

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Erection, Testing, Commissioning, Trial Operation & Handing Over of Boiler and auxiliaries & associate integral piping, SCR & it's Auxiliaries, ESP & auxiliaries, pumps/Fans Ducts, Mills & auxiliaries , Power Cycle Piping, LP Piping etc. including Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site for erection, NDT, fixing of hangers & supports, application of lining, Insulation, painting including paint supply, Stencilling & Labelling etc. of unit-1, 2 & 3 at 3x150 MW BTG package for Hindalco Industries Limited (HIL) Aditya Aluminium at Lapanga, Sambalpur, Odisha

BHARAT HEAVY ELECTRICALS
LIMITED



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Chapter-I: Project Information

1.0 Project Information:

Sl. No.	Description	Details
1	Project Title	3 x 150 MW coal fired Thermal Captive Power Plant (CPP)
2	Customer	Hindalco Industries Limited (HIL)
3	Location	Inside Aditya smelter plant, Lapanga, Sambalpur, Odisha Lapanga, Approx 1.5km Nearest Town/village- Jharsuguda, Approx 20km
4	Nearest Airport	Jharsuguda, Approx 20km
5	Access By Road/Major Cities	State Highway SH-10, Approx 5km
6	Ambient Air Temperature	Maximum / Minimum: 50°C / 6°C Average: 28°C
7	Relative Humidity (RH)	Maximum / Minimum: 87% / 27% Average: 62%
8	Wind Speed	44 m/sec

Chapter-I: Project Information

TENDER NO.: BHEL/CPC/ LPG/M_BLR_ESP_PCP-LP/27/030

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Chapter-II: Scope of Work

2.0	Scope of Works:
2.1.	The broad scope of works includes Erection, Testing, Commissioning, Trial Operation & Handing Over of Boiler and auxiliaries & associate integral piping, SCR & it's Auxiliaries, ESP & auxiliaries, pumps/Fans Ducts, Mills & auxiliaries, Power Cycle Piping, LP Piping etc including Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site for erection, NDT, fixing of hangers & supports, application of lining, Insulation, painting including paint supply, Stencilling & Labelling etc. of unit-1, 2 & 3 at 3x150 MW BTG package for Hindalco Industries Limited (HIL) Aditya Aluminium at Lapanga, Sambalpur, Odisha.
2.2.	<p>Broad area of works in each unit includes, but not limited to: -</p> <ol style="list-style-type: none"> i. Boiler structure ii. Pressure parts & Non-Pressure parts iii. IA/SA Piping iv. All Boiler Integral piping, hanger supports etc. v. Complete system of Selective Catalytic Reduction (SCR) & It's auxiliaries along with ammonia storage shed & associate piping vi. SCR Ducts, Ammonia system, Piping, storage tanks, catalysts, storage shed etc. vii. Rappers, mono rails, Hoists etc. viii. Complete system of Electrostatic Precipitator (ESP) and auxiliaries- ix. Duct dampers and Gates along-with actuators and their support structures with Ladder and platforms etc x. Rotating equipment, Air Preheaters, ID/FD/PA/SA Fans, Mills, and Feeders xi. Complete Ducting (including all accessories, lining, and insulation) up to Chimney inlet xii. Insulation & Refractory of all required system of SG, SCR, ESP, Piping etc. (Piping & Equipment) system as applicable. xiii. Complete Erection and commissioning of Power cycle piping and LP piping xiv. Hanger and supports and Insulation of piping xv. Non-Destructive testing (NDT), Heat Treatment processes as per approved FQP shall be in the bidder scope xvi. Assistance during chemical cleaning, temporary piping with insulation, alkali boil out, acid cleaning and passivation, NDT, Hydrotest, IBR formalities, PG test as per scope given in the tender xvii. All Header inspection and cleaning of boiler by Borescope by cutting and re-welding of inspection nozzles of the Boilers after steam blowing or as per FQP/ Other technical document.

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	<ul style="list-style-type: none"> xviii. Erection testing and commissioning of all Hoists of Boiler, ESP including load test. xix. Coal piping, supports and auxiliaries xx. Steam Blowing and Safety Valve Floating including Erection and Dismantling of all temporary Piping, Valves, etc. required for above operations and other commissioning activities including post commissioning operations and stabilization of the unit. xxi. Painting, stenciling etc. as per scope xxii. Receipt of materials from site store/yard, storage, preservation, erection and commissioning of the system. xxiii. Their preservation and, safe keeping, watch and ward xxiv. Checking, Dressing, Chipping, Leveling of foundations xxv. Pre-assembly, Erection, Alignment of structures, etc. xxvi. Welding, Heat Treatment, UT and Non-Destructive Tests, as per approved documents / FQP. xxvii. Air Leak test, tightness Test, clean air flow test, and other pre-commissioning tests, xxviii. Insulation and painting include supply of paints (as per painting schedule), etc. xxix. Preparation of foundations, erection, levelling, alignment, welding, bolting, grouting, final alignment, final assembly, commissioning, trial run and handover of system and equipment covered under the scope of work xxx. Assistance during PG test as per scope given in the tender. xxxi. Unit Trial/Initial Operation, resolving any deficiencies observed and Handing over of Boiler & Auxiliaries and other equipment covered under the scope of work. xxxii. Common systems pertaining to Boiler and auxiliaries <p>Note: For each item, item rate shall be derived. Payment shall be made on actual execution of work on item rate basis.</p>
2.3.	<p>The work to be carried out at quoted / accepted rates by the Contractor under the scope of these specifications covers the complete work of transporting of materials from project stores sheds / storage yards /Customer site to site of erection or preassembly yard and unloading at pre-assembly area/erection site, checking, pre-assembling of equipment at the preassembly yard with making all necessary arrangements, inspection, preservation, erection, levelling, and other adjustments, Lifting, laying, erection, bolt tensioning, bolt torque tightening, welding, supporting and installation, pre and post weld heat treatment, inspection, NDT including</p>

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	radiography, PWHT and hydrostatic tests by making all necessary arrangements (i.e. dummy plate welding, erection of temporary lines, etc. as required), water / steam flushing, air drying, nitrogen purging and other testing, cutting, edge / surface preparation, welding, grinding, radiography, LPI/MPI/UT/PAUT/CRT testing wherever needed, carrying out air tightness test using soap solution / kerosene, Vacuum test, hydraulic test, steam / air blowing, light up, assistance during chemical cleaning, passivation, steam blowing and safety valve floating including inter connection of all the termination points, below and above ground piping, erection and dismantling of all temporary piping, valves, etc., and all other tests as per FQP and commissioning procedures, required for the above operations, all pre-commissioning tests and trial runs of Boiler and auxiliaries, Power Cycle piping, ESP & auxiliaries, SCR & it's auxiliaries including pumps, Duct dampers and its support structure, Rotating Equipment's, Air Pre-Heaters, ID/FD/PA fans, Mills, Refractory and all other systems and equipment as per the scope of work.
2.4.	Scope covers installation of all valves including other miscellaneous in line / on line items, cleaning, pickling (if required) water / steam flushing, air drying disposal of fluids offsite, reinstatement, preservation of piping and miscellaneous items following hydro test, nitrogen purging, cleaning, assistance during chemical cleaning, painting, insulation, fabrication & installation, all associated incidentals setting and commissioning of pipe supports, guides, anchors, spring supports, temporary/permanent approach/platforms, as required.
2.5.	The work under this contract shall be carried out as per BOQ Cum Rate Schedule and in compliance of tender conditions including technical specifications and approved drawings/ documents.
2.6.	GENERAL
2.6.1.	Further this is to be noted that the drawings and the documents furnished along with this specification are the sole property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.
2.6.2.	The area of work shall be cleared of all vegetation, rubbles and other objectionable matter and materials by contractor. No separate payment for these operations shall be made for such works.
2.6.3.	All the works areas shall be adequately flood lighted to the satisfaction of the Engineer-in-Charge when the work is in progress during the night shifts.

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2.6.4.	Drawings showing enough details for the construction as per the specification shall be furnished to the contractor in a phased manner as far as possible.
2.6.5.	All necessary arrangement for safety like Hard Barricading with scaffolding pipes and providing of safety net is in bidder's scope.
2.6.6.	Establish levels and coordinates at suitable intervals from existing bench marks, marking of reference (level and distance) and other identification works etc., The contractor shall provide the owner/BHEL such an assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.
2.6.7.	Any activity which is necessarily required for satisfactory execution of any item of BOQ in line with technical specifications shall be deemed to be included in BOQ item even if it is not described in the item description and no extra payment shall be made against such activity.
2.6.8.	In case of any HP/LP pipe is routed along the path of walkways, suitable crossover has to be prepared using structural material issued in running meter. In case any additional is approach/ platform required for commissioning/operation of the actuators/valves/gates/dampers is required it shall be in the scope of contractor. Payment/ payment terms of such work shall be done as per Rate schedule identifier - 1A-under head "Structure".
2.7.	Contractor Manpower and Organization structure- Contractor shall deploy experienced and sufficient manpower at site and always maintain a site organization of adequate strength
2.7.1.	<p>BHEL reserves the right to reject or approve the list of personnel proposed by the contractor. The persons whose bio-data have been approved by BHEL will have to be posted at site and deviation in this regard will not be permitted unless specific & reasonable justification is made.</p> <p>Performance of their team to be review on quarterly basis & BHEL may ask for replacement of Engineer/ Supervisor based on their performance. Same to be replaced by Contractor within 30 days.</p>
2.7.2.	The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organizational structure shall be reinforced from time

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	to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.
2.8.	Erection Clause:
2.8.1.	The works to be performed under this contract consist of providing all labour, supervision, material, scaffolding, construction equipment, tools & plants, temporary works, supplies, transportation and all incidental items not shown or specified but reasonably implied or necessary for the proper completion of work in all respects. Testing of all materials etc. are included on the rates of items of work. Works shall be carried out only with approved drawings, document and Procedure. The unit rates shall include all material equipment, fixtures, labour construction plant, temporary works and everything whether of permanent or temporary nature necessary for the completion of job in all respects.
2.8.2.	The bidder should fully apprise himself of the prevailing conditions at the proposed site, local conditions, nearby areas, climatic conditions including monsoon pattern, soil strata and site-specific parameters and shall include for all such conditions and contingent measures in the bid, including those which may have not been specifically brought out in the specifications. Declaration already provided in Forms and Procedure.
2.8.3.	The quantities indicated in the tender specification are approximate and are liable for variation at the requirement of work/discretion of BHEL. The work executed shall be measured and priced as per the unit rate arrived at for each work area as mentioned in the relevant clauses of GCC and preamble to BOQ.
2.8.4.	<p>It shall be specially noted that, the contractor may have to work round the clock (24x7) or may have to deploy additional manpower/resources to achieve the completion schedules / plans / targets during the entire course of erection and commissioning works, which may involve considerable payment including overtime. Hence, contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including labours, engineers / supervisors, T&Ps etc.</p> <p>Time is the essence of contract. Night shift working is envisaged for works not hazardous in nature with due permission of BHEL like- Erection works at low heights, Material shifting, Preassembly works, welding works etc.</p>
2.8.5.	The terminal points can be inferred from the relevant drawings and any further clarifications can be obtained/decided by BHEL and that is final and binding on the

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	<p>contractor for deciding the scope of work and effecting the payment for the work done up to the terminals. Carrying out work as per the specification between equipment constituting terminal points, whether the terminal equipment fall within the scope of work/specification, contractor shall carry out the terminal joints at either end. Also, wherever the piping connection to the terminal points involve flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case, piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, is within the quoted rate.</p> <p>Also, kindly note that various pumps, gear boxes, motors etc. shall be supplied with gland packing, which shall be replaced with mechanical seal after commissioning of respective systems. Replacement of gland packing with mechanical seal has to be carried out by contractor within the quoted rate.</p>
2.8.6.	<p>Considering the area constrain in the subject project, Contractor has to work in close co-ordination with another Erection/Civil agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a particular given time. Activities and erection program have to be planned in such a way that the project milestone events like Boiler light up, Steam blowing, SV Floating, Synchronization etc., are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.</p>
2.8.7.	<p>No member of the already erected structure/ platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / Customer without any additional cost.</p>
2.8.8.	<p>There can be more than one location of open storage yard, Closed shed/ Semi Closed shed. Few locations may be outside project premises, bidder shall make his establishment accordingly for Material Handling and MM services. Bidder shall visit site and ascertain all these aspects before quoting. All materials have to be transported from storage yard/BHEL's shed to construction area by the contractor at his own cost, using own Pick & Carry Crane (Farrana), crane and trailer. The distance from Site to BHEL Yard is approx. 500m within plant premises</p>
2.8.9.	<p>Boiler Drum unloading is in BHEL's MM agency scope (separate contract).</p>

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2.8.10.	<p>Dragging of Boiler drum, if required, to Boiler cavity is in contractor scope. Required cranes (except T&Ps/cranes to be provided by BHEL on free of cost), slings, rails, sleepers, power jacks, winches etc. for dragging of the Boiler drum, as required, has to be arranged by contractor within the quoted price. Contractor shall, if required, fabricate the saddle for dragging of Drum to the Boiler cavity as incidental to work. Structural materials required for the same will be provided by BHEL on free basis.</p>
2.8.11.	<p>Painting:</p> <p>The painting works including supply of the required paints and primers and associated consumables is in contractor scope and shall be carried out as mention in the painting schedule of the respective BHEL material supplying units.</p> <p>All the painting work (Refer Chapter-XVIII) required for handing-over of the equipment to customer has to be carried out in this scope.</p>
2.8.12.	<p>The scope of work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management including high standard safety management (as per relevant clause of tender document) and green belt management (Project Management, HSE & Quality etc.). The contractor should ensure successful and timely completion of the work. The contractor must have adequate quantity of tools, construction aids, equipments etc., in their possession. They must also have on their payroll adequately trained, qualified and experienced supervisory staff and skilled personnel. The manpower deployment identified by contractor shall match with above scope of works. <u>BHEL HSE plan and Hindalco Project Safety Management Standard (Annexure-1 and Annexure-2) shall be followed during the course of execution of work at site.</u></p> <p>Contractor shall arrange necessary First Aid and medical facilities at site for all it's employees, representatives and workers. Contractor personnel may be trained in administering first aid. Round the clock experienced paramedical personnel with first aid facility & ambulance with driver at site will be established by contractor at site within the accepted total price. However, if Medical/First Aid centre/medicines arranged for emergency/Doctor purpose along with ambulance services with fuel and operator (round the clock) arranged by BHEL for handling medical emergencies at site, then Cost against these facilities shall be distributed / shared among the contractors working in the Project site proportionately based on contract value.</p>
2.8.13.	<p>Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any failure to comply with the above might lead to rework and the cost for the same shall be borne</p>

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	by the contractor only. BHEL engineer, depending upon the availability of materials, fronts etc., will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs or for any reason whatsoever.
2.8.14.	Furnishing samples of all materials required by the engineers for testing/inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.
2.8.15.	Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.
2.8.16.	Giving all notices, paying all fees, taxes, statutory clearances, license (like T&P load test, etc), etc., in accordance with the general conditions of contract, that is required for all works including IBR and temporary works. Statutory fees for PESO, if any, shall be in BHEL Scope
2.8.17.	-VOID-
2.8.18.	The contractor shall provide the owner/BHEL such an assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.
2.8.19.	Arranging for joint checking (with BHEL / BHEL's Customer / Consultant) of all site construction activities Preparation of joint protocols for each & every activity and maintaining quality records for audit/inspection as per approved FQP by BHEL is in bidder's scope.
2.8.20.	Contractor shall set up suitable guarded storage facilities. Contractor shall ensure the Storage of only those material at site which will be erected/Pre-assembled within 10 days OR as directed by BHEL Engineer. Any wastage due to lapse of storing shall be debited to contractor with 5% overhead.
2.8.21.	<p>The drawings enclosed with this tender are intended to give the tenderer a general idea of the type and extent of work involved. The drawings are as such only indicative and not to be considered as the exact construction drawings.</p> <p>Further this is to be noted that the drawings and the documents furnished along with this specification are the sole property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.</p>

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2.8.22.	The scope of work will also include such other related works although they may not be specifically mentioned above and all such incidental items not specified but reasonably imply and necessary for completion of the job as a whole all as desired and as directed by the engineer.
2.8.23.	The detail scope of work covered above is not a comprehensive list of items of work involved. The detail scope of work may vary considerably depending on the actual requirements.
2.8.24.	Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, pre-assembly yard and contractor's material storage area etc. at his cost.
2.8.25.	Adequate water-less/Bio urinals (as per HSE plan) at locations identified by BHEL site in-charge , shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas with proper disposal arrangement.
2.8.26.	Vendors have to comply requirements of HSE & Statutory requirement in line with BHEL HSE plan, Hindalco Safety requirement, State/Central statutory requirement.
2.8.27.	Preparation of method statement, HIRA, Job Safety analysis, permit to work, lifting plans, and all supporting documents as required for starting & continuation of work/job is in vendor's scope.
2.8.28.	Scaffolding pipes, clamps, safety nets, floor grills for working platforms are to be made of good quality with proper certifications as per IS Codes.
2.9.	Consumables
2.9.1.	All the required electrodes (in Contractor scope) as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL site, before procurement regarding, suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.
2.9.2.	The contractor shall provide within finally accepted price / rates, all consumables like welding electrodes (including alloy steel and stainless steel), all gases (inert, Nitrogen Gas for accumulators and Gases required for welding, and cutting), soldering material, dye penetrants, water soluble paper. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Sodium silicate, Araldite, petrol, CTC / other cleaning agents, grinding and cutting & buffing wheels are to be provided by the contractor.

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	Steel, H&S, packers, shims, wooden planks and pre-assembly materials (structural steel, concrete sleeper, concrete blocks etc.) hardware items etc. required for temporary works such as supports, scaffoldings, pre-assembly bed etc. can be issued from BHEL at its discretion on returnable basis subject to availability with BHEL site store. In case of non-availability same has to be arranged by agency. Nitrogen cylinders required for Acid cleaning, Oil Accumulator filling & other Commissioning activities of Boiler & Auxiliaries are in the scope the bidder.
2.9.3.	All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost. However, gaskets/packing required for temporary arrangements works such as hydro test of the fuel line etc. shall be in the scope of bidder.
2.9.4.	All the required gases like Oxygen / Acetylene / argon / Nitrogen required for work shall be supplied by the Contractor at his cost. It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of these gases. Non-availability of gases cannot be considered as reason for not attaining the required progress. BHEL reserves the right to reject the use of any gas in case required purity is not maintained.
2.9.5.	The contractor shall submit quarterly statement report regarding consumption of all consumables for cost analysis purposes.
2.9.6.	The contractor shall ensure safe keeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.
2.9.7.	Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate.
2.9.8.	Storage of electrodes shall be done in an air conditioned / humidity-controlled room as per requirement, at his own cost by the contractor.
2.9.9.	All low hydrogen electrodes shall be baked / dried in the electrode drying oven (range 375 deg. C - 425 deg. C) to the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven (Baking & holding oven) and portable drying ovens shall be provided by contractor in sufficient quantities at his cost.
2.9.10.	In case of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the contractor's subsequent bills at market value plus 5% overheads.
2.9.11.	BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.

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2.9.12.	Sealing compounds and GI wires for insulation mattress binding and Self drilling screws / Self taping screws for sheeting works (Al Cladding sheet, Corrugated sheets and other ribbed sheet for the boiler roof and weather protection areas) shall be provided by the agency within the quoted price/rates.
2.10.	HEIRARCHY: In case of any conflict/deviations amongst various documents of TCC, the order of precedence shall be as follows: <ol style="list-style-type: none">1. Items Description in BOQ Cum Rate Schedule.2. Technical Conditions of Contract (TCC).3. Technical Specifications of Customer4. IS Standard.5. BHEL's Standard Specification.
2.11.	BHEL shall hand over handrail material in running meters, along with handrail posts and middle handrail in cut pieces with grooves, to the Vendor. The Vendor shall weld these pieces strictly as per drawings and fix them with stairs, platforms, and other designated locations as specified in the drawings. BHEL shall also hand over toe guard plates either in running meters or in cut pieces. The Vendor shall install and fix the toe guards in accordance with the drawings. The above activities shall be carried out by the Vendor at no extra cost to BHEL. The Vendor shall ensure that the surface finish of handrails and toe guards is smooth and free from sharp edges or burrs to prevent any risk of injuries.

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Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

3.0 Facilities in the scope of Contractor/BHEL:

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
3.1	Establishment:			
3.1.1	For Construction Purpose:			
a	Open space for office (as per availability within project premises)	Yes		Location will be finalized after joint survey with owner.
b	Open space for storage (as per availability within project premises)	Yes		Location will be finalized after joint survey with owner.
c	Open space for fabrication/pre-assembly (as per availability within project premises)	Yes		Location will be finalized after joint survey with owner.
d	Construction of bidder's office, fabrication yard, canteen and storage building including supply of materials and other services		Yes	
e	Bidder's all office equipment, office / store / canteen consumables		Yes	
f	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	
g	Firefighting equipment like buckets, extinguishers etc.		Yes	
h	Cordoning-off of storage area, office, canteen etc. of the bidder		Yes	
3.1.2	For living purpose of the bidder:			

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Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
A	Open space for labour colony		Yes	Contractor has to make his own arrangements for shelter and transportation of labours as per requirement.
B	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	Construction Plan shall be approved by BHEL
3.2	Electricity:			
3.2.1	Electricity for construction purposes (for Site/Project works only) 3 Phase 415/440 V (Free of Cost) within project premises			Free of cost at One point near the site at a distance of approx. 500 meters.
a	Single point source	Yes		
b	Further distribution including all materials, Energy meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances, if applicable		Yes	
3.2.2	Electricity for office, stores, canteen etc. of the bidder within project premises			Chargeable basis
a	Single point source	Yes		Shall be provided by BHEL on chargeable basis at one point near the site at a distance of approx. 500M. (Single point as above 3.2.1, no separate point shall be given)

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Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances, if applicable		Yes	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors, labour Hutment etc.			Contractor has to make his own arrangements
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Payment/Duties and deposits including statutory clearances if applicable		Yes	
3.3	Water Supply:			
3.3.1	For construction purposes:			
a	Making the water available at single point (Free of charge)	Yes	Yes	BHEL shall provide water supply (at single point source) for construction purpose on Free of charge basis
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	Water supply for bidder's office, stores, canteen etc.		YES	Contractor has to make his own arrangements
a	Making the water available at single point		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	Water supply for Living Purpose			Contractor has to make his own arrangement
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4	Lighting			General area lighting through high mast and other fixtures shall be in the scope of BHEL. However, localized area lighting for bidder's construction site/ storage yard/pre-assembly yard/material handling location, etc. shall be in scope of contractor.
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area 4. At the Fabrication yard		Yes	

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Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area 4. At the Fabrication yard		Yes	
c	Providing the necessary consumables like bulbs, switches, etc. during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5	Communication facilities for site operations of the bidder			
a	Telephone, fax, internet, intranet, e-mail etc.		Yes	
3.6	Compressed air wherever required for the work			
a	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc.		Yes	
b	Installation of above system and operation & maintenance of the same		Yes	
c	Supply of the all the consumables for the above system during the contract period		Yes	
3.7.1	Demobilization of all the above facilities		Yes	
3.7.2	Transportation			
a	For site personnel of the bidder		Yes	
b	For bidder's equipment and consumables (T&P, Consumables etc.)		Yes	
3.7.3	Erection Facilities			

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Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
3.7.3.1	Engineering works for construction:			
a	Providing the erection/constructions drawings for all the equipment covered under this scope.	Yes		Shall be provided progressively.
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings wherever deviations observed and executed and also based on the decisions taken at site		Yes	Changes are to be marked in drawing & handover to BHEL on completion of work.
d	Shipping lists etc. for reference and planning the activities	Yes		
e	Preparation of erection schedules and other input requirements as per Form-14.		Yes	In consultation with BHEL
f	Review of performance and revision of site fabrication and erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on Sl. No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on Sl. No. g		Yes	In consultation with BHEL
i	Periodic visit of the senior official of the bidder to site to review the progress so that works is completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
j	Preparation of pre-assembly bay		Yes	Materials required for pre-assembly bay shall be in agency scope. However, if available, BHEL may provide such material on free returnable basis, which shall be returned without any damage.
k	Laying of tracks, support for marching, erection, assembly, commissioning for all type cranes, if provided by BHEL or brought by the contractor /bidder himself.		Yes	

