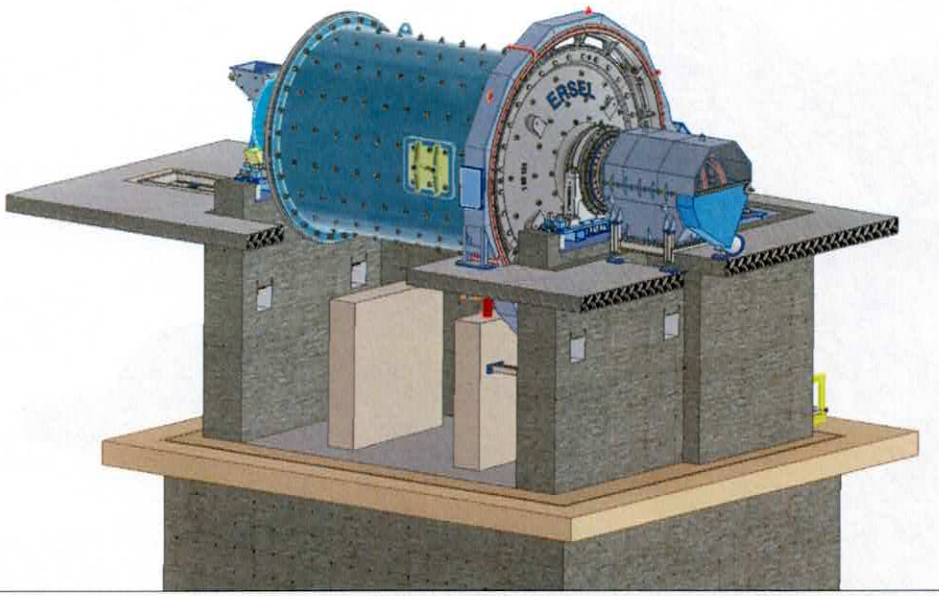

Figure 38. Trommel screen Complete

Trommel screen top cover is disassembled

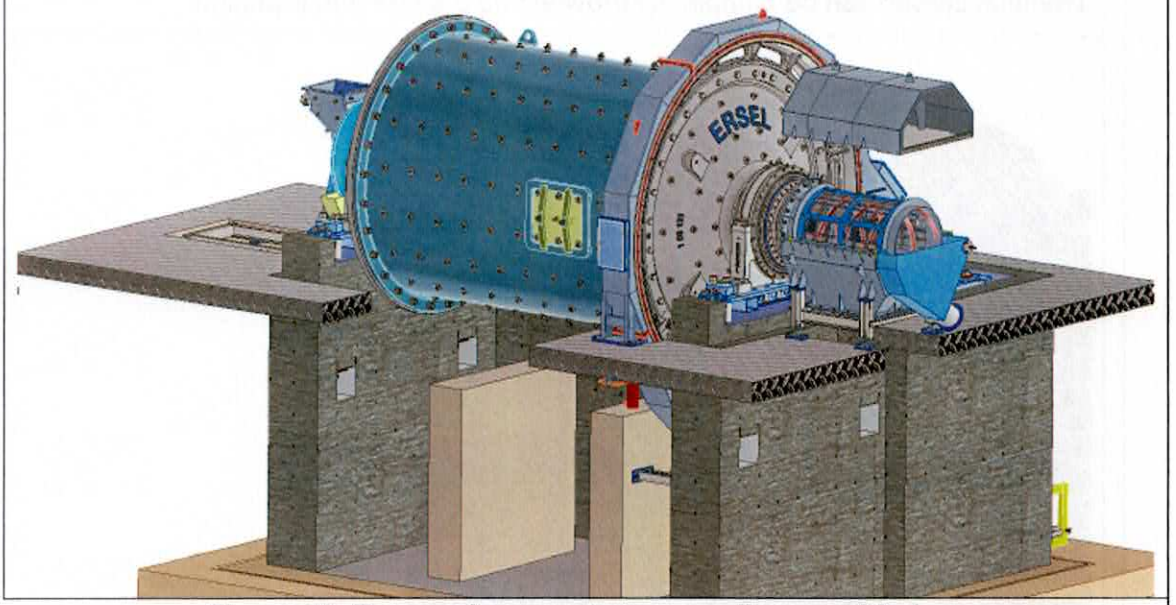

Figure 39. Trommel screen top cover diasasembled

The top cover is placed on the platform

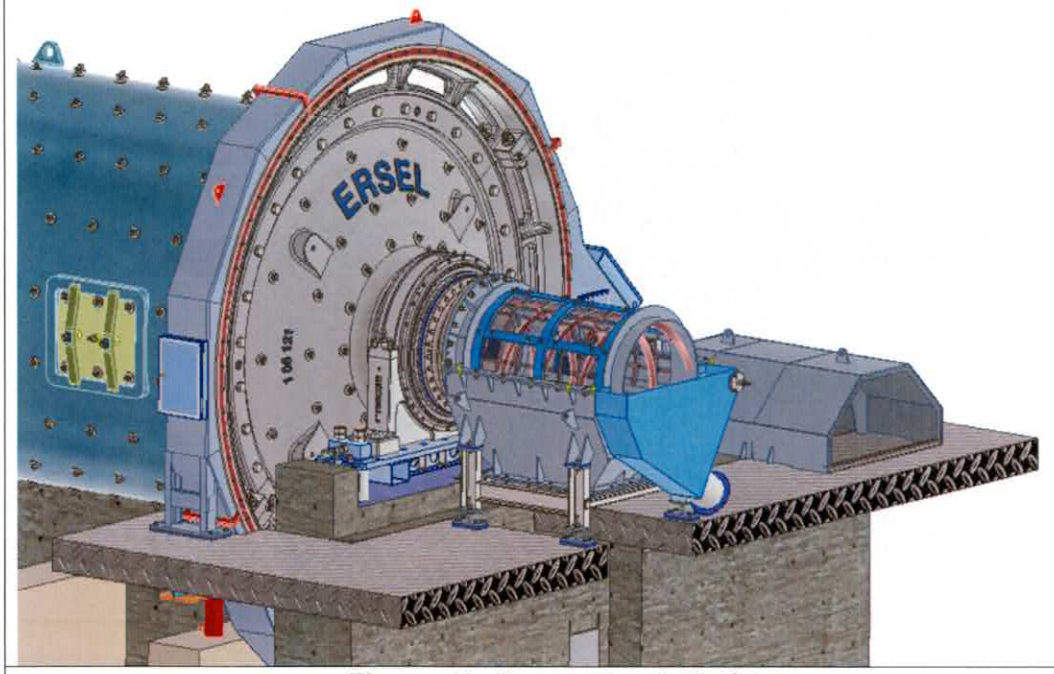

Figure 40. Upper guard platform

Trommel screen can be completely provided as a spare and replaced

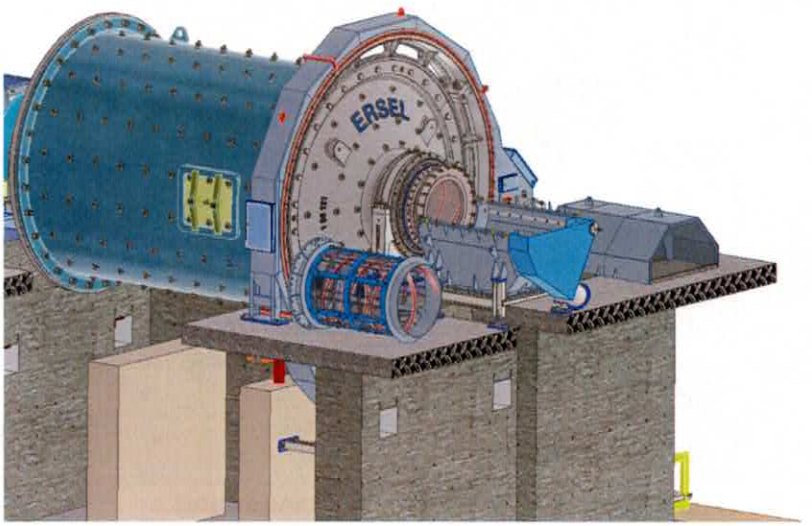

Figure 41. Trommel screen complete spare

The screen panels consists of four segment. Easy to assemble and disassemble. Segments can be changed by taking it out completely or assembly and disassembly can be done by turning the mill inching or the jog button

