PAUL WURTH

# MANUAL FOR FIRST SHUT DOWN
## MIDI-CTG AND VAU

## MIDI BELL LESS TOP ®
## JINDAL STEEL WORKS TORANAGALLU BF 2







**5019064 – JSW – TORANAGALLU BF2**

| | |
|---|---|
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☒ Original instructions

☐ Translation of the original instructions

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## Revisions

| REVISION | DATE | AUTHOR | APPROVED | COMMENTS AND REVISED PAGES |
|---|---|---|---|---|
| | | | | |
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# General Information

WARNING

Make sure that all safety precautions are observed.

Failure to follow the safety instructions in this manual can result in serious injuries or equipment damage.

All operation and maintenance personnel must be trained to ensure that the personnel has familiarized themselves with the equipment and associated hazards.

Unauthorized personnel must not be permitted to enter the Bell-Less Top or the areas adjacent to this equipment.

NOTE

This manual is to use as a guide for the first shutdown. In addition to this guide all maintenance manuals must be read carefully. All regular checks must be done according to the maintenance manuals.

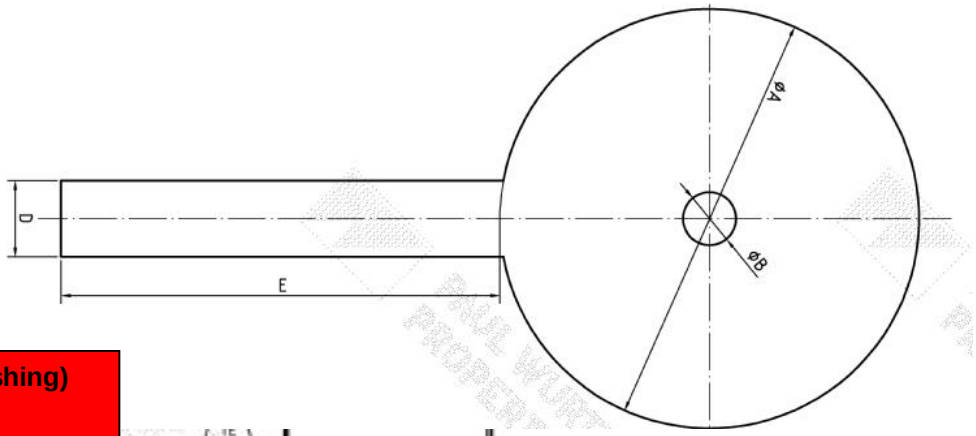
# 1 CHUTE TRANSMISSION GEAR

## 1.1 CASING

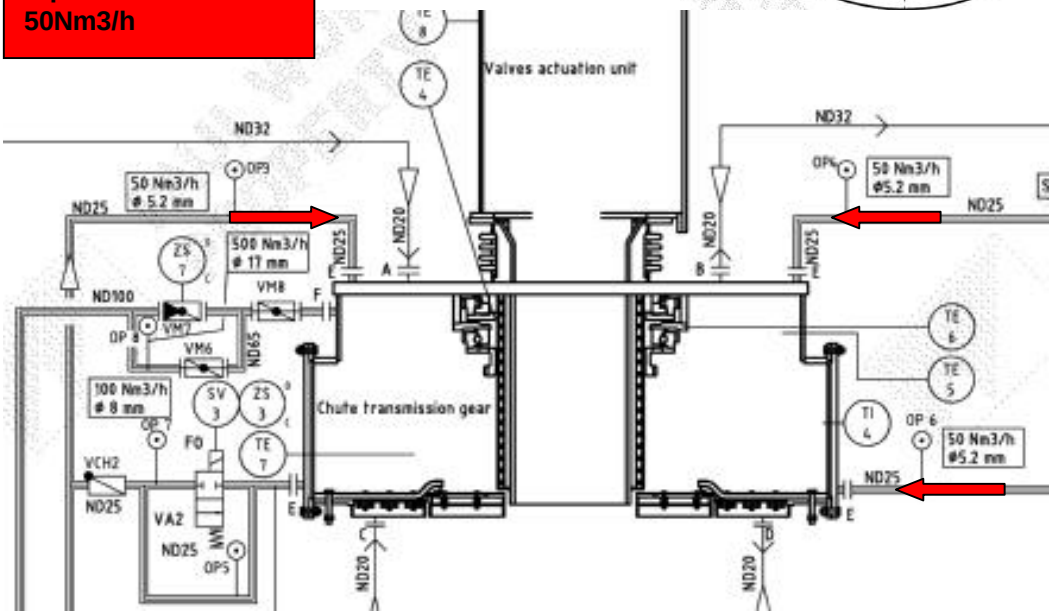
Prior to starting the maintenance works, the chute transmission gear and lower valve actuation unit must be flushed by nitrogen and then vented by compressed air. After doing so, the big maintenance doors of the chute transmission gear and valve actuation unit must be opened.

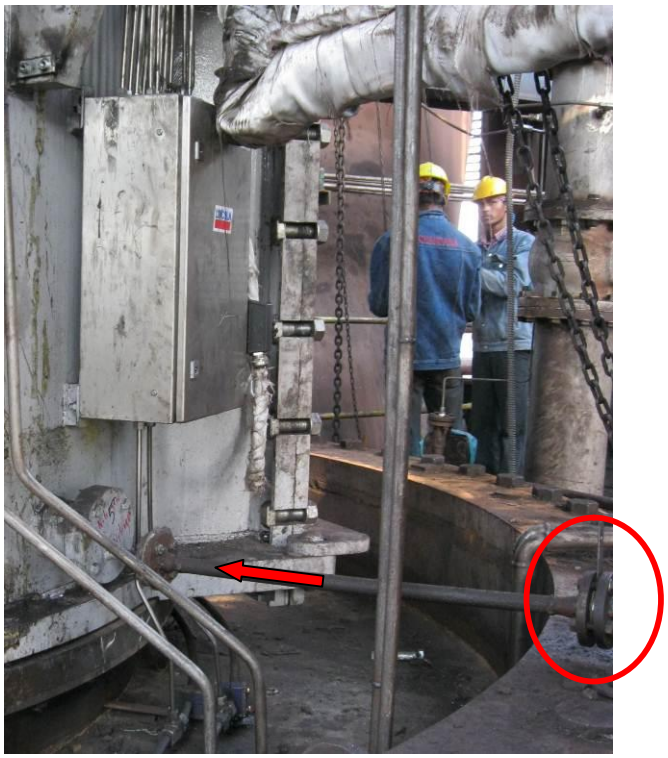
The actual flow for nitrogen flushing of the upper and lower labyrinth is only 40Nm3/h. Therefore the hole diameter B of the orifice plates must be increased.

