

SUB-CONTRACTOR SCOPE OF WORK		
Reheater Replacement (including its testing and commissioning) & Capital Overhauling of Boiler for Unit#5, 210 MW at GGSSTP Rupnagar		
1	Tender Shall Comprise of 2 (Two) Parts: Separate Work order will be issued for each part as per percentages (%) of QV mentioned in Rate Schedule.	
PART-A	Capital/Major Overhauling of Boiler, Air-preheater & It's Auxiliaries for Unit#5, 210 MW at GGSSTP Rupnagar.	44.49111% of QV
PART-B	Dismantling, Erection (Replacement of existing Reheater) Testing & Commissioning of complete Reheater for Unit#5, 210 MW at GGSSTP Rupnagar.	55.50889% of QV
2	COMPLETION PERIOD:- PART A - Forty five (45) days for Scope of Work from the start of work after cooling down of boiler to working temperature to the date of final hydraulic test of Boiler. PART B- Forty five (45) days for Scope of Work from the start of work after cooling down of boiler to working temperature to the date of final hydraulic test of Reheater.	
3	Defect Liability Period shall be:- PART-A:- 30 days from the date of Synchronization of the Unit#5. Subcontract shall provide Full Resource support as and when required for keeping trouble free operation of the unit. PART-B:- 12 Months from the date of taking over of the Unit#5 by Customer. NOTE:- 1.If any Deduction on the part of non- execution of work during defect liability is done by Customer shall be back to back deducted from vendor along with overheads as applicable. 2.For any defect reported by customer within defect liability period. Sub-contractor will attend to defect(s) free of cost as per Shutdown provided by customer. Subcontractor shall provide Comprehensive support as and when required for keeping the Unit to run under defect liability period. 3.Subcontractor will not be relieved from its liability even if attended defect (Reported by customer within defect liability period) repeats even after attending of the defect and vendor has to attend to defect(s) free of cost. Security Refund: For Part-A: Shall fall due after completion of Defect liability period for Mandatory & Optional works, if executed. For Part-B: Shall fall due after completion of Defect liability period subjected to compliance of performance guarantee.	
PART -A	Capital/Major Overhauling of Boiler, Air-preheater & It's Auxiliaries for Unit#5, 210 MW at GGSSTP Rupnagar.	
DESCRIPTION OF MANDATORY WORKS		% of CV of PART-A
A	Boiler Furnace & Pressure Parts	56
B	Wind Box & Burners	15
C	Air Preheaters (2 Nos.) & General Requirements to the Scope of work	29
GRAND TOTAL PART - A		100



OPTIONAL WORKS (To be Executed along with PART-A, if Required)		
	DESCRIPTION OF OPTIONAL WORKS	% of Quoted Value (QV)
1	HP Joints up to 76.1 mm dia. Beyond 450 Nos. (Included in Mandatory works) including its radiography (Considering 500 Number of Joints per Unit)	3.46927%
2	Lowering of additional economizer coil Module (set of 2 or 3 coils) (beyond included in mandatory works) (Considering 1 Module per Unit)	0.06621%
3	Lifting of additional LTSH coil Module (set of 2 coils) (beyond included in mandatory works) (Considering 1 Module per Unit)	0.06621%
4	Scaffolding Materials Retention Charges beyond 45 days subject to retention is done due to reason not attributable to the vendor. (Considering 10 Days of per Unit)	1.36866%
5	Replacement / Reversal of intermediate baskets beyond 20 Nos. (Considering 100 Baskets per Unit)	0.44056%
6	Replacement of support bearing of APH (Considering 1 Bearing per Unit)	0.37962%
7	Replacement of expansion bellow of APH PA/SA inlet/outlet ducts (1 set contains 4 bellows) (Considering 2 sets per Unit)	3.10838%
8	Replacement of Hot end / cold end sector plates (Considering 4 Plates per Unit)	2.60092%

PART - B	Dismantling, Erection (Replacement of existing Reheater) Testing & Commissioning of complete Reheater for Unit#5, 210 MW at GGSSTP Rupnagar.	
DESCRIPTION OF MANDATORY WORKS		% of CV of PART-B
A	Material Handling, Steam Blowing & Dismantling	30
B	Erection, Welding, Radiography of Reheaters	45
C	Restoration, Hydro Testing	15
D	Commissioning & Necessary Testing	10
GRAND TOTAL PART - B		100
Note:		
1	Tentative Date of SHUTDOWN or Start of Work for Unit#5 will be Jan-2027 , However, the schedule is subject to confirmation from customer.	
2	Optional works will be paid, if any of work is executed as per site needs inline with Customer accepted Numbers over Protocol, It shall be in the scope of Vendor to submit Optional work MOM with customer along with Submission of Invoice. Vendor has to provide details of Optional works executed in consent of customer for MOM finalization.	
3	It shall be in interest of the vendor to visit the site before quoting for the work.	



RATE SCHEDULE

A	Lump sum (LS or LPS) price for the TOTAL SOW "Mandatory Works" as per (Annexure-A) inclusive of all consumables, input materials and supervision (Excluding GST/Taxes & Duties.).	Amount to be Quoted: _____				
B	Break up of Price quoted at S. No. A					
S. No.	Job Description for Mandatory Works	Qty	UoM	% age Allotted of the QV at S. No. A	Completion Period (Days)	Remarks, If any
PART-A	Capital/Major Overhauling of Boiler, Air-preheater & It's Auxiliaries for Unit#5, 210 MW at GGSSTP Rupnagar.	1	LPS	44.49111% of QV	Forty five (45) days for Scope of Work from the start of work after cooling down of boiler to working temperature to the date of final hydraulic test of Boiler.	-
PART-B	Dismantling, Erection (Replacement of existing Reheater) Testing & Commissioning of complete Reheater for Unit#5, 210 MW at GGSSTP Rupnagar.	1	LPS	55.50889% of QV	Forty five (45) days for Scope of Work from the start of work after cooling down of boiler to working temperature to the date of final hydraulic test of Reheater.	-
Details of OPTIONAL WORKS (To be Executed along with PART-A, if required Payment shall be done as per actual executed on pro-rata basis)						-
1	HP Joints up to 76.1 mm dia. Beyond 450 Nos. (Included in Mandatory works) including its radiography (Considering 500 Number of Joints)	<u>500</u>	<u>NO</u>	3.46927%	-	% Allocated is for 500 numbers of Joints
2	Lowering of additional economizer coil Module (set of 2 or 3 coils) (beyond included in mandatory works) (Considering 1 Module)	<u>1</u>	<u>Module</u>	0.06621%	-	% Allocated is for 1 numbers of Modules
3	Lifting of additional LTSH coil Module (set of 2 coils) (beyond included in mandatory works) (Considering 1 Module)	<u>1</u>	<u>Module</u>	0.06621%	-	% Allocated is for 1 numbers of Modules
4	Scaffolding Materials Retention Charges beyond 45 days subject to retention is done due to reason not attributable to the vendor. (Considering 10 Days)	<u>10</u>	<u>NO</u>	1.36866%	-	% Allocated is for 10 numbers of Days
5	Replacement / Reversal of intermediate baskets beyond 20 Nos. (Considering 100 Baskets)	<u>100</u>	<u>NO</u>	0.44056%	-	% Allocated is for 100 numbers of Baskets
6	Replacement of support bearing of APH (Considering 1 Bearing)	<u>1</u>	<u>NO</u>	0.37962%	-	% Allocated is for 1 numbers of Bearings
7	Replacement of expansion bellow of APH PA/SA inlet/outlet ducts (1 set contains 4 bellows) (Considering 2 sets)	<u>2</u>	<u>SET</u>	3.10838%	-	% Allocated is for 2 Sets of Bellows.
8	Replacement of Hot end / cold end sector plates (Considering 4 Plates)	<u>4</u>	<u>NO</u>	2.60092%	-	% Allocated is for 4 numbers of Plates

