IMPORTANT NOTES

JOB:	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement along with Assembly & Dismantling of Portal Crane for one unit of 500 MW at NTPC Vindhyachal.**
	IMPORTANT NOTES
1.	**Tender is comprising of Four parts:** **Separate W.O. shall be issued only for three parts i.e. Part 1 ,2 & 3.** **Part-4 will be awarded along with Part-1 and can be executed in any of the Three parts.**
	PART-1: Overhauling of 500 MW Generator of One Unit Along with bar repair (Unit #10). **PART 2: Stator Replacement Including Assembly and Dismantling of Portal Crane (Unit #10).**
	PART-3, Overhauling of 500 MW Generator of One Unit (Unit # 8)
2.	**PART-4 Describe the Optional Activities.** The optional activities described in **Part-4** will be awarded along with **Part- 1** and can be executed in any of the above part. no separate order will be issued for optional activities covered in **Part-4**
3.	**JOB Completion period: -**
4.	**PART-1:** The Completion period for the job as mentioned in the scope of work will be as follow-: Case I -: In case of only overhauling work, completion period will be 28 days from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4). Case II -: In case of overhauling work of generator along with core & top bar repair work, completion period will be 35 days from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4). Case III -: In case of overhauling work of generator along with Bottom bar repair work, completion period will be 55 days from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4). **Part 2 -:** In case of overhauling work of generator along with stator repair, replacement along with Assembly & Dismantling of Portal Crane, completion period will be 75 days from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4). **PART-3:** The Completion period for the job as mentioned in the scope of work will be 28 from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4).
5.	**DEFECT LIABILITY PERIOD: -**
	The defect liability period for the job shall be as follows-: three (03) months from the date of putting machine on barring gear for all the parts
6.	**TOTAL QUOTED RATE FOR SOW SHALL BE DIVIDED AS: -**
	PART-1 – 46.16% PART 2 - 41.54% PART-3 – 12.30% THUS MAKING 100% OF QUOTED VALUE / CV(Part 1+2+3) PART-4 – 16.738% (optional is based on the contract value over and above)
7.	The payment terms for each part shall be applicable separately for each part.
8.	LD/ Penalty for delay shall be applicable separately for each part on applicable cv of respective part as follows-: LD/ Penalty for delay shall be as follows-: LD shall be applicable @ 0.50 % per day or part thereof for the portion of works executed beyond the agreed completion date subject to a maximum of 10 % of contract value of each part.
9.	Tentative schedule for execution of work shall be as follows:
10.	PART-1 & PART 2 (FIRST UNIT) – 20/07/2026 PART-3 (SECOND UNIT) – 15/12/2026 However, the contract shall remain valid for execution till 31/03/2027.
11.	NOTE: Above plan may change based on shutdown given by customer and this shall not entail the bidders to revise their price or any other condition of their offer. this factor may be kept in view while quoting. Bidders are strongly advised to inspect the site, examine and obtain all information required and satisfy himself regarding all matters. the price quoted by the bidder shall be on his knowledge and judgement of the conditions and hazards involved. ignorance of site conditions shall not be accepted as basis for any claim for compensation or will not be considered a reason under force majeure.

Pradeep
(PRADEEP PANDEY)
Sr. engineer

12.	**RATE SCHEDULE**
JOB:-	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement along with Assembly & Dismantling of Portal Crane for one unit of 500 MW at NTPC Vindhyachal.**

A	LUMPSUM (LS) PRICE FOR THE ENTIRE **MANDATORY SOW OF ALL THREE PARTS** (IN 2 UNITS) INCLUSIVE OF ALL T&P, CONSUMABLES, INPUT MATERIALS AND SUPERVISION) EXCLUDING GST			Amount to be Quoted: Rs.....
B	Break up of Price quoted at S. No. A			
	Job Description (Mandatory Portion Only)	UOM	Qty	% age of the Quoted Value (QV) at S. No. A as above
B.1	PART-1: Overhauling of 500 MW Generator of One Unit Along with bar removal (Unit #10)	LS	1	46.16 % of Quoted Rate A
B.2	PART-2: Stator Replacement Including Assembly and Dismantling of Portal Crane (Unit #10)	LS	1	41.54% of Quoted Rate A
B.3	PART-3, Overhauling of 500 MW Generator of One Unit (Unit # 8)	LS	1	12.30% of Quoted Rate A
Note:- Part 1 + Part 2+Part 3 = 100 % of Quoted Rate A				
B.4	Optional work (Part-4)	LS	1	16.738% of Quoted Rate A

- Part 4 (Optional work) has been defined as 16.738% of Total Quoted Value (A) and can be carried out with any part 1,2 or 3 (or in all).
- The item wise percentage breakup is as per BOQ Annexure III

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JOB:	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement along with Assembly & Dismantling of Portal Crane for one unit of 500 MW at NTPC Vindhyachal.**
SL. NO.	**DESCRIPTION OF WORK**
Mandatory Scope of Work for both PART – 1	
10.00/ 14.00	**OVERHAULING OF GENERATOR (For Both Part 1 (BOQ 10.00) & Part 3 (BOQ 14.00))**
1.1	**GENERAL WORKS:**
1.	Taking the Bearing vibration readings before stopping the machine and attending the bearing no. 5, 6 and 7 vibration problems by taking necessary corrective actions. **It shall be carried out as per rate mentioned in BOQ 15.60.**
2.	Conducting Air Tightness Test of Generator Stator checking for any leakages in the Bushing area.
3.	Generator is to be isolated from bus duct side by removing flexible links.
4.	Removal of Exciter dome after removing all Electrical and C&I connections. Removal of Diode wheel cover.
5.	Taking CRO of LP-Generator & Decoupling of LP-Generator rotors. Hydraulic device for coupling and de-coupling to be used and the device along with operator is in agency scope.
6.	Note down Alignment Reading of LP-Gen as per Protocol.
7.	Removal of Generator/Exciter Bearing no 5, 6 & 7. Insulation checking & correction if required.
8.	Inspection of Generator stator, foundation, rotor, exciter and auxiliaries as per BHEL instruction and duly record observations.
9.	All pipeline (PW, seal oil, gas and cooling water lines) hangers to be checked and adjusted, if required.
10.	Inspection of Generator foundation sole plate grouting and condition of foundation bolts.
11.	End shield and stool piece blue matching to be done.
12.	Anchor bolts re-stretching to be done as required.
13.	LP-Generator, Generator-Exciter alignment, and coupling.
14.	Inspection and blue matching of Exciter anchor bolt spherical washer with seating. Torque tightening of exciter foundation anchor bolts with design torque.
15.	Alignment of Generator couplings, CRO & Exciter end swing check.
16.	Check oil catcher clearances and replace fins as per requirement.
17.	Checking of coupling face (generator and exciter) run out, face blue matching with master plate.
18.	Filling of sealing compound in designated ports in end shields and capping the ports.
19.	Measurement of radial/ axial measurement of Spigot/ recess of couplings.
20.	Lube oil flushing.
1.2	**INSPECTION OF STATOR:**
1.	Dismantle stator end shields and replace all gaskets.
2.	Check condition of stator core and winding.
3.	Complete cleaning of stator end shields
4.	Baroscopic inspection & recording of core end pockets, ventilation duct, overhang portion will be carried out.
5.	Inspect the phase connectors and flexible links for any discoloration, cracks, physical damage, or signs of carbon tracking. Check the bushings for oil leakage, discoloration, cracks, or mechanical damage, and ensure terminal connections are tight and free from corrosion. Verify that the bushing mounting hardware is secure and not worn out. Any abnormalities observed inside the bushing chamber should be photographed and documented.
6.	Checking winding support structure and all other Stator Bolts and rectify defects.

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SL. NO.	DESCRIPTION OF WORK
7.	Inspection stator core for any looseness in core laminations, finger at core end packers. Digital ELCID test of core (Leakage current should be <100 mA) ELCID test of stator core. Repair of hot spots and other defects shall be carried out by BHEL Hardwar, if any, repeat ELCIDs after repair work will be in agency scope if required. Core flux test will be conducted if required, necessary equipment along with testing engineers shall be arranged by agency.
8.	Inspection of core clamping ring locking and inspection of core back side. Any defect observed is to be rectified.
9.	Inspection of partial discharge occurrences at under wedge/packers and rectification of the same.
10.	Wedge Tightness test of slot wedging system and rectify any looseness observed. Looseness of more than 3 slots/wedges shall be beyond scope and shall be done on extra cost basis on Man hour basis.
11.	DP Test of Air gap seal ring clamp welding joints DP testing.
12.	DP test of welding joints and pneumatic & hydraulic test of seal oil pipe lines mounted in both end shields.
13.	Replacement of stator inspection man hole 'O' rings.
14.	Tightness check of overhang clamp nuts (M30).
15.	Torque tightness of bar end clamps bolts.
16.	Carry out fluorescent DP test of baffle ring segment blades.
17.	Check the IR of the compressor segments and rectify if found less.
18.	Replace all necessary Generator Flange, manhole gaskets.
19.	Dismantling & Removal of Hydrogen coolers from position.
20.	Carrying out winding hydraulic test and attending any leakage in water and Nitrogen circuits. If any minor leakages are observed in Teflon tubes, rectification work is included in overhauling scope.
21.	Cleaning of stator, thorough inspection of stator, stator core, stator cooling gas circuit and Hydrogen cooler water pipes, stator overhang bracket bolts, core bar bolts and other fasteners inside the stator are to be inspected for tightening and proper locking of nuts and bolts.
22.	Checking of all electrical connections of stator like bushing connection (phase connectors), bar to bar to connection and rectification of defects.
23.	Conducting air tightness test of Generator casing and attending leakages if any.
24.	Cleaning of primary water filters along with conical filters.
25.	Through cleaning of the stator bore, back side core, Teflon hoses, end shields, bus bar connections and bushing chamber.
26.	Physical inspection & cleaning of bushing for any kind fine crack and any mark of heating observed. If bushing replacement is required, it shall be carried as per rate mentioned in **BOQ 15.30.**
27.	Varnishing on stator core.
28.	Cleaning & Spray painting of stator external surface.
1.3	**ROTOR INSPECTION:**
1.	Perform Run out checks as per protocol.
2.	Decouple rotor, thread out rotor and check rotor visually.
3.	Taking IR value of rotor and winding resistance and impedance of rotor.
4.	Check rotor wedge and retaining rings.
5.	Inspect the winding and Gas duct.
6.	Dismantle Compressor Assembly.
7.	Carry out Fluorescent DP test of rotor compressor blades and both end retaining rings after removal of paint.

