

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS
LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC)

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Chapter - I: PROJECT INFORMATION

1.0	Project Information
	1) Purchaser : M/s. NTPC , Gadawara 2) Project Title : Overhauling of Turbine and Generator of Unit-2 , 800MW at NTPC Gadawara 3) Railway Station : Gadawara 4) Nearest airport : Jabalpur

The Bidder shall visit site and get acquainted himself with the conditions prevailing at site before submission of the bid. The information given here in under are for general guidance and shall not be contractually binding on BHEL/ Owner. All relevant site data/information as may be necessary shall have to be obtained /collected by the Bidder.

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Chapter – II: SCOPE OF WORK

The work under the scope of these specifications is broadly as follows.

PRE SHUTDOWN WORK

1. Mobilization of site.
2. Arranging Gate pass, insurance & Accommodations to the contract personnel.
3. Shifting of material store and T&Ps.
4. Shifting of special T&Ps to turbine floor.
5. Removal of Enclosures Cover if required and erect back after OH if available.
6. Shifting of special T&Ps to turbine floor.
7. Removal of Enclosures Cover if required and erect back after OH if available.

SCOPE OF WORK:

SCHEDULE -1: TG BEARING INSPECTION (BEARING NO- 01 TO 08) & ASSOCIATED WORK

1. Catenary checking of all bearing pedestals during dismantling and after correction of alignment and spring deck correction. Catenary checking of all bearing pedestals would be done during dismantling and assembly, and it should be measured by digital instrument. **Digital instrument should be brought by reputed Vendor with technician preferably M/s SIX D** who have done similar work in 500 MW and above. Comparison of existing height of individual deck spring elements with erection value. Adjustment of deck spring height to achieve design /erection catenary values etc. Vendor has to make necessary scaffolding if required in each column around deck springs to carry out above jobs.
2. **Deployment of expert from M/s GERB (during dismantling and final alignment) required for setting of foundation spring during dismantling & assembly.** Locking / unlocking of deck as required Locking / Unlocking of deck. Necessary scaffolding arrangement shall be done by bidder for the catenary setting.
3. Cleaning of removed scraps of insulation materials immediately after removal of insulation and any other scraps generated during the execution of the work is in the scope of Vendor. Scrap insulation or any other scraps generated is to be shifted to NTPC specified Scrap Yard.
4. Removal of insulation if required and carry out touch up insulation is in the scope of VENDOR. Insulation material ceramic pads shall be provided by NTPC. Liquid /spray Insulation if required is in scope of Vendor. Insulation cladding if removed should be marked and be able to be reused.
5. Catenary measurement during dismantling and deck locking before lifting any major loads.
6. Removal of all turbines bearing pedestal covers, assistance in removal of C&I connections and removal of bearing top halves of all turbine bearings. Oil throttle to be replaced by oil strainer.

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7. Decoupling/ Coupling of HP-IP, IP-LP LP-LP and LP- Gen rotors, as required, to be carried out using hydraulic torque wrench. The deployment of hydraulic torque wrench shall be in the scope of the VENDOR.
8. HP inner casing thermocouple replacement
9. Measure and record the HP-IP/ IP-LP-LP and LP-Generator alignment during dismantling and carry out rough alignment by carrying out correction in bearing and pedestals.
10. Recording of seal bore reading at ped# 1 to 8 and axial reference readings during dismantling and assembly. HP/IP and LP FRO/ CRO, Roll check and Bump check to be checked and recorded during dismantling.
11. Swing check at journal no. 1/8 during dismantling to be carried out.
12. Removal of bearing #1 to 8 bottom half and thorough cleaning of bearings and pedestals if instructed.
13. Measure and Record SOC/ TOC of all bearings. Sizes of all coupling bolts and thrust pads.
14. Visual inspection/ replacement of all hydraulic oil hoses.
15. Carry out the DPT of all coupling bolts.
16. Carry out the DPT and UT of all bearings and thrust pads. Proper cleaning of all components is to be carried out the scraping and blue matching of bearing supports and torus as per guideline. Replacement shall be carried out if required.
17. Carry out the DPT of weld joints in complete Lub oil and Jacking oil lines after proper grinding and surface preparation.
18. Carry out the re-finishing of oil guards as per the journal size and record the size for measurement.
19. Carry out the Alignment of HP- IP and IP- LP LP-LP and LP- Generator as required as per the standard procedure and OEM limits.
20. Catenary measurement after deck charging and CW charging to be carried out before alignment in the presence of M/s GERB Representative.
21. Carry out the Roll check and centering of HP/ IP and LP modules after alignment.
22. Carry out Bump check of HP and IP modules if required.
23. Inspection of outer casing supports and alignment keys for all turbines.

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24. Horn drop check of HP and IP casing and necessary adjustment /rectification in packers etc., as per requirement, to be carried out.
25. Reaming, honing of coupling holes to be carried out as required, at least 02 machines of each type (for HP-IP and IP-LP, LP-LP/LP-Gen) with tools for each type to be available at all times during the process. Two separate gangs to be deployed for reaming honing work to ensure parallel work.
26. Coupling of HP- IP and IP- LP as per the standard procedure using hydraulic torque wrenches.
27. Box up bearings 1 to 8 after measurement of SOC/ TOC.
28. Box up bearing pedestals. prepare for lub oil flushing.
29. Carry out the MOT tank, lub oil filter/tank strainer cleaning all oil line inspection / line filter cleaning, JOP flange replacement with SAE flange, assistance in completion of lub oil flushing.
30. Measurement/ setting of shaft Jacking oil lift and output of turning gear.
31. Servicing/replacement of barring gear manifolds.
32. Replacement of hydraulic hoses of all bearings and barring gear motor.
33. Carry out the Hydraulic turning gear and hand turning gear assy inspection as per the requirement. Servicing of Hydraulic valve block assembly, Solenoid valve and Needle valves of Turning Device.
34. Replace the gaskets in the Cross- Over pipe after thorough cleaning of mating flanges. , DPT of all bellows.
35. Assistance in commissioning of the machine.

Note: -

1. Any work required to be carried out for vibration issue of Brg pedestals including pedestal work shall be including in this scope without any additional charge. **Civil works shall be carried out by NTPC.**
2. EOT cranes in working conditions shall be provided by NTPC. However, atleast 02 Nos. Skilled and experienced crane Operators with valid certificate for operating EOT shall be in the scope of vendors for the round the clock's working.
3. Bidder has to depute Reputed Testing Agency along with Test kit & accessories to carry out DP & Ultrasonic test in consultation with BHEL Site-In-Charge

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4. Bidder has to arrange Hydraulic Torque Wrench along with operator for decoupling & coupling of coupling bolts in consultation with BHEL site In-charge.

Note: All Dismantling and trial coupling, assembly to be done by Hydraulic torque wrench. EOT crane will not be used. Before mobilization ensure proper capacity of machine for torquing.

SCHEDULE-02: - LP TURBINE OVERHAULING (QTY-02 NOS.)

1. Dismantling of IP-LP cross-over pipe for dismantling of LPT outer casing.
2. Supporting of LP Inner outer casing in bottom before loosening of P/P studs.
3. Removal of top half of inner-outer casing after loosening of parting plane bolts
4. Opening of inner-inner casing parting plane bolts and lifting of inner – inner top half.
5. Recording of relevant axial and radial clearances & corrections as required.
6. Opening of LPT gland boxes, Inspection of sealing fins, replacement of seal segments fins and subsequent adjustment, if any.
7. Carry out the DPT of LPT Extraction bellows/ shaft seal bellows along with LP Inlet bellow after thorough cleaning and up to the satisfaction of EIC / Area Engineer. **replacement if needed.**
8. Removal of LP Turbine rotor and placing on support.
9. Cleaning of LP rotors and GBC by laser cleaning machine. If proper cleaning is not achieved by laser cleaning, then Cleaning of LPT Rotor and GBC by alumina blasting.
10. Cleaning of Inner-inner casing bottom half using emery paper (as required).
11. Ovality check of inner-inner casing with and without tightening of parting plane bolts.
12. Placing of Rotor in LPT inner-inner casing bottom half, recording clearances for the work.
13. Assembly of front and rear gland boxes & Centering of gland boxes.
14. Placing of LPT inner-inner top half and box up of both halves.
15. Placing of LPT Inner-outer casing top-half in position.
16. Tightening of parting plane bolts of Inner-outer casing. Remove the inner- outer casing bottom support after parting plane tightening.
17. Roll check of LPT assembly with Inner-outer casing in boxed up condition.
18. Carrying out necessary alignment of casing, if required.
19. Checking of LP outer casing Atmospheric Relief Diaphragm for any damage or leakage and replacement of the same if required.
20. Laser profile mapping of LP blade profile, blade pitch, chord angle measurement, coupling face mapping, catenary checking and alignment.

Note :- Bidder shall arrange reputed & experienced agency for Laser profile mapping work in consultation with BHEL site incharge.

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SCHEDULE-03: MPI & NFT OF FREE-STANDING BLADES OF LP ROTORS

1. Removal of all free-standing blades with root from LP turbine rotors.
2. MPI of the Rotor & all Rotor blades of LP turbine to be carried out by Coil Method. MPI test kit along with accessories & consumables etc. shall be brought by VENDOR.
3. Carry out necessary MPI test for both Rotor grooves. Replacement of blades if required. Carry out necessary minor repair in Rotor grooves and blades if required.
4. Natural frequency test of LP Rotors' free-standing blades to be carried out after MPI (both Turbine & Generator ends). NFT test kit along with accessories etc. shall be brought by VENDOR.
5. Necessary de-blading, re-blading and cleaning shall be done by VENDOR. Cleaning of blade roots and rotor grooves thoroughly. Fixing of blades with technological pieces as per requirement. (Technological pieces shall be arranged by VENDOR).
6. In case Detuned blades are available at site. The entire last stage is to be replaced by detuned blades in both units and test is to be done with new blades.
7. Improvement of Natural frequency by improving root contact, if required.
8. Replacement of blades if required. Carry out necessary minor repair in Rotor grooves and blades if required.
9. Fitment of blades on the rotor with new clamping pieces and locking strips/Plate. New clamping pieces and locking plates to be provided by NTPC.
10. All consumables, Technological pieces and instruments for MPI, NFT shall be in the scope of VENDOR.

EXCLUSION: -

1. Any kind of machining works on components.
2. Arrangement of clamping pieces and locking strips or any other material, which goes permanently into the machine shall be excluded from Vendor scope. Same has to be arranged by NTPC.
3. Attending any other blade of other stages other than free standing blades subjected to MPI/ NFT

Note: - Bidder shall arrange reputed & experienced agency for MPI & NFT work in consultation with BHEL site incharge.

SCHEDULE-04: HP /IP STOP & CONTROL AND OVERLOAD VALVES OH

1. Making necessary scaffolding & approach platform for stop valve wherever required.
2. Removal of grills and canopy wherever required.
3. Mounting of Valve support fixture for SV & CV /OLV casing supplied by OEM VENDOR.

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4. Removal of oil piping from servomotor, decoupling of servomotor from valve and removal of servomotor from position any cutting/welding of oil lines is in VENDOR scope.
5. Loosening of threaded ring / cap nuts of valve cover and removal of valve cover from valve casing.
6. Dismantling of valve internals and cleaning of all internals. Carry out DPT as per requirement of parts/components, sealing rings etc.
7. Overhauling of HP /IP STOP & CONTROL and Overload VALVES.
8. Removal of grills and canopy whenever required.
9. Loosening of threaded ring / cap nuts of valve cover and removal of valve cover from valve casing. Carry out DPT as per requirement of parts/components, sealing rings etc.
10. Dismantling of valve internals and cleaning of all internals including Strainer inspection.
11. Repairing / Replacing the defective components and assembly of all internals.
12. Measurement of critical clearance/dimension and compression of "U" seal ring and recording same,
13. Lapping of Seat and disc as per requirement and to the extent possible.
14. Putting the valve internals in position. Tightening of threaded ring / tightening of cap nuts (heat tightening by induction heating whenever required) of valve cover.
15. Fitting of servomotors and oil piping and coupling of servomotors with valve.
16. Charging of system and attending of defects if any.
17. Hot tightening of fasteners after charging whenever required.
18. Commissioning of the system and attending of defects if any.
19. Removal of temporary platform & scaffolding and placing of grills & canopy.
20. Carry out MPI and UT of studs of turbine valves a Carry out the MPI of Bonnet studs using liquid dye method. The studs to be loosened in set of two opposite studs, once the MPI is completed, these studs to be tightened upto the required elongation values. Then, it is to be repeated to other studs.
21. All studs of cooling flanges to be checked with replacement of seal rings and cleaning of surface.
22. Replacement of A 783 studs with X 12 studs. (studs and capnuts supply are in NTPC scope)
23. Recording of elongation values for heated studs, matching with design values. Same to be ensured in presence of NTPC TMD/FQA representative.
24. Arrangement of Gas heating device for loosening /Tightening of IP stop valves are to be arranged by Vendor along with measurement device for elongation.

Notes

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1. Replacement of IPT Stop and Control valve studs(A783) with cap nuts are to be done with modified one(X12)
2. MPI/Eddy current test for all A783 and X12 stud and cap nut of IP Stop and control valves are to be done.
3. MPI/eddy current testing of HP Module support bracket studs are to be also done, and this is mandatory.

This also includes servicing of oil supply unit of Control Fluid will cover the following points:

- a) Checking and setting of PRVs
- b) Oil Flushing of lines.
- c) Accumulator Healthiness Checking.
- d) Calibration of HP control valves 1 & 2, IP control valves 1 & 2 and Overload control valve. e) Checking/Setting of KP values (Operating points) of HP control valves 1 & 2, IP control valves 1 & 2 and Overload control valve as per requirement.
- e) Checking/Setting of closing times of HP control valves 1 & 2, HP stop valves 1 & 2, IP control valves 1 & 2, IP stop valves 1 & 2 and Overload control valve.
- f) Checking/Setting of position feedback of HP control valves 1 & 2, HP stop valves 1 & 2, IP control valves 1 & 2, IP stop valves 1 & 2 and Overload control valve.
- g) Leak test of HP control valves 1 & 2, HP stop valves 1 & 2, IP control valves 1 & 2, IP stop valves 1 & 2 and Overload control valve at barring speed 60 rpm at 100 Bar and 480 deg C.
- h) ATT of HP control valves 1 & 2, HP stop valves 1 & 2, IP control valves 1 & 2, IP stop valves 1 & 2 and Overload control valve should be performed at barring speed 60 rpm.
- i) The Vendor shall ensure the deployment of a specialized C&I Engineer to the site to perform all tests, settings, and checks referenced in the preceding sections.

