

## ANNEXURE 4



# **ODISHA POWER GENERATION CORPORATION LTD IB THERMAL POWER PLANT 2 X 660 MW, Unit 3 & 4**

## **AMC SCOPE OF WORK (Part – B) BOILER & AUXILIARIES**

## **(A) BOILER PRESSURE PARTS, BURNERS, VALVES, OIL SYSTEM, SOOT BLOWER:**

### **1. PM OF WALL BLOWER (MONTHLY CHECKS)**

1. Ensure PTW.
2. Remove the dust & clean the wall blower completely free from ash accumulation, old grease. (Air & manually by waste cotton)
3. Inspect for puppet valve steam leakages from flanges, glands, passing of puppet valves, relief valves, swivel tubes and attend if any.
4. Check the oil level in rotary & rack gear box. Top-up / replace if required. Attend oil leakages if any.
5. Check all the linkages, moving parts to be free from any abnormalities. Attend defect if any.
6. Carryout the manual operation of wall blower for checking the freeness of blower.
7. Take the successful trial run and rectify defects if any.
8. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
9. Any material required to be issued/returned from the main stores is under this scope.

### **2. PM OF WALL BLOWER (6 MONTHLY CHECKS)**

**Note – All activities in Item No. 1 are covered. In addition to that, following activities are to be carried out:**

1. Wall blowers' perpendicularity should be checked with respect to the Boiler wall by placing spirit level on the rack of the swivel tube. Adjust it if necessary.
2. Tightness of all the fasteners should be ensured.

### **3. PM OF LRSBS (MONTHLY CHECKS)**

1. Ensure PTW.
2. Check for steam leakage in the travelling carriage gland packing & puppet valve. In case of excessive leakage, complete gland packing to be replaced.
3. Check for passing of puppet valve.
4. Check the presence of "stop pin" on the cam bracket.
5. Check the angle tracks and chain.
6. Complete cleaning of equipment to be ensured. All ash deposition should be cleaned.
7. Check the oil level in gear box. Top – up if necessary. Report if any oil leakages.
8. Take the successful trial run and rectify defects if any.
9. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
10. Any material required to be issued/returned from the main stores is under this scope.

### **4. PM OF LRSBS (6 MONTHLY CHECKS)**

**Note – All activities in Item No. 3 are covered. In addition to that, following activities are to be carried out:**

1. Check & adjust the chain tension of rotary drive and traversing drive chain.
2. Check and adjust the chain tension of jack shaft drive chain.
3. Lubricate the chains if found rusted. Replace the chains if found heavily rusted, corroded or worn out.
4. All the linkages and actuating arms should be checked for any abnormality, rectify/ lubricate wherever necessary.
5. Tighten the steam flange gasket, replace gasket if leakage observed.

## **5. PM OF LRSBS (12 MONTHLY CHECKS)**

**Note – All activities in Item No. 4 are covered. In addition to that, following activities are to be carried out:**

1. Check the gear box gaskets, tighten the cap screws on covers, and if leakage is excessive replace the gasket.
2. Gear box oil leakages should be checked, refer the previous data of any existing oil leakages, same to be attended.
3. Check the complete assembly, tighten the lose bolts, nuts and cap screws. Replace the missing cotter pins and springs.
4. Coat the threaded component with ant seize compound.
5. Check the mountings and hanger supports of the blowers.
6. Check the valve stem for any signs of pitting, wear. Replace if necessary.
7. Replace the steam flange gasket as per instructions of EIC.

## **6. SERVICING OF WALL BLOWERS/ LRSB**

1. Ensure PTW.
2. Lower the soot blower without disturbing the alignment. Disconnect the poppet valve from flange and dummy the steam line if unit under operation.
3. Dismantle the traverse gearbox, rotary gearbox, rack & pinion, swivel tube etc. Check the straightness of swivel tube.
4. Clean all the parts, replace the damaged/worn out parts as per the instruction of EIC. Parts include all the linkages, cams, stem, feed tube, swivel tube, rack, pinion, flange, stuffing box, chain, sprockets, rollers, pins.
5. Check all the gasket mating surfaces, repair if required. Replace the old gaskets/old oil seals.
6. Poppet valve servicing, lapping & blue matching to be done. Same to be assembled after clearance from EIC.
7. All moving cams, links should be lubricated with rust preventive lubricants.
8. Assemble the soot blower.
9. Lubricate and adjust the chain(if available)
10. Replace the stuffing box packing.
11. Check the coupling between the motor and the gearbox, replace if required.
12. Fill the gearboxes with fresh oil.
13. Mount the soot blower in position and align the swivel tube w.r.t water wall tubes.
14. Adjust the rotary and traverse cams.
15. Check freeness of soot blower during forward and retract motion.
16. Re-fix the external dust guard.
17. Pressure setting of the wall blower after wall blower in service.
18. Take the successful trial run and rectify defects if any.
19. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
20. Any material required to be issued/returned from the main stores is under this scope.

**Note –**

1. **All the above activities are inclusive of both Wall blower and LRSB type. However, actual maintenance is subjected to the activities applicable for each type.**
2. **One wall blower/LRSB servicing will be considered as 1 BOQ.**
3. **Gear oil, gland packing rings, gaskets and spares shall be provided by ITPS free of cost.**

4. **If only replacement of soot blower/only servicing of wall blower at offsite is done, then the rate will be 50% of this BOQ rate.**

#### **7. SERVICING OF SOOT BLOWER GEARBOX**

1. Ensure PTW.
2. Remove the gearbox from Soot blower assembly. Ensure necessary blanking of soot blower connections as per EIC when unit under operation.
3. Dismantle the gearbox.
4. Clean all the parts of the gearbox.
5. Replace oil seal, gasket bearing or spares if required as per EIC.
6. Assemble the gearbox and check the movement of the soot blower for freeness.
7. Take the successful trial run and rectify defects if any.
8. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
9. Any material required to be issued/returned from the main stores is under this scope.

##### **Note –**

1. **If any in-situ repairing of parts required, to be performed by contractor. While workshop assistance can be availed for the same.**
2. **1 wall blower gear box servicing will be considered as 0.5 BOQ, 1 LRSB gearbox will be calculated as 1 BOQ.**
3. **If only replacement of soot blower gearbox is done, then the rate will be 60% of this BOQ rate.**

#### **8. SERVICING OF POPPET VALVE/AIR SCAVENGING VALVE**

1. Ensure PTW.
2. Dismantle the valve from the soot blowers.
3. Lapping of the valve disc, seat and blue match getting clearance from EIC.
4. Replace gland packing after lapping.
5. Check the poppet valve with hydro test in presence of EIC. (Hydro test kit to be arranged by OPGC).
6. Re-fix of the valve with new flange gasket / any other sealing elements.
7. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
8. Any material required to be issued/returned from the main stores is under this scope.

##### **Note –**

1. **Lapping compound and gland packing will be provided by OPGC free of cost.**
2. **If any in-situ repairing of parts required, to be performed by contractor. While workshop assistance can be availed for the same.**
3. **BOQ for air scavenging valve will be 50% of the BOQ.**

#### **9. REPLACEMENT OF LANCE TUBE/FEED TUBE**

1. Ensure PTW.
2. The scope includes shifting of lance tube from Main store to the site and from site to the required elevation at Boiler where replacement is planned. Lifting of lance/feed tube is to be done by winch machine.
3. Length of the lance/feed tube will be 10.6mtr approx.
4. All the arrangements should be done for the replacement and re-fitting of the lance/feed tube from LRSB/Wall blower equipment after clearance from EIC upon ensuring PTW.

5. If after inspection found, same lance/feed tube can be installed with in-situ repair works. Same has to be carried out and re – installed.
6. All the sealing elements and any parts if required as per EIC has to be replaced.
7. The damaged/replaced Lance tube/feed tube has to be taken down from the boiler by winch and shifted to the scrap yard/workshop as directed by EIC.
8. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

**Note –**

1. **Rate for Wall blower screw tube will be 10 % of the value. Includes any repair work thereof.**

## **10. SOOT BLOWER ASSISTANCE FOR OPERATION**

1. Ensure PTW.
2. Deployment of Rigger/Fitter/Helper for assistance in operation of LRSB/Wall blowers.
3. Scope of work includes presence of manpower with Operation during Soot blowing.
4. Check oil level, oil top – up, chain tightness before soot blowing.
5. Manually retract the soot blower by handle/ chain block if required when inoperable by motor.
6. Necessary tools & tackles should be present with the group to avoid any delay in retracting the soot blower.
7. Tightening of gland/flange bolts if required in case of any leakages.
8. Rate payable will be for assistance per shift of 8 hours.

## **11. PRESSURE SETTING OF SOOT BLOWER POPPET VALVE**

1. Ensure PTW.
2. Group should carry pressure gauge, tools & tackles for dummy plug removal & then again re-fitting.
3. Ensure no leakage after pressure setting, attend defects if any.
4. Record and maintain all the set pressures in each soot blowers.

## **12. MANUAL RETRACTING OF STUCKUP LRSB**

1. Contractor has to remove /retract the stucked up LRSB lance assy., with/without chain block.
2. If required to cut the lance tube for removal as per EIC instructions, same has to be done.
3. All tools & tackles mobilizations to be done as per requirements for removal/retracting with minimum amount of time.
4. **If LRSB lance tube has to be removed manually without use of chain block and cutting, 0.5 BOQ will be paid.**
5. General housekeeping and scrap cleaning at job site has to be ensured by the contractor after the job.

## **13. PM OF OIL GUN**

1. Ensure PTW.
2. Check the isolation of oil & steam.
3. Removal of oil guns removable part from position.
4. Check & cleaning the spray plate & back plate.
5. Check the direction of back plate & spray plate.
6. Clean the oil gun by the steam.
7. Lap the spray plate if required and fix the cap nut & spray plate after proper cleaning by diesel & needle shaped wire and also check the hole dimension with GO NO GO gauge.

8. Check the condition of flexible hoses. **If found damaged, replacement to be done. While payment for replacement will be done as per separate price schedule.**
9. Re-fixing of oil guns with new gasket/nipple if required.
10. Attending of oil & steam leakages, such as oil gun hose leak, oil gun chokings, flange leaks etc.
11. Cleaning of each burner corner station.
12. Assistance during trial taking of oil gun. Attend defects if any. **If valve passing/solenoid valve passing observed, separate payment as per schedule will be done.**
13. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
14. Any material required to be issued/returned from the main stores is under this scope.

#### **14. OIL GUN CLEANING**

1. Ensure PTW.
2. Check the isolation of oil & steam.
3. Removal of oil guns removable part from position.
4. Check & cleaning the spray plate & back plate.
5. Check the direction of back plate & spray plate.
6. Clean the oil gun by the steam.
7. Re-fixing of oil guns with new gasket/nipple if required.
8. Assistance during trial taking of oil gun. Attend defects if any.
9. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
10. Any material required to be issued/returned from the main stores is under this scope.

**Note – This oil gun cleaning excludes the oil gun cleaning during regular PM activity.**

#### **15. ATTENDING MINOR OIL GUN DEFECTS/UNION LEAKAGE**

1. Ensure PTW.
2. This schedule includes all the minor defects related to the oil gun system during normal operation defects observed by Operation/EIC.
3. Defects may include oil/steam/air leakages from flanges/glands/unions/hoses. Attending of defects as per EIC instructions. Contractor should ensure no leakages for at least one month of operation. If leakage again comes during that period, contractor has to attend the same free of cost.
4. May include jamming/choking issues. Cleaning of oil spillage areas.
5. Also, after attending defects assistance for successful trial with Operation dept.
6. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
7. Any material required to be issued/returned from the main stores is under this scope.
8. 1 BOQ will be calculated for each defect attending.

#### **16. LDO HFO STRAINER CLEANING/REPLACEMENT**

**The scope of work includes HFO strainer at Boiler floor, FOPH area strainers.**

1. Ensure PTW.
2. Ensure closing of upstream & downstream valves of strainer.
3. Venting of strainers/filters to be done.
4. Opening of top cover & removal of basket strainers/filters element.
5. Cleaning of filter/strainer element with diesel and then air.
6. Check the strainer mesh condition. Replace if required as per instructions of EIC.
7. Clean the filter housing.

8. Check the gasket seating surface and replace the old gasket. Cut the gasket to required size if readymade not available. Box up the strainer/filter with correct tightening of the cover bolts.
9. Open the upstream & downstream valves and check any leakages.
10. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
11. Any material required to be issued/returned from the main stores is under this scope.

#### **17. REPLACEMENT OF OIL/AIR/STEAM FLEXIBLE HOSES**

1. Ensure PTW.
2. Shifting of all tools & tackles required for the replacement of damaged hose i.e., welding & cutting accessories, chain block if needed, gas cylinders etc.
3. Remove the damaged hose assembly from the oil gun/scanner/gun cooling.
4. Cut the damaged hose & new hose to be fitted (welding/threaded joint).
5. Assemble the set.
6. Clean the compartment and place the new scanner/oil gun hose assembly with all the mountings fitted properly.
7. New hose fitting may involve GTAW welding. Certified 6G welder should perform this job.
8. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
9. Any material required to be issued/returned from the main stores is under this scope.

#### **18. ATTENDING BOILER TUBE LEAKAGE**

1. Ensure PTW.
2. Shifting of all T&P's, cutting & welding accessories etc. to the work site as per requirement.
3. Opening of manholes, peepholes & assistance in detection of tube leakage, manholes/peepholes can be opened and closed any number of times for inspection, attending defects before synchronization. Gaskets/sealing rope of manholes has to be replaced as per instruction of EIC.
4. Installed the exhaust fan at the penthouse in sufficient quantity to reduce the working temperature after clearance from the EIC.
5. Internal water washing of boiler to remove the ash/slugs deposited over the tubes/coils/panels/gooseneck area in both 1<sup>st</sup> & 2<sup>nd</sup> pass wherever required for inspection & carrying out of repair work.
6. Chipping of refractory as required for attending BTL. Pouring of new refractory in chipped area and other locations such as manhole doors, scaffolding doors etc. as per EIC. **(Refractory pouring other than BTL job area will be paid in separate schedule for application of refractory)**
7. Shifting of boiler tubes, bends, electrodes, fillers, etc. required for attending the BTL.
8. Assistance in boiler tube leakage area inspection, thickness survey/hardness testing/radiography, borrosocopy, PWHT etc. Separate payment will be done for the Radiography & PWHT as per its schedule. Assistance includes shifting & providing necessary resources for carrying out the NDE services. While thickness survey/DPT/hardness measurement are included under this scope. No separate payment for the same.
9. Coil spacing in second pass, FSH, FRH, PSH, clamp, deflector plate cutting, etc. to be done and same to be normalized after attending the tube joints including coil alignment, flexible clamp welding, binder clamp fixing, any other normalization jobs in the BTL location and adjacent secondary damage areas.
10. Fabrication of tube bends as per required angle & radius if required. Tube bending machine to be provided from OPGC. Qty of bends will be nominal.

11. Shifting of scaffolding from site stores or any other location as decided by EIC for scaffolding erection and again returning back to the same location as per EIC.
12. Lighting inside boiler will be done as per instructions of Engineer in Charge for carrying out the Boiler tube leakage repair & inspection works.
13. For access and attending the Boiler tube leakage work, erection and removal of scaffolding will be done by the agency as per instructions and discussion with Engineer in charge. No separate payment for Scaffolding erected both inside and outside the boiler, confined to the failure area & secondary damage area. **(Exceptions – Sky climber installation payment will be done separately as per its schedule). Scaffolding should be executed as per the scope of work of “Scaffolding Supply, Fabrication and Erection” – Item No. 188.**
14. Scope of work also includes insulation sheet & insulation removal, re-fixing of insulation after BTL normalization including insulation nail welding on water wall fins/duct.
15. Mobilization may also include areas other than the Boiler damage area, example – penthouse area where inspection cutting work may be required for eliminating the root cause of the BTL. No extra payment will be done to that respect.
16. Scope also includes assistance in hydro test, vacuum test done after attending BTL, also includes safety valve gagging and de – gagging, boiler internal inspection for checking leakages during hydro test, vacuum test attending of defects if found during such.
17. Re-welding of attachments, casting of refractory, reinstallation of baffles, shields, seal plates, pressure parts clamps, and skin plates etc. as per requirement. Re alignment of coils, tubes if necessary of the failure areas to be done.
18. Same mobilizations will be done by agency for attending any further leakages found in hydraulic test immediately, without any extra charges.
19. Shifting of failed & un-used boiler tubes, T&P's, cutting & welding accessories, scaffolding materials etc. back to site stores/or any other location as per instruction of EIC.
20. Complete housekeeping should be done at site within 24 hours after synchronization.
21. Boiler repair permission certificate to be obtained from IBR Odisha.
22. Agency shall provide manpower till 1st synchronization of unit.
23. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
24. Any material required to be issued/returned from the main stores is under this scope.

**Note –**

1. **Mobilization for Boiler tube failure i.e. shifting and other arrangement should be done within 24 hours upon information from EIC. While for all other activities included in the scope, agency has to ensure presence of manpower during all the time round the clock until 1<sup>st</sup> synchronization of the unit.**
2. **Upon completion of mobilization with all the activities, 1 BOQ will be paid. If only shifting will be done while Boiler inside work is not executed, then 0.5 BOQ will be paid whose sole discretion is of EIC.**
3. **Special care has to be taken at all times that no loose material has been kept on the Boiler grating. All has to be kept on proper trays provided by the agency.**
4. **24 V supply hand lamp is only allowed inside the Boiler. If additional lighting is required flood light may be used as per instructions of EIC.**
5. **All argon cylinders must be pre-tested by the IBR certified welders before start of work to avoid any purity problems of argon gas.**
6. **T&P's used should be of highest quality as mentioned in the Tools & tackles list for avoiding any delay in the work. Non-compliance of the same may be heavily fined.**
7. **All manpower executing the work should be furnished with all the PPEs. Extra PPE should be kept at the site at all times until normalization of Boiler.**
8. **Any attachment welding/ clamp welding with pressure parts required for normalization of BTL should only be performed by certified IBR class welder only.**

## **19. FIN CUTTING & WELDING**

1. Ensure PTW.
2. Scope of work includes cutting of fins by gas cutting/cutting wheel. Preparations of fin plates of appropriate size as per location. Re-welding of fin plates after attending the Boiler tube repair works. Fin welding to be done by certified IBR class welder.
3. Scope also includes any attachment cutting and then re-welding during Boiler tube repair required for Boiler normalization as per instructions of EIC.
4. Also necessary mobilization required for performing the activity has to be ensured by agency. Rate includes the mobilization also.
5. Agency has to ensure no damages of boiler tubes while fin cutting by gas/cutting wheel. Same may be penalized for 2 X BOQ.
6. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
7. Any material required to be issued/returned from the main stores is under this scope.
8. **Payment will be done as per the running meter of final welding. While no separate payment will be there for activities like cutting of fins/plates, insulation pin. Same included in this payment.**

## **20. APPLICATION OF REFRACTORY**

1. Ensure PTW.
2. Refractory used will be of various categories as per the location. Plastic, castable, pourable, chemical bonded.
3. Agency has to shift the material from plant stores /site stores to the location of job.
4. Arrange access, approach and local lighting.
5. Proper preservation technique as per instruction of EIC has to be followed for refractory storing at site until its use.
6. Agency has to arrange the return of material that is unused.
7. Safety PPEs including rubber gloves, gum boots, nose mask, goggles has to be arranged by agency for its manpower.
8. Preparation and application of refractory has to be done as per instructions of EIC including providing basic equipment needed for refractory such as spade, bucket, tray, etc.
9. Work area included is complete boiler – water wall, furnace hopper, rear arch, goose neck, second pass.
10. Agency also has to perform anchor welding on the boiler fins required for refractory. Same has to be performed only by IBR class welder. Fix retaining meshes, rods, stiffeners etc. as per advice to be obtained from EIC, over the surface I area to be covered by refractory
11. Ensure all crevices, gaps; constricted spaces etc. are thoroughly filled up with the new refractory. Ram if needed.
12. Cure/heat the refractory as per specified procedures to be obtained from EIC. Protect the refractory during curing time.
13. Any surface preparation/chipping of old/damaged refractory has to be performed.
14. If any cracks observed on the surface of the refractory, it will be rectified at contractor's cost.
15. Proper housekeeping of the area after the job completion within 24 hours.
16. Ensure that while removing, the removed pieces do not fall on lower elevations.
17. Ensure that the removed pieces are carefully stuffed in to disposal bags and shifted to identified location as per EIC.
18. Any material required to be issued/returned from the main stores is under this scope.

## **21. SKY CLIMBER INSTALLATION & REMOVAL**

1. Ensure PTW.

2. Open the boiler first pass manhole door.
3. Shifting of grating and sky climber component like plate forms, hand rails, fasteners, motor and wire ropes, from their store to the place of assembly.
4. Lay the bottom gratings above the S-panel.
5. Assemble sky climber in the first pass inside the furnace as per the instruction of EIC.
6. After assembly of sky climber, joint inspection will be carried out by Safety/Mech. Maint./EMD /Contractor. A joint protocol will be prepared.
7. Follow safety procedures while assembling and operating the sky climber.
8. Use sky climber for different maintenance work like tube repair, first pass cleaning conducting tube thickness survey, burner tilt inspection & servicing etc.
9. Extension or shortening of decks are required as per instruction of EIC.
10. Shifting of sky climber may be done from and to any side of furnace.
11. Deploy skilled operator for operating sky climber.
12. Dismantle the sky climber after completion of work.
13. Shift the dismantled sky climber materials and grating to store.
14. Connection and testing of sky climber for operation.

**Note -**

1. **One BOQ will be paid after assembly and dismantling of one set consisting of 2 hoists including shifting of the set inside furnace as per requirement.**
2. **Sky climber being a critical item for the healthiness of the boiler as well as consisting of safety aspects, shifting as well as handling of sky climber materials – rope, hoist, safety lock etc., has to be done by only experienced and skilled manpower. Any damages owing to negligence of Contractor will be deducted 1 BOQ amount for a single damage.**

**22. SKY CLIMBER OPERATION/MAINTENANCE**

1. Ensure PTW.
2. Operation of sky climber at the installed location round the clock shifts.
3. Only skilled and trained manpower will be deployed for sky climber operation.
4. Operator must be competent enough to attend any defects/troubleshooting during operation of sky climber.
5. One electrician to be deployed round the clock for sky climber operation for attending any electrical defects.
6. One BOQ will be paid for sky climber operation for a shift of 8 hours. Minimum manpower to be deployed - 1 skilled operator, 1 electrician, 1 rigger, 2 helpers. Continuous supervision required both for equipment and personal safety.

