# ANNEXURE-5


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

## AOH SCOPE OF WORK

## "Annual Overhaul Work of APH, Fans, Ducting and Gates & Dampers of Unit # 3 & # 4, FY 2021-22"

# SCOPE OF WORK

## Purpose and Intent of the Work

Boiler is a very critical equipment of any Thermal Power Plant. APH, Fans, Ducting and Gates & Dampers are important auxiliaries of Boiler where utmost attention is required and huge amount of work need to be done in limited time but with highest quality standard.
Hence, it is necessary that prospective bidders should understand the purpose and intent of this contract. Bidders are advised to take a note of following points:

1. It is the intent of this contract that the unit must run without any outage of APH and Fans from overhaul to overhaul.
2. It is also the intent of this contract to achieve "ZERO DEFECTS" during maintenance. So, the maintenance work done during overhauling needs to be of highest possible quality standards. The agency must deploy skilled and competent manpower and supervisors. The agency shall be accountable for achieving these objectives.
3. The agency shall establish a proper supervision and quality assurance system in consultation with OPGC Engineers.
4. Agency shall deploy sufficient number of working gangs, Skilled manpower and supervisors so that the work is done in even pace and last minute rush are avoided.
5. Agency shall deploy adequate T&P to maintain the pace of work.
6. The agency shall take all the precaution to ensure safety at work so that the activities are not hindered by accidents.

## Brief Description of the Work

This SOW of the contract consists of Inspection/Servicing of APH Soot Blowers, Lube oil system, Gear Box, Fluid Couplings, Support & Guide Bearings, APH Seals, Insitu Basket Cleaning by high pressure Jet pump etc.

Broad SOW in Fans is Inspection/Servicing of ID, PA, FD and Seal Air Fans and servicing of Lube oil system components.

SOW in Gates & Dampers is servicing of Guillotine gates, Multilouvre Dampers, Hot Air & Cold Air Gates & Dampers.

SOW in Ducting is repair/replacement of Ducting casing plates, Bracings, Metallic Expansion Joints.

For this work, once the NTP is issued to the agency, he is expected to start mobilizing on top priority, so as to achieve the targets set by EIC under schedule.

The agency shall depute his resident engineer and site - in - charge regularly as specified by the EIC to meet him, to submit programs and reports, to discuss strategies and to receive instructions / guidelines.
Overall responsibility for coordinating with all concerned agencies including EIC and to carry out a successful overhaul of , while abiding quality and safety norms and achieving a defect free defect liability period of 90 days from date of BLU(Boiler Light Up) after each unit overhaul shall be in the scope of the agency.

In case of any ambiguity/ dispute in any schedule of scope of work, special terms and conditions etc. decision of EIC shall be final and binding on agency.

THIS CONTRACT IS AWARDED TO CATER THE OVERHAULING OF APH, FANS, DUCTING AND GATES & DAMPERS FOR TWO UNITS OF OPGC PHASE-II: 2X660 MW, AS PER THE ENCLOSED SCOPE OF WORK AND TERMS & CONDITIONS OF THE CONTRACT. ACCORDINGLY, THE VENDOR HAS TO MOBOLIZE ITS RESOURCES TWICE FOR OVERHAULING OF INDIVIDUAL UNIT BOILER PRESSURE PARTS AS PER INSTRUCTION OF THE ENGINEER-IN-CHARGE.
THE SCOPE OF WORK IS GIVEN FOR OVERHAULING OF ONE UNIT WHICH HAS TO BE FOLLOWED FOR OVERHAULING OF OTHER UNIT ALSO.

# (A) AIR PREHEATER:

## 1. SERVICING OF APH SOOT BLOWER

1. Ensure PTW.
2. Disconnect the poppet valve from flange
3. Puppet valve servicing, lapping & blue matching to be done. Same to be assembled after clearance from EIC.
4. Replace gland packings if needed
5. Remove the gearbox from the position and check for lubricant condition, replace if needed
6. Check for any oil leakages from gearbox and attend if any
7. Check the support rollers of Lance tube is OK and repair/replace if needed
8. Replace the Lance tube gland packing
9. Check the chain and chain rack and repair if any problems
10. 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, Lance tube, stuffing box, chain, sprockets, rollers, pins.
11. Check all the gasket mating surfaces, repair if required. Replace the old gaskets/old oil seals.
12. Puppet valve servicing, lapping & blue matching to be done. Same to be assembled after clearance from EIC.
13. All moving cams, links should be lubricated with rust preventive lubricants.
14. Assemble the soot blower.
15. Lubricate and adjust the chain (if available)
16. Replace the stuffing box packing.
17. Check the coupling between the motor and the gearbox, replace if required.
18. Fill the gearboxes with fresh oil.
19. Mount the soot blower in position and align the swivel tube w.r.t water wall tubes.
20. Check freeness of soot blower during forward and retract motion.
21. Re-fix the external dust guard.
22. Pressure setting of the wall blower after wall blower in service.
23. Take the successful trial run and rectify defects if any.
24. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job.
25. Any material required to be issued/returned from the main stores is under this scope.

**Notes: –**

- **One LRSB servicing will be considered as 1 BOQ.**
- **Gear oil, gland packing rings, gaskets and spares shall be provided by ITPS**
- **The scaffolding job not covered in this scope and separate payment will be done for scaffolding**

## 2. SERVICING OF LUBE OIL COOLER OF APH

1. Ensure PTW.
2. Remove the water and oil side piping/end covers and takeout the cooler
3. Remove the cooler tube bundle from the cooler.
4. Flush the cooler and clean the tubes thoroughly.
5. If required cooler tubes has to be cleaned using nylon brushes
6. Check for any leakage by putting air or water inside the coil.
7. Repair the damaged coil if required or replace.
8. Fix the cooler tube bundle.
9. Assemble the cooler.
10. Check for any defect after charging of the cooler and rectify it.
11. Conduct hydrotest of the cooler to desired pressure and observe for any leakages
12. Repair/replace the tube if any leakage found
13. Final box-up and charging the cooler for any leakages and attend the same
14. Return PTW

**Notes:**

- **MW Fitter has to be used for this job. The line item includes cost of both servicing & replacement**
- **One BOQ refers to One no APH lube oil cooler**
- **Hydrotest pump (Manual up to 30 Kg/cm2 capacity) has to be bought by vendor**

## 3. ASH CLEANING OF GUIDE BEARING AREA &INSIDE APH

1. Ensure PTW
2. Wear required PPE
3. Remove the ash from Guide bearing area
4. Remove the ash from APH inside corner ducts etc (Ensure confined space permit before entering inside
5. Collect the ash into suitable bags
6. Dispose all the bags at proper disposal area as instructed by EIC
7. Air cleaning of the area
8. Tools required to be in the scope of vendor
9. Return PTW

**Notes-**

- **One BOQ refers to one No APH Guide bearing and APH internal ash removal on corner ducts etc also included**
- **Gunny bags shall to be arranged by the contractor at his cost**

