**SOP FOR**

1. **PURPOSE: Safe maintenance of GCP, GDC, GAS LINE & FLARESTACK for optimum performance**
2. **SCOPE:** **Blast Furnace Accessories**
3. **RESPONSIBILITY: Engineer in charge & workmen on job**
4. **PROCEDURE: GCP, GDC, GAS LINE & FLARESTACK MAINTENANCE**
5. **REFERENCES: Operation & Maintenance manual**

PPE –s to be used:

* Safety shoes, Helmet, Hand gloves, Cotton cloth and goggle.
* Work No 1 : Silo Bags replacement – In operations scope
* Work No 2 : Silo flange opening.
* Work No 3 : Upper/Lower ash unload valve replacement.
* Work No 4 : Vane feeder replacement.
* Work No 5 : Inlet/Outlet shutoff valve replacement.
* Work No 6 : Goggle valve O-ring replacement.
* Work No 7 : Drive replacement of scrapper conveyor.
* Work No 8 : Replacement of scrapper links.
* Work No 9 : Chain drive replacement and lubrication of scrapper.
* Work No 10 : Purging valve replacement.
* Work No 11 : Drive replacement of bucket elevator.
* Work No 12 : Septum Valve replacement
* Work No 13 : Working On Flare Stack and Burner Assembly
* Work No 14 : Bucket elevator Head pulley Replacement
* Work No 15 : Bucket elevator Tail pulley Replacement
* Work No 16 : Screw conveyor Inspection/Replacement
* Work No 17 : Replacement of lower valve at GDC
* Work No 18 : GDC ball valve replacement
* Work No 19 : GDC Humidifier bearing replacement
* Work No 20 : Gas line bellow & duct replacement

Aspect – Impact

|  |  |
| --- | --- |
| Scrap generation | Resource Depletion |
| Oil Spillage | Land contamination & Resource Depletion |
| Oil traced waste generation | Land contamination & Resource Depletion |
| Fumes | Health |

[Hazards identified](file:///C:\Users\murali\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\00015236\AppData\Local\Temp\Temp5_11%20%20Work%20instruction.zip\4%20RISK%20ASSESMENT\WIMAINT40%20PUG%20MILL%20MAINTENANCE.xls)

Mechanical Hazard

1. Trapping between two objects.
2. Fall of material, equipment, hammer, tools, sling items, bolts.
3. Fall of person from platform.
4. Entanglement in moving Scrapper link.
5. Impact of moving / sling items.
6. Impact of pipe line while working near Purging valves.

Physical Hazard

1. Noise, pressure, temperature
2. Fall of dust/graphite in eyes / ear / body
3. Gas poisoning due to CO /Nitrogen

Chemical hazard

1. Fire/explosion because of CO

Electrical hazard

1. Shock during welding

Chemical hazard - Co gas poisoning & Fire

Biological hazard - Bee sting, Bird attack.

Behavioral hazard - Working without PPE’s, under influence of Alcohol, Not following SOP, Horseplay, Casual approach

Note - Before carrying out all above activities inspection for Honey Bee Hive is to be done.