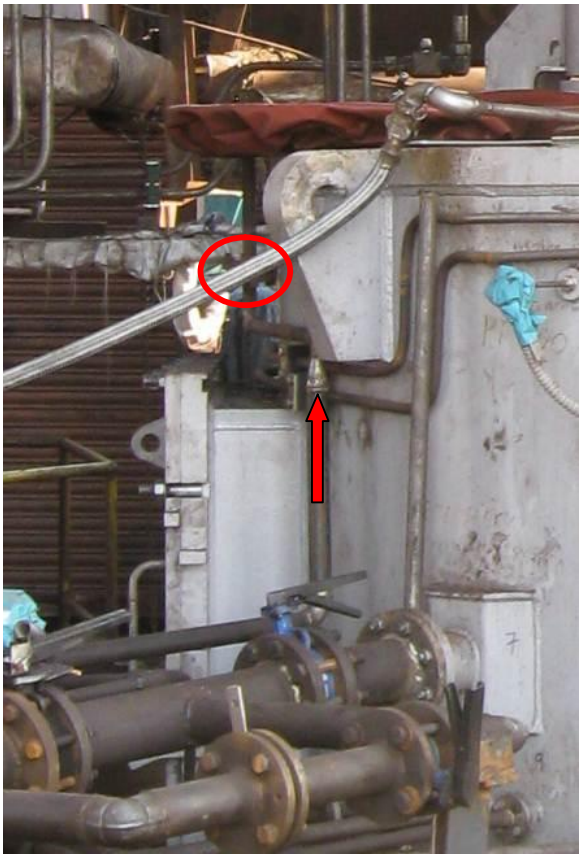
1. Stop flushing of gearbox.
2. Close all by pass valves.
3. Open nitrogen valve and check flow rate (should now be slightly higher than 40Nm3/h)
4. Close nitrogen valve.
5. Change orifice plates.
6. Check flow rate again, should be slightly higher than 200Nm3/h, as blast furnace pressure is 0 bar g. (Compare this value to the previous measured value.)