**23. WATER WASHING AT BUTTERFLY AREA/REAR ARCH/GOOSENECK/SECOND PASS**

1. Ensure PTW.
2. Arrange lighting required for washing.
3. Shift the hydrant hose pipe and check the connections for any leakage. Rectify if any defects.
4. Ensure proper pressure before start of work.
5. Use all necessary PPEs during water washing.
6. Hole watcher should be present at the door all times during washing.
7. Contractor has to ensure proper cleaning of the gooseneck area, rear arch, and butterfly panel. EIC should certify the cleaning of the same. Then 1 BOQ payment will be done.
8. Washing to be carried in butterfly area, rear arch, goose neck.

#### **24. CHECKING DURING HYDRO TEST**

1. Ensure PTW.
2. Scope includes checking of boiler during hydro test, vacuum test of Re-heater area, safety valve gagging and then removal of gags.
3. Attending of any defects arising in valves, assistance for valve operation to Operation dept. during hydro test.
4. Contractor should be responsible for the timely & successful completion of hydro test/vacuum test.
5. Checking of boiler during hydro can be done at different pressures as per instructions of EIC. Provide manpower for checking of the inside of the boiler 1<sup>st</sup> and 2<sup>nd</sup> pass.
6. If any joint failure/ or any pressure parts defect found same has to be attended by the contractor and give clearance for the hydro test again in due time. While separate payment will be done as per the HP joint schedule.  
No extra charges will be paid for any subsequent hydro test done after attending defects.

#### **25. ATT CHECKING & PUNCH POINTS ATTENDING - PENTHOUSE, DUCT, APH**

1. Ensure PTW.
2. Scope includes checking of penthouse area, boiler manhole doors, peephole doors, furnace, wind box, ducts, APH, mills.
3. Attending the defects raised during ATT as per the EIC instructions.
4. All mobilizations required for attending including welding accessories, insulation removal and fitting, refractory application, gland rope replacement, scaffolding. While scaffolding done will be paid as per separate schedule.
5. Arranging lighting & ventilation inside penthouse, APH, Duct, wind box.
6. Rope required for sealing will be provided from OPGC.
7. 1 BOQ payment will be done on lump sum basis after single ATT and subsequent defects attended satisfaction up to EIC.
8. While any additional ATT done during that period to check the leakages attended will not be paid additionally.
9. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
10. Any material required to be issued/returned from the main stores is under this scope.

#### **26. BOILER INTERNAL INSPECTION & RECTIFICATION DURING SHUTDOWN**

1. Ensure PTW.
2. Scope includes opening of manhole doors, arranging of sufficient lighting inside boiler 1<sup>st</sup> & 2<sup>nd</sup> pass during shutdown.
3. Inspection of pressure parts of various zones as prescribed by EIC.
4. Minor corrective actions if any instructed by EIC such as coil clamping, clamp welding, shielding etc. Housekeeping inside boiler zones. Same has to be performed by certified IBR class welders as per EIC instructions.
5. Arranging welding accessories, power supply for carrying out the work.
6. Coil spacing if required for inspection.
7. Group must contain at least 1 IBR class welder, 2 riggers, 2 fitters for any pressure parts works. If any additional joints welding, refractory, scaffolding, sky climber work comes separate price schedule will be applicable for that.
8. 1 BOQ will be paid on a lump sum basis for boiler inspection for a period of 48 hours.
9. Accordingly payment will be done on prorated basis for any less or more duration.

10. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
11. Any material required to be issued/returned from the main stores is under this scope.

## **27. ATTENDING HP WELDING JOINTS**

1. Ensure PTW.
2. Cutting of tubes by power grinder machine/ hack-saw /track saw machine or any other methods as Instructed by the EIC. .
3. Edge preparation of tubes by grinding for welding.
4. Fitting of new tube inserts after proper edge preparation and maintaining suitable gap to ensure quality weld Joint.
5. Filing/ grinding of new tube inserts at inner diameter at both ends in case of rifled tubes or wherever required.
6. Pre-heating of tubes in the case of alloy steel tubes and as per requirement in other cases.
7. Root joint welding-by TIG welding process. Filler rod will be provided by OPGC free of cost. Welding to be done by IBR certified and OPGC tested welders.
8. Subsequent welding by arc welding or TIG welding with appropriate welding electrode/filler wire so as to pass through radiographic test and IBR requirements. Welding electrode should be baked as required before welding. Welding electrodes required for the joint will be supplied by OPGC free of cost. Welding to be done by IBR certified and OPGC tested welders.
9. Controlled cooling of joints by wrapping of asbestos cloth, if required.
10. Dressing of the joints for radiography.
11. Repairing of joints by grind & fill-up / cut & weld, if found during radiography without any extra cost.
12. Scope includes shifting of tools, tubes, welding & cutting accessories, lighting, and power supply connection if required separately.
13. Final decision on welding/cutting/edge preparation procedure shall as per EIC and binding on contractor.
14. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
15. Any material required to be issued/returned from the main stores is under this scope.

### **Mode of payment:**

1. Payment for joints (cutting, edge preparation, spool insert preparation, fit-up & welding) will be done per joint basis. Tube size varies from 30mm to 76mm.
2. In case of repair of old joints
  - a. In case of partial repair/grind & fill-up of defective weld joint, 50% payment will be done as per joint schedule.
  - b. In case of major repair requiring cutting & welding of joint, full payment shall be made.
3. In case of bigger size tubes/pipes:
  - a. In case of OD of the tube/pipe is more than 76mm, the rates will be calculated as per the following formula :  
**Rate for the pipe joint = {(OD in mm) / (76)} X Rate per joint as per weld joint schedule.**
4. In case of socket joints:
  - a. 40mm to 65mm OD of pipe - socket joint, 50% payment shall be done of the BOQ rate of the joint.
  - b. Less than 40mm socket joint, 40% payment shall be done of the BOQ rate of the joint.

Penalty Clause:

- a. In case of any defect in the weld joint noticed; repair/replacement shall be done free of cost.
- b. No payment shall be made for the joint which do not pass the radiography test. A penalty of 2 times the rate per joint shall be imposed for each weld joint which fails in re-radiography test.

**28. CLEANING ASH IN PENTHOUSE**

1. Ensure PTW.
2. Arranging lighting for cleaning work inside penthouse.
3. Facilitating spade, tray, jute bags or any other tools required for cleaning ash inside penthouse.
4. BOQ shall be per MT basis.
5. Contractor can use boiler lift for transporting the collected ash to the designated place as instructed by EIC. While contractor has to arrange the transportation – tractor/any other suitable vehicle for disposal to the final site.
6. Contractor has to clean all the ash inside penthouse as and when prescribed by the EIC following all the standard safety procedures. Disposal of ash as directed by EIC to the designated place.
7. Payment shall be done after the complete satisfaction of the EIC with respect to the cleanliness of the penthouse.
8. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
9. Any material required to be issued/returned from the main stores is under this scope.

**29. BOILER/DUCT/PIPE EXTERNAL INSULATION & CLADDING REPAIR**

1. Ensure PTW.
2. Scope of work includes removal of damaged sheet/insulation on boiler water/steam wall, duct/ pipe of outside diameter from 25mm to 508mm.
3. Application of new insulation and cladding sheet as per EIC instructions.
4. If any minor scaffolding involved for carrying out the insulation same has to be done without charging any extra cost(Such as providing batten between structure and platforms, etc.). While major scaffolding will invite its separate price schedule.
5. Types of insulation used may be performed pipe section/ light resin bonded mattresses with one side wire netting/aluminum silicate blanket. While final decision will be exercised by EIC.
6. Pipe section - The ends will be stitched by 24/22G wire. The insulation will be covered by 22/24G aluminum sheet having paint inside. The sheet will overlap 40mm longitudinally & circumferentially & the joint will be sealed with roofing felt strips. Binding the pipe section with two round G.I wire at distance of 300mm. Self tapping screws will be provided at a distance of 150 mm longitudinally & circumferentially. Aluminum bands of 20mmx24G at 500mm distance will be provided on aluminum cladding sheet. At pipe bends, aluminum insulation sheet bend has to be fabricated at site and to be installed. Skilled fitter to be use for the same.
7. For duct/boiler walls – Insulation mattress will be used on vertical/horizontal section with appropriate thickness as directed by EIC. Corrugated aluminum sheet with binding metallic strips will be fitted. Aluminum sheets will be hold by riveting. Rivet machine has to be arranged by contractor. Self-tapping screws will also be used wherever applicable. Also include welding of metallic strips attached to the cladding sheet.

8. Payment will be done on square meter basis of bare area for complete insulation mattress removal/fixing & aluminum sheet fixing work.
9. Scope also includes proper disposal of old/damaged insulation after work as directed by EIC.
10. Contractor has to maintain cleanliness at all times during insulation work in boiler and its associated premises using tarpaulin sheets for storing, covering by proper means. Tarpaulin sheets have to be arranged by contractor.
11. This schedule doesn't cover insulation work related to attending BTL. While same scope of work is applicable for BTL activity insulation work also.
12. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
13. Any material required to be issued/returned from the main stores is under this scope.

### **30. CLADDING SHEET INSTALLATION/REPAIR**

1. Ensure PTW.
2. This scope includes only cladding sheet work involved in minor/major repair works of insulation cladding sheet – plain/corrugated sheet on pipes/ducts/boiler walls/penthouse/valves, etc.
3. Work instructions applicable are same as given in ITEM NO. 30.
4. Payment will be done on sq. meter basis for aluminum sheet works only. Also include welding of metallic strips attached to the cladding sheet.
5. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
6. Any material required to be issued/returned from the main stores is under this scope.

### **31. SPRING LOADED SAFETY VALVE PRESSURE ADJUSTMENT**

1. Ensure PTW.
2. Contractor has to provide manpower for assistance to any BHEL service engineer/or any other agency service engineer for safety valve servicing.
3. It has to depute skilled safety valve technician along with the supporting group for pressure adjustment required online/offline. Pressure adjustment will be done by spring tightening and subsequent checking by Trevi test.
4. Scope includes shifting of safety valve pressure setting apparatus from and to store, any other facilities required for pressure adjustment.
5. Each safety valve adjustment up to satisfactory conditions as prescribed by EIC will count as 1 BOQ.

### **32. SOOT BLOWER/AUX BOILER SAFETY VALVE SERVICING**

1. Ensure PTW.
2. Complete dismantling of the valve and cleaning of all parts
3. Repair / replacement of damaged components including assisting Bharat Heavy Electrical Ltd. Service personnel or any other agencies -service personnel in case of seat cutting operation if required.
4. It has to depute skilled safety valve technician along with the supporting group.
5. Making new / replaced spares fit to use by repair if required.
6. Lapping of seat and disc.
7. Final blue matching to be confirmed from EIC for clearance of box up.
8. Lapping of stem with disc and other critical components.
9. Replacement of bonnet basket. Inspection & cleaning of gasket seating surface.
10. Noting the initial measurements of various critical dimensions of safety valve as prescribed by EIC and preservation of the same during final assembly.

11. Final tightening inspection, simmering inspection while valve in service and taking the corrective actions if required.
12. Assistance in safety valve Steam testing/Trevi testing.
13. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
14. Any material required to be issued/returned from the main stores is under this scope.

### **33. BOILER SAFETY VALVE & ERV SERVICING**

#### In case of spring loaded Boiler safety valve

1. Ensure PTW.
2. Complete dismantling of the valve and cleaning of all parts
3. Repair / replacement of damaged components including assisting Bharat Heavy Electrical Ltd. Service personnel or any other agencies -service personnel in case of seat cutting operation if required.
4. It has to depute skilled safety valve technician along with the supporting group.
5. Making new / replaced spares fit to use by repair if required.
6. Lapping of seat and disc.
7. Final blue matching to be confirmed from EIC for clearance of box up.
8. Lapping of stem with disc and other critical components.
9. Noting the initial measurements of various critical dimensions of safety valve as prescribed by EIC and preservation of the same during final assembly.
10. Final tightening inspection, simmering & passing inspection while valve in service within one month of light up and taking the corrective actions if required in online or next opportunity shutdown..
11. Assistance in safety valve Steam testing/Trevi testing.
12. Installation of test plugs for hydraulic test and assembly of valve.
13. Gagging of safety valves at the time of internal and external hydraulic tests as per requirement
14. Installation of disc in place of test plug after the hydraulic tests.
15. All mobilizations with respect to the above activities included in this scope only.
16. If any repair works (possible at in-situ) are required to any parts, same has to be done at site workshop by the contractor.
17. If only hydro test plug installations and removal work is carried out then only 0.5 BOQ will be paid.
18. Lapping block/lapping plate/lapping paste, any spares will be provided by OPGC.
19. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
20. Any material required to be issued/returned from the main stores is under this scope.

#### In case of ERV

1. Ensure PTW.
2. Complete dismantling of pilot valve of ERV.
3. Clean all components of pilot valve of ERV.
4. Lapping of seat and disc of pilot valve of ERV.
5. Replace damaged parts as directed by EIC.
6. If any repair works (possible at in-situ) are required to any parts, same has to be done at site workshop by the contractor.
7. Replace old gaskets/gland packing with new one.
8. Show all components of pilot valves to EIC and box up pilot valve after getting permission from EIC.

9. Attending defects such-as flange leak of main body of ERV etc.
10. Check and attend leakage if any during service condition.
11. Correction of drain pipelines as per requirement.

**Note -**

1. Payment for overhauling of main ERV only: 75 %of BOO rate.
2. Payment for servicing of pilot valve only: 25% of BOQ rate.
3. Note: Payments for attending flange leak of main body by replacing gasket/seal ring as mentioned in point 6 will be made 20% of the BOQ rate.

**34. ASSISTANCE IN SAFETY VALVE TREVI TEST**

1. Contractor has to provide manpower assistance to external agency for safety valve trevi test.
2. Job includes mobilizations, shifting of all tools & tackles necessary for carrying out the job.
3. **1 BOQ will be paid after successful safety valve pressure setting.**
4. All safety procedures should be strictly adhered to as per EIC instructions.
5. Contractor must provide skilled technician experienced in safety valve servicing.

**35. VALVE REPLACEMENT, SIZE  $\leq 2$ "**

1. Ensure PTW.
2. Cutting of old valve / pipe line to fit the valve
3. Edge preparation of pipe and valve.
4. Fitting of valve to the line
5. Preheating of the joint with electric coil, if required, as per instruction of the EIC.
6. Welding as per recommended procedure, if required root and fill- up by GTAW and subsequent runs by SMAW, by certified IBR class welders.
7. If PWHT involved, same will be carried out, while separate payment schedule will be there for PWHT.
8. Identification of welding defects during radiography, hydro test, after charging online and attending the defects as required.
9. For butt weld joint type valves – 1 BOQ will be paid for each valve replacement i.e., 2 butt weld joints. For socket weld type valves, 0.4 BOQ will be paid. For flange type/threaded type valves, 0.3 BOQ will be paid. Flange type valves to be replaced with new gaskets also.
10. Scope also includes any rigging activity/valve locking at position required for valve replacement and fit-up.
11. Scope includes issue of valve from stores, return of damaged valve to yard as per EIC, shifting of welding & cutting accessories required for carrying out the job.
12. If welding joint fails in 1<sup>st</sup> radiography, then contractor has to repair/attend the defect free of cost. If welding joint fails for the 2<sup>nd</sup> time, then apart from attending the defect, contractor will be penalized 2 times the BOQ. Also radiography cost will be deducted.
13. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
14. Any material required to be issued/returned from the main stores is under this scope.

**36. VALVE REPLACEMENT, SIZE  $> 2$ "**

1. Ensure PTW.
2. Cutting of old valve / pipe line to fit the valve
3. Edge preparation of pipe and valve.
4. Fitting of new/serviced valve to the line
5. Preheating of the joint with electric coil, if required, as per instruction of the EIC.
6. Welding as per recommended procedure, if required root and fill- up by GTAW and subsequent runs by SMAW, by certified IBR class welders.

7. If PWHT involved, same will be carried out, while separate payment schedule will be there for PWHT.
8. Identification of welding defects during radiography, hydro test, after charging online and attending the defects as required.
9. For butt weld joint type valves – 1 BOQ will be paid for each valve replacement i.e., 2 butt weld joints. For socket weld type valves, 0.4 BOQ will be paid. For flange type/threaded type valves, 0.3 BOQ will be paid. Flange type valves to be replaced with new gaskets also.
10. Scope also includes any rigging activity/valve locking at position required for valve replacement and fit-up.
11. Scope includes issue of valve from stores, return of damaged valve to yard as per EIC, shifting of welding & cutting accessories required for carrying out the job.
12. If welding joint fails in 1<sup>st</sup> radiography, then contractor has to repair/attend the defect free of cost. If welding joint fails for the 2<sup>nd</sup> time, then apart from attending the defect, contractor will be penalized 2 times the BOQ. Also radiography cost will be deducted.
13. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
14. 1 BOQ is applicable for size DN 65 mm, wherever for every 50NB increase in size of valve 20% above BOQ schedule will be paid.

### **37. VALVE SERVICING, SIZE<=2"**

1. Ensure PTW.
2. Decouple the valve from pneumatic/motorized actuator taking the necessary coupling readings as directed by EIC. However actuator dismantling, coupling will be paid as per separate schedule. (Wherever required).
3. Dismantle the valve.
4. Cleaning and inspection of all the components – drive mechanism i.e drive & yoke bush, stem, disc, wedge gate, bonnet, yoke, back seat, valve locking mechanism, wherever applicable.
5. If any repair works (possible at in-situ) are required to any parts, same has to be done at site workshop by the contractor.
6. Replace/Service individual part as directed by EIC.
7. Lapping of man and back seat. Contractor has to ensure confirmation of EIC for assembly of valve.
8. Replace the old gasket/gland packing whichever applicable.
9. Assemble the valve as directed by EIC. All fasteners to be coated with high temperature grease.
10. Mount the actuator wherever applicable, assistance for calibration and limit setting with Electrical/C&I as per instructions of EIC.
11. Hot tightening of gland & bonnet fasteners of valve after charging of the line.
12. Checking for passing of valves after charging of line and attending any defects online/offline during subsequent opportunity.
13. Arranging of bonnet heating (induction/resistance/gas heating) if necessary for removal of valves. Cutting and welding of welded bonnet valves is also to be carried out for dismantling wherever required.
14. Any rigging works if required for handling/removal and assembly of valve is also to be carried out.
15. Gland packing/gaskets/high temperature grease, any new spares will be provided by OPGC. Induction heating m/c will be provided by OPGC.
16. However, Contractor has to mobilize all the materials required for carrying out the service from stores/yard/site store, etc.
17. Valve servicing may include both in-situ servicing and servicing of Boiler area valves at maintenance yard.

18. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

### **38. VALVE SERVICING, SIZE>2"**

1. Ensure PTW.
2. Decouple the valve from pneumatic/motorized actuator taking the necessary coupling readings as directed by EIC. However actuator dismantling, coupling will be paid as per separate schedule. (Wherever required).
3. Dismantle the valve.
4. Cleaning and inspection of all the components – drive mechanism i.e drive & yoke bush, stem, disc, wedge gate, bonnet, yoke, back seat, valve locking mechanism, wherever applicable.
5. If any repair works (possible at in-situ) are required to any parts, same has to be done at site workshop by the contractor.
6. Replace/Service individual part as directed by EIC.
7. Lapping of man and back seat. Contractor has to ensure confirmation of EIC for assembly of valve.
8. Replace the old gasket/gland packing whichever applicable.
9. Assemble the valve as directed by EIC. All fasteners to be coated with high temperature grease.
10. Mount the actuator wherever applicable, assistance for calibration and limit setting with Electrical/C&I as per instructions of EIC.
11. Hot tightening of gland & bonnet fasteners of valve after charging of the line.
12. Checking for passing of valves after charging of line and attending any defects online/offline during subsequent opportunity.
13. Arranging of bonnet heating (induction/resistance/gas heating) if necessary for removal of valves. Cutting and welding of welded bonnet valves is also to be carried out for dismantling wherever required.
14. Any rigging works if required for handling/removal and assembly of valve is also to be carried out.
15. Gland packing/gaskets/high temperature grease, any new spares will be provided by OPGC. Induction heating m/c will be provided by OPGC.
16. However, Contractor has to mobilize all the materials required for carrying out the service from stores/yard/site store, etc.
17. Valve servicing may include both in-situ servicing and servicing of Boiler area valves at maintenance yard.

### **39. VALVE SERVICING, SIZE>8"**

1. Ensure PTW.
2. Decouple the valve from pneumatic/motorized actuator taking the necessary coupling readings as directed by EIC. However actuator dismantling, coupling will be paid as per separate schedule. (Wherever required).
3. Dismantle the valve.
4. Cleaning and inspection of all the components – drive mechanism i.e drive & yoke bush, stem, disc, wedge gate, bonnet, yoke, back seat, valve locking mechanism, wherever applicable.
5. If any repair works (possible at in-situ) are required to any parts, same has to be done at site workshop by the contractor.
6. Replace/Service individual part as directed by EIC.
7. Lapping of man and back seat. Contractor has to ensure confirmation of EIC for assembly of valve.

8. Replace the old gasket/gland packing whichever applicable.
9. Assemble the valve as directed by EIC. All fasteners to be coated with high temperature grease.
10. Mount the actuator wherever applicable, assistance for calibration and limit setting with Electrical/C&I as per instructions of EIC.
11. Hot tightening of gland & bonnet fasteners of valve after charging of the line.
12. Checking for passing of valves after charging of line and attending any defects online/offline during subsequent opportunity.
13. Arranging of bonnet heating (induction/resistance/gas heating) if necessary for removal of valves. Cutting and welding of welded bonnet valves is also to be carried out for dismantling wherever required.
14. Any rigging works if required for handling/removal and assembly of valve is also to be carried out.
15. Gland packing/gaskets/high temperature grease, any new spares will be provided by OPGC. Induction heating m/c will be provided by OPGC.
16. However, Contractor has to mobilize all the materials required for carrying out the service from stores/yard/site store, etc.
17. Valve servicing may include both in-situ servicing and servicing of Boiler area valves at maintenance yard.
18. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
19. Any material required to be issued/returned from the main stores is under this scope.

#### **40. ASSISTANCE FOR ONLINE SEALING**

1. Ensure PTW.
2. Contractor has to arrange the necessary material required for online sealing – welding m/c, air hose supply, scaffolding/access, insulation removal and any other materials if required.
3. BOQ for the activity will be one successful attending of online sealing.
4. Contractor has to provide assistance to the online sealing party technician/service engineer.
5. Contractor has to fabricate online clamps required for the activity as prescribed by Online sealing party technician. Job may involve welding/clamp fabrication at workshop.
6. Any welding jobs in HP/LP line may also involve. HP line welding has to be performed by IBR class welder as per instructions of EIC.
7. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
8. Any material required to be issued/returned from the main stores is under this scope.