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SL. NO.	DESCRIPTION OF WORK
8.	UT of both end retaining rings.
9.	Surface matching of coupling.
10.	Check multi contact system and replacement of multi contact bands, if required.
11.	Boroscopic inspection & recording of rotor winding under retaining rings.
12.	Checking bearing surface and shaft seal surface and rectify any defect.
13.	Perform Gas Tightness Test of Rotor. Replace current carrying bolt and sealing washers, if required as per rate mentioned in **BOQ 15.10.**
14.	Clean all dismantled parts thoroughly before box up. Varnishing on rotor.
15.	Rotor thread- in and Box up.
16.	Boxing up of all dismantled parts as per procedure, seal body IR measurement and bring the IR value to the recommended value.
17.	Alignment of LP-Generator including shifting/lifting of stator to be done, if required and foundation bolts stretching.
18.	Checking of residual magnetism of Generator and Exciter Rotor coupling faces, journal area and bearing pedestal using gauss meter. Demagnetisation to be performed as per rate mentioned in **BOQ 15.50.**
1.4	**EXCITER INSPECTION:**
1.	Dismantle Exciter.
2.	Cleaning of main exciter & diode wheels.
3.	Conduct electrical tests on Exciter assembly.
4.	Check Stator & Rotor windings.
5.	Check condition of rectifier wheels.
6.	Check multi-contact system at both rotor & exciter sides & replacement of multi-contact bands, if required.
7.	Check bearing and pipe insulation.
8.	Check air filters and clean.
9.	Checking condition of ground fault detection system and replace brushes if required.
10.	Applying insulating varnish for stator and rotor windings.
11.	Complete cleaning of diode wheels.
12.	Replacement of diode wheel fuses with new fuses, if required.
13.	Replacement of faulty diodes of the rectifier wheels.
14.	Rectification/modification of exciter hood glass door locking mechanism, if required.
15.	Checking of stroboscope and associated works.
16.	Perform gas leak test of Exciter CC bolt Assy. (Nitrogen leak Test).
17.	If any CC bolts are leaking, all CC bolt gasket are to be replaced, as per rate mentioned in BOQ **10.10/14.10**.
18.	Complete assembly of the Exciter and alignment & coupling with Generator. Replacement of all gaskets and providing proper sealing of exciter dome.
19.	Alignment of Generator-Exciter, swing check and coupling.
20.	Varnishing on Exciter & PMG components.
1.5	**BEARINGS:**
1.	Visual inspection of bearings 5, 6 & 7 for any damage.
2.	Carrying out DP & UT test of the bearings.
3.	Checking of bearing insulation and rectifying the problem if any.
4.	Blue matching of bearing with seating and with shaft journal.
5.	Replacement of bearings if necessary by a new one, as per rate mentioned in BOQ **15.20.**
6.	Bearing clearances & oil catcher clearances of bearing 5, 6 and 7 to be adjusted as per drawing.

SL. NO.	DESCRIPTION OF WORK
1.6	**SEAL OIL SYSTEM**
1.	Perform functional check of all seal oil pumps and motors.
2.	Cleaning of Seal oil tanks.
3.	Servicing of DPRs and check valves as per requirement for eliminating any minor problems.
4.	Servicing of SOT float valves as per requirement for eliminating any minor problems.
5.	Servicing of Equalizing valves as per requirement for eliminating any minor problems.
6.	Flushing of seal oil system and impulse lines.
7.	Leakage test of complete seal oil system.
8.	Checking of any oil passing issue in seal oil cooler three-way valve and SOT make-up valve.
9.	Re-commissioning & tuning of total seal oil system at turning gear & 3000 RPM.
10.	DP test on welding joints of all seal oil pipe lines including supply of standard DP material, paint remover, tools & tackles etc. (Paint remover shall be used to remove the existing paint over weld joints. Applying one coat of red oxide and two coats of suitable cold paint after DPT)
11.	Cleaning of Hydrogen & air side seal oil coolers (tube & shell side) and filters.
12.	Replacement of oil line flange gaskets.
13.	For sl. nos. 3, 4 & 5 above, the valves included for inspection/replacement shall be limited to 6 nos. with size up to 50 NB.
1.7	**GAS SYSTEM**
1.	Check Hydrogen pressure reducers.
2.	Check all valves of the Gas system for tight closing.
3.	Check condition and performance of measuring devices.
4.	Servicing of any defective valves as per requirement for eliminating any minor problems. Valves included for inspection/replacement shall be limited to 6 nos. with size up to 50 NB.
5.	Perform functional check of Hydrogen gas drier.
6.	Replacement of flange gasket with non-metallic oil gasket.
7.	Conduct Air tightness of Generator with complete gas system
8.	DP test on welding joints of all gas pipelines including supply of standard DP materials, tools and tackles.
1.8	**HYDROGEN & EXCITER COOLERS**
1.	Dismantle the coolers.
2.	Cleaning of coolers on air and water side.
3.	Check condition and if required recondition the cooler water channels.
4.	Conduct hydraulic test on coolers at the approved test pressure. Hydraulic pump /test equipment will be in agency scope.
5.	Replace old gaskets with new gaskets.
6.	Painting of water boxes with water resistant paint.
7.	Check condition of cooling water inlet & outlet pipes, vent pipes, and drain pipes.
8.	Check mounting of all coolers.
9.	Washing of all coolers on gas side to remove oil & dirt.

SL. NO.	DESCRIPTION OF WORK
1.9	**SHAFT SEALS**
1.	Dismantle shaft seals and check insulation.
2.	If seal ring is found damaged (severe crack or dislodgement of white metal/ having history of seal damage), then runout of seal body with respect to End shield to be checked. Runout of End shield Seal body seating area to be measured before removal of End Shields.
3.	Replace seal insulation and gaskets based on condition.
4.	Check contact faces of the seal rings.
5.	Check seal ring clearances, three set of readings to be taken in airside, middle and Hydrogen sides of the ring.
6.	Check seal body and Teflon bushes.
7.	Blue matching of seal body and seal ring parting plane.
8.	DP and UT test of seal rings.
9.	Assisting in machining of new seal rings to the required dimensions, if required.
10.	Replacement of old seal rings with new seal rings, if required.
11.	Check Inner & outer labyrinth rings and if required replace seal strips.
12.	Conduct air leak test.
1.10	**PRIMARY WATER SYSTEM**
1.	Perform functional checks on primary water pumps.
2.	Replace resin of ion exchanger.
3.	Top-up alkaliser tank.
4.	Check all valves of primary water system for tight closing.
5.	Servicing of defective valves as per requirement for eliminating any minor problems. Valves included for inspection/replacement shall be limited to 2 nos. of 125 NB.
6.	Filters cleaning & replacement of old 'O' rings in the primary water system with new ones. This include conical filters in Generator primary water circuit and filters at PW Station.
7.	Conduct Hydraulic test of primary water system.
8.	Leak test of Nitrogen gas system including identification of leakage point, testing and rectification, if any.
9.	DP testing of weld joints of all primary water pipe lines.
10.	Check all Teflon hoses for healthiness.
11.	Replacement of water box 'O-rings' with new ones if required.
12.	Cleaning & servicing of Primary water filter & coolers.
1.11	**ELECTRICAL TESTS**
1.	**STATOR** (with primary water in service)
a)	Insulation resistance (IR) test including PI with a stabilized DC source of 5000 V along with a micro ammeter or ability of read current and capacitance.
b)	DC Winding resistance test.
c)	Tan delta & capacitance test with necessary equipment & instruments up to 10 kV.
d)	Partial Discharge measurement
e)	ELCID test on core with computerized digital equipment.
f)	Offline PD Test on Stator using PD free AC HV Source.
g)	IR and resistance measurement of all RTD's
2.	**ROTOR**
a)	Insulation resistance (IR) test with DAR & PI at 500V DC.
b)	Impedance test at 240 V.
c)	Winding resistance test.
d)	RSO test with digital equipment and oscilloscope.
e)	Voltage balance test.

SL. NO.	DESCRIPTION OF WORK
3.	**PMG & MAIN EXCITER**
a)	IR test on armature & field winding
b)	DC resistance on armature & field.
c)	Impedance test on field winding.
d)	Pole drop test on field.
e)	IR & Resistance test on quadrature axis coils.
4.	**DIODE WHEELS**
a)	IR value test on diode wheel heat sinks.
b)	Blocking capability test on rectifiers.
c)	Fuse checking with resistance measurement with micro-ohm meter.
10.10/ 14.10	**ATTENDING CC BOLT LEAKAGE OF EXCITER ROTOR (For Both Part 1 (BOQ 10.10) & Part 3 (BOQ 14.10)**
a)	This scope is for replacement of gaskets for all four numbers CC bolts in 500 MW Generator Exciter.
b)	Dismantling of the old CC bolt with gaskets and insulating ring.
c)	Cleaning of the CC bolt housing.
d)	Checking shaft bore thread and ring shall be done for any damage and wear out.
e)	Shaft bore thread shall be cleaned by proper size tap set.
f)	Box up of the CC bolt by replacing gaskets & worn out parts.
g)	Gas tightness test.
h)	Threaded ring shall be tightened by proper torque.
i)	Deputation of expert along with tools & consumable o ring, rubber washer etc shall be in scope of agency.
10.20	**Replacement of One number faulty stator top bar (1st Bar)**
a)	Dewedging of slots.
b)	Removal of clamping plates, end connections, Teflon hoses, wedges and packers at both TE & EE of affected bar.
c)	Putty removal and Removal of Bar from stator.
d)	IR of stator after removal of bar. AC HV test of stator shall be carried out only after removal of the last bar identified for repair of core packets and after completion of their final repair.
e)	IR & AC HV of New/old bar.
f)	Installation of New /old bar inside stator.
g)	Slot side filling of inserted bar.
h)	Mili volt drop test & AC HV test.
i)	Slot packing after bar insertion and wedging & wedge deflection test.
j)	Putty filling in overhang.
k)	Assembly of clamping plates, Teflon hose connections etc.
l)	Deployment of team of skilled and expert winder having experience of 500 MW bar replacement work (6 Nos) .
m)	Leak tightness test including pneumatic, hydro and flow test of individual bar as required.

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SL. NO.	DESCRIPTION OF WORK
n)	Final IR & AC HV of stator.
o)	Core Cleaning by electromechanical grinding & chemical cleaning.
p)	ELCID test of repaired cores after each attempts of chemical cleaning.
q)	Glue Application & Varnishing of Stator.
r)	**Tests to be carried out are as follows:**
I.	AC HV test at 27.3 kV for 1 min. of rest of the stator winding after bar removal.
II.	ELCID test, Ten Delta & Capacitance Test.
III.	AC HV test at 43 kV for 1 min of new bar/old bar.
IV.	Mili volt drop test.
V.	AC HV test at 27.3 kV for 1 min. of each phase of the entire winding after assembly of new/old bar.
r)	Hydraulic test using primary water pressured through nitrogen at 6 kg/cm2 for 24 hrs.
s)	All required spares & consumables shall be arranged by NTPC/BHEL.
t)	Electrical testing equipment including HV test kit shall be in the scope of Agency.
*Note	Since the intention of bar removal is rectification of core fault, the HV test shall be conducted only after ascertaining that the core repair is both possible and complete, and no further bar removal is required. In case the bottom bar is required to be removed, HV of the remaining bars shall be carried out only after its removal and completion of the core repair.
10.30	**Removal & fitment of one number of successive additional bars to facilitate replacement of faulty bar**
a)	This scope is for removal of each other bars to facilitate replacement of faulty bars.
b)	Replacement of faulty stator bar.
c)	De-wedging, insulation removal, De-brazing & removal of other one number adjacent bars.
d)	Cleaning of slot, Fitment, Re-brazing, Insulation & Re-wedging of one number adjacent bar.
e)	All electrical and other required tests as required shall be carried out before re-installing of winding bar.
f)	All electrical testing equipment including HV test kit shall be in the scope of agency.
*Note	If the fault is not identified in the top bar, then the identified bottom bar shall be removed along with all other top bars that are required to be removed for facilitating bottom bar removal. The BOQ rate for the first bar and subsequent bars shall be applicable as per BOQ provisions.
10.40	**Replacement of faulty stator bottom bar (shall be billed as 1st Bar and subsequent no of top bars as additional bars i.e. (suppose 25 top bars are removed for 1 bottom bar: Total rate shall be, 1st Bar** (per unit allotted value of Sl. No. 10.20) plus 25 bars (25 X per unit allotted value of 10.30)
a)	Dewedging of slots.
b)	Removal of clamping plates, end connections, Teflon hoses, wedges and packers at both TE & EE of affected bar.
c)	Putty removal and Removal of Bar from stator.
d)	IR of stator after removal of bar. AC HV test of stator shall be carried out only after removal of the last bar identified for repair of core packets and after completion of their final repair. (For details refer note below)
e)	IR & AC HV of new/old bar.
f)	Installation of New/old Bar inside stator.
g)	Slot side filling of inserted bar.