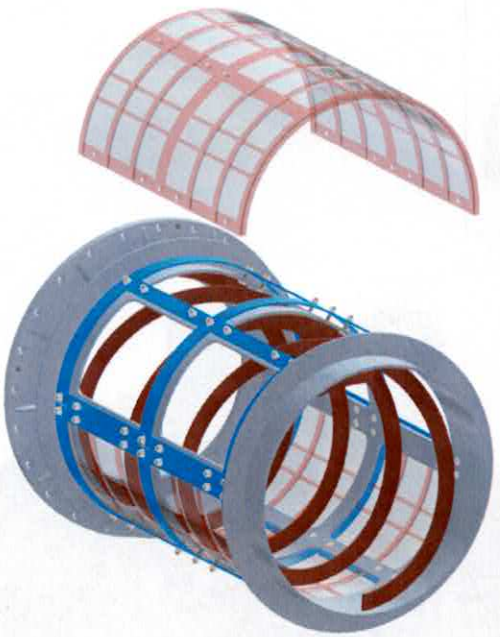

Figure 42. Screen segment

3.4.14 Lubrication system assembly

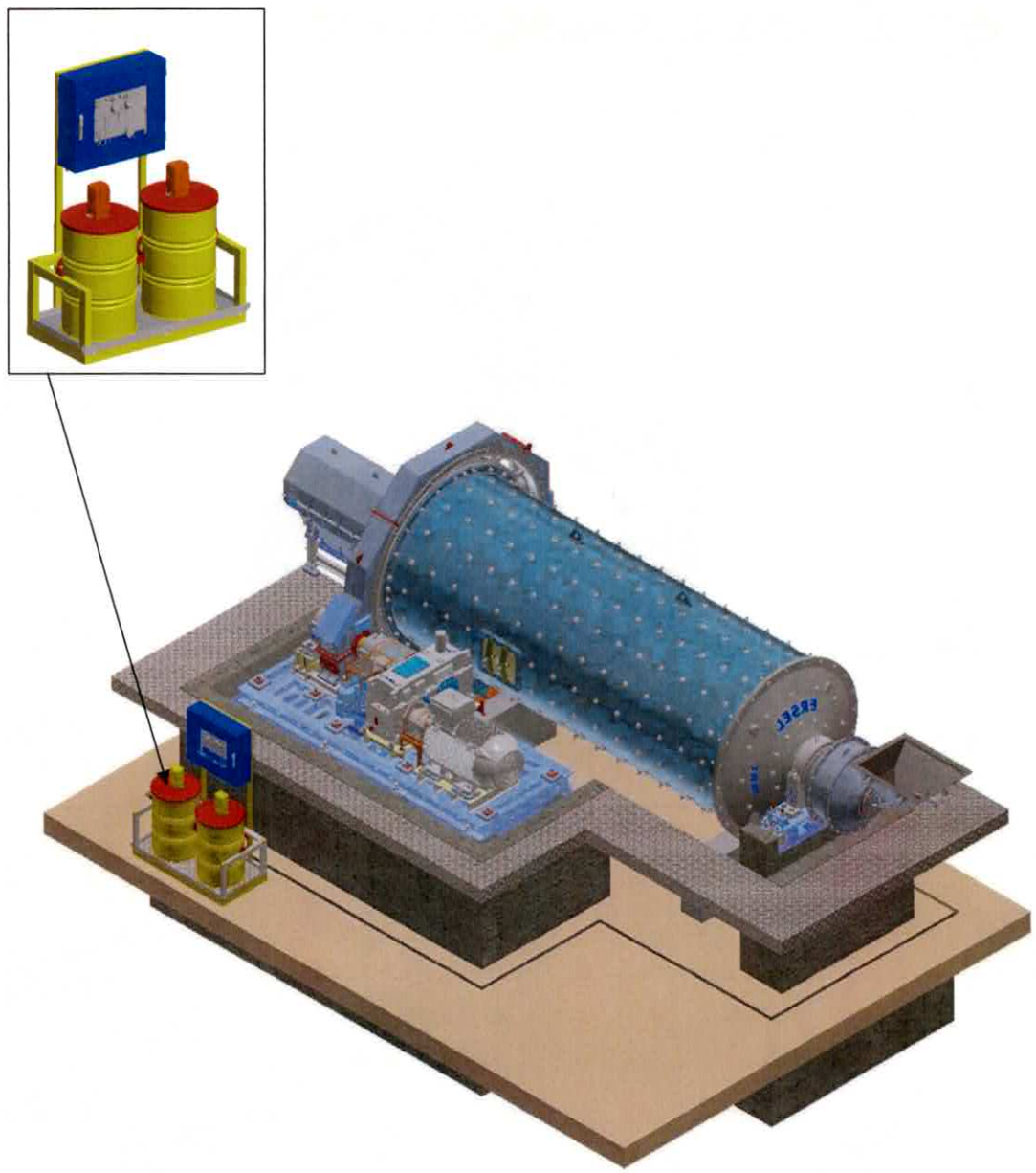

Figure 43. Lubrication system assembly

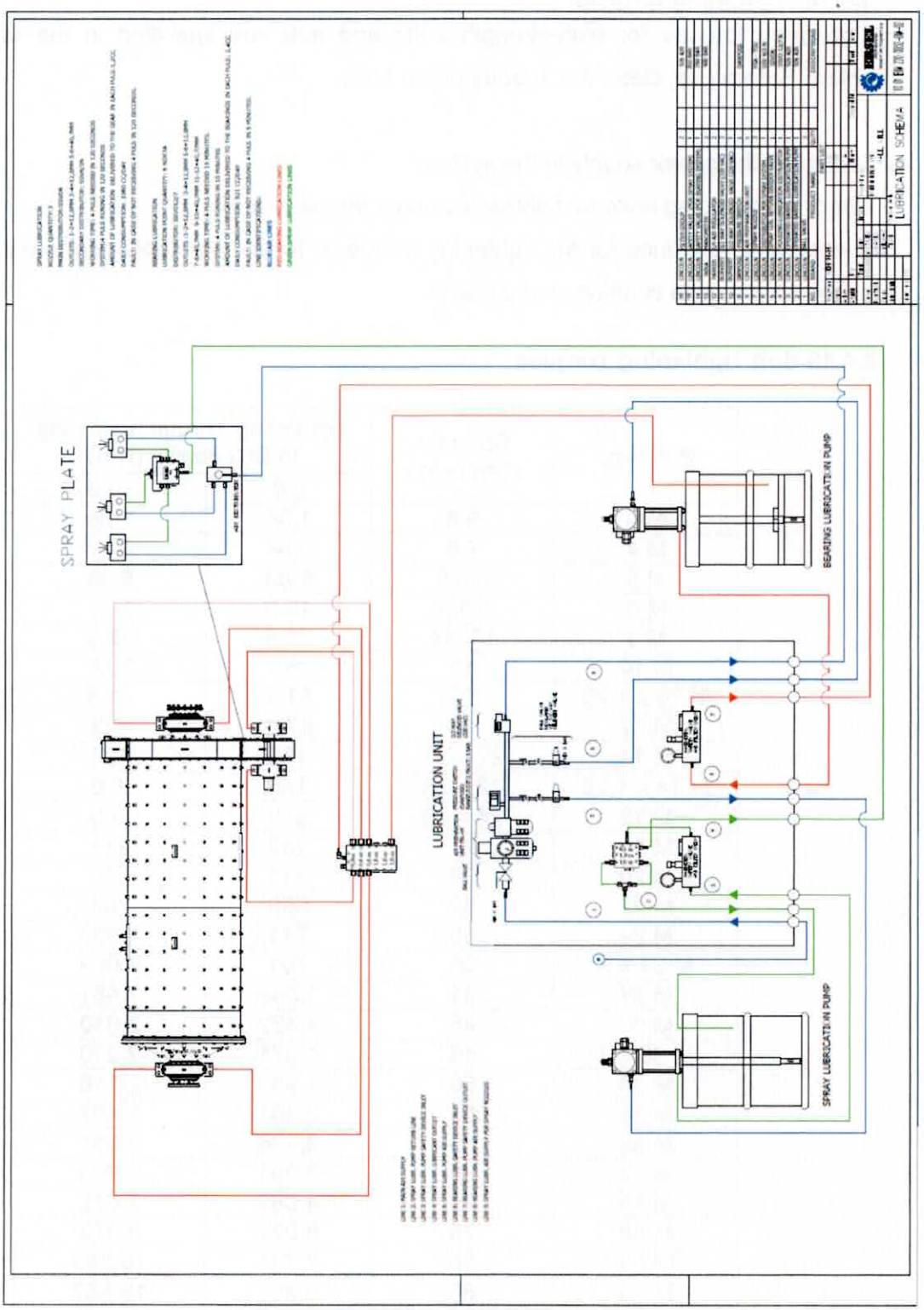

Figure 44. Lubrication system diagram

See Appendix- 4 for details

3.4.15 Tightening torques

Tightening torques for high-strength bolts and nuts are specified in the table below. Before use, clean the threads of the bolts.

Switch off the power supply to the system.

Check all fastening bolts for tightness using a torque wrench.

The general tolerance for the tightening torque is 10 %. The tightening torque is based on a friction coefficient of μ = 0.14.

3.4.16 Bolt Tightening Torques

Bolt Size	Spanner dimension	Tightening Torque according to Bolt quality (Nm)	
		8.8	10.9
M 3	5,5	1,34	1,88
M 4	7,0	3,04	4,32
M 5	8 – 9	6,03	8,48
M 6	10,0	10,3	14,7
M 8	13 -14	25,5	35,3
M 10	16	50	70,6
M 10 x 1,25	16	51,1	71,8
M 12	18	87,3	123
M 14	22 – 23	138	194
M 14 x 1,25	22 – 23	146	206
M 16	24 – 26	210	299
M 18	27	289	411
M 20	30	411	578
M 22	32	559	784
M 24	36	711	1.000
M 24 x 2	36	761	1.069
M 27	41	1.049	1.481
M 30	46	1.422	2.010
M 30 x 2	46	1.571	2.210
M 33	50	1.932	2.716
M 36	55	2.481	3.491
M 39	60	3.226	4.531
M 42	65	3.991	5.609
M 45	70	4.992	7.012
M 48	75	6.021	8.473
M 52	80	7.747	10.885
M 56	85	9.650	13.582
M 60	90	11.964	16.867

4.COMMISSIONING

4.1 Cold start-up

Cold start-up is for initial start-up of a plant without feeding material and steel balls to the mill.

In order to start cold start-up, the mechanical and electrical fitting work must be completed and the fitting acceptance protocol must be signed.

If possible, commissioning should ideally take place in the opposite direction to material flow. The sequence of commissioning is determined by which plant equipment are already assembled and electrically connected.

During cold commissioning each individual plant equipment is first started up.

The commissioning engineer must check in each case whether all the stipulated preconditions are ready and complete. Preconditions are applicable to every plant equipment:

– The plant equipment is mechanically correctly installed

– The plant equipment is electrically connected

The commissioning engineer monitors the tests carried out by customer personnel and, if necessary, the rectification of any faults occurring. He/she also logs the test results.

After this, plant components are matched to each other in groups using sequence tests.

The cold run for the entire plant is then carried out for calibration and for the presetting of process variables and controlled process variables. Material is not fed in during this phase. The results of the cold run are logged by the commissioning engineer.