3.8.	<p>Land/Open Space:</p> <p>Availability of land within plant boundary is very limited and the contractor has to plan and use the existing land considering the use of land by other Civil /mechanical/ electrical contractors and the storage of plant machineries and materials. The existing land shall be shared by all erection agencies. BHEL shall provide free of charge limited open space for office, storage shed and laydown area as and where made available by Customer. It is the responsibility of the contractor to construct facilities such as sheds, fabrication/Preassembly yard, provide all utilities and dismantle and clear the site after completion of work or as and when required, as a part of his scope of work.</p>
3.9.	<p>Labour and Staff Colony:</p> <p>Following are in the Bidder's scope of work for labour & staff colony:</p>
3.9.1.	<p>Labour colony is to be developed by bidder for all the labourers required to be deployed for the works. All labour colony set-up is to be developed as per attached layout drawing (Design Shall be in the scope of Contractor)/BHEL's standard guidelines (Annexure-A) for workers accommodation/establishment and in compliance of statutory requirements OR as per the plan approved by BHEL at site for development of labour colony.</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

	Cement & Steel required for the Labor shed/Set shall be in contractor's scope.
3.9.2.	Contractor shall ensure establishment & maintenance of workmen/labour colony in line with BHEL layout drawings & Guidelines (As per Annexure A - Standard Guidelines for Worker's Accommodation / Establishments at BHEL-Project Sites) OR as per the instructions issued by BHEL at site
3.9.3.	In case labour hutment is not completed as per the drawings, BHEL's guidelines and specification and any penalty is imposed by Customer, same shall be recovered from contracts RA Bill. Rectification and Corrections in labour hutment as pointed out by BHEL/Customer shall be bidder's responsibility and any cost incurred by BHEL to complete the works, in case of noncompliance of the instructions, same shall be recovered from his RA Bills along with 5% overheads.
3.9.4.	<p>Land for labor colony shall be arranged by Contractor at their own cost as per availability outside project area within acceptable limit or approx. 5 KM, necessary levelling/dressing of land shall be done by the contractor. All arrangement for electricity and drinking/service water to be arranged by the contractor within his quoted price.</p> <p>However, if customer (HIL) provides land to BHEL for development of labour colony during the execution of the project, same may be made available to the bidder at the same terms & conditions (including rates) as applicable for BHEL. Bidder should indemnify BHEL for all the charges levied by HIL for such land, if applicable. Necessary levelling/dressing of such allotted land shall be done by the contractor. All arrangement for electricity and drinking/service water to be arranged by the contractor within his quoted price</p>
3.9.5.	Development of Bidder's temporary staff colony and labour colony having adequate no. of rest rooms along with toilets & fencing etc.
3.9.6.	All Civil and Structural work associated with drinking and service water for Bidder's labour and other personnel at the work site/colony/offices including pump houses, pipes, overhead tank, tube wells etc. is in bidder's scope
3.9.7.	Providing and maintaining facilities for safety, welfare, drinking water and sanitation, hygiene, biennial health check-up etc. for construction workers at their workplaces as well as at labour & staff colonies.
3.9.8.	Development and maintenance of above facilities for construction workers deployed by the Contractor shall solely rest with the Contractor.
3.9.9.	<p>Installation of necessary amenities and temporary infrastructure at Project site locations- Following are the minimum amenities to be provided by the bidder within the quoted price including removal/disposal of the same in environment friendly manner after its intended use/completion of scope of work:</p> <ul style="list-style-type: none"> • Labour rest sheds near work spot. • Canteen facility creation / arrangement. • Drinking water facility.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

	<ul style="list-style-type: none"> • Labour Bio toilets near work spot in sufficient nos. with regular cleaning & maintenance arrangement. • Labour colony should have all hygienic condition, dining hall, toilets, proper sewerage system, good drinking water arrangements. • Regular fogging in the work place and labour colony to avoid mosquitoes. • Statutory documents shall be submitted along with RA Bills for processing of Bills.
3.10.	Construction Power:
3.10.1.	<p>Construction power (three phase, 415 V/ 440 V) shall be provided by BHEL free of cost at One point near the site at a distance of approx. 500M. Further, distribution shall be arranged by the contractor at his own cost and services.</p> <p>Construction power (three phase, 415 V/ 440 V) for office, stores, canteen etc. within the site premises will be provided on chargeable basis near the site at a distance of approx. 500M. Further, distribution shall be arranged by the contractor at his own cost and services.</p>
3.10.2.	<p>Contractor shall deploy and install required energy meter (wherever applicable), cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act.</p> <p>Contractor shall provide at his own cost necessary calibrated energy meters (tamper proof, suitably housed in a weather proof box with lock & key arrangement) at point of power supply along with calibration certificate from authorized/ accredited agency for working out the power consumption. In case of recalibration required for any reason the necessary charges including replacement by calibrated meters is to be borne by the contractor.</p> <p>Contractor is advised to maintain the calibrated energy measuring instruments.</p> <p>Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc. towards the clearance of such installations, prior to use.</p>
3.10.3.	<p>Sufficient power factor compensation equipment like capacitor shall be provided by contractor for reactive loads like welding machines etc. In case of any fine/penalty on account of low power factor, same shall be shared by contractor proportionately according to power consumption.</p>
3.10.4.	<p>Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes & vehicles, civil work, fabrication/construction/assembly/ erection etc. and safety of personnel. It may become necessary to relocate some of the installations to facilitate work by other agencies or by him.</p>

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Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

3.10.5.	It shall be the responsibility of the Contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.
3.10.6.	While reasonable efforts will be made to ensure continuous electric power supply, interruptions cannot be ruled out and no claim from the Contractor shall be entertained on this account such as idle labour, extension of time etc. The Contractor shall adjust his working shift accordingly and deploy additional manpower, if necessary, so as to achieve the target.
3.10.7.	Contractor shall be well equipped with back-up power supply arrangement like DG set and diesel operated welding machine etc. to tackle situations arising due to failure of supplied power, so as to ensure continuity and completion of critical processes that are underway at the time of power failure or important activities planned in immediate future.
3.10.8.	BHEL is not responsible for any loss or damage to the Contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.
3.10.9.	The bidder will have to procure & install general mobile illumination system during construction right from start of his work. This system will include temporary pole lighting, within the quoted price. The illumination should be such that minimum illumination requirement as specified by Indian standards for general illumination is maintained.
3.10.10.	Supply of electricity shall be governed by Indian Electricity Act and Installation Rules and other Rules and Regulation as applicable. The contractor shall ensure usage of electricity in an efficient manner and the same may be audited by BHEL time to time. In case of any major deviation from normally accepted norms is observed, BHEL will reserve the right to impose penalty as deemed fit for such cases.
3.11.	Construction water:
3.11.1.	BHEL shall provide construction water supply free of cost (at single point source) for construction. Contractor has to make arrangement of further distribution of water at his own cost. However, contractor shall make alternate arrangement of construction water till the same is made available by BHEL. Contractor has to make his own arrangement to meet Water requirement in case of interruptions during the course of the project. No extra payment shall be made under this account.

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Chapter-III: Facilities in the scope of Contractor/BHEL (Scope Matrix)

3.11.2.	The Contractor should make their own arrangements for storage of sufficient quantity of water required for work.
3.11.3.	Contractor to satisfy himself that the water drawn by him is fit for construction / consumption and adequately treat such water at his cost when it is not found fit for the said purposes.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

4.0 Tools and Plants: Number of T&Ps to be deployed at site shall be decided w.r.t. monthly plan and review format (F-14) based on site requirement.

4.1. Major T&P: The following **Major Tools & Plants** (T&P) shall be arranged by the Contractor with certified operator for execution of work as per Technical Conditions of Contract of this tender within the quoted rate.

S.N.	DESCRIPTION OF MAJOR T&Ps	CAPACITY	QUANTITY	REMARKS
1.	Crawler/Tyre Mounted Crane	150 MT	01 No.	Crane to be made available as per instruction from BHEL Site in-charge. Tentative schedule: from Start of Boiler Erection of unit-1 till Synchronisation of unit-3
2.	Crawler/Tyre Mounted Crane	80 MT	01 No.	Crane to be made available as per instruction from BHEL Site in-charge. Tentative schedule: from Start of Boiler Erection of unit-1 till COF of unit-3
3.	Induction Heating Machine including all accessories	Of required capacity	01 No.	To be made available as per instruction from BHEL Site in-charge. If additional IHM will required then same shall be arranged by contractor within quoted rates. For welding of P-91, P-92, P-22, P-23, & pipes as applicable.

Note for clause 4.1:

- Contractor shall mobilise aforementioned cranes/T&Ps at site, in case stated capacity crane could not be made available, for any reason what so ever, a higher capacity crane shall be mobilised by the contractor without any extra cost.
- Agency shall Mobilize / de-mobilize/ re-mobilise the Major T&Ps as per BHEL instruction without any extra cost to BHEL.

4.2. Other T&Ps: The following **Other Tools & Plants** (T&P) shall be arranged by the Contractor for execution of work as per Technical Conditions of Contract of this tender within the quoted rate. Below given Quantities are tentative for planning purposes by the bidder.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

For Package:

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	TENTATIVE QUANTITY	REMARKS
1.	Tyre mounted mobile crane	18/20/23 MT	As per requirement	Sufficient number for parallel working viz. erection, pre-assembly, material loading unloading etc.
2.	Tyre mounted mobile crane	10/12/14 MT	As per requirement	Sufficient number for parallel working viz. erection, pre-assembly, material loading unloading etc.
3.	Trailer with prime mover	20 MT	01 no.	As per requirement. Within the quoted rates, adequate number of trailers shall be mobilized by contractor at site so that material feeding for achieving monthly target shall not be impacted
4.	Trailer with prime mover	40 MT	As per requirement.	
5.	Man lifter	As per requirement.	As per requirement.	
6.	Calibrated Power driven HSFG bolt tightening machines	As per requirement	As per requirement	
7.	Power Driven Torque tightening machine	As per requirement	As per requirement	
8.	Torque calibrator	As per requirement	As per requirement	
9.	Bolt Tension Calibrator	As per requirement	As per requirement	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	TENTATIVE QUANTITY	REMARKS
10.	Pre-heating, post-heating and post-weld stress relieving equipment with latest technology as per BHEL Engineers instructions along with heating control panel, cables, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment / stress-relieving operations.	As per requirement	As per requirement	As per requirement
11.	Electrical torque wrench	As per requirement	As per requirement	
12.	Impact wrench	As per requirement	As per requirement	
13.	Torque wrench	As per requirement	As per requirement	
14.	Steel tape	As per requirement	As per requirement	
15.	Steel ruler	As per requirement	As per requirement	
16.	Ultrasonic hardness testing machine (Ultrasonic contact impedance (UCI))	As per requirement	As per requirement	GE or Kraut Kramer or Microdur make or reputed branded ultrasonic hardness testing machine. (Hardness test may be Brinell, Vickers and Rockwell tests as per the discretion of BHEL.)

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

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	TENTATIVE QUANTITY	REMARKS
17.	DG SET – 250 KVA or of required capacity	As per requirement	01 set	For continuous/uninterrupted back up power during welding & post weld heat treatment
18.	Ultrasonic thickness gauge (Thickness measurement M/Cs)	As per requirement	As per requirement	
19.	Air compressor/blower (electric/diesel operated)	210 CFM, 7 KG/CM2	As per requirement	
20.	TIG welding set	As per requirement	As per requirement	
21.	Oxy Acetylene Gas cutting Machine	As per requirement	As per requirement	
22.	GTAW Machine & SMAW machine: welding machines	As per requirement	As per requirement	
23.	DC arc welding machine & Submerged ARC welding M/C	As per requirement	As per requirement	
24.	3-phase distribution board with complete set up for drawl of construction power	As per requirement	As per requirement	
25.	Power cable for drawl of construction power	As per requirement	As per requirement	
26.	Self-drilling cum tapping machine for screws	As per requirement	As per requirement	Prior to start of sheeting works.
27.	Radiography arrangement with radioactive isotope source Iridium-192, the geometric un-sharpness shall not exceed 1.5mm. Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width. Film density shall be between 1.5 and 2.0.	As per requirement	As per requirement	Required since Boiler erection start Contractor shall also arrange necessary safe guards required for radiography (including personnel from BARC).
28.	Theodolite of required accuracy	To ensure verticality of	02 Nos.	Required Since start of work

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

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	TENTATIVE QUANTITY	REMARKS
		structural columns.		
29.	Arrangement for UT of higher thickness joints with recording facility & required calibration blocks.	Type USN 50 or equivalent/ up graded type	As per requirement	
30.	Welding rectifiers / MIG Welding (electrical)	As per requirement	As per requirement	
31.	Welding generator (diesel operated)	As per requirement	As per requirement	
32.	Radiography film viewer	As per requirement	As per requirement	
33.	Pipe/Tube cutting/ bevelling /chamfering machine	As per requirement	As per requirement	
34.	Electro/hydraulic pipe bending machine	Up to 2.5" nb and 12 mm thick pipes	As per requirement	
35.	Baking oven with thermostat and temperature gauge for welding electrodes	As per requirement	As per requirement	Required Since start of work
36.	Holding oven with thermostat and temperature gauge for welding electrodes	As per requirement	As per requirement	Required Since start of work
37.	Portable oven for welding electrodes	As per requirement	As per requirement	Required Since start of work
38.	Pug Cutting machines	As per requirement	As per requirement	
39.	Chain pulley blocks	As per requirement	As per requirement	
40.	Electric winch	2/3/5/10/15 MT capacity	As per requirement	
41.	Hand winch	0.5 ton/1.0 MT capacity	As per requirement	
42.	Battery Driven emergency light	As per requirement	As per requirement	

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

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	TENTATIVE QUANTITY	REMARKS
43.	Scaffolding materials with clamps for insulation, painting etc works	As per requirement	As per requirement as decided by BHEL engineer	
44.	Profile making m/c	For aluminium sheet cladding work	As per requirement	
45.	Nibbling m/c	As per requirement	As per requirement	
46.	Shearing m/c	As per requirement	As per requirement	
47.	Portable grinding m/c	As per requirement	As per requirement	
48.	Portable drilling m/c	As per requirement	As per requirement	
49.	Hoisting and pulley devices/pulleys	As per requirement	As per requirement	
50.	Spanners / Eye Bolts (of All Sizes)	As per requirement	As per requirement	
51.	Single sheave Pulley/Double sheave Pulley/D shackle/Turn buckles	As per requirement	As per requirement	
52.	Magnetic particle testing equipment – DRY & WET Type	As per requirement	As per requirement	
53.	Hydraulic Jacks	10/20/50/100 MT	As per requirement	
54.	Dewatering pumps	As per requirement	As per requirement	
55.	Various sizes of clamps/ fixtures for assembling	As per requirement	As per requirement	
56.	Hand Operated Megger 500 / 1000 V	As per requirement	As per requirement	
57.	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy	As per requirement	As per requirement	As per requirement

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

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	TENTATIVE QUANTITY	REMARKS
58.	Digital and Analogue Multimetres	As per requirement	As per requirement	As per requirement
59.	U Tube Manometer 0-2000 mm Water Column	As per requirement	As per requirement	As per requirement
60.	Inclined Manometer 0-50 mm Water Column	As per requirement	As per requirement	As per requirement
61.	Special Slings for Erection of Boiler Drum, Ceiling Girders & other heavy components	As per requirement	As per requirement	As per requirement
62.	Concrete Blocks	As per requirement	As per requirement	For making bed of steel structure for checking dimensional accuracy, configuration and minor rectification.
63.	Wooden/Concrete sleeper 1.5-2.0 Mtr length	As per requirement	As per requirement	
64.	PMI (Positive Material Identification)	As per requirement	01 no.	
65.	Equipment for carrying out NDT test like LPI/MPI, RT, UT, MPI etc along with consumables.	As per requirement	As per requirement	
66.	Painting equipment sets complete	As per requirement	As per requirement	
67.	Digital Elcometer for paint thickness checking	As per requirement	As per requirement	
68.	Sufficient quantity of steel ladders for approach up to the top of each erected column to be required during erection of columns.	As per requirement	As per requirement	
69.	Suspended working platform Size :7mX1mX0.5m, Rated load 800 kg to 1000 Kg,	As per requirement	As per requirement	

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

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	TENTATIVE QUANTITY	REMARKS
70.	Tools for Reaming and Honing	As per requirement	As per requirement	
71.	PVC Caps to cover Pipe/tube ends.	As per requirement	As per requirement	
72.	Filling Pump for Hydro test		01 No	Tentative capacity-80 M head
73.	Furnace maintenance platform (Sky climber)	As per Requirement	01 Nos.	to cover one length and one width of furnace including corners
74.	Spot Welding M/c	As per requirement	As per requirement	
75.	Web Slings	As per requirement	As per requirement	For handling the P-91/92 headers and Piping
76.	Hand operated pressurising pump (of suitable capacity)		01 No	For Hydrotest of hydraulic oil lines/ impulse lines of various system in SG.
77.	Safety Equipments /PPEs- Safety Net, Fall Arrester, Horizontal Life line, Ladders on column, Full body safety harness double lanyard with shock absorber, Industrial Safety Helmet, Industrial Safety Shoes	As per requirement	As per requirement	

4.3.	List of suggestive safety Equipments /PPEs to be included in List of minimum T&P	
1.	Height Rescue Kit and Confined space rescue kit	1 No
2.	Lux Meter & Breathe Analyser	2 Nos
3.	Multi Gas Meter	1 No
4.	ELCB & RCCB Tester	1 No
5.	Earth Resistance meter	1 No
6.	Scaffolding materials as per EN 74 for hard barricading	As per requirement

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7.	Axial Fan with exhaust hood for confined space working and DC Light Unit	Min 2 Nos
8.	Oxygen Meter	1 No
9.	Fire Blanket	Min 500 Mtr
10.	Fire resistant tarpaulins	50-100 Nos
11.	Safety Posters as per BHEL Guidelines	As per requirement and instruction of BHEL
12.	Fire Extinguishers: As per requirement and instruction of BHEL	
13.	Rubber Mat as per IS 15652	Min 200 Sqm
14.	Electrical rubber gloves	As per requirement

4.4.	Measuring and Monitoring Equipment (MMEs): To be finalized as per site requirement.
4.5.	All above T&Ps are to be deployed by contractor as and when required as per instruction of BHEL engineer. If works gets delayed due to non-availability of above T&Ps, BHEL reserves the right to deploy the same and recover the charges thereof from the contractor as per prevailing market rate/hiring rate/BHEL internal hiring rates + 5% overhead rates.
4.6.	Any Heavy Equipment (cranes, winch machine, etc.) manufactured less than 15 Years from the current Year shall be only allowed to be used at project Site. Pre-safety Inspection of the equipment by safety deptt. shall be done before mobilizing the equipment at our project site.
4.7.	Hydras are not permitted for the scope of work. Contractor shall deploy and use pick & carry crane of TRX or equivalent type only for the above purpose.
4.8.	Tandem operation towards material handling is also not permitted in the project premises.
4.9.	Necessary electrical / water / air connection required for operation of any of the tools & tackles shall be to Contractor's account.
4.10.	Contractor has to submit the Calibration certificates of all the precision equipment to BHEL. BHEL may ask for recalibration of the MMEs /precision equipments for ensuring quality of work. Contractor must re-asertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.
4.11.	All Measuring and Monitoring Devices (MMD) used for the work in scope of these tender specifications shall be calibrated by the accredited agencies that are approved by BHEL or calibration tractability is established upto National Physical Laboratory.
4.12.	Contractor has to arrange slings of all sizes for completing the works covered under these specifications.

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4.13.	In the event of need of change of type of any of major T&Ps, approval shall be taken from BHEL Engineer in-charge prior to mobilization. The decision of Number of T&P required due to replacing the enlisted T&P as per above table, shall be taken after analysing the production capacity and suitability of both the T&Ps.
4.14.	The contractor shall submit the valid test certificate/calibration certificates for all the T&Ps before put into actual use at site. The certificates shall be renewed time to time as instructed by BHEL Engineer.
4.15.	Crane operators deployed by the contractor shall be offered for testing by BHEL before they are allowed to operate the cranes.
4.16.	The above list as mentioned in S.No. 4.2 (Other than mentioned in S.No. 4.1 Major T&Ps) is only indicative and these T&Ps may not be required for entire contract period but contractor shall ensure the availability of the T&Ps as per work requirement and T&P Deployment schedule. T&P Deployment schedule shall be finalized at site in consultation with BHEL Engineer based on the work fronts/work requirement. BHEL decision shall be final and binding regarding the T&P deployment schedule. Contractor shall mobilize / maintain the T&P's as per the deployment schedule notified time to time by BHEL Engineer.
4.17.	As per Requirement- Contractor has to deploy T&P, MMD, IMTE as per requirement of site and as decided by BHEL Engineer.
4.18.	Apart from above mentioned T&P, any additional item required in addition to above mentioned T&P for proper execution of scope of work, contractor has to arrange such T&P within quoted rate on the instruction of BHEL in writing in a reasonable period from the written instruction from BHEL.
4.19.	If the work related to T & Ps mentioned above is completed then, BHEL can release that T&P during contract period / extended period (if any). However, written permission shall be taken by contractor from BHEL Construction Manager and gate pass formalities shall be followed by the contractor for releasing the T&P.
4.20.	In the eventuality of contractor not deploying / abnormal down time of T&P/cranes in his scope during the period specified above, and BHEL arranges for the same [BHEL's own cranes], prevailing BHEL Corporate Crane hire charges (which may vary from time to time) shall be recovered from the contractor's running bills. Corresponding pages of Corporate Crane hire charges are enclosed as part of tender document as file titled " Annexure-3-BHEL T&P Hire Charges ". <i>(Please note that these charges are as valid up to Aug'2027 and may get revised further)</i> . In case BHEL arrange the T&P/Crane through hiring, actual hiring charges with 5% over head shall be recovered from the contractor's running bills.
4.21.	The loading, unloading and transportation of contractors T&Ps shall be in the scope of contractor. All necessary items such as Trailers, Cranes, Winches, welding generators, slings, jacks, sleepers, rails etc., are to be arranged by the contractor at his own cost.

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4.22.	All the T&Ps required for this scope of work, except the Tools & Plants mentioned in Chapter V of TCC: T&Ps to be provided by BHEL , are to be arranged by the contractor with in the quoted rates.
4.23.	All operators (for crane, winch etc.) deployed by contractor shall have valid licence from applicable authority (which ever applicable).
4.24.	The contractor has to furnish a list of Tools and plants including cranes/tractors/trailers/trucks etc. which he has proposed to deploy for this work.
4.25.	T&Ps shown in the above in S. No. 4.2 mentioned list is suggestive requirement. However, mobilization schedule as mutually agreed at site for T&Ps, have to be adhered to. Numbers/time of requirement will be reviewed from time to time at site and contractor will provide required T&Ps/equipment to ensure completion of entire work within schedule/target date of completion without any additional financial implication to BHEL.
4.26.	Contractor will give advance intimation & certification regarding capacity etc. prior to dispatch of heavy equipment. Also, on completion of the respective activity, demobilization of T&Ps in total or in part can be done with the due approval of Engineer-In-Charge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.
4.27.	The contractor shall arrange operator, diesel, petrol and other consumables including electrical / water / air connections required for the tools and plants, equipment such as crane, winch, temporary Jhoola, Sky Climber etc. Preventive and routine maintenance of T & P are also to be arranged by the contractor at his cost without any delay. Required number of experienced mechanics and helpers for routine maintenance of the above T&Ps shall be provided by the contractor within his quoted rate.
4.28.	1) The induction heating equipment and other equipment including consumables shall be in the scope of agency. For routine maintenance & attending all type of break-down maintenance, contractor shall deploy sufficient manpower, tools and plant within the quoted rate. 2) Adequate no of DG Set of required rating, operator and fuel for P-91 welding is in Bidder's scope. Diesel Generator for P-91/92 welding, along with required cables, switches, fuel and operator, has to be arranged by the contractor within the quoted rates.
4.29.	Filling pump for hydro test is in contractor scope.
4.30.	Such of those consumables as indicated as consumables provided by BHEL alone will be provided to the contractor by BHEL free of charge for erection activities. Other required

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	consumables like electrodes, all gases, and other materials for this scope of work are to be arranged by the contractor at their cost.
4.31.	Imported electrodes / TIG welding wires released by BHEL manufacturing unit, if any, will be given by BHEL. All other electrodes / TIG welding wires including stainless steel electrodes and Filler wires required for shall be arranged by the contractor at his cost. However, BHEL will provide imported electrodes as provided by manufacturing units. In any case, if the requirement of the electrodes is more than the BHEL MU supplied quantities, Bidder has to arrange the same at his cost. In case, BHEL arranges the electrodes on Bidders behalf, the applicable cost along with 5% overheads towards the purchase of the electrodes shall be recovered from the monthly RAB of the bidder. The bidder shall use the Customer approved quality welding electrodes only.
4.32.	Gaskets, gland packing, wooden sleepers, for temporary work, required for completion of work except those which are specifically supplied by manufacturing unit are also to be arranged by contractor.
4.33.	<p><u>LIFTING OPERATIONS FOR CRANE</u></p> <p>The Contractor shall prepare a lifting plan, checked and submit for authorization by contractor's competent authorized persons prior to any lifting operation and formally communicated to all persons undertaking the work.</p> <p>All persons preparing, issuing lifting plans and all persons involved in lifting operations must be subject to formal competence checks by the contractor to ensure necessary training, experience and qualification prior to commencing work. The Subcontractor must ensure that their nominated Lifting Leader has appropriate qualifications.</p> <p><u>Contractor lifting plans include:</u></p> <ul style="list-style-type: none"> • The lifting methodology, step by step, • The risk analysis of the operation including consideration for weather conditions and work environments (e.g.: proximity of hazards and obstructions to the load, consideration for overturning, load integrity) where appropriate and consideration for simultaneous operations and the measures taken to avoid conflicting tasks in the lifting area. • The identification of the designated lifting area, the fall zone and the control measures to prevent access such as barriers, signs, etc.