#### **41. SERVICING OF SPRAY VALVES (BLOCK VALVE, CONTROL VALVE)**

1. Ensure PTW.
2. Decouple the valve from pneumatic/motorized actuator taking the necessary coupling readings as directed by EIC. However actuator dismantling, coupling and calibration will be paid as per separate schedule.
3. Dismantle the valve.
4. Cleaning and inspection of all the components – drive mechanism i.e drive & yoke bush, stem, disc, wedge gate, bonnet, yoke, back seat, valve locking mechanism, wherever applicable.
5. If any repair works (possible at in-situ) are required to any parts, same has to be done at site workshop by the contractor.
6. Replace/Service individual part as directed by EIC.
7. Lapping of man and back seat. Contractor has to ensure confirmation of EIC for assembly of valve.

8. Replace the old gasket/gland packing whichever applicable.
9. Assemble the valve as directed by EIC. All fasteners to be coated with high temperature grease.
10. Hot tightening of gland & bonnet fasteners of valve after charging of the line.
11. Checking for passing of valves after charging of line and attending any defects online/offline during subsequent opportunity.
12. Arranging of bonnet heating (induction/resistance/gas heating) if necessary for removal of valves. Cutting and welding of welded bonnet valves is also to be carried out for dismantling wherever required.
13. Any rigging works if required for handling/removal and assembly of valve is also to be carried out.
14. Gland packing/gaskets/high temperature grease, any new spares will be provided by OPGC. Induction heating m/c will be provided by OPGC.
15. However, Contractor has to mobilize all the materials required for carrying out the service from stores/yard/site store, etc.
16. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
17. Any material required to be issued/returned from the main stores is under this scope.

#### **42. FLANGE GASKET REPLACEMENT**

1. Ensure PTW.
2. Making minor access if required.
3. Loosen the flange bolts.
4. Remove the damaged gasket from the leaky flange.
5. Repair of flange face (welding/filling/polishing/grinding) if required to ensure smoothness at the gasket seating area.
6. Cutting of gasket from gasket sheet if required.
7. Replacement of new gasket with even bolt tightening as per EIC instructions (Torque tightening wherever applicable).
8. Retightening of flange bolts in case of leakage after charging/hydro test.
9. Arrangement of any rigging activity if required and normalization.
10. Any material required for the activity to be issued from stores./yard as per the EIC instructions.
11. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
12. For Flanges of size up-to 50 NB- 0.5 BOQ payment will be made  
 For Flanges of sizes more than 50 NB up-to 100 NB- 1 BOQ payments will be made.  
 For Flanges of sizes more than 100 NB up-to 200 NB -.2 BOQ payments will be made.  
 For Flanges of size more than 200 NB- 3 BOQ payments will be made.

**Note – If flange face repairing required by welding/grinding/polishing, then 2 times BOQ of the gasket replacement will be awarded for each size.**

#### **43. FLANGE GASKET TIGHTENING**

1. Ensure PTW.
2. This scope includes bolt/stud nut tightening of valve flanges/bonnets line flanges carrying steam/water/oil/air.
3. Making minor access if required.
4. Tightening of flange bolts/bonnet bolts as per instructions of EIC. (Torque tightening wherever applicable).

5. Any material required for the activity to be issued from stores./yard as per the EIC instructions.
6. BOQ will be paid after successful tightening of 1 flange satisfactory to the requirement of EIC.
7. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
8. For Flanges of size up-to 50 NB- 0.5 BOQ payment will be made  
For Flanges of sizes more than 50 NB up-to 100 NB- 1 BOQ payments will be made.  
For Flanges of sizes more than 100 NB up-to 200 NB -.2 BOQ payments will be made.  
For Flanges of size more than 200 NB- 3 BOQ payments will be made.

#### **44. GLAND PACKING REPLACEMENT**

1. Ensure PTW.
2. It is required to open the valve gland follower to take out the damaged packing rings, replace them by new rings & place the gland follower in position for valves of different sizes.
3. Packing rings/packing ropes shall be provided by OPGC as free issue materials.
4. Charge the line and complete hot tightening if required
5. Assistance to operation for any valve jamming after gland packing replacement.
6. Actuator removal & installation for the replacement will be paid separately.
7. Gland packing if done online cut gland ropes – 0.5 BOQ with respect to the size.
8. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
9. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
10. For valves of size up-to 65 NB- 1 BOQ payment will be made  
For valves of sizes more than 65 NB up-to 100 NB- 2 BOQ payments will be made.  
For valves of sizes more than 100 NB up-to 200 NB – 3 BOQ payments will be made.  
For valves of size more than 200 NB- 4 BOQ payments will be made.

#### **45. VALVE GLAND TIGHTENING**

1. Ensure PTW.
2. This scope includes bolt/stud nut tightening of valve glands carrying steam/water/oil/air.
3. Making minor access if required.
4. Tightening of gland bolts nuts as per instructions of EIC. (Torque tightening wherever applicable).
5. BOQ will be paid after successful tightening of 1 flange satisfactory to the requirement of EIC.
6. Cleaning of studs and applying rust preventive.
7. Equal tightening of gland bolts observing both the leakage quantum and gap between gland follower and gland bush.
8. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
9. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
10. For valves of size up-to 65 NB- 1 BOQ payment will be made  
For valves of sizes more than 65 NB up-to 100 NB- 1.5 BOQ payments will be made.  
For valves of sizes more than 100 NB up-to 200 NB – 2 BOQ payments will be made.  
For valves of size more than 200 NB- 3 BOQ payments will be made.

#### **46. ACTUATOR DECOUPLING/REMOVAL**

1. Ensure PTW.

2. The scope of work includes removal, shifting and refitting of electrical/pneumatic actuator of valve size up to 150 NB.
3. Any rigging work – chain block arrangement, minor access, lighting, etc. is included in this scope.
4. Decouple the actuator and valve. Take note of the correct dimensions of the coupling in case of pneumatic actuator.
5. Remove the actuator from the valve. Keep the actuator and fasteners in safe place.
6. Mount the actuator after getting clearance from EIC.
7. Couple the actuator and valve. Check the freeness of the valve manually.
8. In case valve operation is not as per requirement or any other defect is observed due to mounting of the actuator, rectify the same.
9. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
10. Any material required to be issued/returned from the main stores is under this scope.

**Note - Payment for removal, shifting & refitting of electrical actuator for valves of size above 150 NB will be made as double this schedule rate, but for pneumatic actuators above 150mm, payment shall be same as per the BOQ rate only.**

#### **47. HYDRAULIC/PNEUMATIC ACTUATOR SERVICING**

1. Ensure PTW.
2. Remove the actuator from valve or any other driven member.
3. Shift it to the shed.
4. Dismantle the actuator as per EIC instructions.
5. Recondition/repair/replace the worn/damaged parts as per instructions of EIC.
6. Lubricate the parts as directed by EIC.
7. Replace the sealing components.
8. Install the serviced/or any new actuator to the driven member.
9. Any material required for the activity to be issued from stores./yard as per the EIC instructions.
10. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **48. VALVE CALIBRATION/LIMIT SETTING**

1. Ensure PTW.
2. Scope includes assistance for calibration/limit setting of the valves as per EIC instructions.
3. Skilled valve technician should accompany the group for valve limit setting and final freeness operation.
4. Attending any defect if aroused during the calibration/limit setting.
5. For valve size up to – 150 NB, 1 BOQ will be paid. For valves above 150 NB – 2 BOQ will be paid.
6. One successful limit setting and subsequent trial by Operation, EIC will count as 1 BOQ.

#### **49. VALVES PM**

1. Ensure PTW.
2. Clean the valve actuator and drive member greasing parts, valve stem and drive nut.
3. Apply grease to the stem and other components of the valve
4. Apply grease in the actuator, bearing, gear boxes etc. through grease gun as per requirement.

5. 1 BOQ will be paid for PM of complete boiler valves. Valves area included are Boiler spray system, Boiler Drain & vent system, Boiler startup system, MSSV.
6. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **50. BCP STRAINER CLEANING**

1. Ensure PTW.
2. Arrange lighting/minor scaffolding/chain pulley arrangement if required.
3. Disconnect the HP/LP cooler line connections required for removing the strainer.
4. Keep the fasteners in a secured place.
5. Remove the strainer. Clean with diesel, air. Inspect the Pump exposed surface for any abnormalities.
6. Check the sealing surfaces for any irregularities. Rectify the same.
7. Fix the strainer. And tighten the bolts with correct torque tightening as per EIC instructions.
8. HP/LP cooler lines to be connected following the specified torque tightening values.
9. Replace new metallic gaskets in cooler lines.
10. Normalize the system. Removal of rigging arrangements in any.
11. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
12. Any material required to be issued/returned from the main stores is under this scope.

#### **51. FABRICATION & ERECTION OF STRUCTURE**

1. Ensure PTW.
2. Transportation of the material from central store/ site store or any other place as per the availability shall be in the scope of the contractor.
3. Cutting of the material as per the required size.
4. Welding of the pieces as per the required shape and sizes. All load carrying members shall be welded at least 2 runs of the welding or as directed by EIC. At least 100mm stitch welding is required with 100mm gap. Structural class welder certified by OPGC should perform the job.
5. General purpose welding electrodes (6013, 7018) shall be under the scope of contractor for the same.
6. Collecting and returning the scrap generated to the stores as per instructions of EIC.
7. This work can be performed for the following purposes :
  - a. Erection/Extension of platforms/ladders/walkways/stairs/approaches/toe guards/canopy/tray for drains as directed by EIC.
  - b. Fabrication of coil alignment fixtures/end gap templates.
  - c. Fabrication of racks for spares/consumables/special tools up keeping.
  - d. Fabrication of structures for complying to safety/5S standards.
  - e. Any other works requiring fabrication of steels as directed by EIC.
8. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
9. Any material required to be issued/returned from the main stores is under this scope.

#### **52. PAINTING OF STRUCTURE**

1. Ensure PTW.
2. Protective coating is required to be applied to pipes, equipment, structure at various locations & elevations inside the plant.
3. The scope of work includes cleaning the surface to remove dirt oil , grease , rust, scale & other contamination etc. by chipping , scrapping ,wire brushing etc. , applying one coat of primer paint & two coats of finishing enamel paint.

4. Paints / Primers to be provided by OPGC. While the contractor has to arrange wire brush/scrappers/buffing m/c etc.
5. Contractor has to maintain a dedicated rack of paints and handling of the paints should as per safety standards maintained by OPGC.
6. No spillage/ leftovers/ traces of paint is allowed after the painting activity. Same has to be properly cleaned.
7. If minor scaffolding required for painting same has to be carried out. While major scaffolding will be paid as per separate schedule.
8. The interval of surface preparation & painting shall be minimum and in case be longer than 4 hours.
9. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
10. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

### **53. CUTTING, WELDING OF LP PIPING - STEAM LINE, OIL LINE, AIRLINE, WATER LINE, ETC.**

1. Ensure PTW.
2. Removal of insulation if any.
3. Cutting and removal of old pipelines / bends if required for carving out the work.
4. Laying and fitting of new pipelines after edge preparation at both ends.
5. Welding of pipelines with proper electrodes and procedures as per EIC instructions
6. Checking of leakages after charging and attending the same.
7. Giving proper supports to the piping.
8. NDT requirements – Thickness / DPT / Radiography to be carried out as per EIC instructions. Separate payment will be done as per each schedule.
9. Return of the old material to the store.
10. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
11. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **Note -**

1. **Laying of LP pipeline shall be done against this schedule.**
2. **Weld joint for pipeline shall be done by OPGC approved 6G welder. Radiography of weld joint if required as per instructions of EIC shall be carried out by contractor and repair if any observed in the joints shall be attended by the party without any payment. Radiography payment will be done separately.**
3. **Payment for weld joint in HP line shall be paid separately against respective schedules. Stress relieving if required shall be carried out by agency. Payment for stress relieving shall be paid separately.**
4. **Rate for this schedule is for 100 NB pipeline. For higher & lower size pipes payment shall be made on pro Rota basis, based on area of cross section**

### **54. REPAIR & HARD FACING OF COAL NOZZLE**

1. Ensure PTW.
2. Shift the coal nozzles to the designated places as per EIC instructions.
3. For lifting up & down in boiler, winch machine may be provided from OPGC.
4. Inspect the coal nozzle for wear/damages. If required carry out thickness survey as per EIC instructions. Separate payment will be done for the thickness survey.
5. Surface preparation of the coal nozzles by buffing/grinding/edge preparation.

6. Cut the area where thickness has reduced considerable and weld new plate.
7. Arrangement of all the facilities required for repair/hard facing – lighting, welding accessories connection, power supply, any rigging apparatus for handling the coal nozzle.
8. Locking arrangement should be done in the nozzle to avoid any distortion while welding.
9. Hard face the worn out area/new area after putting the buffer layer. Welding should be done as per FQA procedures.
10. Payment should be done per coal nozzle repaired/hard facing done.
11. Hard facing electrodes and any special electrodes will be supplied from OPGC.
12. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
13. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **55. REPAIR & HARD FACING OF COAL/AIR BURNER TIPS**

1. Ensure PTW.
2. Shift the burner tips to the designated places as per EIC instructions.
3. For lifting up & down in boiler, winch machine may be provided from OPGC.
4. Mark all the damaged and worn out areas.
5. Lock properly so that distortion of the nozzle tip is avoided.
6. Cut the worn out portion of the tips as per EIC instructions.
7. Surface preparation of the burner tips by buffing/grinding/edge preparation.
8. Weld new plate. Burner tips will be SS grade material. Welding should be done as per FQA procedures.
9. Hard face the worn out area/new area after putting the buffer layer.
10. Arrangement of all the facilities required for repair/hard facing – lighting, welding accessories connection, power supply, any rigging apparatus for handling the coal nozzle.
11. Payment should be done per burner tip repaired/hard facing done.
12. Hard facing electrodes and any special electrodes will be supplied from OPGC.
13. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
14. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **56. SERVICING OF POWER CYLINDER**

1. Ensure PTW.
2. Remove the actuator from valve or any other driven member.
3. Shift it to the shed.
4. Dismantle the actuator as per EIC instructions.
5. Recondition/repair/replace the worn/damaged parts as per instructions of EIC.
6. Lubricate the parts as directed by EIC.
7. Replace the sealing components.
8. Assemble the power cylinder and Check the operation of power cylinder.
9. Install the serviced/or any new actuator to the driven member and check for smooth operation.
10. Provide assistance to the operation for burner tilt trial operation and attend the defects if any found.
11. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
12. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

## **57. BURNER TILT LINKAGE MECHANISM SERVICING**

1. Ensure PTW.
2. Required T&P shall be arranged well before start of work for avoiding any delay as per EIC instructions.
3. The scope of work includes servicing of burner tilt linkage mechanism including burner connecting link/link rods & shafts/bearings/bushings.
4. Decouple the power cylinder from burner tilt mechanism.
5. Open manhole door/panel door for internal inspection.
6. Clean the linkages/lubricate the linkages.
7. Repair/replace the supporting members and any worn parts.
8. If any job involves machining at work shop, perform the same.
9. Physically check the jamming cause and rectify.
10. Operate the burner manually to both the limits at various positions with the help of chain block.
11. Ensure smooth operation of burner mechanism.
12. Record the burner tilt reading at various elevations.
13. Box up the manhole door/panel door with new gaskets/ropes.
14. Couple the burner tilt power cylinder.
15. 1 BOQ will be paid for all linkages linked to one power cylinder. One power cylinder is connected to 4 or 3 burners. If only individual burners links defects attended BOQ schedule will be paid as per pro Rota basis.
16. Provide assistance to the operation for burner tilt trial operation and attend the defects if any found.
17. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
18. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

## **58. REPLACEMENT OF BURNER TILT SHEAR PIN**

### Scope of work for shear pin replacement in one location

1. Ensure PTW.
2. Required T&P shall be arranged well before start of work for avoiding any delay as per EIC instructions.
3. Clean the component of burner tilt.
4. Remove the damaged shear pin with the help of chain pulley block.
5. Place the new shear pin with coating of anti-seize compound, such as molykote, etc.
6. Check the free operation of the burner tilt after removal of chain pulley block.
7. Provide assistance to the operation for burner tilt trial operation and attend the defects if any found.

### Scope of work for locking of burner tilt in one location

1. Ensure PTW.
2. Required T&P shall be arranged well before start of work for avoiding any delay as per EIC instructions.
3. Clean the component of burner tilt.
4. Remove the damaged shear pin with the help of chain pulley block.
5. Lock the burner tilt by locking pin in 0 degree. Ensure correctness of the locking.  
General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

Any material required to be issued/returned from the main stores is under this scope.

**Note – 1 BOQ shall be paid for replacement of each shear pin / locking of burner links at one shear pin point.**

#### **59. WIND BOX INTERNAL INSPECTION, SADC SERVICING**

1. Ensure PTW.
2. Required T&P shall be arranged well before start of work for avoiding any delay as per EIC instructions.
3. Opening of all the wind box access door for internal inspection.
4. Arranging minor scaffolding/access for entry.
5. Arranging lighting/power supply etc. for carrying out the job.
6. Inspection of wind box duct, bracings, metallic bellow, dampers, burners for any abnormalities.
7. Rectification of the same. While any welding activity involved will be paid separately as per its schedule.
8. Checking with Operation of all SADC for freeness and attend defect if any. Including power cylinder.
9. Lubrication of damper bushes if required as per EIC. (Rustolene may be used)
10. Cleaning of link rods, etc.
11. Cleaning of ash inside duct. This activity will be paid separately as per its schedule.
12. Box – up of all the doors with new gaskets/rope. Any leakage found after light up will invite penalty on pro rate basis. Removal of access / scaffolding if any.
13. 1 BOQ includes all the doors of wind box – approximately 16 doors and all SADC dampers – 72 nos. Any additional or less quantity will be paid on pro rate basis.
14. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
15. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **60. SADC FREENESS ONLINE - SERVICING /MECHANICAL JAM CLEARING**

1. Ensure PTW.
2. Ensure isolation of air supply to SADC power cylinder.
3. Decouple the power cylinder from damper mechanism.
4. Physically check the cause for jamming / defects and attend the same.
5. Couple the cylinder with damper mechanism.
6. Provide assistance to the operation for SADC trial operation and attend the defects if any found.
7. Any rigging arrangements and minor access/scaffolding required for the activity is included in the scope.
8. 1 BOQ will be paid for each SADC servicing done satisfactorily to the EIC requirements.
9. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **61. MANHOLE DOOR ROPE REPLACEMENT**

1. Ensure PTW.
2. Remove the old/damaged rope/gasket.
3. Clean the surface with rustolene / diesel. Ensure the sealing surface to be free from any burrs/ nicks. Also check no eroded marks present on the sealing surface. Rectify if any.
4. Place the new rope/ gasket with sealing paste provided from OPGC.

5. Tighten the bolts uniformly. Torque tighten if required as per EIC instructions.
6. Areas covered – APH, Boiler, Duct, Burner, and Aux Boiler.
7. 1 BOQ will be paid for each manhole/peephole door rope/gasket replacement done satisfactorily to the EIC requirements. Contractor should ensure no leakage from doors at least one month of operation.
8. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
9. Any material required to be issued/returned from the main stores is under this scope.

#### **62. HANGER TIE ROD/SUPPORT RECTIFICATION**

1. Ensure PTW.
2. Making arrangements for adjustments of hanger including the rigging accessories, scaffolding, welding accessories, etc. Scaffolding will be paid separately.
3. Cleaning of all the components of hangers & its supports by wire brush/diesel/cotton waste.
4. Rectification of the defect as per EIC instructions including replacement/repair of tie rods, support pads/ sliding pads, hanger locking, welding, etc.
5. Adjustment of hangers to the required position as per the requirements.
6. Checking of hanger indicators and rectification of defect if any.
7. Any welding cracks to be attended. DPT if required. While DPT will be paid separately.
8. Any oil leakages to be attended.
9. Normalization of the system after clearance from EIC.
10. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
11. If only minor defects to be attended for example pin, circlip replacement, cleaning – 0.5 BOQ will be paid.
12. Any parts if required to be fabricated from Work shop, has to be done by contractor.
13. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **63. HANGER COLD/HOT MEASUREMENT READING**

1. Ensure PTW.
2. Cleaning of hanger for taking reading.
3. Marking the hanger number with paint / template sheet and marking the scale as per requirement.
4. Taking of reading and recording of readings of the hangers.
5. 1 BOQ includes complete boiler hanger readings of all critical pipelines and pressure pats.
6. Contractor has to erect scaffolding if required for taking the readings. Separate payment for the same will be done.
7. Contractor may use binocular for taking readings. Same may be provided from OPGC.
8. Contractor has to certify the readings from EIC for validation of BOQ.