After the successful completion of sequence tests and the cold run itself, cold commissioning is deemed to be completed.

The plant is handed over to the commissioning engineer who is to perform hot/air commissioning together with the protocols of the idle running test and the testing of the start/stop sequences and interlockings.

The cold start-up of individual plant components normally follows a particular scheme:

1. Ersel supervisor checks the correct mechanical assembly of components.
2. Ersel supervisor checks that components are correctly electrically connected.
3. Ersel supervisor checks the control system hardware and software in accordance with the Ersel interlocking diagram.
4. Ersel supervisor sets the time delays (timer) and values for warning or alarm in the hardware and software in agreement with Ersel supervisor.
5. Ersel supervisor checks that all lubricants have been filled up in accordance with the Ersel lubricant list.
6. Ersel supervisor carries out signal tests (I/O checks) on the relevant electrical consumers and instruments.
7. Ersel supervisor checks whether the drive operates coupled or uncoupled.
8. Ersel supervisor ensures that motors are rotating in the right direction.
9. Ersel supervisor parameteries the instruments in accordance with the Ersel and supplier documentation.
10. Ersel supervisor checks interlocking in accordance with the Ersel interlocking diagram.
11. If the relevant components have been commissioned, the commissioning manager carries out a function and trial run (sequence test) on the component groups.
12. Ersel supervisor checks the sequential and processing into locks in accordance with Ersel documentation.
13. Ersel supervisor runs the entire plant down in accordance with the Ersel stop sequence.
14. Ersel supervisor tests the emergency stop sequence in accordance with the Ersel emergency stop sequence diagram.

Note:

Commissioning can only be carried out or monitored by a qualified Ersel commissioning engineer.

4.2 Warm start-up

Commissioning is the term used for initial start-up of a plant including feeding the raw material to be ground. It follows on in the Ersel sequence diagram at the point where cold commissioning was concluded.

To be able to begin commissioning, it is necessary to satisfy the following conditions:

– The plant cold run has been successfully completed and the necessary protocols and reports have been drawn up, signed and handed over in accordance with the Ersel overview of protocols, reports and drafts for commissioning.

– All the plant components are in full working order, ready for operation and safe in accordance with the supplier's documentation.