SCHEDULE-05: EXTRACTION NRVS' SERVICING

1. Make necessary scaffolding.
2. Removal of Insulation
3. Dismantling of all extraction NRVs
4. Check seat and disc, Bush etc., matching by blue matching and lapping if necessary. Replacement of soft packings, studs as required, removal of seized studs if any. Repair of threads.
5. Box-up NRV
6. Reinstall Insulation
7. Remove scaffolding

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SCHEDULE-06: HANGER INSPECTION

1. Carrying out the inspection/ setting/ rectification of MS/HRH/CRH/HPBP/LPBP/ Feed water system/Oil line hanger and supports & submit the hanger/ support inspection and adjustment report in a duly signed format as per NTPC LMI
2. The Inspection of hangers are limited to the turbine building area. Scaffolding erection is in scope of VENDOR. Sufficient scaffolding material to erect scaffolding on TG and for hangers to be brought by vendor for hanger replacement if required, 02 qty will be paid for large hangers of critical piping (MS+CRH+HRH) and 01 for small hangers (other lines)

SCHEDULE-07: LP HEATER (EXTRCN BELLOW) INSPECTION

1. Making Scaffolding inside condenser up to the bellow for carrying out the cleaning and DP test. The scaffolding should be such that it is safe and easily approachable for inspection by NTPC TMD and FQA persons also.
2. Removing the protection shield of bellow, if required by cutting/grinder avoiding damage to bellow.
3. Carry out cleaning, visual test and DP test of all bellows
4. Refitting of protection shield
5. Removal of scaffolding, keeping in view the fall of material from height inside condenser

SCHEDULE-8: - GENERATOR EXCITER OVERHAULING

1. Removal of Exciter dome after removing all Electrical and C&I connections.
2. Removal of all pipelines of exciter bearing. Removal of all C&I accessories will be in NTPC scope.
3. Checking of IR value of pedestal and if found less attending the same.
4. Removal of PMG stator after removing electrical connections.
5. Removal of exciter coolers.
6. Removal of top half of main exciter.
7. Inspection & Measurement of oil guard clearances for all bearing pedestals, opening of bearing covers & lifting of covers. Bearing support/yoke/ key clearance recording, Removal of support/yoke, Measurement of oil catcher clearance, bearing top half removal & measurement of bearing oil clearances. Carrying out Repair / Replacement of Keys, oil guard ring strips, oil catcher ring strips etc as per requirement. Carry out necessary lapping and corrections as per requirement. Necessary workshop facilities to be provided by NTPC free of cost at NTPC workshop.
8. Checking of Swing check & CRO of Exciter rotor for reference.
9. Decoupling of Gen-Exciter rotor coupling & Alignment check.

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10. Removal of exciter rotor and placing it on stand.
11. Checking of PMG rotor for any rubbing marks & measurement of Magnetic field strength through Gauss Meter
12. Carry out DP test with fluorescent dye of fan hub.
13. Inspection of Slip Rings for Rotor Earth fault detection, for ovality, correction thereof & polishing of slip rings. Machining Work/Polishing has to be carried out, only if requirement arises, upon inspection. Machining tools will be provided by NTPC. However polishing or machining work has to be carried out under supervision & guidance of vendor.
14. Visual inspection of PMG, Main Exciter & Diode wheel.
15. Cleaning of all dismantled parts and windings thoroughly.
16. Checking of all windings for any defect and rectifying the same if any (After inspection, if any major rectification is required, shall be done separately with additional cost & time basis).
17. Check the multi-contact band and replace the same if found defective (Optional work).
18. Inspection and measurement of bearing clearances for Generator bearings and exciter bearing. Removal of bottom halves of bearings. Carry out DP test / Ultrasound test for all bearing halves. Measurement of bore for all bearings. Carry out necessary / lapping / polishing on bearings / supports / Journals etc as per requirement. Replacement of bearing if required.
19. Cleaning of Exciter coolers and carrying out Hydraulic testing of the same as per protocol and attending leakages if any.
20. Electrical testing of exciter, diode wheel and PMG limited to the tests given below.
21. Exciter stator: IR, DC resistance of Exciter stator pole winding, AC voltage drop test of exciter stator, IR and DC resistance value of quadrature axis coil. Replacement of Q axis coil, if found defective.
22. Exciter rotor: IR of slip ring, IR checking of diodes, reverse blocking of diodes. Replacement of faulty diodes C fuses of diode wheel, after weight measurement.
23. Thorough inspection of CC bolts for any visible defects & rectification of same. Replacement of CC Bolts, if required.
24. PMG: IR C DC resistance of PMG stator.
25. Check ground fault detection system and rectify any fault. OEM/OES's scope will be limited to inspection & rectification in excitor.
26. Clean the filters of exciter dome & replace the same if required.
27. Replacement of all gaskets and providing proper sealing of exciter dome.
28. Cleaning and varnishing of PMG Stator, Main Exciter Stator & Rotor.
29. Alignment of Gen-exciter rotor, coupling, CRO C swing check after final LP-Gen Alignment.
30. Assembly of main exciter, PMG, Bearing no. 8 housing, after Generator rotor thread-in & box up with/ after clearance checking
31. Assembly of electrical connections after work.

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32. Assembly of exciter cooler housing after work.
33. Putting machine on barring gear.
34. Installation of Exciter dome and Exciter bearing cover after all work completion.

SCHEDULE-9: - MINI GENERATOR OVERHAULING

1. Disconnection of all phase and neutral bus connections. Bushings to be inspected for any oil leakages & same to be rectified. Phase connectors to be inspected for any damages. If found damaged than same to be dismantled & installed. Reapiring work shall be done at BHEL works and expert manpower shall be arranged during dismantling & installation of phase bars.
2. Vendor should provide manpower support for pre overhauling vibration survey and carry out necessary Analysis to reduce the vibrations to the minimum possible level, during running, coasting down & ramping up of machine.
3. Removal of LP Brg top cover only (for working on LP-Gen coupling) & Removal of Brg-6 top cover and top half of bearing shell.
4. Recording of coupled run out (CRO) of LP-GEN, GEN-Exciter coupling / journals / shafts etc. Necessary components required to be removed for taking CRO at LP-Generator and Gen-Exciter couplings / journals.
5. Recording of alignment readings. Checking of Generator Exciter Rotor journals / couplings / shafts free run out.
6. Opening and lifting of bearing 6&7 covers. Bearing 6 and 7 oil guard clearances measurement, Support/yoke/ key clearance recording, Removal of support/yoke, Measurement of oil catcher clearance, bearing top half removal & measurement of bearing oil clearances. Carrying out Repair / Replacement of Keys, oil guard ring strips, oil catcher ring strips etc as per requirement. Carry out necessary, lapping and corrections as per requirement. Necessary workshop facilities will be provided by NTPC free of cost at NTPC workshop.
7. Decoupling of LP-Gen rotor. Recording of alignment readings. Checking of Generator & Exciter Rotor journals / couplings / shafts free run out.
8. Measurement of reference control readings at Generator.
9. Dismantling of seal ring, seal body, oil catchers etc in both TE & EE after recording necessary clearances.
10. DP test, for all Pipelines & flanges, oil & water, to be thoroughly carried out. Wherever required welding of flanges & joints to be carried out.

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11. All Generator Manholes to be opened, & necessary rubber cords/O-rings, gaskets to be replaced. Core to be visibly inspected from manholes for any abnormalities. The activity to be taken up in consultation with EIC.
12. Replace all necessary generator flange gaskets & rubber cords/O-rings.
13. Hydrogen cooler water box flow direction to be checked as per drawing. If required, water boxes to be replaced.
14. H2 Cooler External Pipelines Support Strengthening & Hanger Checking to be carried out. Vendor should provide manpower support for Pre-overhaul survey to be carried out to analyze the vibration of pipes. Vent valve passing of H2 coolers to be checked & valves to be replaced if required.
15. Conical filter cleaning to be carried out and necessary gaskets/cords/O- rings to be replaced.
16. Pneumatic test of Generator stator winding & Hydraulic Test of external piping of PW system (excluding stator winding)" is to be carried out at the specified pressure for the specified time. Leakages if any are to be attended and Hydraulic test is to be completed successfully. (Replacement of flange gaskets, welding leakages, flange joint leakages.)
17. Inspection and measurement of bearing clearances for bearing no 6 & 7. Removal of bottom half of bearing no 6 & 7. Carry out DP test / Ultrasound test for all bearing halves. Measurement of bore for all bearings. Carry out necessary/ lapping / polishing on bearings / supports / Journals etc as per requirement.
18. Check the expansion tank and associated piping; attend the leakages if any, replacement of any valve/ gasket, cleaning of the inlet / outlet conical filter/ screen. C&I and associated work will be excluded from bidder scope.
19. Cleaning of manholes, replacement of gasket & closing manholes. All Pipelines connected to generator casing, for H2/Co2 filling & LLD, gaskets to be replaced. 8.5 Mtr LLD rack gaskets/o-rings to be replaced.
20. Thorough cleaning of bearing halves. Box up of bearings, Yokes, Oil catcher etc for bearings 6 & 7. Maintaining necessary bearing clearances.
21. Facial run out checking of Generator rotor & face correction if required.
22. All measurements with respect to clearances to be recorded in presence of NTPC representative.
23. Checking of axial & radial run out of coupling faces. Blue match to be checked in Presence of NTPC representative Engineer
24. Axial & radial alignment of Generator-LP2 rotors in operating condition

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25. Gen-Exciter coupling including necessary reaming and honing of coupling holes as per requirement. Clearances of coupling bushes to be measured & necessary replacements to be carried out.
26. Pipeline flushing of Seal oil system to be carried out before assembly of seal rings & seal body. Seal oil Tank to be cleaned & Floats to be checked, for any passing & replacement of float valves if required.
27. Assembly of seal body and hydrogen seals after maintaining proper clearances. All rubber gaskets C rings to be replaced during assembly of seal body.
28. Resetting of all bearings oil seals & pedestal oil guard rings. This includes repair/ replacement of strips as per requirement. Refitting of all bearings & setting of bearing pads and keys etc. as per requirement. Cleaning of all JOP NRVs. Setting of JOP lifts at all bearings.
29. Thorough cleaning of bearing pedestals and box up of all bearing pedestals. Inspection of all jacking oil hoses, seal oil hoses and replacement as per requirement. Checking of shaft lift at individual journals and carry out necessary adjustments.
30. Alignment of generator and exciter rotors.
31. Coupling of generator and exciter rotors. Checking/rectification of swing of exciter rotor.
32. Box up of generator and exciter bearings. Checking of oil clearances of bearings and adjustment.
33. Assembly of LP2 bearing, setting of oil catchers & oil guard.
34. Fitting of exciter cover, diode wheel, exciter cooler pipelines and PMG.
35. Fitting of all lube oil, seal oil and cooler pipelines. Installation of removed oil pipelines, primary water system piping, and cooler pipelines & their flushing.
36. Draining of Seal Oil Storage Tank and Cleaning of Seal Oil Storage Tank as and when required during flushing.
37. Preparation for Oil flushing of pedestals, oil lines, line filters inspection, MOT bucket filters inspection C cleaning and normalization after flushing.
38. Painting of Exciter Cover and Generator Body , pipeline, Seal Oil, PW and Gas system as per requirement. Required Paint will be issued By NTPC .
39. Air tightness test of stator and arresting any leakages pertaining to the scope of work.
40. Assistance in rolling and synchronization of the machine and attending any defects observed during rolling with respect to scope of work carried out.
 - a) Rotor flux probe healthiness is to be ensured till server level.

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- b) Take IR value of rotor and winding resistance, RSO & impedance of rotor after thorough cleaning.
- c) Perform Gas tightness test of rotor with N2 gas. If any leakage is found than replacement of seals & rubber parts to be carried out. Special manpower along with tools for attending CC bolt leakage shall be arranged by vendor.
- d) Clean all dismantled parts thoroughly before box up.
- e) Also slip ring rotor earth fault detection system shall be inspected for any uneven wear, pitting etc and also brush holders and support brackets to be inspected and defects to be attended.

SCHEDULE-10: OVERHAULING OF SEAL OIL SYSTEM/ SHAFT SEALS

- 1. Unit-2 SOT tank (Zero Meter.), level is being maintained on Lower side of 240MM, However Normal Operating Level is 340MM, due to which low level float operates for maintaining the SOT Level, leading to deterioration in Purity. RCA to be done for above problem & problem to be rectified. Vendor shall provide necessary manpower assistance.
- 2. Check for oil leakage in seal oil pipelines inside generator and attending the leakage. (Limited to replacement of gaskets).
- 3. Checking clearances of H2 seal rings at both ends as per protocol.
- 4. Visual inspection of H2 seal rings for any damage.
- 5. Carrying out DP test on both the H2 seal rings and replacement of the same if found damaged.
- 6. Thorough cleaning of seal body.
- 7. Blue matching of seal body parting plane, oil catcher parting plane and seal oil Teflon bush surface.
- 8. Inspection of all Teflon bushes and replacement of the same if found damaged.
- 9. Checking of seal oil hoses of impulse lines and replacing the same if found damaged.
- 10. Replace O-rings, rubber cord with new O-rings & rubber cord. Replacement of gaskets of seal oil system piping and valves as per requirement.
- 11. Cleaning of seal oil tank, seal oil storage tank and both Pre chambers.
- 12. Servicing of all DPRVs & check valves. All Oil leakages at 8.5 Mtr rack to be arrested. DPR settings to be done, as required to maintain rated pressure.
- 13. Servicing of seal oil tank float valves & Pressure equalizing valves.
- 14. Flushing of seal oil system & impulse lines.
- 15. Leakage test of complete seal oil system and arresting the leakages if any (limited to replacement of gaskets).

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16. DP test with fluorescent dye on the welding joints of all the seal oil pipelines and attending the problem if any. Arrangement of necessary platform/scaffolding for this work will be excluded from bidder scope.
17. DP test with fluorescent dye on float valves of seal oil tank.

Note: - Bidder shall arrange reputed/experienced agency for Mechanical and electrical test in consultation of BHEL site Incharge.