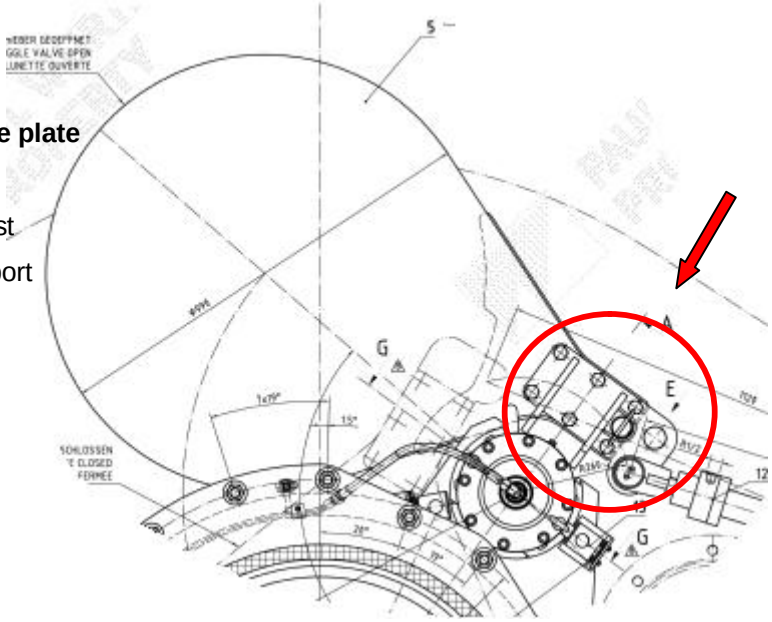



**Nitrogen (flushing)**
**Pipe ND25**
**50Nm3/h**







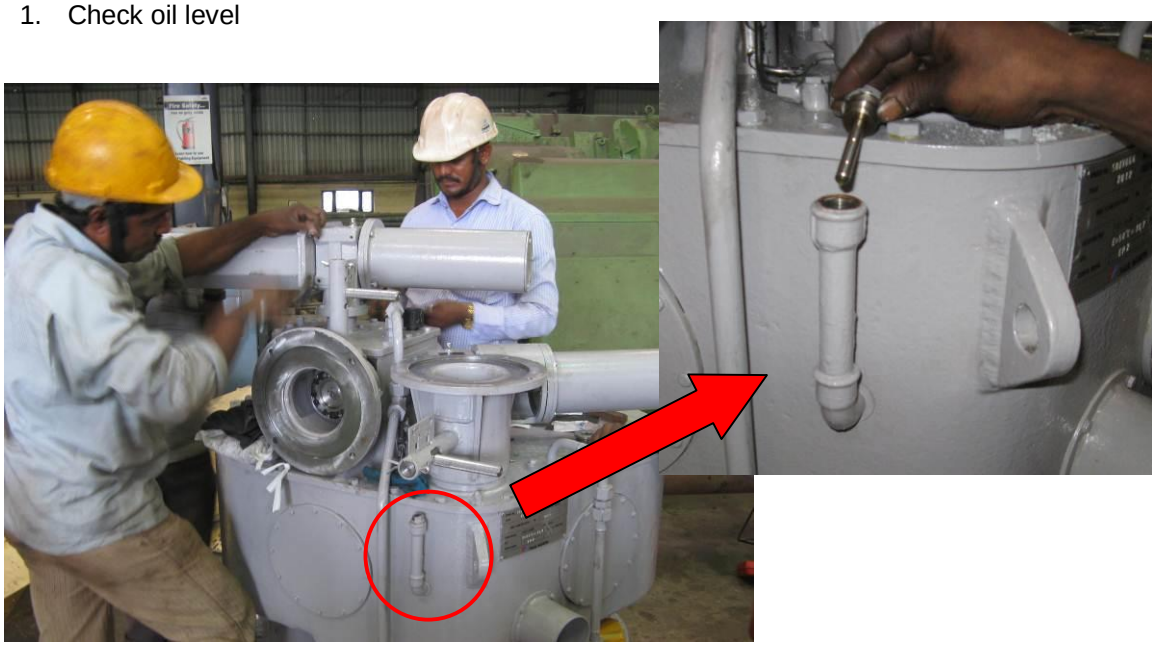


**Weld nitrogen pipe ND25 below goggle plate**

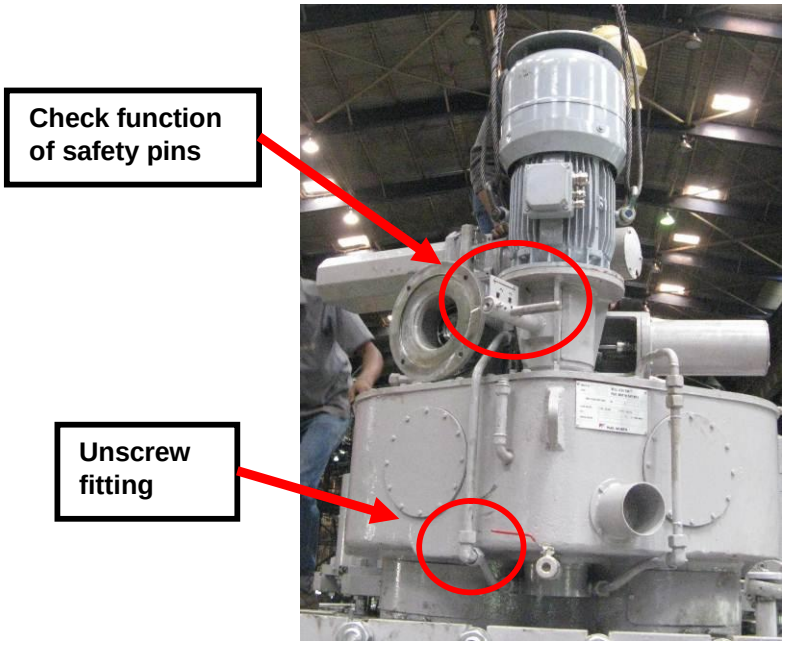
1. Hook goggle plate to a chain hoist
2. Unbolt goggle plate from its support
3. Remove goggle plate
4. Weld pipe ND25 gastight
5. Reinstall goggle plate

## 1.2 PLANETARY GEAR

1. Check oil level



2. Check function of oil pump.
3. Unscrew lubrication pipe as shown on following picture (pressure side).
4. Rotate planetary gear. Oil must flow out.
5. Tighten pipe again.
6. Check function of safety pins

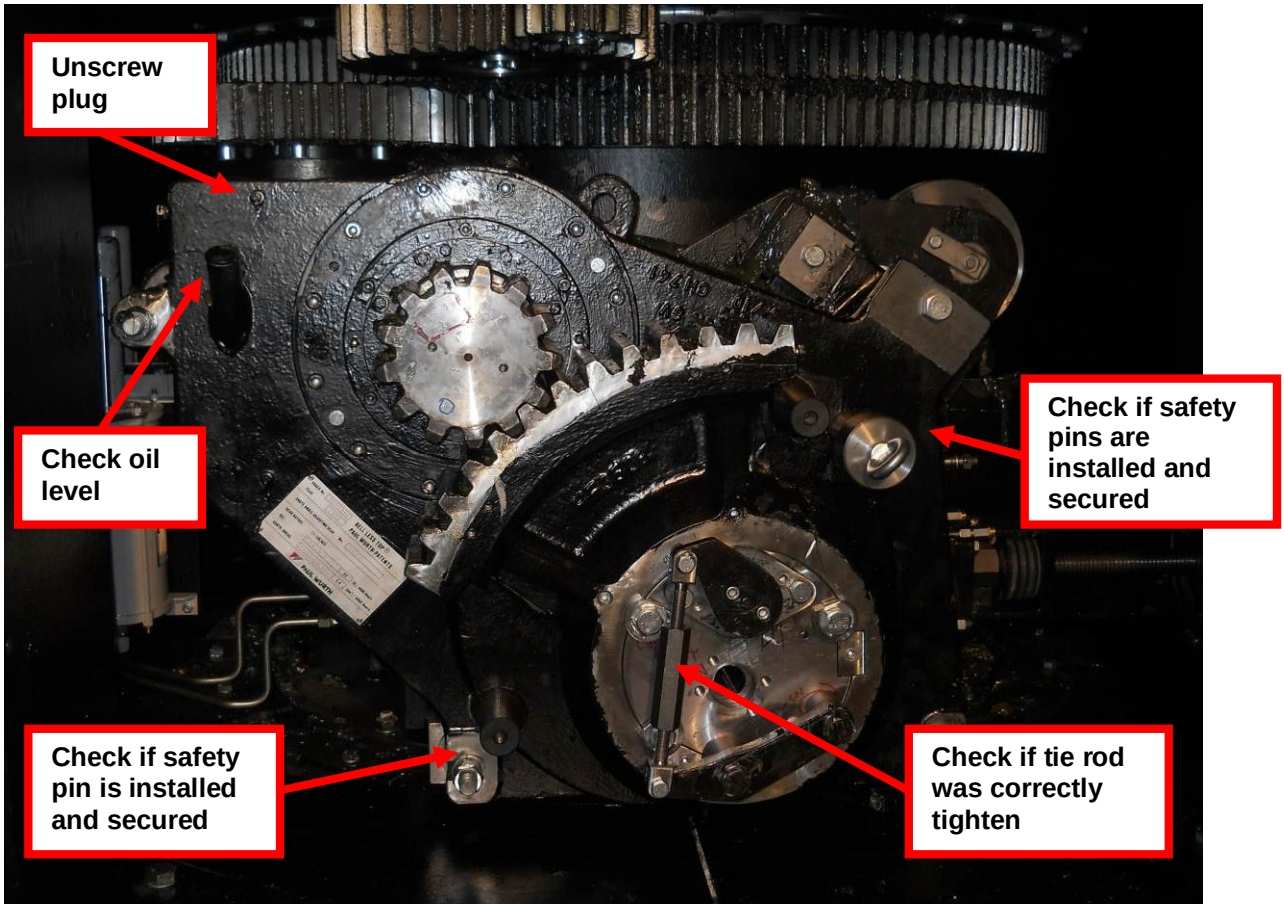


7. Rotate chute 5 min clockwise and 5 min counterclockwise. Record current.
8. Tilt chute from 16° to 50° and from 50° to 16°. Record current.
9. Check correct adjustment of limit switches (rotation and tilting)
10. Check if all lubrication lines are tight.