SL. NO.	DESCRIPTION OF WORK
h)	Mili volt drop test & AC HV test.
i)	Slot packing after bar insertion and wedging & wedge deflection test.
j)	Putty filling in overhang.
k)	Assembly of clamping plates, Teflon hose connections etc.
l)	Leak tightness test including pneumatic, hydro and flow test of individual bar as required.
m)	Final IR & AC HV of stator.
n)	Core Cleaning by electromechanical grinding & chemical cleaning.
o)	ELCID test of repaired cores after each attempts of chemical cleaning.
p)	Tests to be carried out are as follows:
q)	AC HV test at 27.3 kV for 1 min. of rest of the stator winding after bar removal.
r)	ELCID test, Ten Delta & Capacitance Test.
s)	AC HV test at 43 kV for 1 min of new bar/old bar.
t)	Mili volt drop test.
u)	AC HV test at 27.3 kV for 1 min. of each phase of the entire winding after assembly of new/old bar.
v)	Hydraulic test using primary water pressured through nitrogen at 6 kg/cm2 for 24 hrs.
w)	All required spares & consumables shall be arranged by NTPC.
x)	Electrical testing equipment including HV test kit shall be in the scope of BHEL.
xi)	Deployment of team of skilled and expert winder having experience of 500 MW bar replacement work (6 Nos).
*Note	Since the intention of bar removal is rectification of core fault, the HV test shall be conducted only after ascertaining that the core repair is both possible and complete, and no further bar removal is required.
PART – 2	
Mandatory Scope of Work	
10.50	**Deputation of OEM manpower of portal crane (360 MT) ON Man-days basis**
a)	Support for C&I and electrical works during commissioning of portal crane. Agency has to arrange for deputation of OEM Manpower both electrical and mechanical from KONE cranes for tentative 30 days (2 manpower) (4 days (journey days) +26 days) in 2 times/parts (for initial survey and healthiness checking along with assistance during commissioning, load testing and lifting of stator. Assessment of condition and requirement of any spares has to be determined in consultation with OEM, however spares shall be arranged by BHEL.
10.60	**Arrangement of HT fasteners**
a)	HT Fasteners such as studs and bolts (M20, M24, M30 & M48) of Gr. 8.8, if required has to be arranged by agency.

SL. NO.	DESCRIPTION OF WORK
10.70	**Arrangement of Trailers for transportation of portal crane (360 MT) from NTPC Vindhyachal to BHEL SITE.**
a)	Arrangement of transportation of portal crane from NTPC Vindhyachal to BHEL SITE including loading on trailer and unloading. Tentatively 10 open trailers out of which 2 x 60 ft trailers shall have to be used for the same. **Dispatch list & Portal crane specification as per Annexure VI.**
	Note-: 1. Minimum chargeable distance allowed will be 200 Kms. 2. If travel distance is UP to 500 km then charges will be paid as per rate mentioned in BOQ item 10.70(a) only. If travel distance is 501 to 1000 kms than charges will be paid as per rate mentioned in BOQ item 10.70 (b) only.
10.80	**Erection & dismantling of portal crane (360 MT)**
10.80(a)	**Erection of Fixed Leg Assembly (LH & RH)**
a)	Shifting, handling and safe storage of Fixed Leg Assembly components at designated erection area
b)	Inspection and cleaning of all mating surfaces, foundation area, fasteners and accessories prior to erection.
c)	Arrangement of required tools, tackles, lifting equipment, consumables and manpower for erection work.
d)	Marking and alignment checking of foundation/reference points as per approved drawings.
e)	Lifting and positioning of Left Hand (LH) and Right Hand (RH) Fixed Leg Assemblies at designated locations.
f)	Temporary supporting, leveling and alignment of assemblies during erection.
g)	Fit-up and assembly of structural members, base plates, brackets, stiffeners and associated components.
h)	Tightening of foundation bolts, connecting bolts and nuts as per specified torque requirements.
i)	Checking of dimensional accuracy, centerline, elevation, verticality and alignment as per technical specifications/drawings.
j)	Welding of joints/supports wherever applicable as per approved welding procedure specification (WPS).
k)	Rectification of minor erection mismatches, if any, during fitment at site.
l)	Coordination with Site in-charge for inspection and stage clearances.
m)	Housekeeping and removal of erection scrap/debris from work area after completion of work.
n)	Final inspection, documentation and handing over of erected Fixed Leg Assembly (LH & RH) for further activities.
10.80(b)	**Erection of Hinged Leg Assembly (LH & RH)**
a)	Receipt, inspection, and identification of all components related to Hinged Leg Assembly (LH & RH) at site.
b)	Verification of drawings, match marking, and availability of required hardware, fasteners, and consumables before erection.
c)	Shifting/handling of Hinged Leg Assembly components from storage area to erection location using suitable handling equipment.
d)	Cleaning of mating surfaces and checking for any transportation damage or dimensional mismatch prior to assembly.

SL. NO.	DESCRIPTION OF WORK
e)	Assembly and erection of Left-Hand (LH) and Right-Hand (RH) Hinged Leg structures as per approved drawings and technical specifications.
f)	Alignment, positioning, leveling, and temporary supporting of hinged leg assemblies during erection.
g)	Fitment and tightening of bolts, nuts, pins, bushes, and other associated hardware as per specified torque requirements.
h)	Welding activities, wherever applicable, as per approved welding procedure and quality requirements.
i)	Checking of hinge movement, clearances, alignment, and smooth operation after completion of erection.
j)	Coordination with crane/handling agency for lifting and positioning activities during erection.
k)	Rectification of minor fitment issues encountered during erection with prior approval of site engineer.
l)	Conducting final inspection jointly with customer/BHEL representative and attending observations, if any.
m)	Housekeeping and removal of temporary supports, scrap, and unused materials from work area after completion of job.
n)	Compliance with all safety rules, work permit requirements, and site safety practices during execution of work.
10.80(c)	**Assembly of Main Girders at Bay**
a)	Receipt and verification of main girder assembly components at site/bay area.
b)	Shifting, handling, and positioning of main girder assemblies at the designated bay location using suitable lifting arrangements.
c)	Alignment, fit-up, and assembly of main girders as per approved drawing and technical specifications.
d)	Erection of LH & RH main girders including matching, bolting, pinning, and tightening of fasteners.
e)	Checking of dimensions, centerline, level, verticality, and alignment during erection.
f)	Installation of required support structures, temporary supports, and staging arrangements for safe erection activities.
g)	Coordination with crane/handling equipment for lifting and placement activities.
h)	Rectification of minor fitment issues encountered during assembly and erection.
i)	Ensuring compliance with applicable quality standards, safety procedures, and site instructions during execution.
j)	Housekeeping and clearing of erection materials, tools, and consumables after completion of work.
k)	Submission of completion report and readiness for inspection/testing after erection completion.
10.80(d)	**Erection of Main Girders on Legs**
a)	Receipt, shifting, handling, and identification of Main Girders and supporting legs at site.
b)	Verification of erection drawings, alignment references, foundation levels, and match markings before commencement of erection activities.
c)	Preparation of work area including arrangement of tools, tackles, scaffolding, lifting appliances, and safety barricading as required for erection work.
d)	Positioning and temporary supporting of erected legs for installation of Main Girders.
e)	Lifting, positioning, and erection of Main Girders over the erected legs using suitable cranes, chain pulley blocks, hydra, or other approved lifting arrangements.

SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK
f)	Alignment, leveling, matching, and fitment of Main Girders with legs as per approved drawings and technical requirements.
g)	Installation and tightening of connecting bolts, nuts, washers, pins, and other fastening hardware during assembly.
h)	Carrying out required adjustment, correction, and fit-up to achieve proper alignment and dimensional accuracy.
i)	Checking of centerline, elevation, diagonals, verticality, and overall geometry of erected structure jointly with site engineer/representative.
j)	Tack welding/temporary holding arrangement wherever required during erection activities.
k)	Final tightening/torquing of fasteners after completion of alignment and inspection.
l)	Ensuring safe execution of work in compliance with site safety rules, use of PPE, and adherence to statutory safety practices.
m)	Housekeeping and removal of temporary materials, debris, and unused consumables from work area
n)	Receipt, shifting, handling, and identification of Main Girders and supporting legs at site.
10.80(e)	**Erection of Spacer Beams (F1 & H)**
a)	Receipt and shifting of Spacer Beams (F1 & H) from storage area to erection site with proper handling arrangements.
b)	Verification of material condition, dimensions, identification marks, and completeness before erection.
c)	Preparation of work area including cleaning, checking of supporting structures, and ensuring readiness for erection activity.
d)	Arrangement of required tools, tackles, lifting appliances, slings, scaffolding, and consumables for safe execution of work.
e)	Erection, positioning, alignment, and fit-up of Spacer Beams F1 & H at designated locations as per approved drawing and technical requirements.
f)	Carrying out matching, leveling, centering, and dimensional checking during erection.
g)	Tightening/fastening of bolts, nuts, clamps, and associated hardware as per specified torque requirements.
h)	Coordination with crane operation and rigging activities for safe lifting and placement of spacer beams.
i)	Inspection of erected assemblies jointly with site engineer/quality representative and rectification of minor misalignment, if required.
j)	Compliance with all safety regulations, permit systems, housekeeping, and site safety practices during execution of work.
k)	Removal of temporary supports, cleaning of work area, and handing over of erected Spacer Beams (F1 & H) after completion of work.
10.80(f)	**Mounting of Trolley**
a)	Receipt and verification of trolley components, hardware, and accessories at site as per approved drawings and BOM.
b)	Shifting and positioning of trolley components at the designated mounting location using suitable handling equipment.
c)	Cleaning of mounting surfaces and checking alignment, level, and dimensional suitability prior to installation.