OPTIONAL TG WORKS

SCHEDULE-11: REPLACEMENT OF HP MODULE

Completion Period: 20 days (From start to completion)

1. Additional Time: Tentatively Five (5) days before commencement + Five (5) days after completion + additional time extra at actual for extra/optional/additional work, if any.
2. Removal of insulation and all connecting pipes of HP module, which will obstruct during lifting of the HP Module. Dismantling of casing thermocouples. Disposal of insulation and scrap material to designated location including arrangement of its transportation.
3. Checking of all the clearances (roll check, bump check, centering check, horn drop check etc.) and secure valve support before removal of the HP Module from the pedestal. Initial/final measurement of reference readings of HP module. Coupled run out to be checked.
4. Removal of breech nut, overload valve pipe connection and CRH pipelines by induction heating/gas heating/ cutting as applicable, extraction pipeline & other related pipelines (removal of valve is within scope of Vendor). Locking of pipelines as required.
5. Cutting of 01 no of CRH Exhaust Pipe from HP outer body and Welding of CRH Pipe with new modified spare module as per OEM Welding procedure, RT/UT & SR arrangement under vendor scope. Required consumables to be provided by vendor.
6. Locking of turbine shaft with outer casing by locking arrangement. Removal of both bearing no 01 and 02 bottom halves bearings.
7. Lifting of complete HP module from pedestal and placing on fixture.
8. Facial and free run-out measurement of rotor (old/new). Correction of face as required to get desired swing values. Arrangement of annular surface plate (considering spigot) for coupling face correction is in vendor's scope.
9. New Assembled module to be put back on the pedestal.
10. Final connections of all pipe lines, extraction lines, breech nuts, welding of gland steam pipe lines and stress relieving, RT/UT,X-ray of joints including steam gland pipes as applicable. Arrangement of welding rods, filler rod is included in vendor's scope.
11. Reaming and honing of Coupling bolt and Bore dia for HPT-Hydromatic turning gear and HPT-IPT coupling is to be done if required.
12. All consumables required for Removal and installation of HP Module will be in Vendor scope.
13. All controlled dimensions should be recorded during replacement of HP Module.

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14. Filling of grooves of Locating pin 04 Nos. of HP module and Drilling of new holes for locating pins in HP module if required.
15. Any other work required for fitment of TSI instruments.

Exclusions: -

1. Supply and application of Insulation on HP module.
2. Any machining works.

SCHEDULE-12: VIBRATION TRIM BALANCING (ASSISTANCE ONLY)

1. Vibration expert along with vibration analyzer will be deputed by BHEL as per requirement.
2. Analysis of vibration data, calculation of required balancing weights by BHEL.
3. Putting weights in required place as per calculation and same will be done by bidder as per instruction of BHEL to achieve vibration data below alarm levels.
4. High Density Balancing Weight shall be arranged by NTPC.
5. Assistance during Resolution of high vib problem of LPT brg 4 and exciter bearing 8.

Note: -

1. Manpower Assistance shall be provided to BHEL by bidder.
2. Transportation of vibration analyzer kit from BHEL site/ HQ to gadarwara and return back to the location instructed by BHEL site incharge along with one manpower assistance will be agency scope.
3. Above job shall not cover under chapter-6 (time schedule clause 6.1.2). Since it shall be carried out after start of barring gear and during rolling & synchronization machine which is totally driven by customer. Hence Payment shall be made on certification of BHEL site-incharge without any time extension.

SCHEDULE-13: LP TURBINE EXTRACTION BELLOW REPLACEMENT

1. Making Scaffolding up to the bellow for carrying out the cleaning and DP test.
2. Removing the protection shield of bellow, if required.
3. Removing the damaged bellow from the position after giving proper support to both end pipes.
4. Edge preparation of both pipe ends for welding and assistance in transportation of the bellow from central stores to site.
5. Positioning the new bellow in its place.
6. Welding the bellow root by TIG welding.
7. Welding the remaining welding as per the approved welding procedure.
8. Carrying out the DP Test of the root and Radiography of the weld joint.
9. Removing the bellow locking plate & protection cover.

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10. Removing all the T&P from site and taking out all scaffolding material

SCHEDULE-14: HPT/IPT INSPECTION (BOROSCOPIC/VIDEOSCOPIC INSPECTION)

1. Borescope inspection of HPT/IPT. For one turbine ½ rate will be paid.
2. Videoscope inspection through borescope openings for HP, IP, LP casings and cross over pipe, the Borescope and T&P required for opening/Assembly of Borescope openings shall be in the Scope of the VENDOR.
3. Carry out Borescope inspection of HPT/IPT. Carry out the Borescope inspection of HPT and IPT through the endoscopic holes provided in the casing.
4. The Borescope machine shall be in the scope of VENDOR. Vendor will submit the soft copy of the video file in a secure pen drive along with certification.

SCHEDULE-15: ONSITE MACHINING /LAPPING/ REFURBISHMENT OF VALVE SEAT OF HP/IP VALVES IN OH.

1. Cleaning of trim parts.
2. Visual inspection to assess damage of internal parts.
3. Rectification of damage area by welding, machining and grinding.
4. Grinding and lapping with special purpose in-situ machines.
5. Machining of the plug and spindle if required would be carried out by NTPC under VENDOR supervision.
6. Blue matching to check the contact of the mating surfaces.

Note :- Bidder shall arrange reputed & experienced agency for valve seat repair work in consultation with BHEL site incharge.

SCHEDULE-16: IPT STOP VV (“U” SEAL) MACHINING

1. Machining of new U seal for fitment in equipment. Machining to be done after providing required dimensions and tolerance by measuring on opening the valve. 1 BOQ is for 1 valve.
2. Transport/Unloading/ Unpacking Of U-Seal Ring at Vendor Works.
3. Cleaning/ degreasing of the U-Seal surfaces using cleaner/ solvent etc.
4. Machining of U-seal ring as per the dimensions provided at the time of machining.
5. Dimensional measurement of the U-seal ring and arrange for inspection from NTPC and BHEL Executive.
6. Carry out the DP Test and Blue-matching of the U-seal ring.
7. Unloading the U-seal from Machine.
8. Suitably pack the U- Seal ring for Shipping.

Note: - Bidder shall arrange reputed/experienced agency for Machining of U-seal ring in consultation of BHEL site Incharge.

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SCHEDULE-17: HPT STOP VV (“U” SEAL) MACHINING

1. Machining of new U seal for fitment in equipment. Machining to be done after providing required dimensions and tolerance by measuring on opening the valve. 1 BOQ is for 1 valve.
2. Transport/Unloading/ Unpacking Of U-Seal Ring at Vendor Works.
3. Cleaning/ degreasing of the U-Seal surfaces using cleaner/ solvent etc.
4. Machining of U-seal ring as per the dimensions provided at the time of machining.
5. Dimensional measurement of the U-seal ring and arrange for inspection from NTPC Executive.
6. Carry out the DP Test and Blue-matching of the U-seal ring.
7. Unloading the U-seal from Machine.
8. Suitably pack the U- Seal ring for Shipping.

Note: - Bidder shall arrange reputed/experienced agency for Machining of U-seal ring in consultation of BHEL site Incharge.

SCHEDULE-18: HP STOP OR CONTROL VALVE SEAT REPLACEMENT.

1. Remove the Cylindrical locking pins by grinding and/ or drilling.
2. Remove the old worn-out HP Stop or Control seat from position by cutting or gouging.
3. Clean the inside Surface of the Valve Casing thoroughly.
4. Note the measurements of dia and length.
5. Clean the new seat provided by NTPC for replacement.
6. Measure the dia, length, etc and prepare for machining of the same.
7. Prepare GO- NOGO gauges for installation of valve seat.
8. Put the new seat (after machining) in a liquid nitrogen to get the desired shrinkage. Container to Put the new seat in liquid nitrogen to be brought by the Vendor. In case it is not available, the same is to be fabricated at site.
9. Fabricate a device to insert the seat horizontally inside the valve casing.
10. Arrangement for heating the valve body using resistance heating, shall be in the Vendor's scope.
11. Insert the new valve seat inside the valve casing.
12. Insert the locking pins.
13. Take the blue impression of the seat and cone. Minor lapping, if required, to be done.

Note :- Bidder shall arrange reputed & experienced agency for valve seat replacement work in consultation with BHEL site incharge.

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SCHEDULE-19: LPT (800MW) REPAIR

1. If any deformity is observed in LPT parting plane faces of sealing area in general following are to be done:
 - a) Grinding, buffing of affected area to remove scaling / rusting
 - b) Welding of area with suitable electrode and EWS suitable for the job to be provided by vendor.
 - c) Lapping and polishing to make area perfectly matching
 - d) Color matching to verify

SCHEDULE-20: IPT OVERHAULING

Turbine Disassembly

1. Removal of IP turbine casing insulation and lagging.
2. Dismantling of gland steam piping, drain lines, instrumentation, and thermocouples connected to IP turbine casing.
3. Removal of coupling guard and coupling bolts between HP-IP and IP-LP shafts (if applicable).
4. Opening of IP outer casing and inner casing as per KWU procedure.
5. Lifting of IP rotor using suitable lifting tools and EOT crane.
6. Safe shifting of rotor to rotor stands for inspection.
7. Removal of stationary blades/diaphragms, labyrinth seals, and gland seals.

Inspection and Measurements

1. Visual inspection of rotor blades, roots, shrouds, and discs for cracks, erosion, or deposits.
2. Dimensional inspection of rotor journals, coupling faces, and run-out measurement.
3. Clearance measurement of:
 - a) Blade tip clearances
 - b) Diaphragm clearances
 - c) Labyrinth seal clearances
4. Bearing inspection:
 - a) Journal bearing condition
 - b) Thrust bearing pads
 - c) White metal condition
5. Casing inspection:
 - a) Horizontal joint surfaces
 - b) Studs and nuts condition

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6. NDT testing:
 - a) Dye Penetrant Test (DPT)
 - b) Magnetic Particle Inspection (MPI) for critical areas
7. Checking erosion or corrosion of stationary blades and diaphragms.

Cleaning and Repair Work

1. Cleaning of turbine rotor and blades using approved solvents or steam cleaning.
2. Removal of deposits, scaling, and corrosion from diaphragms and casing.
3. Repair of damaged blades, seals, gaskets, and O-rings to the extent possible.
4. Refurbishment or replacement of labyrinth seals and gland sealing segments.
5. Minor repairs on diaphragms and blade carriers if required.
6. Checking and restoration of casing joint surfaces.

Reassembly

1. Installation of stationary blades/diaphragms after clearance verification.
2. Placement of IP rotor into casing using proper lifting arrangement.
3. Measurement and adjustment of radial and axial clearances as per OEM specifications.
4. Reassembly of inner casing and outer casing with new gaskets.
5. Tightening of casing studs and nuts using hydraulic tensioning / torque method.
6. Reconnection of gland steam system, drains, instrumentation, and auxiliary piping.
7. Alignment check of turbine rotor coupling.

Post-Overhaul Checks

1. Bearing clearance and rotor float measurement.
2. Rotor free rotation and rubbing check.
3. Verification of gland sealing system and oil system connections.
4. Tightness check of all bolts, studs, and connections.
5. Restoration of insulation and lagging.

Testing and Commissioning

1. Oil flushing and lubrication system check.
2. Barring gear operation and rotor rotation check.
3. Turbine rolling as per OEM start-up procedure.
4. Monitoring of:
 - a. Vibration
 - b. Bearing temperature
 - c. Axial displacement
 - d. Steam parameters

Load trial and performance observation.

GENERATOR OPTIONAL WORK

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SCHEDULE-21: - COMPLETE GENERATOR OVERHAULING

1. Disconnection of all phase and neutral bus connections. Bushings to be inspected for any oil leakages & same to be rectified. Phase connectors to be inspected for any damages. If found damaged than same to be dismantled & installed. Repair shall be done at BHEL works.
2. Vendor shall provide necessary manpower support for pre overhauling vibration survey and carry out necessary Analysis to reduce the vibrations to the minimum possible level, during running, coasting down & ramping up of machine.
3. Removal of LP Brg top cover only (for working on LP-Gen coupling) & Removal of Brg-6 top cover and top half of bearing shell.
4. Recording of coupled run out (CRO) of LP-GEN, GEN-Exciter coupling / journals / shafts etc. Necessary components required to be removed for taking CRO at LP-Generator and Gen-Exciter couplings / journals.
5. Dismantling of all oil pipelines & water pipelines.
6. Recording of alignment readings. Checking of Generator Exciter Rotor journals / couplings / shafts free run out.
7. Opening and lifting of bearing 6 & 7 covers. Bearing 6 and 7 oil guard clearances measurement, Support/yoke/ key clearance recording, Removal of support/yoke, Measurement of oil catcher clearance, bearing top half removal C measurement of bearing oil clearances. Carrying out Repair / Replacement of Keys, oil guard ring strips, oil catcher ring strips etc as per requirement. Carry out necessary, lapping and corrections as per requirement. Necessary workshop facilities will be provided by NTPC free of cost at NTPC workshop.
8. Decoupling of LP-Gen rotor. Recording of alignment readings. Checking of Generator C Exciter Rotor journals / couplings / shafts free run out.
9. Measurement of reference control readings at Generator
10. Dismantling of seal ring, seal body, oil catchers etc in both TE C EE after recording necessary clearances.
11. Removal of top half of end shield (both TE C EE) after removal of associated pipelines.
12. Measurement of Magnetic center, prior to dismantling.
13. Dismantle Compressor Assembly C checks as per testing protocol, Fluorescent DP, IR etc. If any defects found on compressor blades, then same to be replaced.
14. Preparation for thread out of generator Rotor & lowering of bottom end shields (both TE C EE) C thread out of generator rotor.
15. Thorough Visual inspection of Stator and Rotor, cleaning of Stator and rotor and readiness for electrical tests.
16. Dismantling of stator end shields. Complete cleaning of stator end shields. Inspection of end shields pre-chamber, manholes & casing manholes and attending to leakage problems. DP test of welding joints of end shield pipelines and attending the defective joints if any.
17. DP test, for all Pipelines & flanges, oil & water, to be thoroughly carried out. Wherever required welding of flanges & joints to be carried out.