**Work No 2 : Silo flange opening for cleaning**

1. Always carry CO monitor and go with another person in GCP area
2. Take work permit from BF control room. Resp – Engineer/shift mechanical engineer
3. Ensure isolation of GCP silo by visually checking closure of inlet and outlet shut off valve and goggle valve. Resp – Engineer/shift mechanical engineer
4. Ensure electrical shutdown with LOTO for shut off valve and goggle valve. Put a padlock for manual wheel of inlet and outlet shutoff as well as google valve Resp - Engineer/shift mechanical engineer.
5. Bleeder valve to be opened for purging. Resp – Production engineer
6. Nitrogen purging to be done of silo to be cleaned. Nitrogen purging to be done till CO gas is below 50 ppm. This can be checked from ball valve provided on top of the silo. Resp – Production engineer.
7. After CO level comes below 50 ppm close the nitrogen purging line. Remove hose from Nitrogen line and connect to compressed air line. Now start purging with compressed air. Compressed air is required to be purged till oxygen level in the silo is above 18 %.
8. Puffing header of the silo in which work is to be carried out has to be isolated before opening the manholes. Close the nitrogen inlet valve to the header and slowly open the header bottom valve to de pressurize.
9. After clearance from production open the manhole at bottom/top of silo by loosening the bolts. Note - In case silo 1 & 8 manhole needs to be opened then restrict the concerned staircase entry and use foldable working platform for safe working.
10. Check CO level for below 50ppm, else compressed air purging needs to be done again.
11. After complete cleaning of silo, production engineer will give clearance to close the bottom/top manhole.
12. Clean the flange and blind surfaces properly with wire brush. Fix 2 continuous rounds without joint of 16mm graphite asbestos rope in the groove provided on the flange.
13. Remove hose from compressed air purging and fix it to the nitrogen purging line.
14. Tighten the flange bolts diagonally and uniformly till the gap reduces to 7 to 8mm
15. Soap bubble Leakage test to be carried out at 0.5 kg/cm2 with Nitrogen purging. Nitrogen purging to be carried out with pressure gauge and safety valve in line. Pressure testing is to be jointly done by Mechanical and operation engineer. Excess pressure above 1.6 kg/cm2 could result in explosion of vessel. Never exceed testing pressure above 1 kg/cm2.
16. If soap bubbles appear, re-tighten the bolts
17. Clear electrical shutdown and work permit and hand over to production.

**Work No 3: Upper/Lower ash unload valve replacement**

**For Upper ash unload valve**

1. Take work permit from Production department. Put the valve in field mode.
2. For replacement of upper ash unload valve ensure silo is empty and cleaned by production department.
3. For cleaning of silo and middle ash hopper follow below mentioned work procedure:
4. Always carry CO monitor and go with another person in GCP area
5. Take work permit from BF control room. Resp – Engineer/shift mechanical engineer
6. Ensure isolation of GCP silo by visually checking closure of inlet and outlet shut off valve and goggle valve. Resp – Engineer/shift mechanical engineer
7. Ensure electrical shutdown with LOTO for shut off valve and goggle valve. Put a padlock for manual wheel of inlet and outlet shutoff as well as google valve Resp - Engineer/shift mechanical engineer.
8. Bleeder valve to be opened for purging. Resp – Production engineer
9. Nitrogen purging to be done of silo to be cleaned. Nitrogen purging to be done till CO gas is below 50 ppm. This can be checked from ball valve provided on top of the silo. Resp – Production engineer.
10. After CO level comes below 50 ppm close the nitrogen purging line. Remove hose from Nitrogen line and connect to compressed air line. Now start purging with compressed air. Compressed air is required to be purged till oxygen level in the silo is above18 %.
11. Puffing header of the silo in which work is to be carried out has to be isolated before opening the manholes. Close the nitrogen inlet valve to the header and slowly open the header bottom valve to de pressurize.
12. After clearance from production open the manhole at bottom/top of silo by loosening the bolts. Note - In case silo 1 & 8 manhole needs to be opened then restrict the concerned staircase entry and use foldable working platform for safe working.
13. Check CO level for below 50ppm, else compressed air purging needs to be done again.
14. After complete cleaning of silo, production engineer will give clearance for replacement of valve.
15. Request instrumentation to remove the solenoid coil connected to actuator
16. Close compressed air supply ball valve of the actuator and remove the PU hose connected to the ash unload valve cylinder.
17. Now dismantle the actuator from the valve and keep it on the platform. Actuator is to be dismantled manually with help of 4 manpower.
18. Remove all the bolts of upper flange and lower flange bolts one by one.
19. Now remove the valve manually and keep it on the platform. Valve is to be removed manually with help of 4 manpower.
20. Give clearance to production department for thorough cleaning of lower ash bucket.
21. After clearance from production department Replace the ash unload valve with a new/overhauled one.
22. Ensure metallic gasket between the flanges and tight all the flange bolts
23. Fix the pneumatic actuator as well as PU hose. Ensure oil level in FRL unit and cleanliness of filter element.
24. Request instrumentation to connect solenoid coil and then Open compressed air line.
25. Take trial of the valve.
26. Clean the silo flanges and blind surfaces properly with wire brush. Fix 2 continuous rounds without joint of 16mm graphite asbestos rope/Rubber Gasket in the groove provided on the flange.
27. Remove hose from compressed air purging and fix it to the nitrogen purging line.
28. Tighten the flange bolts diagonally and uniformly.
29. Soap bubble Leakage test to be carried out at 0.5 kg/cm2 with Nitrogen purging. Nitrogen purging to be carried out with pressure gauge and safety valve in line. Pressure testing is to be jointly done by Mechanical and operation engineer. Excess pressure above 1.6 kg/cm2 could result in explosion of vessel. Never exceed testing pressure above 1 kg/cm2.
30. Ensure no leakage/passing through the upper ash unload valve. (By opening bleed/vent valve of lower ash bucket)
31. Inform Control room in charge to change over the system to Auto mode.
32. Clear the work permit & clear electrical shutdown give clearance.