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

- The description of the type, weight, size, shape and center of gravity of the load and the method used for slinging, attaching and detaching the load with the availability of approved lifting points on load when necessary.
- The list of the certified and inspected equipment and lifting accessories to be used.
- The composition of the team required to perform the task (crane driver, rigger, etc.) with the needed qualifications and description of their roles and responsibilities including the intended communication method.
- Any Heavy equipment (crane, winch machine, etc.) manufactured less than 15 years from the current year shall be only allowed to be used at project Site's. Pre-safety Inspection of the equipment by safety deptt. shall be done before mobilizing the equipment at our project site.

The contractor must ensure that a competent operational leader is formally appointed to supervise each lifting operation. All lifting plans must clearly define the specific roles and responsibilities for each person involved (e.g.: crane drivers, lifting coordinators and riggers) and must be checked and issued prior to lifting operation. Clear communication channels must be formally established and maintained between everyone involved in a lift with only authorized person giving instruction to the operator.

Special permission needs to be taken from Customer for tandem lifting and for any non-routine lifting operations must strictly adhere to the guidelines described in corresponding Standard / Procedures / Directive.

No employee of the contractor shall be positioned under a suspended load or between a suspended load and fixed objects.

All lifting equipment and accessories must have valid manufacturers certificates or thorough examination records and be uniquely identified, marked with the safe working load, listed in a register and subject to formal regular inspection as per EHS requirements and shall have valid certificates from a competent authority. Inspection before use by the operator is mandatory. All lifting hooks must have latch. All cranes shall be fitted with Automatic Safe Load Indicator (ASLI) and Anemo Meter.

The contractor shall operate and maintain cranes and hoisting equipment in accordance with manufacturers' specifications and limitations and the safety Requirements. All defective, non-inspected or unidentified (safe working load / identification number) lifting

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	equipment or accessories must be either removed from site or physically prevented from use.
4.34.	<p>Penalty due to non-availability of T&Ps:</p> <p>In order to meeting the site requirement and in line with monthly plan and review format (F-14), Contractor has to mobilise their T&Ps and made available at site for required activities.</p> <p>For Major T&Ps, if contractor fails due to, either of the case, mentioned hereunder, BHEL shall be entitled to impose penalty on Contractor till any alternate arrangement is made by 'Contractor' OR 'BHEL (on cost recovery basis)'.</p> <p>Case 1: Contractor fails to mobilise the same within the mobilisation period of 30 days from the date of intimation.</p> <p>OR</p> <p>Case 2: After mobilisation of T&P at site, the work is getting hampered due to non-availability of T&P for more than 05 days from the date of such intimation,</p> <p>Penal rate for Major T&Ps is mentioned hereunder:</p> <ul style="list-style-type: none">a. 150 MT Crane – Rs. 24,650/dayb. 80 MT Crane – Rs. 8,592/dayc. Induction heating M/c – Rs. 7,700/day

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Chapter-V: T&Ps AND MME TO BE DEPLOYED BY BHEL ON SHARING BASIS

5.0 LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS:

5.1. BHEL shall provide following T&Ps on sharing basis for execution of work:

SL NO	DESCRIPTION & CAPACITY OF T&P	QUANTITY	REMARKS
1	Cranes	As required & decided by BHEL	150 MT or higher capacity cranes. All cranes (except that in Contractor scope as mentioned in 4.1), if required for mentioned work, will be arranged by BHEL as per requirement.
2	Strand Jack for Boiler Drum Lifting	01 no.	As decided by BHEL. Assistance in installation, regular maintenance, repair etc. to be provided by bidder to strand jack supplier in line to BHEL instructions.
3	Crane for ceiling Girder erection	01 no.	As decided by BHEL
4	Boiler Hydraulic Pressure Testing Pump with accessories.	As required	
5	Venturi meter along with Air blower	As required	For ESP Air-in leak test
6	Huck Bolting Machine	As required	BHEL will provide only Huck bolting machine with one set of jaws. Further requirement of jaws to be arranged by the contractor at his cost. Consumables like O-ring, backup ring, springs, hydraulic fluid for top-up etc., required for maintenance of the huck-bolting machine to be arranged by contractor at his cost.
7	Chemical Cleaning Arrangement (incl. Pump)		

5.2.	All the T&Ps mentioned in clause 5.1 above shall be given to contractor on sharable basis and the allotment is made by BHEL on need basis. Contractor shall plan activities well in advance and inform BHEL Engineer in charge/ Construction Manager the date of actual use. The decision of BHEL Engineer in-charge/CM on this will be final and binding.
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Chapter-V: T&Ps AND MME TO BE DEPLOYED BY BHEL ON SHARING BASIS

5.3.	Contractor shall provide assistance to transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores all T&Ps mentioned in Cl. no 5.1 for his use.
5.4.	Cranes provided by BHEL are only for erection purpose and shall not be available for material handling or transportation purpose. Contractor shall make their own arrangements for material transportation to erection site.
5.5.	All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections for the BHEL issued T&Ps shall have to be arranged by the contractor at his cost.
5.6.	The contractor at his cost shall arrange for grouting of anchor points of T&Ps issued to agency. Necessary grout materials are to be arranged by the contractor at his cost.
5.7.	The day-to-day and routine maintenance including replacement of spares for the BHEL T&Ps will be carried out by the contractor at his own cost. However, BHEL shall supply spare parts free of charges for normal wear and tear only.
5.8.	Any loss/damage of tools by the contractor shall have to be replaced or otherwise cost thereof shall be recovered from the contractor.
5.9.	T&Ps provided by BHEL will be on sharing basis with other agencies / contractors of BHEL. The allocation of T&Ps shall be the discretion of BHEL engineer, which shall be binding on the contractor. T&Ps will be deployed at appropriate time as decided by BHEL for suitable duration and intended purpose. Augmentation of BHEL T&P under special circumstances shall be discretion of BHEL.
5.10.	Higher capacity crane is to be used for erection of boiler ceiling structures and equipment/ components above Boiler ceiling structure, etc that require services of this crane as decided by BHEL. This crane will accordingly be deployed at appropriate time as decided by BHEL for suitable duration and intended purpose.
Note	For BHEL Owned or hired Crane:
	1. The cranes may be BHEL owned or may be obtained on hiring basis including operating and maintenance crew.
	2. Operator and O&M for BHEL Owned/Hired crane will be provided by BHEL (including extended hours), free of charge.
	3. Contractor shall provide the fuel for BHEL provided cranes (Hired/owned) for his use.

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Chapter-V: T&Ps AND MME TO BE DEPLOYED BY BHEL ON SHARING BASIS

4. Contractor shall make necessary arrangements like laying of special sleeper beds and steel plates (**Plates for BHEL owned/ hired cranes shall be provided by the BHEL**), assembly and dismantling of heavy attachment, boom, jib etc. for movement and operation of the crane. Contractor shall provide necessary manpower assistance for initial and final assembly & dismantling and for subsequent operations of boom extension and reduction during execution of work. Levelled & reasonably compacted area will be provided by BHEL/customer for the movement of BHEL cranes. Further Consolidation of the ground with hard-crusting of Area required for movement of crane (including civil work with material) for placing crane for operation shall be facilitated by BHEL. Necessary plates required for marching operation shall be provided by the BHEL only for BHEL owned cranes.

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Chapter-VI: Time Schedule

6.0 TIME SCHEDULE & MOBILIZATION

6.1.	Time Schedule and Mobilization:
6.1.1.	Initial Mobilization and Time Schedule:
	<p>After issue of LOA (though Fax/courier/email) the contractor shall report to the Construction Manager/Site In-Charge of BHEL at site within Seven days (07) from date of LOA for Kick-off meeting regarding mobilization of manpower, T&Ps and date of start of work and detailed completion program etc.</p> <p>The contractor has to subsequently augment his resources in such a manner that the project milestones are completed on specified schedules and entire work completed within the entire contract period, as specified in the following clause from the date of start of work, in a manner required by BHEL to match with the project schedule.</p>
6.1.2.	COMMENCEMENT OF CONTRACT PERIOD
	<p>The date of start of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy, the decision of BHEL shall be considered to be final and binding to contractor.</p> <p>The contractor shall have to mobilize his resources before the start of contract period for preparatory work like taking over of Foundations, drawing & materials and chipping of foundations, blue-matching, grouting of packer plates etc. and start of pre-assembly</p> <p>Based on the availability of civil foundations, drawings and material from BHEL, contractor may have to advance the erection activity after getting clearance from Construction Manager, or the erection activity may get delayed due to site conditions.</p> <p>The contractor shall complete all the works in the scope of this contract within the contract period. Pending points identified by the customer/BHEL during the execution of the contract are to be liquidated during the contract period itself.</p>
6.2.	Schedule of Completion:
	<p>The contract period for completion of entire work under scope shall be as mentioned hereunder, from the “DATE OF START OF WORK” as specified earlier for completion of the entire work:</p>

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Chapter-VI: Time Schedule

	S.No.	Package	Contractual Schedule (Month)
	1.	Erection, Testing, Commissioning, Trial Operation & Handing Over of Boiler and auxiliaries & associate integral piping, SCR & it's Auxiliaries, ESP & auxiliaries, pumps/Fans Ducts, Mills & auxiliaries, Power Cycle Piping, LP Piping etc including Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site for erection, NDT, fixing of hangers & supports, application of lining, Insulation, painting including paint supply, Stencilling & Labelling- Unit-1, 2 & 3	32 Months

6.3. The schedule of important milestones is as follows:

Tentative date of start of work is August 2026 (1st Month)

6.3.1. Boiler & Aux Package				
SL No.	Milestones	Tentative Schedule w.r.t date of start of work		
		Unit-1	Unit-2	Unit-3
1.	Boiler Erection Start (BES)	1 st Month	6 th Month	8 th Month
2.	ESP Erection Start	1 st Month	6 th Month	8 th Month
3.	SCR Erection Start	2 nd Month	13 th Month	15 th Month
4.	Completion of Ceiling Girder erection	4 th Month	9 th Month	11 th Month
5.	Drum Lifting	7 th Month	12 th Month	14 th Month
6.	Completion of Air Tightness Test of ESP	12 th Month	22 nd Month	24 th Month
7.	Completion of SCR System	11 th Month	19 th Month	21 st Month
8.	Boiler Hydro Test	12 th Month	19 th Month	21 st Month
9.	Boiler Light Up (BLU)	14 th Month	24 th Month	26 th Month
10.	Steam Blowing & Safety Valve Floating	16 th Month	26 th Month	28 th Month
11.	Synchronization	17 th Month	28 th Month	30 th Month
12.	Full Load Operation	17 th Month	28 th Month	30 th Month

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13.	Completion of Trial Run Operation	18 th Month	29 th Month	31 st Month
14.	Completion of Facilities	19 th Month	30 th Month	32 nd Month

6.3.2.	The above schedule is only tentative. The above schedule shall be advanced, if there are requirements to advance the project to meet the project requirement. No extra payment whatsoever shall be paid on this account.	
6.3.3.	In order to meet the above schedule in general, and any other intermediate targets set, to meet customer/ project schedule requirements, Contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL Engineer w.r.t. monthly plan and review format (F-14).	
6.4.	Intermediate milestones:	
6.4.1.	Two Major Intermediate Milestones are identified as M1 and M2	
	Milestones for Package	Tentative Schedule from start of work
M1	Drum Lifting Unit-1	7 th Month
M2	Boiler Hydro Test Unit-3	21 st Month
6.4.2.	Provision of Penalty in case of slippage of Intermediate Milestones:	
	In case of slippage of Two Major Intermediate Milestones, mentioned as M1 & M2 above, delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to F-14.	
6.4.3.	In case delay in achieving M1 Milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 2% of executable contract value, will be withheld.	
6.4.4.	In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 3% of executable contract value, will be withheld.	
6.4.5.	Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.	
6.4.6.	Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment (corresponding RA Bill) and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.	

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6.4.7.	Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion/ closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
6.4.8.	In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted into recovery.
6.4.9.	Contractor shall make all possible efforts to expedite the activities, in case of delay of any intermediate milestone, to maintain overall project completion schedule.
6.4.10.	* Executable Contract Value - Value Of work for which inputs/ fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.
6.5.	COMPLETION OF WORK AND COMMENCEMENT OF GUARANTEE PERIOD
6.5.1.	The works shall be completed to the entire satisfaction of the Engineer and in accordance with the completion schedule as specified in the Contract, and all unused stores and materials, tools, plant, equipment, temporary buildings, site office, labour hutments and other things shall be removed and the site and work cleared of rubbish and all waste materials and delivered up clean and tidy to the satisfaction of the Engineer at the Contractor's expenses.
6.5.2.	BHEL shall have power to take over from the Contractor from time to time such sections of the work as have been completed to the satisfaction of the Engineer. Such work however shall not be treated as have been completed until the remaining / pending works are executed to the satisfaction of Engineer.
6.5.3.	The BHEL Engineer shall certify to the contractor the date on which the work is completed and the date thereof for commencement of Guarantee Period. Guarantee Period shall be as given in GCC (clause 2.24). The work shall be deemed to be completed upon substantial completion of work leaving aside minor pending works/punch point liquidation/defects which are not likely to affect overall performance of the system. The decision of EIC shall be final and binding on the vendor.
6.5.4.	The contractor shall have total responsibility for protecting his works until it is taken over by the Employer. No claim will be entertained by the Employer or the representative of the Employer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings.

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6.6.	The contractor shall submit and a detailed area/structure wise L3 schedule within 25 days from date of LOA, in consultation with BHEL, based on the tentative schedule provided as above. The detailed L3 schedule shall be approved by BHEL and same shall be implemented. Bidder shall submit L3 schedule in MS Projects and excel to meet the agreed project schedule covering various mile stone activities and their split-up details such as mobilization, procurement of materials & erection activities. This schedule shall also clearly indicate the interface facilities / inputs applicable in each package. Bidders shall submit Resource deployment plan Area wise with detail program in line with above schedule in the form of Bar Chart/ MS project planner along with their offer.
6.7.	The under mentioned Records/ Log-books/ Registers applicable to be maintained. <ol style="list-style-type: none"> 1. Hindrance Register. 2. Site Order Book. 3. Test Check of measurements. 4. Records of Test reports of Field tests. 5. Records of manufacture's test certificates. 6. Records of disposal of scraps generated during and after the work completion.
6.8.	Control and monitoring of progress of work
6.8.1.	Refer forms F -14 to F-15 of volume I D (Forms & Procedure). Plan and review will be done as per the formats.
6.8.2.	The progress reports shall indicate the progress achieved against plan, indicating reasons for delays, if any. The report shall also give remedial actions which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original plan the slippages do not accumulate and affect the overall programme.
6.8.3.	It is the responsibility of the contractor to provide all relevant information on a regular basis regarding progress of work, labour availability, equipment deployment, testing, etc.
6.8.4.	Contractor is required to draw mutually agreed monthly work programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.
6.8.5.	Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

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6.8.6.	The contractor shall submit quarterly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer. The periodicity of the reports will be decided by BHEL Engineer at site.
6.8.7.	The contractor shall submit quarterly statement report regarding consumption of all consumables for cost analysis purposes.
6.8.8.	The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard. Non-submission of report would be considered as no shortage of materials.
6.8.9.	The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.
6.9.	The monthly report as a booklet shall be submitted at the end of every month and shall contain the following details: -
a	Progress photographs in colour.
b	Erection progress in terms of tonnage, welding joints, Radiography, Heat Treatment, stress relieving, etc., completed as relevant to the respective work areas against planned.
c	Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan.
d	Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas cutters, electricians, crane operators and helpers. Data shall be split up under the work areas like TG, Boiler (pressure parts, structures), Piping, Rotating machines, etc.
e	Consumables report giving consumption of all types of gases and electrodes during the previous month.
f	Availability report of cranes.
g	Safety implementation report in the format.
h	Pending material and any other inputs required from BHEL for activities planned during the subsequent month.
6.10.	Site Data Digitalisation: Daily Activity Log, M-Book and Subcontracting Billing Module: -
a	<u>Refer Vendor Portal System with links: for ref. https://pshq.bhel.in/sddvp/</u>
b	Login ID and Password shall be provided by respective package manager.
c	Contractor by clicking 'Daily Work Photos', shall upload area wise photos on daily basis.
d	Contractor by clicking 'Daily Activity Log', shall update site activities on daily basis.
e	Contractor by clicking 'Measurement Book', shall enter Measurement Book in Format and BOQ.

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f	Contractor shall raise their RA Bills along with supporting documents (such as Quality and HR Document – Vetted by Customer Etc.) in the online system or through hard copy as per the instructions of BHEL engineer at site. Contractor should possess required Digital Signature Certificate (DSC).
g	Contractor shall comply the system requirement.
h	Refer Vendor Manual for further details.
	Note: The contractor shall be required to provide all facilities including manpower for the aforementioned activities, without any cost implications to the BHEL.
6.11.	Agency shall extend all support towards inputs for IPMS system for project monitoring and control.

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Chapter-VII: TERMS OF PAYMENT

7.0 Terms of payment

The progressive payment for Erection and Commissioning on accepted price of contract value will be released as per the break up given hereinafter:

Payment Terms for Package: Payment shall be regulated progressively as mentioned in Table 7.1 & 7.2 below:

7.1 Progressive Payment for Boiler & Auxiliaries against monthly running bills will be made upto **85 %** of the value of the erected Pro-rata as per SL no 7.1.1 to 7.1.12.8 of the following table for:

SI No.	Sub Packages ----->	Structures	Pressure Parts	Non-Pressure Parts	ESP	Rotating Machines		Insulation	HP/LP Piping	
	Rate schedule Identifier --->	1A	1B	1C	3A	2A – APH	2B - Fans, Mills, Pumps	5A, 5B, 5C, 5D	4A, 4B, 4C, 4D	H&S-4E
	Pro rata payments (85%)									
7.1.1	On pre-assembly wherever applicable (if not applicable, this portion shall be clubbed with placement in position)	20%	20%	25%	20%	--	15%	--	20%	15%
7.1.2	Placement in position	15%	10%	10%	20%	--	20%	50%	15%	25%
7.1.3	Alignment (with grouting etc wherever applicable)	20%	15%	15%	20%	--	20%	15%	10%	15%

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SI No.	Sub Packages ----->	Structures	Pressure Parts	Non-Pressure Parts	ESP	Rotating Machines		Insulation	HP/LP Piping	
	Rate schedule Identifier --->	1A	1B	1C	3A	2A – APH	2B - Fans, Mills, Pumps	5A, 5B, 5C, 5D	4A, 4B, 4C, 4D	H&S-4E
7.1.4	Welding/bolting/fixing/Torque check/tightness check of bolts	20%	20%	18%	20%	--	20%	15%	15%	28%
7.1.5.	Completion of non-destructive examination (NDE) & stress relieving/ heat treatment as per approved FQP/EWS (if not applicable, then this portion to be paid along with S.No. 7.1.4)	10%	10%	2%	5%	--	--	--	10%	2%
7.1.6	Completion of attachment welding, fin welding, supports	--	5%	--	--	--	--	--	--	--
7.1.7	Completion of roof skin casing & Al cladding works (Al cladding applicable for Insulation only)	--	4%	--	--	--	--	5%	--	--
7.1.8	Hangers & supports etc wherever necessary as per drg	--	1%	15%		--	--	--	10%	--
7.1.9	Equipment trial operation	--	--	--	--	--	10%	--	--	--
7.1.10	Hydraulic test/pneumatic test	--	--	--	--	--	--	--	3%	--
7.1.11	Floating of lines, final adjustment of supports for cold and hot values (if not applicable, this portion to be clubbed along with hydraulic test/pneumatic test)	--	--	--	--	--	--	--	2%	--

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SI No.	Sub Packages ----->	Structures	Pressure Parts	Non-Pressure Parts	ESP	Rotating Machines		Insulation	HP/LP Piping	
	Rate schedule Identifier --->	1A	1B	1C	3A	2A – APH	2B - Fans, Mills, Pumps	5A, 5B, 5C, 5D	4A, 4B, 4C, 4D	H&S-4E
7.1.12	<u>Air Pre-Heaters (PG 52)</u>from the total amount payable for the PGMA weight at tonnage rates, payment will be regulated as under:	--	--	--	--	--	--	--	--	--
7.1.12.1	Completion of support steel squareness and levelling, expansion arrangement, housing panel erection and alignment, erection, alignment and welding of pedestals					11%				
7.1.12.2	Completion of erection, alignment and welding of support bearing, guide bearing, rotor post, bottom and top centre sections, hot and cold end connecting plates	--	--	--	--	14%	--	--	--	--
7.1.12.3	Completion of erection and alignment of modules	--	--	--	--	15%	--	--	--	--
7.1.12.4	Completion of erection, alignment and welding of pin rack assembly and drive assembly	--	--	--	--	12%	--	--	--	--
7.1.12.5	Completion of seals setting	--	--	--	--	17%	--	--	--	--
7.1.12.6	Erection, alignment and welding of lube oil systems, cleaning device, fire sensing device,	--	--	--	--	13%	--	--	--	--

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SI No.	Sub Packages ----->	Structures	Pressure Parts	Non-Pressure Parts	ESP	Rotating Machines		Insulation	HP/LP Piping	
	Rate schedule Identifier --->	1A	1B	1C	3A	2A – APH	2B - Fans, Mills, Pumps	5A, 5B, 5C, 5D	4A, 4B, 4C, 4D	H&S-4E
	deluge and water wash lines, observation port and lighting assemblies and other accessories									
7.1.12.7	Completion of PGMA	--	--	--	--	1%	--	--	--	--
7.1.12.8	Air preheater trial run	--	--	--	--	2%	--	--	--	--
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	85%	85%	85%	85%	85%	85%	85%	85%	85%

7.2 Further **15%** payment for Boiler & Aux will be made on pro-rata basis common to all shall be released on achievement of the following stage / milestones events (as per Cl no 7.2.1 to 7.2.23 of the following table) for the tonnage erected:

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Chapter-VII: TERMS OF PAYMENT

SI No.	Sub Packages ----->	Structures	Pressure Parts	Non-Pressure Parts	ESP	Rotating machines		Insulation	HP/LP Piping	
	Rate schedule Identifier -->	1A	1B	1C	3A	2A – APH	2B - Fans, Mills, Pumps	5A, 5B, 5C, 5D	4A, 4B, 4C, 4D	H&S-4E
	STAGE/MILESTONE PAYMENTS (15%)									
7.2.1	Completion of air & gas tightness test for ESP & associated Ducts with structure/approach	--	--	5%	5%	--	--	--	--	--
7.2.2	Completion of air & gas tightness test for furnace	--	2%	--		--	--	--	--	--
7.2.3	Boiler hydraulic test (drainable)	--	3%	--		--	--	--	--	--
7.2.4	Boiler Hydraulic test (non-Drainable)	--	1%	--		--	--	--	--	--
7.2.5	Clean air flow test	--	--	--		--	1%	--	--	--
7.2.6	Boiler light up	1%	3%	--	2%	2%	1%	2%	1%	1%
7.2.7	ABO/chemical cleaning	--	1%	1%		2%		1%	1%	1%
7.2.8	Steam blowing	--	--	2%		2%	1%	1%	1%	1%