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18. All Generator Manholes to be opened, & necessary rubber cords/O-rings, gaskets to be replaced. Core to be visibly inspected from manholes for any abnormalities. The activity to be taken up in consultation with EIC.
19. Replace all necessary generator flange gaskets & rubber cords/O-rings.
20. Dismantling and cleaning of all H₂ coolers, replacement of all gaskets and conducting Hydraulic test of all the coolers and attending leakages. Hydrogen cooler water box flow direction to be checked as per drawing. If required, water boxes to be replaced.
21. H₂ Cooler External Pipelines Support Strengthening & Hanger Checking to be carried out. Pre-overhaul survey to be carried out to analyze the vibration of pipes.
22. All Dummy Plugholes of H₂ cooler to be inspected for thread wear out & to be replaced, if required.
23. Hydraulic Test of Seal oil pipes in End-Shield to be carried out.
24. Pneumatic test of Generator stator winding & Hydraulic Test of external piping of PW system (excluding stator winding)" is to be carried out at the specified pressure for the specified time. Leakages if any are to be attended and Hydraulic test is to be completed successfully. (Replacement of flange gaskets, welding leakages, flange joint leakages.)
25. Inspection and measurement of bearing clearances for bearing no 6 & 7. Removal of bottom halve of bearing no 6 & 7. Carry out DP test / Ultrasound test for all bearing halves. Measurement of bore for all bearings. Carry out necessary/ lapping / polishing on bearings / supports / Journals etc as per requirement.
26. Check the expansion tank and associated piping; attend the leakages if any, replacement of any valve/ gasket, cleaning of the inlet / outlet conical filter/ screen. C&I and associated work will be excluded from vendor scope.
27. Dismantle Compressor Assembly & checks as per testing protocol, Fluorescent DP, IR etc.
28. Cleaning of manholes, replacement of gasket & closing manholes. All Pipelines connected to generator casing, for H₂/Co₂ filling & LLD, gaskets to be replaced. 8.5 Mtr LLD rack gaskets/O-rings to be replaced. LLD lines to be Air Purged.
29. Inspection of core packets for looseness and minor repair to the extent possible at site.
30. Overhang portion brackets bolts, support brackets & locking. Phase separators to be checked for looseness. Overhang Portion vibration sensors to be checked for any loose-ness. Vibration sensors healthiness to be checked at Lead In plate terminals. Defective vibration sensors to be replaced. Readings of Two Vibration Sensors on TE side are already on higher side. Overhang Portions of both TE & EE side to be checked entirely, for any looseness or fretting material. Upon inspection, if any repairs are required, then vendor shall be provide manpower assistance to carry out such kind of repairs. Vendor must also arrange the material required for repairing the overhang portion, however the cost of material will be borne by BHEL separately.
31. Stator Frame is experiencing vibrations. Loosening & stretching of Generator & cooler housing Base plate bolts to be carried out as per recommended limits.
32. Primary water Teflon Tubes to be inspected for any wear-out & leakages. Replacement to be done, if found damaged.

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33. Mounting of bottom end shields, Generator Rotor Thread-in and loading of generator rotor on bearings. Checking and adjustment of fan blade clearances.
34. Thorough cleaning of bearing halves. Box up of bearings, Yokes, Oil catcher etc for bearings 6 & 7. Maintaining necessary bearing clearances.
35. Facial run out checking of Generator rotor & face correction if required.
36. Measurement of final airgap, magnetic center, and correction.
37. All measurements with respect to clearances to be recorded in presence of NTPC representative.
38. Compressor housing assembly and recording of axial and radial clearances.
39. Assembly of Hydrogen coolers. Hydrogen coolers brackets to be checked specifically for proper fixing of H2 coolers. Associated Pipelines of H2 coolers to be checked for proper clamp welding & loading of Hangers to be checked. Vent valve passing of H2 coolers to be checked & valves to be replaced if required.
40. Checking of axial & radial run out of coupling faces. Blue match to be checked in Presence of NTPC representative Engineer.
41. Axial & radial alignment of Generator-LP2 rotors in operating condition
42. Gen-Exciter coupling including necessary reaming and honing of coupling holes as per requirement. Clearances of coupling bushes to be measured & necessary replacements to be carried out.
43. Pipeline flushing of Seal oil system to be carried out before assembly of seal rings & seal body. Seal oil Tank to be cleaned & Floats to be checked, for any passing C replacement of float valves if required.
44. Assembly of seal body and hydrogen seals after maintaining proper clearances. All rubber gaskets & rings to be replaced during assembly of seal body.
45. Resetting of all bearings oil seals & pedestal oil guard rings. This includes repair/ replacement of strips as per requirement. Refitting of all bearings & setting of bearing pads and keys etc. as per requirement. Cleaning of all JOP NRVs. Setting of JOP lifts at all bearings.
46. Thorough cleaning of bearing pedestals and box up of all bearing pedestals. Inspection of all jacking oil hoses, seal oil hoses and replacement as per requirement. Checking of shaft lift at individual journals and carry out necessary adjustments.
47. Final fitting of generator end shields and sealing compound injection.
48. Alignment of generator and exciter rotors.
49. Coupling of generator and exciter rotors. Checking/rectification of swing of exciter rotor.
50. Box up of generator and exciter bearings. Checking of oil clearances of bearings and adjustment.
51. Assembly of LP2 bearing, setting of oil catchers & oil guard
52. Fitting of exciter cover, diode wheel, exciter cooler pipelines and PMG. Fitting of all lube oil, seal oil and cooler pipelines. Installation of removed oil pipelines, primary water system piping, and cooler pipelines & their flushing.

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53. Draining of Seal Oil Storage Tank and Cleaning of Seal Oil Storage Tank as and when required during flushing.
54. Preparation for Oil flushing of pedestals, oil lines, line filters inspection, MOT bucket filters inspection C cleaning and normalization after flushing.
55. Putting machine on barring gear.
56. Air tightness test of stator and arresting any leakages pertaining to the scope of work.
57. Assistance in rolling and synchronization of the machine and attending any defects observed during rolling with respect to scope of work carried out.
58. Generator Electrical Testing.
 - i. STATOR
 - a. Removal of Generator phase and Neutral Link/flexibles and replacement of Bushing sealing Gaskets, O rings and bushing Insulator. (If required)
 - b. Bushings & Phase extensions to be visually inspected for any wear-outs & abnormalities. If any repairs to be carried out outside site, then same shall be done at extra cost.
 - c. Thorough visual inspection of stator. Check condition of Stator core and winding. Inspection of area between casing and the core for any contamination / presence of foreign material, healthiness of stampings & rectification of the same.
 - d. Checking and conducting wedge tightness and deflection test of generator stator, rectification of defects, if any.
 - e. Check winding support structure and all other Stator bolts and rectify defects if any.
 - f. Check expansion joint of stator Water pipeline and replace if necessary, check Teflon expansion joints & hose connections and rectify defects if any.
 - g. Draining of water from the winding, drying and nitrogen gas filling in the winding, if required however Nitrogen for filling into stator winding to be supplied by NTPC.
 - h. Carrying out winding Pneumatic test as per OEM Manual and attending any leakage in water and nitrogen circuits.
 - i. Measurement of IR C DC resistance of Stator
 - j. Conducting ELCID Test of Stator Core and attending any defects thereof (Minor surface core repair to the extent possible at site shall be carried out free of cost. In case of major repair, same shall be carried out at extra time and extra cost basis). In case of requirement, Core Flux Test is to be done for ensuring the health of the Core. Supply arrangements & cable to carry out core flux test like flexible single core copper cable will be arranged by NTPC. Auto Transformer, watt meter, thermos-vision camera etc. shall be arranged by vendor.
 - k. Conducting Tan Delta & PD test of stator winding, up-to rated phase voltage with the help of resonating inductor. The results of Tan-Delta & PD, to be analyzed & relative condition of insulation to be inferred.
 - l. Checking of all electrical connections of stator like bushing connection, bar to bar connection at appropriate torque by torque wrench and rectification of defects.
 - m. Inspection for fretting powder deposit on winding.

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- n. Inspection of end winding support/spacers.
- o. Thorough cleaning to be carried out in Generator Bushing chamber and all flexible links and if found loose or damaged to be attended.
- p. Inspection of terminal bushings, replacement of "O"-rings if required. Leak test of bushings and rectify defects if any.
- q. In case of Hydrogen Leakage from "lead in plates" of RTD's, replacement is to be done.
- r. Measurement of Resistance of all the RTD's & Thermocouples of Generator and Replacement/Repairing, if required. Replacement of RTD, if required will be limited to replacement without removal of stator bar.
- s. Measurement of Voltage of Generator end winding vibration probes at terminals and Replacement/Repairing, if required.
- t. Cleaning & Varnishing of Stator.

ii. ROTOR:

- a. Visual Inspection of rotor.
- b. Rotor Flux probe data, to be analyzed, pre-overhaul and if any abnormalities observed in flux wave pattern, then due analysis is to be carried out, for any corrective action required. Rotor flux probe healthiness is to be ensured till service level.
- c. Take IR value of rotor and winding resistance, RSO & impedance of rotor after thorough cleaning.
- d. Check rotor wedge, retaining rings and Ultrasonic Test of retaining rings.
- e. Carry out DP test with fluorescent dye of compressor blades, root, couplings, couplings bolts C nuts and retaining ring after removal of paint.
- f. Check the IR of the compressor segments and rectify if found less.
- g. Inspect the winding and Gas duct.

59. After Testing & visual observation, if the requirement of Rotor replacement with spare rotor arises, then same has to be carried out. Shifting of Spare Rotor from Maintenance Bay to TG Floor and associated dismantling/unpacking.

- h. In case of replacement of spare rotor, all Test procedures to be repeated afresh.
- i. Perform Gas tightness test of rotor with N₂ gas.
- j. Clean all dismantled parts thoroughly before box up.
- k. Also slip ring rotor earth fault detection system shall be inspected for any uneven wear, pitting etc and also brush holders and support brackets to be inspected and defects to be attended. In case Earth Fault Detection System is found defective, Assy. is to be replaced.
- l. Rotor heating and varnishing.
- m. Tightness checking of Grub Screws of Rotor at appropriate torque by torque wrench.

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60. During Testing & Visual Inspection of Rotor if it is found, then rotor needs to be replaced with spare rotor. Spare rotor will be provided by NTPC & replacement & Testing of Spare Rotor will be done by vendor. During replacement if any additional activity such as Bearing replacement as per rotor diameter, then same has to be done by vendor. **(Rotor replacement shall be carried out under optional job – schedule-21.1 of price schedule)**

Note: - Bidder shall arrange reputed/experienced agency for Mechanical and electrical test in consultation of BHEL site Incharge.

SCHEDULE-22: - REPLACEMENT OF MULTICONTACT BAND & MULTICONTACT PIN.

1. Isolation of coupling.
2. Removal of insulation plate.
3. Dismantling of old Multi Contact band and MULTICONTACT pin.
4. Reassembly with new MULTICONTACT band and new MULTICONTACT pin. For the replacement, multi contact band shall be provided by NTPC.
5. Measurement of DC resistance and IR before and after assembly
6. Pressure Drop Test with N₂ to be carried out for 24 hrs., to rule out the possibility of leakage.
7. Silver Plating, if required on Pins will be carried out by BHEL. Vendor shall provide manpower assistance.

SCHEDULE-23: - SEAL RING MACHINING

1. Machining of Hydrogen seal ring (Turbine & Generator end)
2. To & Fro transportation of seal ring at works/ along with transit insurance shall be in Vendor scope
3. New Seal rings shall be provided by NTPC.
4. Seal ring machining to be completed within one week of receipt of Seal rings at Machining works

Note: - Bidder shall arrange reputed/experienced agency for Machining of seal rings in consultation of BHEL site Incharge.

SCHEDULE-24: - REPLACEMENT OF SPARE EXCITER: -

This is optional work. Either Schedule 8 or 24 will be executed

1. Shifting of Spare Exciter from Maintenance Bay to TG Floor and associated dismantling/unpacking.
2. Removal of Exciter dome after removing all Electrical and C&I connections.

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3. Removal of all pipe lines of exciter bearing and removal of all C&I accessories in NTPC scope.
4. Checking of IR value of pedestal and if found less attending the same.
5. Removal of PMG stator after removing electrical connections.
6. Removal of exciter coolers.
7. Removal of top half of main exciter.
8. Checking of Swing check & CRO of Exciter rotor for reference.
9. Decoupling of Gen-Exciter rotor coupling & Alignment check.
10. Removal of exciter rotor and placing it on stand.
11. Carry out DP test with fluorescent dye of fan hub of New Rotor.
12. Visual inspection of PMG, Main Exciter & Diode wheel of new rotor
13. Removal of bottom half of main exciter & Exciter bearing pedestal from exciter bed.
14. Removal of all C&I cable, Electrical cables (Main exciter connection, PMG connection, etc. from Exciter bed. (Note removal of all C&I cable, Electrical cables, etc. are in scope of NTPC).
15. Removal & Dismantling of Exciter bed.
16. Assembly of new Exciter bed.
17. Alignment & levelling of new Exciter bed.
18. Placement of all C& I cable, Electrical cables (Main exciter connection, PMG connection, etc. to Exciter bed. (Note placement of all C&I cable, Electrical cables, etc. are in scope of NTPC).
19. Inspection and measurement of bearing clearances for Generator rear bearing and exciter bearing. Removal of bottom halves of bearings. Carry out DP test / Ultrasound test for all bearing halves. Measurement of bore for all bearings. Carry out necessary/ lapping / polishing on bearings / supports / Journals etc as per requirement. Replacement of bearing if required.
20. Cleaning of all dismantled parts and windings thoroughly
21. Checking of all windings for any defect and rectifying the same if any (After inspection, if any major rectification is required, shall be done separately with additional cost & time basis).
- 22. Check the multi-contact band and replace the same if found defective (Optional work Schedule No- 22)**
23. Cleaning of Exciter coolers and carrying out Hydraulic testing of the same as per protocol and attending leakages if any.
24. Electrical testing of exciter, diode wheel and PMG limited to the tests given below.
25. Exciter stator: IR, DC resistance of Exciter stator pole winding, AC voltage drop test of exciter stator, IR value of quadrature axis coil.
26. Exciter rotor: IR of slip ring, checking of diodes. Replacement of faulty diodes of diode wheel
27. PMG: IR C DC resistance of PMG stator.
28. Check ground fault detection system and rectify any fault.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – II: SCOPE OF WORK

29. Clean the filters of exciter dome.
30. Replacement of all gaskets and providing proper sealing of exciter dome.
31. Cleaning and Varnishing of PMG Stator, Main Exciter Stator C Rotor.
32. Alignment of Gen-exciter rotor, coupling, CRO & swing check after final LP-Gen Alignment.
33. Assembly of main exciter, PMG, Bearing no 8 housing. after Generator rotor threading & box up with/after clearance checking
34. Assembly of electrical connections after work.
35. Assembly of exciter cooler housing after work.
36. Assembly of exciter outer cover after Generator rotor threading & Exciter box up
37. Correction of coupling and fouling of bush, bolts, pins etc. In order to make new exciter rotor compatible with existing Generator rotor.
38. Putting machine on barring gear.

Notes:

1. Transportation New spare exciter assembly from store to site (service bay) shall be in NTPC Scope.
2. Un-packing of new spare exciter assembly shall be carried out by vendor.
3. Packing of old exciter assembly shall be carried out by vendor. However, NTPC shall provide all packing material to vendor.
4. Transportation old exciter assembly from site (service bay) to store shall be in NTPC Scope.

Note: - Bidder shall arrange reputed/experienced agency for Mechanical and electrical test in consultation of BHEL site Incharge.

SCHEDULE: 25: DEPUTATION OF TG EXPERTS

1. Two (02) Expert of Turbine, Governing, Valves and Generator. Each are to be deployed by the contractor as per site requirement in consultation with BHEL Site-In-Charge.