## 4. APH GEARBOX INTERNAL INSPECTION, CLEANING AND OIL REPLACEMENT

1. Ensure PTW
2. Drain the oil from the gearbox and collect it properly into a drum
3. Remove the spilled oil and maintain good housekeeping
4. Open the access doors and then clean the internals like gears with good cotton cloth

5. Inspect the internals for any damage and report the same if any found
6. Open the top bearing covers of all stage gears and Inspect the bearings for any damage and inform to EIC in case of damage. Inspection of axial play of each stage bearing and noting down and adjustment with shims if out of range. Replacement of Gears &bearings if found damaged also included in this scope
7. Inspect Overrunning clutch for any damage and inform to EIC in case of damage. Replacement of clutch if required is excluded in this scope and will be paid extra if replacement happens
8. Inspect the Oil circulation pump for any problems and repair/replace the same
9. Open the bottom bearing housing cover of last stage bottom cover for inspection of last stage Bearing. if any doubts the bottom bearing housing to be removed outside for thorough inspection of bearing and replacement of bearing & oil seal if found damaged in this scope only
10. Inspection of Gearbox input shaft, bearings and oil seals and replace if any found damage. Replacement of first stage gear/bearings/oil seals included in this scope only
11. Replacement of gaskets wherever needed
12. Remove the oil breather& filters, clean properly and fix back
13. Clean the view glass
14. Box-up the access doors and end cover
15. Fill the equipment with some oil and do flushing
16. Fill the equipment with the suitable oil up to normal level
17. Refill the oil up to normal level and ensure no oil leakages
18. Inspect the output shaft bearing and grease pipes and clean them
19. Fill the fresh grease to Output shaft bearing using grease gun
20. Box up the piping
21. Attending any other defects if found
22. Return PTW

**Note –**

1. **This job not covers replacement of overrunning clutch.**
2. **This job doesn't cover alignment of drive motors**
3. **Scaffolding erection if needed will be paid extra**

## 5. SERVICING & REPLACEMENT OF FLUID COUPLING

1. Ensure PTW
2. Decouple the fluid coupling from the gearbox and take outside
3. Check the condition of fusible plug and replace if required
4. Fill the new coupling with required amount of oil and then plug the filling hole properly
5. Dismantle the old fluid coupling
6. Observe the bearings and replace if damaged
7. 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)
8. Replace the Oil seals and O-rings
9. Clean the impellers and runners properly and replace if any damaged
10. Assemble the coupling properly
11. Fill the coupling with oil and store properly
12. Return PTW

**Notes: –**

- **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**
- **This job doesn't cover alignment of drive motors**

## 6. SERVICING OF AIR MOTOR

1. Ensure PTW
2. Decouple the air motor
3. Remove the air motor vane assembly and clean the vanes properly
4. Check whether the air ports clear or not and clean properly
5. Check whether any gaskets damaged and replace if found any damage
6. Open the gearbox as per EIC instruction and check for any internals damage
7. Replace if any internal part found damage or assemble the old one
8. Clean the internals properly
9. Replace the bearings and oil seals if required
10. Assemble back the gearbox and fill the oil
11. 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)
12. Connect the air piping to air motor and then take trail for air motor operation
13. Return PTW after work

**Notes:**

- **MW Fitter has to deployed for this job**
- **1 BOQ includes servicing of both Air motor & Air motor gearbox.**
- **This job doesn't cover alignment of drive motors**

## 7. SERVCING / 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 housing assembly from the gearbox
5. Decouple the clutch from bevel gear shaft
6. Remove the clutch from the shaft using suitable puller
7. Inspect the clutch internals and Repair/Replace the clutch if any damaged
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
13. Take trail and then return the permit if everything is normal
14. Repair the clutch later if replaced with new clutch

**Notes: -**

- **MW Fitter has to be used for this job.**
- **Alignment is not included in this scope as it is covered in another BOQ**
- **Payment will be done only if actually work done**

## 8. ALIGNMENT OF MAIN MOTOR / AIR MOTOR

1. Ensure PTW
2. Ensure all the inspection works of Gearbox, fluid coupling & air motor jobs is over before starting alignment

3. Install the 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
9. Get the reading verified by EIC and then remove the alignment fixture
10. Tight the coupling bolts properly
11. Fill the oil in fluid coupling if required
12. Box-up the coupling guard
13. Remove all the T&P from the work area
14. Return PTW

**Note: –**

- **MW Fitter has to be used for this job.**
- **One BOQ refers to one no of Main motor or Aux motor or Air Motor**

## 9. APH BASKETS INSITU CLEANING WITH HP JET PUMP

1. Ensure PTW
2. Arrange the high-pressure jet pump with the tank
3. Arrange water connection to the tank from the source provided by OPGC
4. Arrange electrical connection from the source provided by OPGC
5. Trail run the jet pump for checking operation
6. Open APH manhole doors
7. Ensure no other persons working on other jobs
8. Ensure confined space PTW available and hole watched deployed with log book for IN/OUT entry
9. Start the cleaning of Baskets from Hot End
10. Ensure the water drains open at the bottom of APH air side ducts
11. Continue water jet cleaning of all modules one by one by rotating APH manually. Ensure no persons inside while rotating APH
12. Once Hot end cleaning completed go for Cold End baskets cleaning
13. Ensure the scaffolding at Cold end for basket cleaning is safe and enough for purpose
14. Erect the life line suitably
15. Ensure all persons working inside should wear safety belt and anchored it to life line
16. Continue water jet cleaning of all modules one by one by rotating APH manually. Ensure no persons inside while rotating APH
17. Ensure the baskets cleaning verified by EIC before conclusion of work
18. Remove ash slurry from the ducts and do proper house keeping

**Notes:-**

- **Ensure no wet ash left in Ash hopper before closing manhole doors**
- **Scaffolding erection at APH CE not included in this scope.**
- **Jet pump supply & commissioning also in vendor scope. Vendor has to brought good condition working pump for this job**

## 10. APH SUPPORT BEARING INSITU INSPECTION, ALIGNMNET AND OIL REPLACEMENT

1. Ensure PTW
2. Remove the water shield assembly and Open the support bearing covers
3. Inspect the lube oil condition for any wear particles
4. Drain the oil from the respective equipment

5. Open the access doors and then clean the internals with cotton cloth
6. Inspect the bearing rollers each and every one complete 360 degrees for any pitting, wear or damage. In case of any damage inform to Concern EIC for action plan. Replacement of bearing if found damaged and OPGC EIC will take final decision for replacement
7. Remove the oil breathe & filters, clean properly and fix back
8. Check the support bearing level with master level at four locations of bearing housing
9. Achieve the levelness within design value
10. Clean the bearing internals with diesel and then with service air
11. Box-up the access doors
12. Fill the equipment with some oil and do flushing
13. Fill the equipment with the suitable oil up to normal level
14. Refill the oil up to normal level and ensure no oil leakages
15. Check the support bearing level
16. Return PTW

**Notes:**

- **MW Fitter has to deployed for this job**
- **One BOQ refers to complete 1 no of APH**
- **Replacement of bearing if damaged is also included in this scope.**