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-VII: TERMS OF PAYMENT

SI No.	Sub Packages ----->	Structures	Pressure Parts	Non-Pressure Parts	ESP	Rotating machines		Insulation	HP/LP Piping	
	Rate schedule Identifier -->	1A	1B	1C	3A	2A – APH	2B - Fans, Mills, Pumps	5A, 5B, 5C, 5D	4A, 4B, 4C, 4D	H&S-4E
7.2.9	Safety valve floating	--	2%	--		2%	1%	1%	1%	1%
7.2.10	Rolling and synchronization	--	--	--		--	--	--	--	1%
7.2.11	Readiness for coal feeding	--	--	--		--	--	--	--	--
7.2.12	Coal firing	2%	--	2%		2%	2%	1%	--	1%
7.2.13	Full load	1%	--	--	1%	--	2%	2%	1%	1%
7.2.14	Trial operation of unit	1%	--	--	1%	--	2%	2%	2%	2%
7.2.15	Readiness for GD test	--	--	--	1%	--	--	--	--	--
7.2.16	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	2%	--	--		--	--	--	--	--
7.2.17	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing	--	--	--		--	--	--	2%	--
7.2.18	Completion of Painting works	2%	--	1%	1%	1%	1%	--	1%	1%

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Chapter-VII: TERMS OF PAYMENT

SI No.	Sub Packages ----->	Structures	Pressure Parts	Non-Pressure Parts	ESP	Rotating machines		Insulation	HP/LP Piping	
	Rate schedule Identifier -->	1A	1B	1C	3A	2A – APH	2B - Fans, Mills, Pumps	5A, 5B, 5C, 5D	4A, 4B, 4C, 4D	H&S-4E
7.2.19	Area cleaning, temporary structures cutting/removal and return of scrap	1%		1%	1%	1%	1%	2%	1%	2%
7.2.20	Punch List points/pending points liquidation	2%	1%	1%	1%	1%	1%	1%	1%	1%
7.2.21	Submission of 'As Built Drawings'	1%	--	--		--	--	--	1%	--
7.2.22	Material Reconciliation	1%	1%	1%	1%	1%	1%	1%	1%	1%
7.2.23	Completion of Contractual Obligation	1%	1%	1%	1%	1%	1%	1%	1%	1%
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	15%	15%	15%	15%	15%	15%	15%	15%	15%
	TOTAL 7.1 + 7.2	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note- If work of Temporary Piping being executed at site as per requirement on instructions of BHEL Engineer then Payment Terms for same shall be regulated as below:

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Payment for temporary piping will be made at the rate applicable for **Non-pressure parts (1C)** items as per following break-up:

- 50% on completion of installation of temporary piping.
- 40% on dismantling and return of temporary piping to BHEL stores.
- 10% on Material reconciliation

7.5	Progressive Payment/ Final Payment: The payments for works under the scope of this contract shall be as per clause no 2.6; 2.22; 2.23 of General Conditions of Contract
7.5.1	<u>Documents required for RA Bill:</u> GST Complied Invoice of the work done as per approved BBU. WAM -6 for RA Bill. Jointly signed Measurement sheet with applicable protocol. Power of Attorney before submission of Bill. Validity of Bank Guarantees as applicable under the contract. Monthly HSE Compliance Certificate certified by BHEL- Safety Material reconciliation statement along with RA Bill (Monthly basis). Jointly signed quality check protocols as per FQP HR/IR compliance documents: i. Wages payment sheet as per applicable minimum wages. ii. Proof of PF contribution submission. iii. Proof of ESI/ WC contribution submission iv. Proof of Bonus payment as per Bonus Act if applicable. v. Proof of EL payment if applicable. vi. Any other statutory document if applicable.
7.5.2	<u>Documents required for Final Bill:</u>

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	<p>The final bill is drawn as soon as the entire work is completed. From the final amount due, all amounts already claimed up to the previous running account bill will be deducted. It should be ensured that in the final bill the following additional particulars have been provided:</p> <ul style="list-style-type: none"> • Final Bill in WAM-7 Format. • 'No claim' certificate from the contractor. • Clearance certificates where ever applicable viz. Clearance Certificates from Customer, various Statutory Authorities like Labour department, PF Authorities, Commercial Tax Department etc. • Final Material re-conciliation statement duly approved by BHEL. • Indemnity Bond as per prescribed format. • Deviation statement showing the difference between the actuals and as per the contract. • Final Delay Analysis. 												
7.5.3	<p>The payment for running bills will be released after submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc. and other dues in the meanwhile. No interest shall be payable for the delayed payment (if any).</p> <p>Few points of consideration are as below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center; vertical-align: top;">i.</td><td>The measurements sheets of work done in a month shall be submitted in triplicate duly agreed/signed by BHEL Engineer. The contractor shall extend all necessary assistance for verification of measurements of works without any extra cost.</td></tr> <tr> <td style="text-align: center; vertical-align: top;">ii.</td><td>Material reconciliation shall be complied on monthly basis.</td></tr> <tr> <td style="text-align: center; vertical-align: top;">iii.</td><td>The RA bill payments are interim payments and bills shall be submitted in prescribed formats.</td></tr> <tr> <td style="text-align: center; vertical-align: top;">iv.</td><td>Recoveries on account of electricity, water, statutory deductions etc. shall be made as per terms of contract.</td></tr> <tr> <td style="text-align: center; vertical-align: top;">v.</td><td>BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS.</td></tr> <tr> <td style="text-align: center; vertical-align: top;">vi.</td><td>Final bill shall be submitted after completion of works and upon material reconciliation along with all prescribed formats.</td></tr> </table>	i.	The measurements sheets of work done in a month shall be submitted in triplicate duly agreed/signed by BHEL Engineer. The contractor shall extend all necessary assistance for verification of measurements of works without any extra cost.	ii.	Material reconciliation shall be complied on monthly basis.	iii.	The RA bill payments are interim payments and bills shall be submitted in prescribed formats.	iv.	Recoveries on account of electricity, water, statutory deductions etc. shall be made as per terms of contract.	v.	BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS.	vi.	Final bill shall be submitted after completion of works and upon material reconciliation along with all prescribed formats.
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Chapter-VII: TERMS OF PAYMENT

	<p>vii. Quoted Rates are inclusive of all labour, contractor's equipment, temporary works, consumables and all matters and things of whatsoever nature, charges for Safety Aspects/Compliance to Safety Rules including operations and maintenance services (if applicable) etc., and other services, as identified in the tender Documents, as necessary for the proper execution of the subject work. Statutory boiler fees/license / visit fees etc. as per IBR (to be included within quoted price). However, Inspection fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in (Vol I BCD)) shall be paid by BHEL.</p>
7.6	<p>SECURED RECOVERABLE ADVANCES:</p>
	<p>Interest Free Secured Mobilization Advance as per GCC Clause No. 2.13.1 will be payable under exceptional circumstances on certification of BHEL Construction Manager at Site. Interest Free Mobilization Advance shall be disbursed in specifically mentioned stages of major respective resource mobilization as specified hereunder:</p>
	<p><u>For the Package-</u></p> <ol style="list-style-type: none"> 1. For Installation and Erection of Site Infrastructure by contractor i.e. site office stores, etc. and resources at site to start the work of Boiler as finalised with BHEL Engineer In-Charge – 2% of Contract value. 2. For Mobilisation of 01 No. of 80 MT capacity crane – 1.0% of Contract Value 3. For Mobilization of 01 no. of 150 MT capacity crane - 2.0% of Contract value <p>Note:</p> <ol style="list-style-type: none"> 1. BHEL Site-CM shall be the deciding authority for assessing the admissibility of advance payment to contractor. 2. In case contractor do not fulfil the agreed conditions of payment of earlier mobilization advance, BHEL Construction Manager will have the authority to not allow the subsequent mobilization advance to contractor.

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Chapter-VIII: Taxes and Duties

8.0	TAXES & DUTIES
8.1	<p>The contractor shall pay all (save the specific exclusions as enumerated in this clause) taxes, fees, license, charges, deposits, duties, tools, royalty, commissions, other charges, etc. which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes/duties, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.</p> <p>However, provisions regarding GST on output supply (goods/service) and TDS/TCS as per Income Tax Act shall be as per following clauses.</p>
8.2	GST (Goods and Services Tax)
8.2.1	<p>GST as applicable on output supply (goods/services) are excluded from contractor's scope; therefore, contractor's price/rates shall be exclusive of GST. Reimbursement of GST is subject to compliance of following terms and conditions. BHEL shall have the right to deny payment of GST and to recover any loss to BHEL on account of tax, interest, penalty etc. for non-compliance of any of the following condition.</p>
8.2.2	<p>The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract shall be limited to direct transactions between BHEL & its Contractor. BHEL shall not consider GST on any transaction other than the direct transaction between BHEL & its Contractor.</p>
8.2.3	<p>Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. Where the GST laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL shall have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.</p>
8.2.4	<p>Contractor has to submit GST registration certificate of the concerned state. Contractor also needs to ensure that the submitted GST registration certificate should be in active status during the entire contract period.</p>
8.2.5	<p>Contractor/Vendor has to issue Invoice/Debit Note/Credit Note indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder.</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

8.2.6	Vendor has to submit GST compliant invoice within the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts to enable BHEL to meet its GST related compliances. Special care should be taken in case of month end transactions.
8.2.7	Vendor has to ensure that invoice in respect of such services which have been provided/completed on or before end of the month should not bear the date later than last working day of the month in which services are performed.
8.2.8	<p>Subject to other provisions of the contract, GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Contractor: -</p> <ul style="list-style-type: none">a. Supply of goods and/or services have been received by BHEL.b. Original Tax Invoice has been submitted to BHEL.c. Contractor/ Vendor has submitted all the documents required for processing of bill as per contract/ purchase order/ work order.d. In cases where e-invoicing provision is applicable, vendor/contractor is required to submit invoice in compliance with e-invoicing provisions of GST Act and Rules made thereunder.e. Contractor has filed all the relevant GST return (e.g. GSTR-1, GSTR-3B, etc.) pertaining to the invoice submitted and submit the proof of such return along with immediate subsequent invoice. In case of final invoice/ bill, contractor has to submit proof of such return within fifteen days from the due date of relevant return.f. Respective invoice has appeared in BHEL's GSTR - 2A for the month corresponding to the month of invoice and in GSTR-2B of the month in which such invoices has been reported by the contractor along with status of ITC availability as "YES" in GSTR-2B. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the contractor.g. Contractor has to submit an undertaking confirming the payment of all due GST in respect of invoices pertaining to BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

8.2.9	Any financial loss arises to BHEL on account of failure or delay in submission of any document as per contract/purchase order/work order at the time of submission of Tax invoice to BHEL, shall be deducted from contractor's bill or otherwise as deemed fit.
8.2.10	TDS as applicable under GST law shall be deducted from contractor's bill.
8.2.11	Contractor shall comply with the provisions of e-way bill wherever applicable. Further wherever provisions of GST Act permits, all the e-way bills , road permits etc. required for transportation of goods needs to be arranged by the contractor.
8.2.12	Contractor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or any other liability on account of failure of contractor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder.
8.2.13	In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/alterd/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Contactor's due payment.
8.2.14	Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Contractor in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the Contactor.
8.2.15	In the event of any ambiguity in GST law with respect to availability of input credit of GST charged on the invoice raised by the contractor or with respect to any other matter having impact on BHEL, BHEL's decision shall be final and binding on the contractor.
8.2.16	<p><u>Variation in Taxes & Duties:</u></p> <p>Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability.</p> <p>In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contactor only and within the contractual delivery period only.</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

	In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.
8.3	<u>Income Tax:</u> TDS/TCS as applicable under Income Tax Act, 1961 or rules made thereunder shall be deducted/collected from contractor's bill.

8.4 BOCW Act & Cess Act

8.4.1 BOCW Cess is not to be borne by contractor. Refer Annexure-I for BOCW Act & Cess Act.

Annexure-I:

Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:

1.	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
2.	It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3.	It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4.	It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may, by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

	Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5.	It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.
6.	It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
7.	It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.
8.	<p>It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics:</p> <ul style="list-style-type: none">i) Number of Building Workers employed during preceding one month.ii) Number of Building workers registered as Beneficiary during preceding one month.iii) Disbursement of Wages made to the Building Workers for preceding wage month.iv) Remittance of Contribution of Beneficiaries made during the preceding month
9.	BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.

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Chapter-VIII: Taxes and Duties

10.	It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction.
11.	Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty (if any, imposed by Cess Authorities) from the payables on account of non-compliance.
12.	The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

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CHAPTER-IX: ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE OF WORK (BOQ)

BILL OF QUANTITY/WEIGHT SHCHEDULE

9.0 Summary of Weight of BOQ for the scope of work mentioned in the tender: -

Area	Unit-1 Weight (in MT)	Unit-2 Weight (in MT)	Unit-3 Weight (in MT)	Total Weight (in MT)	Rate Schedule
Structure	2863.36	2863.36	2863.36	8590.08	1A
Pressure Parts	1402.52	1402.52	1402.52	4207.56	1B
Non Pressure Parts	2407.56	2407.56	2407.56	7222.68	1C
Rotating Machines	1150.20	1150.20	1150.20	3450.6	2A & 2B
ESP	2553.77	2553.77	2553.77	7661.31	3A
Power Cycle Piping- P91/92	42.00	42.00	42.00	126	4A
HP Piping including P- 11, P-12, P-22, CS	480.00	480.00	480.00	1440	4B
LP Piping	84.00	84.00	84.00	252	4C
SS Piping	3.00	3.00	3.00	9	4D
Hanger and Supports	110.00	110.00	110.00	330	4E
Insulation- Wool Mattress	470.70	470.70	470.70	1412.1	5A
Insulation- Refractory	178.00	178.00	178.00	534	5B
Insulation- Iron Parts	162.30	162.30	162.30	486.9	5C
Insulation- Aluminium Cladding Sheets	122.21	122.21	122.21	366.63	5D
Total Weight (in MT)	12,030	12,030	12,030	36,089	

Note to weight schedule:

1	The PGMA's/Weights/Quantities/dimensions mentioned above are approximate and liable to vary as per design consideration. There will be change in weight, description etc. However, payments will be made for the tonnage actually erected at the quoted rate. Quantity Variation will be dealt as per clause 2.14 of General Conditions of Contract (Volume I BCD).
2	A material breakup under category Structure, PP, NPP, rotating machinery, insulation, P91/92 Piping, HP Piping, SS Piping, LP Piping, etc. are indicated in the relevant chapter of this tender specification, but the contractor is required to erect actual tonnage which may be necessary to complete the work in all respects as detailed in the tender specifications, for which

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER-IX: ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE OF WORK (BOQ)

	payments shall be released based on agreed rates. The weights and dimensions of material shown are approximate and are liable to vary.
3	Besides PG / PGMA indicated in the weight schedule, there is likely hood of addition product groups integral to the system. The quoted rate shall be applicable for such product groups also. There may be variation or addition of PGMA's, description, weights etc., and any additional scope of work supplied under the above package shall be erected by the contractor and payment will be made as per the quoted / accepted rate in the respective category at the discretion of BHEL. Decision of BHEL Engineer shall be final and binding to the contractor in this regard.
5	Rate Schedule Identified are based on envisaged material specification. Payment shall be made on the basis of material specification of actual material received and erected at site irrespective of PGMA allocation in the weight schedule. BHEL's decision in this regard shall be final.
6	<p>The erection & dismantling of temporary piping, pumps, dummy plates & blanks, valves, pressure gauges and other miscellaneous equipment required for the test for pre-commissioning and commissioning activities like hydraulic test, chemical cleaning, acid cleaning, detergent flushing, steam blowing etc. are covered in this contract and shall be carried out as a part of work.</p> <p>Payment will be made at the rate applicable for Non-pressure parts for items. Weight for the same will be based on jointly measured quantity and corresponding standard weights, except contractor scope materials/equipment. No payment will be made for the equipment brought by the Contractor such as pumps etc and foundations made by the Contractor for temporary systems. Dismantling of temporary piping, edge preparation and return to BHEL stores, area cleaning is in the scope of contractor.</p> <p>Required pipes, valves, blanks, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by agency and returned to BHEL.</p> <p>All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. No Extra Payment shall be made for the same.</p>
8	The Erection of HT/LT MOTORS are covered in this scope of contract. However, dry out, testing and commissioning is not in the scope of this contract.
9	The erection and dismantling of air blowers and connecting pipes and ducts, providing blanks / dummies at the required locations and conducting gas tightness test is in the scope of the contractor and shall be carried out within the quoted rate.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER-IX: ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE OF WORK (BOQ)

10	Payment for additional CONTROL VALVES / STEAM TRAPS/ FLOW NOZZLES / ORIFICES & OTHER VALVES AND FITTINGS (except temporary system valves) will be made as per the quoted / accepted tonnage rate of respective piping category in which these materials is installed. i.e. P91, P92, HP Piping, LP Piping & SS piping.
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9.1 Detailed (PGMA wise) weight of BOQ in each unit under this package:

Boiler and Auxiliaries- BHEL Unit HPVP Vizag supply						
PG NO	Description	Weight (in MT)	Area	BHEL Unit	Category	Rate Schedule
35	Boiler Supporting Structure	1255	Boiler	HPVP	Structure	1A
36	Galleries and Stair Ways	710	Boiler	HPVP	Structure	1A
38	Interconnecting Walk Ways	172.5	Boiler	HPVP	Structure	1A
39	External Structures (Supporting Structures for ID System)	360	Boiler	HPVP	Structure	1A
	Elevator system	75	Boiler	HPVP	Structure	1A
04	Boiler Drum (s)	92.25	Boiler	HPVP	Pressure Part	1B
05	Water Wall Headers & Drums	41.14	Boiler	HPVP	Pressure Part	1B
06	Tube ϕ 63.5, SA210 Gr.A1, Tubc 63.5	163.74	Boiler	HPVP	Pressure Part	1B
07	Circulation System Components	144.01	Boiler	HPVP	Pressure Part	1B
09	Seal Boxes	6.7	Boiler	HPVP	Pressure Part	1B
10	Superheater Headers	63.82	Boiler	HPVP	Pressure Part	1B
11	Superheater Coils and Walls	312.99	Boiler	HPVP	Pressure Part	1B
12	Superheater Components	101.13	Boiler	HPVP	Pressure Part	1B
15	Reheater Headers	9.29	Boiler	HPVP	Pressure Part	1B
16	Reheater Coils and Walls	66.74	Boiler	HPVP	Pressure Part	1B
17	Reheater Components	12.71	Boiler	HPVP	Pressure Part	1B
18	Roof Skin Casing	8.43	Boiler	HPVP	Pressure Part	1B
19	Economiser	243.79	Boiler	HPVP	Pressure Part	1B
21	Soot Blower and Soot Blowing System	16.84	Boiler	HPVP	Pressure Part	1B
24	Boiler Integral Piping and Fittings	93.78	Boiler	HPVP	Pressure Part	1B
31	Boiler Skin Casing	8.16	Boiler	HPVP	Pressure Part	1B
81	Tanks and Vessels (Pipe Lines)	7	Boiler	HPVP	Pressure Part	1B
	HP DOSING SYSTEM	10	Boiler	HPVP	Pressure Part	1B
08	Buck stays and Framing	136.54	Boiler	HPVP	Non Pressure Part	1C

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CHAPTER-IX: ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE OF WORK (BOQ)

20	Soot Blowers	28.16	Boiler	HPVP	Non Pressure Part	1C
28	Man Holes and Furnace Openings	5.37	Boiler	HPVP	Non Pressure Part	1C
41	Oil and Gas Burners, Ignitors and Scanners	2.1	Boiler	HPVP	Non Pressure Part	1C
42	Oil and gas system	34.08	Boiler	HPVP	Non Pressure Part	1C
43	Ignitor and Scanner Air System	27.6	Boiler	HPVP	Non Pressure Part	1C
45	Burner System	50.67	Boiler	HPVP	Non Pressure Part	1C
47	Pulverized Fuel Piping	185.46	Boiler	HPVP	Non Pressure Part	1C
48	Ducts, Dampers & Expansion Joints	588.38	Boiler	HPVP	Non Pressure Part	1C
65	Coal Feeders	37.68	Boiler	HPVP	Non Pressure Part	1C
67	Mill Plant Auxiliaries	40.57	Boiler	HPVP	Non Pressure Part	1C
33	Insulation Wool	158	Boiler	HPVP	Insulation-Wool	5A
32	Fixing Components/Pins for Insulation	118	Boiler	HPVP	Insulation-Iron parts	5C
30	Aluminium Cladding Sheet	38	Boiler	HPVP	Insulation- Al sheet	5D
37	Boiler Outer Casing	25.21	Boiler	HPVP	Insulation- Al sheet	5D
33	Refractory Bricks & castable/Pourable	178	Boiler	HPVP	Insulation-Refractory	5B
Total		5628.84				

SCR- BHEL Unit Trichy supply

PGMA	Description	Weight (in MT)	Area	BHEL Unit	Category	Rate Schedule
387-1-SD-307	SCR Duct Flow Devices	71	SCR	Trichy	NPP	1C
388-1-SD-342	SCR INLET DUCTING	100	SCR	Trichy	NPP	1C
389-1-SD-344	EXPJNT-SCR INLET DUCTING	20	SCR	Trichy	NPP	1C
390-1-SD-345	SUPPORTS-SCR INLET DUCTING	35	SCR	Trichy	NPP	1C
391-1-SD-352	SCR OUTLET DUCTING	75	SCR	Trichy	NPP	1C

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CHAPTER-IX: ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE OF WORK (BOQ)

392-1-SD-354	EXPJNT-SCR OUTLET DUCTING	7.5	SCR	Trichy	NPP	1C
393-1-SD-355	SUPPORTS-SCR OUTLET DUCTING	7.5	SCR	Trichy	NPP	1C
394-1-SD-362	ECO BYPASS DUCTING	20	SCR	Trichy	NPP	1C
395-1-SD-364	EXPJNT-ECO BYPASS DUCTING	8	SCR	Trichy	NPP	1C
396-1-SD-365	SUPPORT-ECO BYPASS DUCTING	4	SCR	Trichy	NPP	1C
397-1-SD-395	CLH/VLH OF SCR DUCTS	2	SCR	Trichy	NPP	1C
398-1-SD-911	SCR DUCT BEARING PLATE	0.5	SCR	Trichy	NPP	1C
399-1-SD-915	SCR DUCT MANHOLE DOORS	0.265	SCR	Trichy	NPP	1C
400-1-SD-993	SCR DUCT ERECTION MATERIAL	10	SCR	Trichy	NPP	1C
448-1-SL-700	Bulked DD components for SCR System	12.3	SCR	Trichy	NPP	1C
449-1-SL-701	BPS Fasteners for SCR System	1	SCR	Trichy	NPP	1C
411-1-SR-010	ANHYDROUS AMMONIA TRUCK UNLOADING SKID	4.5	SCR	Trichy	NPP	1C
412-1-SR-020	ANHYDROUS AMMONIA FORWARDING PUMP SKID	2	SCR	Trichy	NPP	1C
413-1-SR-050	WASTE AMMONIA DILUTION TANK	2.5	SCR	Trichy	NPP	1C
351-1-SR-100	ANHYDROUS AMMONIA STORAGE TANK	60	SCR	Trichy	NPP	1C
414-1-SR-103	AMMONIA STORAGE AREA - BHEL VALVES	1	SCR	Trichy	NPP	1C
415-1-SR-106	AMMONIA STORAGE AREA - BOI VALVES	0.4	SCR	Trichy	NPP	1C
416-1-SR-121	AMMONIA STORAGE AREA- PIPING SUPTS	1.5	SCR	Trichy	NPP	1C
352-1-SR-122	AMMONIA STORAGE AREA - DD ITEMS	0.8	SCR	Trichy	NPP	1C
653-1-SR-128	AMMONIA STORAGE AREA - SHOP ITEMS	4	SCR	Trichy	NPP	1C
417-1-SR-150	WASTE AMMONIA HANDLING SYSTEM - SD	1.6	SCR	Trichy	NPP	1C
418-1-SR-151	WASTE AMMONIA HANDLING SYS-PIPING SUPT	1.1	SCR	Trichy	NPP	1C
419-1-SR-152	WASTE AMMONIA HANDLING SYSTEM- DD ITEMS	0.25	SCR	Trichy	NPP	1C
654-1-SR-158	Waste water Ammonia -Shop items	0.6	SCR	Trichy	NPP	1C
420-1-SR-171	WATER SPRINKLER SYSTEM- PIPING SUPTS	2.8	SCR	Trichy	NPP	1C