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SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK
d)	Assembly and mounting of trolley structure, wheels, brackets, guide rollers, and associated mechanical parts as per approved procedure/drawing.
e)	Tightening of all fasteners with required torque and ensuring proper locking arrangement.
f)	Alignment and leveling of trolley assembly to ensure smooth movement and proper operation.
g)	Checking of wheel rotation, clearance, balancing, and free movement of trolley on track/guide arrangement.
h)	Rectification/adjustment, if required, during trial movement and inspection.
i)	Carrying out trial run of trolley assembly and ensuring satisfactory performance.
j)	Cleaning of work area and removal of unused materials, debris, and temporary supports after completion of work.
k)	Submission of work completion report along with inspection clearance and measurement details, wherever applicable.
l)	All tools, tackles, consumables, manpower, supervision, and safety arrangements shall be in contractor's scope.
10.80(g)	**Mounting of Hook & Rope Reeving**
a)	Receipt, inspection, and shifting of hook block, wire rope, and associated accessories to the erection site.
b)	Verification of hook block assembly, sheaves, rope drum condition, bearings, pins, and safety accessories prior to mounting.
c)	Arrangement of required tools, tackles, scaffolding, and manpower for execution of the work safely.
d)	Mounting and alignment of hook block assembly as per approved drawing and manufacturer's recommendations.
e)	Cleaning and inspection of rope grooves, sheaves, equalizer pulleys, and rope path before reeving activity.
f)	Carrying out rope reeving through drum, sheaves, equalizer pulley, and hook block as per standard reeving diagram and approved procedure.
g)	Proper clamping, fastening, and securing of dead end and running end of wire rope with required hardware.
h)	Adjustment of rope tension and equalization of rope load across all falls.
i)	Lubrication of wire rope, sheaves, bearings, and moving parts wherever required.
j)	Checking free movement and smooth operation of hook block and reeved rope arrangement.
k)	Tightening of all fasteners, locking arrangements, split pins, and safety devices after completion of reeving work.
l)	Trial operation of hook movement for checking alignment, smooth travel, and abnormal sound/vibration, if applicable.
m)	Compliance with site safety requirements including use of PPE, barricading, work permit, and adherence to safety procedures during execution.
n)	Housekeeping and clearing of surplus materials, tools, and debris after completion of work.
o)	Submission of completion report and joint inspection with concerned engineer after completion of the job.
10.80(h)	**Cabling & Interconnection**
1.	The scope includes complete cabling and interconnection activities for the equipment/system as per approved drawings, technical specifications, and site requirements.
10.80(i)	**Ladders, Platforms, etc. Assembly**
a)	Receipt, identification, and verification of structural materials, ladders, platforms, gratings, handrails, supports, fasteners, and associated accessories as per approved drawings and BOM.
b)	Preparation of work area, staging, scaffolding, tools, tackles, and safety arrangements required for assembly activities.
c)	Assembly and erection of ladders, platforms, walkways, staircases, handrails, toe guards, support structures, and allied structural components as per approved erection drawings and technical specifications.
d)	Alignment, leveling, fit-up, matching, and temporary clamping of structural members before final tightening/welding.

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SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK
e)	Bolt tightening, torqueing, tack welding, and final welding of structural joints as per applicable standards and approved procedures.
f)	Fixing of gratings, chequered plates, kick plates, handrails, and safety guards including cutting and modification, if required at site.
g)	Ensuring dimensional accuracy, verticality, horizontality, and proper clearances during assembly.
h)	Shifting, handling, lifting, and positioning of structural components using suitable lifting tools/tackles.
i)	Rectification of minor fitment issues and attending alignment corrections during erection.
j)	Cleaning of erected structures and removal of temporary supports, debris, welding spatters, and unused materials from work area.
k)	Inspection and joint verification with site engineer/inspection agency for conformity with drawings and quality requirements.
l)	Compliance with all safety regulations, work permit systems, PPE requirements, and site safety practices during execution of work.
10.80(j)	**Commissioning & No-load Trials**
a)	Verification of completion of erection and assembly activities prior to commissioning.
b)	Checking and confirmation of alignment, clearances, tightness of fasteners, coupling condition, and lubrication system readiness.
c)	Inspection and testing of all electrical connections, control circuits, protection systems, interlocks, and instrumentation.
d)	Verification of availability and healthiness of auxiliary systems including cooling water, sealing system, lubrication oil system, excitation system, and turning gear arrangement.
e)	Pre-commissioning checks of generator and associated auxiliaries as per approved checklists and technical standards.
f)	Carrying out insulation resistance (IR), polarization index (PI), continuity, and other required electrical tests before energization.
g)	Trial operation of auxiliary equipment and verification of operational parameters.
h)	Synchronization readiness checks and confirmation of protection relay settings.
i)	Conducting commissioning activities in coordination with site engineer/client representative as per approved procedure.
j)	Carrying out no-load trial run of equipment/generator and monitoring vibration, temperature, noise level, bearing performance, voltage, current, and other operating parameters.
k)	Observation and rectification of abnormalities noticed during no-load trial operation.
l)	Recording of all commissioning and no-load trial parameters in approved formats and submission of reports.
m)	Ensuring compliance with safety standards, permit systems, and site safety regulations during commissioning activities.
n)	Minor Servicing /repair work of any part of portal crane shall be in agency scope.
10.80(k)	**Load Test & Certification of Portal crane (360 MT)**
1.	Carrying out load testing of equipment/system as per approved procedures and applicable standards, including arrangement of required instruments, monitoring operational parameters during testing, recording observations/results, rectification of minor abnormalities if any, and submission of certified test reports along with load test certificate after successful completion of the test. Any other work required for load test and certification of portal crane shall be in scope of agency

SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK
10.80(l)	**Dismantling of Fixed Leg Assembly (LH & RH)**
a)	Deployment of required manpower, supervisors, tools & tackles, lifting tools, consumables, and safety equipment for execution of the job.
b)	Isolation of the equipment/system and ensuring necessary safety clearance before commencement of work.
c)	Marking, identification, and tagging of all components, hardware, shims, and matching parts for proper reassembly.
d)	Removal of connected accessories, piping, supports, guards, covers, and obstruction items, if any, required for dismantling of Fixed Leg Assembly (LH & RH).
e)	Loosening and removal of foundation bolts, holding bolts, pins, locking arrangements, and fitted hardware associated with the Fixed Leg Assembly.
f)	Dismantling of Fixed Leg Assembly (LH & RH) carefully without causing damage to adjoining equipment/components.
g)	Handling, shifting, and placement of dismantled components at designated location within the work area/store as instructed by BHEL representative.
h)	Cleaning of dismantled parts, hardware, and mounting surfaces for inspection purpose.
i)	Inspection assistance, dimensional checking support, and preparation of components for further repair/reconditioning activities.
j)	Proper preservation and safe custody of dismantled components, fasteners, shims, and accessories during the work period.
k)	Housekeeping of work area before, during, and after completion of the job.
l)	Compliance with all safety regulations, PPE requirements, site safety practices, and instructions of BHEL.
m)	Arrangement of consumables such as cotton waste, cleaning materials, grease, rust remover, marking paint, etc., unless otherwise specified.
10.80(m)	**Dismantling of Hinged Leg Assembly (LH & RH)**
a)	Preparation and arrangement of required tools, tackles, lifting equipment, consumables, and safety accessories for execution of work.
b)	Isolation of the system/equipment and ensuring safe working conditions as per site safety procedures and permit requirements.
c)	Identification and marking of LH & RH hinged leg assembly components before dismantling to facilitate correct reassembly.
d)	Removal of connected accessories, locking arrangements, fasteners, pins, bushes, shims, supports, and associated fittings of hinged leg assembly.
e)	Dismantling of LH & RH hinged leg assemblies carefully using suitable lifting arrangements without causing damage to adjoining components/equipment.
f)	Handling, shifting, and safe placement of dismantled hinged leg assemblies and associated materials at designated location/site store as instructed.
g)	Cleaning of dismantled components and inspection for visible damages, wear, cracks, deformation, or abnormal conditions.
h)	Proper tagging, segregation, and preservation of dismantled parts, fasteners, and hardware for reuse/replacement.
i)	Preparation and arrangement of required tools, tackles, lifting equipment, consumables, and safety accessories for execution of work.

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SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK
10.80(n)	**Dismantling of Main Girders from Legs**
a)	The work includes safe dismantling and separation of main girders from supporting legs by removal of all connected fasteners, plates, and structural joints using suitable tools and equipment.
b)	The job shall be carried out with proper lifting arrangements, staging/scaffolding, safety precautions, and supervision to avoid damage to structural members and nearby equipment
c)	All dismantled materials shall be shifted and stacked at the designated location as per site in-charge instructions
10.80(o)	**Lowering & Disassembly of Main Girders at Bay**
a)	Arrangement and erection of scaffolding/platforms as required for safe access to the Main Girder area at bay.
b)	Isolation of the work area and ensuring all safety precautions, barricading, illumination, and permit requirements before commencement of work.
c)	Marking, identification, and recording of matching positions of Main Girder components, joints, hardware, shims, spacers, and connected accessories before dismantling.
d)	Removal/disconnection of all connected accessories, supports, brackets, couplings, alignment fixtures, electrical connections, and associated fittings interfering with lowering activity.
e)	Loosening and removal of nuts, bolts, pins, locking arrangements, clamps, and fasteners of Main Girders.
f)	Safe lowering of Main Girders from bay using suitable lifting arrangements such as crane/chain pulley block/hydra and shifting to designated dismantling area.
g)	Disassembly/dismantling of Main Girder into individual sections/components as per site requirement and engineering instructions.
h)	Cleaning of dismantled components and segregation of reusable and damaged materials.
i)	Proper stacking, tagging, and preservation of dismantled Main Girder components at designated locations within plant premises.
10.80(p)	**Dismantling of Spacer Beams (F1 & H)**
a)	Identification and marking of Spacer Beams F1 & H at all five points as per drawing/instructions of site engineer.
b)	Removal of connected fasteners, locking arrangements, shims, supports, clamps, and associated fittings required for dismantling of spacer beams.
c)	Dismantling of Spacer Beams F1 & H carefully from all five points without causing damage to adjacent structures/equipment/components.
d)	Handling and shifting of dismantled spacer beams and associated materials to the designated storage area/site location using suitable lifting arrangements.
e)	Cleaning of dismantled components and work area after completion of dismantling activities.
f)	Proper tagging, identification, and stacking of dismantled materials for ease of reassembly and inspection.
10.80(q)	**Dismantling of Trolley**
a)	Isolation and removal of all connected accessories, fasteners, supports, clamps, pins, couplings, wheels, bearings, and structural members associated with the trolley assembly.
b)	Dismantling of complete trolley assembly as per site conditions and instructions of Engineer-in-Charge.
c)	Cutting/opening of seized or rusted nuts, bolts, and joints wherever required using approved methods.

SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK
d)	Isolation and removal of all connected accessories, fasteners, supports, clamps, pins, couplings, wheels, bearings, and structural members associated with the trolley assembly.
	Dismantling of complete trolley assembly as per site conditions and instructions of Engineer-in-Charge.
e)	Cutting/opening of seized or rusted nuts, bolts, and joints wherever required using approved methods.
f)	Handling and shifting of dismantled and associated materials of Trolley to the designated storage area/site location using suitable lifting arrangements.
10.80(r)	**Removal of Hook & Rope Reeving**
a)	Removal of existing hook block assembly from crane after proper supporting and load balancing arrangements.
b)	Dismantling and removal of wire rope reeving from drum, pulleys, equalizer sheaves, and hook block carefully without causing damage to associated components.
c)	Marking and recording of reeving arrangement before dismantling for reference during re-assembly.
d)	Inspection of removed hook block, pulleys, rope guides, equalizer sheaves, and related hardware for any visible damage/wear and reporting the observations.
e)	Safe handling, coiling, shifting, and stacking of removed wire rope and hook assembly at designated location as instructed by site in-charge.
10.80(s)	**Removal of Cabling & Interconnection**
a)	Removal of control cables, power cables, instrumentation cables, earthing connections, and associated interconnections
b)	Dismantling of cable glands, lugs, clamps, supports, and cable dressing accessories wherever required.
c)	Safe handling of cables during removal to avoid damage to nearby equipment, panels, and structures.
d)	Coiling, bundling, tagging, and shifting of reusable cables to designated storage locations.
10.80(t)	**Removal of Ladders, Platforms, etc.**
a)	Removal/dismantling of ladders, platforms, handrails, gratings, supports, fasteners, clamps, and connected structural components carefully without causing damage to adjacent equipment/structures.
b)	Cutting, unbolting, gas cutting, grinding, and loosening of welded/bolted joints wherever required for dismantling activities.
c)	Safe lowering and shifting of dismantled materials from work location to designated storage/stacking area.
11.00	**Generator Stator Replacement**
a)	Removal of primary water tank and associated pipe lines from position and re-positioning of the same after spare stator erection. Removal and rewelding of PW tank supports on stator frame. Necessary pipe line modifications required during re-erection of PW tank to be carried out. PW tank temporary flushing using detergent along with fabrication of lines for the same. DPT of weld joints. Boroscopic inspection of primary water tank.

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SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK
b)	Removal of terminal bushing, flexible terminal connections, connecting/extension bus bars, pipelines and all associated components inside bushing chamber. Re-assembly of connecting/extension bus bars, flexible terminal connections, terminal bushings, pipe lines and all associated components inside bushing chamber after spare stator erection.
c)	Electrical & mechanical testing of removed as well as spare terminal bushings as per OEM testing norms. All necessary devices required for testing to be fabricate by agency. Material for fabrication will be in BHEL/ NTPC scope. HV test of bushings. Gas tightness test of all bushings and IR measurement.
d)	Delinking of bushing compartment from old stator and all associated components. Normalization of bushing compartment after new stator erection. Welding between stator frame & bushing compartment (terminal box) to be done using 309Cb electrode & DPT test. Electrode is in scope of agency. Tightness checking of the same as per OEM testing norms. Temporary devices fabrication (if required) will be arranged by agency. Material for fabrication will be in BHEL/NTPC scope.
e)	All the necessary works for the approach of trailer to crane as well as service bay shall be arranged by NTPC including removal of any existing systems and normalization. Passage and access of portal crane towards switch side in TG bay by removal of sheets, beams etc. shall be in NTPC scope. However, agency has to provide minor support and assistance in such activities such as lifting, welding, cutting etc. for plates etc.
f)	Approach roads, any civil structure demolition and reconstruction shall be in NTPC scope.
g)	Minor repairs in existing foundation as per requirement. Inspection of stator base foundations, end shield etc. and epoxy grouting if required, shall have to be done. Agency needs to carry out UPV testing and /or rebound hammer test to access the requirement.
h)	Erection of portal crane in position, load test of crane and its dismantling.
i)	Necessary crane tubular/crawler and hydra, fork clip etc for erection of portal crane is in the scope of contractor. The max wt. is 33 T to be erected at approx. height of 30 meters.
j)	Conduction of Load test along with arrangement of load test certificate form adequate certified test agency before replacement/lifting of stator. OLD stator may be used for load test.
k)	Lifting & shifting of old stator from TG floor and loading into trailer and placement at identified place.
l)	Loading and shifting of new stator from its position (with in approx. 3 KMs from TG floor) to TG deck.
m)	Shifting of old stator from identified place to final place as decided by BHEL/NTPC and its placement on stand.
n)	Arrangement of hydraulic trailer of sufficient capacity along with its placement on suitable space, its covering with dummy end shield and tarpaulins/ polythene etc. and its reloading if required.
o)	All supports, jacks, sleepers etc. along with tarpaulin/polythene scaffolding etc. shall have to be arranged by agency.
p)	Arrangement of one trailer for transportation of 4 nos of saddle from BHEL Site to NTPC Vindhnagar approx. weight is 15 MT.
q)	Stator & exciter foundation bolts/ anchor bolts removal, revisioning, testing and placement in position.
r)	Stator alignment screws removal from existing stator and placement in spare stator. Fixing of airgap seal ring assembly & binding ring assembly in spare stator. Ensure proper Locking of deck.
s)	Loading of spare stator in trailer from service bay with help of hydraulic jacks and transportation to crane area.

SL. NO.	DESCRIPTION OF WORK
t)	Lifting of spare stator and positioning of stator in TG floor. Minor works in linking of bus duct.
u)	Piano wire setting for radial references, record of axial references with respect to exciter and Bearing # 4 pedestal along with elevation and its transfer on new stator.
v)	Testing of stator and rotor including exciter as per BHEL norms including hydraulic/ pneumatic test of various systems such as RSO, Tan Delta, PD, ELCID, Wedge deflection, resistance, IR etc.
w)	ELCID Test, core flux test as required, repetition of ELCID as required.
x)	Removal of all pipelines of stator casing and restoration of the pipelines to spare stator with necessary modifications and welding works. DPT of the same.
y)	Checking of stator foundation plates, replacement of foundation studs as per requirement. However, all civil works will be in NTPC scope.
z)	Healthiness checking of end shield foundation bolts and corresponding stator stool plates threading and cleaning of levelling screw and stator hole threads.
aa)	Centering of old stator end shield in spare stator, minor enlargement of holes along with reaming honing etc. Dowelling of end shields with respect to stator frame centering.
ab)	Restoration of stator in correct axial & radial position.
ac)	Restoration of all pipelines (PW, seal oil, gas and cooling water lines) hangers and adjustment of hangers loading as per design value.
ad)	Trial assembly of end shield along with its horizontal dowelling, reaming etc. Taper runout of end shield seal body seating area and its counter machining on seal body.
ae)	Trial assembly of bushing and measurement of contact resistance as per norms. Arrangement of high precision digital voltmeter (6-digit voltage readings)
af)	Arrangement/fabrication of loops for flushing of primary water system along with detergent cleaning. Material for fabrication shall be provided by BHEL/NTPC.
11.10	**Multi axle trailer arrangement for Shifting of spare stator from service bay/stored location (Load capacity to be more than equal to 280 MT)**
1.	Arrangement of multi axle trailer with sufficient capacity for Loading of spare stator from service bay and transportation to crane area.
2.	Arrangement of multi axle trailer with sufficient capacity for transportation of removed/spare stator along with 1 set of stator transportation stands from loading area to a point of unloading. The trailer is then to be used for loading of spare stator to the point of loading through portal crane to TG floor. Trailer is to be used again for reloading of removed stator and unloading to the same position where spare stator was placed or any other defined position.
12.00/14.20	**MISCELLANEOUS (For Both Part 1 (BOQ 12.00) & Part 3 (BOQ 14.20))**
1.	Arrangement of one office attendant in BHEL site office for official work in each shift. Arrangement of one Laptop/Computer (Latest Configuration), PSC- Coloured Printer (3 in 1 Printer, Scanner, Copier), Computer stationary /cartridges, Internet connection (Modem) at free of cost, from start until completion of work. Arrangement of office table and chair for BHEL staff as per requirement.
2.	Providing one qualified safety officer during entire duration of works on round the clock basis to ensure that safety rules are observed/ followed to avoid any accident/ mis-happening.
3.	Qualified and experienced EOT crane operators in each shift for round the clock operation of EOT crane, to carry out above overhauling work.

SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK	
4.	Arrangement of manpower for To & Fro Transportation of Materials & Equipment from RSC-Varanasi or other site as required.	
5.	Arrangement of one no. furnished quarter with required utensils, gas stove and gas for mess purpose.	
6.	Vendor has to provide necessary supporting documents along with bill against these miscellaneous services and payment shall be released only after verification of these documents by site Engineer.	
13.00/14.30	**PROVIDING VEHICLE FOR SITE USAGE (For Both Part 1 (BOQ 13.00) & Part 3 (14.30))**	
A.	SCOPE: Providing One Vehicle exclusively for BHEL Staff use at, NTPC Vindhyachal, for Part 1 and 3 from start of work to till completion of work. (Tentatively 140 Vehicle days for all units).	
B.	Payment: Payment for providing the vehicle shall be done as per actual usage of vehicle days including running charges, OT & Night Charges as per following rate and Terms & conditions detailed as below.	
C.	Schedule of Rates for (4+1-Seater) Dzire/Indigo/SUV or (6+1-Seater) Bolero/ Scorpio or any equivalent type of Vehicle	
1.	Type of Vehicle	(4+1 Seater) Dzire/Indigo/SUV or (6+1 Seater) Bolero/ Scorpio or any equivalent type of Vehicle
2.	Daily Hire charges Rate for 12 hours duty	Rs. 986/- per day
3.	Running charges	Cost of 1 litre fuel for every 10 Km running
4.	Overtime charges per hour (after 12 hours duty)	Rs. 54/- per hour
5.	Night Charges per night for stay beyond 11 PM ** Overtime and night cannot be clubbed together night shall only be paid when vehicle is used away from site due to any reason.	Rs. 293/- per night
D.	Terms and Conditions: As per annexure V	

SCOPE OF WORK

JOB:	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**
SL.NO.	DESCRIPTION OF WORK
PART 4	**OPTIONAL SCOPE OF WORK**
	OPTIONAL SCOPE OF WORK CAN BE EXCUTE WITH ANY PART 1 OR PART 2 OR PART 3
15.10	**Attending CC bolt leakage of Generator Rotor**
a)	This scope is for replacement of gaskets for all two numbers CC bolts in 500 MW Generator rotor.
b)	Dismantling of the old CC bolt with gaskets and insulating ring.
c)	Cleaning of the CC bolt housing.
d)	Checking shaft bore thread and ring shall be done for any damage and wear out.
e)	Shaft bore thread shall be cleaned by proper size tap set.
f)	Box up of the CC bolt by replacing gaskets & worn out parts.
g)	Threaded ring shall be tightened by proper torque.
h)	Gas tightness test.
i)	Deputation of expert along with tools & consumable o ring, rubber washer etc shall be in scope of agency.
15.20	**Replacement of Generator bearings**
	Replacement of Bearing No. 5 or 6 or 7 in Generator if required. The scope is for replacement one number bearing.
a)	Dismantle the lube oil, jacking oil line from bearing.
b)	Remove the old bearing.
c)	Carry out DPT, UT for new bearing.
d)	Carry out all dimensional measurement of new and old bearing.
e)	Replace the new bearing and connect it with lube oil & jacking oil line.
f)	Carry out matching with bearing saddle and rotor journal.
15.30	**Replacement of generator terminal bushing / 'o' ring**
a)	The scope is for replacement of one number of phase or neutral busing /"o"-ring.
b)	Removal of defective bushing.
c)	Inspection of new bushing.
d)	Testing of new bushing
e)	Leak test of new bushing.
f)	Replacement of Bushing / replacement of O rings & gasket.
g)	After replacement of "O" rings work / replacement of bushing work, all the necessary testing (electrical + gas leakage) of bushing shall be done by agency. All the necessary testing equipment shall be in the agency's scope (Bushing HV Test kit will be arranged by NTPC).