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

3.1 **SPECIAL TERMS AND CONDITIONS:**

1. The bidder shall submit following documents to the BHEL Engineer in charge before starting of the work at site: -
 - a) Valid labour license of total Nos. of labours.
 - b) Valid labour Insurance policy to cover all the workers.
 - The Contractor shall necessarily take Workmen Compensation Policy and if required Third Party Liability Policy shall be taken by bidder.

Third Party Liability Insurance Policy- Total/ Aggregate amount during the currency of Contract: Rs. 50.00 Lakhs or '110% of Contract value (Excluding GST)' whichever is lower, For any one occurrence: 50% of Total aggregate amount.

 - c) **Medical Fitness Certificate of each worker issued by registered medical practitioner if required.**
 - d) A photocopy of employment card issued to each worker as per format prescribed in factory rules.
 - e) List of safety appliance provided by the contractor to their workers with receipt.
 - f) Valid test certificate issued by competent authority as per factory rules for the T&P (like pulling / lifting devices, slings, machines etc.) to be utilized at site.
 - g) List of personnel's and workers deputed / deployed along with their full address proof, Police verification etc., shall be get done of his workers by the contractor.
 - h) Submission of Indemnity Bond.

Subcontractor should assure that the repair of the equipment covered in the scope of this offer will be conducted with the best of skills and know how available with Subcontractor and in conformance with the clearances and adjustments set forth in manufacture's drawing instruments and other information's furnished to Subcontractor.
2. Bidder shall visit site well in advance for identification & to ensure availability of required special T&P as well as other infrastructure required.
3. During execution of site it may be required to close the site temporarily, In this case De-Mobilization & Re mobilization charges shall not be payable.
4. All consumables required for the overhauling will be bidder's scope.
5. The various setting, clearances, adjustments and benchmarks will be restored to the extent possible during rectification to the condition as per the erection and commissioning log sheets available with customer. If however we are not able to produce erection / commissioning log sheets, efforts will be made to attend the best possible parameter or the conditions as observed at the time of dismantling of the equipment in consultation with us.
6. Subcontractor must prepare PERT CHART/BAR CHART. Daily monitoring will be done jointly and log sheets of important activities should be noted down and signed jointly.
7. Daily work planning, scheduling & reviewing of work will be done by the party every morning & evening and daily programme must be submitted on daily basis to EIC. Party also to submit the progress exception report. Agency should also submit filled protocol duly signed every day/after completion of work.
8. All the works shall be carried out as per the instructions and to the satisfaction of the Engineer In-charge.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

9. The contractor will attend contributory to faulty and poor workmanship during commissioning and trial run of the equipment.
10. Round the clock working under expert supervision shall be ensured by the contractor deploying two equal parallel strength of groups in 12 hrs. Shift with equal T&P for all the jobs so as to complete the work in stipulated period or earlier.
11. Agency has to engage his manpower for 24-hour work in all working days/holidays as per the instruction of Engineer-in-charge headed by responsible and experienced Engineers/Supervisors. The agency has to submit detailed manpower deployment program for round the clock work before commencing overhauling works
12. It is the responsibility of contractor to keep the plant, equipment, machinery and surrounding area clean.
13. Removal of insulation from turbine, stop and control valve, associated pipe lines and through cleaning of subjected area is in the scope of bidder.
14. Agency has to engage competent/skilled manpower as per the requirement of the respective jobs. BHEL reserve the right to disallow any worker to continue the work, if found unsuitable for the specific job.
15. The names of working persons like Site in-charge, supervisors, foreman, main fitters to be deployed during the job with full details has to be submitted stating their area of work and experience and specialization of the work to site in-charge before the start of work. BHEL may ask to change/delete the person not found suitable for the work at any point of time during execution of job. For any addition and deletion of the working person prior permission from BHEL shall be taken.
16. Subcontractor has to ensure that all the key persons must continue till completion of job i.e. machine comes on load. Subcontractor manpower (adequate) should remain at site for a period of **03 days after machine comes on full load.**
17. VENDOR shall aid during commissioning of TG set; however, commissioning responsibilities shall be on NTPC. During commissioning VENDOR Engineer (Minimum Manpower) shall be available for 72 Hrs.
18. **Mobilization of full strength manpower and T&P shall be done immediately within 03 days after receipt of LOI or as per intimation from BHEL.**
19. Work distribution sheet for all the workers/supervisors deployed shall be submitted to BHEL one day in advance on daily basis.
20. Subcontractor should mobilize additional resources such as plant, equipment's, material as may be required by site in-charge to improve the progress of the work if the progress of the work is not satisfactory.
21. Subcontractor should get registered under relevant sales tax and or work contract Act (VAT) where the jobs are executed.
22. Party has to quote lump sum rate for all activities mentioned in the price bid as the actual quantities may vary during overhauling of the unit for which the contractor is not permitted to raise any dispute or claims. Items mentioned as optional will be taken up depending on condition, availability of spares and requirement.
23. Radiography and stress relieving of the joints are in the scope of the contractor.
24. **Removals of insulation are in the scope of the contractor.**
25. Scrap & insulation etc. is to be shifted to scrap disposal area as indicated by the Site-in-charge.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

26. One administrative personnel to control the resources and attendance of the workers to be ensured.
27. Contractor shall arrange certified HP welder for welding job as required whose welding test will be conducted.
28. Free electricity shall be provided by customer but duties if any as applicable shall be paid by contractor.
29. Argon, Oxy- Acetylene gas shall be arranged by the contractor with cutting/welding set / argon welding set and other welding appliances.
30. Enerpack make close height Hydraulic jacks of 50T and 100T capacity - 4 nos. each shall be arranged by the contractor in 100 % working conditions.
31. If the duration of work continues beyond stipulated period due to any reason, no claim for compensation will be entertained.
32. The work details are brief & for Subcontractor knowledge only. Subcontractor will have to do all the related works as per requirement.
33. The contractor will be responsible to pay the damages to the property of Board or individual caused by his worker during the course of contract. If the contractor fails to pay the same it will be recovered from his bill.
34. No compensation claimed for idle labor for any reason will be entertained by BHEL.
35. All general tools and plants for execution of the work will have to be arranged/ maintained by the contractor at his own cost & risk.
36. In normal course, the interpretation of the under signed on any matter or decision given by him on any disputable points will be final and binding on the contractor.
37. Successful bidder is to obtain labor license before the start of the work.
38. Successful bidder is to obtain necessary "No Dues" certificate before de-mobilization from site.
39. Successful bidder has to arrange Site mobile recharge till the site closing.
40. LAP-TOP with latest configuration, DVD/CD writer/pen drive, its peripherals including printer-scanner and one USB Modem for Internet connectivity to be provided for BHEL site office.
41. Barring Gear is the essence of the contract.
42. Sufficiently adequate man power T&P and other resources should be mobilized by the contractor to operate round the clock work progress with standby technicians to be deployed immediately if need arises. Offer should be submitted considering these requirements.
43. Accommodation for the sub-contractor's manpower will be provided if made available by the customer as per the applicable charges.
44. Contractor shall arrange vehicle for his manpower transportation.
45. Magnetic base drilling machine along with drill/reamer is required (Wherever Applicable) for dowelling of cylindrical support of bearing in case of their replacement.
46. Taper reamer along with drill is to be arranged for dowelling of MOP (Wherever Applicable).
47. The agency shall erect approach platform as per requirement and dismantle the same.
48. The agency shall be fully responsible for maintenance of records of his employees.
49. The agency shall start the work only after instruction by contract operating authority.
50. **Scaffolding pipes, clamp, aluminium planks, Jallies &, 40 mm thick wooden planks are to be arranged by Sub-contractor for various platforms as required for the and Safety will be taken on priority basis.**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

51. **Bidder has to arrange certified person to approve scaffolding erected before use.**
52. Contractor reconciles the material and submits along with the bill. To credit the balance spares worn out articles/spares and scrap in the main store.
53. Contractor shall clean the surrounding working area within three days immediately after completion of work/ Machine taken onto barring.
54. Give proper assistance to maintain the readings at site for the protocol.
55. Condenser tube bundles shall be covered properly with wooden planks/scaffolding boards, tarpaulins etc at the top of tube bundle to prevent falling of foreign material on condenser tubes from top of condenser/LP turbine.
56. Cast iron plates shall be first matched with calibrated surface plate by manual scrapping & matching and then above cast-iron plates shall be used for scrapping coupling faces to correct convexity/concavity/taperness of coupling faces.
57. Adequate numbers of tarpaulin are to be arranged by the sub-contractor for covering of various equipment during insulation removal / application.
58. For carrying out MPI, NFT, UT, DPT etc. agency should engage competent certified personnel/vendors along with calibrated instruments/equipment's etc.
59. Ultrasound test kit, MPI, DP Test kit of standard makes CHECK MATE / Magna Flux ml Aerosol cans and suitable colour paint to repaint the weld joint after DP test along with required accessories and consumables.
60. Transportation of material required during overhauling from central work shop to site is in the scope of bidder. Tractor & trailer, hydra, crane shall be arranged by bidder for shifting of materials if required. **However Mobile Cranes of adequate capacity/BOT with operators will be provided free of cost by NTPC.**
61. Once Turbine Rotors are removed from their casings, high spots on their coupling faces shall be removed & they will be placed on the turbine bearings. The rotors will be coupled with complete loose/fitted coupling bolts & stretched to full value for measurement of coupled run-out & swing value. Necessary correction by scraping etc. shall then be done, if required, in order to achieve acceptable run-out/swing values. This process of correction may require more than one attempt. Similar process shall be applied to Gen-Exciter coupling for achieving exciter end swing value.
62. The agency/sub agency shall have to take utmost care of spares parts/materials during dismantling, assembly, storage and handling of equipment's etc as applicable.
63. The contractor shall be fully responsible for erection of rigid and stable (enough) scaffolding for the safety of persons carrying out work. (Scaffolding material shall be arranged by bidder).
64. The agency shall be fully responsible for the safety of his personnel during the work at site, and shall ensure the use of safety appliances by his workmen.
65. Calibrated surface plate of size 1 Mtr. x 1 Mtr. and flatness within 06 microns. This is required to correct convexity/concavity and taperness of coupling faces.
66. Preheating/post heating, stress relieving and RT will be arranged by agency.
67. Agency has to give necessary assistance for drawn of spares from stores & returning the damaged spares to store.
68. Any fixture required for the above job shall be fabricated by the agency.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

69. IBR qualified welder for use in welding of high-pressure pipes etc., as applicable.
70. Machines, T&PŠ required for reaming & honing of coupling holes shall be arrange by agency.
71. To & fro transportation of their entire team on their own from place of stay to airport/station, from place of stay to site and to meet other essential requirements.
72. All testing equipment required as per above scope of work shall be in the scope of agency.
73. The agency shall provide all necessary assistance while commissioning back the Turbine, Generator & aux systems mentioned above and shall rectify, if any, problems encountered during commissioning.
74. The agency shall provide all necessary assistance during commissioning of T/G Set.
75. **Available workshop facilities at the Power Station Premises will be extended. Machining of any component shall be carried out by NTPC. Machining facilities will be provided along with operator by NTPC, however VENDOR shall inspect machining works. Manpower assistance for machining will be provided by VENDOR.**
76. **Fire Fighting Hose Pipes with accessories as required will be provided free of cost by NTPC.**
77. **Electricity for Power and Lighting, compressed air and water supply will be made available at convenient location on free of cost by NTPC.**
78. **Plates, Angles, Channels, Beams, Rails, Rods, Pipes, and other steel sections will be provided free of cost by NTPC.**
79. **Special Tools like heavy spanners, rotor turning device, slings and other special tools supplied by VENDOR with equipment will be spared by NTPC.**
80. **Adequate store space for site store along with locking arrangement will be made available at work site by NTPC.**
81. **Flood lighting at workplace will be made available by NTPC. Pedestal fans if available will be made available.**
82. **All spares & other materials including consumable such as hylomer, omega compound, various Sealants, jointing compounds and lubricants, special electrode etc. which go into equipment permanently to be arranged by NTPC free of cost.**
83. **Hydraulic torque wrench with operator shall be arranged by bidder for decoupling & trial coupling, final coupling.**
84. **All Casing and Valves fasteners should be loosened / tightened by Induction Heating Method. Suitable capacity Induction Heating Machine shall be in the scope of bidder. In addition to this gas heating arrangement should be kept ready for emergency.**
85. **Blast cleaning shed erection and dismantling and cleaning of scrap alumina and alumina dust around the blast shed.**
86. **Alumina blasting work of turbine rotor, blades, guide blade carriers, valve cone, valve stem etc. should be carried out at two places round the clock, Bidder shall observe safety precaution while carrying out alumina blasting.**
87. **Required white fused Alumina powder shall be arranged by bidder.**
88. **Removal of thermal insulation wherever required for working.**
89. **Sufficient Halogen Lamps shall be in the scope of bidder.**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

90. **Skilled EOT Crane operators, for round the clock working for Two cranes are in bidder's scope.**
91. **Reaming & honing of coupling holes if required shall be carried out by the bidder.**
92. **Bidder has to fulfil all HSE related requirement at site.**
93. **In case any material is dropped by Vendors person inside header /Condenser, It is in Vendors scope to remove the material and arrange for repair due to fall if any free of cost within time period.**
94. **Any minor modification/makeshift arrangement in TCP as required shall be in scope of vendor.**
95. **Work shall be carried out on basis 24 hours per day basis as per requirement. Additional one group consisting of 10-12 full-fledged manpower with foreman will work in night shift. VENDOR shall ensure availability of Foreman at Gadawara site upto synchronization of Unit.**
96. **The vendor has to ensure all safety policies are followed and no unsafe act is done.**
97. **Arrangement for suitable sealing compound injection into the "O" ring grooves of end shields /parting planes shall be in the scope of the VENDOR.**
98. **All measuring instruments required for assembly of the machine and testing instruments needed for the electrical testing of Generator Stator, Rotor and Exciter is in the scope of the VENDOR. All testing instruments/ measuring equipment should have a valid calibration certificate and the same should be submitted to the Engineer-in Charge on demand.**

NOTE:

1. The specific (minor) work which is not mentioned in the scope of work but required to be carried out for completion of subject work is in the bidder's scope.
2. Decision of BHEL site in charge regarding interpretation of the scope of work shall be final.

LIAISON WITH ALL STATUTORY AUTHORITIES:

- Compliance of statutory provisions, whether mentioned in this contract or not shall be binding on the contractor.
 - a) If there is any change in labour laws after the contract has been awarded, then the new law shall automatically be binding on the contractor.
 - b) No additional financial compensation shall be paid by BHEL to the contractor on account of increased expenditure caused by a) and b) above.
 - c) Liaisoning with local commercial tax dept. to obtain Coml. Tax exemption certificate.