– The operator makes available feed material in/of sufficient quantity and quality so that the start of commissioning is not delayed and measurement results are not negatively influenced.

– The operator makes available further consumables required such as e.g. electric current, water, air, oil, lubricant, fuel, etc. in/of sufficient quantity and quality so that the start of hot/air commissioning is not delayed and measurement results are not negatively influenced.

– The operator makes available sufficiently qualified and experienced personnel so as to ensure 24-hour operation.

– The operator makes available all the required tools, vehicles, machines and spare parts.

– The operator ensures that measurements and settings can be carried out on all plant components.

– All protective devices are adjusted, in proper working order and ready for operation.

An engineer from Ersel shall supervise during the assembly period and commisioning. The Ball mill will be charged with 50% grinding media at commissioning. The Ball mill will be controlled by an Ersel engineer after operating with 50% grinding media. After about four (4) to six (6) days of run, all bolts should

again be tightened and the gear and pinion alignment checked and adjusted if necessary.

Grinding media charge will be increased gradually after controls by Ersel's engineer.

The commisioning must not be done without Ersel's supervision.

The direction of rotation is important. Otherwise the gearbox can be damaged.

ATTENTION!

THE COMMISIONED MACHINE WITHOUT INFORMING ERSEL DOES NOT INCLUDE GUARANTEE.

5.OPERATION INSTRUCTION OF THE BALL MILL

The ball mills can be extremely dangerous machines if not operated properly. Therefore, the operators need to follow essential safety and maintenance tips during ball mill operation. This is the only way to ensure safe operation and long life span. The operators should take certain precautions before they start operating a ball mill. The list of the most important safety maintenance steps that all operators should follow when using a ball mill:

Planning – Planning ahead is a must. Operators should know exactly when to lock and stop the ball mill. Planning ensures proper coordination and cooperation between the maintenance and production departments.

Selecting The Crew – It's very important to select the right maintenance crew that will be responsible for the maintenance schedule. Everyone needs to know exactly what needs to be done before and after every operation. In case something is not clear, employees need to turn to their crew leaders.

Issue Safe Work Permit – Operators must be issued a work permit before they start working with a ball mill.

Proper Technical Knowledge – Operators should receive proper technical training before they start working with a ball mill. They should fully understand how the ball mill actually works.

Barricading – The best way to avoid work-related injuries, is to barricade the area around the ball mill for safety reasons. It is also advisable to put signs that forbid entry without authorized permit. Signs also warn people of potential hazards.

Locking Out The Electrical Power – Once the ball mill operation is completed, the operator should disconnect the high-voltage electrical power. Operators should also test the circuit, once they are done with the task.

Clean Up The Machine After Use – A ball mill should be cleaned up after every operation or at the end of the working day. Every part or component should be regularly lubricated and checked for damages.

5.1 Mill operation flow chart

The ball mill run with automation. First step off the ball mill run is lubrication system. Lubrication system cycle starts by pushing the button , if air pressure is min.5 bar (P1). Bearing lubrication pump solenoid valve(Y1) and gear lubrication pump motor (m) and gear lubrication spray soloneid valve(Y3) are on.

System makes pre-lubrication for 20 seconds.

After that period lubrication system cycle starts.

Gear lubrication system cycle :

- T2 : Gear lubrication cycle time
- N1 : Gear lubrication sensor pulse number
- Y2 = 1 , Y3= 1

Until S1 sensor pulses reach N1 –> Y2=1 , Y3 = 1

If T2 time elapsed but the pulses < N1 the " Gear lubrication fault " occurs.

When pulses = N1 Y1 valve energy cut off (Y1=0) until the T2 time elapsed.

Y3= 1 for 20s more to clean the spray nozzles with air (T3).

This cycle continues until lubrication stop button (B4) is pushed (if no fault occured).

N1 =4 pulses , T2 = 120 seconds

Bearing lubrication system cycle :

- T4 : Bearing lubrication cycle time
- N2 : Bearing lubrication sensor pulses number
- Y1=1

Until S2 sensor pulses reach N2 –> Y1=1 If T4 time elapsed but the pulses < N2 The "Bearing lubrication fault" occurs. When pulses = N2 Y1 valve energy cut off (Y1=0) until the T4 time elapsed. This cycle continues until lubrication stop button

(B4) is pushed (if no fault occurred).

N2 =8 pulses, T4= 15 minutes

General Information

- B5 Stop push button stops mill and lubrication at the same time.
- After pre-lubrication ends, B3 push button lamp lights and mill motor is ready to be operated.
- S1 Remote switch allows operating the system via profibus communication.
- When emergency stop button is pushed,the main switch trips and " emergency stop fault " occurs. Attention! Signal state must be 1.
- While B6 Jog push button is pressed, mill operates with fixed speed (motor frequency: 5 hz). Lubrication is not necessary for jogging. Max. Jog time is 2 minutes. (If available)
- If "drive running" signal is received, B4 push button lamp lights.
- In case of a fault, H1 fault lamp lights.
- In case of Mill FC fault "Mill FC is not ready" message appears.(Frequency Convertor) Attention! Signal state must be 1.

a.Mill Starting Sequence

- There must be no fault.
- Start pre-lubrication.
- Sound the horn for 20s
- Start lubrication system cycle.
- Start mill motor cooling fan
- Start mill motor.

b.Mill Stoping Sequence

- Stop mill motor.
- Stop mill motor cooling fan
- 20 seconds delay
- Stop the brake motor
- Stop the lubrication