**For lower ash unload valve**: -

1. Obtain work permit from Production department.
2. Take electrical shutdown of vane feeder of respective silo. Request electrical engineer to disconnect cables and remove vane feeder manually with help of 4 manpower.
3. Request instrumentation to remove the solenoid coil connected to actuator
4. Close compressed air supply ball valve of the actuator and remove the PU hose connected to the ash unload valve cylinder.
5. Now dismantle the actuator from the valve and keep it on the platform. Actuator is to be dismantled manually with help of 4 manpower.
6. Open bleed valve of lower ash bucket and depressurize.
7. Remove all the bolts of upper flange and lower flange bolts.
8. Now remove the valve manually and keep it on the portable platform. Valve is to be removed manually with help of 4 manpower and gradually lower the valve from portable platform to the ground with help of nylon rope and pulley.
9. Give clearance to production department for thorough cleaning of lower ash bucket.
10. After clearance from production department Replace the ash unload valve with a new/overhauled one.
11. Ensure metallic gasket between the flanges and tighten all the flange bolts
12. Fix the pneumatic actuator as well as PU hose. Ensure oil level in FRL unit and cleanliness of filter element.
13. Request instrumentation to connect solenoid coil and then Open compressed air line.
14. Take trial of the valve.
15. Clear electrical shutdown and work permit and hand over to production.

**Work No 4: Vane feeder replacement.**

1. Take clearance from control room in charge by taking work permit.
2. Silo to be taken offline before carrying out the activity.
3. Ensure that control room in charge has changed over the system into field mode & respective vane feeder is taken out from the loop.
4. Take electrical shut down of vane feeder by putting off isolators and locking with padlock LOTO. Also request to disconnect the electrical connection of vane feeder.
5. Request instrumentation to remove the solenoid coil from lower ash unload valve.
6. Close the inlet ball valve of compressed air of this particular silo, disconnect the PU hoses to ensure zero energy & LOTO to be done.
7. Remove the mounting bolts of vane feeder & lower the assembly manually on the ground.
8. Refer WI/MAINT/12 for material handling.
9. Replace vane feeder with new/overhauled one, fully tighten the bolts.
10. Request instrumentation to connect solenoid coil of lower ash unload valve.
11. Connect the PU hose and open inlet air supply valve.
12. Clear electrical shut down and take trial in manual mode along with electrical & operation dept.
13. Clear work permit and change system back to Auto mode.