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SCOPE OF WORK

JOB:	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**
SL.NO.	DESCRIPTION OF WORK
15.40	**Brushless exciter rotor slip ring machining separately on Low speed Balancing Machine**
a)	Exciter rotor slip ring run-out measurement and making necessary set-up for machining of slip ring.
b)	Arrangement of Machining setup with independent rotating device for exciter rotor slip ring machining separately at unloading bay. All power sources required for machine running shall arrange by NTPC.
c)	Deputation of skilled manpower or agency for slip ring machining along with all tools and tackles for machining and polishing of slip ring and to achieve the run-out as per BHEL recommendation.
d)	Fabrication of machining tools as per suitability of the location and space.
e)	Carrying out OD machining of slip ring, polishing at barring gear in-situ condition to achieve the run-out within design value and to remove any ovality/taper of slip ring.
f)	Provision arrangement of balancing machine as well as balanced adapter coupling plate shall be in scope of agency. The adapter coupling plate to be retained by BHEL for future uses.
15.50	**Demagnetization of Generator/ exciter Rotor**
a)	Deployment of qualified manpower, tools & testing equipment.
b)	Initial measurement of magnetic field intensity on couplings using calibrated gauss meter.
c)	Application of suitable demagnetisation technique to reduce residual magnetism in couplings and associated fasteners. Separate calibrated gauss meter to be arranged by agency and retained by BHEL for continuous measurement.
d)	Progressive demagnetisation at various current levels till the magnetic field is brought down to the extent possible.
e)	Final verification of demagnetisation through gauss meter readings and recording of results.
15.60	**Vibration Expert deputation for Vibration analysis**
a)	Deputation of vibration expert is applicable for generator overhauling works and related to generator bearings + Lp bearing and other bearings as required.
b)	Deputation of vibration expert along with vibration instrument
c)	Analysis of Lp rear, generator Front, Rear and exciter bearing as per requirement. Expert shall carry portable vibration measuring device.
d)	The agency to depute vibration analysis expert with all required equipment to capture and analyse signature and vibration trend of Generator (TG) system from rolling of to full – load of TG set.
e)	The agency needs to carry out vibration analysis of the Generator system during the pre & post overhauling work of the generator and establish reasons thereof for vibrations, if any.
f)	Contractor shall also take run-up characteristics of TG during TG rolling.
g)	Probable reasons and the corrective actions required for achieving normal level vibrations of the TG set. trim balancing requirement, if any, to be clearly brought out.
h)	Detailed analysis to be submitted to BHEL along with the overhauling report / protocol.

SCOPE OF WORK

JOB:	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**
SL.NO.	DESCRIPTION OF WORK
15.70	**Vibration Expert deputation for Trim balancing**
a)	Deploy team for carrying out trim balancing activities and ensure full preparation before start of work.
b)	The sub agency should mobilize required manpower having the experience and skill of fixing balance weights on a warm machine.
c)	Prepare the required access to the balancing planes on the rotor/coupling for fixing of balancing weights.
d)	Prepare the fixtures for fixing the balance weights to the balancing plane on the rotor/coupling.
e)	Barring gear shall be stopped after completion of all preparatory works.
f)	Carry out trim balancing of the– generator system as per the analysis and instructions of the deputed vibration analysis expert.
g)	Balance weights to be fixed at location as finalized by the analysis of the vibration data and locked. box-up the machine after fixing the weights and clearance for turbine rolling to be recorded.
h)	Trim balancing is a continuous (round the clock) activity and manpower of agency to be planned and mobilized accordingly.
i)	Multiple trials as may be required to bring down TG set vibrations to normal level.
j)	Agency shall mobilize necessary manpower, t&p, vibration monitoring machines as per requirement for carry out trim balancing at site.
15.80	**Deputation of expert**
a)	Deputation of expert for winding work (winder) /core repair work/bar repair work/overhang repair work/ RTD replacement work, or all (as required) during the work. subject to acceptance by the BHEL site engineer.
b)	Payment will be made on a pro-rata basis, based on actual man-days deployed, limited to a maximum of 72 man-days.

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SCOPE OF WORK

SL. NO.	DESCRIPTION OF WORK
	SPECIAL TERMS AND CONDITIONS
1.	The detailed SOW mentioned above is not exhaustive and comprehensive. Any other associated works and any other associated equipment & systems not specifically included in or excluded from the scope of work but essentially required for successful completion of work and guaranteed performance of the equipment & systems shall form integral part of the scope of work & agency has to execute the same as per BHEL instruction within final quoted price.
2.	Proper Arrangement of House Keeping, strict compliance of Health Safety & Environment norms of BHEL, Day to Day cleaning of the entire working area and final area cleaning on completion of work including arrangement of water washing equipment and accessories is included in the Scope of Work of the agency.
3.	For carrying out NDT testing, agency has to arrange UT, DPT (fluorescent and normal) kits including penetrant, developer, remover etc. DP and UT kit along with expert and consumables shall be in the Scope of Work of the agency.
4.	The agency shall engage a reputed party for conducting all electrical tests on Generator and auxiliaries & UT/DP by reputed testing agency, which shall deploy persons having valid Level-II certificate in that specialized field. The Agency shall arrange for a detailed test report with all test results, analysis and remarks etc. The testing instrument & meters shall be of good quality and reputed make and are with valid calibrations.
5.	All the scaffolding material as required during work shall be arranged by agency. Agency should arrange separate manpower for scaffolding work on round o clock basis.
6.	All miscellaneous welding works related to Generator shall be arranged by the agency including welding machine, Argon gas, DA cylinder for gas cutting etc.
7.	The agency must maintain proper system of documentation for Quality, Safety, HSE and other aspects so as to fulfil the requirement of ISO, OHSAS, 5S, SA 8000 and other National/ International standards.
8.	The work shall be carried out in three shifts. Deployment of sufficient manpower shall be ensured by the agency. Timely completion and maintaining quality of work, round the clock including Sundays and Holidays.
9.	Penalty will be imposed on agency against violation of safety, health and environment as per NTPC /BHEL guidelines.
10.	The complete overhauling report should be submitted within 15 days from the date of completion of overhauling.
11.	Manpower assistance to BHEL Hardwar team may be required for repair of core packets. If assistance is required, it shall be paid on manhour rate basis as mentioned in tender specification.
12.	Any fixture required for work shall be fabricated/arranged by agency.
13.	Housekeeping on daily basis for maintain cleaning working area.
14.	Transportation of any material/spares from central stores, workshop and site stores to execute The job shall be in the scope of agency. Agency need to arrange suitable transport vehicle for this purpose.
15.	Transportation & disposal of scrap generated during the work at specified locations as per Instruction of BHEL/ NTPC representative.

Pradeep

BILL OF QUANTITY

JOB :	Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.

PART 1 (Unit#10)

SL. NO.	ITEM DESCRIPTION / AREA OF WORK	UNIT	Qty.	% age of allotted Value at Sl.No B.1of rate schedule (%)	Total allotted Value (%)	Completed (%)
	MANDATORY WORKS					
10.00	Overhauling of generator	No.	1	23.90	23.90	
10.10	Attending CC bolt leakage of Exciter Rotor	LS	1	0.93	0.93	
10.20	Replacement of One number faulty stator top bar	No.	2	14.52	29.04	
10.30	Removal & fitment of one number of successive additional bars to facilitate replacement of faulty bar	No.	32	1.385	44.32	
12.00	**Miscellaneous**	LS	1	1.81	1.81	
	TOTAL				100%	

PART 2 (Unit#10) Stator Replacement (BOQ 10.50 to 11.10)

SL. NO.	ITEM DESCRIPTION / AREA OF WORK	UNIT	Qty.	% age of allotted Value at Sl.No B.2 of rate schedule (%)	Total allotted Value (%)	Completed (%)
10.50	Deputation of OEM manpower of portal crane On Man-days basis	Man day	30	0.36053	10.816	
10.60	Arrangement of HT fasteners					
	M20 (limited to 50 nos.) with nut and washer	No.	50	0.00358	0.179	
	M24 (limited to 12 nos.) with nut and washer	No.	12	0.004833	0.058	
	M30 (limited to 10 nos.) with nut and washer	No.	10	0.008	0.08	
	M48 nuts (limited to 40 nos.)	No.	40	0.007375	0.295	
10.70	Arrangement of Trailers for transportation of portal crane to from NTPC Vindhyachal to BHEL Site. (One of option a or b shall be executed)				11.523	
a)	Up to 500 kms	Per KM	1	0.0154		
b)	501 to 1000 kms	Per KM	1	0.011523		

***Note- Sl.No. 10.40** -Replacement of faulty stator bottom bar (shall be billed as 1st Bar and subsequent no of top bars as additional bars i.e. (suppose 25 top bars are removed for 1 bottom bar: Total rate shall be 1st Bar (per unit allotted value of Sl. No. 10.20) & 25 bars (25 X per unit allotted value of 10.30)

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BILL OF QUANTITY

JOB :	Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.					
SL. NO.	ITEM DESCRIPTION / AREA OF WORK	UNIT	Qty.	% age of allotted Value at Sl.No B.2of rate schedule (%)	Total allotted Value (%)	Completed (%)
PART 2 (Unit#10)						
10.80	**Erection & dismantling of portal crane (360 MT)**					
10.80(a)	Erection of Fixed Leg Assembly (LH & RH)	LS	1	0.481	0.481	
10.80(b)	Erection of Hinged Leg Assembly (LH & RH)	LS	1	1.202	1.202	
10.80(c)	Assembly of Main Girders at Bay	LS	1	1.562	1.562	
10.80(d)	Erection of Main Girders on Legs	LS	1	0.961	0.961	
10.80(e)	Erection of Spacer Beams (F1 & H)	LS	1	0.601	0.601	
10.80(f)	Mounting of Trolley	LS	1	0.841	0.841	
10.80(g)	Mounting of Hook & Rope Reeving	LS	1	0.601	0.601	
10.80(h)	Cabling & Interconnection	LS	1	0.601	0.601	
10.80(i)	Ladders, Platforms, etc. Assembly	LS	1	0.481	0.481	
10.80(j)	Commissioning & No-load Trials	LS	1	0.481	0.481	
10.80(k)	Load Test & Certification Portal crane (360 MT)	LS	1	0.601	0.601	
10.80(l)	Dismantling of Fixed Leg Assembly (LH & RH)	LS	1	0.361	0.361	
10.80(m)	Dismantling of Hinged Leg Assembly (LH & RH)	LS	1	0.601	0.601	
10.80(n)	Dismantling of Main Girders from Legs	LS	1	0.721	0.721	
10.80(o)	Lowering & Disassembly of Main Girders at Bay	LS	1	0.361	0.361	
10.80(p)	Dismantling of Spacer Beams (F1 & H)	LS	1	0.361	0.361	
10.80(q)	Dismantling of Trolley	LS	1	0.361	0.361	
10.80(r)	Removal of Hook & Rope Reeving	LS	1	0.361	0.361	
10.80(s)	Removal of Cabling & Interconnection	LS	1	0.24	0.24	
10.80(t)	Removal of Ladders, Platforms, etc.	LS	1	0.24	0.24	
11.00	Generator Stator Replacement	LS	1	57.364	57.364	
11.10	Multi axle trailer arrangement for Shifting of spare stator from service bay/stored location (Load capacity to be more than equal to 280 MT)	LS	1	7.665	7.665	
	TOTAL				100%	
13.00	Providing vehicle for site usage	1 vehicle		As per actual (tentative 90 vehicle days)		

Note: Payment to be made on actual usage/pro rata basis for item no 10.50 & 10.60 and for 10.70(b) on actual Km basis, however for 10.70 (a) minimum km payable shall be 200 Km if the actual distance is less than 200 Km.