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421-1-SR-172	WATER SPRINKLER SYSTEM - DD ITEMS	0.5	SCR	Trichy	NPP	1C
651-1-SR-178	WATER SPRINKLER SYSTEM - SHOP ITEMS	1	SCR	Trichy	NPP	1C
422-1-SR-180	AMMONIA STORAGE AREA-SAFETY EQUIP. SD	2	SCR	Trichy	NPP	1C
423-1-SR-181	AMMONIA FARM UTILITY PIPING SUPTS, MISC	0.45	SCR	Trichy	NPP	1C
424-1-SR-182	AMMONIA FARM UTILITY - DDITEMS	0.05	SCR	Trichy	NPP	1C
655-1-SR-188	AMMONIA FARM UTILITY - SHOP ITEMS	0.35	SCR	Trichy	NPP	1C
425-1-SR-200	AMMONIA SYSTEM SCR AREA - SUB DELIVERY	7.5	SCR	Trichy	NPP	1C
426-1-SR-203	AMMONIA SYSTEM SCR AREA - BHEL VALVES	0.2	SCR	Trichy	NPP	1C
353-1-SR-206	AMMONIA SYSTEM SCR AREA - BOI VALVES	0.4	SCR	Trichy	NPP	1C
427-1-SR-207	AMMONIA SYSTEM-FASTENERS	0.6	SCR	Trichy	NPP	1C
428-1-SR-251	AMMONIA SYSTEM SCR AREA- PIPING SUPT,MISC	0.25	SCR	Trichy	NPP	1C
429-1-SR-252	AMMONIA SYSTEM SCR AREA - DD ITEMS	0.07	SCR	Trichy	NPP	1C
656-1-SR-258	AMMONIA SYSTEM SCR AREA - SHOP ITEMS	0.35	SCR	Trichy	NPP	1C
950-1-SR-271	AMMONIA INJECTION PIPING SUPTS,MISC	2.5	SCR	Trichy	NPP	1C
949-1-SR-272	AMMONIA INJECTION PIPING - DD ITEMS	0.35	SCR	Trichy	NPP	1C
948-1-SR-278	AMMONIA INJECTION PIPING - SHOP ITEMS	1.2	SCR	Trichy	NPP	1C
430-1-SR-281	AMMONIA SCR UTILITY PIPING SUPTS, MISC	0.45	SCR	Trichy	NPP	1C
354-1-SR-282	AMMONIA SCR AREA UTILITY - DD ITEMS	0.05	SCR	Trichy	NPP	1C
657-1-SR-288	AMMONIA SCR AREA UTILITY - SHOP ITEMS	0.4	SCR	Trichy	NPP	1C
658-1-SR-300	Dilution air system - Sub delivery	2.2	SCR	Trichy	NPP	1C
431-1-SR-301	DILUTION AIR SUPPLY SYSTEM - PIPING SUPT	5	SCR	Trichy	NPP	1C
432-1-SR-303	DILUTION AIR SUPPLY SYSTEM - BHEL VALVES	0.18	SCR	Trichy	NPP	1C

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433-1-SR-306	DILUTION AIR SUPPLY SYSTEM - BOI VALVES	1	SCR	Trichy	NPP	1C
355-1-SR-307	DILUTION AIR SUPPLY SYSTEM - FASTENERS	0.25	SCR	Trichy	NPP	1C
659-1-SR-308	DILUTION AIR SUPPLY SYSTEM - SHOP ITEMS	7	SCR	Trichy	NPP	1C
434-1-SR-311	DILUTION AIR HEATER STEAM PIPING, MISC	1	SCR	Trichy	NPP	1C
435-1-SR-312	Dilution air heater Steam Piping-Fitting	0.09	SCR	Trichy	NPP	1C
436-1-SR-318	DILUTION AIR HEATER STEAM PIPING - SHOP	0.2	SCR	Trichy	NPP	1C
437-1-SR-330	DILUTION AIR HEATER - ELECTRIC	2.2	SCR	Trichy	NPP	1C
438-1-SR-400	SCR - RECTIFIER	20	SCR	Trichy	NPP	1C
439-1-SR-490	SCR-REACTOR SEALING SYSTEM	4.5	SCR	Trichy	NPP	1C
440-1-SR-500	CATALYST DE- DUSTING SYSTEM	10.6	SCR	Trichy	NPP	1C
652-1-SR-507	Catalyst De- Dusting system-Fasteners	0.03	SCR	Trichy	NPP	1C
441-1-SR-511	CATALYST DE-DUSTING SYS. PIPING SUPRT	1.75	SCR	Trichy	NPP	1C
660-1-SR-512	De-dusting system piping - Fittings	0.29	SCR	Trichy	NPP	1C
356-1-SR-518	CATALYST DE-DUSTING SYSTEM PIPING - SHOP	2.35	SCR	Trichy	NPP	1C
442-1-SR-900	SCR - CATALYST TROLLEY	3.5	SCR	Trichy	NPP	1C
444-1-SR-990	SCR-CATALYST HANDLING SYSTEM	2.7	SCR	Trichy	NPP	1C
361-1-SS-915	SCR CATALYST FRONT CASING WALL	11	SCR	Trichy	NPP	1C
362-1-SS-916	SCR RECTIFIER FRONT CASING WALL	4	SCR	Trichy	NPP	1C
363-1-SS-917	SCR CAP TOP CASING WALL	4	SCR	Trichy	NPP	1C
364-1-SS-918	SCR BOTTOM HOPPER FRONT CASING WALL	4	SCR	Trichy	NPP	1C
365-1-SS-925	SCR CATALYST REAR CASING WALL	17	SCR	Trichy	NPP	1C
366-1-SS-926	SCR RECTIFIER REAR CASING WALL	3	SCR	Trichy	NPP	1C
367-1-SS-927	SCR CAP REAR CASING WALL	11	SCR	Trichy	NPP	1C
368-1-SS-928	SCR BOTTOM HOPPER REAR CASING WALL	4	SCR	Trichy	NPP	1C

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385-1-SS-935	SCR CATALYST LEFT CASING WALL	21	SCR	Trichy	NPP	1C
369-1-SS-936	SCR RECTIFIER LEFT CASING WALL	4	SCR	Trichy	NPP	1C
370-1-SS-937	SCR CAP LEFT CASING WALL	4	SCR	Trichy	NPP	1C
371-1-SS-938	SCR BOTTOM HOPPER LEFT CASING WALL	4	SCR	Trichy	NPP	1C
372-1-SS-945	SCR CATALYST RIGHT CASING WALL	21	SCR	Trichy	NPP	1C
373-1-SS-946	SCR RECTIFIER RIGHT CASING WALL	4	SCR	Trichy	NPP	1C
386-1-SS-947	SCR CAP RIGHT CASING WALL	4	SCR	Trichy	NPP	1C
374-1-SS-948	SCR BOTTOM HOPPER RIGHT CASING WALL	4	SCR	Trichy	NPP	1C
375-1-SS-955	SCR CATALYST SUPPORT ARRANGEMENT	39	SCR	Trichy	NPP	1C
376-1-SS-965	SCR CATALYST SUPPORT HANGER STRAP	9	SCR	Trichy	NPP	1C
377-1-SS-975	SCR CATALYST LOADING DOOR	10	SCR	Trichy	NPP	1C
378-1-SS-981	SCR PTFE BEARING SUPP APP.4 NO'S/SCR)	1	SCR	Trichy	NPP	1C
379-1-SS-983	SCR FASTENERS	1	SCR	Trichy	NPP	1C
380-1-SS-996	SCR TURNING VANE	12	SCR	Trichy	NPP	1C
381-1-SS-997	SCR MISCELLANEOUS 2	10	SCR	Trichy	NPP	1C
382-1-SS-998	SCR MISCELLANEOUS 3	7	SCR	Trichy	NPP	1C
383-1-SS-999	SCR TEMPORARY INTERN. SUPP FOR ERECTION	6	SCR	Trichy	NPP	1C
	SCR Catalyst	170	SCR	SBD	NPP	1C
946-1-SS-631	Ammonia Storage Structure Columns	20	SCR	Trichy	Structure	1A
945-1-SS-632	Ammonia Storage Struct Beams&Bracings	23	SCR	Trichy	Structure	1A
944-1-SS-633	Ammonia Storage Floor Steel Arrangement	36	SCR	Trichy	Structure	1A
943-1-SS-634	Ammonia Storage Handling Arrangement	4	SCR	Trichy	Structure	1A
942-1-SS-635	Ammonia Storage Roof Structure	17	SCR	Trichy	Structure	1A
941-1-SS-636	Ammonia Storage Roof Sheet	6	SCR	Trichy	Structure	1A
940-1-SS-637	Ammonia Storage Structure Stairs	2	SCR	Trichy	Structure	1A
939-1-SS-638	Ammonia Storage Structure Floor Grills	7	SCR	Trichy	Structure	1A

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938-1-SS-639	Ammonia Storage Structure Handrails	5	SCR	Trichy	Structure	1A
937-1-SS-640	Ammonia Storage Structure Misc-1	4	SCR	Trichy	Structure	1A
936-1-SS-641	Ammonia Storage Structure Misc-2	2	SCR	Trichy	Structure	1A
935-1-SS-642	Ammonia Storage Structure Misc-3	1	SCR	Trichy	Structure	1A
357-1-SS-700	SCR HSFG FASTENERS	1	SCR	Trichy	Structure	1A
358-1-SS-901	SCR SUPPORTING POSTS AND RESTRAINTS	25	SCR	Trichy	Structure	1A
359-1-SS-906	SCR RECTIFIER TRUSS ARRANGEMENT	11	SCR	Trichy	Structure	1A
360-1-SS-907	SCR CAP TRUSS ARRANGEMENT	7	SCR	Trichy	Structure	1A
384-1-SS-908	SCR BOTTOM HOPPER TRUSS ARRANGEMENT	8	SCR	Trichy	Structure	1A
446-1-SL-021	Mineral Wool for SCR System	106	SCR	Trichy	Insulation-Wool	5A
447-1-SL-210	Fixing Components for SCR System	6.3	SCR	Trichy	Insulation-Iron parts	5C
450-1-SL-810	Outer Casing for SCR System	21	SCR	Trichy	Insulation-Al sheet	5D
Total (SCR)		1,241.93				

ESP, APH, Fans, Mills, Motors and Gates & Dampers- BHEL Unit Ranipet, HPEP Hyd, Jhansi & Bhopal supply

PG	MA	Description	Weight (in MT)	Area	BHEL Unit	Category	Rate Schedule
52	010	LARG AH-ROTOR ASSY	59.50	APH	Ranipet	RTM-APH	2A
52	013	LARG AH-ROTORSEALS	2.30	APH	Ranipet	RTM-APH	2A
52	024	COLD BASKET&ELEMENT	97.80	APH	Ranipet	RTM-APH	2A
52	025	HOT BASKET & ELEMENT	128.00	APH	Ranipet	RTM-APH	2A
52	030	LARG AH-ROTORHOUSING	32.20	APH	Ranipet	RTM-APH	2A
52	041	HOT END CONN PLATE	35.40	APH	Ranipet	RTM-APH	2A
52	042	COLD END CONN PLATE	42.50	APH	Ranipet	RTM-APH	2A
52	054	LARG AH-AXIAL SEAL	0.25	APH	Ranipet	RTM-APH	2A
52	055	LARG AH-BY PASS SEAL	0.78	APH	Ranipet	RTM-APH	2A
52	100	LARGE AH ROTOR DRIVE	3.40	APH	Ranipet	RTM-APH	2A
52	101	LARG AH-AUX ROTDRIVE	9.00	APH	Ranipet	RTM-APH	2A
52	211	LARG AH-AIRSEAL PIPE	0.68	APH	Ranipet	RTM-APH	2A
52	220	LARG AH-GENS DETAILS	2.70	APH	Ranipet	RTM-APH	2A

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52	261	LARG AH-GUIDE BEARNG	3.00	APH	Ranipet	RTM-APH	2A
52	262	LARG AH-SUPRT BEARNG	3.90	APH	Ranipet	RTM-APH	2A
52	271	OIL PIPING GUIDE BRG	0.52	APH	Ranipet	RTM-APH	2A
52	272	OIL PIPING SUPRT BRG	0.55	APH	Ranipet	RTM-APH	2A
52	274	LUB OIL CIRCULATION UNIT	1.20	APH	Ranipet	RTM-APH	2A
52	275	LARGE AIR HEATER-LUBRICANTS	0.80	APH	Ranipet	RTM-APH	2A
52	301	WASH MANIFLD GAS INL	0.55	APH	Ranipet	RTM-APH	2A
52	302	WASH MANIFLD GAS OUT	0.50	APH	Ranipet	RTM-APH	2A
52	325	LARG AH-CLEANG EQPT	1.49	APH	Ranipet	RTM-APH	2A
52	326	CLEANG EQPT GAS OUT	5.00	APH	Ranipet	RTM-APH	2A
52	329	CLE EQPT DRIVE UNIT	1.56	APH	Ranipet	RTM-APH	2A
Total (APH)			433.6				
55	015	FD FAN COUPLING GUARD	0.05	FAN	Ranipet	RTM	2B
55	011	FAN FIX MATERIAL	0.40	FAN	Ranipet	RTM	2B
55	012	FD STAIR & HAND RAIL	2.00	FAN	Ranipet	RTM	2B
55	019	FD FAN MOTOR CANOPY	1.00	FAN	Ranipet	RTM	2B
55	031	PA FAN FIX MATERIAL	0.90	FAN	Ranipet	RTM	2B
55	032	PA STAIR & HAND RAIL	2.00	FAN	Ranipet	RTM	2B
55	035	PA FAN CPLNG GUARD	0.05	FAN	Ranipet	RTM	2B
55	039	PA FAN MOTOR CANOPY	1.50	FAN	Ranipet	RTM	2B
55	210	FD FAN LOS CANOPY	1.00	FAN	Ranipet	RTM	2B
55	214	1 STG FD ROTOR	4.10	FAN	Ranipet	RTM	2B
55	230	PA FAN LOS CANOPY	1.00	FAN	Ranipet	RTM	2B
55	334	2 STG PA ROTOR	8.50	FAN	Ranipet	RTM	2B
55	410	FD SET & INDN SHAFT	0.14	FAN	Ranipet	RTM	2B
55	430	PA SET & INDN SHAFT	0.20	FAN	Ranipet	RTM	2B
55	510	FD FAN EXPN JOINTS	0.60	FAN	Ranipet	RTM	2B
55	514	1 STG FD HOUSING	5.10	FAN	Ranipet	RTM	2B
55	530	PA FAN EXPN JOINTS	0.70	FAN	Ranipet	RTM	2B
55	634	2 STG PA HOUSING	7.30	FAN	Ranipet	RTM	2B
55	714	FD FAN SUCTION BOX	2.50	FAN	Ranipet	RTM	2B
55	734	PA FAN SUCTION BOX	4.00	FAN	Ranipet	RTM	2B
55	810	FD FAN COUPLING	0.20	FAN	Ranipet	RTM	2B
55	814	FD FAN DIFFUSER	2.90	FAN	Ranipet	RTM	2B
55	830	PA FAN COUPLING	0.55	FAN	Ranipet	RTM	2B
55	834	PA FAN DIFFUSER	3.60	FAN	Ranipet	RTM	2B
55	910	FD FAN LUBE OIL SYS	3.80	FAN	Ranipet	RTM	2B
55	911	FD FAN SILENCER	15.35	FAN	Ranipet	RTM	2B
55	930	PA FAN LUBE OIL SYS	3.80	FAN	Ranipet	RTM	2B
55	931	PA FAN SILENCER	18.00	FAN	Ranipet	RTM	2B

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CHAPTER-IX: ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE OF WORK (BOQ)

56	021	ID FAN FIX MATLS	2.35	FAN	Ranipet	RTM	2B
56	022	ID STAIR & HAND RAIL	3.00	FAN	Ranipet	RTM	2B
56	025	ID FAN CPLNG GUARD	0.08	FAN	Ranipet	RTM	2B
56	029	ID FAN MOTOR CANOPY	2.00	FAN	Ranipet	RTM	2B
56	072	SA STAIR & HAND RAIL	1.00	FAN	Ranipet	RTM	2B
56	075	SA FAN CPLNG GUARD	0.03	FAN	Ranipet	RTM	2B
56	079	SA FAN MTR CANOPY	0.25	FAN	Ranipet	RTM	2B
56	161	PENT HOUSE FAN	1.00	FAN	Ranipet	RTM	2B
56	173	SA FAN ROTOR	1.65	FAN	Ranipet	RTM	2B
56	220	ID FAN LOS CANOPY	1.00	FAN	Ranipet	RTM	2B
56	226	ID FAN ROTOR	17.60	FAN	Ranipet	RTM	2B
56	320	ID BEARING HSG & ACC	1.90	FAN	Ranipet	RTM	2B
56	370	SA BEARING HSG & ACC	0.21	FAN	Ranipet	RTM	2B
56	473	RADIAL SEAL AIR FAN STATOR	6.80	FAN	Ranipet	RTM	2B
56	526	ID FAN STATOR	42.20	FAN	Ranipet	RTM	2B
56	670	RADIAL SEAL AIR FAN MOTOR	1.80	FAN	Ranipet	RTM	2B
56	820	RADL IDFAN COUPLING	0.85	FAN	Ranipet	RTM	2B
56	870	SEAL AIR FAN COUPLING(RADIAL)	0.03	FAN	Ranipet	RTM	2B
56	920	RADIAL ID FAN LUBE OIL SYSTEM	4.00	FAN	Ranipet	RTM	2B
		ID Fan Motor	30.00	Motor	Bhopal	RTM	2B
		PA Fan Motor	14.00	Motor	Bhopal	RTM	2B
		FD Fan Motor	7.00	Motor	Bhopal	RTM	2B
55	919	FD FAN INSUL WOOL	4.00	FAN	Ranipet	Insulation-Wool	5A
55	939	PA FAN INSUL WOOL	5.70	FAN	Ranipet	Insulation-Wool	5A
Total (Fan)			239.7				
		SEPARATOR BODY ASSEMBLY FOR 803	74.5	Mills	HPEP, Hyd	RTM	2B
		SEPARATOR TOP	30.9	Mills	HPEP, Hyd	RTM	2B
		MILL SIDE ASSY	75.7	Mills	HPEP, Hyd	RTM	2B
		JOURNAL SHAFT ASSLY	60.0	Mills	HPEP, Hyd	RTM	2B
		BOWL HUB ASSEMBLY	38.0	Mills	HPEP, Hyd	RTM	2B
		70 LPM MILL LUBE OIL SYSTEM	5.0	Mills	HPEP, Hyd	RTM	2B
		GEARBOX ASSEMBLY	70.7	Mills	HPEP, Hyd	RTM	2B
		JOURNAL HEAD LINER ASSLY.	4.8	Mills	HPEP, Hyd	RTM	2B
		JOURNAL HEAD	22.7	Mills	HPEP, Hyd	RTM	2B
		INNER CONE	4.5	Mills	HPEP, Hyd	RTM	2B
		JOURNAL SPRING ASSLY	13.5	Mills	HPEP, Hyd	RTM	2B
		EL.OP.MILL HAND.SYSTEM	16.0	Mills	HPEP, Hyd	RTM	2B

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		MILL DISCHARGE VALVE ASSY, XRP 803	17.5	Mills	HPEP, Hyd	RTM	2B
		JOURNAL SKIRT ASSLY	1.1	Mills	HPEP, Hyd	RTM	2B
		CENTER FEED PIPE - ASSEMBLY	5.4	Mills	HPEP, Hyd	RTM	2B
		MILL MOTOR COUPLING	1.5	Mills	HPEP, Hyd	RTM	2B
		PYRITE HOPPER ASSY	5.0	Mills	HPEP, Hyd	RTM	2B
		Mill Motor	40.0	Mills	Bhopal	RTM	2B
Total (Mills)			486.6				
57	013	DAMPER-FD FAN OUTLET	5.70	GATE	Ranipet	NPP	1C
57	020	GATE-SA APH BYPASS	6.00	GATE	Ranipet	NPP	1C
57	023	DAMPER-SA APH BYPASS	2.10	GATE	Ranipet	NPP	1C
57	073	DAMPER-SA APH INLET	6.00	GATE	Ranipet	NPP	1C
57	113	DAMPER-PA FAN OUTLET	5.50	GATE	Ranipet	NPP	1C
57	141	SEAL AIR PIPING	25.00	GATE	Ranipet	NPP	1C
57	143	DAMPER-COLD AIR TO MILL	2.50	GATE	Ranipet	NPP	1C
57	160	GATE-COLD AIR TO MILLS	9.00	GATE	Ranipet	NPP	1C
57	173	DAMPER-PA APH INLET	5.50	GATE	Ranipet	NPP	1C
57	203	DAMPER-SA APH OUTLET	6.40	GATE	Ranipet	NPP	1C
57	209	MOUNTING BRACKET	3.60	GATE	Ranipet	NPP	1C
57	223	DAMPER-PA APH OUTLET	6.50	GATE	Ranipet	NPP	1C
57	270	GATE-HOT AIR TO MILLS	14.20	GATE	Ranipet	NPP	1C
57	273	DAMPER-HOT AIR TO MILL	6.00	GATE	Ranipet	NPP	1C
57	363	DAMPER-ECONOMIZER BYPASS ISOLN	6.60	GATE	Ranipet	NPP	1C
57	413	DAMPER-ECONOMISER BYPASS CNTRL	5.80	GATE	Ranipet	NPP	1C
57	433	DAMPER-GAS APH OUTLET COMMON	13.00	GATE	Ranipet	NPP	1C
57	460	GATE-ESP INLET	15.00	GATE	Ranipet	NPP	1C
57	470	GATE-ESP OUTLET	12.00	GATE	Ranipet	NPP	1C
57	483	DAMPER-ID FAN INLET	9.50	GATE	Ranipet	NPP	1C
57	491	BLOWER WITH MOTOR	17.00	GATE	Ranipet	NPP	1C
57	493	DAMPER-ID FAN OUTLET	9.60	GATE	Ranipet	NPP	1C
57	497	KGV & CHECK VALVE	11.50	GATE	Ranipet	NPP	1C
57	577	ELECT ACTUATOR FOR GATE,DAMPER	7.30	GATE	Ranipet	NPP	1C
57	578	ELECTRICAL ITEMS FOR GATE,DAMP	0.08	GATE	Ranipet	NPP	1C
57	603	DAMPER-SCR INLET	20.00	GATE	Ranipet	NPP	1C
57	613	DAMPER-SCR OUTLET	46.00	GATE	Ranipet	NPP	1C

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57	623	DAMPER-SCR BYPASS	20.00	GATE	Ranipet	NPP	1C
57	S09	MOUNTING BRACKET-SCR	0.60	GATE	Ranipet	NPP	1C
57	S41	SEAL AIR PIPING-SCR	17.60	GATE	Ranipet	NPP	1C
57	S77	ELECTRIC ACTUATR-SCR	4.48	GATE	Ranipet	NPP	1C
57	S78	ELECTRIC ITEM-SCR G&D	0.06	GATE	Ranipet	NPP	1C
57	S91	BLOWER WITH MOTR-SCR	14.40	GATE	Ranipet	NPP	1C
57	S97	KGV & CHECK VALV-SCR	6.80	GATE	Ranipet	NPP	1C
57	466	PLATFORMS AND LADDERS	25.86	GATE	Ranipet	Structure	1A
57	666	PLATFORMS AND LADDERS-SCR GD	6.00	GATE	Ranipet	Structure	1A
Total (Gate and Dampers)			373.2				
79	814	SUPPORT INSULATORS	5.00	ESP	Ranipet	ESP	3A
79	830	ELECTRICAL SD COMPTS	5.50	ESP	Ranipet	ESP	3A
79	831	GEARED MOTORS FOR RAPPING MECH	8.70	ESP	Ranipet	ESP	3A
79	859	SUPPORTS FOR ELECTRICAL ITEMS	19.00	ESP	Ranipet	ESP	3A
79	863	ASH LEVEL INDICATOR	0.80	ESP	Ranipet	ESP	3A
79	872	INTERLOCKS-EP	0.61	ESP	Ranipet	ESP	3A
79	873	ELECTRICALLY OPERTD HOIST&ACCE	3.00	ESP	Ranipet	ESP	3A
79	890	HEATING ELEMENTS	1.50	ESP	Ranipet	ESP	3A
79	901	ROLL/SLIDE SUPPORTS	8.31	ESP	Ranipet	ESP	3A
79	905	ESP-SUB-DELIVERY COMPONENTS	0.16	ESP	Ranipet	ESP	3A
79	906	INSULATOR HOUSING AS	14.34	ESP	Ranipet	ESP	3A
79	908	GAS DIST. ASSY	30.00	ESP	Ranipet	ESP	3A
79	909	GD-RAPPING MECHANISM	5.00	ESP	Ranipet	ESP	3A
79	910	GD_DRIVE ARRANGEMENT	0.25	ESP	Ranipet	ESP	3A
79	911	GAS SCREEN-EP	11.00	ESP	Ranipet	ESP	3A
79	913	EMIT SYST SUSPENSION	5.00	ESP	Ranipet	ESP	3A
79	915	EMITTING ELECTRODES	11.00	ESP	Ranipet	ESP	3A
79	916	EMIT ELECT RAPP MECH	15.00	ESP	Ranipet	ESP	3A
79	917	DRIVE ARGT. FOR EMIT. SYS	9.40	ESP	Ranipet	ESP	3A
79	919	COL ELEC SUSPENSION	54.52	ESP	Ranipet	ESP	3A
79	920	COLLECTING ELECTRODE	535.00	ESP	Ranipet	ESP	3A
79	921	EMIT SYS FRAME-TOP	57.64	ESP	Ranipet	ESP	3A
79	922	EMIT SYS FRAME BOTOM	57.00	ESP	Ranipet	ESP	3A
79	923	INSPECTION DOORS	3.90	ESP	Ranipet	ESP	3A
79	924	SHOCK BARS	38.60	ESP	Ranipet	ESP	3A