PAYMENT TO WORKERS:

- Payment to workers shall be done in the presence of BHEL representative or through bank account only.
 - a) The contractor shall intimate the day of payment at least three days in advance in writing along with copy of the pay sheet and attendance cards.
 - b) All workmen shall be covered by PF Rules irrespective of their period of employment.
 - c) Payment shall be made inside the plant premises and during office hours.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

SUBMISSION OF DOCUMENTS:

- The contractor shall submit following documents at appropriate time either before or during the execution of the work and as directed by Site in-Charge.
1. Test certificates of Pulling and Lifting machines and appliances.
 2. Details of workers to be deployed with name, address, category.
 3. Details of supervisory staff to be deployed.
 4. Authorization for receipt of materials and for signing of Measurement Books etc,
 5. Labour license specific to the contract.
 6. List of T&P brought into plant premises along with their serial numbers and dates/years of purchase.
 7. All the Staff/Workers deputed for the Job should have Insurance Cover and document in this regard should be submitted along with 1st RA Bill.
 8. List of consumables brought into plant premises along with their serial numbers and dates/years of purchase, along with test certificates wherever applicable.
 9. Insurance policy for the workers to be deployed in this contract.
 10. Safety undertaking.
 11. Copy of ESI certificate to be furnished.
 12. Proof of Payment of GST.

(Sl.No.11 to 12 are required before final bill is processed).

The contractor shall submit following documents in report form within 15 days from commissioning of unit after the overhaul/shut down work is completed:

- Details of work executed.
 - Measurements against different schedules in compiled form.
 - Material issue details.
 - Material consumption details.
 - Material returns details.
 - Details of retrenchment benefits given to workmen.
 - Details of issue of PF slip to workmen.
 - Details of settlement of accident benefits if any to workmen
 - Copies of pay sheets to workmen.
 - Details and proof of remittance of PF to workmen (before final bill).
 - No dues clearance from different stores of customer
 - Valid labour license
- Indemnity bond & documents for labor license processing are to be submitted timely by vendor. Other documents for HR clearance for final bill must be submitted as per following table.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

Sl.No.	Suggestive list of document
1	Wage sheet
2	PF (ECR and confirmation Slip)
3	EC policy or ESI Challan, as applicable
4	Proof of online payment to wages
5	Labour license under contract labour (R&A) Act 1970 if applicable.
6	License under interstate Migrant worker act , 1979 if applicable
7	BOCW resitration if applicable
8	Proof of enrolment under PMJJY & PMSBY
9	Payment of bonus, Wherever applicable
10	Proof of full and final settlement
11	Any other document as decided by site HR

Statutory Inspection

- Please refer General and Special Conditions of Contract. In addition to it the scope includes getting the approvals from the statutory authorities (like IBR, smoke nuisance inspector, anti-pollution authorities, labour officials). This includes arranging for inspection visits of such authorities periodically as per requirement, submitting documents etc. and payment of fees connected with it.

3.6 Safety:

Contractor should engage at 01 no. Qualified Engineer in each shift during the contract period. Strict Safety measures have to be followed at Site. Contractor shall also adhere to all the safety provisions of our customer. In case violation of any provision at site fine of Rs.500/- to Rs.2000/- at the discretion of our site in-charge shall be imposed for each of such occasion and shall be recoverable from the contractor's bill.

1. The contractor should ensure the use of 24 volt hand lamps and 24 volt transformer by his workers. The all electrical gadgets shall have plug top & proper earthing.
2. All T&P like pulling and lifting machine, chain pulley blocks, slings, D-shackles should be maintained in proper working condition. Necessary test certificate has to be submitted by contractor for lifting tools & tackles. Third party testing certificates is also must in C.G.
3. The contractor shall be fully responsible for the safety of his workers.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter –III: SPECIAL TERMS AND CONDITIONS

4. The Use of ISI mark safety helmet, ISI mark safety shoes, Goggles, hand gloves, ear plugs and nose mask is a must. In addition to this, a full body (safety) harness, face shield must be provided to workers carrying out work at height & cutting/ welding/ grinding respectively. Gas cutting set with flash back arrester etc. should be provided by the contractor and should ensure the use of these safety equipment's, all PPE by his worker while working.
5. Scaffolding should be erected properly and strong enough with hand rails and it should not be used before getting it checked by Engineer-in-charge. it can be used after green tag from safety department.
7. The contractor shall be solely responsible for the safety of his workers & employees. The contractor must ensure that the persons working in site/nature jobs/ skilled jobs/ working with the welding machines, grinders, cutting set & other special T&P shall be having experience & expertise to perform that job. Contractor should engage physically and mentally fit manpower. The electrical connection / repair jobs shall be done only by the electricians.
8. The contractor shall ensure that prior to start of work all his workers shall get the safety training.
9. The contractor shall also take care for the safety of the equipments & persons working in the vicinity.
10. Customer at its own discretion may decide to recheck / retest some or all of the T&P / machines of the contractor inside the plant premises.
11. The helmets, safety shoes and safety belts issued by the contractor shall be conforming to relevant IS standards.
12. The contractor shall maintain the first aid box at site.

PROVISION OF PPEs

- Personnel Protective Equipment (PPEs), in adequate numbers, will be made available at site & their regular use by all concerned will be ensured
- The following matrix recommends usage of minimum PPEs against the respective job.

Sl.NO	Type of Work	PPEs
1	Concrete and asphalt mixing	Nose mask ,hand glove ,apron and gum boot
2	Welders/Grinders/Gas cutters	Welding/face screen, apron, hand gloves, nose mask and ear muffs if noise level exceeds 90dB. Helmet fitted with welding shield is preferred for welders
3	Stone /concrete breakers	Ear muffs, safety goggles, hand gloves
4	Electrical Work	Rubber hand glove, Electrical Resistance shoes
5	Insulation Work	Respiratory mask, Hand glove, safety goggles
6	Work at height	Double lanyard full body harness, fall arrestor (specific cases)
7	Grit/Sand blasting	Blast suit, blast helmet, respirator, leather gloves
8	Painting	Plastic glove, Respirators (particularly for spray painting)
9	Radiography	As per BARC guidelines

- The PPEs shall conform to the relevant standards as below and bear ISI mark.

Relevant is-codes for personal protection

IS:2925-1984	Industrial safety Helmets
IS:4770-1968	Rubber gloves for electrical purpose.
IS:6994-1973(Part-I)	Industrial safety Gloves(Leather & Cotton Gloves)
IS:1989-1986	Leather Safety boots and shoes.
IS:5557-1969	Industrial and safety rubber knee boots.
IS:6519-1971	Code of practice for selections care and repair of Safety foot wear.
IS:11226-1985	Leather Safety footwear having direct molding sole.

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IS:5983-1978	Eye protectors.
IS:9167-1979	Eye protectors.
IS:1179-1967	Eye & face protection during welding
IS:3521-1983	Industrial Safety Belt and Harness
IS:8519-1977	Guide for selection of industrial Safety equipment for body protection
IS:9473-2002, 14166-1994, 14746-1999	Respiratory Protective Devices

The list is not exhaustive. The safety officer may demand additional PPEs based on specific requirement.

NOTE: All employee of vendor should wear company uniform along with company logo at work place. Please follow strictly. Otherwise it may lead to penalty under safety provision.

- **VENDOR to ensure that the Vendor deployed safety personnel for round the clock monitoring (at least 2 No safety supervisors). Records of PPE distributed, PPT talks given, daily TBT taken to be maintained and submitted for safety clearance, the workers deployed must be identifiable by providing them with similar safety jackets or similar PPE**

3.7 Important Safety Conditions:-Agency has to ensure utmost safety at all associated workplace/s. Penalty for non-compliance of safety rules each time.

- i. Non using safety shoes per person per occasion —Rs.1000
- ii. Non using safety helmet per person per occasion —Rs.1000
- iii. Non using safety belt per person per occasion —Rs.1000

3.8 OTHER TERMS AND CONDITIONS

- 1.0 Successful bidder has to extend manpower assistance for minor cleaning/scraping, etc.
- 2.0 ~~A copy of tender document with each page duly signed and stamped shall be submitted along with your offer as a token of your unconditional acceptance to this tender condition.~~ Also any deviation to the tender conditions shall be submitted in a separate paper duly signed by the bidder, any overwriting / correction by the bidder on the tender will not be recognized and the offer may be rejected on this ground.
- 3.0 General and special conditions of contract' enclosed herewith will be fully applicable, except otherwise stated in this enquiry. In case of any conflict, the conditions specified in this enquiry letter will prevail over that of the 'General and special conditions of contract'.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – IV: T&Ps and MMEs to be deployed by Contractor

4. LIST OF MANPOWER REQUIRED

Sl.No	Manpower	Category	No. of Persons
1.	Site-in charge	Highly Skilled	1
2.	Foreman	Highly Skilled	4
3.	Supervisor	Skilled	6
4.	Store Keeper	Skilled	2
5.	HP Welder	Highly Skilled	As per requirement
6.	Welder (Non IBR)	Skilled	3
7.	Gas cutter	Skilled	3
8.	Millwright Fitter	Highly Skilled	8
9.	EOT Crane Operator	Highly Skilled	4
10.	Sarang	Skilled	4
11.	Fitter	Skilled	15
12.	Electrician	Semi-Skilled	2
13.	Jr.Filter	Semi-Skilled	20
14.	Insns.Lagger / Carpenter	Semi-Skilled	1
15.	Grinder Man	Skilled	3
16.	Rigger	Semi-Skilled	8
17.	Helper	Un-Skilled	50
18.	Office Boy	Semi-Skilled	2
19.	Safety Engr	Safety Supervisor	2
20.	Expert Manpower	Turbine, Generator, Governing Valves, & Associated Experts	2
Total manpower required			140 Nos.
Except Engaged Agency Manpower			Approx 10 nos.

This is an indicative list; the sub-contractor shall deploy adequate manpower to carry out the work round the clock and as per requirement of the site during execution of the Job.

Note: Site in-charge should be qualified Engineer, B.E. (Mechanical) and all the supervisors should have diploma in engineering. **VENDOR to ensure that the Vendor deployed deploys safety personnel for round the clock monitoring (at least 2 No safety supervisors). Records of PPE distributed, Pep talks given, daily TBT taken to be maintained and submitted for safety clearance, the workers deployed must be identifiable by providing them with similar safety jackets or similar PPE.**

Successful bidder has to arrange suitable mobile communication facility for BHEL site-in charge

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – IV: T&Ps and MMEs to be deployed by Contractor

4.1 Man power & T&P:

- Adequate manpower along with T&P should be deployed at site. All the T&P required for the work shall be arranged by the contractor and all T&P should reach the site immediately as machine is under shutdown. All the measuring instruments shall be duly tested / calibrated and valid certificate to that effect should be submitted to our Site In-charge before start of the work.
1. A deployment plan along with experience and name of the Site In-charge, Engineers, Supervisors, Foreman and main technicians to be submitted on per shift basis.
 2. LAP-TOP with latest configuration, DVD/CD writer, its peripherals including printer-scanner and one USB Modem for Internet connectivity to be provided for BHEL site office.
 3. One office boy in each shift is to be provided for BHEL site office.
 4. Well experienced experts (at Least 25 years' job experience) shall be arranged by bidders.

4.2 LIST OF TOOLS AND PLANTS TO BE ARRANGED BY CONTRACTOR

01. Taper gauge, slip gauge set, depth gauge and depth micrometer.
02. Feeler gauge sets, feeler strips of 0.03 to 0.10 mm size.
03. One set of 2-meter-long feeler gauge strips (0.05 to 1.0 mm).
04. Dial indicators New with magnetic bases (12 dials of diameter 40 mm travel – 5 mm).
05. Micrometers (inside and outside up to 300 mm, 450mm, 600mm & 1000mm).
06. Telescopic gauge (2 sets). Bevel protractor and combination sets.
07. Try square.
08. Straight edge for coupling and bearing checking.
09. Set of parallel blocks/ V blocks.
10. Vernier calipers, (150 and 300 mm), measuring steel tapes and 5 meters steel rulers.
11. Precision spirit level (with micro head).
12. 2 sets of D.E. and Ring spanners (6-36mm).
13. 2 sets of box spanners (6 to 20mm and 22-50mm).
14. Allen keys of various sizes (from 2mm. onwards).
15. D.P. Test Kit (with consumables).
16. Crowbars tin cutters, pliers (cutting plier, nose plier grip plier circlip-outside and inside).
17. Screw drivers and sledge hammers – 10 lbs – 1 lbs.
18. Adjustable wrenches, pipe wrenches and heck saws.
19. Single ended spanners (36 mm and above).
20. Flat, half round, triangular bearing scrappers-8", to 12".
21. Files flat round, half round and square, rough and smooth (sizes 6", 9" and 12").
22. Bench Grinders, straight grinders GQ4 and GQ6, Angle grinders.
23. Reamers upto 30 mm. Taper reamers.
24. Drilling machine with magnetic stand upto –30 mm with drill bits.

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25. Flexible grinders with grinding stones and cutters of different Shapes and sizes, Angles
Grinders and Sander machine.
26. Number punch, letter punch, centre punch and hole punches etc.....
27. Steel wire brushes, wire brush wheels, nylon wire brushes and Painting bushes.
28. Reamers and honing tools with proper jigs and fixtures for carrying out coupling hole
Reaming /honing.
29. Lifting devices eye bolts, D-shackles, slings of various sizes Guide rods etc.....
30. Chain pulley blocks upto 10 tons-4,5 tons-4, 2 tons-4 pull/lift.
31. Copper/Brass rods dia. ½" to 1 ½"X450 mm.
32. Tap and die sets 6 to 36 mm.
33. Surface plate 450 X 450 mm.
34. Torch light/hand lamps with cables, 230/24 V transformer.
35. Torque wrench and torque multiplier.
36. Wooden mallet, Nylon Mallet.
37. Hand glover-asbestos, Manila rope, asbestos cloth leather and Rubber gloves.
38. Set of needle files.
39. Air blower – electric.
40. Electric drills – ¼", ½", and 5/8".
41. Ball pen hammer of various sizes.
42. Gas cutting and heating set with torches regulators, hoses and cylinder minimum two sets).
43. Arc welding generator/rectifiers with regulator, cables, Electrode holders and shields,
TIG welding holders.
44. Pneumatic – grinders.
45. Hose pipes for compressed air.
46. Bench vices.
47. Hydraulic jacks 5, 10, 25, 50 & 150 tons capacity and screw jacks- 5 to 10 tons.
48. Hydraulic pump for testing coolers and 500 V megger.
49. Electric switchboards with RCCB and flood light arrangements with fuse boxes and isolating switches,
Plugs and sockets.
50. In addition to above T and P contractor will be required to fabricate fixtures such as pullers
etc. for removal of any other equipments related to the scope of work.
51. Pedestal fans/air coolers.-04 nos if required
52. Wooden sleepers.
53. Wooden Planks.
54. Magnifying glass.
55. Plastic helmets, Fiber helmet.
56. Gas cutting/welding goggles, grinding goggles.
57. Bearing pullers.
58. Tarpaulin.