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Part-A		
SCOPE OF WORK		
Sub :	Boiler & Auxiliaries overhauling at GGSSTP Ropar Unit#5 210 MW.	
A-1	Boiler Furnace & Pressure Parts:	% of CV of Part-A
i)	MAIN FURNACE	
	Supply and erection of cup lock type scaffolding in the furnace first pass (up to ceiling superheater), sealing at Goose neck area including scaffolding for Platen, SH, FSH & RH. Conventional scaffolding for second pass. Dismantling of scaffolding after completion of work. Scaffolds being erected, modified or dismantled must be tagged as suitable for use, before start to work. Tagging shall be done with standard tag holder. Scaffolding tag should be certified by scaffolding inspector having valid certificate. (Vendor has to arrange cup lock type & Conventional scaffolding) > GREEN scaffold tag - shall be fixed when scaffold is complete and safe for use, signed and dated by the scaffolding competent person daily. > RED scaffold tag - to be fixed if scaffold is in some way defective and cannot be used or is still under erection. > YELLOW scaffold tag - to be fixed if scaffold is in under construction/ maintenance. Scaffolding inspector is to be deployed by Vendor. For other areas including platen superheater, reheater, final superheater & all second pass areas, all the scaffolding material including pipes, challis / wooden planks etc. will also be in contractor scope. Scaffolding will be made in the areas as per requirement / directions of Engineer In charge. However minimum areas for erection of scaffolding are as detailed below: (a) Front middle and rear of Platen-superheater-Three Elevations Top/middle/ Bottom (b) Front middle and rear of reheater -Three elevations Top/middle/bottom (c) Front and rear of Final Superheater-Three elevations Top/middle/bottom (d) Economizer hanger tubes-three rows (A, B, C) three elevations Top /middle/ bottom (e) Spacer tube inspection. (f) Economizer bottom above entire ECO hoppers. (g) Economizer Supply tubes up to lower bends. Note:- Any Repair/defect due to scaffolding erection and removal shall be considered into the period of defect liability.	15
ii)	Inside & outside cleaning of boiler & areas as specified by EIC. Water Washing/Cleaning of entire pressure parts up to first pass & second pass along with clearing of ECO hoppers by water jet cleaning and manual scrubbing & all other areas by manual scrubbing. Jet cleaning system/ equipment to be arranged by contractor as per instruction of EIC. The firm will bring separate jet cleaning pump for pressure parts cleaning and for cleaning of APH heating baskets of sufficient discharge pressure. The Quantum of Ash as found is to be removed from the boiler as per instruction of EIC for carrying out the COH works.	3
iii)	Inspection of tubes & measurement of thickness to identify damaged, overheated, eroded tubes and bends for replacement. The thickness survey shall be carried out by thickness meter in the areas mentioned below but not limited to these, the same will be carried in areas as per requirement /direction of engineer-in-charge detailed report shall be submitted immediately after completion of thickness survey to access the damage and carry out the repairs. a) Water wall around soot blower areas. b) Burner panels. c) S panels. d) Platen Superheater. e) Reheater f) Final Superheater. g) Water wall hanger tubes. h) Water wall screen tubes. i) LTSH terminal tubes. j) Economizer hanger tubes. k) Economizer coils. l) ~~Ceiling superheater~~	5
NOTE:-	a) The contractor will have to bring minimum four ultrasonic type D-Meters in working condition with four skilled persons for D-Metering. D-metering team deployed should have Level-II, having 5 years of working experience. b) D-Metering will be only done after thorough cleaning by emery paper/buffing wheel. c) D-Metering work in second pass will start immediately after internal water washing of boiler. d) D-Meters and D-Metering staff will remain at site till thickness survey completion and clearance of same by engineer In-charge. e) Contact media like grease/jelly tubes would be used. (no open grease would be allowed).	

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iv)	To cut samples from water wall tubes for determination of scale formation inside the tubes and to weld new tubes in their place. In water wall screen tubes, LTSH and economizer area, Baffles have been provided on the bends for screening. For thickness survey, these will have to be removed and re-fixed, any addition/alteration in the cassette baffles is also included. Apart from shields/cassette baffles of LTSH /Economizer coils associated with lifting /taking out of these coils for inspection/ rectification, any other rectification / addition / replacement in cassette baffles/ shields in all the areas is also covered in scope of work without any extra charges. As per directions of engineer in-charge, the firm will cut and remove the Economizer coils out side the furnace for proper repair. The economizer coils taken outside will be shifted to "0" meter elevation for repair/ replacement of damaged portions.	2
iv)1	Replacement of tubes, bends, panels and coils found defective in the above area i.e. at Sr. no. (iii) & (iv) above. Inspection and replacement of drain bends of SHH-8, SHH-4 including their expansion bellows without any extra charges. Replacements will include:-	4
iv)2	Providing of shields and replacement of worn out stub bends of LTSH inlet header, i.e. header no. 9 and providing of shields on screen tubes etc. Stress relieving equipment with control unit and experienced operator to be arranged by Vendor.	1
iv)3	Checking and replacement/repair of damaged cassette baffles.	1
iv)4	Inspection of buck stay beams of 1st and 2nd pass and adjustment/ rectification of the same, if required.	1
iv)(a)	Bringing of tube from Site store/central store to site after cleaning of tube with air pressure to make it free from dust / foreign material.	6
iv)(b)	In all vertical tubes, grinder would cut first lower joint and thereafter proper blanking would be done before cutting of upper joint.	
iv)(c)	All vertical tube holes (after cutting) would be necessarily covered by blanks to avoid falling of any foreign material in the tubes.	
iv)(d)	Certified HP Welder (BHELwill also test the welder) would do all HP Welds and related fin welding.	
iv)(e)	Root run would be done by TIG subsequent run would be done by ARC welding.All welding electrodes including TIG filler wires required for HP welding shall be in subcontractor scope.	
iv)(f)	Use of proper tube material, welding electrode, heat treatment if required is to be Confirmed from BHEL representative.	
iv)(g)	Equipment, instrumentation and manpower for heat treatment would be brought by contractor at no extra cost to BHEL.	6
iv)(h)	Electrode heating ovens in good working condition to be supplied by contractor are to be compulsorily used by welders. All HP welders must have valid running certificates.	
v)	Welding of high pressure joints of pressure parts root run by TIG welding and subsequent run by Arc welding process. 100% radiography of the welded joints and repair of defective joints. 450 nos. HP joints per unit will be covered under lump sum rates i.e. Mandatory works (Four hundred fifty H.P. Joints). However HP Joints welded more 450 nos. will be paid extra per joint as per Rate Schedule of actual number of joints . Some water wall portions may have to be replaced in the form of water wall panels or loose tubes. The firm will replace water wall in the form of water wall panels or water wall tubes / bends as per directions of engineer in-charge depending upon actual inspection at site. This job will be covered under HP joint rate. Total 500 numbers extra H.P. joints per unit have been estimated for the unit as Optional works.	
vi)	Post welding heat treatment / stress relieving of H.P. joints as per norms wherever required i.e. for thickness of carbon steel >19mm and alloy steel > 13mm etc.	3
vii)	Checking of alignment of platen super-heater, final super-heater, ceiling super-heater, economizer, LTSH lower and upper bank as per standard procedure and rectification by standard method.	1
ix)	Inspection of ring header by opening hand hole and removal of unwanted foreign material.	
x)	Inspection of liners in de-super-heater and inspection of headers for foreign materials if any by removing plug/welding joint and re-welding the plug joint. Removal of foreign material is also included.	
xi)	Adjustment and repair of all man holes and peep holes of Boiler furnace 1 st & 2 nd pass. All necessary refractory works is included in scope.	1
xii)	Checking of flexible joints of buck-stays in first and rear pass and re-fixation of nuts, bolts and pins etc.	
xiii)	Inspection of corner fittings of buck-stay beams with furnace and header, minor rectification of any defect noticed.	
xiv)	Removal of ash from boiler area like enclosures, viz. penthouse, dog house, S-panel and inspection and repair of skin casing, economizer hopper etc. and its thorough cleaning including Ash disposal from zero meter. Inspection and repair of its supporting structure. Inspection repair and replacement of supporting structure below economizer coil up to air-pre-heater inlet duct of F.G. The Quantum of Ash as found is to be removed from the boiler for the COH works.	1
xvii)	Cutting of four nos. water wall tube samples i.e. one from each water wall of high heat zone area.	1
xviii)	Die-penetrating tests of stub joints of platen superheater inlet and outlet and reheater inlet headers.	
xix)	Fin welding of tubes as per site requirement / instruction of the Engineer-in-charge is in the scope of contractor and no extra payment shall be made.	
xx)	Taking out or lowering of minimum 2-3 Nos. end coils of economizer from each end, complete inspection and replacement of eroded/thinned tubes thereof and refitting in original position. Lowering of additional coil shall be paid extra as per Optional work rates .	2
xxi)	Lifting of minimum 2 nos. end coils of LTSH at each end, complete inspection and replacement of eroded/thinned tubes there of. Lifting of additional coil shall be paid extra as per Optional work rates .	
xxii)	Hydrostatic test of Boiler Pressure parts.	1