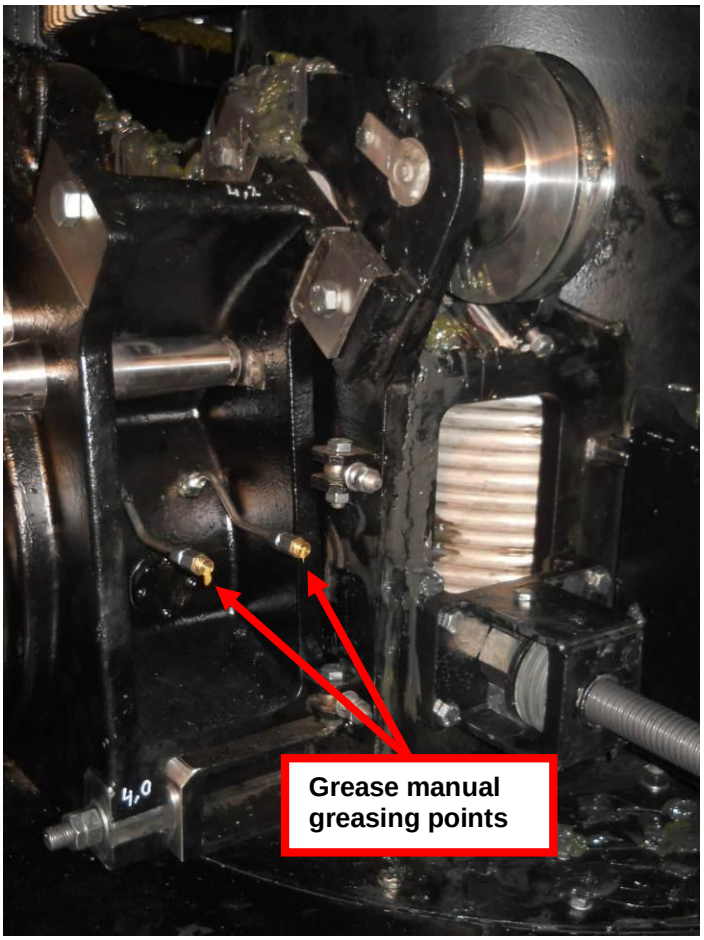
## 1.3 TILTING GEARS

Before entering the chute transmission gear, make sure that the safety pins are introduced and that the power is cut by the local isolator switches.

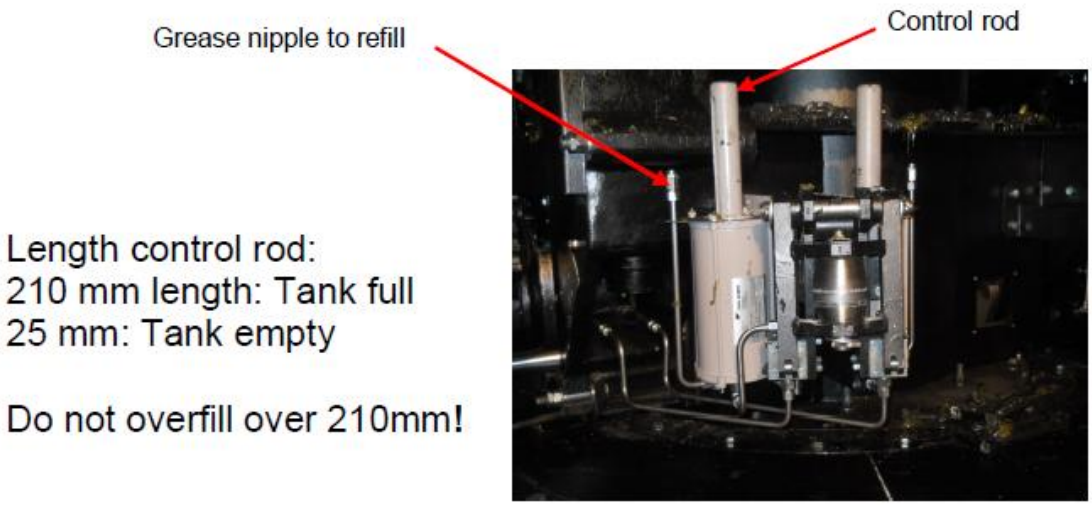
1. Rotate one tilting gearbox in front of the big maintenance door.
2. Check oil level.
3. Remove plug of lubrication line. The plug is situated above the oil level gauge.
4. Actuate tilting motor. Oil must flow out of the opening.
5. Check in general if all screws are tighten.
6. Remove grease and dust from the inside of the gearbox. A clean gearbox will ease maintenance works and regular checks