### **(B) FANS (ID/PA/FD FANS, SCANNER FAN, SEAL AIR FANS&OTHER FANS):**

#### **64. SCANNER AIR FAN FILTER CLEANING**

1. Ensure PTW
2. Remove the filter cover
3. Remove the filter element
4. Clean the filter element with air
5. If the filter element found damage replace the same

6. Box up the filter cover
7. Clean the fan casing with air & then with cotton waste
8. Return PTW

**Note -**

One BOQ includes cost for cleaning of one Filter and casing body but excludes impeller cleaning

If Impeller cleaning also needs to be done then one BOQ cost will be paid additionally

**65. SCANNER AIR FAN INSPECTION & PM**

1. Ensure PTW
2. Clean the fan casing with air & then with cotton waste
3. Check for looseness of bolts if any
4. Check for any air leakages
5. Note down all the defects
6. Check the freeness of dampers
7. Inspect the impeller only if permit is with electrical isolation
8. Box up and Return PTW

**66. SCANNER FAN SUCTION/DISCHARGE FLAP VALVE SERVICING**

1. Ensure PTW
2. Clean the fan casing with air & then with cotton waste
3. Check for jamming of flaps
4. Open the flap cover and check for any internal problems and clear the same
5. Check the gasket of flap is proper or not and replace if found damage
6. Clean and apply the lubricant to flap bearings
7. Box--up the covers
8. Return PTW

**67. DAMPER SEALING FANS PM/DEFECTS**

1. Ensure PTW
2. Clean the fan casing with air & then with cotton waste
3. Check for jamming of flaps
4. Open the flap cover and check for any internal problems and clear the same
5. Check the impeller condition and remove ash if found
6. Check the fan bolts tightness
7. Check for the frame defects if any and attend the same
8. Attend the leakages if any observed
9. Return PTW

**68. DAMPER SEALING FAN PM**

1. Ensure PTW
2. Clean the fan casing with air & then with cotton waste
3. Check for jamming of flaps
4. Open the flap cover and check for any internal problems and clear the same
5. Check the impeller condition and remove ash if found
6. Check the fan bolts tightness
7. Check for the frame defects if any and attend the same
8. Attend the leakages if any observed
9. Return PTW

## **69. PM OF ID/PA/FD FAN**

1. Ensure PTW
2. Visit the fan area and observe any abnormal sounds from fan casing, coupling and Lube oil pumps and note down the same
3. Inspect the lube oil skid for any leakages and record the same for attending in opportunities
4. Inspect the blade pitch feedback angle and note down
5. Inspect the filter DP and clean/replace the filter if required
6. Clean the lube oil skid and coolers properly without disturbing the valves and other instruments
7. Removal of scrap if any in fan area
8. Inspection of air & flue gas leakages from fans and note down
9. Inspection of insulation and cladding sheets and if any abnormality note down the same
10. Inspection of fan motor area and note down any oil leakages (if applicable)
11. Record all the abnormalities and submit the same to Engineer In-charge
12. Return PTW

## **70. INSPECTION & CLEANING OF SILENCER, SUCTION & DIFFUSER DUCTS OF ID/PA/FD FAN**

1. Ensure PTW with all required isolations & precautions
2. Open manhole Doors
3. Place exhaust fans on the inspection door if required.
4. Place 24 V DC light inside ensure sufficient illumination.
5. Clean the suction duct & discharge duct free from ash, dust & also all foreign materials.
6. Erect the proper scaffolding for silencer inspection & get it approved
7. Inspect the silencer support clip plates welding proper or not and do DPT if necessary and repair if any defect found
8. Inspect the Guide vanes and casing support brackets properly and do required hard facing if necessary for both suction & discharge ducts
9. Inspect the bracings and their supports properly in suction & discharge ducts and repair if any
10. Remove the scaffolding from suction duct after approval from Engineer In-charge
11. Once again check the suction & discharge ducts for any foreign materials etc and remove the same
12. Close the Manhole doors by applying proper gasket and sealant and make it leak proof(The defect liability period will be 1 year and In case any leakage happens from manhole within next 1 year the same has to be attended by the vendor at free of cost)

**Note - Scope of work includes issuing of spares if required during maintenance**

## **71. FAN CASING LIFTING FOR BLADES INSPECTION & CLEANING, INTERNAL OIL LEAKAGES ATTENDING – FD/ID/PA FANS**

1. Ensure PTW with all required isolations & precautions
2. Open manhole Doors
3. Place 24 V DC light inside ensure sufficient illumination.
4. Clean the suction duct & discharge duct free from ash, dust & also all foreign materials
5. Remove the fabric bellows at suction & discharge side of casing
6. Remove the insulation sheets for casing bolts removal
7. Remove the casing bolts and store properly
8. Arrange the sling ropes for casing lifting
9. Using EOT lift the casing and place it on the 6 stands provided
10. Inspect for any leakages on main bearing housing and servomotor side as well

11. Attend all the leakages founded in inspection
12. Remove the ash in servomotor hood
13. Clean all the blades thoroughly and inspect visually for any cracks on it. If any blade found cracked replace the blade as per EIC instruction
14. Check the blade angles w.r.t. casing for all the blades and adjust if any deviation wrt the punch mark on impeller
15. Torque tightening of all the blade bolts if required
16. Servomotor alignment check and correction
17. Inspect the coupling bolts at Fan & Motor side and tight if found loose
18. Inspect servomotor coupling elements and replace if found damage
19. Blade pitch trial and limit setting and adjustments if any
20. Inspection of suction and discharge ducts before box-up
21. Cleaning of the casing seating surfaces with buffing wheel and then applying suitable sealant
22. Casing box-up and then Bolts tightening
23. Fixing the casing joint fabric bellows and clamp tightening
24. All casing manholes box-up properly for leak proof sealing
25. Removal of scrap from workplace
26. Return PTW

**Note – MW Fitter has to be used for this job.**

## **72. REMOVAL AND REPLACEMENT OF BELLOW/RUBBER JOINT IN SUCTION/DIFFUSER SIDE – PA/FD/ID FANS**

1. Ensure PTW with all required isolations & precautions
2. Place 24 V DC light inside ensure sufficient illumination
3. Removal of bellow clamps from suction and discharge side
4. Inspection and if required replacement of the bellows
5. Setting of the bellows properly as per design
6. Fixing the clamps back in position and tightening
7. If only one side of bellow only(Suction or discharge) needs to be worked then only 50% of the Unit rate will be paid
8. If after work completion after starting the fan if leakages found again the same has to be attended by the vendor with no extra cost

**Note – MW Fitter has to be used for this job.**

## **73. INSPECTION/REPAIR/REPLACEMENT/SERVICING OF THE LUBE OIL PUMPS**

1. Ensure PTW with all required isolations & precautions
2. Ensure motor cable termination is done
3. Place 24 V DC light inside ensure sufficient illumination if needed
4. Take out the motor from the lube oil skid
5. Take out the pump along with suction piping & coupling with spider
6. Inspect and clean the suction strainer
7. Inspect the spider and replace if required
8. Inspect the coupling and replace if found damage
9. Inspect the pump for any seal leakages and replace if required
10. Servicing of the pump if replaced
11. Box-up of the lop with coupling, spider and all the lube oil piping and tight properly
12. Trail run of the pump and check for any abnormal sound, oil leakages if any
13. If found any problem the same to be attended and the cost is included in this scope only

14. Return PTW and remove all the scrap from workplace
15. The defect liability period will be 1 year and In case any leakage happens from manhole within next 1 year the same has to be attended by the vendor at free of cost

**Note – MW Fitter has to be used for this job.**

#### **74. OVERHAULING OF MAIN BEARING ASSY. FD/PA/ID FAN**

1. Ensure PTW with all required isolations & precautions
2. Remove the coupling from main bearing assembly shaft using suitable puller
3. If required the puller has to be fabricated by the vendor with the raw material supplied by the OPGC
4. Removal of the end covers of bearing assembly
5. Removal of the shaft and bearings from the housing
6. Removal of the bearings from the shaft if requires replacement
7. Replace the bearings if required
8. Take the dimensions of shaft, bearings and housings of bearing seating area accurately
9. After inspection of readings assemble the bearings onto the shaft properly
10. Assemble the shaft inside bearing housing and box-up end covers
11. Check the axial float of the shaft and adjust it to design value
12. Assemble back the Coupling into position and preserve the complete assembly
13. Remove the scrap at work area and do proper house keeping
14. Return PTW

**Note – MW Fitter has to be used for this job.**

#### **75. SERVICING OF SEALING AND COOLING AIR FANS OF ID FAN**

1. Ensure PTW with all required isolations & precautions
2. Open the fan suction duct and inspect the impeller for any damage or looseness
3. Check the discharge flap for freeness and attend if any problem
4. Check the damper bearings.
5. Check the damper bearings and replace if required
6. Clean the ash inside the fan casing and on the impeller
7. Assemble back all the internals and then casing
8. If required assistance for motor replacement and then box up.
9. Return PTW

**Note – MW Fitter has to be used for this job.**

#### **76. ALIGNMENT OF FAN WITH MOTOR FOR FD/PA/ID FAN**

1. Ensure PTW with all required isolations & precautions
2. Remove the coupling guard and fix the dial gauge
3. Lift the casing for fitting Dial gauge at Fan side
4. Adjust the Intermediate shaft cover for fitting dial gauge clamps
5. Take the clearances between bearing housing to its pedestal and check if it is in required range or not and adjust if required
6. Take the readings and note down the values
7. Check & Adjust the Magnetic center distance as per OEM value wherever applicable
8. Take the alignment readings and adjust the values to Required values with the shims
9. Full tightening of Base bolts after final adjustment and take reading once more
10. After final reading is attained within design value inspect along with Engineer In charge and take approval for box-up

11. Remove dial gauge and clamps and then tight the coupling bolts fully to required torque value
12. Position back the intermediate shaft cover to its position
13. Remove all the foreign material and box-up the casing, manholes and coupling guards and others
14. Return PTW

**Note – MW Fitter has to be used for this job.**

#### **77. REPLACEMENT OF SERVO MOTOR (HAD-Hydraulic Adjustment Device) IN FAN ROTOR, FD/ID/PA FAN**

1. Ensure PTW with all required isolations & precautions
2. Open the manhole door at diffuser side and enter into the servomotor chamber ( In case of ID Fan it is suggested to lift casing for better & safe work on Servomotor)
3. Remove the oil piping, couplings, impeller covers and takeout the servomotor
4. Replace the new/repaired servomotor
5. Assemble the Impeller Cover and bolt the HAD to the end cover. Assemble the Lube oil piping
6. Start LOP to check blade pitch operation
7. If blade pitch found operating normal and no oil leaks found then proceed for further step. Otherwise replace the HAD
8. If HAD found healthy then go for HAD alignment wrt main rotor
9. Assemble the couplings of had back to position
10. Limit setting in coordination with C&I and Operation team
11. All Manholes Box-.up
12. Return PTW

**Note – MW Fitter has to be used for this job.**

#### **78. SERVOMOTOR INSITU INSPECTION, COUPLING REPAIR, LINK RODS TO ACTUATOR SERVICING, FD/ID/PA FAN**

1. Ensure PTW with all required isolations & precautions
2. Open the manhole door at diffuser side and enter into the servomotor chamber
3. Inspect the coupling elements for any damage and replace the same if damaged
4. Inspect the Link rod bearings for freeness and greasing
5. Inspect and replace the Oil seals of Link rod bearings if required
6. Inspect the coupling of pneumatic cylinder and rectification
7. Limit setting in coordination with C&I and Operation team
8. All Manholes Box-.up
9. Return PTW

**Note – MW Fitter has to be used for this job.**

#### **79. SERVO MOTOR (HAD) SERVICING, FD/ID/PA FAN FD/PA/ID FAN**

1. Ensure PTW if required
2. Open the HAD feedback rod, cylinder end cover
3. Remove the piston locknut and take piston outside
4. Take the cylinder body out from the piston shaft
5. Dismantle servo head assembly in sequence without damaging any part and store properly
6. Observe if any of the O-rings found damage

7. Remove and replace all the bearings of Piston shaft as well as Feedback rod
8. Replace all the oil seals and O-rings of Servo head assembly and also Cylinder
9. Replace if any of the items found damage
10. Assemble back the items in reverse order
11. After final box-up keep the cylinder in test jig and connect to oil pump
12. Run the oil pump and raise the pressure up to 50 bar for testing leakages
13. Operate the command shaft and test the total stroke of the cylinder
14. Set the stroke to design value using limit bolts
15. After final setting remove the HAD from test jig and keep properly

**Note – MW Fitter has to be used for this job.**

#### **80. SERVICING OF THE LUBE OIL PUMPS FD/PA/ID FAN**

1. Ensure PTW if required
2. Open the lube oil pumps end covers and inspect the seals & bearings
3. Remove the pump internals and inspect
4. Thoroughly clean the internals before reassembly
5. Replace the damaged parts wherever applicable
6. Replace the oil seals and bearings as per requirement
7. Final box-up and test for smooth operation and store properly
8. Return PTW

**Note – MW Fitter has to be used for this job.**

#### **81. LUBE OIL PUMP COUPLING/SPIDER REPLACEMENT FD/PA/ID FAN**

1. Ensure PTW with all isolations
2. Shifting of the spares to job location
3. Ensure Motor cable termination and then remove the LOP motor and take it out
4. Decouple the Lube oil piping as per requirement
5. Inspect the coupling and Spider and replace if damaged
6. Inspect and replace the pump if damaged or found jammed.
7. Assemble back the pump in position along with coupling, spider and Lube oil piping
8. Place the motor back in position
9. Take the Motor trail and check for Lube oil pressures and observe for any leakages and arrest the same if found
10. Return the PTW if all found normal

**Note – MW Fitter has to be used for this job.**

#### **82. INSPECTION/REPLACEMENT OF LUBE OIL PUMP FD/PA/ID FAN**

1. Ensure PTW with all isolations
2. Shifting of the spares to job location
3. Ensure Motor cable termination and then remove the LOP motor and take it out
4. Decouple the Lube oil piping as per requirement
5. Take the LOP along with coupling and also the suction piping
6. Inspect and clean the suction strainer
7. Inspect the coupling and Spider and replace if damaged
8. Inspect and replace the pump if damaged

9. Assemble back the pump in position along with coupling, spider and Lube oil piping
10. Place the motor back in position
11. Take the Motor trail and check for Lube oil pressures and observe for any leakages and arrest the same if found
12. Return the PTW if all found normal

**Note – MW Fitter has to be used for this job.**

### **83. LUBE OIL SKID OIL LEAKS ARRESTING, FD/PA/ID FAN**

1. Identify all the leakages prior to taking PTW and mark or tag properly
2. Ensure PTW with all isolations
3. Attend the all identified leakages and apply proper sealants, O-rings & gaskets and tight properly
4. This scope includes all the lube oil piping inside and outside the lube oil skids up to Fan casing and also includes up to motor bearings
5. After completion of work start pump and check for any leakages
6. Return PTW when there is no visible leakages

### **84. LUBE OIL COOLER SERVICING & HYDRO TEST**

1. Ensure PTW with all isolations
2. Shift the hydro test pump to job site
3. Remove the dummies from cooler and connect it to test pump
4. Raise the pressure up to test pressure as mentioned on Cooler and hold at this range and observe the pressure drop
5. If there is no considerable pressure drop then De pressurize the system and assemble the end covers back to position
6. If any leakages found in cooler tubes then repair/replace the cooler
7. Take trail after normalization and check for any leakages
8. Return PTW

### **85. SERVICING/REPLACEMENT/SETTING OF VALVES (PRV/NRV/3-WAY VALVES ETC) FD/PA/ID FAN/APH**

1. The scope of work includes servicing of any Pressure Relief valve, pressure regulating valves, Non return valves, Isolation valves and 3-way valves located in Lube oil skids of ID/PA/FD Fans and the amount quoted should refers to one no of valve only
2. Ensure PTW with all required isolations & precautions
3. Open the valve/PRV from the lube oil piping
4. Open the valve/PRV and inspect the internals for any damage or foreign materials
5. Repair/replace the valve if found any damage
6. Clean the internals thoroughly and replace the valve back to position
7. In case of PRV please do pressure setting also after starting the Lube oil pump
8. Take trail run and check if any leakages and attend the same if any
9. Return the PTW

**Notes** - One BOQ value should refers to cost of one no of valve or one no of PRV servicing.

## **86. PM OF SEAL AIR FAN**

1. Ensure PTW
2. Inspect the seal air fan for any casing air leakages and other flange leakages and record the same for attending during opportunities
3. Inspect for oil leakages in fan bearing housing area and note down the same if any
4. Inspect for oil level in the bearing housing
5. Inspect for any abnormal sound from the fan and Bearing housing
6. Inspect the fan bearing housing by touching with hand and observe for any high temperature
7. Inspect the damper and actuators properly intact or not
8. Record all the observations and list out the defects for attending in opportunities
9. Return PTW

## **87. SEAL AIR FAN COUPLING REPLACEMENT**

1. Ensure PTW
2. The scope includes Decoupling, inspection and replacement of coupling
3. Decouple the Fan with motor by removing the coupling bolts or Coupling grid
4. Inspect the coupling element and replace if required
5. Inspect the coupling and replace if damaged
6. The Alignment is not included in the scope and if alignment has to be done then the same will be covered in below line item
7. Box-up the coupling and fix coupling guard
8. Return PTW

**Note – MW Fitter has to be used for this job.**

## **88. SEAL AIR FAN ALIGNMENT**

1. Ensure PTW
2. Remove the coupling guard
3. Fix the alignment clamp and then fix dial gauges
4. Check the coupling gap as per design or not and correct if required
5. Take the alignment readings and note down the same
6. Correct the readings to desired value by adjusting the shims
7. After final reading achieved tight all the fixing bolts fully
8. Take one more final reading and then get it approved by EIC
9. Do the coupling
10. Return PTW

**Note – MW Fitter has to be used for this job.**

## **89. SEAL AIR FAN BEARING INSPECTION/REPLACEMENT, CLEARANCE CHECKS**

1. Ensure PTW
2. Remove the bearing end covers and inspect the oil seals
3. Take the clearance of bearing using feeler gauge
4. If clearance found high replace the same
5. Replace the Oil seal assembly if required
6. Check the bearing to housing clearance using lead wire and adjust the same if required
7. Assemble back the bearing housing

8. Final Box-up and return PTW

**Note – MW Fitter has to be used for this job.**

#### **90. SERVICING OF SEAL AIR FAN SUCTION STRAINER**

1. Ensure PTW
2. Arrange scaffolding approach if required
3. Open the inspection door (If not available cut an inspection hole in the duct)
4. Inspect the strainer for accumulation of dust/ash or any foreign material
5. Clean the Ash/dust from the strainer
6. Check the Locking of strainer with duct proper or not and correct the same
7. Take the clearance and then Box-up the inspection door
8. Remove scaffolding if erected
9. Return PTW

#### **91. SEAL AIR FAN CASING/DAMPERS LEAKS ARRESTING**

1. Observe and mark the leakages before taking PTW
2. Ensure PTW
3. Arrange scaffolding approach if required
4. Replace the gaskets/ropes etc wherever require
5. Do the welding wherever required to arrest leakages
6. Return PTW

#### **92. OIL SEAL/LABYRINTH SEAL REPLACEMENT/INSPECTION IN DE/NDE BEARING OF SA FAN**

1. Observe and mark the leakages before taking PTW
2. Ensure PTW
3. Drain the oil from the housing
4. Remove the bearing end covers and check the sealing assembly
5. Repair/replace the seals if required
6. Box-up the bearing housing
7. Fill the oil back into position and check for any leakages
8. Return PTW and observe for any leakages after starting the fan
9. If any leakages found attend the same immediately

**Note – MW Fitter has to be used for this job.**

#### **93. COMPLETE OIL REPLACEMENT IN DE & NDE BEARINGS OF SA FAN**

1. Ensure PTW
2. Drain the oil from the housing and observe for any metal particles
3. Remove the bearing covers if metal particles found for bearing inspection
4. Fill the bearing with some oil and again flush the bearing housing
5. Remove and clean the view glass properly
6. Fix the view glass back in position
7. Fill the bearing housing with the oil
8. Check for any visible oil leakages and attend immediately if found
9. Return PTW

## **(C) AIR PREHEATER:**

### **94. SERVICING & REPLACEMENT OF LUBE OIL PUMPS**

1. Ensure PTW and required isolations
2. Drain the oil properly from the pump
3. Decouple the motor with the pump
4. Remove the suction & discharge piping connections with the pump
5. Remove the pump and replace it with new pump
6. Connect the lube oil piping with the pump
7. Check the coupling & spider and replace if any damage
8. Position the motor and do the alignment
9. Fill the pump with some oil
10. Final Box-up and then return PTW
11. Take trail and if any abnormality found attend the same
12. For servicing of pump remove the pump end covers and then open all the internals
13. Inspect the mechanical seal and replace if damaged
14. Inspect the internals of the pump and replace the damaged
15. Clean all the parts thoroughly and then assemble back
16. Fill the preservation oil

**Note: Note – MW Fitter has to be used for this job. The line item includes cost of both servicing & replacement. If only either replacement or servicing done 50% amount only will be paid**

### **95. REPLACEMENT OF LUBE OIL PUMP COUPLING/ COUPLING SPIDER**

1. Ensure PTW
2. Loose the motor base bolts and take the motor away
3. Inspect the coupling and spider and replace if found any damaged
4. Fix the motor back in positions and do the alignment
5. Return PTW

**Note –**

1. **MW Fitter has to be used for this job.**
2. **The line item quantity of 1No. Includes cost of replacement of spider. If coupling also replaced then 1.5 times of line item cost will be will be paid**

### **96. APH & APH LOS PM**

1. Ensure PTW
2. Clean the Support & guide bearing Lube oil skids properly
3. Check the oil level of guide bearing, support bearing and Gearboxes
4. Top up the equipment with suitable oil if found low level
5. Check for any oil leakages in the skid & Gearbox area and note down
6. Attend the leakages after getting clearance from operation team
7. Note the oil pressures and temperatures
8. Clean the standby Lube oil filter
9. After cleaning filter changeover will be done and then clean the second filter also

10. Remove the Ash at Guide bearing area
11. Remove the Metal scraps in APH area
12. Do the house keeping in APH
13. Check for any air and gas leakages in APH and note down
14. Check for any hot air leakages near gearbox & guide bearing area and note down
15. Check for insulation missing areas and note down
16. Check for the damper link rod connections proper or not and if any problem report
17. Listing all the problems and submitting to OPGC.
- 18. 1 BOQ IS FOR PM OF ONE APH.**

#### **97. OIL REPLACEMENT IN APH GUIDE BEARING/SUPPORT BEARING/GEARBOX**

1. Ensure PTW
2. Drain the oil from the respective equipment
3. Open the access doors and then clean the internals with cotton cloth
4. Inspect the internals for any damage and report the same if any found
5. Remove the oil breathe & filters, clean properly and fix back
6. Clean the view glass if any
7. Box-up the access doors
8. Fill the equipment with some oil and do flushing
9. Fill the equipment with the suitable oil up to normal level
10. Refill the oil up to normal level and ensure no oil leakages
11. Return PTW

**Note - Here one line item includes cost of only one equipment like Guide bearing or Support bearing or Gearbox only.**

#### **101. ASH CLEANING OF GUIDE BEARING AREA**

1. Ensure PTW
2. Wear required PPE
3. Remove the ash from Guide bearing area
4. Collect the ash into suitable bags
5. Dispose all the bags at proper disposal area
6. Return PTW

**Note - Here One quantity refers to cost for one APH Guide bearing only**

#### **102. REPLACEMENT OF OVER RUNNING CLUTCH**

1. Ensure PTW
2. Decouple and then remove the drive motor
3. Remove the coupling from the input shaft
4. Remove the clutch hosing assembly from the gearbox
5. Decouple the clutch from bevel gear shaft
6. Remove the clutch from the shaft using suitable puller
7. Replace the clutch
8. Assemble back the clutch to bevel shaft
9. Assemble the clutch housing to gearbox
10. Set the bearings and oil seals properly
11. Assemble the coupling to the clutch shaft
12. Reposition the drive motor and do the alignment