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BILL OF QUANTITY

JOB :	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**

PART 3 (Unit # 8)

SL. NO.	ITEM DESCRIPTION / AREA OF WORK	UNIT	Qty.	% age of allotted Value at Sl.No B.3 of rate schedule (%)	Total allotted Value (%)	Completed (%)
	MANDATORY SCOPE OF WORK					
14.00	Overhauling of generator	No.	1	89.9	89.9	
14.10	Attending CC bolt leakage of Exciter Rotor	LPS	1	3.6	3.6	
14.20	Miscellaneous	LPS	1	6.5	6.5	
	TOTAL				100%	
14.30	Providing vehicle for site usage	1 vehicle		As per actual (tentative 50 vehicle days)		

PART 4 (OPTIONAL SCOPE OF WORK)

	OPTIONAL SCOPE OF WORK CAN BE EXECUTE WITH ANY PART 1 or PART 2 or PART 3	UNIT	Qty.	% age of allotted Value at Sl.No A of rate schedule (%)	Total allotted Value (%)	Completed (%)
15.10	Attending CC bolt leakage of Generator Rotor	LPS	2	0.491	0.982	
15.20	Replacement of Generator bearings	No.	3	0.335	1.005	
15.30	Replacement of generator terminal bushing / 'o' ring	No.	3	0.2334	0.7002	
15.40	Brushless exciter rotor slip ring machining separately on Low speed Balancing Machine	LPS	1	4.7811	4.7811	
15.50	Demagnetization of Generator/ exciter Rotor	No.	2	2.3065	4.613	
15.60	Vibration Expert deputation for Vibration analysis	LPS	2	1.1869	2.3738	
15.70	Vibration Expert deputation for Trim balancing	LPS	2	0.3574	0.7148	
15.80	Deputation of expert	M-days	72	0.02178	1.56816	
	TOTAL % age for PART 4				16.73806	

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JOB :	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**

TERMS & CONDITIONS

1.0	**JOB COMPLETION PERIOD:**
	WORK COMPLETION PERIOD (WORK HAS TO BE DONE IN TWO DIFFERENT UNITS AS PER CUSTOMER REQUIREMENT): **PART-1:** The Completion period for the job as mentioned in the scope of work will be as follow-: **Case I** -: In case of only overhauling work, completion period will be 28 days from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4). **Case II** -: In case of overhauling work of generator along with core & top bar repair work, completion period will be 35 days from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4). **Case III** -: In case of overhauling work of generator along with Bottom bar repair work, completion period will be 55 days from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4). **PART 2** -: completion period will be 75 days from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4). **PART-3**: The Completion period for the job as mentioned in the scope of work will be 28 from Barring gear Out to Barring gear IN including any/all OPTIONAL BOQ'S (PART-4).However, the job completion period may be reduced due to any emergent reasons or BHEL's commitment to customer or any other reasons and the agency shall have to complete the work in the reduced completion period as per instruction of BHEL Engineer by augmenting manpower & other resources and by use of improved techniques & methods as required without any extra cost to BHEL. Any additional quantity of work or optional works executed and any unforeseen hold-ups or unavoidable delay not attributable to the agency affecting the Critical Path Activities shall be reviewed and evaluated by BHEL Site Engineer for the purpose of determining Overall Job Completion Period. However, the agency must make all out efforts by augmenting manpower & other resources to meet the completion schedule.
2.0	**EXECUTION OF WORK:**
	Work shall be carried out round the clock in 2 shifts of 12 Hours each with adequate Manpower & Resources in each shift and for all critical activities; workforce must be available during lunch hours & during shift changeover period also so as to avoid any discontinuity in work.
3.0	**COMMENCEMENT OF WORK:**
	The successful bidder must mobilize required manpower & resources at site within 03 days on issue of Mobilization Notice /Telephonic Request. Considering the requirement of statutory permission and other gate pass formalities, agency mobilized & report at site at least 07 days prior to the actual start of the work.
4.0	**DEFECT LIABILITY PERIOD:**
	The defect liability period for the job shall three (03) months from the date of putting machine on barring gear for all parts.

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	The agency shall have to attend the defects directly attributable to their faulty workmanship / negligence / omission and defects arising out of the effects of faulty workmanship, occurred during trial run or during the defect liability period of the equipment without any extra cost. Such reported defects shall be attended at earliest available opportunity as intimated by NTPC. BHEL shall impose a Penalty of 2% of total sub-contractor order value of each individual part on its sub-contractor, if any defect link to poor workmanship is identified during defect liability period. Penalty will be applicable only when the defect (workmanship) is of such order that Unit goes to shut down. **SD shall be released only after successful completion of defect liability for each individual part.**
5.00	**INSURANCE, PROVIDENT FUND & LABOUR LICENCE OF WORKMEN:**
	The agency shall compulsorily take Insurance under Workmen Compensation Act for all personnel deployed and the insurance must be valid till defect liability period. The agency must have independent PF Registration No. and they must deposit the prescribed amount to the Statutory Authorities as per the relevant Acts/Rules. The agency should have valid Labour License and they must obtain the Labour License prior to commencement of work as per the relevant Acts/Rules.
6.00	**GATE PASS & POLICE VERIFICATION OF PERSONNEL:**
	The agency shall arrange entry/exit gate pass for Manpower, Materials & Vehicles from concerned Security Agency of the Customer at their own cost as per the prescribed procedures of the customer. The agency must get the character & antecedents of all personnel deployed to site duly verified from the concerned Police.
7.00	**FACILITIES AT SITE:**
	Suitable accommodation for agency personnel, if available, shall be provided by NTPC on chargeable basis, the charges for which shall be payable directly by the agency. However, in case of non-availability, the same shall be arranged by agency on its own. Suitable Stores & Office for agency shall be provide by NTPC as per the availability at site. However, in case of non-availability, the same shall be arranged by agency on its own cost, space for the same shall be provide at site. The agency shall have to provide, at his own cost, all necessary facilities to the personnel deployed like residential accommodation with proper sanitary facilities, transport, electricity, water, medical, food, safety equipment, personal protective equipment, first aid etc. as required under relevant statutory acts & rules. Adequate arrangement of illumination of working area including providing of flood lights, halogen lamps, 24 V Transformers etc.
8.00	**MANPOWER**
a)	The agency has to deploy adequate nos. of Engineers, supervisors and skilled, semi-skilled & un-skilled manpower so as to complete the work in the specified completion period. Arrangement of Crane operator (02 No.) round O'clock throughout the contract period. Deputation of qualified safety officer (1 No.) and supervisor (1 No.) in each shift throughout the contract period.
b)	The agency shall ensure that no physically unfit/mentally unsound and under-aged person (below 18 years) are employed at any time and shall also maintain the requisite health records of the personnel deployed.
c)	In addition to above, the agency must provide additional manpower as required at any stage of work for smooth execution & timely completion of work without any extra cost to BHEL. In case the agency fails to provide additional manpower as required, BHEL reserves the right to arrange additional manpower from other sources and recover the cost incurred with overhead at prevailing rate from the bills of the agency.

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9.0	**T&P, IMTES & CONSUMABLES:**
a)	Contractor will have to provide all necessary T&Ps, IMTE's & Consumables required for successful completion of works in schedule time. T&Ps & IMTEs used by the agency duly tested and test certificate from Govt. approved agency must be available at site. However, the contractor may be asked to arrange the additional required T&Ps, IMTE's & Consumables at any stage depending upon the job.
b)	Other T&P viz pliers, hammers & files etc. and consumables viz HSS/carbide rotary cutters, carbide tipped cutting tools, material handling T&Ps, Spanners, hacksaws, Measuring Tapes, Tri Square and other general purpose T&Ps/IMTEs, emery papers of various grades, buffing wheels, high speed rotary stones, grinding/cutting wheels, diamond grinding paste, hold tight, Rust removing sprays for removal of seized fasteners etc. are to be arranged in sufficient quantity as per requirement
c)	All consumables like, welding electrodes, gases, cotton waste, emery, cloth, hacksaw blades, petrol /diesel, anti-rust, fluorescent DPT kits, DPT Kits etc. shall be arranged by the contractor at their own cost.
d)	DA, Oxygen, Argon, Liquid Nitrogen and all Industrial gases must be arranged from approved agencies only and their testing certificates must be submitted. Entry Gate pass of all consumables must be submitted to the site office.
e)	In case the contractor fails to provide such additional T&Ps, MMDs, Consumables & Other Materials as required, BHEL reserves the right to arrange additional T&Ps, MMDs, Consumables & Other Materials from any source and recover the cost incurred with overhead at prevailing rate from the bills of the contractor.
f)	All the Critical Material Handling T&Ps such as Chain Pulley Blocks, Pull & Lifts, Slings etc. and Electrical T&Ps such as Welding Machines, Grinders etc. should have valid Testing Certificates and the same must be checked & tested prior to their use at site. In the event of non-availability of the required T&Ps after start of the work, BHEL shall have the option to provide the T&Ps on chargeable basis subject to availability. In addition, a penalty of R s. 1000/- per item shall also be levied on the contractor.
g)	All the Critical MMDs must be available with valid testing & calibration certificates at site. The contractor shall submit the list of available MMDs along with their calibration certificate. In case of failure to submit the above details or in the event of non-availability of the required MMDs after start of the work, BHEL shall have the option to provide the calibrated MMDs on chargeable basis subject to availability. In addition, a penalty of Rs. 1000/- per item shall also be levied on the contractor.
h)	All the Consumables must be of the best quality and of approved brands only. Only BHEL approved Welding Electrodes & Filler Wires shall be used and their Test Certificates shall be submitted. DA, Oxygen, Argon and all Industrial gases must be arranged from approved agencies only and their testing certificates must be submitted. DPT Consumables shall be of CHECKMATE Make only. Aluminium Silicates shall be arranged by the agency free of cost.
10.0	**SUBMISSION OF DOCUMENTS:**
a)	The agency shall have to submit the list of Manpower, T&Ps, MMDs, Consumables & Other Materials before commencement of work and they shall also submit copies of Labour License, PF Registration Certification, Workmen Insurance, Gate Passes of Manpower & Materials and other statutory documents after mobilization at site. Agency has to submit quality Plan, Detail Welding Schedule and Day wise activity schedule before starting of job. During execution of the work, Daily Progress Reports and other required Documents shall have to be furnished by the agency.

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11.0	**JOB PROGRESS & REVIEW:**
a)	Checking of all defects and submission of report to BHEL by the contractor to be done as soon as the machine is opened to facilitate early action for rectification/replacement. Daily work planning, scheduling and reviewing of work will be done by the contractor and Contractor's representative must attend daily review meeting with BHEL every evening in the work control office and submit progress report on daily basis to BHEL. BHEL shall have the option of ensuring completion of the work in time by arranging additional resources and manpower at the risk & cost of the agency in case the job progress is not satisfactory.
12.0	**Safety**
a)	Contractor should engage at 01 no. Qualified Safety 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.
b)	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.
c)	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.
d)	The contractor shall be fully responsible for the safety of his workers.
e)	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.
f)	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.
g)	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.
h)	The contractor shall ensure that prior to start of work all his workers shall get the safety training.
i)	The contractor shall also take care for the safety of the equipment's & persons working in the vicinity.
j)	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.
k)	The helmets, safety shoes and safety belts issued by the contractor shall be conforming to relevant IS standards.
l)	The contractor shall maintain the first aid box at site.