**Work No 5: Inlet/Outlet shutoff valve replacement.**

**For Inlet shut off valve:**

1. Inlet shut off valve can be changed only during furnace shutdown.
2. Take clearance from control room in charge by taking work permit.
3. Take electrical shut down of inlet and outlet shut off valve as well as inlet & outlet goggle valve in close position by putting off isolators and locking with padlock LOTO and also ask them to disconnect cables of inlet shut off valve.
4. Isolate rest of the silo by closing inlet shut off valve and keep all inlet shut off valve in field mode.
5. Open bleed valve off valve of respective silo and start nitrogen purging followed by air purging.
6. Open both bleeder valve of inlet header and start nitrogen purging to displace CO.
7. Start air purging till oxygen is above 20%
8. Now secure the valve with a 2 Ton chain block and start removing bolts.
9. Replace the damaged valve with a new/overhauled one and ensure tightness of all the bolts.
10. Clear electrical shut down and take trial in field mode in presence of production engineer.
11. Clear electrical shut down of inlet goggle valve and outlet shut off valve.
12. Change rest of silos into auto mode.
13. Clear work permit and hand over system for operation.

**For Outlet shut off valve:**

1. Outlet shut off valve can be changed only during furnace shutdown
2. Take clearance from control room in charge by taking work permit.
3. Take electrical shut down of inlet and outlet shut off valve, inlet & outlet goggle valve in close position & relief valve open position by putting off isolators and locking with padlock LOTO and also ask them to disconnect cables of outlet shut off valve
4. Isolate rest of the silo by closing outlet shut off valve and keep all outlet shut off valve in field mode.
5. Open bleed valve of respective silo and start nitrogen purging followed by air purging.
6. Close septum valve and Open both bleeder valve of outlet header and start nitrogen purging to displace CO.
7. Start air purging till oxygen is above 20%.
8. Now secure the valve with a 2 Ton chain block and start removing bolts.
9. Replace the damaged valve with a new/overhauled one and ensure tightness of all the bolts.
10. Clear electrical shut down and take trial in field mode in presence of production engineer.
11. Clear electrical shut down of outlet goggle valve and inlet shut off valve.
12. Change rest of silos into auto mode.
13. Clear work permit and hand over system for operation.

**Work No 6: Goggle valve O-ring replacement.**

**For Open position:**

1. Take clearance from control room in charge by taking work permit.
2. Ensure that control room in charge has changed over the system into field mode & respective goggle valve and shut off valve is taken out form the loop.
3. Take electrical shut down of respective goggle valve (close position) by putting off isolators and locking with padlock LOTO.
4. Monitor CO with help of portable CO monitor.CO should be below 50 ppm for working in that area.
5. Remove the damaged O-ring and replace it with a new one. Ensure that the edges of O-ring are cut tapered.
6. Clear electrical shutdown of goggle valve as well as shut off valve.
7. Clear work permit and change system back to Auto mode.

**For Close position:**

1. Take clearance from control room in charge by taking work permit.
2. Ensure that control room in charge has changed over the system into field mode & respective goggle valve and shut off valve is taken out form the loop.
3. Take electrical shut down of respective goggle valve (Open position) and by putting off isolators and locking with padlock LOTO.
4. Monitor CO with help of portable CO monitor.CO should be below 50 ppm for working in that area.
5. Remove the damaged O-ring and replace it with a new one. Ensure that the edges of O-ring are cut tapered.
6. Clear electrical shutdown of goggle valve as well as shut off valve.
7. Clear work permit and change system back to Auto mode.

**Note: - If Both Open and Close O-rings are damaged or if the clamp is not holding properly or CO leakage from goggle valve then silo is to be isolated. Take electrical shutdown of inlet and outlet shut off valve (close position) as well as inlet & outlet goggle valve. Open bleed valve of silo and start nitrogen purging. Monitor CO level of silo from ball valve provided at top. Work can be started only if CO is below 50ppm**

**Work No 7: Drive replacement of scrapper conveyor.**

1. Take clearance from control room in charge by taking work permit.
2. Ensure that control room in charge has changed over the system into field mode.
3. Take electrical shut down by putting off isolators and locking with padlock LOTO
4. Remove Chain cover and remove the chain.
5. Remove foundation bolts, replace faulty drive with a new/overhauled one.
6. Fix chain and ensure proper tightness.
7. Ensure tightening all foundation bolts, put back chain cover and ensure all bolts are fully tightened
8. Clear electrical shut down and take trial.
9. Inform production engineer about completion of work and clear work permit.