13. Coupling with motor and then box-up
14. Take trail and then return the permit if everything is normal
15. Repair the clutch later

**Note – MW Fitter has to be used for this job.**

### **103. SERVICING & REPLACEMENT OF FLUID COUPLING**

1. Ensure PTW
2. Decouple the fluid coupling from the gearbox and take outside
3. Replace new coupling and couple properly
4. Check the condition of fusible plug and replace if required
5. Fill the new coupling with required amount of oil and then plug the filling hole properly
6. Fix the alignment fixture and do the alignment and record the reading
7. Get the approval from EIC regarding Alignment reading and then remove alignment fixture
8. Box-up the coupling guard and surrender for operation
9. Dismantle the fluid coupling
10. Observe the bearings and replace if damaged
11. Observe for any shaft undercuts at oil seal area and if found get the work done in workshop(the scope not includes machining works but includes manpower assistance for coupling transportation within site workshop)
12. Replace the Oil seals and O-rings
13. Clean the impellers and runners properly
14. Assemble the coupling properly
15. Fill the coupling with oil and store properly
16. Return PTW

**Note – MW Fitter has to be used for this job. One BOQ refers to cost of both replacement & servicing. If either of replacement or servicing done then only 50% of BOQ cost will only be paid**

### **104. FUSIBLE PLUG REPLACEMENT & OIL FILLING OF FLUID COUPLING**

1. Ensure PTW
2. Remove the Coupling guard
3. Check fusible plug for any damage
4. Drain the residual oil in the fluid coupling
5. Fill some oil in the fluid coupling flush and drain again
6. Fill the oil up to suitable level as per OEM recommendation
7. Replace the fusible plug and then tight properly with suitable gasket
8. Take trail and check for any leakages
9. Return PTW

**Note – MW Fitter has to be used for this job.**

### **105. SERVICING OF AIR MOTOR**

1. Ensure PTW
2. Remove the air motor vane assembly and clean the vanes properly
3. Check whether the air ports clear or not and clean properly
4. Check whether any gaskets damaged and replace if found any damage
5. Open the gearbox and check for any internals damage

6. Replace if any internal part found damage or assemble the old one
7. Clean the internals properly
8. Replace the bearings and oil seals if required
9. Assemble back the gearbox and fill the oil
1. Assemble the vane assembly back into air motor casing correctly. (If any vanes damaged or air motor needs replacement then it also included in the scope)
2. Connect the air piping to air motor and then take trail for air motor operation
3. Return PTW after work

**Notes:**

- i. MW Fitter has to deployed for this job
- ii. One BOQ includes either of servicing of Air motor or Air motor gearbox. If both have done then 2 BOQ amount will be paid

**106. REPLACEMENT OF AIR MOTOR**

1. Ensure PTW
2. Decouple the air motor with gearbox
3. Remove the air motor assembly from the gearbox
4. Repair/replace the air motor
5. Assembly back to gearbox
6. Take trail and return PTW

**Note – MW Fitter has to be used for this job.**

**107. SERVICING OF MIST LUBRICATOR**

1. Ensure PTW
2. Drain the oil from lubricator
3. Remove the lubricator from the air piping
4. Check for internals and repair/replace if required
5. Fill the oil
6. Assemble back to position
7. Return PTW

**108. ALIGNMENT OF MAIN MOTOR/AIR MOTOR**

1. Ensure PTW
2. Arrange 24 V lights for sufficient illumination
3. Install then alignment clamp and then dial gauges
4. Take the readings and note down
5. Adjust the shims to get desired reading
6. Check and adjust the coupling gap if needed
7. Take the reading after shims adjustment
8. Full tight the base bolts and then take final reading and if found within design value remove the alignment fixture
9. Tight the coupling bolts properly
10. Fill the oil in fluid coupling if required
11. Box-up the coupling guard
12. Remove all the T&P from the work area
13. Return PTW

**Note – MW Fitter has to be used for this job.**

## **109. APH MANHOLES OPENING AND CLOSING FOR INSPECTION WORKS**

1. Ensure PTW
2. Arrange 24 V lights for sufficient illumination
3. Open all the manholes of Hot end and cold end for both air and flue gas
4. Inspect for radial ,axial, bypass and other seals & seal tabs condition and inform to EIC
5. Inspect for any bellow and duct leakages and note down
6. Removal of foreign material if found any
7. Inspect the condition of APH baskets
8. Arrange scaffolding of up to 2x2 sq meter at cold end if instructed by EIC for cold end baskets inspection
9. Box-up the coupling guard
10. Remove all the T&P from the work area
11. Return PTW

## **110. RADIAL SEAL REPLACEMENT/SETTING**

**Note - This scope covers radial seal repair/replacement (partial or full length) of one module and also includes seal gap setting.**

1. Ensure PTW
2. Open the manhole doors
3. Arrange 24 V lights for sufficient illumination
4. Inspect the radial seals for any damages
5. Replace the damaged seals including the seal tabs.
6. Install the straight edge if needed
7. Adjust the seal gap wrt sector plate as per design value
8. Rotate the APH and set the radial gap setting for all the seals
9. Remove all the T&P and scrap and foreign material from the APH
10. Box-up the ,manholes and ensure all the manholes to be seal proof
11. Return PTW

**Note – MW Fitter has to be used for this job. One BOQ refers to cost of replacement of one radial seal assembly of around 6.617 meter.**

## **111. APH COLD END FLUE GAS SIDE SCAFFOLDING & INSPECTION**

1. Ensure PTW
2. Take all the necessary safety precautions
3. Shift all the scaffolding material to APH
4. Open the manhole doors
5. Arrange 24 V lights for sufficient illumination
6. Arrange the life line
7. Ensure all the people to wear safety harness and other safety PPE
8. Arrange the scaffolding as per requirement
9. Use only metallic pipes and jolleys for scaffolding
10. Ensure the scaffolding is certified by safety department
11. Tie all the gratings properly & rigidly
12. After completion of work remove all the scaffolding material
13. Box-up the manholes

14. Return PTW
15. Shift the scaffolding material to stores again and store properly

## **112. SECTOR PLATE LEVELLING & CHECKING**

1. Ensure PTW
2. Open the manholes of APH
3. Arrange 24 v Lamps for sufficient illumination
4. Select any one of radial seal and check the sector plate to seal radial seal gap w.r.t. any that seal
5. Note the readings of all the 3 sector plate at both ends of sector plates at Inboard, middle and out board also
6. If the readings is found different for the 3 sector plates then adjust the sector plate to same value
7. Clean the LCS system of sector plate adjustment mechanism
8. Using suitable tool Adjust the both track rods of the sector plate to match the suitable clearance w.r.t. radial seal
9. Do the greasing of the gearbox if required
10. Adjust all the 3 sector plates to required clearances
11. Box-up the gearbox mechanism
12. Adjust the tracking rod indicator and set to correct value
13. Remove all the T&P and other foreign materials inside APH
14. Box-up all the manholes doors
15. Return PTW

**Note – MW Fitter has to be used for this job. One BOQ refers to complete 1 no of APH i.e 3 sector plates.**

## **113. APH ROTOR LEVEL & GUIDE BEARING ALIGNMENT INSPECTION & CORRECTION**

1. Ensure PTW
2. Open the manholes of APH
3. Arrange 24 v Lamps for sufficient illumination
4. Arrange the master level at Out board end of the module
5. Clamp the master level properly and set the value to zero
6. Rotate the APH and take the master level readings at each 90 degrees
7. If the reading is found mire that the design value then adjust the rotor level using adjuster bolts at Guide bearing housing
8. Set the rotor level reading in design value throughout the rotor
9. Open the guide bearing housing cover
10. Cover the bearing properly so that no foreign material should enter the bearing housing
11. Arrange the dial gauge onto the trunion shaft and take run out reading of shaft w.r.t. bearing housing
12. If the run out value found more than the desired value then adjust the same if found more
13. Temporarily lock the rotor during run out adjustment if required
14. After adjustment is over remove the temporary locking
15. Take the final reading of rotor level with master level and Run out of guide bearing w.r.t. trunion shaft, both parallel and note down the readings and go for correction again till the design value obtained
16. Replace the guide bearing oil if required
17. Box up the guide bearing housing and seal properly using packing rope and sealant

18. Remove the T&P and other foreign material inside APH
19. Box up all manholes
20. Return PTW

**Notes:**

- i. MW Fitter has to deployed for this job
- ii. One BOQ refers to complete 1 no of APH

**114. ONLINE DUCT LEAKAGE ATTENDING**

1. Ensure PTW
2. Observe the leakages
3. Remove ash if present
4. Apply refractory or suitable sealant
5. Hold for few minutes
6. Return PTW

**115. AIR SEAL ASSY. LEAKAGE ATTENDING**

7. Ensure PTW
8. Clean the air seal assembly area
9. Ensure seal air piping is through
10. Open the seal assembly covers
11. Replace the gland ropes and gaskets
12. Find any welding leakages and attend the same
13. Close the seal assembly covers properly and tightening
14. Apply refractory at missing areas nearby seal assembly area
15. Return PTW

**116. SECTOR PLATES TIE RODS GLAND ROPE REPLACEMENT**

1. Ensure PTW
2. Clean the tracking rod area
3. Open the gland assembly covers and gland follower
4. Remove the old gland packing if damaged
5. Replace the new gland packing
6. Fix the gland follower back in position
7. Box up the gland cover
8. Repeat the same for all tracking rods of the APH

**Note - This scope covers one No of APH tracking rods completely i.e 6 Nos completely. If only partial done then payment will be on prorate basis**

**117. APH GEARBOX DEFECTS ATTENDING DURING SHUTDOWN (LEAKAGE, HIGH TEMP.)**

1. Ensure PTW
2. Observe the oil leakage area
3. Attend the oil leakages
4. Replace the oil seals if leakages found

5. Apply putty or M-seal if not possible to attend the leakage
6. Top-up the oil of level found low
7. Clean the grease tubing and then apply grease to output shaft
8. Box up and then Return PTW

**Note – MW Fitter has to be used for this job.**

### **118. RACK PINION ARRANGEMENT INSPECTION**

1. Ensure PTW
2. Open the Pin rack access door at gearbox bottom
3. Check visually for any wear out at Pin rack pins and pinion gear
4. Check and note the pin rack gap and adjust the gap if required
5. Close the access door and apply proper gasket and sealant
6. Return PTW

**Note – MW Fitter has to be used for this job.**

## **(D) GATES, DUCTS & DAMPERS**

### **119. DAMPER / GATE SERVICING**

1. Ensure PTW
2. Inspect the damper for the problems
3. Arrange the scaffolding for ease of access wherever required
4. Repair the damaged link and reconnect
5. Replace the damaged bearings if required and grease all the bearings
6. Check the freeness of each flap and make it freely operating.
7. If required use a chain block for freeness of flaps
8. Properly tight all the dampers locknuts and install lock pin properly
9. Inspection of damper gearbox supports and repair
10. Providing stiffeners for the supports if required
11. Final connection of all the links as per drawing
12. Check for free operation of damper
13. Remove the scaffolding if installed
14. Return PTW

### **120. DAMPER / GATE INSPECTION & DEFECT ATTENDING**

1. Ensure PTW
2. Inspect the gate for the problems
3. Arrange the scaffolding for ease of access wherever required
4. Inspect the gearbox to gate connection/coupling and rectify if any problem
5. Replace/servicing of Gearbox or its internals if required
6. Replace the damaged bearings if required
7. Check the freeness of each gate and make it freely operating.
8. If required use a chain block for freeness of gate
9. Properly tight all the bolts and install lock pin properly
10. Inspection of gate gearbox supports and repair
11. Providing stiffeners for the supports if required
12. Final connection of all the links as per drawing

13. Check for free operation of gate
14. Remove the scaffolding if installed
15. Return PTW

**121. DAMPER LINK PIN/ROD REPLACEMENT/MECH LOCK INSTALLATION/  
MECHANICAL FREENESS AS PER REQUIREMENT**

1. Ensure PTW
2. Inspect the damper for the problems
3. Arrange the scaffolding for ease of access wherever required
4. Repair the damaged link and reconnect
5. Replace the damaged bearings if required and grease all the bearings
6. Check the freeness of each flap and make it freely operating.
7. If required use a chain block for freeness of flaps
8. Properly tight all the dampers locknuts and install lock pin properly
9. Inspection of damper gearbox supports and repair
10. Providing stiffeners for the supports if required
11. Final connection of all the links as per drawing
12. If the damper needs to be locked as per operation arrangement do the mechanical locking
13. Remove the scaffolding if installed
14. Return PTW

**(E) FOPH, AUX BOILER, DRAIN FLASH TANK**

**122. PM JOB OF HFO/LDO/DRAIN OIL PUMP (3 MONTHLY)**

1. Ensure PTW with isolations
2. Check for mechanical seal leakages and replace the seal if leakages found
3. Check for leakages in flanges and attend the same
4. Check the freeness of the pump and rectify if any problem
5. Open the rear cover of pump and check the condition of screws and bearings
6. Lubricate the bearings with suitable oil/grease as per OEM recommendation
7. Check the coupling condition and replace if any damage of internals
8. Do the servicing of relief valve if required
9. Attend all leakages in the pump
10. Clean the suction strainers and filters associated with the pump
11. Check the tightness of motor and pump base bolts
12. Do the alignment if replacement in case of any mechanical seals/coupling or any other internals
13. Box up the equipment
14. Return PTW

**123. PM JOBS OF HFO/LDO TANKS**

1. Ensure PTW
2. Check for leakages in flanges and attend the same
3. Check whether level indicator properly working or not
4. Check whether tank heaters(Wherever installed) properly working or not
5. Attend the steam leakages if any in HFO tank heaters
6. Check for any rusting/corrosion of tank and inform if any abnormality

7. Check all the valves associated with tanker properly operating or not and if any problem inform the same
8. Return PTW

#### **124. HFO/LDO/DRAIN PUMP OH/SERVICING**

**Note:** The scope includes both replacement of pump and then overhauling the replaced pump or in-situ overhauling of the pump

1. Ensure PTW with required isolations
2. Decouple the pump and remove the pump
3. Replace the new spare pump if available or Overhaul the same pump and then replacement
4. After replacement do the alignment within allowable limit
5. Box up and trail run of the pump after work completion
6. Open the replaced pump for overhauling
7. Remove all the internals from the pump in sequence
8. Clean all the internals like screws, cartridge, bearings and bushes, seals and O-rings properly
9. Inspect the mechanicals seal condition and replace if found damaged or wear out
10. Inspect the screw and cartridge condition for wear out and check clearance between screw and cartridge. If clearance found high replace the screw set along with cartridge
11. Replace all the bearings, O rings and oil seals
12. Lubricate the bearings with suitable oil/grease as per OEM recommendation
13. Open relief valve and clean all the internals
14. Replace the damaged internals if any
15. Box up the relief valve assembly and kept the spring load at minimum and adjust the same during trail run after pump installation
16. Box up the equipment
17. Return PTW

#### **125. UNLOADING OF FUEL OIL ROAD TANKERS/WAGONS**

1. Ensure PTW
2. Assistance in oil testing include in this scope
3. Install the unloading hose to the tanker and tight properly
4. Open the tanker valve fully and check for any leakages
5. If any leakages found close the tanker valve immediately and attend the leakages
6. After opening the valve and no leakages found inform for operation team for starting unloading pump
7. Wait till the completion of unloading
8. Inspect and ensure tank is fully unloaded and no oil left in tanker
9. Return PTW

#### **126. HFO/SCAPH HEATERS AOH**

1. Ensure PTW
2. Observe for any leakages in the heater and note down before isolations
3. Drain the oil in a suitable container
4. Replace the flange gaskets and tight fully to required torque value
5. Observe for any damage of tube and dummy the same if required
6. Do the servicing of valves associated with heaters

7. Do the hydro test if needed
8. Box up the equipment
9. Charge the heater and check for any leakages
10. If further leakages found the same has to be attended in this scope only
11. Return PTW if no leaks found

#### **127. HFO/LDO/DRAIN PUMP LUBRICATION**

1. Ensure PTW
2. Inspect the oil level/grease condition of bearings
3. Refill/replace the lubricant with sufficient quantity as per OEM recommendation
4. Box-up the bearing housing
5. Return PTW

#### **128. AUX BOILER BFP/BOOSTER PUMP PM (4 MONTHLY)**

1. Ensure PTW
2. Check for any water leakages in the pump and attend the same
3. Check for lubricant condition and replace the same if required
4. Check for coupling condition and repair/replace if needed
5. Check the mechanical seal/gland packing condition and replace if having leakage
6. Check for tightness of the base bolts properly
7. Check the NRV condition and clean and install properly
8. Check the cooling water piping and clean thoroughly
9. Clean the strainers installed and fix back in position
10. Do the alignment if any internals replaced
11. Box-up all the equipment properly
12. Return PTW

#### **129. AUX BOILER FD FAN PM (4 MONTHLY)**

1. Ensure PTW
2. Check for any air leakages and attend the same
3. Check for any gland rope/gasket leakages and attend the same properly
4. Check for any duct/casing leakages and do attend/welding the same properly
5. Inspect and servicing of suction and discharge damper expansions bellows
6. Inspect and servicing of suction and discharge side expansions bellows
7. Checking the lubricant condition and replace/refill to normal level
8. Check for coupling condition and rectification
9. Do the alignment if the vibrations found high
10. Properly box up all the equipment
11. Return PTW

#### **130. FLASH TANK DRAIN TANK CONDENSATE PUMP (BI – MONTHLY)**

1. Ensure PTW
2. Check for any water leakages in the pump and attend the same
3. Check for lubricant condition and replace the same if required
4. Check for coupling condition and repair/replace if needed
5. Check the mechanical seal/gland packing/oil seal condition and replace if having leakage
6. Check for tightness of the base bolts properly

7. Check the NRV condition and clean and install properly
8. Check the cooling water piping and clean thoroughly
9. Clean the strainers installed and fix back in position
10. Do the alignment if any internals replaced or if vibration found high
11. Box-up all the equipment properly
12. Return PTW

## **(F) COAL MILLS, COAL FEEDERS, LUB OIL SYSTEM**

### **131. PREVENTIVE MAINTENANCE OF COAL MILL**

1. Ensure PTW
2. Open Pulveriser Access Doors
3. Place exhaust fans on the inspection door.
4. Place 24 V DC light inside ensure sufficient illumination.
5. Clean the internals of mills completely by removing coal and foreign materials.
6. Check the oil level in lube oil tank and if necessary top up the oil.
7. Check the oil level and quality in journal assembly with dip stick and top up if necessary.
8. Check and adjust ring to roll gap.
9. Check and adjust spring to journal head gap.
10. Check the condition of scrapper and adjust the scrapper clearance.
11. Check the gap between inner cone & inverted cone.
12. Check the gap between inner cone & center feed pipe.
13. Open the inner cone inspection door and inspect the internals.
14. Remove the gunny bags/wires or any other foreign materials from the classifier vanes.  
Adjust the classifier vanes setting.
15. Check the gape between the air restriction ring segments and bowl hub.
16. Repairing /welding of air restriction ring segment.
17. Check for spring tensioning as if required.
18. Purging of seal air line
19. Check coupling for wear or damages.
20. Check the Grinding roll and BRS wear.
21. Check trunion bolts condition, if damaged replace it with new ones.
22. Check head liner and skirt assembly, and as per the instruction of EIC replace or repair it.
23. Check the deflector conditions and if necessary repairing to be done.
24. Check the condition of vane wheel assembly and if necessary repairing to be done.
25. Check the condition of feeder o/l chute and transition piece, if necessary repairing to be done.
26. Check classifier vanes, if required repair or replacement to be done as per the instruction of EIC.
27. Lubrication of adjustment mechanism of classifier vanes.
28. If replacement of any spares required, issue it from store.
29. PM of lube oil system to be carried out in synchronous with the mill PM. No separate PM to be awarded for lube oil system.
30. Close all pulveriser access doors.
31. Housekeeping of Coal Mill

#### **Note –**

- 1. Scope of work includes issuing of spares if required during maintenance  
Proper housekeeping to be ensured after work is completed**
- 2. Ensure MWF for the job.**

- 3. PM of Coal Mill, Lube oil system and feeder will be taken on the same day but different gangs to be allocated for the work.**

### **132. OPENING OF MAN HOLE DOOR**

1. Open the manhole door as directed by the engineer in charge.
2. Close the manhole doors after completion of job/inspection etc. by putting proper rope/gasket as may be the case.

### **133. JOURNAL (ROLLER) ASSEMBLY GRINDING ROLL REPLACEMENT**

1. Open the separator body access doors.
2. Remove the seal air piping from the spring assembly.
3. Lower the journal so the grinding rolls is resting on the bowl by removing the stop bolt nut and fasteners. Remove the key, stop bolt & O-Ring.
4. Rig the journal opening cover through the two holes in the top. A choker around the end of the spring assembly with come-along up to the crane hook for balance may be used. Remove the fasteners and cover.
5. Tilt out the roller assembly.
6. Remove the grinding roll keeper.
7. Remove the set screws which are in the grinding roll face. Do not remove the set screws in the journal housing face.
8. Install the grinding roll removal lug, ensure that the bolts thread into the grinding roll, not the journal housing. Torque the bolts to 50 ft-lb.
9. Install a wire rope sling through the grinding roll removal lug.
10. Attach the rope sling to the overhead crane positioned above the centre of the grinding roll. Take up the slack.
11. Heat the grinding roll with a stress relieving blanket or similar device; monitor the temperature.
12. As the temperature of the roll approaches 93°C, apply a slight load on the rigging. Maintain a constant heat for approximately 45 to 60 additional minutes to insure that the roll is heated throughout.
13. Once the roll breaks free and lifts clear of the housing, move it away from the pulveriser to a suitable area to cool.
14. Clean the mating surfaces of the journal housing and the bore of the new roll.
15. Install the grinding roll removal lug on the new roll.
16. Use a stress relieving blanket or similar device to heat the new grinding roll. Monitor the roll temperature; it should not exceed 93°C.
17. Lift the roll and carefully lower it onto the journal housing.
18. Verify that the back face of the roll seats completely on the housing.
19. Remove the wire rope sling and grinding roll removal lug. Immediately install the grinding roll keeper plates and fasteners. Torque the fasteners to 310 ft-lb.
20. Allow the roll and journal housing to cool to near ambient.
21. Install the set screws into the face of the grinding roll.