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JOB:	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**		
13.0	**PROVISION OF PPEs**		
a)	Personnel Protective Equipment (PPEs), in adequate numbers, will be made available at site & their regular use by all concerned will be ensured.		
b)	The following matrix recommends usage of minimum PPEs against the respective job.		
	Sl.NO	**Type of Work**	**PPEs**
	I.	Concrete and asphalt mixing	Nose mask, hand glove, apron and gum boot
	II.	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
	III.	Stone /concrete breakers	Ear muffs, safety goggles, hand gloves
	IV.	Electrical Work	Rubber hand glove, Electrical Resistance shoes
	V.	Insulation Work	Respiratory mask, Hand glove, safety goggles
	VI.	Work at height	Double lanyard full body harness, fall arrestor (specific cases)
	VII.	Grit/Sand blasting	Blast suit, blast helmet, respirator, leather gloves
	VIII.	Painting	Plastic glove, Respirators (particularly for spray painting)
	IX.	Radiography	As per BARC guidelines
c)	All employee of agency should wear company uniform along with company logo at work place. Pl ease follow strictly. Otherwise it may lead to penalty under safety provision.		
d)	Important Safety Conditions		
e)	Agency has to ensure utmost safety at all associated workplace/s. Penalty for non-compliance of safety rules each time.		
f)	Non-using safety shoes per person per occasion -–Rs.1000		
g)	Non-using safety helmet per person per occasion -–Rs.1000		
h)	Non-using safety belt per person per occasion -–Rs.1000		
i)	As the work involves working on height suitable zip(life) lines, safety nets and harness etc should be maintained on part of the vendor. Reflective safety jacket is a must for the same and all the same should be mentioned during insurance of workers.		

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JOB :	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**
14.0	**MISCELLANEOUS**
a)	Agency shall depute their representative for necessary co-ordination, follow up and shifting/transportation of materials from and to work spot / workshop /stores etc. Day to day area cleaning and scrap removal & final area cleaning after completion of work to be done as directed by BHEL. Removal of insulation, refractory, cladding, paint as per site requirement is included in the scope. All jobs are to be carried out as per BHEL norms and all measurements/clearances etc. are to be set as per BHEL standards.
b)	Transportation of Materials at Site including arrangement of truck/trailer and Hydra along with fuel and operator as required. Return of unutilized spares and other materials provided by the customer.
c)	No idle labour/over-run/de-mobilization/mobilization charges shall be paid in the event of any stoppage of work or the completion period getting extended for any reason.
d)	The successful bidder shall not sub – contract work in part or whole without the written permission of BHEL and the bidder is solely responsible to the work awarded to the bidder.
e)	No interest shall be payable on Earnest Money Deposit, Security Deposit or any other claims. Terms of forfeiture of EMD & SD and Other Terms & Conditions shall be as per NIT.
15.00	**Important Safety Conditions**
a)	Amount linked towards safety aspects/ compliance to safety rules: 5% of contract value. Amount 5% from each RA bill will be deducted towards compliance of safety provisions by contractor, amount will be released at the work completion (whichever is earlier) after due certification by BHEL and safety in-charge for fulfilment of safety aspects for the reference time period. In case of any deviation or penalty, amount will be deducted as per tender provisions regarding safety compliance.

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TERMS & CONDITIONS FOR VEHICLE USAGES AT SITE

JOB :	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**

D.	TERMS & CONDITIONS FOR VEHICLE USAGES AT SITE
1.	Type of Vehicle must be (6+1 Seater) Bolero/ Scorpio or any equivalent type of Vehicle and not older than 2020 Model with excellent running conditions or, Type of Vehicle must be (4+1 Seater) Dzire/Indigo/SUV or any equivalent type of Vehicle and not older than 2020 Model with excellent running conditions. BHEL shall inform as per manpower deployed.
2.	The vehicle should be in the name of bidder or should be duly authorized by the rightful owner for deployment under this contract.
3.	Distance and time shall be taken into the account from garage to garage. However, these will be limited to 10 km and half an hour each way for the payment of purpose.
4.	The above rates are inclusive of all charges towards driver, fuel, maintenance, lubricants, insurance and statutory taxes etc. No other charges shall be payable.
5.	Duty hours shall be 12 hours/day. Depending on the site condition vehicle can be retained at site throughout the night and continued next morning in which case overtime (OT) beyond 12 hours will be paid as per agreed rates.
6.	Night charges and overtime charges shall Not be paid concurrently beyond 11 pm.
7.	The vehicle shall be diesel or petrol driven and in excellent running condition. In case of break down alternate replacement vehicle shall have to be provided by the agency otherwise BHEL will arrange the vehicle at the risk and cost of the agency.
8.	For running charges, receipt of fuel shall be attached along with bill.
9.	The maintenance of vehicle shall be responsibility of agency. However, suitable breaks for maintenance of vehicle shall be given as per convenience of BHEL, during this agency shall provide alternate vehicle.
10.	All expenses towards state taxes/road tax, passenger taxes, road permits, pollution control certificate, insurance, driver's license etc. shall be borne by the agency. No claim in this regard will be entertained by BHEL.
11.	Mobile Phone is compulsory for each driver who is on duty.
12.	All legal responsibility of the vehicle shall be of the agency. Photocopy of all statuary requirements i.e. pollution test certificate, challan, vehicle registration book, driving license, ownership documents etc. will have to be made available/submitted to BHEL by the agency.
13.	Toll tax and parking charges shall be paid by the agency which will be reimbursed to him by BHEL, as per actual, on submission of receipt.
14.	Vehicle shall be used at site as per requirement till completion of work, if work completed before the contract period BHEL reserves the right to terminate the contract.
15.	The vehicle may be required to be taken outside the power plant area whereby the same rates will be applicable.
16.	During contract, if there is any dispute then the decision taken by the legal advisor appointed by BHEL shall be binding on both parties.
17.	The meter reading shall be checked at random intervals to ensure its correctness.
18.	Driver engaged shall be courteous and well behaved. Safety of driver, his accommodation, food and other facilities for the driver have to be arranged by the agency.
19.	All bills shall be accompanied by vehicle log book, duly completed and signed by the users.
20.	No payments shall be made for the unsigned mileage reflected in the log book.
21.	Payment shall be made after completion of work on receipt of bills and duly verified by BHEL engineer in-charge by electronic transfer to the account in the bank identified by the agency.
22.	Signed no due certificate from the owner of the vehicle along with signed wage sheet payment of drivers should be enclosed along with the bill.

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TENTATIVE PACKING LIST OF PORTAL GANTRY CRANE TRAILER WISE

JOB : **Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**

ITEM DESCRIPTION	QTY.	APPROX. WT. (in MT)	DIMENSIONS (in M) L x W x H	TYPE OF VEHICLE	CAPACITY OF VEHICLE (in MT)
MAIN GIRDER (M1-Left) + SPLICE JT. PLATES	1 No.	33	18.9 x 1.350 x 2.4	TRAILER 60 '	33
MAIN GIRDER (M1-Right) + SPLICE JT. PLATES	1 No.	33	18.9 x 1.350 x 2.4	TRAILER 60'	33
MAIN GIRDER (M2+M3-Right) + SPLICE JT. PLATES	1 No.	17.65	10.36 x 1.350 x 2.4	DOUBLE AXLE TRAILER	22
MAIN GIRDER (M2+M3-Left) + SPLICE JT. PLATES	1 No.	17.65	10.36 x 1.350 x 2.4	DOUBLE AXLE TRAILER	22
HINGE LEGS (H2+H3) (8.50 T)	1 Nos.	11.7	14 x 4.8 x 0.6	DOUBLE AXLE TRAILER	22
HINGES (2 T)	2 Nos.		0.6 x 0.6 x 0.8		
LADDERS (1.2 T)	4 Nos.		0.8 x 4.3 x 0.6 5 x 1 x 2		
HINGE LEG (H1) + HINGE (2 Nos.) (8.5 T)	1 NOS.	13.6	9.5 x 4.8 x 0.6	DOUBLE AXLE TRAILER	22
HINGE LEG (H4) + HINGE (2 Nos.) (2.8 T)	1 NOS.				
TROLLEY STAND (2.2t)	1 NOS.		2 x 2 x 1.4		
HINGE LEG PLATFORMS (.1T)	14 NOS.		Small items		
SPACER BEAM (Fix Leg) (8.6T)	1 NO.	25	7.5 x 1 x 3.8	TRIPLE AXLE TRAILER	27
SPACER BEAMS (Hinge Leg) (5.5T)	1 NO.		7.5 x 1 x 2.5		
FIXED LEGS+ HINGE (Right & Left) (3.5T)	2 NOS.		3.5 x 1.5 x 0.9		
FIXED LEGS CONNECTING LINKS(1T)	2 NOS.		0.9 x 0.9 x 0.6		
LOAD BEAM (6.4T)	1 NO.		3.51 x 1 x 1		
SM CLASSIC TROLLEY (SM1116) with cover	1 NO.	33	6.2 x 4.8 x 1.7	TRAILER	33
LIFTING SLING - (TKRP-105 78mm) - 3 nos. 5T	1 BOX	7	2 x 2 x 1	DOUBLE AXLE TRAILER	22
PLATFORMS	11 NOS.				
GIRDER HANDRAILS	5 NOS.		Small item (2 x 2 x 2)		
LADDERS	4 NOS.				
PENDANT & FESTOON MOUNTING BRACKETS	2 NOS.				
ELECTRIC PANEL	1 BOX	15	Max size item 2 x 2 x 1.5	DOUBLE AXLE TRAILER	22

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JOB :	**Overhauling of 500 MW Generator (2 No.), stator repair, replacement, Assembly & Dismantling of Portal Crane for one unit of 500 MW & at NTPC Vindhyachal.**

Portal crane (360 MT) Specification

TECHNICAL DATA

LOAD	360 t
SPAN	26.67 m
LIFTING HEIGHT	23.18 m (23 m)
HOISTING SPEED	1/0.06 m/min
TRAVERSING SPEED	6/1 m/min
HOISTING MOTOR (2xM18LCTNB2A1A49)	2X37 kW, 40% ED
- MICRO SPEED MOTOR (2xM010LATU2X5783)	2X22 kW, 100% ED
TRAVERSING MOTOR (2xM011MTUB4X3595)	2X1.8 kW, 40% ED
- MICRO SPEED MOTOR (2xM010LTU4X4064)	2X1.1 kW, 100% ED
TRAVELLING MOTOR	
-MICRO SPEED MOTOR	
WEIGHT OF TROLLEY	2x20 t
WEIGHT OF BRIDGE	128 t
POWER SUPPLY	3 ~ 415 V ; 50 hZ
LENGTH OF RUNWAY	
CRANE GROUP	
- STEEL STRUCUTRE	FEM 2
- HOISTING MACHINERY	FEM 1Bm
- TRAVERSING MACHINERY	FEM 1Am
- TRAVELLING MACHINERY	
WEIGHT OF LOADING DEVICE	8 t

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