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A-2	<u>BOILER DRUM INTERNALS</u>	
i)	Inspection of boiler drum by removal of drum internals, checking of drum internals and re-setting/repair of the same. Re-fixation of internals after servicing.	2
ii)	Inspection/repair of phosphate dosing line, CBD line, Baffle etc. and thorough cleaning to know their continuity.	
A-3	<u>SAFETY VALVES</u>	
i)	Assistance in Cutting and set right of seats of safety valves using valve seat cutting machine (which shall be in the scope of Vendor along with expert/technician) for Boiler Drum, CRH, HRH and MS Safety valve.	1
A-4	<u>SEAL TROUGH</u>	
i)	Installation of scaffolding & lighting arrangement inside boiler. Repair/rectification in seal trough area.	1
ii)	Inspection and rectification of wire mesh of seal trough is also included in the Scope of work.	
iii)	Removal of refractory & MS Plates & its repair as per site requirement.	
A-5	<u>PENT HOUSE:</u>	
i)	Ash to be removed from all the areas of pent house including first pass, platen superheater area, reheater and final superheater area and second pass. The Quantum of Ash as found is to be removed as per instruction of EIC.	4
ii)	Cutting of damaged skin casing plates/ channels /expansion bellows/ crown plates / seal bands etc.	
iii)	Removal of damaged beams.	
iv)	Removal of damaged castable refractory.	
v)	Alignment of misaligned radiant superheater tubes.	
vi)	Replacement of damaged saw cut fins.	
vii)	Application of new bitumen paint subjected to supply of bitument paint by PSPCL.	
viii)	Application of castable refractory.	
ix)	Fixing and welding of new skin casing sheets / channels /expansion bellows/ crown plates/seal bands etc..	
x)	Fixing of hangers/replacement of damaged hangers.	
xi)	Repair of refractory, Repair of roof etc.	
xii)	Repair and servicing of manholes of pent house.	
xiii)	Attending to the leakage points observed during air tightness test of furnace in pent house.	
xiv)	For sheet/structural welding inside the pent house welding electrodes conforming AWS-E-7018 as detailed in scope of supply shall only be used. The Make of Electrodes shall be only of BHEL Approved Vendor.	
Total % of (A)		56
B-1)	<u>COAL BURNERS:</u>	
i)	Removal of coal burner after locking the coal pipes.	7
ii)	Checking of coal burners for proper alignment and tilting. Re-setting of the system to have proper angle of burners and proper lower and upper tilt on all corners.	
iii)	Replacement of coal burners found defective.	
iv)	Complete servicing of Tangential Tilt burner assembly including SADC, wind box, and burner tilt mechanism.	
v)	Zero setting of all nozzles and ensuring proper and equal burner tilt and SADC operation.	
vi)	Opening of side plates and front plates of coal elevation and re-fixation around the wind box with proper sealing.	
vii)	Providing new bolts in place of broken one shall be in the scope of subcontractor	
viii)	Shifting of new/repared coal burners from store to site and dismantled burners from site to store/workshop.	
B-2)	<u>OIL GUNS</u>	
i)	Checking of oil guns removable and fixed part including diffuser and their tilting mechanism.	2
ii)	Repair/replacement of any worn out / damaged component.	
iii)	Resetting of alignment of oil guns if required.	
B-3)	<u>AIR NOZZLES</u>	
	Checking of all air nozzles, secondary air dampers, scanner guide pipes, igniter guide pipes and wind box expansion joints.	1
i)	Repair/replacement/servicing of any worn out / damaged components.	
ii)	Resetting / alignment of components.	
iii)	While ensuring trouble free operation of secondary air dampers, minimum gaps to be ensured in closed position. Fresh proper marking of dampers position will be done by the contractor .	
B-4)	<u>WIND BOX</u>	
i)	Ash removal & cleaning of Wind box. Inspection of both wind boxes (left and right) and secondary air duct starting after outlet expansion bellow of APH to identify and repair/replacement of eroded ducting plate, the expansion bellows, beams, other connected structure and attachment welds inside the wind box as required.	5
ii)	To identify and repair of furnace for leakage at wind box along the walls in 1 st and 2 nd pass and to conduct leakage test after the repair and to repair the partition plates of wind box of all the four corners.	
Total % of (B)		15

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C)	<u>AIR PREHEATERS</u>	
(i)	HOT WATER WASHING OF AIR PREHEATER	
(a)	Opening of APH manhole doors, S.A. and P.A. duct drain points.	1
(b)	Charging of water washing lines of APH by operating the valve.	
(c)	Also water washing is to be done by fire hoses through APH manhole doors.	
(d)	In case of partial choking of fire fighting and water washing nozzle, the same is to be cleaned and water washing to be done again.	
(ii)	INTERNAL CLEANING AND INSPECTION	
(a)	Checking accesses for entering inside the Airpreheater safely from each manhole door.	1
(b)	Checking hand railing near every manhole door (inside /outside the Airpreheater) and providing the same if railing is weak or not available.	
(c)	Cleaning of all manhole door plates so that entry through the door can be safe.	
(d)	Removal of ash accumulated at air heater ducting portions above and below the expansion joints.	
(e)	Cleaning of ash and other debris if any accumulated over heating elements.	
(f)	Checking of all internals of APHs like Seals, Supports, Ducts, Sector plates and axial seal plate, Baskets and gratings.	
(g)	Airpreheater water washing to be done with washing lines as well as fire hose through manholes.	
(h)	Rope of all manhole doors to be replaced and damaged manholes to be repaired.	
	NOTE:- Adequate and safe scaffoldings are to be provided for internal inspection wherever required (specially for cold end side).	
(iii)	INSPECTION OF SUPPORT BEARING	
(a)	Cleaning of support bearing area and removal of support bearing cover.	1
(b)	Draining of oil and cleaning of surface for level checking.	
(c)	Inspection of bearing housing level and bearing condition.	
(d)	Fixing back the cover by providing proper ropes and gaskets and Lube oil filling.	
(e)	Dip stick level marking, checking and remarking if required.	
(iv)	GUIDE BEARING INSPECTION / REPLACEMENT	
(a)	Cleaning of guide bearing area and inspection of base frame weldments and rectification if required.	1
(b)	Draining of oil & removal of all connecting Lube oil lines.	
(c)	Removal of guide bearing cover and cleaning of internals.	
(d)	Inspection of guide bearing to ensure its healthiness.	
(e)	If guide bearing found damaged is to be replaced by proper locking of rotor.	
(f)	Cleaning of all Lube oil lines.	
(g)	Restoration of dipstick and Lube oil lines, topping up oil.	
(h)	Placement of guide bearing cover.	
(i)	Dip stick level marking checking and remarking if required.	
(v)	CLEANING OF HOT AND INTERMEDIATE BASKETS	
a)	There are 120 nos. of hot end baskets and 120 nos. of intermediate end baskets per Airpreheater.	8
b)	This job is to be done sector wise, ensuring the equilibrium of Airpreheater by opening of basket removal door at the rear side of FG duct at hot end.	
c)	Shifting and fitting of monorail beam and chain pulley blocks.	
d)	Inspection / reversal / replacement / interchanging the hot end / hot intermediate baskets.	
d)	Cleaning of hot end/ hot intermediate baskets in position by firewater hose, Pocking rods and water jet pump as per site requirement.	
e)	Welding of stay plates with diaphragm plates if found broken and repair of basket support bars as per requirement.	
f)	Putting back hot end baskets in position. If any of the baskets is found not fit for use, should not be positioned and should be replaced with new basket.	
g)	Removal of monorail, chain pulley blocks etc.	
h)	Closing of basket removal door by providing suitable sealing material.	