**Work No 8: Replacement of scrapper links.**

1. Take clearance from production department (Work Permit) from the shift Superintendent / in charge.
2. Take electrical shut down by putting off isolators and locking with padlock LOTO.
3. When system is in AUTO, interlock is there that when scrapper conveyor is taken shut down, none of the upper & lower dust valves will operate.
4. Close the inlet valve of main airline to upper & lower dust valves of all the silos & LOTO to be done (as upper & lower dust valve are positive isolation). Ensure zero energy before start of the work.
5. Remove top cover of scrapper.
6. Identify the link to be replaced. Remove link by taking out connecting pin.
7. Replace it with new one.
8. Ensure proper fixing of split pin.
9. Fix back top cover and ensure tightening of all bolts.
10. Clear electrical shut down and take trial.
11. Inform production engineer about completion of work and clear work permit.

**Work No 9: Chain drive replacement and lubrication of scrapper.**

Take clearance from control room in charge by taking work permit.

1. Ensure that control room in charge has changed over the system into field mode.
2. Take electrical shut down by putting off isolators and locking with padlock LOTO.
3. Remove the chain drive guard & keep it aside
4. Loosen the chain tensioning bolt.
5. Remove the old chain after disconnecting the master link & replace it with new one.
6. Ensure proper lubrication and greasing is done.
7. Tighten the chain tensioning bolt by visually checking the tension on chain.
8. Put back chain drive guard.
9. Clear electrical shut down and take trial along with electrical & operation dept.

**Work No 10: ~~Purging~~ Puffing valve replacement**.

1. Take clearance from control room in charge by taking work permit.
2. Ensure that control room in charge has changed over the system into field mode.
3. Request instrumentation to remove solenoid coil of damaged purging valve.
4. Close corresponding header by closing inlet isolation valve.
5. Slowly open the drain valve of same header to de pressurize the system.
6. Close outlet valve of the line for which ~~purging~~ puffing valve is to be replaced.
7. Remove faulty ~~purging~~ puffing valve and replace it with a new/overhauled one.
8. Ensure tightening of all the bolts.
9. Request Instrumentation to connect the solenoid coil.
10. Close the drain valve of header & Open main isolation valve of header as well as outlet valve of the line.
11. Manually purge the valve and check proper functioning of ~~purging~~ puffing valve.
12. Inform Control room in charge to change over the system to Auto mode.
13. Clear the work permit & give clearance.

**Work No 11: Drive replacement of bucket elevator.**

1. Take clearance from control room in charge by taking work permit.
2. Ensure that control room in charge has changed over the system into field mode.
3. Take electrical shut down by putting off isolators and locking with LOTO padlock.
4. Follow WI/SP-44G for working at height.
5. ~~Remove drive belt cover.~~ Remove the drive chain cover.
6. ~~Loosen the tension on V belt, by loosening the jacking bolt~~.
7. Remove ~~the V belt~~ the drive chain.
8. Replace the old gear box –motor unit with new/ overhauled one,
9. ~~Put V-belts~~ Put drive chain and adjust the tightness by adjusting the jack bolt.
10. Fix back safety cover and ensure tightness of all bolts
11. Clear electrical shut down and take trial.
12. Inform production engineer about completion of work and clear work permit.

**Work No 12: Septum valve replacement**

1. Furnace shutdown to be ensured before starting of this job.

2. All Silos of GCP are to be Isolated. Keeping all Outlet Goggle valves closed & relief valve in open.

3. Gas line to be purged with N2 keeping all flare stack valve in 100% open condition & clean gas header in open condition for 30-45Min.

4. After gas line is purged, gas line to be water sealed in front of blower (PCM U SEAL) keeping relief valve in open condition. LOTO to be done for drain & overflow line valves after operation gives clearance once water sealing is done.

5. Disconnect the actuator connections, keeping the valve in closed position. Call electrical & instrumentation engineer for dismantling of cable connections.

6. Obtain work permit form BF control room, saying “replacement of septum valve” which includes “gas cutting & welding” (respective valve nomenclature to be described). Area barricading has to be done.