## 11. APH GUIDE BEARING INSPECTION, ROTOR LEVEL & GUIDE BEARING ALIGNMENT INSPECTION & CORRECTION AND OIL REPLACEMENT

1. Ensure PTW
2. Open the manholes of APH
3. Arrange 24 v Lamps for sufficient illumination
4. Inspect the guide bearing trunnion bolts for any damage or looseness
5. Open the guide bearing housing cover
6. Cover the bearing properly so that no foreign material should enter the bearing housing
7. Inspect the Guide bearing thoroughly for any damage, pitting etc by rotating APH in presence of OPGC EIC. If any damage found inform the same to EIC and action plan for further will be planned. Replacement of bearing if found damaged is also included in this scope
8. Proceed for further rotor alignment
9. Arrange the master level at Out board end of the module
10. Clamp the master level properly and set the value to zero
11. Rotate the APH and take the master level readings at each 90 degrees
12. If the reading is found more that the design value then adjust the rotor level using adjuster bolts at Guide bearing housing
13. Set the rotor level reading in design value throughout the rotor
14. Arrange the dial gauge onto the trunnion shaft and take run out reading of shaft w.r.t. bearing housing
15. If the run-out value found more than the desired value then adjust the same if found more
16. Temporarily lock the rotor during run out adjustment if required
17. After adjustment is over remove the temporary locking
18. Take the final reading of rotor level with master level and Run out of guide bearing w.r.t. trunnion shaft, both parallel and note down the readings and go for correction again till the design value obtained
19. Drain the lube oil completely from the housing and clean with diesel and then service air
20. Place some fresh oil and do flushing
21. Fill the oil to desired level
22. Box up the guide bearing housing and seal properly using packing rope and sealant
23. Remove the T&P and other foreign material inside APH

24. Box up all manholes
25. Return PTW

**Notes:**

- **MW Fitter has to deployed for this job**
- **One BOQ refers to complete 1 no of APH**
- **Replacement of Guide bearing if found damaged also included in this scope**

## 12. RADIAL SEAL INSPECTION, REPAIR/ REPLACEMENT AND SEAL SETTING

1. Ensure PTW
2. Open the manhole doors
3. Arrange 24 V lights for sufficient illumination
4. Prepare safe approach for APH manhole door entry
5. Inspect the radial seals for any damages
6. Replace the damaged seals including the seal tabs.
7. Inspect the sector plate and static seal assembly for any damage and repair if any damage found
8. Inspect the sector plate tie rods and clean them
9. Adjust all the 3 sector plates wrt radial seal to the required clearance
10. Install the radial seal straight edge at HE
11. Adjust the seal gap wrt sector plate as per design value
12. Rotate the APH and set the radial gap setting for all the seals and note down readings
13. Get the readings checked by EIC
14. Ensure sufficient scaffolding arranged at Cold End (CE) side of APH
15. Inspect the CE side sector plate for ant damage and repair if found any
16. Inspect for damage of any radial seal or seal tabs and repair/replace the same if needed
17. Arrange Straight edge if needed
18. Take the CE radial seal clearances wrt sector plate and note down
19. Do the same for all radial seals by rotating APH manually
20. Get the readings verified by EIC
21. Remove all the T&P and scrap and foreign material from the APH
22. Box-up the, manholes and ensure all the manholes to be seal proof
23. Return PTW

**Notes: -**

- **MW Fitter has to be used for this job.**
- **One BOQ refers to 1 no of APH completely**
- **Dedicated hole watcher needs to be deployed continuously for this job**

## 13. BYPASS SEAL INSPECTION, REPAIR/ REPLACEMENT AND SEAL SETTING

1. Ensure PTW
2. Open the manhole doors
3. Arrange 24 V lights for sufficient illumination
4. Prepare safe approach for APH manhole door entry
5. Inspect the Bypass seals for any damages
6. Replace the damaged seals
7. Inspection of T-bars and rectify the problems
8. Adjust the seal gap wrtT-Bars as per design value
9. Set the bypass seal clearance to desired value all around the rotor
10. Get the readings checked by EIC

11. Ensure sufficient scaffolding arranged at Cold End (CE) side of APH
12. Inspect the CE side the Bypass seals for any damages repair/replace the same if needed
13. Adjust the seal gap wrtT-Bars as per design value
14. Set the bypass seal clearance to desired value all around the rotor
15. Get the readings checked by EIC
16. Remove all the T&P and scrap and foreign material from the APH
17. Box-up the, manholes and ensure all the manholes to be seal proof
18. Return PTW

**Notes: -**

- **MW Fitter has to be used for this job.**
- **One BOQ refers to 1 No APH**
- **One dedicated hole watcher needs to be deployed for this job**

## 14. AXIAL SEAL INSPECTION, REPAIR/ REPLACEMENT AND SEAL SETTING

1. Ensure PTW
2. Open the axial seal plate adjuster assembly doors
3. Open the Axial seal assembly access doors
4. Arrange 24 V lights for sufficient illumination
5. Prepare safe approach for APH manhole door entry
6. Inspect the Axial seals for any damages
7. Replace the damaged seals including the seal tabs.
8. Inspect the Axial seal sector plate for any damage/wear and repair if any damage found
9. Inspect the Axial seal sector plate adjuster bolts and clean them
10. Adjust all the 3 sector plates wrt Axial seal to the required clearance using adjuster bolts
11. Install the Axial seal straight edge
12. Adjust the seal gap wrt sector plate as per design value
13. Rotate the APH and set the Axial seal gap setting for all the seals and note down readings
14. Get the readings checked by EIC
15. Inspect the axial seal plate cover doors for any air leakages and attend if any leakages found
16. Attend any welding leakages in axial seal plate doors
17. Replace the gland rope of man hole doors
18. Remove all the T&P and scrap and foreign material from the APH
19. Box-up the, manholes and ensure all the manholes to be seal proof
20. Return PTW

**Notes: -**

- **MW Fitter has to be used for this job.**
- **One BOQ refers to 1 No APH**
- **One dedicated hole watcher needs to be deployed for this job**

## 15. APH COLD END SCAFFOLDING ERECTION

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 which shall be suitable for Radial seal setting and also for Cold end basket cleaning
9. On flue gas side erect scaffolding suitable for bracing inspection
10. Use only metallic pipes and Jolley for scaffolding
11. Ensure the scaffolding is certified by safety department
12. Tie all the gratings properly & rigidly
13. After completion of work remove all the scaffolding material
14. Box-up the manholes if any
15. Return PTW
16. Shift the scaffolding material back.