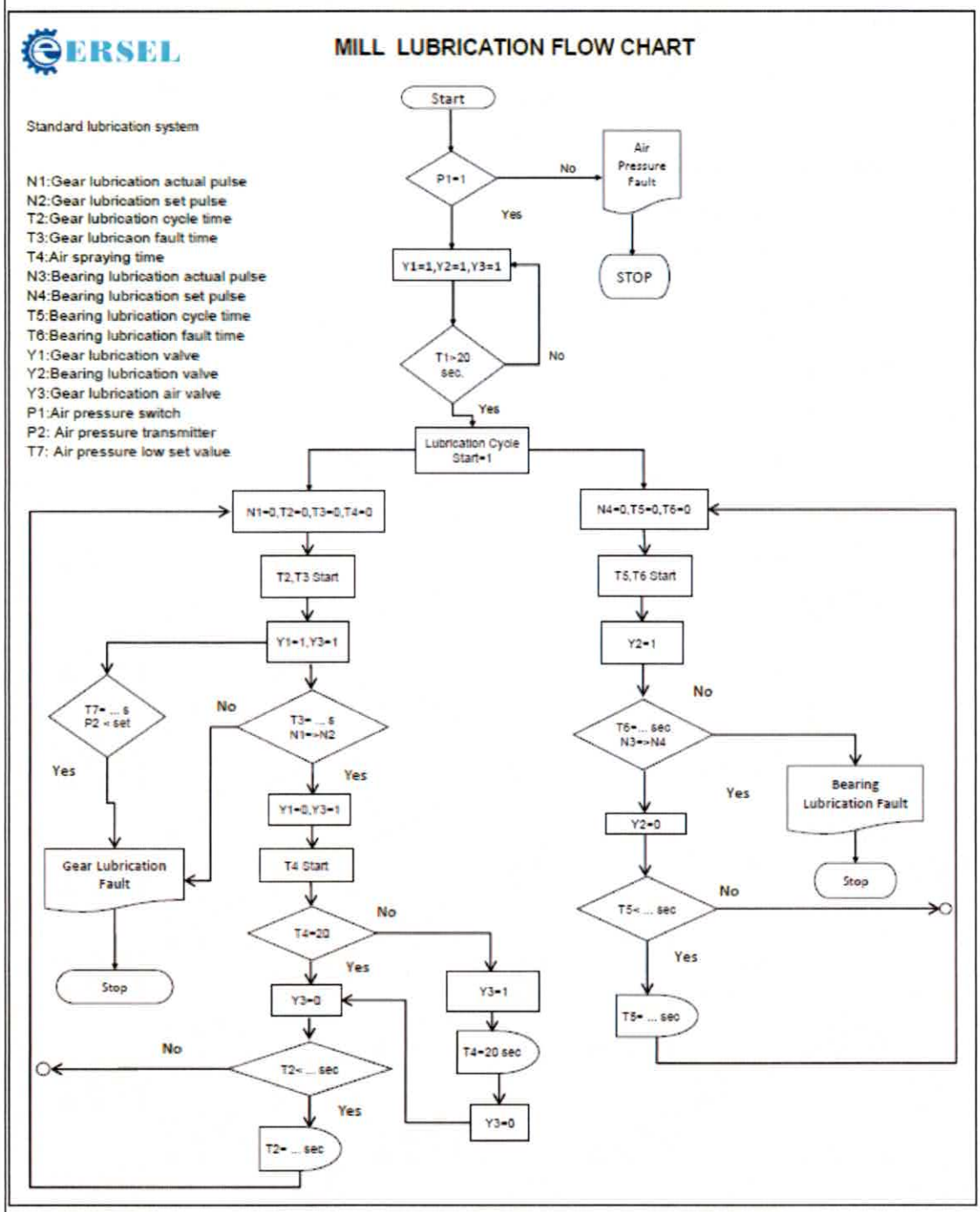

Figure 45. Ball Mill Lubrication Flow Chart

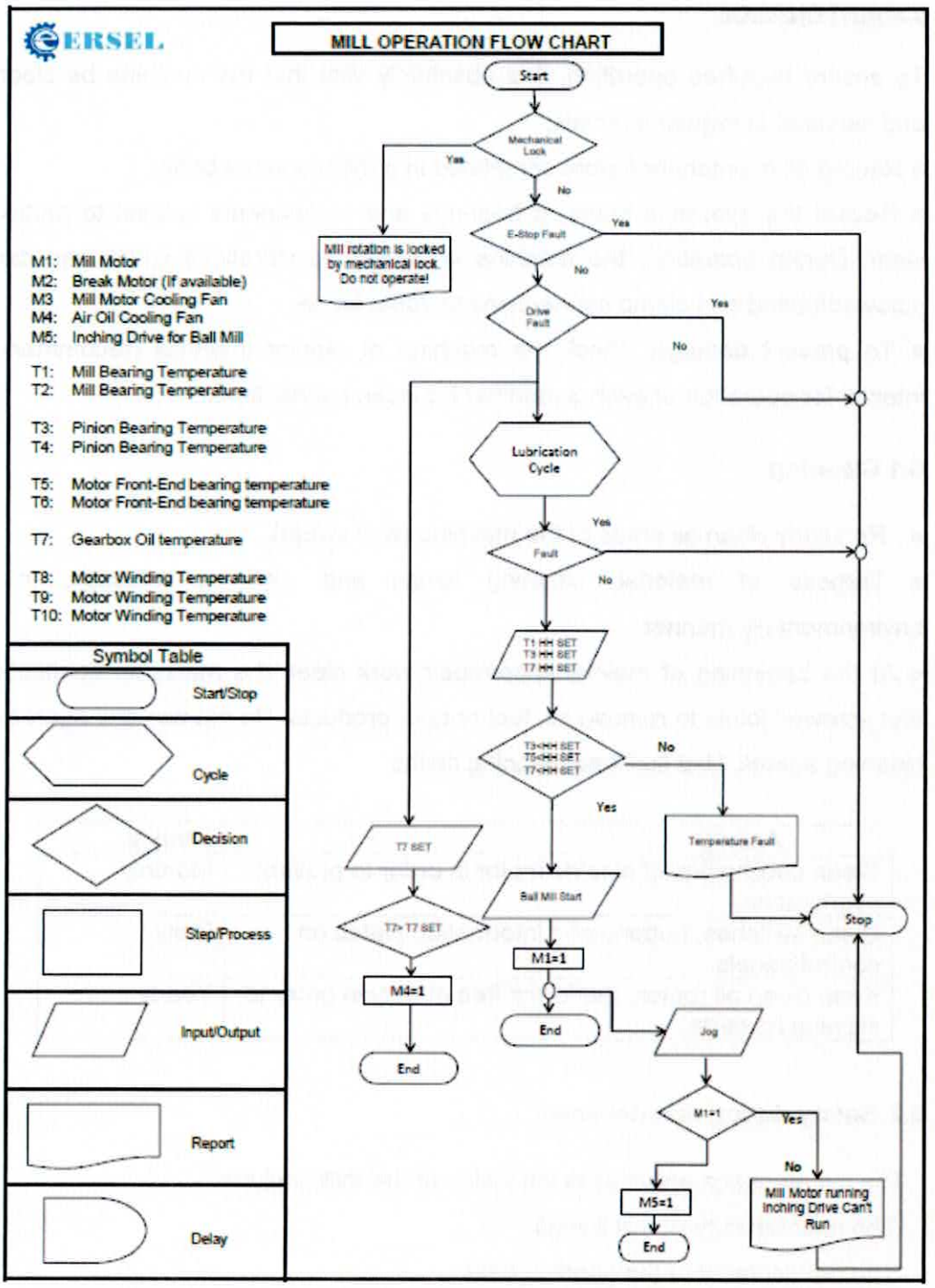

Figure 46. Ball Mill Operation Flow Chart

6.MAINTENANCE

To ensure fault-free operation, it is absolutely vital that the machine be cleaned and serviced at regular intervals.

- Record all maintenance work completed in a maintenance book.
- Record the operating hours of bearings and components subject to particular wear. During operation, the machine is subject to vibrations which can cause screwed/bolted and clamp connections to come loose.
- To prevent damage, check the machine at regular intervals (recommended interval for operation of each 3 months) for loose connections.