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(vi)	CLEANING OF COLD END BASKETS.	
a)	There are 120 nos. of cold end baskets in 24 sectors per Airpreheater.	4
b)	This job is to be done sector wise ensuring the equilibrium of air pre heater. Opening basket removal door at the cold end of individual sectors.	
c)	Removal of baskets from position and cleaning them by water jet pump to the entire satisfaction of engineer in-charge and proper stacking.	
d)	Repair of baskets, casings and supports as per requirement.	
e)	Repair/replacement of cold end diaphragm plate and cold end basket door.	
f)	Repair of cold end basket grating support by welding of pieces of M.S. plates.	
g)	Inserting back the baskets in position.	
h)	Inserting of basket removal doors by providing suitable sealing left after closing the door.	
Note:-	The firm will bring jet cleaning pumps(Minimum 2 Numbers) developing sufficient pressure exclusively for cleaning of heating baskets of air preheaters along with manpower. Persons deployed for jet cleaning job should have sufficient experience. Two pumps have to be kept available for the entire duration of COH, as per site requirements.	
(vii)	REPLACEMENT OF HEATING ELEMENTS WITH NEW BASKETS:- Replacement of eroded, damaged, choked heating elements may be necessary after inspection. The transportation of new heating elements from the stores, lifting them to Airpreheater platform, their installation and removal of damaged baskets from the air heater and returning the scrap in store as per direction of Engineer In-charge. All the hot end heating baskets have to be covered with flat at the gaps between the two baskets & between the basket and rotor diaphragm.	2
(viii)	AIR SEAL HOUSING	
b)	Removal of insulation and refractory near air seal housing area and the top area of Centre section.	1
c)	Opening of air seal housing. Removal of packing ropes and kao-wool.	
d)	Packing of air seal housing with new packing ropes and kao-wool, and fixing back of cover.	
e)	Casting of refractory or insulation at the air seal housing area as per requirement.	
f)	Fabrication /repair/cleaning of seal boxes inside the air heaters below guide bearing, static seals and also at cold end air seal housing.	
(ix)	LUBE OIL SYSTEM SERVICING (BOTH GUIDE AND SUPPORT BEARING)	
a)	Oil draining from cooler, filters and piping.	1
b)	Cleaning of coolers & filters, hydraulic testing of coolers and attending defects or replacement as per requirement.	
c)	Checking freeness of oil and water line valves and servicing / providing new valves as per requirement.	
d)	Checking pump, coupling & alignment and replacement/adjustment if required.	
e)	Lube oil lines and water lines up to root valves connecting with cooling water header are also to be cleaned by air jet.	
f)	Cutting/welding may be required for above cleaning. If required lines/pumps are to be replaced.	
g)	Cleaning of lube oil pump, checking it and do necessary servicing as per requirement.	
h)	Replacement of oil in guide and support bearings, trail of Lube oil system, adjustment of pressure and attending leakages if any.	
i)	Mark dipstick in the oil filling line.	
(x)	INSPECTION /SERVICING OF DRIVE GEAR BOX, PINION, PIN RACK AND AIR MOTOR & FLUID	
a)	Inspection/servicing of drive gearbox, pin ion and pin rack.	1
b)	Opening of pinion cover and inspection of pins and pinion condition.	
c)	Gear box oil draining, inspection/servicing and after that flushing and filling with new oil.	
d)	Pinion/taper lock bush are to be removed if required and their condition is to be checked and are to be replaced as per requirement.	
e)	Checking and adjustment of pinion root gap (after rotor leveling) as per standard.	
f)	Putting back pinion cover by providing proper packing rope so that there is no leakage in running condition.	
g)	Dismantling of air motor, cleaning and inspection of blades, bearing and other internal parts, replacement of damaged ones.	
h)	Assembling of all the parts providing lubrication.	
i)	Removal of water clogging in the air line. Servicing of manual valves as per requirement.	
j)	Fixing back the air motor, restoring air line connections, (if removed) coupling back and trial run of the air motor, checking for any defects and attending the same.	
k)	Servicing of over-running clutch per APH to be carried out. Bearing of over-running clutch to be replaced as per requirement. Subjected to availability of instrument air..	
l)	Removal of fluid coupling from position.	
m)	Dismantling of fluid coupling.	
n)	Inspection of bearings, seals and other internal parts.	
o)	Cleaning and box up of the fluid coupling by replacing damaged components with new ones, oil filling and testing for oil leakages.	
p)	Inspection and replacement of multi disc, resilient plate if damaged, and fixing back.	
q)	Fitting back the fluid coupling in position; Alignment of coupling with motor & gear box. Trial run of the same and attending defects if any.	

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(xi)	STATIC SEAL AND ROTOR POST SEAL WORKS (AT BOTH HOT AND COLD ENDS)	
a)	Removal/pocket cutting of static seal plates (inboard & outboard)	
b)	Replacement/repacking of kao wool and refitting/replacement of seal plates at both hot and cold ends.	
c)	Inspection and repair of static spool by patch welding or replacement as per requirement at both hot and cold ends.	
d)	Repair/replacement of rotor post seal at both hot and cold ends.	
e)	Repair/replacement of plate from axial seal plate to sector plate.	
(xii)	T-BAR & ROTOR ANGLE, BYPASS SEAL ANGLE REPAIR WORKS	
a)	Repair of T-Bar, rotor angles & by pass seal support angles at hot end & cold end as per requirement.	1
b)	Providing T-Bar cleats and tabs as per requirement.	
c)	Replacement of T-Bar & rotor angles as required.	
(xiii)	ROTOR REPAIR WORK.	
a)	Repair of eroded rotor drum portion by patch welding.	
b)	Repair of diaphragm plates by metal build up and grinding or by cutting and patch welding as per requirement.	
c)	Inspection and welding of stay plates with diaphragm plates. At damaged portions stay plates are to be cut and patch welded if found eroded.	
d)	Welding of diaphragms with shell as per requirement.	
(xiv)	REPAIR OF HOT END CENTRE SECTION AND COLD & HOT END SECTOR PLATES AND AXIAL SEAL PLATES.	
a)	Removal of insulation and refractory at center section.	
b)	Cleaning of center section and inspection of weldments.	
c)	Re-welding of weldments, existing plates in position or new plates as per requirement.	
d)	Checking for any leakages during fan trials and attending defects if any.	
e)	Re-insulation and refractory works of center section upto expansion joint.	
f)	Making access to worn out area of the sector plates at both cold and hot ends by cutting casing/shell and removing baskets and making scaffolding as per requirement.	1
g)	Cutting & removal of worn out portion of sector plate and fitting new plate piece/pieces.	
h)	Welding of the plate pieces with sector plates and grinding to flush the surface maintaining dimensions.	
i)	Refitting & welding of parts cut to access and removal of scaffolding.	
(xv)	ROTOR LEVELING	
a)	Fixing of master level on diaphragm plate.	
b)	Rotating the rotor and noting the master level readings.	
c)	Adjustment of rotor to bring the level within limits subjected to availability of required spares.	
(xvi)	RADIAL SECTOR PLATE LEVELING.	
a)	Checking & adjusting the T-Bar run out.	
b)	Marking of hi point of T-Bar.	
c)	Providing seal tab and measuring the gap at in board and out board of radial seal plates.	1
d)	Adjustment of sector plates to maintain gap within limits and locking the same.	
(xvii)	AXIAL SEAL PLATE ADJUSTMENT.	
a)	Marking of high point of T-Bar.	
b)	Providing seal tab and measuring the gap at top and bottom of the axial seal plates.	
c)	Adjustment of axial plates to maintain gap within limits and locking the same.	