7. Grease manual greasing points

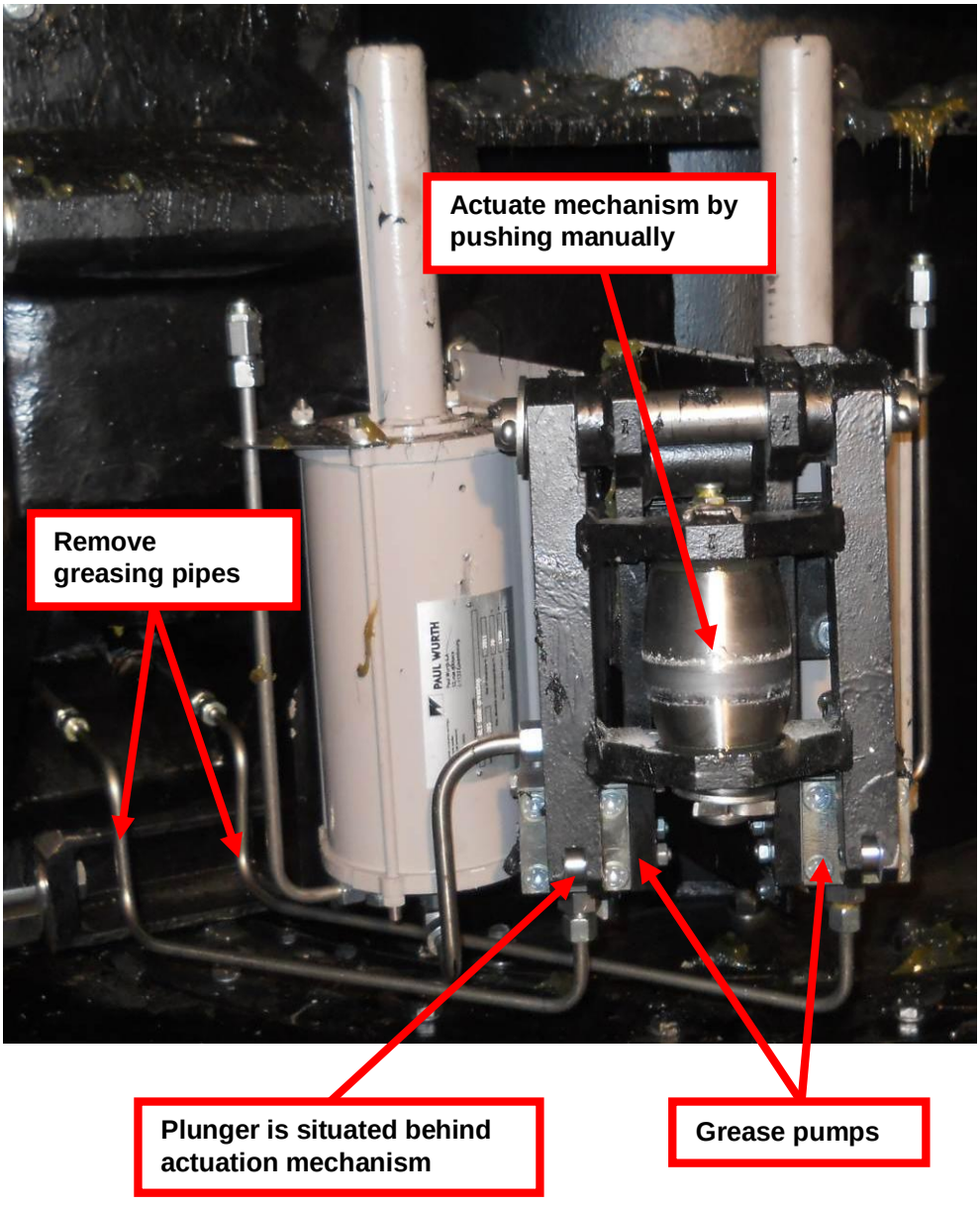



8. Check grease level in vessel.
9. Refill both grease vessels

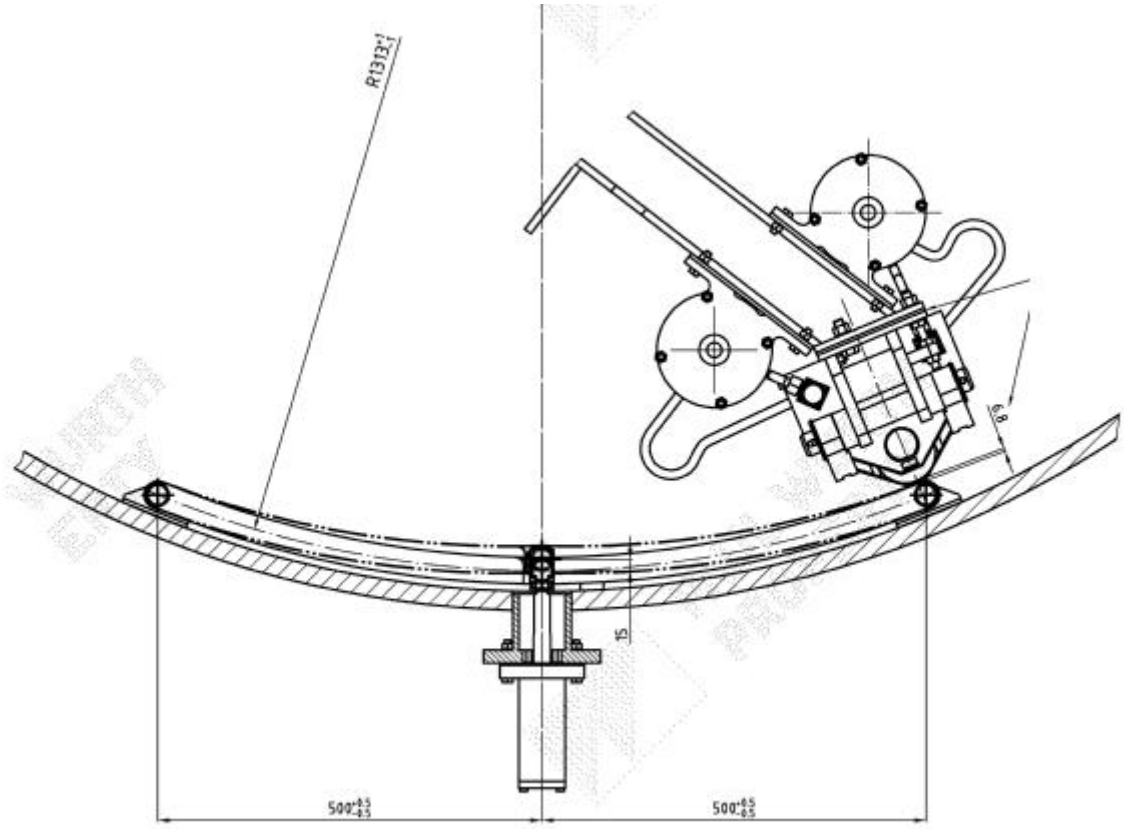


- Grease quantity: 4 x 2.4 liters (2.4 liter per grease tank, 2 grease tanks per gear)
- Grease quality: PW recommendation: KLÜBER STABUTHERM GH 461.
- Disposal of used grease: Follow manufacturer's instructions.