6.1 Cleaning

- Regularly clean all areas of the machine (well swept).
- Dispose of material, cleaning waste and cleaning materials in an environmentally manner.
- At the beginning of maintenance/repair work clean the machine, connections and screwed joints to remove oil, fuel or care products. Do not use any aggressive cleaning agents. Use fluff-free cleaning cloths

Activity	Interval
Clean cooling fins of electric motor in order to prevent overheating.	Monthly
Clean switches, buttons and information plates on control panels.	Daily
Keep clean all routes, platforms free of dirty in order to slipping hazards.	Yearly

6.2 Safety during maintenance

The maintenance activities in the inside of the mills include:

-The maintenance of mill linings

-The replacement of the grinding balls

The maintenance activities in the outside of the mills include:

-Listed below maintenance and repair work

As a result of the above activities a number of serious hazards are created for the workers at least as follows:

- Falls from height (from the mill platforms)
- Work in confined spaces with insufficient ventilation
- Exposure to High temperatures

Due to the nature of the hazards involved such high risk operations must necessarily be planned so that all the following preventive measures are adhered to:

- Securing of the plant in a place where there is easy access of the maintenance technician into the mill
- The maintenance activity must be conducted by authorised personnel
- The work must be carried out under continuous supervision
- Adherence to documented operating preventive procedures
- Assure the necessary ventilation of the work space
- Assure the reduction of temperature prior to access to the space

The use of the appropriate PPEs that must include:

- Special helmet equipped with eye protector and safety shoes
- Safety belt and harness connected to a tying rope
- Special work ware and foot ware able to withstand thermal load
- Heat proof gloves
- Special mask equipped with ventilating fan or connected to a central ventilation system
- Portable torch-light

6.3 General maintenance

- The body of the mill and the outer surfaces of the bearing houses should be cleaned on weekly basis.
- The liners must be checked regularly. Broken and worn liners must be replaced with the new ones .
- The connection bolts of the lining should definitely be checked weekly and loosened bolts – if there are any- should be tightened.
- The foundation bolts should be checked frequently and bolts must be tightened according to appropriate torque value (Torque values are given in the appendix chart.)

- The felts on the gear covering should be checked, adjusted and if there are any missing ones, they should be renewed.
- Mill lubrication pumps must be checked everyday if they work properly.
- Pinion and rim gears must be checked everyday if they are lubricated.
- Housings must be checked everyday if they are lubricated.
- The temperature of mill housings and pinion housings must be checked daily.
- Grease must be pressed to gear-coupling every three months.
- Elastic coupling must be checked if it is firm.
- Oil level inside the gearbox must be checked every month.
- The body temperature of gearbox must be checked everyday.
- Check conditions of the heater and oil cooler once in a year. (if available)
- Check the sediments on cooling and heating system at certain intervals. (if available)
- Clean oil filter once in a year; Replace it if necessary. (if available)
- Electrical panel must clean frequently.
- Service must be taken from Ersel twice in a year which is in scope of service contract during the warranty period.

IN CASE OF INCOMPLIANCE WITH THE CONDITIONS STATED IN THE OPERATING AND MAINTENANCE MANUAL, GUARANTEE CONDITIONS OF ERSEL BECOME INVALID.

6.4 Maintenance table

Table_ Maintenance and Repair Works		
Control Points	Control Period	Remarks
Anchor, all connection bolts and nuts		
Check tightness	Monthly	
Check frame balance	Yearly	
Gear (Pinion and Rim Gear)		
Check tooth bearings	Every 3 months	See:Section 7.5 Appendix 3
Check lubrication nozzles	Weekly	
Check gear surfaces for pitting	Every 3 months	
Check gear alignments	Yearly+ General Maintenance	See: Section 7.5 Appendix 1
Check rim gear sealings	Weekly	
Couplings		
Check elastic coupling buffers	Every 3 months	
Check gear Coupling, sealings and lubrication	Every 3 months	
Mill Liners		
Check liner sealings	Monthly	
Check tightness of liner bolts	Weekly	
Check liner damages	Weekly	
Main and Pinion Bearings		
Bearing Clearances and surfaces	Yearly	Perform with Ersel supervision
Motor	Electric motor back should be fed with ~55 gr of grease once in every 4.700 hours and front bearing	See.ABB Manual
	Front should be fed with ~85 gr of grease once in every 4.700 hours.	

Table_ Maintenance and Repair Works (Continue)

Control Points	Control Period	Remarks
Gearbox		See. ERSEL Gearbox manual
Check oil temperature	Daily	
Check for unusual gear-unit noise	Daily	
Check oil level	Weekly	
Check gear unit for oil leaks	Weekly	
Test the water content of the oil	Approx. 500 operating hours, at least once per year	
Perform first oil change	Approx. 500 operating hours after start-up	
Oil Change	After 10.000 hours operation or every 2 years.	
Clean air filter	Every 3 months	
Clean fan and gear unit	Depends on requirements, at least every 2 years	
Refill seals with grease	Every 3000 operating hours or at least every 6 months	
Check hose lines*	Yearly	
Change the hose lines*	6 years from the manufacturing date impressed	
Check cooling coil*	Every 2 years	
Check auxiliary drive*	Yearly	
Check tightness of fastening bolts	After first oil change, then every 2 years	
Lubrication Unit		See. Lincoln Manual
Check oil level	Daily	
Check pump, pump elements and distributor	Every 3 months	
Check lubrication piping	Every 3 months	

6.5 Lubrication

Grease lubrication					
Pos no	**Machine Name**	**Lubrication Point**	**Quantity of Lubricant**	**Recommended Lubricant**	**Description**
1	Ball Mill Electrical Motor	Motor –ABB	DE- 6324/C3- ~85 gr- 4.700 h NDE- 6319/C3VL0241 ~55 gr-4.700 h	Mobilith SHC 100 (Lithium Soap and synthetic oil) Exxon Mobil-Unirex N3 (Lithium Complex Soap), Shell-Shell Alvania RL3 (Lithium Soap) Petrobras-Lubrax Industrial GMA-2 (Lithium Soap) Shell-Stamina RL2 (Diurea Soap) SKF-LGHP 2 (Polyurea Soap)	
2	Ball Mill Lubrication	Rim gear and pinion (Before first start)	Grease 25 Lt	Graflascon AG-1 ULTRA-Klüber Berulit EL 443-BECHEM Ceplattyn 300-FUCHS Ceplattyn SF/P-FUCHS	Will be applied with a brush.
		Rim gear and pinion (Commissioning running in)	Grease 180 Lt	Graflascon B-SG 00 Ultra-Klüber Berulit 420-BECHEM Ceplattyn GTRN-FUCHS	This must be provided as a barrel because of lubrication system requirement.
		Rim gear and pinion	Grease 180 Lt 120 Sn. 4 puls – 140 cc/h	Ceplattyn KG10 HMF-2500, Klüber Graflascon- C-SG 2000 Ultra, Bechem Berulit Ga 2500	This must be provided as a barrel because of lubrication system requirement.
		Main and pinion housings	Grease 180 Lt 900 Sn. 3 puls - 30 cc/h	Mobilgrease XHP 222, Unipolly 222 EP , Beruplex LI EP 2, Spheerol EPLX 200-2, Shell Albida EP2, Renolit Duraplex EP2, Renolit GP2	This must be provided as a barrel because of lubrication system requirement.
3	Gear Coupling	ERSEL	2,7 liter	Fuchs-Renolit CX TOM 15 Castrol-Spheerol EPL 2 Klüber-Petamo GHY 133 N Shell-Gadus S2 V220 2 Texaco-Mulifak EP2 Total-Multis EP2	First filling must be done before commissioning Lubrication interval should be each 3 months.