**Notes: -**

- **MW Fitter has to be used for this job.**
- **One BOQ refers to 1 No APH**
- **One dedicated hole watcher needs to be deployed for this job**

## 16. AIR SEAL ASSY INSPECTION AND LEAKAGE ATTENDING

1. Ensure PTW
2. Clean the air seal assembly area
3. Ensure seal air piping is through
4. Ensure seal air pipe and hose pipe is not damaged and repair/ replace if any damage found
5. Open the seal assembly covers
6. Repair the stationary spool inside APH if found damage
7. Replace the insulation inside if found damage
8. Find any welding leakages and attend the same
9. Replace the gland ropes and gaskets
10. Close the seal assembly covers properly and tightening
11. Apply refractory at missing areas nearby seal assembly area
12. Return PTW

**Notes: -**

- **MW Fitter has to be used for this job.**
- **One BOQ refers to 1 No APH**

## 17. APH PIN RACK ARRANGEMENT INSPECTION & CORRECTION

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 down the pin rack gap of each segment both ends and note down the same
5. Take runout reading of Pin rack of each segment both ends using dial gauge
6. Take the clearance readings and dial gauge readings of all Pin rack segments (Total no of segments=24 nos for 1 no APH)
7. If any abnormality found inform to EIC and take further action after discussion with EIC
8. The scope also covers pin rack adjustment if any abnormality found
9. Inspect the condition of pinion
10. Inspect the Worthington hub for any looseness and tight the bolts if required
11. Close the access door and apply proper gasket and sealant
12. Return PTW

**Notes: –**

- **MW Fitter has to be used for this job.**

### 18. APH CASING INSPECTION FOR AIR LEAKAGES & ARRESTING

1. Ensure PTW
2. Prepare the scaffolding for accessing corner ducts and axial seal plate joints etc and wherever the leakage source identified earlier during operation
3. Remove cladding sheet and insulation without damaging it
4. Clean the casing surface and locate the leakage point
5. Identifying leakages in ATT and attending the same
6. Attend the leakages by welding or changing gaskets/ropes whichever applicable
7. Re-fix the insulation. If any damage to insulation found replace the same
8. Fix the cladding sheet back in position properly
9. Remove the scaffolding and shift back to stores
10. Do the proper House keeping
11. Return PTW

**Notes: –**

- **One BOQ refers to 1 no APH**
- **Scaffolding and insulation jobs not covered in this scope. It will be paid extra**

### 19. APH HOT END CENTRE SECTION AREA REFRACTORY APPLICATION

1. Ensure PTW
2. Remove the ash present in guide bearing area
3. Remove the insulation and cladding sheet
4. Cleaning the center section if needed grinding
5. Shifting of refractory from stores
6. Fabrication and welding of supports/spikes on Centre section plates for refractory holding
7. Repair of any defects like air leakages etc in the center section before refractory application
8. Refractory application of the complete APH HE centers section area
9. Allowing curing time and controlling movement till that time on 24x7 hr basis
10. Ensure refractory dried completely and get it verified by OPGC EIC
11. Return PTW

**Notes: –**

- **One BOQ refers to 1 no APH HE Centre section**
- **Approx. Volume of refractory will be around 16 M3 and there will be some deviation in the quantity. The quantity is just for reference only and hence vendor has to consider complete APH HE Centre section refractory for this job with deviation to mentioned volume**
- **Transportation of refractory from ware house included in this scope only. Vendor has to arrange his own vehicle for transporting refractory from ware house without any extra cost**
- **Suitable PPE & tools for handling the refractory has to arrange by the vendor**

## (B) DUCTS, GATES & DAMPERS

### 20. GULLOTINE 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. Inspect the bearings and replace if found damaged
6. Clean the bearing thoroughly and apply fresh grease all the bearings
7. Inspect the gate for proper alignment and correct if misaligned
8. Check the freeness of gate operation and make it freely operating.
9. If required use a chain block for freeness of gate
10. Inspect the gate chain links for any damage/wear or looseness and rectify if any problem found
11. Replacement of damaged seals if any
12. Replacement of gland packing if any
13. Inspection of Gate actuator gearbox for its supports and repair if any problem found
14. Assistance in Gate actuator jobs for EMD if needed
15. Final trail run of Gate
16. Remove the scaffolding if installed
17. Return PTW

**Notes:**

- **One BOQ refers to one actuator with gate. For Example, ID Fan suction and discharge gates each gate is divided into 2 separate gates with individual drives and hence 2 BOQ will be considered for the same**
- **The scaffolding needed for this job will be paid separately**
- **The gate may be fans gate or ESP gates**

## 21. MULTI LOUVRE DAMPER INSPECTION & DEFECT ATTENDING

1. Ensure PTW
2. Inspect the damper for the problems
3. Arrange the scaffolding for ease of access wherever required
4. Inspect the damper gearbox to supports &coupling and rectify if any problem
5. Replace/servicing of Gearbox or its internals if required
6. Remove the connecting links between each flap of damper and rectify if any of the links found having problems
7. Inspect each flap shafts for any damage and rectification jobs like welding, grinding and machining assistance included in this scope
8. Inspect the damper bearings and Replace the damaged bearings if required
9. Lubrication of damper bearings wherever applicable
10. Stuffing box cleaning with air and Gland packing of damper shafts replacement
11. Replacement of damaged seals of louver blades
12. Check the freeness of individual flaps and make it freely operating.
13. If required use a chain block for freeness of gate
14. After ensuring freeness connect the links of all flaps
15. Properly tight all the bolts and install lock pin properly
16. Inspection of damper actuator & gearbox supports and repair
17. Providing stiffeners for the supports if required
18. Final connection of all the links as per drawing
19. Check for free operation of gate
20. Trail run and calibration of damper with C&I collaboration
21. Remove the scaffolding if installed
22. Return PTW.

**Notes:**

- **One BOQ refers to one actuator with Damper. For Example, One APH Flue gas inlet damper is divided into 4 drives and hence 4- BOQ quantity will be considered for the same**
- **The scaffolding needed for this job not included in this scope only. Separate payment for scaffolding erection if done will be paid extra**
- **Scaffolding material supply is in vendor scope**
- **Workshop service will be provided by OPGC however assistance manpower has to be supplied by Vendor wherever applicable**

## 22. SERVICING OF HOT AIR DAMPER (HAD) & COLD AIR DAMPER (CAD)

1. Ensure PTW.
2. Decouple the damper from the pneumatic cylinder.
3. Inspect each damper flap for any wear out/damage and repair
4. Arrange scaffolding for accessing damper bearings at NDE side (Opposite to Cylinder)
5. Inspect the damper shafts for any wear out and repair if any found
6. Inspect the damper bearings and repair/replace if any problem found
7. Clean all the damper bearings thoroughly
8. Remove the old gland packing from the dampers and install the new one of proper size as per the design requirement.
9. Fasten the flange bolt after replacement.
10. Couple all the damper flaps and check for free operation manually
11. Calibration and limit setting of dampers along with C&I and operation

**Notes: –**

- **One BOQ refers to one no of HAD or CAD**
- **Scope of work includes issuing of spares if required during maintenance.**
- **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**
- **The scaffolding needed for execution of this job not included in this scope. Separate payment for scaffolding will be paid extra**

## 23. SERVICING OF HOT AIR GATE & COLD AIR GATE

1. Ensure PTW.
2. Opening the manhole door
3. Inspect the coupling with pneumatic cylinder for any damage and repair.
4. Inspect the gate gland seals for any damage and repair the same
5. Inspect the guides of gate for any damage and repair/rectify
6. Inspect the gate plate for any damage and repair
7. Inspect the gate seals for any damage and rectify/replace if needed
8. Inspect gate full close condition and check for any clearance/path with duct for air passing and rectify the same
9. Inspect the gate body for any air leakages and rectify the same
10. Inspect the gate weld joints with duct for any leakages and rectify the same.
11. Inspect the flange joints of gaskets for any leakages and repair. If gland rope is there replacing the same. If weld joint found leakage do the seal welding
12. Inspect the manhole door for any leakages and rectify the same. Replace man hole door gaskets also