#### **Note -**

- 1. Scope of work includes issuing of spares if required during maintenance.**
- 2. Ensure MWF for the job**
- 3. Hydra and operator to be provided as per the requirement by the contractor.**
- 4. Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

5. **Planned replacement of Grinding roll schedule to be given to contractor beforehand and the contractor should make proper arrangement prior to job. This includes shifting of spares from store to site, shifting of Tools, tackles and other consumables required for the work. Contractor should also be prepared for any unplanned replacement depending upon the equipment condition and instruction from EIC.**

#### **134. BULL RING SEGMENT REPLACEMENT**

1. Grind out the welds holding the vane wheel segment wear shrouds to the bowl extension ring segments. Remove the shrouds.
2. Match-mark the vane wheel segments to the bowl and bowl extension ring segments.
3. Remove the vane wheel segments and fasteners. They may be stored in the bottom of the mill. It is not necessary that they be removed from the mill unless they are damaged and will be replaced.
4. There are Grind welds between the bull ring segment end shims and the bowl extension ring segments. Grind them out and remove the shims.
5. Remove the fasteners holding the bowl extension ring segments to the bowl and lift out the bowl extension ring segments. Jackscrews have been provided in the bowl extension ring segments to aid in breaking the segments loose.
6. Remove bull ring clamping ring and Remove the bull ring segments.
7. If the bull ring clamping ring and keys are undamaged, they may be left in place. If they are damaged, remove them.
8. Clean the surface of the bowl.
9. If required, install the bull ring clamping ring segments with fasteners.
10. If required, install the key with fasteners.
11. Arrange the bull ring segments on the bowl in numbered sequence starting with the keyed segments #1 and proceeding clockwise. Be sure to push each segment down firmly against the bull ring clamping ring and driven counter-clockwise so that it is firmly up against the proceeding segment.
12. Bull ring segments side shims may be added or removed as required to make tight fitting assembly.
13. The upper surface of the segments should match within 1.5 mm. The total mismatch around the entire perimeter of the assembly must not exceed 3 mm.
14. Install the bowl extension ring segments with fasteners. To be sure that the segments are properly seated, use a feeler gage between the bowl extension ring segments and the bowl.
15. Replace the hex socket head set screws that were used to jack up the bowl extension ring segments. The screws should be flush to two turns below the surface.
16. At the middle of each segment, measure the gap between the segment and bowl extension ring segment.
17. Reinstall the vane wheel segments using fasteners.
18. Reinstall the vane wheel segment wear shrouds. Tack welds them in position.

#### **Note -**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job**
3. **Hydra and operator to be provided as per the requirement by the contractor.**
4. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**
5. **Planned replacement of BRS schedule to be given to contractor beforehand and the contractor should make proper arrangement prior to job. This includes shifting of spares from store to site, shifting of Tools, tackles and other consumables required**

**for the work. Contractor should also be prepared for any unplanned replacement depending upon the equipment condition and instruction from EIC.**

### **135. VANE WHEEL ASSEMBLY & DEFLECTOR REPLACEMENT**

1. Grind out the welds holding the vane wheel segment wear shrouds to the bowl extension ring segments. Remove the shrouds.
2. Remove the vane wheel segments and fasteners.
3. Grind out the welds that are holding the air restriction ring segments to the bottom of deflector liner support plate.
4. Grind out the plug welds that are holding the deflector liners and remove the liners.
5. Install the deflector side liner in position. Secure it in place with a C-clamp or two weld plugs with tack welds only.
6. Install the middle deflector liners in place working from the right to the left. Secure each with a C-Clamp or two weld plugs with tack welds only. The gap between liners should be equal at 3 mm, adjust as necessary.
7. Install the deflector side liner in position. Secure it in place with a C-clamp or two weld plugs with tack welds only, adjust as necessary.
8. Install the intermediate liners working from the left to the right. Trim the right side of the last liners if required.
9. Complete all of the weld plug welds.
10. Fill all of the gaps between the liners with RTV #732.
11. Fill the weld plug holes with filler.
12. Fasten the vane wheel segments to the bowl extension ring segments using fasteners.
13. Fasten the vane wheel support lugs to the bowl using fasteners.
14. Weld the vane wheel support lugs to the vane wheel segments.
15. Weld the vane wheel segment wear shroud to the vane wheel segments.
16. Weld the air restriction ring segments to close up the gap between the vane wheel segments and deflector liner support plate. Rotating the bowl by using a strap wrench on the gearbox input shaft will aid in verifying that the gap is uniform as the mill spins.

#### **Note -**

- 1. Scope of work includes issuing of spares if required during maintenance.**
- 2. Ensure MWF for the job**
- 3. Hydra and operator to be provided as per the requirement by the contractor.**
- 4. Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**
- 5. Planned replacement of vane wheel and deflector schedule to be given to contractor beforehand and the contractor should make proper arrangement prior to job. This includes shifting of spares from store to site, shifting of Tools, tackles and other consumables required for the work. Contractor should also be prepared for any unplanned replacement depending upon the equipment condition and instruction from EIC.**

### **136. JOURNAL ASSEMBLY SERVICING**

1. Drain the oil from the journal.
2. Remove the journal head liner assembly.
3. Remove the journal skirt assembly.
4. Remove the oil fill pipes. Plug the port in the end of the journal shaft with the pipe plug.

5. Remove the set screws in the face of the journal housing
6. Install the grinding roll removal lug; ensure that the bolts thread into the journal housing, not the grinding roll. Torque the bolts.
7. Install a wire rope sling through the grinding roll removal lug.
8. Attach the rope sling to the overhead crane positioned above the centre of the grinding roll. Take up the slack.
9. After removing the fasteners holding the journal shaft assembly to the journal head lift the journal shaft assembly off the journal head and take it to a maintenance facility.
10. Secure the shaft assembly to the foundation plate.
11. Remove the lower journal housing cover. Discard the O-Ring.
12. Unbolt the oil seal keepers and remove them.
13. Remove and discard the three oil seals. As the seals are removed, some residual oil may spill; be prepared for clean-up.
14. Unbolt and remove the two journal housing liners
15. Unbolt the upper journal housing cover and let it slide down to rest on the seal wear ring. When the O-ring seal loosens, some residual oil may spill; be prepared for clean-up. Discard the O-Ring.
16. Continue disassembly of the journal shaft by unbolting and removing the journal bearing keeper, cap screw lock plate, and bearing keeper shims.
17. Using a suitable puller, remove the inner outer race of the lower journal bearing from the journal shaft.
18. Attach lifting equipment, eyebolts and sling, to the journal housing. Lift the journal housing off the journal shaft. The upper and lower bearing inner races will remain inside the journal housing.
19. Using a suitable puller, remove the inner outer race of the upper bearing and spacer from the journal shaft.
20. Lift off the upper journal housing cover.
21. Using a suitable puller, remove the seal wear ring from the journal shaft.
22. Use a suitable puller to remove the upper and lower bearing cone assemblies from the journal housing.
23. Clean and inspect all components to determine required replacements.
24. Slide over the shaft the three solid oil seals and set them down on the flange. Be sure that the two closest to the large flange have the lips pointing towards the flange and the one farthest away from the flange has the lip pointing away from the flange.
25. Heat the new oil seal wear ring to 120°C and slide it into position on the journal shaft. The oil seal wear ring must be firmly seated against the shaft step before it cools.
26. Set the upper journal housing cover down over the journal shaft and block it up so that the end of the journal housing cover is at the same elevation as the end of the oil seal wear ring.
27. Grease the O-ring with molykote grease (or other equal product) and set in the upper journal housing cover groove.
28. Slide the journal bearing spacer over the journal shaft with the chamfer side against the shoulder.
29. Slide the inner race assembly for the upper bearing onto the journal shaft. It should rest firmly against the bearing spacer.
30. Chill the two tapered roller bearing outer races down to at least -15°C. Install both races in the journal housing and clamp them in place until the housing and race temperatures reach equilibrium.
31. Lower the journal housing assembly onto the journal shaft.
32. Install the inner race assembly of the lower tapered roller bearing on the journal shaft.
33. Attach the bearing keeper to the end of the journal shaft. Hand tighten the bolts.
34. When the component temperatures are equal, rotate the journal housing at least five times in each direction to seat the bearing rollers.

35. Remove the bearing keeper and use a depth micro meter to measure the gap between the end of the shaft and the edge of the lower bearing cone.
36. Assemble a shim set 0 ~0.05 mm more than the measured gap.
37. Install the shims, bearing keeper, and the lock plate, and torque the fasteners.
38. Install three eyebolts 120° apart on the bearing housing; attach chain shackles and a chain sling.
39. Centre a crane over the roll and shaft assembly and attach a chain fall, shackle, sling and load cell.
40. Install three dial indicators onto the bearing keeper plate. Rest the indicator needles on the machined surface of the journal housing.
41. Rotate the roll several times to be sure that the bearings are properly seated. Zero the indicators.
42. Number and mark the location of each indicator on the journal housing.
43. Rotate the journal housing five times and return to original indicator positions. If all indicator readings do not return to zero, repeat step.
44. Using the chain fall, apply a lift load (Lift Load with Roll) to the journal housing assembly.
45. Rotate the housing several times to be sure the bearings are properly seated. Align the indicators at their original positions, record the indicator readings, and average them.
46. Release the load on the journal housing assembly and rotate the housing several times to seat the bearings. Line up the indicators with their original marks. All indicator readings must return to zero.
47. Repeat procedure for bearing endplay checks five times and calculates the average of the averages. This average should be between 0.025 mm and 0.076 mm, the recommended initial endplay for new bearings. If the averaged readings are out of specification, add or subtract shims as necessary and repeat the bearing endplay check. When the measured endplay falls within the indicated range, remove the equipment used for checking, and proceed with the journal shaft reassembly.
48. Grease the lower journal housing cover O-ring with molykote grease or other equal product. Install the O-ring and the lower journal housing cover.
49. Replace pipe plugs in the lower journal housing cover using pipe sealant. Lubricate and replace setscrews in tapped holes; stake four places.
50. Remove the journal shaft from the foundation plate and turn the journal assembly over so that the lower journal housing cover is sitting on the floor. Verify that the O-ring is properly positioned between the upper journal housing and housing cover.
51. Fasten the upper journal housing cover to the journal housing.
52. Add to the journal assembly the journal oil thru the port in the end of the journal shaft.
53. Coat the journal housing cover upper seal bore with small amount of molykote grease.
54. Pack the oil seals with molykote grease.
55. Slide the first seal into the bore with the lip facing into the bore. Slide the second and third oil seals into the bore with the lip facing out.
56. Install the oil seal keeper.
57. Position and fasten both halves of the journal housing liner to the journal housing. Install the remaining bolts through the journal housing cover into the journal housing.

**Note -**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job**
3. **Hydra and operator to be provided as per the requirement by the contractor.**
4. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

### **137. JOURNAL SHAFT ASSEMBLY REINSTALLATION**

1. Turn the journal shaft assembly over so that the large flange is down and install the grinding roll removal lug, ensure that the bolts thread into the journal housing, not the grinding roll.
2. Set the journal shaft assembly down on the journal head. Be sure to align the offset bolt hole.
3. Using the hydraulic torque wrench, pump and drive and torturing pattern, torque the fasteners.
4. Remove the roll removal lug and install the set screws.
5. Install the journal skirt.
6. Install the journal shaft liner assembly.
7. Tilt in the journal assembly.
8. Remove the access cover on the back side of the journal head.
9. Remove the pipe plug in the end of the journal shaft and check the oil level.
10. Add or subtract oil as necessary. Reinstall the oil fill pipe and fittings and reinstall the access cover.

#### **Note -**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job**
3. **Hydra and operator to be provided as per the requirement by the contractor.**
4. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

### **138. JOURNAL OPENING COVER INSTALLATION**

1. Grease the frame of the separator body.
2. Rig the journal opening cover thru the two holes in the top. A choker around the end of the spring assembly with come-along up to the crane hook for balance may be used. Install the journal opening cover with fasteners.
3. Grease the O-Ring with molykote and install it in the groove.
4. Install the journal stop bolt. Be sure not to damage the O-Ring which is in the cover with the threads of the stop bolt.
5. Install the key.
6. Apply anti-seize compound to the threads of the stop bolt.
7. Apply sealant to the face of the stop bolt nut.
8. Install the stop bolt nut.
9. Reinstall the seal air piping.

#### **Note -**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job**
3. **Hydra and operator to be provided as per the requirement by the contractor.**
4. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

### **139. SPRING ASSEMBLY PRELOAD PROCEDURE**

1. The journal spring assembly should be completely assembled except for the spring stud extension cap, cotter pin, and nuts.
2. Mount the hydraulic cylinder onto the preload fixture using fasteners.

3. Thread the preload adjusting stud into the journal pressure spring preload stud to the full depth of the preload stud threads.
4. Install the spring preload fixture onto the journal spring assembly.
5. Install the flat washer and lock nut, and hand tighten with a wrench. The nut must thread completely onto the adjusting stud.
6. Preload the spring by pressurizing the hydraulic cylinder to the load
7. Use the locknut wrench to advance the adjustment castle nut until it contacts the spring stud adapter. If the slots in the castle nut do not align with the cotter pin hole in the journal spring preload stud, back off the nut, a quarter turn maximum, until the slot aligns with the hole.
8. Relieve the hydraulic cylinder pressure.
9. Check the preload by reapplying the hydraulic pressure and recording the pressure at which the nut begins to move away from the spring stud adapter.
10. Release the hydraulic pressure and remove the preload adjusting stud, hydraulic cylinder and preload fixture.
11. Install the cotter pin and spring stud extension cap.
12. Set the roll-to-ring clearance.
13. Set journal spring to journal head clearance.

**Note -**

- 1. Scope of work includes issuing of spares if required during maintenance.**
- 2. Ensure MWF for the job**
- 3. Hydra and operator to be provided as per the requirement by the contractor.**
- 4. Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

**140. ADJUSTING - RING TO ROLL GAP**

1. Open at least one pulveriser separator body access door and clean the bowl. Vacuum out any residual coal from the bowl.
2. Back out the journal spring adjusting studs 25.4 mm in order to provide additional clearance between the journal spring assembly and the journal head.
3. Working with one journal at a time, remove the stop bolt nut fasteners and retract the stop bolt nut until the journal roll rests on the bowl.
4. Mark the back face of the roll at the contact point between the bowl and roll. Label this point "1".
5. Raise the roll by turning the stop bolt nut 2 flats.
6. Find the high spot on the roll by turning the roll through one full revolution. If the roll turns through one complete revolution, skip to Step 8.
7. If the roll cannot be turned through one full revolution, mark the contact point with the bowl and label "2" and repeat Step 5. Continue this procedure (5, 6, 7, etc.) until the highest point is found on the roll.
8. After the roll can be turned through one full revolution, turn the roll so that the high point of the roll (highest number) is at the 6 o'clock position.
9. Turn the stop bolt nut two complete revolutions inward in order to raise the roll away from the bowl.
10. Repeat Steps 3 through 9 for the remaining journals.
11. Once journal adjustments are complete, remove any foreign material from the bowl area and close the separator body access doors.
12. Place the pulveriser lube oil system in operation and start the pulveriser. If any roll is still in contact with the bowl, raise the roll slightly.
13. Working with one roll at a time, lower the roll (via the stop bolt nut) until till the first indication of contact with the bowl. Stop at first indication of contact.

14. Immediately raise the roll via the stop bolt nut four flats (one revolution with 4 threads per inch thread) of the stop bolt nut.
15. Repeat Steps 13 through 14 for the remaining journals. Stop and isolate the pulveriser.
16. Secure the stop bolt nut by installing the four fasteners between the nut and stop bolt keeper plate. If the holes in the nut and keeper plate do not line up, turn the stop bolt nut clockwise (raise the roll slightly) so that they can be installed.

**Note -**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

#### **141. ADJUSTING SPRING ASSEMBLY TO JOURNAL HEAD GAP**

1. Using two opposite spring adjusting studs, move the spring assembly into the mill until there is a 1~1.5 mm. gap between the spring stud face and the journal head. Filler gauge should be used to ensure that this gap is maintained.
2. Adjust all the remaining spring adjusting studs so that they make contact with the spring stud adapter. Verify that all of the studs are positioned correctly by measuring the stud length extending from the spring housing cover. The stud length extending should be the same within 1~1.5 mm.
3. Remove the 1~1.5 mm shim and verify the gap.
4. After install the spring stud extension cap, install and torque the spring position adjusting nuts.
5. Set the spring position on the other two journals.
6. Close the separator body access doors.

**Note -**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

#### **142. SCRAPER ASSEMBLY REPAIR/REPLACEMENT**

1. Open scrapper area manhole door(s).
2. Clean out any residual material in the bottom section of the mill.
3. Remove the stud and lock nut which will unload the spring preload on the scraper.
4. Disassembly the sub assembly consisting of -scraper support block, scraper pin, spring, scraper, and scraper wear plate from the scraper support bracket by removing the fasteners.
5. Remove the fasteners and the washer that are retaining the spring on the scraper pin, and remove the spring.
6. Remove the fasteners that are retaining the scraper pin to the scraper, and remove the scraper pin.
7. Remove the washer from the scraper pin.
8. Remove the scraper wear plate from the scraper.
9. Clean and inspect all components to determine required replacements.
10. Sub-assemble the scraper and spring to the scraper support block using the scraper pin and secure the components with washer and fasteners. Check to be sure that the spring is correctly oriented. Tack weld the nuts.
11. Install a new washer on the end of the scraper pin.
12. Assemble the scraper support block sub-assembly to the scraper support bracket.
13. Using the stud and nut, force the scraper so that it is vertical.

14. Install the scraper wear plate to the scraper using fasteners so that there is a gap of  $8\pm 1.5$  mm between scraper wear plate & mill side liner.
15. Using a strap wrench on either the motor shaft or planetary gear box input shaft, turn the bowl hub and scrapers to verify that the gap between the scraper wear plate and the bottom of the mill is correct in all positions. Adjust the height of the scraper wear plate as necessary.
16. Tack weld the scraper wear plate to the scraper.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

#### **143. SERVICING OF TRUNNION SHAFT AND BUSH**

1. Ensure PTW.
2. Open the manhole door.
3. Remove the journal opening cover as already mentioned.
4. Tilt out the journal assembly.
5. Remove the journal assembly from the journal head.
6. Remove the Seal air piping from the trunnion assembly.
7. Loose the bolts of the trunnion shaft end cover.
8. Remove the journal head assembly.
9. Remove the trunnion shaft and trunnion bush.
10. Clean and inspect all components to determine required replacements.
11. Replace the O-ring and grease the bush and shaft assembly.
12. Install back the trunnion bush and shaft assembly.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job.**
3. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

#### **144. SERVICING AND REPLACEMENT OF COMPONENTS OF SPRING ASSEMBLY**

1. Ensure PTW.
2. Open the manhole door.
3. Open the spring assembly cover.
4. Loose the check nut of the studs.
5. Remove the lock.
6. Install the stud and the jack assembly for removal of tension in spring
7. Apply pressure in the jack till there is separation in the nut, then loose the nut.
8. Repeat the process till the nut is completely loosened.
9. Remove the spring, bush, shaft and all the components of the spring assembly. Clean and inspect all components to determine required replacements.
10. After complete servicing and placement install back the spring components in their correct sequence.
11. Tension the spring to its designed limit and maintain the designed journal head gap before installing the spring cover.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**
3. **Here 1BOQ=Replacement of spring.  
0.5 BOQ= Replacement of bush/sleeve**

#### **145. REPLACEMENT OF INNER CONE ASSEMBLY**

1. Remove the journal over cover.
2. Tilt out all 3 journal assembly and remove the journal assemblies from the journal heads.
3. Remove all three journal heads.
4. Make proper scaffolding inside the mill body for proper approach to inner cone bolt.
5. Make proper arrangement to rig the inner cone assembly by cutting pockets in the inner cone.
6. Remove all the inner cone bolts. Take full load in the chain block arrangement and cut the support pipes of the inner cone.
7. Slowly down the inner cone and remove the inner cone from the mill by cutting into different parts.
8. Assemble different parts of the new inner cone as per the sequence. Align the inner cone properly so that the inner cone edges are not in offset condition. Do not tighten the bolt fully.
9. Completely weld the edges of the inner cone from inside as well as from outside.
10. Maintain proper gap with the inverted cone and feed pipe
11. Tighten the bolt fully.
12. Complete the welding of the inner cone support pipes.

##### **Note -**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job**
3. **Hydra and operator to be provided as per the requirement by the contractor.**
4. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**
5. **Planned replacement of vane wheel and deflector schedule to be given to contractor beforehand and the contractor should make proper arrangement prior to job. This includes shifting of spares from store to site, shifting of Tools, tackles and other consumables required for the work. Contractor should also be prepared for any unplanned replacement depending upon the equipment condition and instruction from EIC.**

#### **146. ALIGNMENT OF MOTOR WITH GEARBOX**

1. Remove the coupling guard.
2. Decouple the motor from mill.
3. Check run out of the shaft.
4. Check the bolt tightness of mill gearbox foundation and sole plate.
5. Alignment of mill with motor (radial as well as axial) to be done after making necessary arrangement for checking of alignment & correction to be done by putting shims as per instruction of the E-I-C.
6. After alignment couple the motor with mill. Put the coupling guard.
7. Dial gauge, shims of required thickness will be in the contractor's scope.

**Note -**

- 1. Scope of work includes issuing of spares if required during maintenance.**
- 2. Ensure MWF for the job.**
- 3. Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

**147. INSPECTION OF MILL DUE TO ABNORMAL SOUND FROM FOREIGN MATERIAL OR DAMAGED MILL INTERNALS**

1. Ensure PTW.
2. Open the manhole door and three inspection doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside ensure sufficient illumination.
6. Clean the internals of mills completely by removing coal.
7. Check for any foreign materials or broken mill internals from which abnormal sound is coming.
8. Check for any high point between grinding roll and BRS by rotating the mill manually.
9. Remove the foreign materials or repair the broken part.
10. Adjust the gap between journal assemblies to BRS if there is any high point.
11. Close all the manhole doors

**Note –**

- 1. Scope of work includes issuing of spares if required during maintenance.**
- 2. Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

**148. INSPECTION OF MILL DUE TO MORE/LESS CURRENT**

1. Ensure PTW.
2. Open the manhole door and three inspection doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside ensure sufficient illumination.
6. Remove all the coal between journal assemblies and BRS.
7. Check the journal assemblies to BRS gap.
8. Ensure the free rotation of Journal assembly.
9. Check for any foreign material between grinding roll and BRS which restricts the journal assembly from rotating freely. If no foreign material is found between the mating parts and still there is jamming then go for the journal assembly replacement as bearings have been damaged.
10. Install the new journal assembly as per the steps described above in the Journal assembly replacement section.
11. Close all the manhole doors.