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79	925	COLL ELECT RAPP MECH	36.90	ESP	Ranipet	ESP	3A
79	926	COLL ELEC RAPP DRIVE	2.10	ESP	Ranipet	ESP	3A
79	928	ESP ROOF BEAM	80.00	ESP	Ranipet	ESP	3A
79	932	EMIT SYS FRAME-MIDLE	78.70	ESP	Ranipet	ESP	3A
79	942	OUTER ROOF-EP	105.43	ESP	Ranipet	ESP	3A
79	943	HOPPER RIDGES	21.70	ESP	Ranipet	ESP	3A
79	944	HOPPER UPPER PART	101.41	ESP	Ranipet	ESP	3A
79	945	HOP MLD&LOWER PART	143.30	ESP	Ranipet	ESP	3A
79	946	INSULATOR SUPP PANEL	37.85	ESP	Ranipet	ESP	3A
79	947	ROOF PANEL ASSY	55.05	ESP	Ranipet	ESP	3A
79	948	CASING STRUCTURE	160.00	ESP	Ranipet	ESP	3A
79	949	CASING SHELL/PANEL	325.00	ESP	Ranipet	ESP	3A
79	950	INLET-OUTLET FUNNEL	56.00	ESP	Ranipet	ESP	3A
79	955	PENT HOUSE FOR E P	75.00	ESP	Ranipet	ESP	3A
79	957	SPLITTER&GUIDE VANES	8.00	ESP	Ranipet	ESP	3A
79	961	EP PERF TEST EQUIPT	10.00	ESP	Ranipet	ESP	3A
79	965	APP PLATFORM-HOPPER	55.00	ESP	Ranipet	ESP	3A
79	966	WATER WASHING SYSTEM	2.50	ESP	Ranipet	ESP	3A
79	981	SUPPOTING STRUCTURES FOR ESP	200.00	ESP	Ranipet	ESP	3A
79	989	GUIDE PLATE/VANE EP INLET DUCT	5.00	ESP	Ranipet	ESP	3A
89	610	EP GALLERIES&STAIRS	16.00	ESP	Ranipet	ESP	3A
89	611	ESP ROOF HANDRAILS	5.50	ESP	Ranipet	ESP	3A
89	612	FLOOR GRILL AND STEP TREAD	11.00	ESP	Ranipet	ESP	3A
89	613	FLOOR GRILL AND MOBILE LADDER	15.00	ESP	Ranipet	ESP	3A
89	614	PENT HOUSE ROOFING SHEETS	12.00	ESP	Ranipet	ESP	3A
		95kVp/1000mA ESP TRANSFORMER	35.10	ESP	BHEL Jhansi	ESP	3A
79	967	MIN WOOL FOR ESP INSULATION	90.00	ESP	Ranipet	Insulation- Wool	5A
79	968	FIXING COMP. FOR ESP INSULATION	38.00	ESP	Ranipet	Insulation- Iron parts	5C
89	615	INSULATION CLADDING SH FOR ESP	38.00	ESP	Ranipet	Insulation- Al sheet	5D
Total (ESP)			2719.8				
Grand Total (ESP+APH+Fans+Mills+Motors+Gates & Dampers)			4252.85				

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Power Cycle Piping- BHEL Unit PE&SD Hyd supply						
Sl No	Description	Weight (in MT)	Area	BHEL Unit	Category	Rate Schedule
1	AS[P91]	42	Piping	PESD	PC Piping	4A
2	AS[P11+P22]	114	Piping	PESD	HP Piping	4B
3	SS (304)	3	Piping	PESD	SS Piping	4D
4	CS	243	Piping	PESD	HP & LP Piping Piping	4B & 4C
5	MISC PIPING ITEMS	30	Piping	PESD	HP Piping	4B
6	PIPING INSULATION	107	Piping	PESD	Insulation	5A
7	HANGERS & SUPPORTS	110	Piping	PESD	H&S	4E
8	ACCESS PLATFORMS	80	Piping	PESD	Structure	1A
9	Trichy valves	176	Piping	Trichy	HP Piping	4B
	Total-Piping	905				

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THE SCOPE OF THE WORK WILL COMPRISE OF BUT NOT LIMITED TO THE FOLLOWING:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

10.0 GENERAL

10.1 The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services/ facilities to complete the work or portion of work awarded to him. The quoted/ accepted rates/ lump sum price shall deem to be inclusive of all such contingencies.

10.2 It is not the intent to specify herein all details of all material. Any item related this work not covered by this but necessary to complete the system will be deemed to have been included in the scope of the work.

10.3 Site Visit by the Bidder: - The bidder shall, prior to submitting his tender for the work, visit and examine the site of works and its surroundings at his own expense, and obtain and ascertain for himself on his own responsibility all information that may be necessary for preparing his tender and entering into a contract, and take the same into account in the quoted contract price for the work.

10.3.1 The bidder shall satisfy themselves about the following factors:

- i) Site conditions including access to the site, existing and required roads and other means of transport/communication for use by him in connection with the work including diverting and re-routing of services.
- ii) Requirement and availability of land and other facilities of his enabling works, establishment of his nursery, office, stores etc.
- iii) Ground conditions including those bearing upon transportation, disposal, handling and storage of materials required for the work or obtained there-from.
- iv) Source and extent of availability of suitable materials, including water etc., and labour (skilled and unskilled) required for work, and laws and regulations governing their use and employment.
- v) Geological, meteorological, topographical and other general features of the site and its surroundings as are pertaining to and needed for the performance of the work.
- vi) The type of equipment and facilities needed, for and in the performance of the work.
- vii) The extent of lead and lift required for the work in complete form over the entire duration of the contract, and All other information pertaining to and needed for the work including

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information as to the risks, contingencies and other circumstances which may influence or affect the work or the cost thereof under this contract.

- 10.4** The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc. for any temporary supporting or approach platforms or scaffolding works or as bed for pre-assembly works. Contractor shall arrange himself all such materials. The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel (angles, channels, beams, plates etc) for such usage as normal scope of work without any cost implication on BHEL. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor. However, if available with BHEL (in form of scrap/good steel), vendor may be allowed to use on returnable basis on discretion of BHEL.
- 10.5** Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies / personnel on latest ISO Standards.
- 10.6** Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer for other agencies, like Civil, Electrical, instrumentation, BOP, etc., to commence their work from / on the equipments coming under this scope. Sometimes, more than one agency may have to work in same location. Sometimes it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.
- 10.7** For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.
- 10.8** The boiler shall be erected as per relevant provisions of latest Indian Boiler Regulations (IBR) and amendments/addendums thereof, if any. Contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.
- 10.9** Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding (Boiler, Power cycle piping, special tanks, IBD Tanks, CBD tanks any other tanks applicable) under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., visit fees is in the scope of contractor, and necessary drawing / details only will be given by BHEL. If applicable/required, all boiler, piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. After approval of the above drawing, Erection of pressure parts, pipe line to be started.

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- 10.10** All necessary certificates and licenses, permits & clearances to carry out this work from the respective IBR authorities/statutory/ local authorities/ etc are to be arranged by the Contractor, if required, at his cost in time to ensure smooth progress of work and render all assistance, service required in this regard.
- 10.11** All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully pay-able under the provisions of the Indian Boiler Regulations and any other statutory laws and its amendments from time to time during erection in respect of the plant equipment ultimately to be owned by the customer, shall be to the account of the customer. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor, the additional fees for such inspection and/or registration shall be borne by the Contractor. Inspection fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in (Vol I BCD)) shall be paid by BHEL.
- 10.12** The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
- 10.13** During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads (5%) from contractor's bills.
- 10.14** The intent of specification is to provide services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the Contractor of the responsibility of providing such facilities to complete the work without any extra compensation.
- 10.15** Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.
- 10.16** The Contractor shall perform any services, tests etc. which may not be specified but nevertheless, required for the completion of work.

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- 10.17** The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.
- 10.18** BHEL reserves right to recover from the Contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to Contractor's lapse during any stage of work. Any loss to BHEL due to Contractor's lapse shall have to be made good by the Contractor as per GCC.
- 10.19** All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc. as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the Contractor as part of the work within the quoted rates.
- 10.20** The Contractor shall take delivery of the components, equipments, chemicals, and lubricants etc. from the BHEL stores/ storage area after getting the approval of BHEL Engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipments after usage shall be submitted to the BHEL and reconciled periodically.
- 10.21** Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc. The details of equipments to be erected under this contract are generally as per the schedule given in relevant appendices. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.
- 10.22** Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.
- 10.23** Layout of field routed, fine fittings, boiler trim piping, oil system and other small-bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. As such, layout of small-bore piping in boiler and oil system shall be done as per the site requirement. Necessary sketch for routing these lines shall be prepared and got

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approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

- 10.24** Fixing and seal welding of thermowells & plugs before Hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermowells after hydro test/steam blowing of lines as part of work.
- 10.25** In installation of various equipments it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials. Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipments to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements will be provided by BHEL on free - returnable basis which shall be returned to BHEL after the use.
- 10.26** Interconnection/ hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.
- 10.27** Contractor shall regulate flow of material to and from site in such a manner and sequence that material accumulation at site does not lead to congestion at site. In case it is necessary to shift and restack the materials kept at work areas / site to enable other agencies to carry out their work or further any other reason, it shall be done by the Contractor most expeditiously. No claim for extra payment for such work will be entertained.
- 10.28** It may so happen that certain components like manhole doors, hanger etc may be supplied in loose items. They need to be assembled as per relevant drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.
- 10.29** The Contractor shall have total responsibility for all equipment and materials in his custody at Contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.
- 10.30** BHEL is operating web based computerized E-store system that includes, inter-alia, issue of materials, daily progress reporting, Contractor's running monthly billing and material reconciliation through a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work.

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- 10.31** In the event the computerized E-store/SOMS is inoperative for any reasons, the Contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the E-store/SOMS as and when the E-store/SOMS is reactivated/ normalized.
- 10.32** Gases like argon, oxygen, acetylene etc that are required for erection related activities shall be arranged by the Contractor at his cost. The supply should accompany test certificate for the batch indicating individual element 'ppm' level and overall purity level. Contractor should arrange to verify the purity of argon at site as required by BHEL/Customer
- 10.33** **All lubricants and chemicals required for testing, preservation, chemical cleaning / acid cleaning, oil flushing, and the lubricants for trial runs of the equipments and trial operation of the unit will be supplied by BHEL free of charges.**
- 10.34** Site testing wherever required shall be carried out for all items / materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.
- 10.35** The work shall be executed under the usual conditions without affecting power plant construction / operation and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
- 10.36** Wherever Construction sequences are furnished by BHEL, the contractor shall follow the same sequence.
- 10.37** Contractor shall, transport all materials to site and unload at site / working area for inspection and checking. All material handling equipment required shall be arranged by the contractor.
- 10.38** Contractor shall retain all T&P / Testing instrument / Material handling equipment's etc. at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from engineer in charge. The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.
- 10.39** The consumables (welding electrodes, special T&Ps etc), commissioning spares and erection material spares released in PG-MA XX-991, XX-992, XX-993, XX-988, XX-997 and other similar items are not billable. However, certain spare items when actually erected as a part of

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permanent equipment shall be paid as per agreed payment terms as applicable. The decision of BHEL Engineer in this regard shall be final and binding on contractor.

- 10.40** Neutralisation pit for Chemical cleaning/Acid cleaning shall be made by BHEL. After completion of job pit has to be dismantled and area is to be levelled before handing over of area to owner. Dismantling of temporary piping & Cleaning of the area, erected by bidder, is in the scope of contractor. Pit size shall suitably decide jointly at site as per site requirement. Cost incurred in construction & post-use levelling of neutralization pit shall be borne by the BHEL.
- 10.41** Contractor shall remove all scrap materials periodically generated from his working area and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's cost with applicable overheads if there is any failure on the part of contractor in this respect.
- 10.42** The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer in- Charge.
- 10.43** Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and levelled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor with 5% overhead. The decision of BHEL Engineer in this regard is final.
- 10.44** The contractor's work shall not hinder other work, either underground or over ground, such as electrical, phone lines, water or sewage lines, etc. In areas of overlap, the contractor shall work in coordination with other related contractors.
- 10.45** Any damage of the landscape by contractor's team to such utilities will be penalized and contractor shall be responsible for cost/making good for such damages.
- 10.46 SITE INSPECTION**
- 10.46.1** The owner / BHEL or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / BHEL without any extra cost to the owner/BHEL. No cost whatsoever such duplication of inspection of work be entertained.

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10.46.2 BHEL / Customer will have full power and authority to inspect the works at any time, either on the site or at the contractor's premises. The contractor shall arrange every facility and assistance to carry out such inspection. On no account will the contractor be allowed to proceed with work of any type unless such work has been inspected and entries are made in the site inspection register by customer / BHEL.

10.46.3 Wherever the performance of work by the contractor is not satisfactory in respect of workmanship, deployment of sufficient labour or equipment, delay in execution of work or any other matter, BHEL shall have the right to engage labour at normal ruling rates and get the work executed through other agency and debit the cost to the contractor with 5% overhead, and the contractor shall have no right to claim compensation thereof. In such a case, BHEL shall have the right to utilize the materials and tools brought by the contractors for the same work.

10.47 UTILITY POINTS

10.47.1 Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N₂) etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by site engineer and shall route the piping to these points as per site conditions, and shall submit as built layout with 'BILL OF MATERIAL' to BHEL for approval.

10.47.2 The utility points shall be located at convenient point to handle and to be terminated with brass / bronze valve with suitable connection for hose pipe.

10.48 DOCUMENTATION

10.48.1 Contractor has to maintain documents regarding erection, alignment, welding, joints, NDT and other erection data as per the FQP (min 05 Copies). These shall be required at different stages of erection and commissioning for statutory clearances as well as during handing over to Customer.

10.49 AS BUILT DRAWING:

After successful completion, testing and commissioning of installation work, Purchaser's drawings / documents shall be updated in line with the actual work carried out and as built drawings / documents shall be submitted by the contractor as agreed for the project. Contractor shall be supplied with one extra copies of the layout & isometrics drawings. Contractor to incorporate in one of the copies with red ink all the changes / deviations / alterations etc., Carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

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10.50 Statutory approval

10.50.1 Necessary approval for drawings, documents, Load Testing, license of hoists/lift Misc cranes erected by bidders has to be arranged for getting statutory fitness certificates, drawings/documents from Statutory agency/Third party inspectors without any extra commercial implication on BHEL treating as normal scope of work.

10.50.2 Contractor has to arrange sufficient manpower (fitters, electricians with supporting helpers) and T&P /other resources with sufficient testing instruments, IMTE/MMD for erection and commissioning of these systems without any extra commercial implication on BHEL treating as normal scope of work.

10.50.3 It shall be the responsibility of the Contractor to obtain the all necessary approvals/permits from the inspection/regulatory authorities etc. on behalf of the Employer, as may be required for erection, testing and commissioning etc. As called for under the statutes, regulations and the safety codes, all such documentation submission and taking necessary approval shall be the responsibility of contractors. Necessary approval is required from statutory authorities for the entire work.

10.51 Support for Handing Over of T&P, spares to BHEL/Customer, diversion to other BHEL Sites/Units

Vendor will assist in handing over of Special T&Ps for Erection/commissioning which were issued to them free of charge for returning to BHEL /Customer store.

10.52 Dewatering

Dewatering of Low Lying (as per scope applicability) till handing over to customer is in bidders scope for which vendor has to arrange and maintain adequate no. of Diesel & electrical pumps of suitable capacities, operators, necessary manpower with sufficient quantity of suction & discharges hoses, pipes, Clamps, cables, Electrical panels/starters, diesel, consumables without any extra commercial implication on BHEL treating as normal scope of work. Dewatering pumps will be required to run to ensure job progress is not hampered & if required pumps are to be run on round the clock basis on working days & holidays, Sundays.

10.53 Housekeeping/Area Cleaning

The contractor has to do area cleaning on every date on daily basis. Non-compliance of the above cleaning shall call for penal recovery limited to **Rs.2,000.00 on each instance** and at the same time, cleaning of the area shall be done by BHEL at Cost recovery basis with **5%** overheads. No excuses on this above account shall be entertained by BHEL on whatsoever account.

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Contractor shall engage separate gangs throughout the contract period, exclusively for proper housekeeping of the site. The contractor has to make necessary arrangements for collection and for bringing down the scrap from all locations and taking them away from the erection areas to various locations as indicated by BHEL Engineer. The house keeping must be a routine and continuous activity. in the various work fronts.

10.54 Approach platforms, fixtures

10.54.1 Erection of Platforms (with grating, railing, toe-guards and stairs) for safe approach and operation of auxiliaries and valves, as per BHEL and customer requirement etc is to be carried out by contractor. Structural shall be issued by BHEL for this on free of cost basis. Payment/ payment terms of such work shall be done as per Rate schedule identifier - 1A.

10.54.2 Steel items like angles, scaffoldings, Tie beams required for erection of items which are temporary in nature are to be arranged by vendor for structural erection treating it as normal scope of work without any cost implication on BHEL.

10.55 Assistance during commissioning of panels, Equipment, system, actuators for valves (motor operated/pneumatic), gates, dampers

Agency has to give assistance for commissioning during initial period and subsequently during unit operation during stabilization period/trial run/PG Test. For this purpose, for the items erected by agency has to provide manpower, other resources, diesel, other consumables, scaffoldings, Other T&Ps as required from time to time. These types activities will be repetitive in natures for number of times and in cases dismantling, reinstallation of items/parts has also to be done till handing over of unit to customer. During case of dismantling /reinstallation logistic supports like Tyre mounted crane/Crawler Crane/crane/truck/trailers as applicable including manpower are to be arranged by vendor. These types of activity are treated as vendor's normal scope of work without any extra commercial implication on BHEL.

10.56 Sky Climber

Agency has to supply, erection, commissioning, maintenance, shifting, resifting of sky climbers as per site requirement. Taking statutory fitness certificates from Statutory Authorities/Third Party Inspectors as per requirement from time to time lies with boiler vendor. Contractor shall take back the sky climber after completion of works as per instruction of BHEL Engineer.

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Chapter-X: General

- 10.57** All relevant provisions/responsibilities of contractors as mentioned in any of the chapter of this specification (same or different chapter) shall also be applicable, mutatis-mutandis, to any other chapter of this specification.

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Chapter-XI: Welding Schedule

11.0 Following points may be noted with respected to the Welding schedule

Erection/Final Welding Schedule of subject Project shall be made available during Erection.

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Chapter-XII: FOUNDATIONS & GROUTING

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

12.0 PREPARATION OF FOUNDATIONS AND GROUTING

- 12.1** Building foundations and other necessary civil works for supporting structures, equipments etc will be provided by BHEL / Customer. The checking of dimensional accuracy, axis, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits have to be checked and logged by the Contractor. The permanent benchmark / reference marks will have to be transferred to new locations with sufficient care to maintain the accuracy and protected / preserved with adequate care (to enable rechecking at later dates) as per BHEL instruction.
- 12.2** Minor adjustment of foundation level, dressing and chipping of foundation surfaces and blue-matching (wherever required) for of all equipments as per BHEL Engineers instructions, should be done by the Contractor as part of the work. Contractor/BHEL shall prepare protocols before taking over the foundations. All minor adjustments of foundation level, dressing and chipping of foundations up-to **+/- 50 mm**, enlarging the pockets in foundations, cleaning using compressed air, etc., for achieving proper levels & erection of equipment/ plants, will be within the scope of work/specification.
- 12.3** It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection.
- 12.4** Foundation pockets are to be cleaned thoroughly before placing the supports / columns / equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nut's movement. If required cleaning of the threads to be done with proper dies.
- 12.5** While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packer plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with Prussian blue to get the required contact with frames.
- 12.6** The required packer plates shall be provided by BHEL free of cost. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL will

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Chapter-XII: FOUNDATIONS & GROUTING

have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare **packers and shims by gas cutting / chiseling / grinding and de-burr the same.**

- 12.7** Contractor shall ensure perfect matching of packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer. If required the packer plates may have to be aligned and fixed on the foundations using special high strength, non-shrinking and quick setting grouts. The minimum thickness below the packer plate should be 20mm or as per drawings/instructions of BHEL Engineer. The material required for this has to be arranged for by the contractor at his cost
- 12.8** All temporary foundations and anchor points required for installing erection Equipments and winches, foundations for pumps, tanks etc (until otherwise explicitly mentioned in the tender) are in the scope of Contractor. All building materials like cement, steel including re-enforcement bars, grits cements etc for such temporary foundations shall have to be arranged by the Contractor within the quoted rates. All such foundations shall be demolished and normal ground conditions restored after the usage.
- 12.9** The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments / equipments based on the foundations including shear lug provisions / openings.
- 12.10** Civil work for Neutralisation pit for Chemical cleaning shall be in BHEL/customer scope.
- 12.11** Contractor shall carry out scrapping and blue matching of embedded plates/ packers of rotating equipments. Chipping and the levelling of concrete surfaces, fine dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of this work. Scrapping, chipping and matching shall be done so as to achieve prescribed percentage of contact between the two surfaces.
- 12.12** Complete grouting of structures, equipments, including anchor/ foundation bolts, beneath base, base hollows etc, as may be applicable, is **INCLUDED** in the scope of Contractor. Arranging all labour, building materials including cement, ordinary portland as well as quick setting – free flow - non-shrink grout mix (e.g. conbextra GP-1/GP-2/GP-3), form work, shuttering, and any other requirements is in the Contractor's scope. Contractor shall obtain approval of BHEL for cement (Ordinary Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use. While grouting the contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved

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Chapter-XII: FOUNDATIONS & GROUTING

by Engineer. If required, decoupling of equipment's has to be done for conducting the verification. In case any disturbance is noticed the cause, if any, shall be removed and re-alignment done as part of work. Cleaning of foundation surfaces, pocket holes and anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods are within the scope of this specification/ work.

- 12.13** After the grouting has finally set and cured, alignment of structure, equipment, alignment of shafts of rotating machines, the slopes of all bearing pedestals, centring of rotors with respect to their sealing bores, coupling etc involved shall be checked again to verify for any disturbance or any other reason. If required, de-coupling of equipments has to be done for conducting the verification. In case any disturbance is noticed the cause, if any, shall be removed and re-alignment done as part of work.
- 12.14** The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment. Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc., shall also be blue matched by Prussian Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineer's instructions.
- 12.15** Total grouting of the columns / equipment including pocket grouting, grouting at the gap between foundation, base plates top surface of column / equipment, anchor/ foundation bolts, beneath base, base hollows, etc is in the scope of the contractor. All the grouting should be carried out by non-shrink cement like conbextra GP-1 / Conbextra GP-2 / GP-3 Shrinkkomp or its equivalent etc. This special non-shrink cement shall be arranged by the contractor at his cost. The quoted rate shall be inclusive of the same.
- 12.16** All equipment bases and structural steel bases and foundations pockets shall be grouted and finished as per these specifications after surface preparation unless otherwise recommended by the equipment manufacturers. The surface preparation includes soda washing of the foundations to remove oil, grease etc. to ensure proper grouting.
- 12.17** The certificates of the grout are to be submitted to BHEL. If necessary, test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting

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Chapter-XII: FOUNDATIONS & GROUTING

with Portland cement is approved, necessary cement, sand etc. to be arranged by the contractor including the fine aggregates.