**Notes: –**

- **One BOQ refers to one no of HAD or CAD**
- **Scope of work includes issuing of spares if required during maintenance.**

- **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**
- **The scaffolding needed for execution of this job not included in this scope only. Separate payment for scaffolding will be paid extra if needed.**

### 24. SERVICING OF COAL MILL SEAL AIR DAMPER

12. Ensure PTW.
13. Inspect damper flap for any wear out/damage and repair. If required pocket cutting needs to be done
14. Inspect the damper shafts for any wear out and repair if any found
15. Inspect the damper bearings and repair/replace if any problem found
16. Clean all the damper bearings thoroughly
17. Decouple trail run if instructed by EIC
18. Remove the old gland packing from the dampers and install the new one of proper size as per the design requirement.
19. Trail run with cylinder
20. Calibration and limit setting of dampers along with C&I and operation
21. Inspection door boxup/Welding
22. In case of any major problem identified during inspection then the seal air damper has to taken from duct for maintenance work and the same also included in this scope

**Notes: –**

- **One BOQ refers to one no of HAD or CAD**
- **Scope of work includes issuing of spares if required during maintenance.**
- **Proper housekeeping to be ensured after work is completed and returning of scrap material to the store**
- **The scaffolding needed for execution of this job not included in this scope. Separate payment for scaffolding if done**

### 25. REPAIR/REPLACEMENT OF DUCT PLATE AND BRACINGS

1. Ensure PTW
2. Opening of manhole doors
3. Ensure scaffolding for accessing bracings and duct plates wherever required
4. Inspect the bracing supports and rectify if any problem found
5. Weld protective shield like angle or half pipe for protecting the bracing as per EIC instruction
6. Replacement of shield pipes wherever needed
7. Inspection of diverter plates/vanes if any and repair the same
8. Inspection of duct plate thickness and noting down the survey readings
9. Attending leakages in the duct during ATT and attending the same
10. Inspection of outside duct hangers and supports and repair of any problems
11. Removal of all the scaffolding
12. Remove all the scrap inside and outside
13. Do the proper House keeping
14. Box up of Manhole doors
15. Return PTW

**Notes:**

- **One BOQ refers to one Metric Ton by Weight of replaced spool pieces & protective shields**
- **The vendor has to quote prices per MT of steel repaired/replaced**

## 26. WELDING OF CARBON STEEL

1. Ensure PTW
2. Opening of manhole doors
3. Ensure Removal of accumulated ash inside the duct
4. Inspection of weld joints for damage and DPT if needed
5. Ensure access to the points where welding is needed in the duct
6. Welding of duct at leakage points and damaged joints as per EIC instruction
7. DPT of weld joints after welding and get certified by EIC
8. Removal all the scaffolding
9. Remove all the scrap inside and outside
10. Do the proper House keeping
11. Return PTW

**Notes:**

- **One BOQ refers to one running meter length of welding and hence vendor has to quote price for 1 meter length welding**
- **Scaffolding job not included in this scope as it will be covered separately**

## 27. METALIC BELLOW REPLACEMENT

1. Ensure PTW
2. Ensure safe approach to the bellow to be repaired
3. Removal of accumulated ash in bellow
4. Inspect of bellow, weld joints for any damage and rectify if any problem found
5. Removal of bellow if found damaged
6. New bellow shifting from stores to job location
7. Replacement of new bellow and seal welding of the bellow joints and duct joints
8. Remove all the scrap inside and outside
9. Do the proper House keeping
10. Return PTW

**Notes:**

- **One BOQ refers to one no of metallic bellow**
- **Shifting of bellow from stores also included in this scope only**
- **Arrangement of winch machine/chain pulley for bellow shifting to position is also included in this scope only**
- **The Metallic bellows included will be of APH inlet and outlet side, Hot PA duct and Hot SA ducts also**
- **Scope of work includes issuing of spares if required during maintenance**
- **Special electrodes (like SS electrodes, Other than CS) will be issued by OPGC**
- **Wherever TIG welding is necessary vendor has to execute TIG welding only as per EIC decision**
- **The scaffolding required for this job not included in this scope and separate amount will be paid for the scaffolding**

## 28. CLEANING OF ASH INSIDE FLUEGAS & AIR DUCTING

1. Ensure PTW
2. Opening of manhole doors
3. Supply of bags for collecting the ash
4. Removal of accumulated ash inside the duct
5. Collecting the ash into bags properly
6. Shifting of ash bags from duct to zero meter and subsequently to the disposed area
7. Arrangement of tractor for ash shifting is also included in this scope

8. Ensure removal all the scrap inside and outside
9. Do the proper House keeping
10. Return PTW

**Notes:**

- **One BOQ refers to one Metric Ton of Ash removed. The same has to be certified by OPGC EIC**
- **Supply of tractor trolley for ash shifting to designated area will be in vendor scope only.**

### 29. SCAPH INSPECTION &CLEANING

1. Ensure PTW
2. Opening of manhole doors
3. Removal of accumulated ash near the SCAPH area
4. Ensure scaffolding for SCAPH inspection if required
5. Inspection of SCAPH for any ash accumulation and clean the same
6. Inspection of SCAPH tubes for any damage and repair the same
7. Inspection of Guide vanes for SCAPH and repair the same
8. Removal all the scaffolding
9. Remove all the scrap inside and outside
10. Do the proper House keeping
11. Sealing rope replacement and manhole door Boxup
12. Return PTW

**Notes:**

- **One BOQ refers to one no of SCAPH and for one Boiler 2 nos. SCAPH available**
- **IBR if required will be supplied by OPGC if any SCAPH tube repair needs to be done.**

## (C) FANS (ID, PA, FD FANS& SEAL AIR FANS):

### 30. FAN ANNUAL CHECKS BY OPENING FAN CASING – 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. Arrangement of chain blocks if EOT not operational
5. Arrange life line for chain block arrangement and other works on fan casing top
6. Remove the fabric bellows at suction & discharge side of casing
7. Remove the insulation cladding sheets for casing bolts removal as well as at top for casing lifting hook access
8. Remove the casing bolts and store properly
9. Arrange the sling ropes for casing lifting
10. Using EOT/Chain block lift the casing and place it on the stands provided
11. Erection of scaffolding for Inspection of suction side silencer support plates and DPT of all the weld joints at suction side silencer
12. Repair the defects if any found on silencer
13. Inspection and repair of duct and bracings upto discharge damper
14. Removal of ash in the duct
15. Inspect for any leakages on main bearing housing and servomotor side as well
16. Attend all the leakages founded in inspection