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(xviii)	RADIAL SEAL SETTING (BOTH HOT AND COLD ENDS)	1
a)	Removal of old worn out radial and diaphragm seals.	
b)	Replacement with new seals and bolts as per requirement.	
c)	Fixing of straight edges for both hot end and cold end and setting of seals to maintain specified gaps subjected to availability of straight edge tool for radial seal setting.	
d)	Fixing of radial seal tabs.	
e)	Removal of straight edge.	
(xix)	AXIAL SEAL SETTING	
a)	Removing of all worn out / damaged axial seals.	
b)	Replacement with new seals and bolts as per requirement.	
c)	Fixing of straight edge and setting of seals to maintain specified gaps.	
d)	Fixing of axial seal tabs and removal of straight edge.	
(xx)	BY-PASS SEAL SETTING (BOTH HOT AND COLD ENDS)	
a)	Checking of T-Bar run out and adjustment if required. Removal of damaged / worn-out by pass seals.	
b)	Replacement by new seals and bolts.	
c)	Seal gap adjustment with respect to rotor.	
d)	Replacement/setting of axial seal plate to radial sector plate seals by opening respective doors and closing the same after adjustment.	
(xxi)	SERVICING OF APH SOOT BLOWING SYSTEM.	1
a)	Dismantling of motor, gear boxes and servicing of same.	
b)	Replacement of oil & grease in gear boxes and alignment with motor.	
c)	Cleaning of ash from cleaning device lance, conical box.	
d)	Making lance traverse free.	
e)	Inspection of nozzle and replacement/repair of nozzle.	
f)	Inspection of leakage after motorized steam valve and repairing.	
g)	Inspection of swivel joint and rectification for any leakage.	
h)	Trial run to be taken & all defects to be attended as per requirement.	
(xxii)	REPAIR/CLEANING OF APH WASHING AND FIRE FIGHTING SYSTEM.	
a)	Cleaning of APH wash and fire fighting pipe and nozzles.	
b)	Repair of lines by patch welding and replacement of damaged nozzles.	
c)	Repair of support of the same if required total water washing and fire fighting pipes are to be fabricated/replaced along with new supports and shields are to be provided(subjected to availability of required material).	
(xxiii)	SCRAP REMOVAL AND STORAGE OF UNUSED PARTS.	
a)	Removal of all the scrap from inside ,outside and including zero meter of air heater and water washing of airpreheaters.	
b)	Removal of scrap from hopper (eco hopper or Airpreheater hopper) below Airpreheater and washing afterwards.	
c)	Stacking unused spares of airpreheaters at the site stores as per direction of engineer in charge after overhauling of unit.	
(xxiv)	BOX UP OF AIR HEATERS AND CLEARANCE.	1
a)	Removal of all men and material from airpreheaters.	
b)	Closing of all doors.	
c)	Removal of all men and material from APH drive and bearing area before giving final clearance.	
(xxv)	TRIAL RUN OF AIRPREHEATER	
a)	Checking of air leakages at guide bearing, support bearing and air heater areas while running of FD & PA fans and attending the same.	
b)	Checking for any abnormalities like abnormal sound/vibration of APH and its drive and attending the same after the trial run.	



(xxvi)	REPLACEMENT OF T-BAR	
a)	Removal of old T-Bar, by removing T-Bar bolts and cutting T-Bar cleats and tabs.	
b)	Shifting of new T-Bar set from central stores/site store to site.	
c)	Fixing the new T-Bar in position.	
d)	Aligning and adjusting them by rotating the rotor.	
e)	Checking of T-Bar run out and adjustment if required, tightening of T-Bar bolts and welding of cleats and tabs.	
(xxvii)	REPLACEMENT OF ROTOR ANGLE OR BY PASS SEAL ANGLE	1
a)	Removal of old rotor angle or bypass seal angle from rotor or APH housing respectively and cleaning the surface by grinding.	
b)	Shifting of new rotor angle/from central stores/site store to site.	
c)	Fixing the new rotor angle/bypass seal angle in position.	
d)	Aligning and adjusting them by rotating the rotor.	
e)	Checking run out of rotor angle/bypass seal angle and adjust run out if required, proper welding of rotor angle/bypass seal angle with rotor/APH housing respectively.	
xxviii)	AREA FOR THE WORK OF REPAIR/ REPLACEMENT OF DUCTING SHALL BE AS UNDER:-	
a)	Flue gas duct after economizer hoppers up to expansion bellow at air pre heater inlet and at outlet of Airpreheater up to hoppers including expansion joints at out let of airpreheaters. Connected bracings/supports are also included in the scope work.	
b)	Primary air duct coming out of Airpreheater up to 1st expansion bellow (small portion).	
c)	Secondary air duct from Airpreheater outlet up to entering point of wind box air compartment including expansion joints.	
xxix)	REPAIR/REPLACEMENT OF DUCT SHALL INVOLVE:	1
a)	Cleaning and checking of ducting from inside and outside for any erosion and damage.	
b)	Repair /replacement of eroded duct.	
c)	Replacement of the eroded duct plate shall be with 6 or 8 mm thick Mild steel or any other hard faced/coated plate(subjected to availability of required material).	
d)	Removal of insulation wherever required as per instructions of engineer in- charge shall be included in the scope of work .	
e)	Replacement of the eroded channel/ beam/angle shall be in the scope of work.	
f)	Providing M.S. lining to avoid erosion in the flue gas duct of Air pre-heater wherever required.	
g)	Repair of ducting supports, expansion joints and manhole.	
h)	Replacement of asbestos dori on manholes.	
i)	There are 2 no hoppers at outlet of each Airpreheater. Eroded portion of each hopper has to be repaired.	
j)	40 Sq. meter. area is covered in the lump sum rate.	
xxx)	REPLACEMENT OF PINS/PIN RACK IN THE RACK OF AIR PREHEATERS:-	
	The replacement of pins will involve removal of old eroded pins by gas cutting and fitting the new pins. Suitable approach may be made by cutting the casing sheet on rear side of the air pre heaters. Proper support be welded at the joints of the pin rack before removing the pins near the joints. Alignment of all the pins to be done. One set consists of 346 numbers pins as complete set or in parts are to be replaced in one air pre heater.	1
Total % of (C)		29
Total % of CV of Part-A [FOR COH]		100



Optional Works		
1	REPLACEMENT OF SUPPORT BEARINGS OF AIR PREHEATERS :(payment shall be made as per Rate Schedule of optional works). The complete load of the air pre heater is supported by a thrust bearing to which the load is transmitted by a Trunnion bolted to the lower end of the rotor post. To replace the support bearing following procedure will be adopted :-.	
i)	Loosen the guide bearing and remove radial seals of hot end fouling with sector plates.	
ii)	Remove the housing cover, water shield and trunnion air sealing cover etc.	
iii)	Jacking the rotor with four no. 50 T capacity jacks activated by a single hydraulic pump and blocking the rotor after lifting.	
iv)	Un-bolt the bearing housing allowing bearing to be removed. Replace the old bearing with new and fit the housing in its place. Make the rotor free.	
v)	Check the guide and support bearing level. Check the rotor level and fix the radial seals, bearing housing cover, water shield etc.	
2	REPLACEMENT OF EXPANSION BELLOWS AT PRIMARY AIR AND SECONDARY AIR DUCTS AS PER SCOPE OF WORK OF AIR PREHEATER:-(payment shall be made as per Rate Schedule of optional works). The expansion bellows in the primary air and secondary air ducts are butt welded with the main respective duct which will have to be cut before removal. Following procedure will be adopted for replacement of expansion bellow:-	
a)	Before cutting the eroded bellow the respective duct will be properly supported to maintain the required gap.	
b)	After removing the eroded bellows, the duct surface has to be made smooth by gouging and grinding. The new bellow will be inserted in the duct and welded with the main duct from both sides.	
c)	The expansion bellow for primary/secondary air duct and flue gas duct supplied by BHEL are in four parts with saw toothed end connection. These four parts of expansion bellow after fixing in the concerned duct will be welded at the ends with each other.	
d)	All the points to be seal welded and should be gas tight.	
e)	After completion of job, supporting structure will be removed for free movement of the expansion bellow.	
f)	The insulation removed for dismantling the existing bellows will be re-applied after completion of job. The eroded/damaged expansion bellows are required to be replaced as per actual site conditions.	