OIL LUBRICATION					
Pos No	**MACHINE NAME**	**LUBRICATION POINT**	**QUANTITY OF LUBRICANT**	**RECOMMENDED LUBRICANT**	**DESCRIPTION**
1	Ball Mill Gearbox	Gearbox-ERSEL	175 Lt.	Viscosity: 320 cst Mobilgear SHC gear Alphasyn EP Renolin unisys CLP Carter SH Shell omala S4GVX/S4GX	Please check Ersel catalogue for details

6.6 Fault

Faults	Reasons	Solutions
Increased vibration in the mill	Loosening of bolts	Reviewing setting under personel supervision
	Gear defect	Reviewing setting under personel supervision
	Coupling misalignmet	Reviewing setting under personel supervision
	Defect on gear surfaces, pitting	-Checking the correct operation of the lubrication system -Gear guard seals should be checked and dust should be prevented from entering
Unusual sounds	Liners falling off or breaking	Mill routine lining check
	Increase or decrease in ball level	Adding or removing balls if the mill is out of the optimum value of current drawn
Mill lubrication error	It should be checked that the oil used is Ersel approved	Checking grease brands and viscosities
	Checking the lubrication system equipment	Control of lubrication pumps and equipment
	Correct operation of the lubrication system according to the ambient temperature	It should be ensured that grease reaches the lubrication system, bearing and gear
	Low pressure air error	Compressor should be checked
	Selenoid valve error	Valves should be checked
Gerabox oil temperature error	If the temperature values show different values than the normal operating set values	The valve from the PT100 should be checked
	If the oil reaches high temperatures	Check oil level
	Oil cooling equipment, pump and fan control	Checking whether the equipment is working

7.TRANSPORT

Ø2.500x7.500mm BALL MILL MAIN PARTS WEIGHTS					
No	Designation	Qty	Weight (kg)	Dimension (mm)	Description
1	Mill body	1 set	30.000	ø2910x10444x2980	Including liners.
2	Mill rim gear	1 set	3.037	3429x1760x920	
3	Drive unit frame	1 set	3.367	4750x1700x575	
4	Main bearing frame	1 set	554	2210x370x710	
5	Motor	1 set	3.200	1895x981x1212	
6	Gear Covering	1 set	876	2947x2677x990	
7	Trommel screen+ Trommel cover	1 set	805	1617x1290x1670	
8	Feeding Bunker	1 set	107	1196x1080x822	
9	Lubrication unit+ Pipes	1 set	205	1200x1200x2200	
10	Pinion group	1 set	1.447	1356x680x641	
11	Gearbox+Fan	1 set	2.700	1247x1877x2079	
12	Sensors and manuals	1 set	75	750x750x750	

** Installation parts, pipings and small equipment are not included the table. Dimension and weights are approximate value. Only main parts are given in the table.

8. PART LIST

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GROUP NO			

BALL MILL PART LIST

NO	DWG NO	DESIGNATION	QTY	STANDARD	DESCRIPTIONS
1	15 01 EBM 250 01 0062	FRAME LAYOUT PLAN	1		
2	10 36 EBH 085 0001	FIX HOUSING BODY	1		
3	10 36 EBH 085 0002	IDLER HOUSING BODY	1		
4	11 01 EBM 000 24 0624	HOUSING FIXING PART	4		
5	11 01 EBM 250 06 0004	MILL HEAD FEEDING SIDE	1		
6	11 01 EBM 250 06 0003	MILL HEAD DISCHARGING SIDE	1		
7	15 01 EBM 250 07 0062	BODY GROUP	1		
8	15 01 EBM 250 34 0002	RIM GEAR GROUP	1		
9	15 01 EBM 250 10 0004	HEAD+BODY	30		
10	15 01 EBM 250 10 0005	HEAD+BODY CONN.GRP.	30		
11	15 01 EBM 250 10 0006	BODY+HEAD CONN.GRP.	4		
12	11 24 778	SPECIAL WASHER	8		
13	16 01 EBM 250 08 0003	FEEDING THROAT	1		
14	15 01 EBM 000 39 0001	MILL FEEDING CHUTE	1		
15	15 01 EBM 250 35 0003	GEAR GUARD	1		
16	15 01 EBM 250 22 0003	GUARD SUPPORT	2		
17	10 20 EFD 110 22 0002	FEEDING DRUM	1		
18	16 01 EBM 250 09 0004	OUTLET THROAT	1		
19	11 01 EBM 250 13 0001	DISCHARGE GRATE	2		
20	15 01 EBM 250 50 0001	DISCHARGE CHUTE	1		
21	15 01 EBM 250 33 0005	TROMMEL SCREEN	1		
22	15 01 EBM 250 12 0004	DISCHARGE CHUTE GROUP	1		
23	15 01 EBM 250 12 0005	OUTLET CHUTE SUPPORT	1		
24	16 01 EBM 250 12 0006	TROMMEL SCREEN DISCHARGE GROOVE	1		
25	15 01 EBM 250 28 0062	DRIVE UNIT	1		
26	15 01 EBM 250 32 00 0062	LINER COMPLETE	1		
27	10 96 003	BARREL TYPE LUBRICATION	1		
28	60 014 01 10 0016	O-RING	2		Ø6xØ760
29	60 014 01 13 0006	O-RING	2		Ø8xØ732
30	60 014 01 13 0014	O-RING	2		Ø8xØ2634
31	60 014 01 14 0019	O-RING	1		Ø10xØ550
32	60 001 02 30 0166	HEX.HEAD SCREW	8	ISO 4014	M36x200
33	60 001 02 17 0177	HEX.HEAD SCREW	16	ISO 4017	M20x90
34	60 005 01 01 0019	WASHER	40	DIN 125-1 A	M20 Ø21
35	60 002 02 01 0015	NUT	40	ISO 4032	M20
36	60 002 02 04 0015	CONTRA NUT	24	ISO 4035	M20
37	60 001 02 17 0135	HEX.HEAD SCREW	32	ISO 4017	M16x55
38	60 001 02 17 0136	HEX.HEAD SCREWA	32	ISO 4017	M16x60
39	60 001 02 01 0077	COUNTERSUNK HEAD SCREW	8	ISO 10642	M16x60
40	60 005 01 01 0017	WASHER	72	DIN 125-1 A	M16 Ø17
41	60 002 02 01 0013	NUT ISO 4032 M16	8		

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GROUP NO	15 01 EBM 250 28 0062		