17. Tightness of MBA fixing bolts, Fan coupling bolts, Blade fixing bolts and other fixing bolts in impeller hub to desired Torque setting as mentioned in OEM drawing
18. Cleaning of the impeller blades and DPT of blades
19. Inspect the blades for wear out and other cracks
20. Inspect the intermediate shaft for cracks and conduct DPT
21. Inspect the MBA mounting flange for cracks and conduct DPT
22. Inspect the wear on Fan casing and its guide vanes
23. Master level checking on MBA and intermediate shaft
24. DPT of all weld joints on weld joints coupling, casing vanes etc
25. Clean the suction duct & discharge duct free from ash, dust & also all foreign materials
26. 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
27. Check the blade angles wrt. casing for all the blades and adjust if any deviation wrt the punch mark on impeller
28. Torque tightening of all the blade bolts
29. Take Blade hub clearances and Tip clearances wrt Casing readings for all the blades
30. Check free operation of all blades and clean the blade hub portion thoroughly
31. Remove the ash in servomotor hood
32. Opening of HAD dome cover and check the condition of sliding blocks and replace if found damaged
33. Check for any oil leakages in HAD by starting LOP and if any leakages found attend the same or replace HAD if needed
34. Stop the LOP and then do torque tightening of adjusting lever bolts and Thrust plate bolts etc
35. Box up of dome cover and HAD
36. Servomotor alignment check and correction
37. Inspect servomotor coupling elements and replace if found damage
38. Inspection of HAD command and feedback shafts and bearings for any damage and repair the same
39. Blade pitch trial and limit setting and adjustments if any
40. Alignment clamp installation on coupling and the alignment of fan to motor
41. Check & Adjust the Magnetic center distance as per OEM value wherever applicable
42. Inspection of alignment reading, coupling gaps etc. by EIC before box-up
43. Inspection of suction and discharge ducts before box-up
44. Cleaning of the casing seating surfaces with buffing wheel and then applying suitable sealant
45. Casing box-up and then Bolts tightening
46. Fixing the casing joint fabric bellows and clamp tightening. Replacement of bellows if found damaged included in this scope only
47. All casing manholes box-up properly for leak proof sealing
48. Insulation and cladding sheet fixing on the fan.If any cladding sheet found missing or damaged the same to be fabricated and fitted in this scope only. Material will be provided by OPGC
49. Removal of scrap from workplace
50. Return PTW
51. Trail run of fan and checking for any abnormal sounds and smooth operation. If any abnormalities found the same has to be rectified by the vendor without any additional cost

**Note –**

- **MW Fitter has to be used for this job.**
- **The scope covers only insitu inspection of fans and above check points. The scope not covers replacement of rotor**

- **The scaffolding needed for execution of this job will be paid separately**

## 31. REMOVAL, SERVICING & REPLACEMENT OF COMPLETE ROTOR ASSEMBLY OF PA/ID/FD FANS

1. Ensure PTW
2. Removal of cladding sheet, bellows casing bolts etc
3. Arrangement of chain block if EOT not available
4. Lifting of casing and shifting to zero meter
5. Dismantle of blades from the rotor
6. Removal of rotor from the casing and shifting to maintenance bay
7. Arrange rotor along with MBA onto the suitable stand
8. Remove the coupling from main bearing assembly shaft using hydraulic puller supplied by OEM. Note down Coupling back side clearance with MBA cover before removal of coupling just for reference
9. Removal of impeller side end covers, HAD, HAD covers etc. to access the shaft for fixing impeller hub removal kit
10. Removal the counter weight end cover and check the condition and positioning of counter weights is OK or not. If any problem found inform to EIC for planning corrective action
11. Arrangement of Impeller hub removal kit onto the shaft
12. Notedown the reading of impeller hub from MBA end cover gaps before removal of hub from MBA shaft
13. Removal of Impeller hub from the MBA shaft using the hydraulic puller and high-pressure pumps for hub expansion
14. Carefully taken out the impeller hub from the MBA shaft and kept it at distance on the wooden blocks
15. Remove the NDE side End cover of MBA
16. Prepare a suitable lifting lug and fix it on DE side of MBA shaft for lifting it vertically
17. Place the MBA assembly on a stand vertically with DE side up. Fabricate the stand if not readily available. Material will be supplied by OPGC
18. Removal of the DE end covers of bearing assembly
19. Removal of shaft with bearing from the MBA housing
20. Inspect the condition of bearings and its rolling elements for any damage or wear or pitting
21. Inspect the MBA mounting flange for cracks and conduct DPT
22. Removal of the bearings from the shaft if bearing requires replacement as per EIC decision
23. Replace the bearings if required as per EIC instructions
24. Take the dimensions of shaft, bearings and housings of bearing seating area accurately
25. After inspection of readings assemble the bearings onto the shaft properly
26. Assemble the shaft inside bearing housing and box-up end covers
27. Check the axial float of the shaft and adjust it to design value
28. Take the shaft OD at Coupling and Impeller hub area and cross check with standard readings in presence of EIC.If any deviation found action plan will be decided by EIC which may needs replacement/Machining works of shaft if needed
29. Arrange the MBA assembly onto the stand
30. Assemble back the Coupling into position and fix lock plate
31. Assembly back the impeller hub onto the MBA shaft using the Mounting jack
32. Lock nut fixing and insitu drilling for grub screw fixing on lock nut clamp
33. Open the Blade bearing assembly end cover by draining the lube oil
34. Remove the sliding block from adjusting lever
35. Remove the blade shaft clamping bolt and then remove adjusting lever
36. Loose the thrust bearing lock nut of blade shaft bearing and remove the locknut

37. Remove the snap ring of counter weight
38. Then remove the blade shaft from impeller
39. Inspect the blade shaft and blade shaft bearings repair/replace if needed
40. Thoroughly clean the blade shaft and its bearings with diesel
41. Inspect the seal set of blade shaft and replace if needed
42. Assemble back the guide bearings and fill with grease
43. Assemble counter weight and thrust bearing onto the shaft
44. Assemble lock nut and tight it till axial float found within 0.03 to 0.05 mm
45. Do the exercise for all the blades and ensure float within 0.03 to 0.05 mm
46. Assemble the blade shaft bearing cover and the fill the lubricant as per recommendation
47. Box up all the end covers of impeller hub
48. Box-up of HAD assembly and dome cover
49. Remove the scrap at work area and do proper house keeping
50. Fix the dummy plugs in MBA assembly and fill preservation oil
51. Shifting of Rotor assembly into the casing and fixing onto the casing
52. Tightness of MBA fixing bolts, Fan coupling bolts, Blade fixing bolts and other fixing bolts in impeller hub to desired Torque setting as mentioned in OEM drawing
53. Cleaning of the impeller blades and DPT of blades
54. Inspect the blades for wear out and other cracks
55. Inspect the intermediate shaft for cracks and conduct DPT
56. Inspect the wear on Fan casing and its guide vanes
57. Master level checking on MBA and intermediate shaft
58. DPT of all weld joints on weld joints coupling, casing vanes etc
59. Clean the suction duct & discharge duct free from ash, dust & also all foreign materials
60. 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
61. Check the blade angles wrt. casing for all the blades and adjust if any deviation wrt the punch mark on impeller
62. Torque tightening of all the blade bolts
63. Take Blade hub clearances and Tip clearances wrt Casing readings for all the blades
64. Check free operation of all blades and clean the blade hub portion thoroughly
65. Remove the ash in servomotor hood
66. Opening of HAD dome cover and check the condition of sliding blocks and replace if found damaged
67. Check for any oil leakages in HAD by starting LOP and if any leakages found attend the same or replace HAD if needed
68. Stop the LOP and then do torque tightening of adjusting lever bolts and Thrust plate bolts etc
69. Box up of dome cover and HAD
70. Servomotor alignment check and correction
71. Inspect servomotor coupling elements and replace if found damage
72. Inspection of HAD command and feedback shafts and bearings for any damage and repair the same
73. Blade pitch trial and limit setting and adjustments if any
74. Alignment clamp installation on coupling and the alignment of fan to motor
75. Check & Adjust the Magnetic center distance as per OEM value wherever applicable
76. Inspection of alignment reading, coupling gaps etc. by EIC before box-up
77. Inspection of suction and discharge ducts before box-up
78. Cleaning of the casing seating surfaces with buffing wheel and then applying suitable sealant
79. Casing box-up and then Bolts tightening