- 12.18** All the materials required for grouting including special cements as approved by BHEL and other materials like Portland cement, sand chips, gravel etc., are to be arranged by the contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.
- 12.19** **PROCEDURE FOR GROUTING:** Contractor has to carry out the grouting as per the work instructions for grouting available at site/as per BHEL engineer's instructions or the grouting is to be carried out as per the supplier's recommendation / IS standard. Copy of those recommendations is to be submitted to BHEL for records.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIII: MATERIAL HANDLING, TRANSPORTATION AND SITE STORAGE

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

13.0 Material Handling, Transportation and Site Storage

- 13.1** Loading at BHEL / Customer stores and storage yard, transport to site, unloading at site / working area of equipment, placement on respective foundation / location, pre-assembly bay or at working area are in the scope of work. The scope includes taking materials / Equipments from customer stores / storage yard also. Contractors Quoted / Accepted rate shall be inclusive of the same. Required cranes, tractors, trailer or trucks/ slings/ tools and tackles / labour including operators, fuel, lubricants etc. for loading & unloading of materials will be in the scope of contractor.
- 13.2** The storage yard is located within the Main Plant Boundary.
- 13.3** Transportation of all items including ODC items from BHEL Store/Yard to Erection site shall be in the contractor's scope. However, in some cases, consignments including ODC may be unloaded near erection site as per space availability and site requirements.
- 13.4** Loading at storage yard and transporting to site, unloading at site / pre-assembly area or at working area, is in the scope of work. Required cranes for loading & unloading of materials, trailer shall be in the scope of contractor. The contractor shall provide any fixtures, concrete blocks & wooden sleepers, sandbags which are required for temporary supporting of the components at site.
- 13.5** The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection / location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage / loss of such equipment at site.
- 13.6** The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.
- 13.7** Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

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Chapter-XIII: MATERIAL HANDLING, TRANSPORTATION AND SITE STORAGE

- 13.8** During the course of issue of materials from BHEL storage stacks, it shall be the responsibility of the Erection Agency to ensure that any balance or leftover materials are properly re-stacked in an orderly manner. If, during the process of loading or handling, the existing material stack becomes disorganized or disturbed, the Erection Agency shall immediately re-stack the materials to restore the stack to its original or acceptable condition. In the event that the Erection Agency does not re-stack the disorganized materials, BHEL shall carry out the re-stacking activity, accordingly the cost of such re-stacking + 5% overheads shall be chargeable to the Erection Agency
- 13.9** Contractor shall plan and transport equipments, components from storage yard to erection site in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. However, in specific cases **“as a special case to expedite the job”** the consignment received at BHEL stores can directly be diverted to the work site, as decided by BHEL, following issuance procedure of BHEL. Such direct issues shall be as per the Challan/dispatch document/LR received with the consignment. In such cases, contractor shall do unloading of materials from trucks/lorry/trailers at their own cost but only after instructions given by BHEL Engineer.
- 13.10** All materials issued by BHEL shall be stacked neatly, preserved, stored in the contractor’s shed / work area above ground level by use of concrete or wooden sleepers. No materials shall remain on ground at any time. All concrete or wooden sleepers required for stacking the materials shall be arranged by contractor at his own cost within the quoted rates. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost. Contractor shall maintain register/diary for location and quantity of materials transported from BHEL/Customer Store/Yard and unloaded at site/ pre-assembly area.
- 13.11** All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.
- 13.12** The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered. Contractor has to arrange required fire proof tarpaulins to protect the machined components / assembled parts drawn from BHEL store before and after erection as required at their cost.
- 13.13** The contractor shall take all such measures as may be reasonably necessary to ensure that its arrangements and those of its sub-contractors with respect to the transport of Goods, Materials and Labour to the site do not interfere with local traffic in the vicinity of the site and where such

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Chapter-XIII: MATERIAL HANDLING, TRANSPORTATION AND SITE STORAGE

interference is unavoidable shall make such special arrangements as may be reasonably required to minimize the effect of such interference.

- 13.14** The contractor shall solely be responsible for the safety & security of material after it is handed over and issued to contractor by the BHEL. BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.
- 13.15** Open land for storage purposes shall be provided by BHEL on free of cost/as available basis for storage of materials issued to contractor (if required). Temporary barbed wire fencing (if required), as required, of the open storage yard is to be done by the contractor and is included under the scope of his work. Contractor shall also remove grass, bushes, trees etc wherever required off the land provided to agency and shall make proper continuous up keeping of the open yard /land by removing grass, bushes trees etc and same is included under the scope of his work & No extra payment shall be made to the contractor in this regard. The bidder shall make complete arrangement of necessary security personnel to safeguard all such materials in his custody. The contractor shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering. In case, loss of any materials for whatsoever reasons attributable to the contractor, then cost of such materials shall be recovered from the running bill payment with 5% overhead.
- 13.16** All surplus materials shall be returned to BHEL store. All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be returned to the stores on weighment basis in consultation with BHEL Engineer and a receipt obtained for material accounting purposes. Scrap materials shall be sorted section-wise and returned separately at a place directed by BHEL Engineer within the project area. Return of such materials will not be entitled for any handling and incidental charges.
- 13.17** All lifting tackles including wire ropes, slings, shackles etc. used by the contractor shall be got approved by BHEL Engineer at site before they are actually put on the work. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damage to other equipment and personnel. All equipment/structure shall be adequately supported and protected to prevent damage during handling and erection. The history cards for major equipment to be maintained by the contractor.

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Chapter-XIV: ERECTION

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

14.0 Erection

- 14.1** Brief list of System / sub-system to be erected by the contractor & approximate weight of individual structure, equipment, PGMA's and number of welding joints mentioned in this Tender Specification are meant for giving general idea to the tenderer only about magnitude of the work involved. This is tentative and should not be taken for billing or any other claims. All weights for such purposes will have to be taken from design documents only (shipping list). This section also gives general idea about various components to be erected with expected accuracy level. However, the contractor shall get the correct details from the engineer to avoid mistakes and rework.
- 14.2** All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out of all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include equipment for checking, cleaning, servicing and site fabrication. Following among others shall form part of contract in contractor's scope:
- a) Scaffolding and rigging operations,
 - b) Machine/ flame/ electric cutting, grinding, welding, and stress relieving & wrap inspection by Holiday detector.
 - c) Fitting, Fettling, Filing, Straightening, Chamfering, Chipping, Scrapping, Reaming, cleaning, checking, levelling, blue matching, aligning and assembly
 - d) Machining, Surface grinding, drilling, doweling, shaping
 - e) Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication
 - f) Insulation and painting
- 14.3** The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision/clarification of BHEL engineer will have to be followed.

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Chapter-XIV: ERECTION

- 14.4** The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be affected for such excess draws at the rate prescribed by manufacturing units.
- 14.5** The temporary structures/ items welded to permanent members/pipes are to be cut and removed without any damage. Any damage so to permanent members/ pipes to be made good by the contractor at his cost.
- 14.6** Approach road in the vicinity of erection area are to be maintained by Contractor.
- 14.7** In the case of structural members / ducts in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connects the joints at no extra cost.
- 14.8** All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope. No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc.
- 14.9** Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.
- 14.10** Wherever elbows of 45 deg. or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used as per BHEL engineer instruction. No extra cost shall be paid.
- 14.11** Welding of all thermo wells, draft, pressure and temperature instrumentation points and all other instrumentation points on piping and auxiliaries and welding of thermocouple pads for permanent system as well as for performance guarantee test is in the scope of work.
- 14.12** Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.
- 14.13** Wherever hanger and support materials are not received from manufacturing unit in time to suit the erection schedule, contractor shall erect the system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by

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Chapter-XIV: ERECTION

BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports.

- 14.14** Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive is within the quoted / accepted rate.
- 14.15** All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints and other components as per instruction of BHEL Engineer during erection within the quoted rate.
- 14.16** The contractor shall take all reasonable care to protect the materials and equipment during erection.
- 14.17** Any fixtures, scaffolding materials, approach ladders, concrete block supports, steel structures required for temporary supporting, pre-assembly, checking, welding, lifting & handling during pre-assembly and erection and during application of insulations shall be arranged by the contractor at his cost.
- 14.18** **Field Quality Assurance Formats:** - It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL and customer as token of their acceptance. Payment to the contractor will be linked with the submission of these FQA log sheets.

14.19 Boiler & Auxiliaries

Boiler is Main equipment including all related auxiliary equipment as specified below. Scope includes Erection, alignment and welding, bolting, fastening, grouting, commissioning as applicable of:

1. Erection of Boiler Drum and Ceiling Girder and ceiling/roof structures.
2. Complete circulating system including down comers, headers, riser tubes etc.
3. Complete super-heater system, including headers connecting pipes, vents, drains, drain, funnels, pipelines up to Blow down tank, safety valves, sampling connections, start up lines etc.
4. Complete Re-heater system including headers, connecting pipes, coils drains, drain funnels,

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- drain pipes up to Blow down tank, safety valves etc.
5. De-super-heater system for super-heaters & re-heater steam temperature control, pneumatically operated diaphragm type control valves with isolating valves, block valves and bypass valves.
 6. Pumps complete with drive motors, high pressure coolers, lubricating system, purge & fill system, emergency cooling system, etc.
 7. Economiser system including connecting pipes, headers & economiser re-circulation system.
 8. Rotary Air heater complete with structure, bearings, lube system etc.
 9. All Boiler integral piping, valves & fittings including check valves, motorised isolating and motorised stop valves, motorised startup valves, blow-down valves, safety valves, and electromatic safety valves, control valves with pneumatic connection for drum, super-heater and re-heater, safety valve escape pipings with silencers. Complete steam and water sampling lines with sample coolers & collectors. Chemical feed line. IBD & CBD lines, vents, RH/SH spray control station, Eco re-circulation etc.
 10. All approaches to valves and mountings including platforms.
 11. Applicable Air & gas duct work (Ref. wt schedule) with necessary expansion joints with protection against ash erosion insulation wherever required, dampers gates, supports, access doors etc. and support steel work.
 12. All the ash hoppers for boiler, economiser, air-heater stainless steel dip plates for bottom ash hopper and shield plates with refractory. The fly ash hoppers shall be provided with suitable vibration and heating arrangement to prevent ash build up.
 13. Boiler roof mountings including access / inspection doors for boiler / furnace, air-heater, economiser, and ducts etc. and also access for power operated maintenance platform.
 14. Complete soot blower and wall blower system with drains, entire piping and fittings including control valves.
 15. All drain lines including trap discharge outlet with drain funnels/drain receivers and pipelines from funnels discharge up to the nearest plant drainage system.
 16. Temperature measuring probe for start up (at furnace outlet) along with its starter cum control panel.
 17. Complete boiler and auxiliaries supporting structural steel, walkways, platforms, ladders and gratings, hand rail, stair cases at both sides of the boilers including inter connecting walkways between steam generator operating floor and main building and connecting platform for boiler and elevator including chequered plates, kicker / toe-guard plates wherever required, foundation bolts, nuts, fasteners, inserts, anchor channels, base plates, packers, shims, pipe sleeve for equipment and columns under scope.
 18. Erection of Elevator structure including it's bracings, connecting members and cladding structures
 19. Erection of burner block, guns, ignitor etc.
 20. Erection of scanner air fan with motor and its ducting up to burners.
 21. Structural steel material & purlin for boiler roof, drum level and burner operating floor.
 22. Complete buck stays and tie bars for pressure part system.
 23. Piping (HP/IP) work other than boiler parts but integral part of Boiler as detailed in the weight schedule.

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24. All hanger components, spring cage assembly, constant load hanger and aux. steel structure will be supplied as loose items. You shall pick up the correct components pertaining to a hanger, assemble the component at site and erect as per the drawing/ document. Necessary cutting of rods and aux. steel structure to the required lengths shall be done at site by you within accepted rate.
25. Fuel piping complete with gates, hangers etc.
26. Welding, radiography, heat treatment of piping joints will be as per specification enumerated in the relevant clause.
27. All ducts (both air & flue gas) required for boiler up to chimney and inside the chimney up to limit point.
28. Primary Air (PA) fan with drives including suction and discharge duct.
29. Seal air fans and drives, Feeders including Feeder Air System.
30. Motors with their handling devices, monorails etc.
31. Forced Draught (FD) fans and motors including suction duct
32. Induced Draught (ID) fans including drive motors.
33. Lube oil equipment assemblies as below:
 - For ID fan.
 - For FD fan.
 - For PA fan
34. Run way beams and lifting tackles for maintenance of FD, ID, PA.
35. Maintenance platform for FD, ID, PA Fans, valves, actuators, dampers, gates, oil burners, PG test points for Boiler.
36. Temporary piping for steam blowing and chemical cleaning, acid cleaning, chemical cleaning, detergent flushing, temporary drain to waste.
37. Corrugated sheeting of roof top and burner weather protection sheeting along with fasteners, bitumen washers etc.
38. All ducts (both air & flue gas) required for firing.
39. Complete water cooled furnace wall system complete with down comer including header drains, drain funnels, drain pipelines up to & including blow down tank and necessary stubs for chemical cleaning, nitrogen purging and wet lay up.
40. All interconnecting steel platforms, between Boiler & Main power house with associated ladders/stairs, grating, handrails etc.
41. Drinking water, Distribution of construction Power, Development of pre-assembly yard, area lighting of pre-assembly area and Boiler area, obtaining approval from statutory authority.
42. Garbage Chute.
43. Miscellaneous tanks
44. Application of pourable insulation, refractory, fixing of insulation pins, related iron/steel components, lagging of insulation mattresses, claddings over insulated surfaces etc. including supply & application of black bitumen paints on inside surfaces of the insulation cladding as per specification/drawings.

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- 45. Supply & Application of final painting over steel surfaces of boiler & aux. components (as per approved Painting Schedule). Paints shall be taken from approved paint manufacturers & various colour codes will be decided by BHEL/Customer.
- 46. Hoists for ID, FD, PA Fan, APH bucket handling, ESP roof etc.
- 47. Coal mills, complete with all necessary accessories (Rear Mill arrangement)

14.20 PRESSURE PARTS AND STRUCTURE

- 14.20.1** Installation of temporary structure as required for drum lifting including Cat head structure for strand jack is in the scope of contractor. Required steel for that purpose shall be provided by BHEL free of cost. These shall be fabricated to suit the requirement, erected and welded as part of work. NDT has to be carried out as per instructions. These structures have to be dismantled at appropriate stage and returned to BHEL as per the instructions of BHEL Engineer. Also, the relevant area of permanent structures has to be finished as instructed. Payment for above will be made at the rate accepted for structures; no separate payment will be made for fabrication, dismantling and finishing work and return of materials.
- 14.20.2** Pressure parts components like headers, panels, coils, loose tubes etc. have to be flushed / blown with compressed air, checked for dimensional accuracy and configuration and minor rectifications, if necessary will have to be done before erection. This will involve making appropriate bed of steel structures over the concrete blocks. Steel, in random sizes, for this purpose will be provided by BHEL from the packing materials / scraps etc., where as necessary concrete blocks shall be arranged contractor. Bed shall be fabricated as per requirement. These shall be dismantled & returned to BHEL at appropriate stage. No separate payment for making /dismantling such bed is envisaged.
- 14.20.3** Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, you shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. No gas cutting will be permitted. All fittings like “T” pieces, weld neck flanges, reducers etc. shall be suitably matched with pipes for welding (this is applicable to piping work also).
- 14.20.4** Welding of all attachments on pressure parts including those required for insulation work is in the scope of work.
- 14.20.5** Preparation of pre-assembly bed is very much essential for pre-assembly of MBLs, columns, ceiling girders, panels, coils etc. on consolidated ground and to avoid sagging and shrinking the

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temporary supports are to be provided. The pre-assembled component should have minimum three supports to avoid sagging.

- 14.20.6** Furnace area and heat recovery area of flue gas passage has to be made leak proof by seal welding. Air leak test by pressurization has to be conducted to prove effectiveness of the seal weld and soap bubble, kerosine or any other similar test will have to be carried out for the entire seal welds to ascertain the effective sealing is achieved. The tests may have to be repeated till satisfactory result is achieved.
- 14.20.7** If required, the pressure parts, after initial erection and tests, will have to be preserved by either dry or wet preservation procedure. you shall erect the piping & valves and provide necessary assistance for the same. Required piping, valves and preservative (gas / chemicals) will be provided by BHEL as free issue.
- 14.20.8** The drum internals, if already installed, may have to be removed to facilitate inspection by statutory authorities and chemical cleaning. The drum internals are to be preserved properly and refitted afterwards as part of work.
- 14.20.9** The column and girder pieces are to be measured individually to check for camber, sweep etc. The level markings on the columns to be checked before erection. The verticality stickers are to be fixed over individual column pieces on both the flanges (90 degrees apart in two places). Arranging these stickers shall be done by the contractor.
- 14.20.10** Tier by tier erection method is to be followed. Columns are to be tied up with horizontal and diagonal bracing in each tier before proceeding to next level. Log sheets are to be maintained in line with log sheets which are available with BHEL. After grouting the first-tier columns, second tier erection is to be taken up. Adequate curing of the grout is to be ensured. Verticality of the columns is to be ensured either by plumb bob or theodolite. The tolerance shall be as indicated in BHEL's erection drawings. Care should be taken while erecting the vertical and diagonal bracings to maintain the work points as per drawing. Necessary lubricant for the girder pin assembly should be applied as per drawing within the quoted rates.
- 14.20.11** The drum has to be lifted and erected in position by contractor through most convenient and standard method which would be acceptable to BHEL/Customer. Contractor will submit plan, procedure along with test certificate of the T&Ps (except T&Ps / Cranes to be provided by BHEL on free of charges) to be used for approval of BHEL / Customer.
- 14.20.12** Corrections in the profiles of scalloped plates / bars, skin casing, seal plates etc. for proper matching with matting parts, wherever required, shall be done as incidental to the work.

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- 14.20.13** Flame cutting of high-pressure piping and pressure parts shall not be permitted.
- 14.20.14** Extra portions of fins in water-wall panels has to be smooth ground for making panels to panel joints. Also, panel to panel tube joint alignment may require some amount of fin cutting and edge preparation/adjustment of panel. Such works shall be carried out by contractor to the desired accuracy as part of the scope of work complete penetration of water wall (panel to panel) fin welding shall be achieved either by single side or double side welding.
- 14.20.15** Panel to panel welding in water-wall panels shall be carried out as part of the scope of work. This shall be carried out by approved high pressure welders only.
- 14.20.16** Attachment welding of necessary seal boxes inspection windows. Instrument tapping points, thermocouple pads, root valves, condensing valves, flow nozzles and control valves etc., both for regular measurement and performance testing to be provided on boiler, its auxiliaries or pipelines covered within the scope of this tender, will also be the responsibility of contractor and the same will be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be your responsibility, within your accepted rate.
- 14.20.17** The inside of all tubes, pipes, valves and fittings shall be free from dirt, and loose scales. Before being erected, all pipelines shall be thoroughly blown and/or flushed; the ball and sponge test shall be carried out. All the above works shall be carried out as part of the scope of work. A system for recording all such operations shall be developed and maintained in a manner to ensure that no obstructions are left inside the tubes/pipes and no tubes/pipes are left uncleaned and untested.
- 14.20.18** All attachment, welding, fixing hooks, supports, anchors, studs, plates, angles and other steel components to support insulation and refractory over the pressure parts components erected shall have to be carried out u as specified in the drawings and as per instructions of the BHEL Engineer. welding of supports shall be done by high pressure welders only.
- 14.20.19** Suitable crane to be used for handling / lifting the ceiling girder will be provided by BHEL. Levelled area will be provided by BHEL for erection. However, backfilling and consolidation, if further required, shall be carried out by the contractor, at no extra cost. Necessary plates/sleepers required for marching and operation shall be provided by the BHEL for BHEL owned/deployed cranes. Positioning of the crane is to be decided in consultation with BHEL.
- 14.20.20** The erection of the welded beams, rolled beams, boiler roof frame assembly etc. to be taken up along with ceiling girders immediately as the crane moves from first girder to the last. The silencers of various safety valves also to be erected in the respective bays. The completion of

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the roof sheeting should follow to create a comfortable working space in the boiler cavity giving protection to all work men from rains and sun. It is expected that the contractor will complete the same before pressure parts erection. The materials for boiler roofing and side cladding etc. will be supplied by BHEL and contractor has to erect the same at the quoted /accepted tonnage rate.

- 14.20.21** The tightening procedures for HSFG bolts are to be obtained from BHEL at site before taking up the work. Normally it is done by turn of nut method. Torque wrenches also can be used. The bolted joints will be checked jointly by BHEL/Customer engineers for required tightness and retightening is to be done as per requirement. The tightened bolts will be marked with colour paints (*Paint in scope of Contractor*). Facility for random checking by torque wrench will have to be done. The required calibrated torque wrench will be provided by the contractor.
- 14.20.22** Some platform materials, approach ladders, suspension materials etc. will be supplied in running meters. The contractor has to fabricate these materials wherever they are supplied in running meters to the required size / shape, to be welded and erect them within the quoted rates.
- 14.20.23** Scrap disposing chutes are to be provided by the contractor within the quoted rate at different areas like along the boiler main column and duct supporting structures. Material for the scrap chute will be provided by BHEL.
- 14.20.24** Certain adjustments in length of steel /pipe/tube members may be necessary while erecting high pressure pipelines of boiler and piping (pre-fabricated lines) and the contractor should remove the extra lengths to suit the final layout after preparing edges afresh and adopting specified heat treatment procedures at no extra cost, wherever indicated. Depending upon the type of deviation BHEL will consider the reimbursement at man hour rates as per GCC. If the drawing provides for erection allowance, then it becomes part of the work and no compensation is payable. The prepared edges in pressure parts shall be applied with weldable primer as preservation and supply of the primer is in contractor scope.
- 14.20.25** Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection. (Walls with stiffeners in welded condition will be provided).
- 14.20.26** All the dampers, valves, lifting equipments, power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre-commissioning. The bearings of dampers shall be properly cleaned, serviced and lubricated before commissioning at no extra cost. Even after commissioning, if there are problems in the

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operation they have to be attended by the contractor during the tenure of the contract without any extra cost to BHEL.

- 14.20.27** All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain a reliable and complete pipe installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and Payment/ payment terms of such work shall be done as per Rate schedule identifier - 1A. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost.
- 14.20.28** All valves will have to be checked, cleaned, lapped or overhauled in full or in part before erection, after chemical cleaning and during commissioning as may be necessary.
- 14.20.29** Pipes are sent in standard length and will be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends up to NB 65 mm will have to be fabricated at site adopting specified heat treatment procedures, wherever required at no extra cost. Only cold cutting methods are to be employed for cutting of pipes and tubes irrespective of the size and material. Gas Cutting, if any, will be allowed only in CS LP piping as per instruction of BHEL Engineer.
- 14.20.30** **The enclosed welding schedule is tentative and for reference only. The applicable welding schedules will be issued during erection of work at site.**
- 14.20.31** Attachment welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., both for regular measurements and performance testing to be provided on boiler / its auxiliaries or pipelines covered with in scope of this tender, will also be the responsibility of the contractor and the same will be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be contractor's responsibility even if, (a) Product group (PG)/Shipping List under which these items are released are not covered in the scope of this tender, (b) Items are supplied by an agency other than BHEL if they are integral to the scope envisaged under this package. Payment will be regulated as per the agreed terms and conditions.
- 14.20.32** The contractor shall fabricate piping, install lube oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lube oil system, carry out the pressure test of oil coolers etc.,
- 14.20.33** All the tubes and pipes shall be cleaned and blown with compressed air and shown to the Engineer before lifting. Sponge ball test shall be carried out for all tubes before erecting the

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same. Bigger size pipes should be cleaned with flexible wire brush, wherever necessary. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.