DRIVE UNITE PART LIST

NO	DWG NO	DESIGNATION	QTY	STANDARD	DESCRIPTIONS
1	60 040 02 01 03 125	MOTOR ABB -M3BP 400 LB 4 3GBP402520-ADG	1		560 kW 1491 rpm IE4
2	10 41 EFC 360 0003	EFC 360 ELASTIC COUPLING	1		100x110
3	10 02 EHG 060 0001	EHG 60 GEARBOX COMPLETE	1		180 x 210 (H13)
4	10 41 EGC 100 0002	EGC 100 GEAR COUPLING	1		
5	11 01 EBM 250 17 0005	PINION SHAFT	1		
6	11 01 166	IDLER HOUSING COMPLETE	1		
7	11 01 EBM 250 03 0003	PINION GEAR	1		
8	11 36 EBH 020 04 0004	PINION SHAFT BUSHING	2		
9	10 36 EBH 020 0001	FIX HOUSING COMPLETE	1		
10	11 04 529	PINION SHAFT COVER	1		
11	10 15 ECR 215 0001	CLAMPING RING GROUP	2		Ø215
12	11 00 20 100 0060	RING	1		
13	11 01 EBM 000 16 0005	BRAKE DRUM LOCKED	1		
14	11 22 02 1076	STUD	4	DIN 976-1-B	M36x220
15	11 01 EBM 000 24 0012	FIXING PART	1		
16	60 087 01 01 0009	DRUM BRAKE	1		TE 250 EB 300-50
17	11 22 02 0930	STUD	6	DIN 976-1-B	M30x190
18	15 01 EBM 000 31 0001	MECHANICAL LOCK	1		40
19	60 009 01 06 00 176	BEARING SKF 24140 CC/W33	1	DIN 635	Ø200xØ340x140
20	11 08 01 0004	WOOL FELT Ø215xØ255	4		SIZE:22x12x855
21	11 00 24 0734	SPECIAL WASHER	4		M36
22	11 00 24 0044	SPECIAL WASHER	4		M36
23	11 00 24 0717	SPECIAL WASHER	10		M30
24	60 001 01 34 0073	SETSKUR	6	DIN 913	M10 x 16
25	60 001 02 14 0140	HEX.HEAD SCREW	4	ISO 4014	M30 x 140
26	60 001 02 14 0077	HEX.HEAD SCREW	4	ISO 4014	M16 x 140
27	60 001 02 17 0136	HEX.HEAD SCREW	4	ISO 4017	M16x60
28	60 001 02 17 0102	HEX.HEAD SCREW	2	ISO 4017	M12x40
29	60 001 02 17 0074	HEX.HEAD SCREW	8	ISO 4017	M8x25
30	60 005 01 01 0025	WASHER	10	DIN 125-1 A	M30 Ø31
31	60 005 01 01 0017	WASHER	16	DIN 125-1 A	M16 Ø17
32	60 005 01 01 0015	WASHER	2	DIN 125-1 A	M12 Ø13
33	60 002 02 01 0021	NUT	8	ISO 4032	M36
34	60 002 02 01 0019	NUT	16	ISO 4032	M30
35	60 002 02 04 0019	CONTRA NUT	10	ISO 4035	M30
36	60 002 02 01 0013	NUT	8	ISO 4032	M16
37	11 00 05 27 0243	KEY	1	DIN 6885-1 B	45x25x160
38	60 005 01 01 0013	WASHER	8	DIN 125-1 A	M8

COMPLETE NO	10 01 EBM 250 0062	PAGE NO	3
GROUP NO	15 01 EBM 250 32 00 0062		

LINER COMPLETE PART LIST

NO	DWG NO	DESIGNATION	QTY	STANDARD	DESCRIPTIONS
1	11 01 EBM 250 32 02 0003	INLET-OUTLET RING	2		
2	11 01 EBM 250 32 03 0001	HEAD LINER	28		
3	16 01 EBM 000 32 04 0006	INLET-OUTLET HEAD LIFTERBAR	28		
4	11 01 EBM 250 32 05 0002	CORNER LINER	16		
5	11 01 EBM 250 32 06 0006	BODY LINER	120		
6	11 01 EBM 250 32 06 0008	BODY LINER NEAR COVER	4		
7	11 01 EBM 250 32 06 0009	BODY LINER NEAR COVER	2		
8	11 01 EBM 250 32 06 0010	BODY LINER NEAR COVER	2		
9	11 01 EBM 250 32 06 0011	BODY LINER NEAR COVER	8		
10	11 01 EBM 250 32 06 0012	BODY LINER NEAR COVER	8		
11	16 01 EBM 000 32 07 0031	BODY LIFTERBAR	116		
12	16 01 EBM 000 32 07 0033	BODY LINER NEAR LIFTERBAR	4		
13	11 01 EBM 250 32 06 0007	COVER LINER	2		
14	16 01 EBM 000 32 07 0032	COVER LIFTERBAR	4		
15	11 01 EBM 000 32 00 0011	RUBBER WASHER	12		M20
16	11 01 EBM 000 32 00 0012	THRUST WASHER	12		M20
17	11 01 EBM 000 32 00 0003	THRUST WASHER	556		M20
18	11 01 EBM 000 32 00 0002	THRUST WASHER	556		M20
19	11 01 EBM 000 32 00 0001	LIFTERBAR SHOES	568		M20
20	60 001 02 17 0178	HEXAGON HEAD SCREW	484	ISO 4017	M20x100
21	60 001 02 17 0181	HEXAGON HEAD SCREW	28	ISO 4017	M20x130
22	60 001 02 17 0182	HEXAGON HEAD SCREW	28	ISO 4017	M20x140
23	60 001 02 17 0183	HEXAGON HEAD SCREW	28	ISO 4017	M20x150
24	60 002 02 01 0015	NUT	568	ISO 4032	M20

9. SPARE PART LIST

COMPLETE NO		10 01 EBM 250 0062	
NO	**SPARE PARTS**	**QTY**	**PROJECT CODE**
1	**ERECTION&COMMISIONING SPARES**		
1.1	Ball Mill O-ring	1 set	60 014 02 01 0021
1.2	Main and Pinion Bearing Felt Seals	1 set	11 08 01 0013
1.3	Mill Gear Radial Felt Seals	1 set	11 00 08 0025
2	**1 YEAR OPERATIONAL&RECOMMENDED SPARES**		
2.1	Feeding Spout Liners	1 set	
2.2	Feeding Trunnion Liner	1 pc	16 01 EBM 360 08 0001
2.3	Main and Pinion Bearing Felt Seals	1 set	11 08 01 0013
2.4	Mill Gear Radial Felt Seals	1 set	11 00 08 0025
2.5	**Mill gear lubrication system**		
2.5.1	Spray Nozzle HSA-TD2	4 pcs	60 070 01 0005
2.5.2	Safety Valve SV 350 BAR	2 pcs	60 070 01 0006
2.5.3	Distributor SSVD 6	1 pc	60 070 01 0001
2.5.4	Spray lubrication distributor SSV 6/3 N	1 pc	60 070 01 0002
2.5.5	Distributor SSVD 12/7 N	1 pc	60 070 01 0003
2.5.6	3/2 Way Solenoid Valve (220 VAC)	2 pcs	60 070 01 0008
2.5.7	2/2 Way Solenoid Valve (220 VAC)	1 pc	60 070 01 0009
2.5.8	Pressure Switch Danfoss kp36 1/4	1 pc	60 070 01 0010
2.5.9	Air Conditioner - SMC-1/2	1 pc	60 070 01 0011
2.5.10	Inductive Sensor For Distributor	2 pcs	60 070 01 0012
2.5.11	Filter Group	2 pcs	60 070 01 0013
2.5.12	Manometer Q63X400 GLS, ALT	2 pcs	60 070 01 0014
2.5.13	Safety Device	2 pcs	60 070 01 0007
2.5.14	Pump Kit 926	2 pcs	60 070 01 0021
2.5.15	Air Regulator SMC -1/4	2 pcs	60 070 01 0004
2.5.16	Trommel Screen Set	1 set	15 01 EBM 250 33 0005
2.5.17	HMI	1 pc	450 040 01-00 058
2.5.18	Gearbox oil temperature PT100	1 pc	60 089 01 01 0003
2.5.19	Discharge side pinion bearing temperature	1 pc	60 089 01 01 0004
2.5.20	Feeding side pinion bearing temperature	1 pc	60 089 01 01 0004
3	**STRATEGIC SPARES**		
3.1	Pinion	1 pc	11 01 EBM 250 03 0003
3.2	Pinion Bearing	2 pcs	60 009 01 06 00 176
3.3	High speed coupling	1 pc	10 41 EFC 360 0003
3.4	Low speed coupling	1 pc	10 41 EGC 100 0002
3.5	Seals of gearbox	1 set	60 013 01 02 0165 60 013 01 02 0393