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59. Insulation testers and Meggers 500 V and 1000 V at least 1 No. each.
60. Any other T and P as per requirement and as per our General and special conditions of Contracts.
61. Digital Multimeter
62. Analogue multimeter of Motwane make
63. Scaffolding materials
64. heating torch-4 nos, , Pneumatic / cutter.

NOTE:

1. The above list is only indicative for work in one unit; and not exhaustive. Arrangement for any other T and P required for completion of the job shall be the responsibility of the contractor and shall be arranged by him.
2. All the tools and tackles/measuring instruments shall be duly tested/calibrated and valid certificate to that effect should be submitted to our site in-charge before the start of work.

4.3 CONSUMABLES TO BE ARRANGED BY CONTRACTOR

(The list is indicative only and not exhaustive)

01. Kerosene oil.
02. Rustolene.
03. Petrol/white Petrol/Benzene/CRC/CTC/WD-40-% litre.
04. Grease/Graphite Grease.
05. Hacksaw Blades.
06. Waste cloth/Cotton.
07. Marking/lint free cloth/Muslin.
08. Asbestos cloth/Asbestos cord.
09. Prussian blue.
10. Graphite (flaked) powder/Molykote/Mosil.
11. Cardiom compound.
12. Holdtite/shellac/Gasket sealing compound.
13. Lead wire 1.0 m/1.5 mm/0.5 mm.
14. Liquid soap.
15. Carborandum grinding paste coarse/fine/Diamond lapping paste.
16. Emery papers/Rolls.
17. Cutoff wheels.
18. Grinding wheels.
19. Oil stones, Mounted wheels, rotary cutters.
20. D. P. test chemicals.
21. Gas Cylinders for cutting/welding.
22. Chalk pieces, marking pens, t hermoschalks upto 400c
23. Insulation tape, Johnson Tapes.

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Chapter – IV: T&Ps and MMEs to be deployed by Contractor

24. Sander discs and wheels.
25. Polyethylene sheets.
26. Araldite, M. Seal, Instabond, Dendrite.
27. CRC 2-26, white spirit.
28. Electric fuse wire, cables for the connections
29. 2.5 mm² Cu cable (flexible) of 200 mtr. length.
30. Ortho phosphoric acid
31. CRC Lectra-clean.
32. plastic sheet general purpose electrodes for welding purpose, industrial oxygen, acetylene, Nitrogen gas cylinder, epoxy gel red (make Dr. beck), Dilutenet, thinner, Hardener, EH 411/Metallon, E-2082, Becktol Red, Araldite, glass tape.
33. Infrared Temperature gun for breech nut opening.

NOTE:

The above list is only indicative for work in one unit & not exhaustive. Arrangement for any other consumables required for completion of the job shall be the responsibility of the contractor & shall be arranged by him.

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Chapter – V: Quality Requirements

QUALITY REQUIREMENT

- Various inspection/ quality control / quality assurance procedure/ methods at various stages will be as per BHEL/ customer quality control procedure/ codes/ IBR and other statutory provisions and as per BHEL Engineer's instructions.
- Preparation of quality assurance log sheets and protocols with customer's engineers, welding logs, other quality control and quality assurance documentation as per BHEL Engineer's instructions, is within the scope of work/ specification.
- A daily log book should be maintained by Area In-charge of contractor on the job incorporating erection / alignment / welding clearance /radiography / progress of work etc. and the same shall be submitted to BHEL. Also, daily reports shall be submitted to BHEL.
- All the important measurements like pre-assembly checking of alignment leveling/ centering work etc. shall be recorded in the daily log book with sketches based on BHEL drawings indicating readings/ measurements actually taken and signed by BHEL/ Customer/ Contractor representatives.
- The inspection/measuring and testing equipments should be of brand, quality and accuracy, as specified by BHEL engineer and should have valid calibration certificates traceable to national/international standards.
- Total quality is the watchword of the work and contractor shall strive to achieve the quality standards, procedures laid down by BHEL. He will follow the instructions as per BHEL drawings and quality standards.
- The welder's performance will be reviewed from time to time as per the BHEL/ IBR standards and any welder not performing to the standards set by BHEL/ IBR standards will be removed from working, Contractor shall arrange for the alternate welders immediately.
- **STAGE INSPECTION BY BHEL / CUSTOMERS ENGINEERS**
Apart from day-to-day inspection/ stage inspection of equipments by BHEL engineers, the equipments may be checked at various stages by customer's engineers and quality assurance teams. Contractor shall arrange all labour, tools/tackles etc. for such inspections free of cost.

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Chapter-VI: Time Schedule

6.1 TIME SCHEDULE & MOBILIZATION

6.1.1 INITIAL MOBILIZATION:

After receipt of fax LOI, Contractor shall discuss with Project Manager / Construction Manager/BHEL Site In charge regarding mobilization. A Full-fledged team with T&P shall be mobilized **within 03 days on receipt of LOI or BHEL intimation.**

6.1.2 MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING, OVERHAULING ETC.

The activities for Overhauling shall be started as per directions of Site In-charge of BHEL. Contractor shall mobilize further resources (in addition to those required for activities under clause no. 6.1.1) as per requirement to commence Overhauling of Turbine and Generator of Unit-2, 800MW at NTPC Gadarwara and progressively augment the resources to match schedule of the project.

OVERHAULING TIME SCHEDULE IS THE ESSENCE OF THIS CONTRACT. SUBCONTRACTOR SHOULD COMPLETE ALL WORK WITHIN 40 DAYS (FROM STOPPING OF BARRING GEAR TO MACHINE PUT BACK ON BARRING GEAR) OF TIGHT SCHEDULE. ANY MAJOR ADDITIONAL WORK IF REQUIRED WILL BE CONSIDERED FOR GRACE PERIOD.

As informed by Customer NTPC Gadarwara, Unit#2 shall be stopped for overhauling tentatively from 1st week of September.

Validity of Contract: - 12 Month from the date of LOA.

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Chapter-VII: TERMS OF PAYMENT

Payment Terms :-

1. 40% on completion of mobilization of site, completion of dismantling work. **Documents like Insurance & Labour License to be submitted along with first bill.**
 2. 40% on assembly work & machine put on barring gear
 3. 10% after synchronization of machine. Indemnity Bond to be submitted along with bill etc
 4. 10% after completion of defect liability period. and also on payment of all dues and submission of all the documents like No Dues certificate from Customer/ HR clearance if required, EPF challan, Insurance, Labour License, Labour Payment sheets, proof of payment of GST, Indemnity Bond to be submitted along with final bill etc.
- **Amount linked to safety 5% of the RA Bill / PO value will be retained towards minimum safety percentage (Amount linked to Safety Aspects/ compliance to Safety Rules). This amount will be released on pro-rata basis in each RA bill/after completion of job/overhauling as per the certification by the BHEL Site Incharge as per given below: -**
- i. **The amount linked to Safety Aspects/ compliance to Safety Rules shall be paid in two parts, viz,**
 - a. 10% amount (calculated as 0.1 Y of the service portion amount of RA bill) shall be linked to Fatal/Major Accidents,
 - and
 - b. B) 90% amount (calculated as 0.9 Y of the service portion amount of RA bill) shall be linked to various **Safety Aspects specified in Safety Rules of NTPC.**
 - ii. **Also agency has to follow safety as per Tender conditions & NTPC safety aspect & safety rule.**
 - iii. **Annexure-A attached for above (i & ii) & amount will be released on pro-rata basis in each RA bill/after completion of job/overhauling as per the certification by the BHEL Site Incharge**

Note:

1. **For final bill:** -If required documents are not submitted by bidder within 90 days from the date of Synchronization, then Penalty of 1% per week of the total contract value will be levied & it is subject to maximum 5% of the contract value shall be deducted from contractor 's bill.
2. Penalty of 1% per day of the total contract value will be levied for improper mobilization of man power and 1% per day for T & P and consumables separately subject to maximum 5% of the contract value shall be deducted from contractor 's bill
3. While submitting the invoices, Bidder should mention their Bank Account No. on each of their invoices for the purpose of making e-payment.
4. The bill due for payment shall be submitted to the Engineer in-charge of BHEL **along with documentation of Refund of Retention Money Format No. F24 (Rev 00)** (revised format is attached in VOL I BCD 'forms and procedure') at site for necessary verification and processing through proper channel.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: TAXES AND DUTIES

TAXES, DUTIES, LEVIES (Rev 14 dated 09/10/2020)

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- 1) All taxes excluding GST, GST Cess & BOCW Cess **but including, Royalties, fees, license, deposits, commission, any State or Central Levy and other charges whatsoever, if any, shall be borne by you and shall not be payable extra.**
- 2) Any increase of the taxes excluding GST, GST Cess & BOCW Cess, at any stage during execution including extension of the contract shall have to be borne by the contractor. Quoted/ accepted rates/ price shall be inclusive of all such requirements. Please note that since GST on output will be paid by BHEL separately as enumerated below, your quoted rates/ price should be after considering the Input Credit under GST law at your end.
- 3) **GST** :
The successful bidder shall furnish proof of GST registration. GST along with Cess (as applicable) legally leviable & payable by the successful bidder as per GST Law, shall be paid by BHEL. Hence Bidder shall not include GST along with Cess (as applicable) in their quoted price.
- 4) GST charged in the Tax Invoice/Debit note by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return
- 5) E-invoicing under GST has been implemented with effect from 1st October 2020 for all the taxable persons having turnover more than the threshold limit in any preceding financial year from 2017-18 onwards. Therefore, for all the taxable persons falling under the purview of E-invoice, it is mandatory to mention a valid unique Invoice Reference No. (IRN) and QR code as generated from E-Invoicing portal of the Government for the purpose of issuing a valid Tax Invoice. Only an E-invoice issued in the manner prescribed under rule 48(4) of CGST Rules shall be treated as valid invoice for reimbursement of GST amount.
If the successful Bidder is not falling under the purview of E-Invoicing then he has to submit a declaration in that respect along with relevant financial statements.
- 6) Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred there under) wherein the 'Bill To' details will as below:
BHEL GSTN – As per **Annexure -1**
NAME -- Bharat Heavy Electricals Limited
ADDRESS -- Site address
- 7) Bidder to immediately intimate on the day of removal of Goods (in case of any supply of goods) to BHEL along with all relevant details and a scanned copy of Tax Invoice to below email ids to enable BHEL to meet its GST related compliances :-
Email id ---- to be intimated later on.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: TAXES AND DUTIES

In case of delay in submission of the abovementioned documents on the date of dispatch, BHEL may incur penalty /interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from the successful bidder, if such delay is not attributable to BHEL.

- 8) In case of raising any Supplementary Tax Invoice (Debit / Credit Note) Bidder shall issue the same containing all the details as referred to in Section 34 read with Rule 53.
- 9) Bidder shall note that in case GST credit is delayed/ denied to BHEL due to delayed / non receipt of goods and /or tax invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other reasons not attributable to BHEL, GST amount shall be recoverable from the vendor along with interest levied / leviable on BHEL, as the case may be.
- 10) Bidder shall upload the Invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit availed by BHEL is denied or reversed subsequently as per GST Law, GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the bidder along with interest levied / leviable on BHEL.
- 11) Way Bill: Successful Bidder to arrange for way bill / e-waybill for any transfer of goods for the execution of the contract.

The Bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit/ Way Bill, if required, shall be arranged by the contractor and BHEL will not supply any Road Permit/ Way Bill for this purpose.

- 12) **New taxes and duties:-**Any New taxes & duties, if imposed subsequent to due date of offer submission as per NIT & TCN, by statutory authority during contract period including extension, if the same is not attributable to you, shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties. Benefits and/or abolition of all existing taxes must be passed on to BHEL against new Taxes, if any, proposed to be introduced at a later date.
In case any new tax/levy/duty etc. becomes applicable after the date of bidder's offer but before opening of the price bid, the bidder must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of the price bids. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

- 13) For transportation work, bidder shall declare in his quotation whether he is registered under GST, if yes, whether he intends to claim GST on forward charge basis. In absence of

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: TAXES AND DUTIES

this declaration, BHEL will proceed further with the assumption that bidder intends not to claim GST on forward charge basis. However, in case of GST registered transporter, the amount to the extent of goods and service tax will be retained till BHEL avails the credit of GST. Further, transporter shall issue tax invoice which inter alia includes gross weight of the consignment, name of the consigner and the consignee, registration number of vehicle in which the goods are transported, details of goods transported, details of place of origin and destination, GSTIN of the person liable for paying tax whether as consigner, consignee or goods transport agency, and also containing other information as mentioned under rule 46.

- 14) **TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills unless exemption certificate from the appropriate authority/ authorities is furnished.**
- 15) **TDS under GST shall be deducted at prevailing rates on applicable value from the running bills.**
- 16) **TCS under Income Tax 1961 has been implemented with effect from 1st October 2020 for every seller having turnover more than threshold limit during financial year immediately preceding financial year in which the sale of goods is carried out, who receives any amount as consideration for sale of any goods of the value or aggregate of such value exceeding threshold limit other than export of goods or who is already covered under other provision of section 206C, collect from the buyer, TCS as per applicable rates of the sale consideration exceeding threshold limit subject to following conditions**
 - B**
 - i. **uyer shall be as per clause (a) of section 206C- (1H)**
 - ii. **Seller shall be as per clause (b) of section 206C- (1H)**
 - iii. **No TCS is to be collected, if the seller is liable to collect TCS under other provision of section 206C or the buyer is liable to deduct TDS under any provision of the Act and has deducted such amount.**

If Successful Bidder is falling under the purview of TCS then he has to submit a declaration in that respect along with relevant financial statements before the start of work or if bidder is falling under preview of TCS during the work in progress then bidder is compulsorily required to submit relevant financial statement in the beginning of the respective FY.

For TCS claim, vendor has to submit relevant documents required as per Income Tax Act.

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Chapter-VIII: TAXES AND DUTIES

17) Refer Annexure – 2 for BOCW Act & Cess Act.