7. Obtain clearance from operation in-charge for opening of septum valve manhole.

8. Loosen or remove the alternate fasteners from the flanges of respective valve.

9. Sling the valve with proper slinging arrangement engaged to 25T/30T locomotive telescopic crane.

10. Gas cut the one end flange (towards GCP) with piping 200 mm apart maintaining a gap of 10 mm with proper match marking. (Ensure CO PPM =0 before gas cutting and continuous nitrogen purging.

11. Remove all the fasteners of the Valve flange at the flare stack side, then lift the valve and flange piping cut piece using crane (dismantle and lower it safely) over the ground.

12. Ensure the inner periphery & disc of the valve is coated with anti-wear coating. Thoroughly clean both the flanges of the ducting and the new septum valve.

13 Dismantle the flange piping cut piece from the dismantled valve and thoroughly clean. Fasten it thoroughly with the new valve. (Proper gasket is to be inserted between flanges).

14. Sling the New valve with proper slinging arrangement engaged to 25/30 MT locomotive telescopic crane. Lift and place the valve in position between the duct flanges (gasket to be inserted between the valve and uncut duct flange).

15. Place the fasteners towards uncut side (flare stack) duct flange and tighten them thoroughly.

16. After proper alignment, weld the piping using external metallic strip.

17. Call E & I engineers for connecting of disconnected cables. Clear the electrical shutdown on temporary basis for trial of newly fitted valve. Take trials in local mode and PLC mode.

18. Clear the electrical shutdown and work permit after satisfactory trials and handover the equipment to operation dept.

**Work No 13: Working on Flare Stack and Burner Assembly**

**Activity 1: working on burner assembly**

1. Furnace shut down is required for working on flare stack top platform.
2. Inform production about the job being carried out on flare stack.
3. Isolate gas line from flare stack by operating goggle valve and shut off valve.
4. Take Electrical shutdown of Goggle valve and shut off valve in closed position.
5. Take shutdown of panel by switching off supply and removing incoming supply fuse (i.e., 11KV burner shutdown). Ensure that switch or MCB is Off and glass fuses are opened physically.
6. Take work permit from production for working on flare stack.
7. ~~Dummy flange ahead of goggle valve in flare stack line should be opened. (This will purge the line by air i.e. through natural draft.)~~
8. Ensure flare stack is purged ~~through air~~ and check if CO gas levels are within safe limits on working/burner platform
9. IF CO gas levels are not met do not carry out the job till safe levels are reached.
10. Follow Work Instruction for working at Heights (WI/BF3/SP-44G)
11. Follow Work Instruction for safe welding practice (WI/BF3/SP-44E)
12. After the job is over ensure housekeeping is done of the working are and all workmen are brought down safely.
13. Take trial of the goggle and shut off valve along with operation in charge
14. Close the dummy flange ahead of goggle valve in flare stack line.
15. Clear all the Electrical shutdowns.
16. Clear the work permit.

**Activity 2: Flare stack valve replacement**

**PROCEDURE** -

1. Furnace shut down is required for working on flare stack & gas line.
2. Take work permit from production for working on flare stack.
3. Ensure gas line valve to NPP is close & water seal is done. LOTO to be done for drain & overflow line valves after operation gives clearance once water sealing is done.
4. Dummy flange ahead of goggle valve in flare stack line should be opened. (This will purge the line by air i.e. through natural draft.)
5. Take electrical shut down of valve to be removed.
6. Ones the co level is zero remove the flange bolts of valve & remove the valve with the help of 25T crane using proper slings.
7. Install the new valve with 25T/30T crane & tightened the bolts (Ensure both side gaskets are properly placed).
8. Follow Work Instruction for working at Heights (WI/BF3/SP-44G)
9. After the job is over ensure housekeeping is done of the working are and all workmen are brought down safely.
10. Close the dummy flange ahead of goggle valve in flare stack line.
11. Clear all the Electrical shutdowns.
12. Clear the work permit.
13. Take trial of the valves.