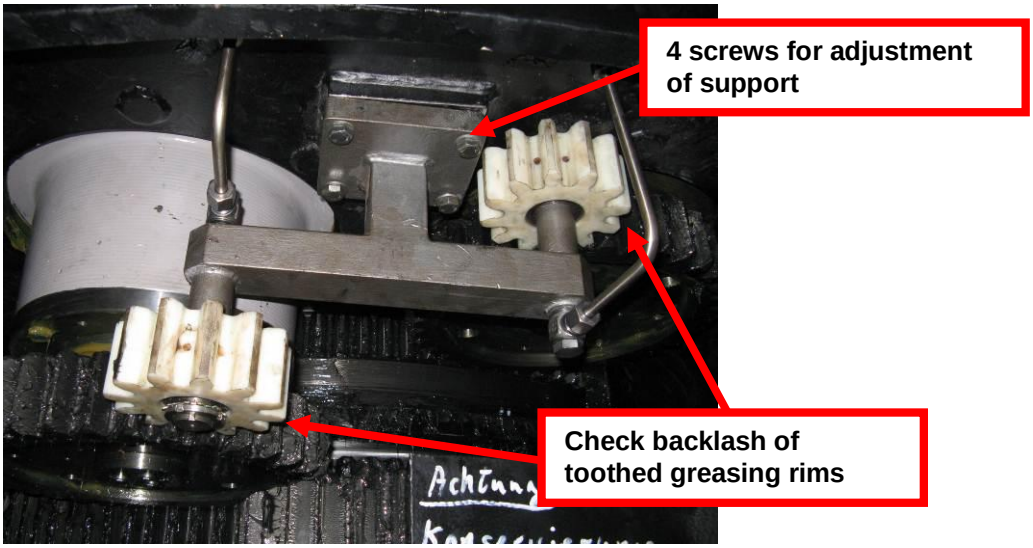
10. Remove pipes connected to the greasing points
11. Actuate the greasing pump manually.
12. Grease must flow out of the opening
13. Take care that the plunger of the pump will get out of the pump casing after pushing the mechanism



14. Check wear of grease pump actuator. (Therefore actuate greasing cylinder and rotate gearbox 3 turns. Doing so, the grease pipes must be disconnected as described under point 10)



15. Check backlash of greased toothed rims. The backlash should be 0,8mm-1mm. If the backlash is too less, loosen the 4 connecting screws and readjust support.



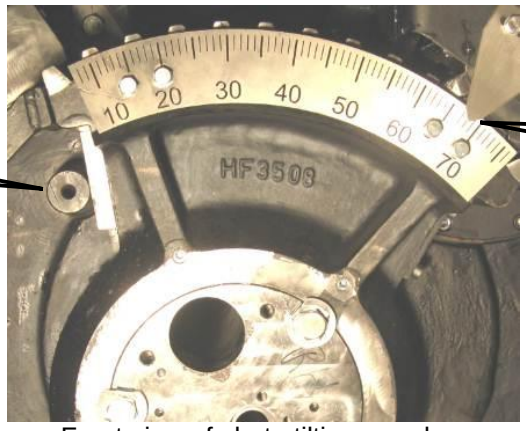
## 1.4 ADJUSTMENT OF CAM OPERATED LIMIT SWITCH

During the very short time attributed for the replacement of the TOTEM charging system by a PW charging system there was not enough time available for the exact adjustment of the cam operated limit switch for the chute dismantling. As the doors on the chute transmission gear box were closed, only a provisional adjustment could be done.

The limit switch has been adjusted to ±57° by PAUL WURTH.

This final adjustment has to be done during the next distribution chute exchange.

The mechanical stop of the chute inclination for the chute exchange is ±69°




Front view of chute tilting gear box

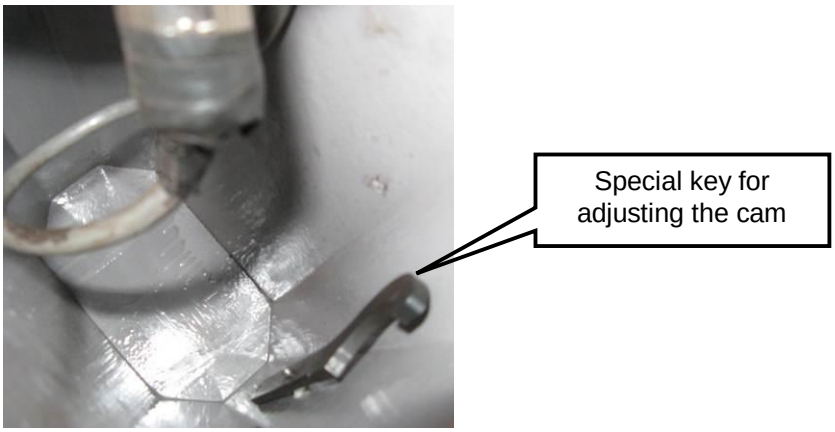

Top view of cam operated limit switches

Description for doing the adjustment

- Remove the big door in the top cone
- Position the chute in front of the door
- Remove the mechanical stop 53,5° on the 2 chute tilting gears
- Remove the cover of the cam operated limit switches


- Lift the chute until ±69° and adjust the cam of the limit switch. When lifting, make sure that the gear box doesn't strike the mechanical stop. Double check by first lowering the chute and subsequently lift the chute. The limit switch must stop the motor before the movable part of the gear box is striking the mechanical stop.

  For the adjustment of the cam, use the special key which is stored inside the protection cover



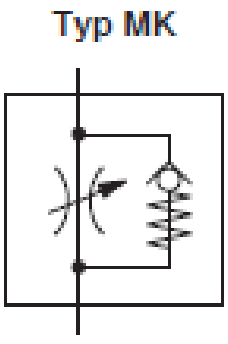
# 2 VALVE ACTUATION UNIT

## 2.1 GENERAL

The moving times of all hydraulic cylinders must be checked and adjusted according to the table shown below.

| Table with speeds of hydraulic cylinders (time is measured from start point of movement to start point of cushioning) | | |
|---|---|---|
| **Equipment** | **Movement** | **Time Taken** |
| Lower Seal Valve: | Opening, Unclamping: | 1.5 Seconds |
| | Opening, Slewing: | 3 Seconds |
| | Closing, Slewing: | 3 Seconds |
| | Closing, Clamping: | 1.5 Seconds |
| Lower Material Gate: | Opening to setpoint: | 3 Seconds |
| | Closing: | 5 Seconds |

Special care must be taken to avoid shocks at the beginning and the end of stroke. Therefore the cushioning must be fine-adjusted. As on the hydraulic valve desk no pilot valves are installed, it might be difficult to minimize the shock when starting the movement of the hydraulic cylinder. Due to shocks, the wear of the equipment will increase “parabolic”. Cylinder seals or bearings can be damaged. All cylinders must move smoothly. So, if shocks at the beginning of the stroke are too high, pilot valves must be added to the valve desk. Alternatively, a second throttle-check valve could be installed in the pressure line (inlet flow) of the hydraulic cylinder (between hose and hydraulic cylinder).