3	REPLACEMENT OF SECTOR PLATES AT AIR PREHEATER	
	Each Air preheater is fitted with sector plates (3 no. sector plates at hot end & 3 nos. at cold end) to restrict the flow of air and gas in the respective paths (i.e. flue gas, primary air and secondary air paths) after passing through the Air preheaters. The sector plates are supported and adjusted with the adjusting mechanism to maintain the clearance with the rotor shell. Payment shall be made as per Rate Schedule of optional works. To replace the sector plate, following procedure to be adopted:-	
(a)	<u>Hot end sector plate</u>	
i)	Remove all hot end radial seals.	
ii)	Cut and remove rotor posts seals and all static seals.	
iii)	Cut and removal spool if the same has to be replaced.	
iv)	Cut and remove the inboard & outboard guide pin assy. from the sector plates.	
v)	Cut & remove the sector plate adjusters and free the sector plates.	
vi)	Remove the sector plates from its position and take out through hot end basket removal door or through a suitable opening in the hot connecting plate duct.	
vii)	Increase the hot end basket removal door size suitably if required.	
viii)	Install new spool assy. and weld as per the drawing.	
ix)	Insert the new sector plate for primary Centre section through the opening.	
x)	Place the sector plate on the rotor and rotate to the position and fix it.	
xi)	Repeat the same for the other sector plates and fix them one by one.	
xii)	Assemble the out board adjusters with sector plate and pins washer and tack weld the washers as specified.	
xiii)	Position the guide pins at inboard and outboard ends and weld them properly.	
xiv)	Ensure proper orientation of sector plates at inboard and outboard ends.	
xv)	Assemble the hot end static seals and fill ceramic wool at inboard end.	
xvi)	Level the rotor. Align the sector plates with reference to T-bar.	
xvii)	Adjust axial seal plate to sector plate seals.	
xviii)	Assemble the hot end rotor post seal and properly seal weld.	
xix)	Fix the hot end radial seals with required clearance.	
(b)	<u>Cold End Sector Plates</u>	
i)	Remove all cold end radial seals.	
ii)	Cut and remove rotor post seals and all static seals.	
iii)	Cut one cold end diaphragm plates for 300mm for its full length after removing cold end baskets and gratings in two sectors.	
iv)	Rotate the rotor (which diaphragms were cut) above the sector plates to be removed.	
v)	Support the sector plates temporarily and remove the adjusters and guide pins.	
vi)	Lift the sector plates and weld it to rotor temporarily.	
vii)	Rotate the rotor near to basket removal door and pull it out.	
viii)	Repeat the procedure for other sector plate.	
ix)	Insert new sector plates and lock temporarily with rotor.	
x)	Rotate the rotor and move the sector plate to its position and fix them properly with adjusters and guide pins.	
xi)	Repeat the procedure for installation of other sector plates.	
xii)	Install spool and static seals. Install rotor post seals and weld.	
xiii)	Level the rotor. Align the sector plates with respect to T-bar.	
xiv)	Adjust axial seal plate to sector plate seals.	
xv)	Install radial seals with required clearance.	

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Part -B		
SCOPE OF WORK		
Part-B:- Dismantling, Erection (replacement of existing reheater) its Testing and Commissioning of complete reheater 210 MW Unit#5 at GGSSTP, Rupnagar.		
The job includes dismantling of the existing reheater coils (59x2 -both sides) and replacement of same with new reheater coils supplied by BHEL, Trichy. Works which are necessary for completing this dismantling and replacement of reheater is included in below mentioned SCOPE OF WORK. However, it may be noted that below mentioned scope of work is only a guideline; if any additional work required for carrying out and completion of work is to be done, contractor has to complete the same without any additional extra cost. 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 based 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.		
DESCRIPTION OF MANDATORY WORKS		% of CV of Part-B
1	Transportation of new Reheater coils (59x2 assemblies) & Associated auxillaries , scaffolding materials and other spares from O&M stores to site including arrangements of Hydra/Mobile Crane, Tractor Trailers with operators & fuel. Contractor to submit details of materials/T&P's used for job. Shifting any other tool, spares etc. for use shall also be covered in the scope.	6
2	Sponge Testing of New Reheater coils at zero meter using Compressed air and rectify defects prior to erection as required. Contractor to arrange tapping of compressed air arrangements. (min. 6 Kg/sq. cm).	2
3	Steam Blowing test at zero meter, Necessary arrangements for tapping through steam lines. arrangement of pipeline, insulation & restoring after test, shifting scrap. Contractor to mobilize manpower/material (3 shifts) well before shutdown.	3
4	Supply and Erection of Cup Lock Scaffolding in 1st Pass including sealing of furnace, conventional scaffolding for other areas. Extension and removal of existing platforms as per requirement.	7
5	Preparatory Works: Cutting openings in Water Wall & Steam Cooled Wall, adjacent screen tubes, spacer tubes, removal of platforms, pipes (air/steam/oil/water) fouling for access route of coils installation or dismantling work. removing insulation/refractory/cladding, etc. for access	3
6	Handling Arrangements: Winch Machines, Rope Line, temporary structures for handling coils, structural steel, beams, channels, all T&P by contractor.	3
7	Dismantling of roof - reheater attachments as per requirement. Providing temporary supports as per site requirements. Removal of refractory.	3
8	Dismantle Existing Reheater Coils through cutting/grinding (Header shall be retained),Removal of individual coils, lower, transport to disposal yard; cutting done by grinding machine only. Necessary safety precautions, arrangement of safety nets, harness protection shall be in subcontractor scope.	5
9	Lifting of New coils to position & locking with temporary supports wherever required. placement of individual coils.	10
10	Erection, Alignment, HP Welding of New Reheater Coils, arrangement of welding electrodes & filler wires for HP welding of Reheater coils & headers connection.Erection of spacer tubes & its supports.	15
11	100% Radiography of HP welds & Stress Relieving as per BHEL procedure, rectification of defects & re-testing/ radiography until succesfull welding of HP joints. Stainless steel erosion shields at bends as applicable	9



12	Restoration of roof -- reheater, header attachments, skin casing etc. Roof Skin casing welding	4
13	Restoration: Coils, tubes, pressure parts attachments, welding/structures/restoration of removed items. Insulation, cover sheets, restoring access doors, removing temporary structures.	5
14	Refractory application: restore refractory wherever broken/dismantled for erection/alignment.	4
15	Restoration works- Restoration of platforms, tubes or Pipes (air/water/oil/steam), WW Panels	3
16	Miscellaneous:- office attendants & Cook for BHEL Mess, Laptop, printer, stationery, internet having unlimited 5G connectivity till completion of work.	1
17	Statutory assistance for IBR clearance during inspection/hydraulic test, prior permission from Boilers Dept Punjab, final clearance by PSPCL.	4
18	Arranging Ex-BHEL or any other State or Central govt personnel of 1. Boiler APH, 2. Pressure Parts 3. Burner & Tilt Mechanism as per the instruction of EIC till work completion for PART-A and B.	3
19	Testing and Commissioning: Conducting Hydraulic/Vacuum Test, Commissioning, rectification as needed.	10
Total % of CV of Section-B		100



Annexure - II		
Reheater Replacement (including its testing and commissioning) & Capital Overhauling of Boiler in 210 MW Unit#5 at GGSSTP Rupnagar		
	T&Ps and MMDs	QTY
	Contractor shall deploy sufficient T&P for carrying out the jobs mentioned in scope of work to complete the job within scheduled time. Tentative T&P as detailed below shall be made available at site before start of work as shall be got checked from engineer-in-charge. In case same not available at site. It shall be arranged at the risk and cost of contractor and payment shall be made from contractor's bill/dues with BHEL.	
	All normal T& P like gas cutting torch/set, welding sets, welding leads, wire brushes, welding holders, gloves, welding screens, grinding, drilling machines, safety helmets for all staff, safety belts, hand tools, winches, pulleys, pulling and lifting machines and manila ropes etc.	
	All tools, tackles and consumables including arc welding machine, DP kits etc are to be arranged by the contractor. The contractor shall provide inspection, measuring and test equipment duly calibrated (from BHEL/ PSNR accredited agencies) with traceability to national standards. The contractor shall submit a copy of test certificates in respect of electrodes and instruments as detailed above.	
	Complete Cup lock scaffolding arrangement shall be arranged by Subcontractor.	
	Electric hoist required for removal of HE/Hi Baskets shall be arranged by subcontractor	
1	Pressure Parts Jet cleaning Pump/equipment including Fire Fighting hose pipes with attachments & accessories or washing of Furnace.	2
2	Jet Cleaning Pump APH	2
3	Straight grinder GQ-4/AG-4/AG-5	14
4	Pistol grinder/portable grinder	10
5	Flexible grinder FF-2	8
6	Welding generator set	15
7	Transformer/rectifier set	12
8	Chain pulley block 10 Ton	15
9	Chain pulley block 5 Ton	25
10	Chain pulley block 3 Ton	20
11	Electrical Winch 10 Ton	1
12	Tirfor 2 Ton/3 Ton	6/6
13	Electrical Winch 5 Ton	5
14	Electrical or Manual Winch 2 Ton/3Ton	2/2
15	Hydraulic jack 50 Ton	6
16	De spanner set	4
17	Ring Spanner Set	4
18	Gas Cutting set	8
19	Portable oven for electrodes	16
20	Mother oven for stores	2
21	Angle grinder AG-7	8
22	All Type of Calibrated Outside/ Inside Micrometers	As per requirement
23	Master Level 150mm 0.02mm/m & 0.04mm/m	2/2
24	Tube bending machine with die	As per requirement
25	Cutting sets	12
26	TIG welding sets	8