**Work No. 14: Bucket elevator Head pulley Replacement.**

1. Take written clearance from production department in the form of work permit.
2. Confirm for the electrical isolation of the bucket elevator /scrapper conveyor by taking electrical shutdown.
3. Empty the buckets.
4. Remove head pulley top cover.
5. Decouple drive unit completely.
6. Loose tensioning arrangement.
7. Clamp the belt with chain block.
8. Pull the belt with chain block.
9. Clamp two chain blocks to the shaft of head pulley.
10. Loose Plummer block bolts.
11. Remove the pulley with Plummer block.
12. Place new head pulley with Plummer block.
13. Remove all chain blocks and tight the belt with tensioning arrangement.
14. Fix the top cover.
15. Couple with drive unit.
16. Clear electrical shut down and take no load trail.
17. If found satisfactory, surrender work permit and hand over the equipment for operation.

**Work No. 15: Bucket elevator Tail pulley Replacement.**

1. Take written clearance from production department in the form of work permit.
2. Confirm for the electrical isolation of the bucket elevator/scraper conveyor by taking electrical shutdown.
3. Empty the buckets.
4. Remove tail pulley bottom door at both sides.
5. Loose the take-up arrangement (tensioning arrangement).
6. Remove guide bar.
7. Remove holding arrangement.
8. Remove tail pulley with chain block.
9. Place new pulley with complete assembly.
10. Remove the chain block and close the door.
11. Clear electrical shut down and take no load trail.
12. If found satisfactory, surrender work permit and hand over the equipment for operation.

**Work No. 16: Screw conveyor Inspection/Replacement.**

1. Take written clearance from production department in the form of work permit.
2. Take electrical shut down of screw conveyor by putting off isolators and locking with padlock LOTO.
3. Open the inspection doors of both side of screw conveyor & through cleaning to be done (resp: operation).
4. Inspect for blade conditions & replaced the damage ones
5. For replacement of assembly close the manual gate valve above screw conveyor & isolate mechanically.
6. Remove the distance piece above screw conveyor.
7. Disconnect & remove water & steam pipe line of screw conveyor.
8. Decoupled the GB & remove the same.
9. Remove the screw conveyor with the help of 12T hydra & chain pulley block by removing frame mounting bolts.
10. Install the new screw conveyor by following step no 9 to 6 reverse procedure.
11. Clear the shutdown & take trials
12. Clear the work permit & handover the equipment to operation.

**Work No 17**: **Replacement of ball valve at GDC**

1. This job can be carried out only in shutdown.
2. Ensure that GDC to be made empty and purged before taking up the job.
3. Upper dust ball valve to be kept close & Take the Electrical shut down of ball valve.
4. Ensure that CO level in GDC is zero.
5. Take the work permit from operation department.
6. Inform electrical department to disconnect the electrical connections.
7. Gas cut & remove the fasteners connecting to the valve.
8. Remove the bottom side distance piece for easy removal of valve.
9. Replace the valve by using the 2tn chain blocks from both sides.
10. Again, insert the distance piece and tighten the all-fastener bolts.
11. Inform electrical department to connect the electrical connections.
12. Clear the shutdown, take trial.
13. Clear the work permit and handover the equipment to production department.

**Work No 18**: **Replacement of Lower dust valve at GDC**

1. This job can be carried out only in shutdown.
2. Ensure that GDC to be made empty and purged before taking up the job.
3. Take the Electrical shut down ball valve.
4. Ensure that CO level in GDC is zero.
5. Take the work permit from operation department.
6. Inform Instrumentation to disconnect the electrical connections.
7. Remove the fasteners connecting to the valve.
8. Replace the valve by lifting it carefully.
9. Again, insert the distance piece and tighten the all-fastener bolts.
10. Inform electrical department to connect the electrical connections.
11. Clear the shutdown, take trial.
12. Clear the work permit and handover the equipment to production department.