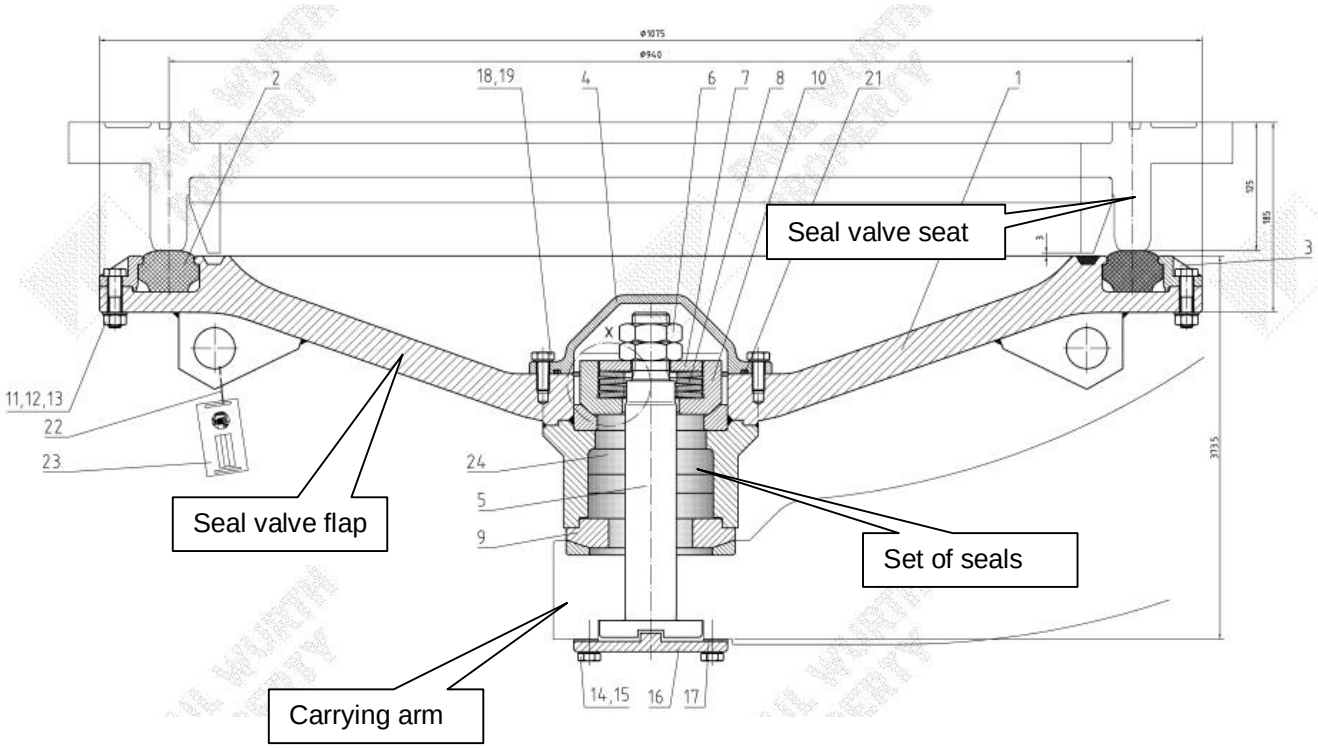



## 2.2 VALVE CASING

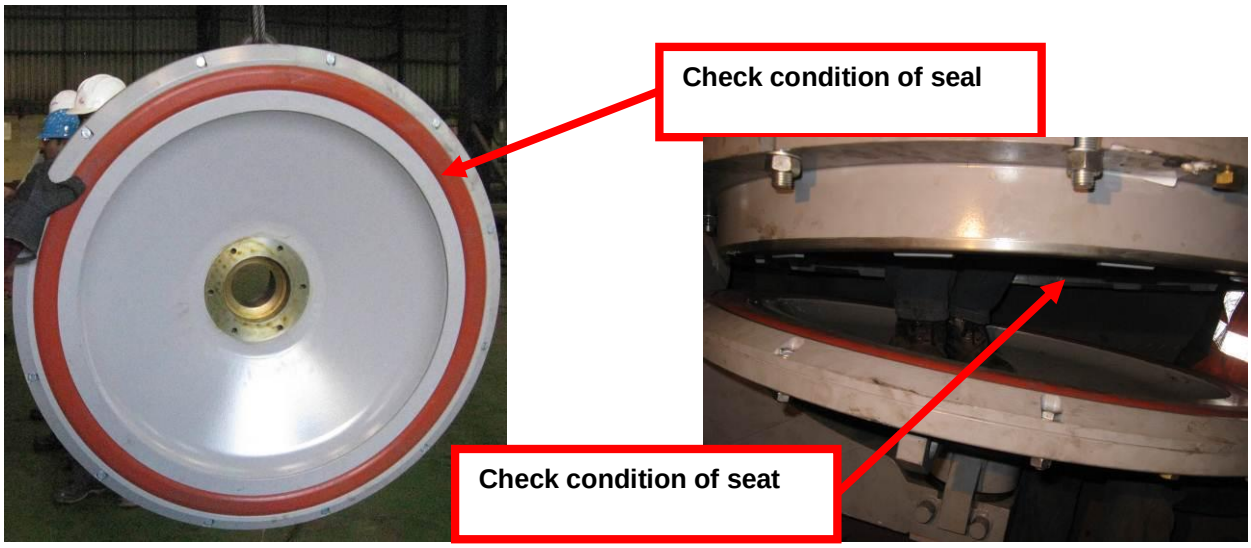
1. Close goggle valve.
2. Open maintenance door
3. Clean casing, remove dust deposits.
4. Check condition of thermocouple
5. Check length of hoses on hydraulic cylinders.