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27	ARC Welding Set	15
28	DA & Oxygen Gas	As per requirement
29	Argon gas	As per requirement
30	Welding Electrodes	As per requirement
31	Welding, cutting & Grinding consumables	As per requirement
32	DP test Kit	As per requirement
33	Calibrated IMETs like Vernier, Depth Gauge, Scales, Dial Gauges etc.	As per requirement
34	Tube Cutting Machine	2
35	Radiography kit with Team	01
36	Stress Relieving Kit with team	01
37	Thickness survey machine(D-Metering ultrasonic type Portable)	4
38	Anti seize & Rust Removal Compounds (WD-40 etc.)	As per requirement
39	Sealing & Jointing compounds	As per requirement
40	Cloth & Oil for cleaning	As per requirement
41	General Purpose consumables	As per requirement
42	Micro meters of any size, Vernier callipers of any size, Master level, hydraulic jacks up to 200 tones, hydraulic testing pumps (for coolers), dial gauges and magnetic base etc.	As per requirement
43	Trucks, trailer, Hydra and hand cart required for transportation of material from store and returning of scrap in store.	As per requirement
44	Scaffolding pipes, challis, manila rope for use other than inside of 1st pass of boiler.	As per requirement
45	All consumables such as kerosene oil, diesel, Rustolene, Petrol, duster cloth, cotton waste, emery paper, grinding wheel, all hex blades and other small items required for handling of overhauling job.	As per requirement
46	Anti seize spray and paste, DPT kits, Red oxide paint (approximately 10 Ltr.), etc.	As per requirement
47	All welding electrodes including filler wires. Welding electrodes as per BHEL approved list shall be used for General purpose and HP line welding purpose.	As per requirement
48	All gases including argon required for cutting and welding. LPG is not allowed to be used at site for cutting/heating purpose.	As per requirement
49	General Purpose MMDs and T&Ps.	As per requirement
	Note- the above list is only indicative and not exhaustive. Arrangement for any other consumable/non-consumable/T&P required for completion of the job shall be responsibility of the contractor and shall be arranged by the vendor without any financial implication to BHEL.	



MAJOR/CAPITAL OVERHAULING OF Boiler and Reheater Replacement in 210 MW Unit#5 at GGSSTP, ROPAR, PUNJAB.

List of Tentative **Suggestive manpower**, required for overhauling works is mentioned below. Contractor has to depute sufficient skilled manpower to ensure round the clock working in three shifts as per Labour laws to complete the as per schedule.

Being short duration shutdown job, completion of work on time is essence of contract. In case bidder/contractor fails to deploy skilled manpower during work execution by more than 3 days then, **Penalty for less/delayed deployment of manpower shall be done by BHEL based on below mentioned Minimum Manpower list. Penalty @ Rs. 1500/per person/per day for Engineer/Supervisor/skilled manpower shall be deducted as per deemed fit to EIC.** Moreover If any Penalty is deducted by Customer over any head/s the same shall be deducted from RAB bills along with applicable overheads as per deemed fit to EIC.

The contractor should observe all safety measures in order to avoid any accident at site. They should also inspect all lifting tools and tackles regularly and service them properly in order to avoid any accident. If during surprise checks done by BHEL any non-compliance is observed, penalty as per HSE Policy will be imposed for each case on each occasion of surprise check.

In Case of non Deployment of Ex-BHEL personnel as per the instruction of EIC for PART-A and B the deduction of payment shall be done from the allocated % of CV from Scope of work.

MANPOWER	CATEGORY	NO. OF PERSONS
Site In charge	Site-In charge (Having at least 5 Years of Experience of capital Mtc. of Steam Boiler KWU Sets)	1
Safety in charge	Graduate (Certified)	1
Safety supervisor	Diploma	2
Supervisor pressure parts (Reheater 2, 1st pass-1)	Graduate/Diploma	3
Supervisor burner works	Graduate/Diploma	1
Supervisor APH	Graduate/Diploma	1
Expert for pressure parts	Ex. BHEL (at least 15 Yrs.)	1
Expert for burner works	Ex. BHEL (at least 15 Yrs.)	1
Expert for BHEL for APH	Ex. BHEL (at least 15 Yrs.)	1
Scaffolding Supervisor	Skilled	2
Storekeeper	Skilled	2
D Meter Team	Team with Ultrasonic Kit	4
HP Welder	IBR	8
Stress Relieving Team	Team with Kit	1
Radiography Team	Team with Kit	1
Welder (Non-IBR)	Skilled	10
Fitter for pressure parts	Skilled	6
Fitter for burner works	Skilled	2
Fitter for APH	Skilled	2
Gas cutter	Skilled	6
Sarang	Skilled	8
Electrician	Skilled	2
Jr. Fitter	Semi-Skilled	8
Grinder man	Semi-Skilled	12
Rigger	Semi-Skilled	20
Helper	Un-skilled	35
Total		141



Other Special Conditions to the Contract

1	All normal T&P (duly certified) like jacks, welding sets, welding leads, general purpose electrodes (BHEL Approved Vendors only), wire brushes, welding torches, Hand gloves, welding screens, Grinding/Drilling machines, safety belts, hand tools, pulleys, winches, pulling machines, Gas hoses, manila ropes etc. Contractor will arrange cutting sets & all types of gas cylinders like DA/Oxygen/Argon gases etc. required for cutting and welding. Use of LPG in the plant is strictly prohibited.
2	Radiographic equipment and technical expertise (Level-II Qualified) for testing and reading / film interpretation. Quality and life certificate of Source (i.e. iridium-192- 10 to 12 query) shall be intimated before mobilization to site.
3	Transportation of spares/material from store to site. such as tubes, bends, steel items, lubricants, new APH baskets, coal nozzles etc. The worn out spares, scrap, used/dirty oil, empty drums, old/scrapped APH baskets etc. shall also be returned to PSPCL store. Arrangements for cleaning of spares with air etc to make it free from dust/foreign material before erection at site. Winch machines, Trailer, Tractor Trolley, hydra & Carts required for transportation of material from stores to site and returning of scrap to the stores shall be arranged by contractor.
4	All checks as per BHEL/OEM shall be exercised timely and protocols jointly signed with Customer.
5	The individual equipment/complete boiler shall be cleared of scrap etc. after completion of the overhauling but before commissioning of equipment's.
6	Stress relieving equipment shall be in scope along with Control unit and operator.
7	D-metering equipment's along with Expert team having sufficient Knowledge of the job.
8	Medical Facilities including providing of ambulance on chargeable basis by Customer.
9	Canteen facilities shall be on chargeable basis. The contractor shall be liable to arrange and pay for the expenses towards medical treatment in respect of all workers employed for the execution of contract.
10	Suitable accommodation for vendor personnel on chargeable basis , the charges for which shall be payable directly by subcontractor to Customer, subject to availability shall be provided in Customer Township.
11	Fire fighting hose pipe with attachments and accessories.
12	Vendor has to deployed Experts of Respective field for the entire duration of Job at least one for each area.
13	HP Welding electrodes ,Electrode Heating oven/ arrangements/ Equipment in sufficient quantity shall be in scope.
14	Daily clearing and house keeping in area of work shall be in scope. The bill shall only be released by the area engineer after assuring that the necessary cleaning has been done and dust and waste materials have been removed from the working place and dumped in the area earmarked.
15	Locking of components wherever required for dismantling/erection. Cutting of fouling structures and pipes, re-enforcements of the main structure, also making platform etc. and its restoration is in scope.
16	NDT Test as per instruction of EIC wherever required shall be in scope along with Kit, Consumables and Qualified Testing Engineer.
17	Fabrication, Blanking & restoration of any line, fixture to carry out the work is in scope.
18	Temporary and safe lighting at place of work will be responsibility of the contractor for which he should arrange wires, hand lamps, holders and step-down transformers etc. Halogen lamps/flood lights for illumination wherever required near to working area is to be arranged by contractor without any extra cost. Minimum of 15 flood lights is to be arranged by contractor however quantity may increase/ decrease depending upon site conditions.