80. Fixing the casing joint fabric bellows and clamp tightening. Replacement of bellows if found damaged included in this scope only
81. All casing manholes box-up properly for leak proof sealing
82. Insulation and cladding sheet fixing on the fan. If any cladding sheet found missing or damaged the same to be fabricated and fitted in this scope only. Material will be provided by OPGC
83. Removal of scrap from workplace
84. Return PTW
85. Trail run of fan and checking for any abnormal sounds and smooth operation. If any abnormalities found the same has to be rectified by the vendor without any additional cost
86. Return PTW

**Notes: -**

- **MW Fitter has to be used for this job.**
- **The scope includes replacement& servicing of complete rotor assembly**
- **Manpower assistance for any machining job for above job will be in this scope only. Workshop facilities will be in OPGC scope**

### 32. ANNUAL SERVICING OF THE LUBE OIL TANK AND AUXILIARIES (Except LOP)

1. Ensure PTW with all required isolations & precautions
2. Shift any Lube oil flusher to the fan for removal of lube oil into empty drums
3. By starting lube oil flusher transfer the lube oil into drums
4. Open the tank inspection door
5. Clean the inside of tanks thoroughly
6. Check for any Paint missing or damaged and repair if any defect found
7. Check the return oil side filter like magnetic filter and clean it
8. Clean the breather and if found damage replace the same
9. Inspection of change over valve and seat replacement if any problem found
10. Inspect the Lube oil filters and clean/replace the same
11. Inspect PRV internals and clean thoroughly with diesel and air
12. Inspect NRV for any problems and clean it and assemble back
13. Inspection of Lube oil coolers for any tube leakages by Hydro test and attending the problems
14. Inspection of cooler leakages both oil side and water side and attending the same
15. Cleaning of tubes if scaling observed by using brushes
16. Attending any oil leakages in the Lube oil piping
17. After final inspection box up of tank inspection door
18. Refilling of the lube oil and do flushing with external flusher for at least 72 hours
19. Also check whether any leakage from tank inspection door
20. Check for any oil leakages after starting Lop and attending the same
21. Removal of material, waste and scrap after work
22. Return PTW

**Note –**

- **MW Fitter has to supervise this job.**
- **One BOQ refers to One no of fan Lube oil system**
- **Hydro test pump (Manual up to 25 Kg/cm2 capacity) has to be bought by vendor**

### 33. ANNUAL SERVICING OF THE LUBE OIL PUMPS OF FD/PA/ID FANS

23. Ensure PTW with all required isolations & precautions
24. Ensure motor cable removal is done

25. Place 24 V DC light inside ensure sufficient illumination if needed
26. Take out the motor from the lube oil skid
27. Take out the pump along with suction piping & coupling with spider
28. Inspect and clean the suction strainer
29. Inspect the spider and replace if required
30. Inspect the coupling and replace if found damage
31. Inspect the pump for any seal leakages and replace if required
32. Inspection of the pump internals and rectification of problems if any
33. Servicing of the old pump if replaced with new pump
34. Box-up of the lop with coupling, spider and all the lube oil piping and tight properly
35. Alignment of LOP wherever applicable
36. Trail run of the pump and check for any abnormal sound, oil leakages if any and attend the problems if found any
37. If found any problem the same to be attended and the cost is included in this scope only
38. Return PTW and remove all the scrap from workplace

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

## 34. ANNUAL OVERHAULING OF SEAL AIR FAN

1. Ensure PTW
2. Inspect for oil leakages in fan bearing housing area and note down
3. Opening the Bearing housing and inspection of bearing condition and bearing clearances
4. Replacement of bearing if found any damage or clearances found high
5. Replace the internals of bearing housing if any found damaged
6. Inspection of coupling and its elements for any damage and repair/replace if any problem found
7. Opening of casing manhole doors and inspection of impeller for any cracks or wear out etc
8. Inspection of impeller position on shaft and check locking is intact
9. Inspection of Casing parting planes, Manhole doors for any air leakages, gland rope damages and replace the gland rope of the same
10. Inspection of Bearing face out reading in bearing housing and correct if any deviation
11. Inspection of interference between bearing and bearing housing
12. Box-up of bearing housing and filling oil to suitable level
13. Check for oil leakages for next 24 hours and attend the same if any
14. Alignment of fan and motor
15. Inspection of suction and discharge dampers for freeness and rectify if any problems found
16. Inspection of suction and Discharge damper bearings and gland inspection, repair/replacement
17. Box-up of manhole doors
18. Housekeeping of the area
19. Return PTW

**Notes: –**

- **MW Fitter has to be used for this job.**
- **The scaffolding needed for execution of this job will be paid separately**

## 35. 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

**Notes: –**

- **The scaffolding needed for this job will be paid separately if done**

# (D) Miscellaneous:

### 36. SCAFFOLDING SUPPLY, ERECTION & REMOVAL

1. Ensure PTW.
2. The scope of works includes supply, fabrication & erection& removal of scaffolding for the jobs which are not covered above.
3. Scaffolding materials should be M.S. Pipes confirming to IS: 1161 and couplers (Right angle couplers/Cup lock couplers/ Swivel Couplers) conform 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. All materials such as binding wire/ coconut rope required for executing the above job should be arranged by the contractor at his cost.
6. 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.
7. 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.
8. Complete scaffolding materials is under contractor's scope.
9. OPGC will designate a dedicated place for storing scaffolding material inside plant premises.
10. 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.
11. Proper housekeeping has to be maintained at all times during and after scaffolding.
12. 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.
13. Whenever instructed scaffolding material has to be shifted well in advance to the site location as per EIC instructions.
14. Only designated riggers will perform the scaffolding job.
15. General cleaning & housekeeping of the equipment & surrounding areas to be ensured after completion of job
16. Scaffolding erection has to be done as per OPGC standard, and it will be inspected by designated Officer of OPGC and upon his certification only scaffolding will be used for any

job. Any alterations recommended by the Officer has to be strictly implemented with no extra cost.