**Note –**

- 1. Scope of work includes issuing of spares if required during maintenance.**
- 2. Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **149. REPLACEMENT OF GLAND ROPE OF GEARBOX**

1. Ensure PTW.
2. Mark the ends of the expanded metal guard of the gearbox so that fitment can be done easily.
3. Remove all the bolts of the expanded metal guard.
4. Remove the expanded metal guard. Check if the expanded metal guard fouls with the lube oil piping, if any such hindrance comes then dismantle the lube oil pipe.
5. Loose the bolt of the gland packing across the gearbox.
6. Remove the gland ropes.
7. Install new gland ropes.
8. Assemble the gland packing and tighten the bolt.
9. Assemble the expanded metal guard and tighten the bolt.
10. Assemble the lube oil pipe if dismantled during the gland rope replacement.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **150. INSPECTION OF MILL DUE TO HIGH REJECT/LOW FINENESS**

1. Ensure PTW.
2. Open the manhole door and three inspection doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside ensure sufficient illumination.
6. Clean the internals of mills completely by removing coal.
7. Ensure the free rotation of Journal assembly.
8. Check for any foreign material between grinding roll and BRS which has increased the gap.
9. Check the roller gap, if not found as per the manual instruction then adjust the gap.
10. Check for grinding roll and BRS wear. If complete wear out of grinding roll and BRS has taken place then go for its replacement.
11. Check the vane wheel condition. If holes were found in the plates then repairing to be done.
12. Check if any air restriction segment is missing; if so install a new one.
13. Check the classifier settings.
14. After complete inspection, close the manhole door.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **151. REPAIRING/REPLACEMENT OF JOURNAL HEAD LINER**

1. Ensure PTW.
2. Open the manhole door and three inspection doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside ensure sufficient illumination.
6. Check the condition of journal head liner. If it can be repaired then patching to be done.

7. Replacement of journal head liner should be done as per the instruction of E.I.C.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **152. GREASING IN TRUNNION SHAFT AND BUSH DURING RUNNING CONDITION**

1. After proper communication with the operation Dept. Greasing of trunion shaft and bush to be done as the mill will be in running condition.
2. Remove the greasing nipple cover provided in the trunion shaft assembly.
3. Greasing to be done with the help of grease gun until the grease comes out from the vent
4. Application of grease as per the manual (Servo gem- Super HTXX of IOC or equivalent).

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **153. ROTATION OF FEEDER O/L CHUTE**

1. Ensure PTW.
2. Check for proper approach to the feeder o/l chute.
3. Mark the pattern of the erosion in the feeder o/l chute.
4. Loose the bolt of the flange of feeder o/l chute with the feeder o/l gate and cut the feeder o/l chute top portion with the help of grinding machine or plasma cutting, machine.
5. Cut the feeder o/l chute with the help of grinding machine or plasma cutting machine.
6. Rotate the feeder o/l chute and do the fit up by tack welding. After completing the fit up
7. Start welding the top end and do the bolt tightening of lower end with feeder o/l chute.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job.**
3. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **154. ROTATION OF TRANSITION PIECE**

1. Ensure PTW.
2. Check for proper approach to the transition piece.
3. Mark the pattern of the erosion in the transition piece.
4. Loose the bolt of the flange of transition piece with the feeder o/l gate and cut the transition piece bottom portion with the help of grinding machine or plasma cutting, machine.
5. Rotate the transition piece and do the fit up by tack welding. After completing the fit up
6. Start welding the bottom end and do the bolt tightening of top end with feeder o/l chute.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job.**

3. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **155. REPLACEMENT OF VICTAULIC COUPLING GASKET**

1. Ensure PTW.
2. Check for proper approach, if required scaffolding to be done (scaffolding price to be estimated per the cubic meter)
3. Replace the damaged gaskets or damaged Victaulic coupling.
4. Remove the scaffolding after replacement.

#### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **156. MILL CHOKE UP CLEARING**

1. Ensure PTW.
2. Open the manhole door and three inspection doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside, ensure sufficient illumination.
6. Coal cleaning to be done in scrapper chamber and bowl area.
7. Close the manhole doors after clearing the mill choke up.

#### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **157. COAL CLEANING**

1. Regular monitoring of coal accumulation to be carried out at mill top by contractor.
2. If coal found accumulated at mill's top then as per the instruction of E.I.C coal cleaning to be carried out.
3. Final inspection will be done by E.I.C.

### **158. REPAIRING OF AIR RESTRICTION RING SEGMENT**

1. Ensure PTW.
2. Open the manhole door and three inspection doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside, ensure sufficient illumination.
6. Check for the damage of the air restriction ring segment. If welding found crack at some points, rebuilding to be done.
7. If any of the segment gets dislocated from its position, then fit up to be done first and then complete welding to be carried out. Designed gap to be maintained between air restriction segment and the vane wheel.

8. Close all the access doors after completion of work.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **159. REPLACEMENT OF PLATE VALVES OF MILL O/L CHUTE**

1. Ensure PTW.
2. Loose the bolt of the expansion joint with the flange of the plate v/v.
3. Inspect the plate v/v with E.I.C.
4. As per the instruction of E.I.C repair the plate v/v or change the gland packing or replace the whole assembly.
5. Fasten the flange bolts after repairing or replacement.

**Note –**

1. **1 BOQ= Replacement of complete plate valve assembly, 0.5 BOQ= Replacement of gland packing or plate).**
2. **Scope of work includes issuing of spares if required during maintenance.**
3. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **160. CLEANING OF ORIFICE OF GEARBOX**

1. Ensure PTW.
2. Loose the joints of the lube oil pipe line containing orifice which will be connecting the l/p shaft of the gearbox.
3. Clean the orifice by blowing air.
4. Assemble after cleaning.
5. Run the lube oil pump to see if there is any leakage, if leakage found again tightens the joints with the application of suitable sealant.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **161. REPAIRING/CLEANING OF CLASSIFIER VANES**

1. Ensure PTW.
2. Open the manhole door and three inspection doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside, ensure sufficient illumination.
6. Ensure proper scaffolding to reach to classifier vanes so that inspection can be done. Clean the classifier assembly if any foreign material is found. if any classifier vanes are missing replace it with the new one.
7. Close the access door after completion of work.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**
3. **Payment of scaffolding will be claimed as per cubic meter.**

**162. REPLACEMENT OF HAD/CAD GLAND PACKING**

1. Ensure PTW.
2. Decouple the damper from the pneumatic cylinder.
3. Remove the flange bolts of each damper flap or if bolts are jammed, remove the bolts with the help of gas cutting.
4. Remove the old gland packing from the dampers and install the new one of proper size as per the design requirement.
5. Fasten the flange bolt after replacement.
6. Check the operation after coupling it with the pneumatic cylinder; if limit setting is required take the help of the C&I personnel.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

**163. REPLACEMENT OF GLAND ROPE REPLACEMENT OF MDV**

1. Ensure PTW.
2. Loose the bolts of the gland follower.
3. Remove the gland packing and replace it with new one.
4. Ensure proper fitment.
5. Box up the MDV.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

**164. REPAIRING OF BOWL HUB INSULATION LINER**

1. Ensure PTW.
2. Open the manhole doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside, ensure sufficient illumination.
6. Check for bolt condition of the bowl hub insulation liner, if sheared replace it with new ones
7. Check for the damage of plate, if damaged patching/repairing to be done.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **165. REPLACEMENT OF COUPLING**

1. Ensure PTW.
2. Remove coupling guard.
3. Loose the coupling bolts and remove the intermediate shaft.
4. Heat the coupling uniformly and by using suitable puller removes the coupling from gearbox and motor shaft.
5. Install the new coupling and tighten the intermediate shaft with the coupling.
6. Align the motor with gearbox.
7. Install the coupling guard.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

## **166. COAL PIPE BEND REPLACEMENT**

1. Ensure PTW.
2. Ensure proper approach to reach to respective bends safely.
3. Lock the coal pipe with the help of chain block or supporting pipe.
4. Lock the bend which is to be taken out with the help of chain block
5. Loose the bolt of the Victaulic coupling.
6. Loose the bolt of the elbow with the burner corner flange.
7. Remove the bend from its position and place it on the floor.
8. Inspect the bend for any damage and as per the instruction of EIC replace or repair the bend.
9. Bring the repaired or new bend to its position with the help of chain block and tighten the bolt with the burner corner and Victaulic coupling.
10. Remove the locking of the coal pipe.
11. Remove the approach
12. Return the PTW.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**

## **LUBE OIL SYSTEM**

### **167. PREVENTIVE MAINTENANCE OF COAL MILL LUBE OIL**

1. Ensure PTW.
2. Clean lube oil filter.
3. Clean breather filter
4. Check the oil level in the tank, if required top up.
5. Housekeeping of lube oil station.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**

2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

#### **168. LUBE OIL PUMP COUPLING/ COUPLING SPIDER/ BEARING/ OIL SEAL REPLACEMENT.**

1. Ensure PTW.
2. Decouple the pump from the motor. (NOTE: cable removal is under EMD scope).
3. Remove the motor.
4. Dismantle the pump, check for any damage.
5. Replace the damaged items and assemble the pump.
6. Couple the motor.
7. Check the performance after trial run.

##### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

#### **169. REPLACEMENT OF LUBE OIL PUMP**

1. Ensure PTW.
2. Check if repairing of pump takes more time than its replacement/client wants to check the performance of refurbished pump/ for fitment of pump from new vendor, replacement of new pump is required.
3. Scope of work includes issuing of pump from the store and return of refurbished/serviced pump to the store.
4. Couple the motor.
5. Trial run to be taken, check for the performance after trial run.

##### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

#### **167. SERVICING OF LUBE OIL PUMP**

1. Dismantle the lube oil pump to check where actually the problem exits.
2. Use diesel/proper solvent to clean all the components of pump.
3. Use tray for keeping of materials.
4. Replace the damaged spares with the new one as per the instruction of the EIC.
5. Proper housekeeping to be ensured after completion of work.

##### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

#### **168. SERVICING OF LUBE OIL COOLER**

1. Ensure PTW.
2. Remove the cooler tube bundle from the cooler.
3. In case of welded type cooler, remove the cooler from the system by hacksaw cutting.

4. Flush the spiral type condensing loop pipe.
5. Clean the threaded pressure reducer.
6. Check for any leakage by putting air or water inside the coil.
7. Repair the damaged coil if required or replace.
8. Clear the tube chocking.
9. Fix the cooler tube bundle.
10. Assemble the cooler.
11. Check for any defect after charging of the cooler and rectify it.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **169. REPLACEMENT, SERVICING & SETTING OF VALVE**

1. As per the instruction of EIC v/v setting to be done.
2. For replacement ensure PTW.
3. Make the new v/v available at site prior to replacement.
4. Servicing of the damaged v/v to be carried out in the presence and as per the instruction of EIC.
5. Ensure use of tray.
6. Proper housekeeping to be ensured.
7. Use of proper solvents/ diesel for cleaning of v/v components.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **170. OIL REPLACEMENT AND TANK CLEANING**

1. Ensure PTW.
2. Make sure the availability of the empty drum, bucket, clothes, tray etc. at site prior to start of work.
3. Remove the oil from the tank to the empty drum via flusher machine or hand pump as per the availability.
4. After complete removal of the oil, clean the tank properly.
5. Final inspection will be done by the EIC.
6. Close the oil tank manhole after inspection.
7. After the approval of the EIC, oil to be filled in the tank.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store.**
3. **Issuing of oil drum and transporting from the store to the site will be in contractor's scope)**

## **171. ATTENDING OIL AND WATER LEAKAGES**

1. Ensure PTW.
2. Identify the leakage area; clean the surface properly so that there should not be any leftover dirt, sealant material etc.
3. Use gasket /Teflon tape/appropriate sealant/O-ring etc. to tighten the flange/joints.
4. After tightening run the lube oil pump for leakage checking.
5. If leakage comes more than two times from the same joint, payment cannot be claimed, it should be done free of cost.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **172. REPAIRING/REPLACEMENT OF JOURNAL HEAD LINER**

1. Ensure PTW.
2. Open the manhole door and three inspection doors of the mill.
3. Place exhaust fans on the inspection door.
4. Check the internal air by gas analyzer/explosive meter.
5. Place 24 V DC light inside ensure sufficient illumination.
6. Check the condition of journal head liner. If it can be repaired then patching to be done.
7. Replacement of journal head liner should be done as per the instruction of E.I.C.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **COAL FEEDERS**

### **173. PREVENTIVE MAINTENANCE OF COAL FEEDER**

1. Ensure PTW.
2. Open the manhole doors.
3. Check the liner condition of head pulley and take up pulley, if required replace it with new one. ( Replacement bill can be claimed separately)
4. Check the bearing condition of head pulley and take up pulley, if required replace it with new one. ( Replacement bill can be claimed separately)
5. Ensure the idlers freeness.
6. Ensure the idlers are in same level.
7. Checks the belt condition, if required replace it with new one.
8. Clean the belt tracking device
9. Checks the bearing condition of COC, if required replace it with new one.
10. Check the oil level in the gearbox and COC gearbox
11. Check COC sprockets, if required repairing/replacement to be done.
12. Check for any damages in the Head pulley and take up pulley shaft, if required replace with new one. ( Replacement bill can be claimed separately)
13. Close the access doors.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Replacement of head pulley, take up pulley, coc and bearings can be claimed separately)**

**3. Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

**173. COAL FEEDER BELT REPLACEMENT**

1. Ensure PTW.
2. Open all access doors
3. Remove the coal accumulated in the feeder.
4. Remove inner scraper.
5. Lift scraper balance weight with ropes to disengage outer scraper from the belt.
6. Dismantle gear reducer, motor and tachometer from head pulley shaft.
7. Locate service tool kit below the head pulley.
8. Loosen the fixings of the bearing at the opposite side of head pulley.
9. Unfasten flange bolts, remove bearing and flange, then insert head pulley dismantle bracket between belt and head pulley, and fix it with screws.
10. Insert pulley service tool between head pulley and belt, unfasten head pulley screws, and dismantle head pulley with dismantle bracket.
11. Remove weigh roller and load cell from side access openings, and take off supporting roller and four rollers below inlet, remove tension nuts and tension.
12. Use service tool lengthen bracket to dismantle take-up roller and belt.
13. Assemble take-up roller and belt
14. Assemble weigh roller and load cell from side access openings, and fit supporting roller and four rollers below inlet, fix tension nuts.
15. Insert head pulley and belt, fasten head pulley screws.
16. Fit the bearings and fasten flange bolts.
17. Tighten the fixings of the bearing at the opposite side of head pulley.
18. Assemble gear reducer, motor and tachometer from head pulley shaft
19. Attach scraper balance weight with ropes to engage outer scraper to the belt.
20. Fit the inner scraper.
21. Check & top up or change the oil in gear reducers for belt drive & clean out conveyor drive.
22. Lubricate all the bearings.
23. After belt mounted, operate coal feeder under no load condition. Run the belt as long as possible to eliminate stretches.
24. Adjust tension of the belt:
25. Check belt tension; verify belt tension through observing openings. While tension arrow pointed to the centre of permissive range, the belt is in proper tension.
26. Belt in slack: Clockwise turn the left and right screw for same turns.
27. Belt is over tensioned: counter clockwise turn the left and right screw for same turns.
28. Run and observe the belt for 10 revolutions, adjust it if necessary.
29. Adjust left and right screws 1/3-1/4 turn for different directions.
30. After adjustment, run and observe the belt for 5 revolutions, adjust again if necessary.
31. Close all access doors.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Ensure MWF for the job.**
3. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## 174. HEAD PULLEY REPLACEMENT

1. Ensure PTW.
2. Open all access doors
3. Remove the coal accumulated in the feeder.
4. Remove inner scraper.
5. Lift scraper balance weight with ropes to disengage outer scraper from the belt.
6. Dismantle gear reducer, motor and tachometer from head pulley shaft.
7. Locate service tool kit below the head pulley.
8. Loosen the fixings of the bearing at the opposite side of head pulley.
9. Unfasten flange bolts, remove bearing and flange, then insert head pulley dismantle bracket between belt and head pulley, and fix it with screws.
10. Insert pulley service tool between head pulley and belt, unfasten head pulley screws, and dismantle head pulley with dismantle bracket.
11. Remove weigh roller and load cell from side access openings, and take off supporting roller and four rollers below inlet, remove tension nuts and tension.
12. Insert head pulley and belt, fasten head pulley screws.
13. Fit the bearings and fasten flange bolts.
14. Tighten the fixings of the bearing at the opposite side of head pulley.
15. Assemble gear reducer, motor and tachometer from head pulley shaft
16. Attach scraper balance weight with ropes to engage outer scraper to the belt.
17. Fit the inner scraper.
18. Check belt tension; verify belt tension through observing openings. While tension arrow pointed to the centre of permissive range, the belt is in proper tension.
19. Belt in slack: Clockwise turn the left and right screw for same turns.
20. Belt is over tensioned: counter clockwise turn the left and right screw for same turns.
21. Run and observe the belt for 10 revolutions, adjust it if necessary.
22. Adjust left and right screws 1/3-1/4 turn for different directions.
23. After adjustment, run and observe the belt for 5 revolutions, adjust again if necessary.
24. Close all access doors.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## 175. TAKE UP PULLEY REPLACEMENT

1. Ensure PTW.
2. Open all access doors
3. Remove the coal accumulated in the feeder.
4. Remove inner scraper.
5. Lift scraper balance weight with ropes to disengage outer scraper from the belt.
6. Remove weigh roller and load cell from side access openings, and take off supporting roller and four rollers below inlet, remove tension nuts and tension.
7. Use service tool lengthen bracket to dismantle take-up roller and belt.
8. Remove the bearings from the take up pulley shaft.
9. Assemble bearings into the new take up roller shaft.
10. Assemble take-up roller and belt
11. Assemble weigh roller and load cell from side access openings, and fit supporting roller and four rollers below inlet, fix tension nuts.

12. Attach scraper balance weight with ropes to engage outer scraper to the belt.
13. Fit the inner scraper.
14. Check belt tension; verify belt tension through observing openings. While tension arrow pointed to the centre of permissive range, the belt is in proper tension.
15. Belt in slack: Clockwise turn the left and right screw for same turns.
16. Belt is over tensioned: counter clockwise turn the left and right screw for same turns.
17. Run and observe the belt for 10 revolutions, adjust it if necessary.
18. Adjust left and right screws 1/3-1/4 turn for different directions.
19. After adjustment, run and observe the belt for 5 revolutions, adjust again if necessary.
20. Close all access doors.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **176. COC/ CHAIN LINK REPLACEMENT**

1. Ensure PTW.
2. Open all access doors
3. Remove the coal accumulated in the feeder.
4. Dismantle gear reducer and motor from coc shaft.
5. Loose the tension of the coc.
6. Dismantle the bearing of other end.
7. Remove the chain and install the new chain.
8. Fit the bearings and fasten flange bolts.
9. Assemble gear reducer and motor coc shaft
10. Tension the chain.
11. Take the trial run and adjust the tension in the chain
12. Close all access doors

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

### **177. MANHOLE DOOR GASKET REPLACEMENT**

1. Ensure PTW.
2. Open all access doors.
3. As per the instruction of EIC replace the door gaskets/rope of access doors.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**
3. **If leakage found from manhole doors due to damage rope or gasket after PM then it is to be done free of cost.**

## **178. FEEDER MOTOR/COC GEARBOX OIL SEAL REPLACEMENT**

1. Ensure PTW.
2. Dismantle the gear reducer and motor from the shaft.
3. Keep the assembly in the tray.
4. Remove the oil from the gearbox.
5. Remove the oil seal and fit the new oil seal.
6. Assemble the gear reducer and motor in the shaft.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **180. COAL BLOCKAGE CLEARING**

1. Ensure PTW.
2. Open feeder manholes and empty coal from top and bottom trough.
3. Inspect and remove any foreign materials stuck up between body and belts.
4. Run the feeder and carry out tracking if necessary.
5. Close the doors

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **181. ASSISTANCE IN C&I IN CALIBRATION**

1. Ensure PTW.
2. Open the access door.
3. Keep the belt in the centre for calibration.
4. Ensure idler freeness and alignment.
5. Close the access door after C&I finish calibration.

### **Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **182. HEAD PULLEY/ TAKE-UP PULLEY/ COC & IDLER DE & NDE BEARINGS REPLACEMENT**

1. Ensure PTW.
2. Open feeder end doors and side doors.
3. Open bearing end cover and remove bearings using suitable pullers.
4. New bearings supplied by department will be mounted after thorough cleaning of bearing shaft.
5. Checking of belt tracking.
6. Box up the feeder.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

**183. GREASING IN BEARING DURING EQUIPMENT RUNNING CONDITION**

1. As per EIC grease the bearings of the feeder with the help of grease gun during feeder running condition.

**184. BELT TRACKING DEVICE REPLACEMENT/SERVICING**

1. Ensure PTW.
2. Open feeder end doors and side doors.
3. Loose the tension of the belt. Mark the thread number of stud of each side so that proper tension can be ensured.
4. Check for the damage, as per the instruction of E.I.C replace or service the belt tracking device.
5. Close the access doors after completion of work.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

**185. BELT TRACKING**

1. As per the instruction of E.I.C man power to be provided for Tracking and leveling of the belt.
2. Adjust left and right screws 1/3-1/4 turn for different directions.
3. After adjustment, run and observe the belt for 5 revolutions, adjust again if necessary.

**186. SCRAPPER SHOE REPLACEMENT**

1. Ensure PTW.
2. Open feeder end doors and side doors.
3. Check for any abnormality in the scrapper shoe by trial run or by visual inspection.
4. If scrapper shoe is worn out, replace it with new one.
5. If scrapper shoe assembly is damaged/L-clamp crack/scrapper assembly is bent, repair/replace the components or assembly as per the instruction of EIC.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

**187. REMOVAL OF FOREIGN MATERIAL FROM THE BELT**

1. Ensure PTW.
2. Open feeder end doors and side doors.
3. Remove coal from the feeder.

4. Thoroughly inspect the feeder for any foreign material.
5. Check for abnormality or damages.
6. As per the instruction of EIC repair or replace the damaged spares.
7. Feeder trial run to be taken for final inspection.
8. Close the feeder end doors and side doors.
9. Return PTW.

**Note –**

1. **Scope of work includes issuing of spares if required during maintenance.**
2. **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**

## **(G) MISCELLANEOUS JOBS**

### **188. INSPECTION OF BOILER – WALK DOWN CHECKLIST**

1. Ensure PTW.
2. Contractor has to depute a group for Boiler walk down checklist and maintain a register.
3. Some of the check points - Duct leakage, Bellow leakage, Valve passing, Oil leakages, air leakages, insulation condition, BTL sound, manhole/peephole leakage, housekeeping points etc.
4. Group has to conduct the walk down and report the observations as per EIC instructions.
5. If any minor defects – attend as per EIC instructions.
6. 0.5 BOQ will be paid for each Boiler walk down checklist completion.
7. General cleaning & housekeeping of the equipment & surrounding areas to be ensured while walk down checks.