19	Adequate no. of scaffolding pipes, challis, manila ropes, slings of different sizes (1", 2" , 4" etc.) as required. All consumables such as kerosene oil, diesel, Rustolene, liquid penetrant kit, petrol duster cloth, 8. Anti seizes spray and cotton waste, emery paper, grinding wheel, all hexa blades, Polythene sheets electric fuse wire and cables, marking cloth and other small items required for handling of overhauling of the job. In case the contractor fails to bring sufficient consumables to site and without which work is suffering. BHEL has the right to procure the same from market and recover from contractor bill @ Actual price incurred + Overheads as applicable for the purchase price of each item.
20	Test/Calibration certificates of all T&Ps which contractor is going to use in work are to be submitted well before starting of work. Load testing certificates of winch machines are to be shown at the time of bringing lifting equipment at site or if required load testing of all equipment are to be done at site.
21	The contractor shall make an arrangement that his authorized representative shall be available round the clock at a specific location to take up job (on all days including Sundays and gazetted holidays).
22	The contractor shall depute on his work during its progress a competent authorized representative (overall in charge) besides foreman executing the job. He will represent the contractor in his absence and all directions given to him shall be binding as if given to the contractor. In no case, the authorized representative will refuse to receive the instructions. Contractor will depute sufficient no. of foreman to supervise the job technically and as per instruction of engineer-in-charge.
23	All other T&P, consumable, other items manpower, supervisor which may be required for the work shall be in scope.
24	All the workmen and supervisors shall have sufficient knowledge and experience of the job to carry out the work. If the engineer in charge feels that the particular workman is not of suitable calibre, the same shall be replaced immediately by the sub-contractor as per Instruction of BHEL EIC.
25	The contractor shall make his own arrangement for providing all facilities like boarding and transport for his workers.
26	The clearance settings and other measurements affecting quality are to be taken in presence of BHEL/Customer.
27	The dismantled parts of the equipment are to be kept in a clean place covered properly and the custody of the part(s) /equipment(s) from damage, theft, pilferage is the responsibility of the contractor.
28	Removal of all temporary arrangement, scaffolding if any made at the work site to facilitate working is the responsibility of the contractor without any cost.
29	All T&P if supplied by customer/BHEL to the contractor shall be returned in the same good working condition. However, in case of any damage to the T&Ps on account of negligence of contractor they are to be repaired or replaced by the contractor at his own cost.
30	It shall be contractor's responsibility to maintain and keep his manpower in specified area only. Contractor has to keep all the loose components and T&P's provided by Customer/BHEL under his custody round the clock during execution of work.
31	Contractor will also supply protective equipment such as safety helmets, safety shoes, safety belt, ear plug & nose mask etc to all his workmen.
32	No man/material without gate pass duly signed by BHEL Engineer in charge shall be brought in or taken out by the contractor.
33	The contractor shall ensure timely payment of the wages as per act and other labour laws. Wage sheets to be submitted regularly to Engineer-in-Charge
34	Contractor will have to satisfy all statutory requirements with total indemnity to Customer/BHEL on any account. Vendor shall follow HSE/OHSAS Guideline as per customer/BHEL.
35	The welders will be tested by BHEL quality engineer and then allowed to work.

36	If any work is denied or refused same shall be carried out at Risk and cost of the vendor and cost as per actual for execution to meet urgency shall be recover with overheads as per NIT.
37	Sub contractor has Workers compensation policy: The contractor must take and maintain ESI and Workman compensation Policy for the workmen engaged for this work in compliance of labour Laws & other applicable statutory laws as applicable where the contract or any part thereof is executed.
38	Covid or any other State/Central Govt. Guideline and further modalities prevailing in the area at the time of execution of work is to be arranged at own cost.
39	Contract should provide for submission of supporting documents for deployment of office attendant, laptop/computer, printer, safety officer, crane operator as per contract requirement for releasing payment against Miscellaneous Services.
40	To Comply safety and security at site and follow all safety rules and regulations applicable at as rules and instruction of EIC. Insurance of sub-contractor's labour & T&P shall be in the scope.
41	In case of contradiction with GSCC, Conditions as per detailed in Scope of work will prevail & be final.
42	The contractor shall duly comply with all State and Central Laws, Statutory Rules, Regulations, etc., including but not limited to: The payment of Wages Act, Minimum Wages Act, Workmen Compensation Act, Employers Liability Act, Industrial Dispute Act, Employees Provident Fund Act and various schemes framed thereafter, Employees State Insurance Scheme, Contract Labour (Regulation & Abolition) Act 1970 and other Acts, Rules and Regulations for labour as may be enacted by the Government during the tenure of the contract and having force or jurisdiction at site. The contractor shall give to the local Governing body, Police and other relevant authorities all such notices as may be required by law.



12. HSE PENALTIES

- Nonconformity of safety rules and safety appliances will be viewed seriously and BHEL has right to impose fines on the subcontractor for every instance of violation noticed.
- As per contractual provision HSE penalties shall be imposed on subcontractors for non-compliance on HSE requirement as per following format.
- Following are the applicable penalties for various Safety violations:

Sub: MEMO for Penalty for non-compliances in Safety

Following lapse (tick marked) was observed and penalty (in Rs.) is imposed as stated at the bottom of this memo. It is requested that such occurrences be please avoided in future.

S. No	Nature of Non - Compliance	Penalty (in INR)	Remarks
A. System Violations			
1	Working without valid Work Permit/ HIRA/ Method Statement / JSA	2000	Per case
2	Controls as per Work Permit/ HIRA/MS/JSA not ensured	2000	Per case
3	Reported Safety Violations Not Closed within Stipulated Time	1000-10000	Per case
4	Absence of required Subcontractor Officials (Site Head, HS Head) in Safety Reviews/Meetings	5000	Per case
5	Not providing required PPEs (Safety Harness, Lifeline, Safety Net, Fall arrestor, Safety Helmet, Gloves, Shoes etc.) for the work by subcontractor	2000	Per case
B. Competency/ Training/ Induction Violations			

Bharat Heavy Electricals Limited, Power Sector
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1	Incompetent personnel deployed for specialized jobs like height work, hot work, rigging, vehicle operation etc. (without valid license/ certificate etc.)	3000	Per case
2	Work without induction training & medical check	2000	Per case
3	Height Work without Vertigo Test and height work training	2000	Per case
C. PPE Violations – Height Work			
1	Not wearing/ hooking Double Lanyard Safety Harness while working at height (> 1.2 meters) or not anchoring to lifeline	1000	Per case
2	Not Providing Lifeline for height work	3000	
3	Unsafe platforms – without Top, Mid Rails and Toe-Guards for Height Work	3000	
4	Not providing secondary means of fall protection for height work (Safety Nets, Retractable Fall Arrestors etc.)	3000	Per case
D. PPE Violations – General			
1	Not wearing safety helmet	1000	Per case
2	Wearing of helmets without chin straps	1000	Per case
3	Not Wearing safety shoes	500	Per case
4	Not wearing gloves	500	Per case
6	Not using grinding goggles/ face shield during grinding/ cutting	2000	Per case
E. Electrical Safety Violations			
1	Broken/ exposed wires/ cables	2000	Per case per day
2	Electrical plug not used for connection/ hand machines	1000	Per case per day
3	Not using proper ELCBs for electrical equipment	2000	Per case per day

4	Improper earthing of welding & Other electrical machines (Lack of double earthing, improper/ untested earth pit etc.)	2000	Per case per day
5	Not using 24 V supply for lighting in confined spaces	2000	Per case
6	Cables haphazard/ blocking way/ not organized properly	1000	Per case per day
F. Lifting & Rigging Violations			
1	Using Sling/ Chain Pulley Block and other Small T&Ps without proper, traceable Tag and Test Certificate	2000	Per T&P per day
2	Using damaged slings or not slinging properly	2000	Per T&P per day
3	Use of lifting equipment without having valid Test certificate	5000	Per equipment per seven days
4	Lifting hooks used without latches	2000	Per hook per day
5	Not effectively barricading area below lifting activity	5000	Per case
6	Using untrained/ unqualified rigger	5000	Per case
G. Housekeeping			
1	Non-removal of scrap from platforms	5000	Per Event Per location per 7 days
2	Not conducting scheduled housekeeping drives	5000	Per drive
H. Hot Work Safety Violations			
1	Gas cutting without flash back arrestor at both ends	5000	Per machine per incidence
2	Gas cutting at height without fire blanket	2000	Per event