## 2.3 SEAL VALVE

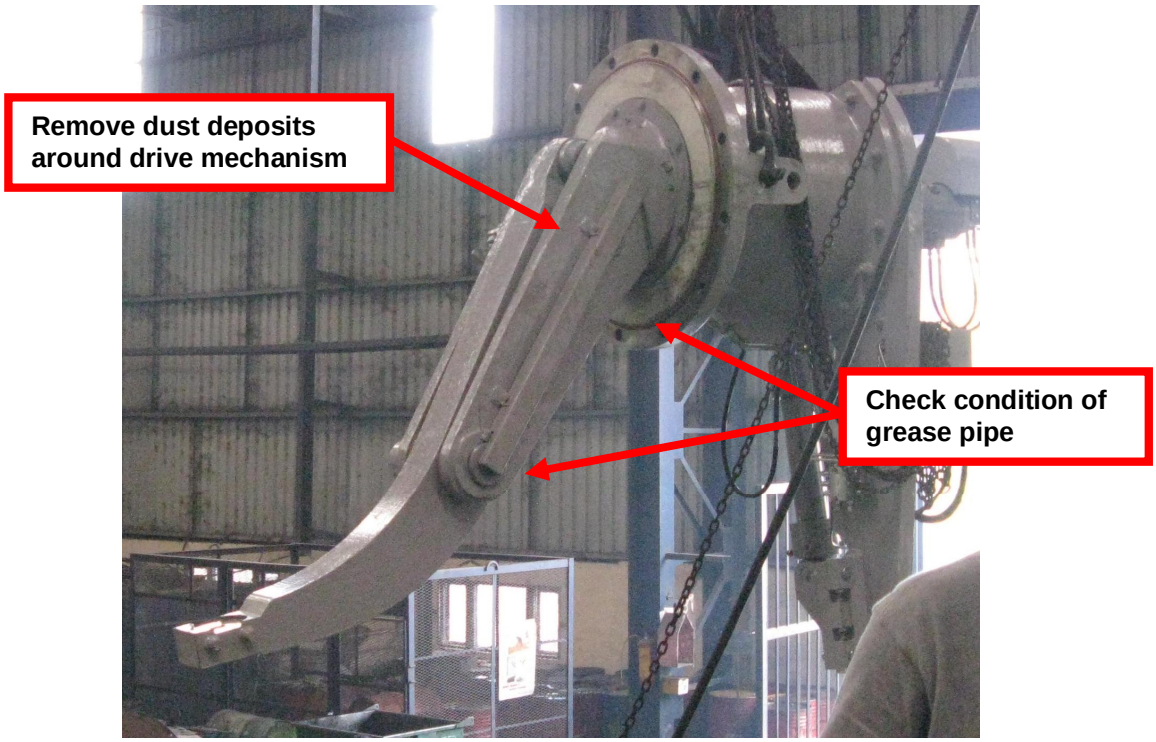
**Seal Valve flap suspension:**




1. Check condition of flap suspension. Seal valve flap must be centered on the carrying arm and cannot be tilted by hand.
2. Check condition of flap seal. The seal should not be burnt and should have no scratches.
3. Check condition of seal valve seat. If needed, the seat should be polished by sandpaper (fine grain size).
4. Check condition of hydraulic cylinders and greasing system.

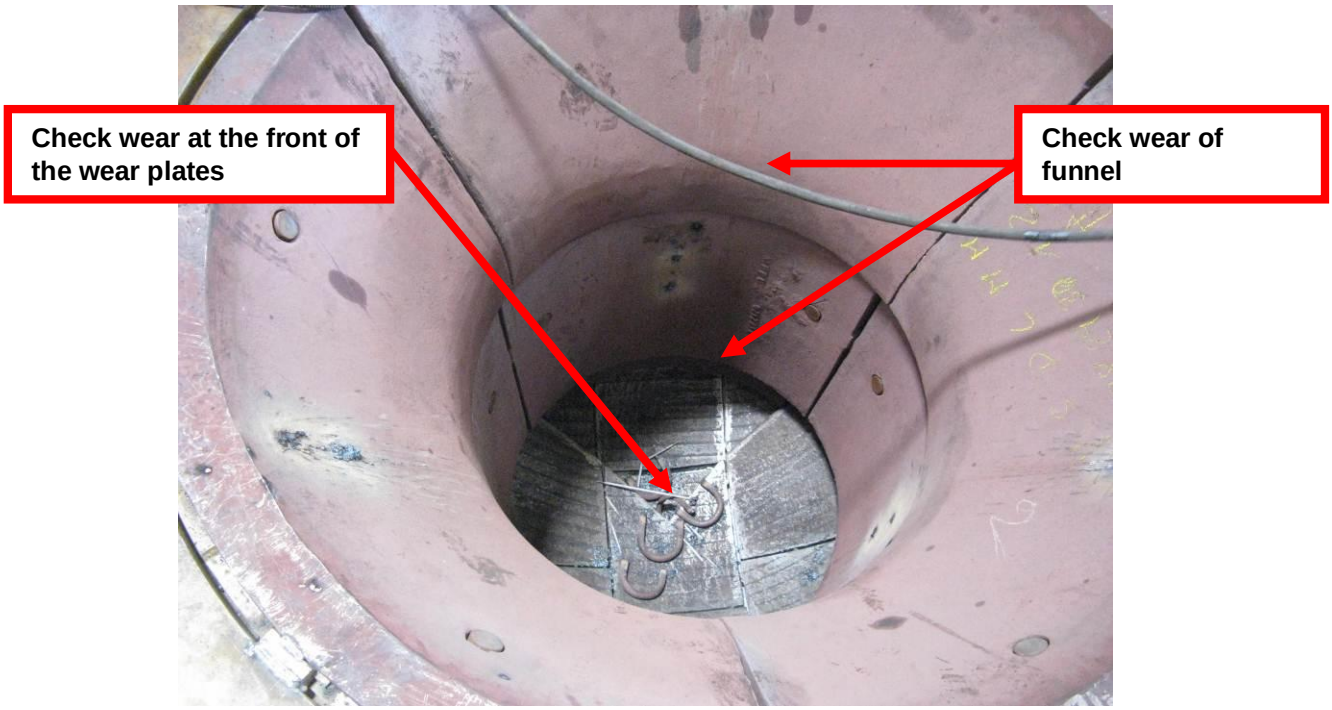



1. Check the mechanism of the drive inside the casing carefully and remove probable dust deposits.
2. Check the condition of the grease pipe installed along the carrying arm.



## 2.4 MATERIAL GATE

1. Close goggle valve.
2. Open maintenance door of material hopper.
3. Open material gate to set-point 20%.
4. Lock the hydraulic lines hydraulically.
5. Check condition of wear plates from the inside of the material hopper. Do not enter the valve casing.
6. Open material gate.
7. Lock material gate by safety pin.
8. Check if there is enough space between gate and casing.
9. If necessary, remove dust deposits.



# 3 PICTURES