ANNEXURE-1

State wise GSTIN no.s of BHEL

Sl. No	Projects under state	GSTIN
1	Andhra Pradesh	37AAACB4146P7Z8
2	Bihar	10AAACB4146P1ZU
3	Chhattisgarh	22AAACB4146P1ZP
4	Gujarat	24AAACB4146P1ZL
5	Jharkhand	20AAACB4146P5ZP
6	Madhya Pradesh	23AAACB4146P1ZN
7	Maharashtra	27AAACB4146P1ZF
8	Orissa	21AAACB4146P1ZR
9	Telangana	36AAACB4146P1ZG

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Chapter-IX: Schedule of Rates and Quantities

Sch no.	Description of Work	UOM	QTY	Percentage w.r.t total lumpsum price quoted in the price bid
1	TG BEARING INSPECTION (BEARING NO- 01 TO 08) & ASSOCIATED WORK	LS	01	8.92%
2	LP TURBINE OVERHAULING	NOS.	02	10.27%
3	MPI & NFT OF FREE-STANDING BLADES OF LP ROTORS	NOS.	02	3.86%
4	HP /IP STOP & CONTROL AND OVERLOAD VALVES OH	NOS.	09	5.82%
5	EXTRACTION NRVS' SERVICING	LS	01	0.97%
6	HANGER INSPECTION	LS	01	0.87%
7	LP HEATER (EXTRCN BELLOW) INSPECTION	LS	01	0.75%
8	GENERATOR EXCITER OVERHAULING	LS	01	3.34%
9	MINI GENERATOR OVERHAULING	LS	01	6.58%
10	OVERHAULING OF SEAL OIL SYSTEM/ SHAFT SEALS	LS	01	0.75%
	OPTIONAL JOB			
11	REPLACEMENT OF HP MODULE	LS	01	9.05%
12	VIBRATION TRIM BALANCING (ASSISTANCE ONLY)	LS	01	0.37%
13	LP TURBINE EXTRACTION BELLOW REPLACEMENT	NOS.	04	2.20%
14	HPT/IPT INSPECTION (BOROSCOPIC/VIDEOSCOPIC INSPECTION)	LS	01	0.38%
15	ONSITE MACHINING /LAPPING/ REFURBISHMENT OF VALVE SEAT OF HP/IP VALVES IN OH.	PER VALVE	01	1.84%
16	IPT STOP VV ("U" SEAL) MACHINING	NOS.	02	3.08%
17	HPT STOP VV ("U"SEAL) MACHINING	NOS.	02	1.96%
18	HP STOP OR CONTROL VALVE SEAT REPLACEMENT.	NOS.	04	13.52%
19	LPT (800MW) REPAIR	LS	02	1.75%
20	IPT OVERHAULING	LS	01	6.45%
21	COMPLETE GENERATOR OVERHAULING	LS	01	8.57%
21.1	GENERATOR ROTOR REPLACEMENT	LS	01	1.95%
22	REPLACEMENT OF MULTICONTACT BAND & MULTICONTACT PIN	LS	01	0.30%

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Chapter-IX: Schedule of Rates and Quantities

23	SEAL RING MACHINING	NOS.	02	1.05%
24	REPLACEMENT OF SPARE EXCITER	LS	01	4.65%
25	DEPUTATION OF TG EXPERTS	NOS.	01	0.75%
TOTAL Lump-sum value to be quoted by the bidder in VOL II Price Bid				100%

Annexure-A

11.4.10 Safety

The Employer has formulated Safety Rules for Construction & Erection of Power Plants and can be referred from NTPC tender website: www.ntpctender.ntpc.co.in These Safety Rules lay down the safety requirements for safe execution of project activities, responsibilities of the Contractor, and all concerned involved in Construction and Erection. The Contractor, including his sub-contractors, while executing the Works, shall strictly comply with these Safety rules and statutory requirements (including amendments thereof), as applicable, in respect of safety of personnel, equipment and materials at site area under execution of the Contractor. In addition to other clauses specified in 'NTPC Safety Rules for Construction and Erection of Power Plants', Contractor shall adhere to the following provisions for payment linked to Safety Compliances as specified in Payment Terms:

i) Safety Personnel

Contractor shall adhere to the requirements of Clause 2.3 (requirement of Safety personnel) of 'NTPC Safety Rules for Construction and Erection of Power Plants'.

ii) Personal Protective Equipment & Safety Equipment

Contractor shall adhere to the requirements of Clause 4 (Personal Protective Equipment) of 'NTPC Safety Rules for Construction and Erection of Power Plants' and the provisions of the Bidding Documents with regards to number of Safety Equipment/PPEs to be provided by the Contractor. In case Contractor fails to comply with aforesaid requirement, EIC/Safety Officer shall issue a warning letter/Non-compliance Memo to the Contractor regarding the same advising him to take corrective action. EIC/NTPC Safety Officer shall maintain written record of all such incidents when Warning letter/Non-compliance Memo is issued to the Contractor for not meeting the requirements of Clause 4.0 (Personal Protective Equipment) and the provisions of the Bidding Documents.

iii) Safety Induction and Training

Contractor shall adhere to the requirements of imparting Safety training as per Clause 8.0 (Safety Induction and Training) of 'NTPC Safety Rules for Construction and Erection of Power Plants'. Contractor shall maintain written record of Safety trainings imparted to its Employees/workmen for purpose of aforesaid payment. These records shall be available for review of EIC/NTPC Safety Officer all the time.

iv) Medical and First Aid Amenities

Contractor shall adhere to the requirements of Clause 13 (Medical and First Aid Amenities) of 'NTPC Safety Rules for Construction and Erection of Power Plants'. NTPC Safety Officer/EIC shall maintain written record of incidences when requisite Medical and first aid amenities as per Clause 13 of Safety Rules were not available for purpose of aforesaid payment.

v) Compliance to Work Permit System

Contractor shall adhere to the requirements of Clause 17 (Work Permit System) of 'NTPC Safety Rules for Construction and Erection of Power Plants'. In case Contractor fails to obtain work permit or fails to comply to any requirements of aforesaid Work permit system, he will be issued a warning letter/Non-compliance Memo by EIC/Safety Officer of NTPC regarding the same advising him to take corrective action. NTPC Safety Officer / EIC shall maintain written record of all such incidents when Warning letter / Non-compliance Memo is issued to Contractor for not complying with the

requirements of Work Permit System as per Clause 17 of Safety Rules for purpose of aforesaid payment

20.7 Payment of Amount linked to Safety Aspects/ compliance to Safety Rules

I. The amount linked to Safety Aspects/ compliance to Safety Rules shall be paid in two parts, viz, A.10% amount (calculated as 0.1 Y of the service portion amount of RA bill) shall be linked to Fatal/Major Accidents, and

B.90% amount (calculated as 0.9 Y of the service portion amount of RA bill) shall be linked to various Safety Aspects specified in Safety Rules of NTPC. NOTE:

‘Amount linked to Safety Aspects/ Compliance to Safety Rules’ specified in Price Schedule

$Y = \frac{\text{(Amount linked to safety aspects/compliance with the safety rules specified in the contract)}}{\text{(Total amount for the Service Portion of the Contract)}} \times 100$

II. While raising each RA Bill, Contractor shall claim Amount linked to Safety Aspects/Compliance to Safety Rules in such a manner that amount claimed is equal to Y% total works portion (i.e., Amount of works/services other than the amount linked to safety Aspects/Compliance to safety rules) of RA Bill.

III. This aforesaid amount at para 20.7 (I) shall be withheld from first and second monthly RA bill of the respective quarter/three-month period and shall be released in part or full based on safety compliance duly certified by EIC and Safety-in-charge on quarterly basis. The amount for the entire quarter (i.e. RA bills raised during a 3-month period) shall be paid to the Contractors at the end of that three months’ period along with 3rd/last RA Bill for the quarter/three months’ period upon complying the following conditions:

A) Amount of RA Bill linked to Fatal/ Major Accidents (0.1Y i.e. 10% of amount as elaborated above at para I.A) Aforesaid amount (on quarterly basis) shall be payable to Contractor only in case, there is

i)No fatal injury or accident-causing death in that three months’ period

and

ii)No Major injury or accident causing 25% or more permanent disablement to workmen or employees in that three months’ period. Permanent disablement shall have the same meaning as indicated in The Workmen's Compensation Act' 1923.

In case of any fatal injury or accident as elaborated above occurs during that three-month period, the stipulated amount (0.1Y) subject to minimum of Rs 10 Lakh per fatality shall be forfeited and shall not be payable to the Contractor under the contract. In case, the amount to be deducted/forfeited exceeds the amount linked to Fatal/ Major Accidents, the same shall be recovered from remaining Amount (0.9Y) linked to Compliance of Safety Rules and/or any other payments immediately due to the Contractor under the Contract.

In case of any Major injury or accident causing 25% or more permanent disablement to workmen or employees occurs during that three-month period, Rs 4 lakh per Major injury shall be deducted from the amount (0.1Y) linked to Fatal/ Major Accidents and shall not be payable to the Contractor under the contract. In case, the amount to be deducted/forfeited exceeds the amount linked to Fatal/ Major Accidents, the same shall be recovered from remaining Amount (0.9Y) linked to Compliance of Safety Rules and/or any other payments immediately due to the Contractor under the Contract.

Further, in case, Contractor doesn't raise RA Bills in any three-month period/quarter and if any fatal injury and/or major accident takes place in that period, EIC shall deduct the amount [Rs 10 Lakh per fatality and Rs 4 lakh per Major injury] pertaining to this particular quarter from his next RA bill/due payment. In case, the amount to be deducted/forfeited exceeds the amount linked to Safety, the same shall be recovered from any other payments immediately due to the Contractor under the Contract.

The amount deducted/forfeited as mentioned above shall be in addition to the compensation payable to the workmen / employees under the relevant provisions of the Workmen's Compensation Act' 1923 and rules framed there under or any other applicable laws as applicable from time to time.

B) Amount of RA Bill linked to Compliance of Safety Rules (0.9Y i.e. 90% of amount as elaborated above at para I.B)

Aforesaid amount (on quarterly basis) shall be payable to Contractor in five equal parts under five heads as under:

(i) Amount payable on deployment of required Safety Personnel

One fifth of the amount specified in para 20.7.III.B (calculated as 0.18Y of Service portion amount of RA Bill), on quarterly basis, shall be paid upon certification by EIC in consultation with Safety dept. that required number of Safety personnel as per Clause 2.3 of 'NTPC Safety Rules for Construction and Erection of Power Plants' have been deployed. The aforesaid amount linked to deployment of requisite safety personnel shall be paid as under:

- a) 50% of the amount referred above at 20.7.III.B.(i), for deployment of Safety Supervisors shall be paid on pro-rata basis depending upon the actual no. of Safety Supervisors deployed vis-à-vis actual requirement:

Amount to be paid = $0.09Y \times \text{RA bill amount} \times (a/b)$

Where 'a' is actual no. of Safety supervisors deployed

and

'b' is required no. of Safety supervisors as per Safety Rules.

In case, actual no. of Safety supervisors deployed is more than requisite number (i.e. a/b is more than 1), the amount to be paid shall be restricted to 0.09Y.

- b) 50% of the amount referred at 20.7.III.B.(i), for deployment of Safety Officers shall be paid on pro-rata basis depending upon the actual no. of Safety Officers deployed vis-à-vis actual requirement:

Amount to be paid = $0.09Y \times \text{RA bill amount} \times (a/b)$

Where 'a' is actual no. of Safety Officers deployed

and

'b' is required no. of Safety Officers as per Safety Rules.

In case, actual no. of Safety Officers deployed is more than requisite number (i.e. a/b is more than 1), the amount to be paid shall be restricted to 0.09Y.

- c) In case aforesaid requisite no. of Safety personnel are not deployed by Contractor, amount not to be paid as calculated above for that particular quarter/three month period shall be forfeited and shall not be payable to the Contractor under the contract.

(ii) Amount payable on providing requisite Personal Protective Equipment & Safety Equipment

One fifth of the amount specified in para 20.7.III.B (calculated as 0.18Y of Service portion amount of RA Bill), shall be paid upon certification by EIC in consultation with Safety dept. that Contractor has adhered to the requirements of Clause 4 (Personal Protective Equipment) of 'NTPC Safety Rules for Construction and Erection of Power Plants' and the provisions of the Bidding Documents with regards to number of Safety Equipment/PPEs to be provided by the Contractor.

In case of non-compliance by Contractor, warning letter/Non-compliance shall be issued by EIC/Safety Officer of NTPC as per clause 11.4.10 (ii) of GCC. Further, if more than two such warning letters/Non Compliance Memos are issued in a quarter/three monthly period, above mentioned amount for that particular quarter/three-month period shall be forfeited and shall not be payable to the Contractor under the contract.

(iii) Amount payable on providing requisite Safety Induction and Training

One fifth of the amount specified in para 20.7.III.B (calculated as 0.18Y of Service portion amount of RA Bill), shall be paid upon certification by EIC in consultation with Safety dept. that Contractor has adhered to the requirements of imparting Safety training as per Clause 8.0 (Safety Induction and Training) of 'NTPC Safety Rules for Construction and Erection of Power Plants' to at least 90% of its employees/workmen (who have not been previously provided with requisite training) in a quarter/three months period.

In case Contractor fails in meeting the aforesaid requirement, above mentioned amount for that particular quarter/three-month period shall be forfeited and shall not be payable to the Contractor under the contract.

(iv) Amount payable on providing requisite Medical and First Aid Amenities

One fifth of the amount specified in para 20.7.III.B (calculated as 0.18Y of Service portion amount of RA Bill), shall be paid upon certification by EIC in consultation with Safety dept. that Contractor has adhered to the requirements of Clause 13 (Medical and First Aid Amenities) of 'NTPC Safety Rules for Construction and Erection of Power Plants'.

In case Contractor fails to provide Medical and first aid amenities as per requirement of aforesaid Clause 13 even on one incidence in any quarter/three-month period, above mentioned amount for that particular quarter/three-month period shall be forfeited and shall not be payable to the Contractor under the contract.

(v) Amount payable on compliance to Work Permit System

One fifth of the amount specified in para 20.7.III.B (calculated as 0.18Y of Service portion amount of RA Bill), shall be paid upon certification by EIC in consultation with Safety dept. that Contractor has adhered to the requirements of Clause 17 (Work Permit System) of 'NTPC Safety Rules for Construction and Erection of Power Plants'.

In case of non-compliance by Contractor, warning letter/Non-compliance shall be issued by EIC/Safety Officer of NTPC. Further, if more than two such warning letters/Non Compliance Memos are issued in a quarter/three monthly period, above mentioned amount for that particular quarter/three-month period shall be forfeited and shall not be payable to the Contractor under the contract.

II. No interest shall be payable on the amounts linked to Safety Aspects / Compliance to Safety Rules including aforesaid retained amount. The amounts linked to Safety Aspects / Compliance to Safety

Rules including aforesaid retained amount shall be payable in part or full based on safety compliance duly certified by EIC and Safety-in-charge on quarterly basis.

Note: Amount linked to safety 5% of the RA Bill / PO value will be retained towards minimum safety percentage (Amount linked to Safety Aspects/ compliance to Safety Rules). As this is overhauling work, hence This amount will be released on pro-rata basis in each RA bill/after completion of job/overhauling as per the certification by the BHEL Site in charge & at the discretion of BHEL site-in charge.