### **189. LINE FLUSHING**

1. Ensure PTW.
2. Opening/ Cutting of the HP/LP line carrying steam/ water/ oil/ air, etc. for inspection
3. Air purging/ Steam purging, back charging of the line/ valves/any other equipment/ instruments and clearing of the line from choked materials.
4. Hammering of the line if necessary.
5. Insulation removal & fitting of the line if required. Separate payment schedule for insulation.
6. Scaffolding for access of the line. Separate payment schedule for scaffolding. If minor scaffolding required, no separate payment will be done.
7. Welding/ bolting of the line as per the existing system.
8. BOQ will be done after satisfactory flushing as per the EIC requirements.
9. **If any HP welding involved, separate payment will be done as per its schedule.** LP welding joints are included in this scope.
10. Mobilization of T&P required for the activity.
11. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
12. Any material required to be issued/returned from the main stores is under this scope.

### **190. SCAFFOLDING SUPPLY, ERECTION & REMOVAL - BOILER/DUCT/APH/MILL/FAN/FOPH.**

1. Ensure PTW.

2. The scope of works includes supply, fabrication & erection of scaffolding inside & outside of Boiler/Duct/APH/Mill/Fan/FOPH etc. to facilitate inspection & other job to be carried out by OPGC. The scaffolding should be rigid. **Minor scaffolding works like providing access/batten only will be exclusive of this scope.**
3. Scaffolding materials should be M.S. Pipes confirming to IS: 1161 and couplers (Right angle couplers/Cup lock couplers/ Swivel Couplers) confirming to IS: 1570. Platforms should be provided with toe guards in order to prevent falling. Earth connection points should be provided wherever electrical power is expected to pass through the scaffolding. Ladders shall be provided for proper access.
4. Scaffolding material shall be free from rust and can be rejected if integrity of material not found up to the requirements of EIC.
5. Wherever required, the contractor has to provide platform by using good wooden planks, which can withstand a minimum of 4 people of about 300 kg. Load.
6. All materials such as binding wire/ coconut rope required for executing the above job should be arranged by the contractor at his cost.
7. While erecting the scaffolding, the contractor should exercise utmost caution, so that instruments, pipelines etc. are not damaged. Scaffolding outside the pipes / equipment shall be two meters length & two meters in width.
8. The payment shall be per cubic meter of erection from the base of the scaffolding up to the top most platforms only covering a minimum base area of 4 sq. mtrs.
9. The start point for measurement at height shall be from the base of the erected scaffolding & not from the bottom of the boilers of ground as the case may be.
10. Contractor will quote the price for outside scaffolding. If any job involves scaffolding inside confined space – boiler, duct, etc. then 1.2 times BOQ will be paid.
- 11. Complete scaffolding materials is under contractor's scope.**
12. OPGC will designate a dedicated place for storing scaffolding material inside plant premises.
13. Contractor has to shift the material from that place to the location of scaffolding and again after removal of the scaffolding, store at the same place. Transportation has to be arranged by the contractor on its own. Designated place may be any Boiler elevation, site store, plant store, etc.
14. Proper housekeeping has to be maintained at all times during and after scaffolding.
15. A proper scaffold will include side railings, accessible ladder approaches, and fall arrestor if applicable and all other safety standards for scaffolding has to be followed. Any other site specific standards related to scaffolding erection shall be strictly followed by the contractor as and when instructed by EIC.
16. Whenever instructed scaffolding material has to be shifted well in advance to the site location as per EIC instructions.
17. Only designated riggers will perform the scaffolding job.
18. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

## **191. SPARES PRESERVATION ACTIVITY IN STORES**

1. Ensure PTW.
2. Contractor has to provide manpower for assistance to spares preservation at site store/ plant main store.
3. All the T&Ps and any other accessories required for spares preservation has to be shifted to plant main store as per EIC instructions.
4. 1 fitter, 1 rigger and 1 helper may be supplied for the same. If any special requirements exists – additional manpower has to be provided from Contractor.

5. Major spares requiring preservation are BCP set, Boiler tubes & bends, Fan Rotor bearing assembly, APH bearings, Servo motor, Oil seals, O rings, FOPH pump assembly, etc.

## **192. NDT SERVICES – THICKNESS, HARDNESS TESTING, DPT**

1. Ensure PTW.
2. This scope covers the following test :
  - a. Thickness Survey is to be done at specified points/ Tubes.
  - b. Hardness testing is to be done as per requirement and instructions of EIC at specified points/ Tubes.
  - c. Dye penetrant test of welding
3. Contractor has to arrange Ultrasonic thickness meter for thickness measurement.
4. At least 3 sets has to be maintained at all times for thickness survey in Boiler & Aux. area.
5. All measuring device should have valid calibration certificate at all times.
6. Contractor has to provide service on demand basis from OPGC EIC. While contractor will be informed well in advance about the requirement at least 8 hours before during running unit requirement and 24 hours in advance during shut down.
7. Perform the DPT as per EIC instructions / NDT standard procedures whichever applicable being EIC the sole deciding authority.
8. Contractor should arrange the DPT kits – developer, penetrant, cleaner, clean cotton cloth, etc.
9. Various areas include water wall/second pass/FSH/FRH during BTL and shut down. Ducts/Mills/Coal pipes/Burners servicing, etc.
10. Thickness to be measured may vary from 4mm to 30mm.
11. Tube OD vary from 15 mm to 90mm. Also pipe OD vary from 300mm to 700mm.
12. Contractor has to take the measurements and send reports/data to the OPGC in the OPGC prescribed format.
13. Payment will be done per point basis as certified by OPGC EIC.
14. Payment schedule – Thickness survey - 1 BOQ per point, Hardness testing – 2 BOQ per point, DPT – For tube of size 2.5” or 235mm length approx. - 2 BOQ will be paid. For length of DPT joint above 2.5” or 235 mm length shall be paid on pro – rata basis.

## **193. PWHT OF WELDING JOINTS**

1. Ensure PTW.
2. Arrangement of stress relieving kit and its shifting to the location. Mounting of kits over the place where stress relieving is to be done. All stress relieving material including asbestos cloth/wool etc. shall be brought by the contractor.
3. Power supply has to be given for heating m/c. While any assistance if required may be supplied from OPGC Electrical department.
4. Agency has to bring the power cables for its machine.
5. Electrical resistance/ Induction heating m/c shall be done for stress relieving. Adequate nos. of thermocouples shall be mounted for proper measurement of temperature and rate of heating and cooling shall be as per instruction of EIC.
6. Stress relieving cycles are to be properly recorded and submitted to the EIC.
7. Stress relieving shall be carried out strictly as per specified code cycle given by EIC.
8. Payment shall be made only on acceptance of stress relieving chart by EIC.
9. No extra payment will be given for pre-heating of tubes, pipes & headers during welding.
10. The contractor has to arrange the agency for doing above works within 24 hours of intimation.

11. Payment rate: Payment will be done on per day basis consisting of 24 hours for 1 BOQ calculation. Time for calculating the start of period will be from 8 hours prior to start of wrapping of coils on tube/pipes. 8 hours is for preparedness of PWHT kit.
12. However, any delay in activity due to manpower/RT equipment will be penalized of double rate of the delay duration.

#### **194. RADIOGRAPHY OF WELDING JOINTS**

1. Ensure PTW.
2. Radiographic inspection of Boiler tube & header joints as per instruction from EIC.
3. Boiler tube OD varies 20 mm to 90 mm approx.
4. Pipe OD varies from 100 NB to 400 NB approx.
5. The scope of this procedure covers the Receipt, Storage, Transportation and Operation of Radiography source- IR 192 at OPGC Site between PIT rooms to required work location inside the plant premises.
6. Safety measures should be taken care for movement & and use of radiography source as per standards of BARC and OPGC safety checklist.
7. Site in charge should have minimum 7 to 10 years of experience in the relevant field / Boiler Pressure Parts with NDT Level – II Certificate from BARC.
8. Radiography technicians should have minimum 5 to 8 years of experience with in the relevant field / Boiler Pressure Parts, NDT-Level-II.
9. Source Identification & Authorization letter from BARC – Mumbai or any other approved source along with authorization list of technician for use of source is in vendor's scope.
10. RSO –Radiology Safety Officer shall present at site for review of site works as and when required
11. Contractor shall submit the SOP for carrying out the radiography & source movement from Pit Room to work place/Job location.
12. The procedure is prepared to define the requirements of Storage and Handling of Radiography cameras and sources in safe, legal and efficient manner, inside the plant premises as per OPGC safety procedure. It is to be submitted by contractor for approval, before start of work at site.
13. Radiographic source to be maintained by contractor as per SOP and shall be responsible for any deviation.
14. Contractor should ensure availability of one source with capacity of 10 to 20 curie at all the time. Please note that source of capacity below 10 curie will not be accepted. During over hauls, second source to be mobilized by contractor. Due intimation will be given before eight days for providing second source for extra works.
15. Documents to be supplied prior to sending Equipment to site:
  - a. Type approval document – IR 192.
  - b. Source and letter of Authorization from BARC – Mumbai
  - c. Pit approval document.
  - d. RSO – license.
  - e. BARC Level-II.
  - f. Source removal procedure.
  - g. Back loading of source.
16. Equipment Details :
  - a) Radiography camera specification and radioactive source details.
  - b) Radiography for Tubes by IR-192 is to be to be taken at specified joints / Tubes.
  - c) Single shot elliptical.
  - d) Two source (8 curie & 20 curie each).
  - e) Job Size of tube below 2.5" & for pipes size: 4" to 12" (approx.)
  - f) Radiography for Pipes by IR-192, Film sizes like:

- a) 4" X 3" b) 4" X 12
- g) RT-Films shall require AG- D5 for tubes & D7 for pipes
- h) Survey Meter, Densitometer, Dosimeter shall be required.
- 17. After completion of work, four copies of RT-report in prescribed format duly signed by qualified technician as per NDT along with RT films shall be submitted to this office.
- 18. Contractor shall develop the RT film at our site and shall indicate the shortcomings by proper marking on the joint, if any, so as to repair the joints accordingly.
- 19. Time being essence of this contract, all the work shall be positively completed within stipulated time limit period.
- 20. Payment rate: Payment will be done on per day basis consisting of 24 hours for 1 BOQ calculation. Time for calculating the start of period will be from 4 hours prior to start of radiography at site. 4 hours is for mobilization and area preparedness(barricading).
- 21. However, any delay in activity due to manpower/RT equipment will be penalized of double rate of the delay duration.

## **195. ARRESTING OF COAL LEAKAGE**

### PATCH WELDING OF COAL PIPE:

1. Make suitable safe working platform near the work area.
2. Cut alloy steel pipe/plate and make the required profile.
3. Gas cut the coal pipe to the desired area as per the direction of E-I-C.
4. Place the new piece on coal pipe and weld throughout the perimeter.
5. Paint the new pipe as per the direction of E-I-C and check for any leakage on charging.
6. Remove scrap and deposit as per the direction of E-I-C.

### ARRESTING OF COAL LEAKAGE (ON LINE):

1. Identify the leakage area and provide suitable safe working platform.
2. Clean the area to expose the leakage.
3. Apply sodium silicate/foam seal sealant with rope/cotton waste to arrest the leakage.
4. Clean the area of coal dust.

General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

Any material required to be issued/returned from the main stores is under this scope.

## **196. CLEANING /REPLACEMENT OF DISCHARGE FILTER**

1. The choked strainer to be taken out by removing the cover.
2. The strainer to be cleaned properly with diesel /air.
3. Refitting the same
4. There should not be any leakage after the fitting.

**(Note: Scope of work includes issuing of spares if required during maintenance)**

## **197. OVERHAULING & LOAD TESTING OF HOT/CHAIN PULLEY BLOCK/ELECTRIC HOIST**

1. OVERHAULING OF EOT/HOT/CHAIN PULLEY/SKY CLIMBER

The gearboxes, brakes, all bearings, traveling wheels, wire ropes & other components are to be checked thoroughly & serviced. Change of lubricants & lubricating of wire rope are to be done wherever required & as per advice of engineer in charge. After overhauling, proper operation of the crane to be ensured. Spares required shall be supplied by OPGC free of cost. Minor repair arising out of wearing parts have to be done by the contractor & the same is considered as part of the scope of work. The waste lubricants & scraps are to be shifted to designated location. Assistance to sky climber service engineer for annual maintenance.

## 2. LOAD TESTING OF ELECTRIC/MANUAL HOIST/SKY CLIMBER

The Electric Hoist with chain blocks shall to be physically checked for operation of limit switches/lubrication of ropes etc & it is to be rectified if required. Then hoists are to be tested individually at 1.25 times of its capacity or as per instruction of competent authority .The test load shall be given by OPGC & the contractor has to make their own arrangement for transporting the test loads to different spots & returning them back again as per requirement. The test load shall be kept in lifted condition for at least 1-½ hours & the lift clearance to the ground shall be measured at the interval of 10 mins. Further, along with the test load the crane shall be operated in long & cross travels .On satisfactory results the job is said to be completed.

NOTE: - After servicing & load testing of lifting machine, the date of testing & due date of testing should be stamped on the equipment by paint/label clearly.

## 3. LOAD TESTING OF HOT/CHAIN PULLEY

The chain pulley blocks are to be checked for proper operation prior to load test & load tested at 1.25 times its individual capacity or as per the direction of engineer in charge. The test load shall be supplied by OPGC free if cost. However necessary arrangements, transportation of test loads to be testing place & return to designated place are to be done by the contractor. The servicing & load testing shall be repeated, if the equipment does not give satisfactory result & to the satisfaction of the testing engineers & safety officers of OPGC.

**NOTE:- After servicing / load testing of lifting machine ,the date of testing & the load for which it is tested has to be stamped on the equipment by paint clearly.**

## **198. SHIFTING OF SCRAP MATERIALS TO STORE**

The agency will collect scrap materials and shift to central store as per instruction of E-I-C. The scraps generated due to the job carried by the agency are not included in this scope. Truck/Tractor and lifting device shall be provided by the agency. Payment will be done on the basis of truck/tractor trip.

## **199. PREVENTIVE MAINTENANCE OF HOISTS**

1. Ensure PTW.
2. Check the oil level in the gearbox.
3. Ensure free movement of hoist in the beams.
4. Check the operation of limit switches by moving the hook up and down, carriage forward and reverse.
5. Check the lubrication of the wire rope and check for any damages.
6. Check the condition of the hoist hook and latch.
7. Check the condition of the brake and drum.

8. Boom lift to be provided by OPGC and if boom lift is not available contractor has to make alternative arrangements to carry out all the checks.

**(Note: Scope of work includes issuing of spares if required during maintenance)**

## **200. METALLIC BELLOW REPLACEMENT**

1. Ensure PTW.
2. Lock the pipes/ducts prior to cutting of metallic bellow.
3. If the bellow is not approachable make proper scaffolding or arrangement. Scaffolding prepared for this purpose cannot be claimed for billing.
4. Fit up the new metallic bellow and do complete welding.
5. After work is completed, dismantle the approach and shift to its proper place.
6. Proper housekeeping is to be ensured after completion of work.

**(Note: Scope of work includes issuing of spares if required during maintenance)**

## **199. METALLIC BELLOW REPAIRING**

1. Ensure PTW.
2. Check the composition of the material of the expansion joint.
3. Clean and identify the leakage/defective portion of the bellow.
4. Repair/patching to be carried out by the suitable electrode as per the material composition of the bellow.

## **200. HT MOTOR REMOVAL AND BEARING REPLACEMENT**

1. Ensure PTW.
2. Decouple the motor from the gearbox.
3. Check whether bearing can be dismantled at this position or else it will be shifted to maintenance bay.
4. Bearing puller/jack etc will be in the contractor's scope.
5. Install the new bearing in place of damaged one.
6. Place the motor at its location and couple with the gearbox.
7. Align it as per the limits given by E.I.C.
8. Proper housekeeping is to be ensured after completion of work.

**(Note: Scope of work includes issuing of spares if required during maintenance)**

## **201. ASSISTANCE IN SPARE DEVELOPMENT**

As per the instruction of E.I.C manpower with required tools and tackles to be provided to vendor for assisting in equipment spares development. Scope of work includes dismantling and assembly of equipment as per requirement.

## **202. ROUND THE CLOCK ASSISTANCE**

1. Assistance to chemistry for collecting oil sample and coal sample.
2. Assistance to operation in valve or gates operation (like opening and closing, filter& cooler change over)
3. Feeder belt tracking.
4. Fan and mill lube oil filter cleaning.
5. Boiler/Mill/Fan/APH Manhole door opening for Maintenance, C&I, electrical and operation.

6. Oil top up/ greasing in APH/ soot blowers
7. Attending leakages oil, water and coal and cleaning of the same in the equipment.
8. Flusher machine shifting, installation, filter cleaning etc.
9. Attending running defects.
10. Soot blower steam line blinding by dummy plate.
11. Repair / replacement of minor linkages/parts/drive pins/coupling pins/cam links etc. in soot blowers.
12. Manual retract of wall blower if stuck in assistance with ITEM NO. 10 schedule.
13. Manual retract of LRSB (in case of stuck) with/without chain block pulley.
14. Cam assembly/pawl assy. Replacement
15. LRSB Middle support correction
16. LRSB Gear box support roller bearing replacement.
17. Replacement of soot blower motor.
18. Replacement of Air scavenging valve.
19. LRSB trial/wall blower trial (for defects finding/operation trial).
20. Mechanical jam clearing of valve or Hand wheel problem.
21. Attending oil/steam/air/water leakages in APH/Oil system/FOPH/Aux boiler/Mill other than given in the job schedule.
22. Taking Boiler expansion reading.
23. Assistance in attending boiler tube failures in on-line condition, i.e. without stoppage of units in terms of scaffolding, insulation removal, online clamp fabrication, protection plate.
24. Color coding of boiler tubes, any 5S activity, safety activity and proper stacking of spares, tools etc. in department stores.
25. Assistance in new spares fitment checks, material mix up checks.
26. Assistance in Burner, SADC, Oil guns, Soot blowers, valves online defects other than mentioned in the schedule.
27. Assistance in repair/salvaging of special OPGC tools & tackles like hydraulic jacks, electrical winches, pullers, hoists, pressure setting kit, heating m/c, etc.
28. Minor repairing of railing, toe guards, small opening in grating. Material will be supplied form OPGC.
29. Assistance in Annual safety tests/ maintenance of OPGC assets other than included in the schedule – Scaffolding material, etc.
30. Removal of scrap, waste oil drum, waste insulation material etc from working area to store / specified area as per instructions of EIC. Scrap to be collected in specified dust bin. Different type of Dust Bin with proper marking to be arranged or fabricated by the contractor for different type of scrap. Maintaining proper housekeeping.
31. Inspection & rectification of buck stay pin and expansion measurement rod.
32. Identification of leakages by removal of insulation.
33. Assistance in portable dewatering pump operation at various locations in Boiler & Aux. area.

**(Note: Scope of work includes issuing of spares if required during maintenance)**

ONE BOQ will be paid for providing manpower for one shift of 8 hours – Group should include supervisor, fitter, helper & rigger for carrying out the above jobs as per scope of work. While the above list is not exhaustive, group may have to perform other regular day to day jobs required for the reliable and safe operation of the system as per the instructions of the EIC.

### **203. HOUSEKEEPING OF MILL LUBE OIL SKID AND MAINTENANCE BAY AREA**

Contractor shall deploy manpower for housekeeping of the area as well as equipment. Payment shall be made on the basis of no of times the housekeeping of unit has been done.

Supervisor of the contractor shall maintain the record of supply of manpower for housekeeping and it should be duly signed by the EIC on that particular date. Housekeeping is to be done by blowing service air/cotton waste/cloth whatever is applicable. If the contractor fails to deploy specified manpower, penalty for the shortage equal to double the awarded rate shall be imposed.

#### **204. ASH CLEANING**

1. Scope of work includes accumulation of ash from the ducts and removal of ash via gunny bags or through any other arrangement.
2. Payment will be done as per the tonnage of ash cleaned from the duct.
3. Truck/tractor for ash disposal will be in the contractor's scope.
4. Area where ash is to dispose will be allocated by OPGC.
5. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.

#### **205. DUCT LEAKAGES/ADDITIONAL WELDING/STIFFENING ATTENDING**

1. Ensure PTW.
2. Check the leakages during operation.
3. Contractor has to quote per running meter of welding in areas like Duct repair activities/duct bracing welding/stiffener welding/coal burner tip repair welding.
4. At least 2 runs of welding required. Certified 6G welder needs to perform the job.
5. Contractor has to perform DPT as per the requirements of EIC.
6. Mobilizations like welding accessories shifting, scaffolding, and insulation removal to be done. Separate payment to be done for insulation & scaffolding activity.
7. General purpose welding electrodes (6013, 7018) shall be under the scope of contractor for the same. Special electrodes if required will be supplied by OPGC.
8. Any minor patch works if required, to be done. For the same plate to be cut and new plate welded at place. Payment will be in terms of running meter of welding.
9. Activity may involve both inside and outside duct/boiler jobs. Contractor has to arrange lighting facilities accordingly.
10. For coal burner tips repairing inside Boiler, sky climber will be used. Sky climber erection and operation will be paid separately. Job includes worn plate cutting, new plate preparation and welding.
11. Any material required for the activity to be issued from stores/yard as per the EIC instructions.
12. Return of the old material to the store.
13. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
14. **Payment Schedule –**
  - a. **For cutting & removing the damaged/eroded/worn out parts from the system – 1 BOQ will be paid for each running meter of cutting length.**
  - b. **For welding per running meter – 1 BOQ will be paid.**

#### **206. HOUSEKEEPING OF BOILER ALL FLOORS, BUCKSTAYS, COAL PIPING, DUCTING, APH, BURNER WINDBOX ETC.**

1. Contractor shall deploy manpower for housekeeping of the boiler at all elevations, platforms, gratings, buck stays, duct top, coal piping, APH, Burner corner, insulation, piping. Payment shall be made on the basis of no of times the housekeeping of complete unit has been done as per EIC instructions. Supervisor of the contractor shall ensure complete housekeeping

and it should be duly certified by the EIC on that particular date. Housekeeping is to be done by blowing service air/cotton waste/cloth whatever is applicable. If the contractor fails to deploy specified manpower, penalty for the shortage equal to double the awarded rate shall be imposed.