17. PTW has to be renewed on daily basis

**Notes:**

- **One BOQ refers to one Cubic Meter volume of scaffolding both erection and removal**
- **The scaffolding material supply completely in vendor scope**
- **Trolley required for scaffolding shifting is in vendors scope only**

## 37. PRE & POST S/D MISC. WORKS

a. Pre shutdown works :Initial mobilization, T&P testing, Welder Test, Site Set up, Submission of docs such as Labor License, ESI docs, T&P certificates, List of consumables, submission of copy of gate passes etc.

b. Post shutdown works: Post overhauling housekeeping, Post overhauling defect rectification, return of materials to store, submission of documents such as details of work executed measurement sheets, material consumption details, material return details, weld joint wise report for different zones of Boiler along with RT & PWHT report, DPT protocols, copies of wage sheet of workman etc.

### c. Pre shutdown works (In detail) :

**Initial Mobilization:-**

a) Submit Form - IV and take form - V from OPGC.
b) Arrange Labor license, Arrange comprehensive workmen insurance, which should cover all risks encountered in such a job. The policy paper shall mention the name of the work and the location (OPGC, Jharsuguda), besides the number of persons covered.
c) Depute Resident engineer, Site - in - charge and key supervisory and skilled personnel to interact with EIC and his representatives, for understanding the detailed resource requirements of the work (Staff, T&P, Consumables etc), to understand the anticipated quantum of work, to make PERT net work, to work out group - wise distribution of work, to work out day - wise and group - wise program of the work and to understand the quality and safety requirements. Considering the importance of the work as given at the beginning of the schedule, the indicated resources of right quality shall be mobilized prior to the actual shut down.
d) To conduct briefing sessions for the various groups to ensure that the understanding percolates to the bottom most level.
e) To arrange Photo passes for workers, staff and passes for vehicles.
f) To arrange medical check - up for the workers to ensure fitness for work.
g) To make arrangements for accommodation/ conveyance/ food refreshments etc.
h) To transport T&P & consumables to inside Plant premises with due entry at gate.

**T&P's Testing:-**

a) To arrange for testing & TPI of T&P
b) Shifting of T&P like chain pulley blocks, winches, hook chucks, slings, wire

ropes etc (all T&P for which periodic testing is a must as per Factories act or is required to ensure their safe performance) to testing site

c) Shifting of loads, other items required for testing purpose to the test location & also return back the same after testing.
d) Arrange for the testing of the T&P before-hand (to be witnessed by the competent person of OPGC.
e) Submit copies of the test certificates issued by the competent person based on tests carried out as above to EIC. Failed T&P shall be sent out of plant premises.
f) Shifting of electrical equipments like welding machines, grinding machines, chop saw machines etc to electrical repair shop for checking & testing to ensure healthiness. Assist Repair shop personnel for checking/ testing of the equipments.
g) Only such T&P, Electrical equipments and Safety Gadgets, which are certified to be OK, shall be deployed during overhaul.
h) Arrangement of and payment for the competent person (as recognized by the factories act) shall be done by the agency only.
i) In case of notice of deployment of any T&P/ electrical equipment which has not been tested within plant premises, or, for which, the validity of such a test has expired, a penalty of at least RS. 1000/- shall be imposed for each such occasion in addition to penalties imposed by OPGC safety department.

**Welders Test:-**

To arrange for testing of skilled manpower, as given below:

a) Only those welders, who pass the tests, shall be engaged on the job.
b) The welders shall always carry (when in job) and produce when demanded, the photo identity card issued by OPGC.
c) Gas cutters and Grinder men shall be tested by representative of EIC (Visual and verbal).

**Safety at Site:-**

a) Safety supervisor shall be tested verbally by EIC/safety officer of OPGC.
b) Arrange safety training to all the workers and staff at OPGC safety cell.

**Site Set-up:-**

a) Shift T&P, consumables, spares, scaffolding materials to specified location/platforms as per EIC instructions.
b) Chalk out the movement path of the major materials from and to the boiler.
c) Carryout pre-assembly works as instructed by EIC – weld joints, steel fabrication, etc.
d) Set up electrical connections, shift feeder pillar boards, Cables, external flood lighting etc as required/as specified by EIC.
e) Shift scaffolding pipes and metallic planks to respective locations. Erect scaffolding as instructed by EIC before start of Unit overhaul.
f) Make site store/office ready for use.
a) Check welding and lighting supplies.
b) Set up winch for lifting / lowering of materials to work location.
c) Ensure all persons to be deployed are adequately skilled for the job.
d) Ensure all persons to be deployed are adequately trained in safety.
e) Prepare registers and formats for use during the work.
f) Arrange procurement of leak - proof ash disposal bags.
g) Cleaning of the boiler tube spool pieces by blowing compressed air as per

instruction of EIC.

h) Any other work as per direction of engineer - in - charge.

## d. Post shutdown works (In detail):

**Post overhaul housekeeping:-** Clearing of the Boiler of all debris, scrap, left – over spares, T&P, consumables etc. and dispose them as per instructions of EIC.

**Post overhaul defect rectification:-**

a) Deploy manpower for assisting in light up activities of boiler up to achieving in full load/or as specified by OPGC.
b) Erection and operation of sky climber if required for attending defects
c) In case of no defect up to 30 days period after 1st synchronization, payment shall be released to the contractor as a reward for the quality work.

**Return of Materials:-**

a) Return of OPGC material as directed. Stacking / arranging the returned items as specified.
b) Reconciling measurements and materials with EIC.
c) Servicing and return of OPGC's T&P used during the job to make ready for next work.

**Submission of documents:-**

Submit the following documents in report form within 07 days from synchronization of the unit after the overhaul / shutdown work is completed or before release of running bills:

d) Details of work executed.
e) Measurements against different schedules in compiled form.
f) Material issue details.
g) Material consumption details.
h) Material return detail.
i) Weld joint - wise report for different sections I zones/ areas of boiler along with RT report reference
j) Radiography reports along with repair details of defective joints.
k) DPT protocols.
a) Protocols of other hold points, Check of fit - up and weld procedure of critical welds, SR charts" etc.
b) Copies of wage sheet of workmen along with duly filled up additional format specified by EIC.

**Mode of payment:**

Pre-shutdown jobs – 65% of the lump sum rate to be paid on certification by EIC.
Post shutdown jobs – 35% of the lump sum rate to be paid after successful completion of jobs certified by EIC.

Penalty terms – Penalty of Rs 10000/- per day will be applicable on failure of submitting of load test documents before the schedule start of unit overhauling, Penalty of 5000/- will be applicable if return of scrap/scaffolding materials/spares are not done to the satisfaction of EIC for each instance.

**38. Deployment of Fitter/Gas Cutter/Grinder/Welder:**

**39. Deployment of Rigger:**

**40. Deployment of Helper:**

1. Any work which is not specified above shall also be in the scope of the contractor. Payment for the same shall be made on job execution time & man-day deployment basis.
2. 2. Payment shall be done on the basis of man days involved. Man days shall be calculated on 8 hour basis.
3. EIC decision shall be final in all respect for payment against deployment of additional manpower.