**Work No 19: GDC Humidifier bearing replacement**

1. Take clearance from production by taking work permit.
2. Take electrical shut down of humidifier by putting off isolators and locking with padlock LOTO.
3. Remove coupling guard.
4. De couple the motor by removing V belts.
5. Remove drive pulley & keep aside.
6. Put sling on shaft on both sides of the drum.
7. Remove Plummer block foundation bolts.
8. Lift the drum to make Plummer block free.
9. Remove Plummer block along with bearing.
10. Replace bearings /Plummer blocks.
11. Fill grease in Plummer block & bearings, close bearing covers
12. Fix the Plummer blocks foundation bolts.
13. Tighten the foundation bolts of Plummer blocks.
14. Fix drive pulley and V belts, align it with driven pulley.
15. Tighten the foundation bolts of Motor.
16. Fix the coupling guards
17. Follow housekeeping procedure as per instruction specified by WI/MAINT/91.
18. Clear the S/d.
19. Take trial, hand over to operation.

**Work No 20:** **Gas line bellow & duct replacement**

1. Furnace shut down is required for working on gas line
2. Take work permit from production for working on gas line
3. Ensure that gas line valve to NPP is close & water seal is done if work is to be carried out after PCM U-SEAL If any work on gas line is to be done before PCM U-SEAL, then water sealing of PCM – U-SEAL to be done. For both the cases, LOTO to be done for drain & overflow line valves after operation gives clearance once water sealing is done.
4. Ensure the gas line is purged & co level is zero PPM.
5. Ones the co level is zero Gas cut the gas line duct on either side of bellow and slowly lift the bellow with the help of 25T/30T crane & safely get it down.
6. Keep the removed bellow aside at safe position & barricade
7. Install the new bellow with 25T/30T crane & weld it. (while installing ensure the flow direction of bellow)
8. Follow Work Instruction for working at Heights (WI/BF3/SP-44G)
9. Follow Work Instruction for safe welding practice (WI/BF3/SP-44E)
10. After the job is over ensure housekeeping is done of the working area and all workmen are brought down safely.
11. Clear the work permit.

**Work No 21: Bucket elevator links & bucket replacement (Full Set)**

1. Take clearance from control room in charge by taking work permit.
2. Ensure that control room in charge has changed over the system into field mode.
3. Take electrical shut down by putting off isolators and locking with LOTO padlock.
4. Open the both bottom manholes & disconnect the bucket & links.
5. Open the top hood cover & keep it at a safe place.
6. Remove the links with bucket with the help of min 25T crane.
7. Install one side link with bucket & lock it with 5T wire rope sling, install the other side & joint both the links.
8. Joint the remaining links from the bottom manhole.
9. Once links are joint fix the remaining buckets.
10. Fix the top hood cover
11. Temporary release the Elec shut down & take trials by keeping the bottom inspection manhole in open condition if found satisfactory take shut down & close the bottom manholes.
12. Follow housekeeping procedure as per instruction specified by WI/MAINT/91.
13. Clear the S/d & work permit

* **Carry out housekeeping as per procedure** [**WI/MAINT/91**](file:///C:\Users\murali\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\Content.Outlook\AppData\Roaming\Microsoft\Word\WIMAINT91%20HOUSE%20KEEPING.doc)**.**

**DO**

* Use tested chain blocks & slings only.
* Cordon the total workable area.
* Return back all scrap to store.
* Avoid oil spillage while lubricating the machine. Use oil tray while carrying out lubrication activity
* Use completely sealed goggles while working near dust/graphite.
* Follow work instruction [WI/MAINT/12](file:///C:\Users\murali\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\Content.Outlook\AppData\Roaming\Microsoft\Word\WIMAINT12%20MATERIAL%20HANDLING%20.doc) for material handling.
* Carry Co monitor when working in gas prone area

**DO NOT**

* Keep Cutting set hoses haphazardly on walkway.
* Do not smoke, or use gas cutting torch and welding inside the bag house. This can cause fire hazard in the bag house.
* Start the activity of bags replacement incase Oxygen % is less than 75%.

**Amendement Record**

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| --- | --- | --- | --- |
| **Date** | **Manual Section Ref. & Para** | **Brief details of Revision** | **New Rev.** |
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