- 14.20.34** It is the responsibility of the contractor to do the alignment, checking, etc., if necessary, repeatedly to satisfy BHEL Engineer / Customer Engineers with all the necessary tools and tackles manpower, etc., without any extra cost. The alignment will be complete only when jointly certified so, by the BHEL Engineer & Customer. Also, the contractor should ensure that the alignment is not disturbed afterwards.
- 14.20.35** Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before and after installation.
- 14.20.36** Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be assembled and erected by contractor. However, the contractor shall be paid for this work on accepted tonnage rate for erection of structures (Rate schedule identifier - 1A). The steel materials required for these works shall be supplied by BHEL free of cost and the contractor will have to install them to suit the requirement. Works of major nature not covered under this clause.
- 14.20.37 NO FINS CUTTING IS PERMITTED BY GAS CUTTING; ONLY GRINDING/ CUTTING WHEEL SHALL BE PERMITTED TO CUT THE FINS.**
- 14.20.38** Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.
- 14.20.39** Certain extra lengths of various tubes/pipes and fabricated ducts are provided as erection allowance and the same have to be cut/adjusted to suit the site conditions and layouts or certain small lengths may have to be added for adjustments to suit the site conditions. For any mismatch while matching the joints in tubes, the cutting, adjusting, re welding, addition spool pieces should be done by the contractor to match site conditions without any extra payment.
- 14.20.40** Assistance for calibrating / testing the power cylinders / valves, gauges, instruments, etc. and setting to actuators coming under various groups shall be provided by contractor within the quoted rates.
- 14.20.41** Skin casing sheet for covering the boiler roof panels, and other areas will be supplied as fabricated items. Any cutting and re-fabrication to suit the site conditions shall be carried out within the quoted rates.

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14.20.42 Heavy component lifting:

- i. Before lifting the heavy components like header, panels, burner assemblies, down comer pipes etc. soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch. The end caps provided at shop for various stubs are to be removed during final fit up only.
- ii. While Lifting the headers, lifting lugs or shell portion of the headers only to be used. The temporary supports to be removed prior to hydraulic test. While erecting the temporary supports, care should be taken so that they do not affect the erection of permanent supports. Tack welding of suspension rods with bearing plates to be done after final adjustment. Details for welding of bearing plates can be referred in the drawings/check list.
- iii. Erection of various components is taken up from top to bottom. Planning has to be done every month in consultation with the engineer. Pre-assembly of seal boxes for the peep hole openings, pressure tapping, soot blowers etc. can be done on the ground before erection, if feasible. The burner blocks are to be erected in convenient position before closing the furnace with panels. For panel to panel erection and welding panels erection attachments are supplied by units. Furnace alignment with respect to boiler /furnace axis is very vital and important. The alignment is to be achieved. Details to be checked with engineer.
- iv. Before erecting the valves and other mountings, check for the tag for correct rating with valve schedule. Ensure correct flow direction. Ensure easy accessibility for operation and maintenance of valves.
- v. Ensure removal of drains plugs provided in the silencers, the gap between exhaust pipe and roof is sealed properly.
- vi. DWLGs to be erected as per drawing. Joint protocol to be made for its correct erection with supports.
- vii. Other tapping points meant for monitoring the level should be erected and protocol is to be made. Maximum use of the pads and lugs welded on the steam components/drum to be used for giving supports.
- viii. All the drain lines should have sufficient slope towards drain. Provide expansion loops in all the vents and drains as per the drawings.

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- ix. The necessary connection to the wind box is to be completed in all respects as per drawing. If any drain holes are envisaged, the same to be provided. No pipe line supports should be taken from the buck stays without getting the approval from engineer.
- x. Sagging of roof tubes results in condensate stagnation during shut down. Hence ensure that radiant roof and back pass roof tubes are erected without sagging.
- xi. Total boiler is to be examined in all levels for free expansion. All the arrestors are to be removed. Expansion indicators are to be erected in various levels as per drawing / instruction of engineer.
- xii. Voids are to be closed suitably to retain refractory in position and to achieve the gas tightness

14.20.43 Erection of Boiler structures and points to be taken care of for achieving verticality of Boiler columns.

- a. The column pieces are pre-assembled and site match marks to be provided.
- b. Pre-assembly checks to detect and deviations in the columns like length, camber sweep, twist etc.
- c. Checking of foundations for its levels distance, diagonal, distance etc.
- d. Proper tightening of the foundation bolts.
- e. Erection of columns tier by tier and box by box. Grouting to be done immediately after 1st tier erection.
- f. Ensuring the availability of guy ropes, etc. during column erection and removal of guy ropes after ensuring the verticality of columns.
- g. Using calibrated theodolite for verticality measurement of columns.
- h. Tightening of HSFG bolts to be done by turn of nut method only after ensuring the verticality of the columns.
- i. Measuring adjacent diagonals of the ceiling girders after its erection.
- j. Ensuring the verticality of the columns before and after the Boiler Drum erection.

14.20.44 The work on various piping systems will include cutting to required length, edge preparation, laying, fixing & welding of the pipes / elbows / fittings / valves etc. in the pipeline, fixing & adjustment of supports / anchors / shock absorbers and carrying out all other activities / work to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineers instructions and / or as per approved drawings / documents.

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- 14.20.45** Tubes or pipes wherever deemed convenient, will be sent in random lengths. These shall be cut and edge prepared to suit the site conditions and the layouts. Fittings like bends tees, elbows, reducers, flanges etc. will be supplied as loose items. However, bends of tube size up to Nb 65 mm will have to be formed at site as incidental to work.
- 14.20.46** All drains / vents /relief / escape / safety valve exhaust piping etc. to various tanks / sewage / drain canal / flash box / sump / atmosphere etc. from the stubs on the piping and equipments are covered in the scope of work.
- 14.20.47** Connection (either flanged / bolted or welded) of piping to the terminal points / equipments etc. is in the scope of work even though such terminal point / equipment may not form part of this work.
- 14.20.48** All NDE including radiography/UT with recording/MPT/DPT of joints so made, post-weld-heattreatment if any, are also within the scope of work / specification. The terminal points work is inclusive of cutting of existing lines, if required, edge preparation, welding / blanking and hook up work.
- 14.20.49** It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipments. Necessary protocols have to be prepared for such fit-up along with BHEL / customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, are also within the scope of work / specification.
- 14.20.50** Mechanical freeness of valves has to be ensured prior to erection.
- 14.20.51** The above provisions shall be applicable mutatis – mutandis, to other piping systems e.g. oil piping of rotating M/cs, other piping etc.
- 14.20.52** All drain points shall be laid to the drain pit with necessary support as advised by BHEL
- 14.20.53** Fine fittings, boiler drain piping, oil system & other small bore piping have to be routed according to site conditions and hence shall be done only in position. As such, layout of small bore piping in boiler and oil system including bending, cutting edge preparation etc. shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL. There is a possibility of change in routing the above pipelines even after completion, to suit the site condition which shall have to be done contractor at no extra cost. On completion of piping erection contractor should submit 'AS-BUILT' drawings.

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- 14.20.54** The air heater baskets have to be thoroughly cleaned by compressed air and preservative to be spread as part of responsibility contractor within the quoted rates.
- 14.20.55** The fans shall be checked for blade clearance and other vital tolerances. The Flow control devices in fans like IGV/Damper units shall be serviced.
- 14.20.56** Necessary assistance for balancing of equipment during trial run shall be provided by the contractor.
- 14.20.57** Vital clearance of mill should be checked at site and adjusted if required.
- 14.20.58** The HT motor bearings shall be blue matched at site and checked for bearing clearance. Scrapping of bearing housing, if required shall be carried out by the contractor. No extra claim for blue matching of any two surfaces will be entertained. The HT motors will be checked for air gap and adjustment of stator / rotor to magnetic centre shall be carried out as part of erection.
- 14.20.59** The actuators / motors of valves may be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions BHEL Engineer including placement on foundation.
- 14.21 MAIN SUPPORTING STRUCTURES, EXTERNAL STRUCTURES, ELEVATOR STRUCTURES, STAIRWAYS, GALLERIES & PLATFORMS & HANDLING ARRANGEMENT**
- 14.21.1** In some cases, the structural material will be supplied in random lengths, which have to be fabricated to suit the requirement as incidental to work. Also, it may sometimes be necessary to remove some of the erected members to facilitate erection of bigger/ pre-assembled equipments. In such cases, the removal and re-erection of such members as agreed by the BHEL Engineer, will have to be done by the Contractor as incidental to work.
- 14.21.2** Contractor shall arrange materials required for temporary cat ladders & working platforms during erection of columns, platforms and other structural components. Such arrangements shall, as far as possible, be only of clamping & bolting type, as welding on columns etc will not be permitted. After the completion of work these shall be removed.
- 14.21.3** All the hand rails and toe guards shall be provided as per drawings and site requirement. hand rails supplied in running lengths shall be suitably cut, edge prepared and welded. Also, hand rails/ guards may have to be provided from the safety point of view in certain places though not indicated in the erection drawings. The weld joints of hand rails shall be ground smooth to flush finish.

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- 14.21.4** Electro-forged floor grills will be supplied for this project. These may have to be cut to suit requirement. Cutting shall be done only by mechanical cutters only **and not by gas cutting**.
- 14.21.5** Fixing of floor grills shall be done by self-tapping screws **and not by weldable studs**. Special purpose electrically operated hand tools are available in the market for this, which drills, taps and fixes the screws in a single operation. **Supply of necessary self-drilling-cum-tapping screws and fixing clips are in contractor scope**. Contractor shall deploy the **drilling cum fixing machine** required for this purpose as a regular scope of work.
- 14.21.6** The Contractor shall also install additional platforms of permanent nature for approaching different equipment as per the site requirement and to meet O&M requirements, though these may not be indicated in the erection drawings. Materials required for such platforms will be supplied by BHEL in random sizes on free issue basis. These have to be fabricated to suit the requirement. Payment only for erected weight as certified by BHEL engineer shall be made at the rate applicable for structures. No payment is envisaged for fabrication of such structures.
- 14.21.7** Girder may be supplied in multiple pieces. The same will have to be assembled, welded and NDE & PWHT(SR)done on ground prior to their erection in position.

14.22 OTHER PRODUCTS AND SYSTEMS AND COMMON REQUIREMENTS

- a) The **ducting from Boiler to Chimney inlet**, with associated dampers/gates and their drives, supports and suspensions etc for these systems. The ducting covered under this scope of work is flue gas ducting from boiler to chimney inlet, hot and cold secondary air ducting from FD fans outlet to wind box, hot and cold primary air ducting from PA fans to mills, flowmeters, dampers/gates and their drives, supports and suspensions etc. for these systems.
- b) Ducts / expansion bellows (metallic & non-metallic) are normally supplied in loose components / segments and these are to be assembled and welded/ jointed at site before erection. The fabric portion of non-metallic expansion joints (NMEJ) namely bolster, fabric belt and canopy shall be installed by Contractor under supervision/guidance of equipment supplier/BHEL for the first few cases. Contractor shall ensure that all subsequent NMEJ are assembled with due care and proper procedure.
- c) Suspensions for ducting will be supplied in running lengths, which shall be cut to size and adjusted as required. Ducts / expansion bellows are dispatched to site in loose walls plates / pieces and these are to be assembled and welded at site along with stiffeners etc., before erection within the finally accepted rates. All joints connecting duct expansion piece and dampers shall be seal welded on inside as well as on outside.

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- d) Ducts/ expansion bellows (metallic & non-metallic) are normally supplied in loose wall plates/ segments and these are to be assembled and welded at site before erection. Correction of ovalities/ distortion of ducts, expansion bellows etc occurred during transportation/ handling are to be carried before erection as part of work. Erection of mechanical components of non-metallic joints is included in the scope of work.
- e) All joints connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be made leak proof and tested as per technical instruction / requirement.
- f) All welded joints should be painted with anticorrosive paint / primer immediately after completion of all work. Necessary paints and other consumables for the above work are in the scope of the Contractor.
- g) Hangers and suspensions, support steels for ducts and other equipments, piping etc will be supplied in running/random lengths/ sizes, which shall be cut to suitable sizes and adjusted as required.
- h) Touch up and preservative painting of all components issued to and/or erected by Contractor shall form part of scope of work. The Contractor shall arrange all paints, primer and consumables, T&P and facilities.
- i) Agency shall supply self-tapping screw for entire scope of work of different sizes as required at site.
- j) Arranging paints, primers for painting (as applicable) as per tender specification for all erected materials is in the scope of contractor.

14.23 ROTATING MACHINES: Certain rotating machinery after initial runs and commissioning of the equipment have to be hot aligned as per the instructions of BHEL engineer. Cleaning fans, ducting etc., free of extraneous steel, scaffolding materials electrodes, all foreign materials etc., before trial run of rotating machinery, and at various stages of pre-commissioning activities as per BHEL engineer's instruction, is within the scope of work.

14.23.1 Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with kerosene or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will be supplied free of cost by BHEL. However, recommended grease to be arranged by the contractor.

14.23.2 After initial trial of rotating equipment, control and power cabling for motors and other equipment / instrumentation shall have to be disconnected for checking alignment and re-setting / re-alignment / hot alignment. Contractor shall have to arrange for disconnecting control and power cabling as per BHEL engineer's instructions and clearance and reconnect the

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control and power cabling after realignment. Before final alignment of rotating equipment, if require associated piping (like ACW & DMCW piping) may also to be disconnected and again to be assembled after correction of any piping pull. Quote tonnage rate shall be inclusive of the above.

- 14.23.3** Packer plates supplied may have to be machined to the correct dimensions. It may also be necessary to blue match the same with each other/ with equipment / with foundations as per BHEL instructions
- 14.23.4** Trial run of the drives in un-coupled state and then coupled with equipment has to be done after necessary alignment.
- 14.23.5** Contractor shall arrange changing of preservative oil in the gearboxes, journal and other bearing assemblies of rotating equipment when in storage areas or after erection of equipment as the case may be as per the instructions of BHEL engineer. Necessary lubricants / oil will be supplied by BHEL and the same will be drawn by contractor from BHEL / Customer 's stores and transporting to site. No additional payment will be made for such works even though supply of lube oil might have been made under regular dispatch-able unit (DU) number against product group main assembly (PGMA) and appearing in the shipping list. Prior to the commissioning of the equipment, oil should be drained and collected in drums provided by BHEL and returned to BHEL / Customer 's stores.
- 14.23.6** The fans, mills and other rotating machines shall be checked for clearances and other vital tolerances.
- 14.23.7** Non-specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.
- 14.23.8** Actuators / drives of dampers, gates, powered vanes etc. may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.
- 14.23.9** All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary by dismantling and refitting before erection. If, in the opinion of Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.

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- 14.23.10** All the shafts of rotating equipment shall be properly aligned to those of the matching equipment within design tolerances. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.
- 14.23.11** All the motors and equipment shall be suitably doweled after alignment of shafts with taper / parallel machined dowels as per the direction of the Engineer. Dowel pins required are to be machined by the contractor at his own cost. However, the materials for dowel pins shall be issued by BHEL free of cost.
- 14.23.12** Certain instruments like pressure gauges, pressure transmitters, temperature gauges, flow switches and indicators, etc., are received in assembled condition as integral part of equipment. Contractor shall be responsible for safe receipt, installation and custody of these instruments supplied mounted on skids / equipment. The calibration of skid / equipment mounted instruments shall be arranged by BHEL through other agency engaged for C&I. Contractor will be informed by BHEL engineer about the details of C&I agency. The contractor shall coordinate with the C&I agency for removal, calibration and re-installation of the instruments. Though C&I agency will remove and reinstall the instruments after calibration, the contractor for this package will maintain the list of all the instruments removed & reinstalled. Instruments prior to removal and after reinstallation shall be considered in custody of the contractor for this package.
- 14.23.13** All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR value, before they are energized. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.
- 14.23.14** The contractor shall completely erect and test all the piping systems, covered in the specification including sampling lines up to and including sample coolers, hangers & supports, valves and accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning and painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged, screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings.
- 14.23.15** The contractor shall ensure lowering of pipes in position with adequate precautions as to avoid any damage to either material or men. Only the anchoring points earmarked for the purpose of lowering the pipes are to be used.

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14.23.16 The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition. Checking of alignment and recoupling of the motor to the driven equipment as per instructions of BHEL engineer and to their satisfaction. All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. Vendor shall all necessary MMDs including the motorized insulation testers for the above test.

14.23.17 The contractor shall fabricate pipe, special bends etc., threading and welding as required for installing lube oil system and carry out the acid cleaning of the fabricated piping. The contractor shall also service the lube oil system, carrying out the hydraulic test of oil coolers etc.

14.23.18 Contractor shall carry out kerosene testing of all bearing housings of various rotating equipment like pumps, fans etc., as per BHEL engineer's instructions. Performance of hydro test of oil coolers of rotating machines and hydro test of other equipment as per BHEL engineer's instructions is included in the scope of work. Forced lube oil system of motors or rotating equipment form parts of the work under this specification.

14.24 Piping:

14.24.1 All Piping (IBR Piping supplied by BHEL PE&SD) shall be supplied as per the following philosophy:

- i. Pipes will be supplied IN PRE-FAB CONDITION in length of 3 to 7 metres.
- ii. All Stubs (Pressure tap-offs, Temp tap-offs, Vent & Drain tap-offs and all pipe to pipe tees & stubs) will be supplied loose
- iii. All Fittings will be supplied loose.
- iv. All Flanges, Gaskets & Stud Nuts will be supplied loose.
- v. All Valves will be supplied loose.
- vi. Even though the piping is supplied in pre-fab condition ,if required, activities of Cutting of Pipes , Spool preparation, Edge preparations, Drilling etc., welding of Branches & Stubs and the final field welding of Pipe Spools & Fittings and all other erection activities(viz.Flanging, valve erection) as required by respective Piping Isometric and Piping Layout drawings shall be carried out by contractor.

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- 14.24.2** All Piping (NON-IBR Piping supplied by BHEL PE&SD) shall be supplied as per the following philosophy:
- i. Pipes will be supplied IN LOOSE CONDITION in length of 3 to 7 metres.
 - ii. All Stubs (Pressure tap-offs, Temp tap-offs, Vent & Drain tap-offs and all pipe to pipe tees & stubs) will be supplied loose.
 - iii. All Fittings will be supplied loose
 - iv. All Flanges, Gaskets & Stud Nuts will be supplied loose.
 - v. All Valves will be supplied loose.
 - vi. Complete activities of Cutting of Pipes, Spool preparation, Edge preparations, Welding of Branches & Stubs and the final field welding of Pipe Spools & Fittings and all other erection activities(viz.Flanging, valve erection) as required by respective Piping Isometric and Piping Layout drawings shall be carried out at site by contractor within the quoted rates.
- 14.24.3** All welding Electrodes and consumables required for welding of Piping in the scope shall be arranged by contractor within the quoted rates.
- 14.24.4** Pipe shoe (i.e saddles & trunnion), saddle fabrication and welding of pipe shoe to the Main Pipe including welding of shoe pad is in the scope of Erection Agency. Necessary plates, pipes shall be supplied loose by BHEL.
- 14.24.5** Fabrication (i.e including surface preparation and painting) and Installation of Auxiliary Structure for Pipe Supports is in the scope of contractor. Necessary plates, pipes shall be supplied loose by BHEL.
- 14.24.6** Spring Hangers and Rigid Hangers will be supplied in assemblies / part-assemblies
- 14.24.7** Preparation of all the documentation for Quality & Inspection, testing ,AS-built drawings etc as suggested by the Site engineer shall be in the scope of contractor
- 14.24.8** Pipes welding or flange joint with Pump case / volute shall be in the scope of work and it is to be done as per instruction of BHEL.
- 14.24.9** In certain cases, motor alignment shall be taken only after completion of system pipe work supports. When mounted, the pump should accommodate movement in the pipe without

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imposing excessive loads on the casing and branches. Sufficient clearance should be available beneath the motor to facilitate removal during maintenance.

- 14.24.10** While erecting the safety valves, check for the set pressure and type. The lever arrangement, blow down ring approach for floating should be ensured. Drip pan drains with proper slope to be given to safe location. Check the drain/overflow/exhaust pipe arrangement for expansion and proper guides to be given. Ensure anchor points for the above pipes.
- 14.24.11** In some cases, structural material, pipes, ducts, suspension for pipes/ducts, silencer supports, roof cladding structure will be supplied in running lengths which shall be cut to size and adjusted as required. All joints connecting ducts, expansion pieces shall be seal welded on inside and as well outside. Also, it may sometime become necessary to remove any of the erected members to facilitate erection of bigger / pre-assembled equipment. In such as the removal and re-erection of such members as per instruction of the BHEL Engineer, will have to be carried out by the contractor without any extra payment.
- 14.24.12** The pipes, tubes and equipments shall be checked for clearances and other vital tolerances.
- 14.24.13** Whenever required the contractor shall arrange for pre-qualification of process task Performers.
- 14.24.14** Instrument tapping for all systems and associated equipment's to be welded/fitted by the contractor with in the quoted price.
- 14.24.15** The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.
- 14.24.16** The contractor shall be responsible for correct orientation of all valves so that seats, stems and hand wheels will be in desired location. It is the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.
- 14.24.17** Suspension for piping, ducting etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required. The adjustment of all hangers & supports erected in both cold & hot conditions for maintaining the proper slopes towards the drain pots and application of cold pull in the piping wherever required is also included in the scope of the contractor.
- 14.24.18** Contractor shall install piping in such a way that no excessive or destructive expansion forces exists in either the cold condition or under conditions of maximum temperature and pressure. All bends, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion

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joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.

- 14.24.19** The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Other means shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the pipe and building structure.
- 14.24.20** All the valves, including motorized valves, flap valves, dampers, actuators, etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates.
- 14.24.21** The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The methods used the tools and the equipment deployed shall be subject to the approval of Engineer. The competent technicians shall carry out the bolting work.
- 14.24.22** The contractor shall prepare as built piping drawing & submit to BHEL Engineer for approval & verification of material used.
- 14.24.23** Brief list of equipment / sub-assemblies to be erected by the contractor & approximate weight and size of individual heavy components are given under the (Bill of quantity) and is meant for giving general idea to the tender only about magnitude of the work involved. The components are sent in parts for convenient transportation. They are to be cleaned, assembled in stage by stage, fastened / welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.
- 14.24.24** The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.
- 14.24.25** All fittings like elbows, tees, reducers, weld neck flanges, inserts etc., shall be matched with pipes for welding which may require re-edge preparation, grinding etc., No extra cost shall be paid for this.
- 14.24.26** Contractor shall remove the bridge, stopper etc., by gouging/ grinding and not by hammering. Any burrs left on the equipments / piping, after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.

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- 14.24.27** All erectable gaskets, fasteners and other hardware shall be supplied by BHEL free of cost, if any, except those which are specifically included in the scope of contractor.
- 14.24.28** The piping, valves etc will be provided by BHEL free of cost. However, dismantling of the piping, valve etc, its cleaning and edge preparation, for its reuse, if required, will have to be done by the contractor without any extra claim.
- 14.24.29** All pipes and fittings like tees, reducers, elbows, manholes, mitre bends, flanges etc shall be supplied by BHEL in fabricated condition. However, if required, the contractor shall fabricate mitre bends, tees, reducer incidental to work as per site requirement as per instruction of BHEL Engineer. Raw material for such fabrication shall be provided by BHEL free of cost.
- 14.24.30** Erection & welding, of all valves, misc. fittings required to complete the system but not specifically mentioned in relevant chapter of tender is covered in the scope of contract and payment will be made as per applicable piping item of mechanical price schedule. All such materials will be supplied by BHEL. The erection activity of valve also includes cleaning, servicing and final painting of valves. All counter flanges, bolts, nuts, washer, gaskets etc shall be supplied by BHEL loose (free issue).
- 14.24.31** Any other connected material supply which is not covered in BOM but required to complete the system shall be erected by the vendor and payment in this case shall be made as per applicable item rate.
- 14.24.32** Bidders to exercise utmost care while doing execution and commissioning work for this package so that no damage is caused to the existing plant at site. Any such damage will be back charged to bidder.
- 14.24.33** Protection of pipeline against floatation during the contract period shall be the responsibility of the contractors. Should any section of the pipe line float due to their negligence etc. the entire cost of laying it again to the correct line and level shall be to the contractor's account.

14.25 PLATFORMS, CROSSOVERS & CANOPIES

Platforms, ladders, crossovers and canopies shall also be provided at places where it has not been shown in drawings but if felt necessary by site engineer.

Contractor has to fabricate and install canopies for all outdoor pumps and motors, actuators, lube oil units, control valves and at places as instructed by BHEL Engineer etc. Platforms, ladders, crossovers and canopies shall have to be fabricated from raw materials/ scrap material supplied

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by BHEL and erected by contractor as per instruction of BHEL and shall be paid as per accepted tonnage rate for "STRUCTURES" i.e, Rate schedule identifier - 1A.

14.26 Fin /attachment/scallop plates & associated items Cutting, restoration of Tubes, panels of Boiler

During course of erection in boiler pressure parts fin/attachment/scallop plates & associated items cutting to align difference tubes, panels will be required in boilers and this type of activity will be treated as normal scope of work without any commercial implication on BHEL. Even activity may have to be repeated as per job/Site requirement and for this also no extra work payment will be given to vendors as this type of job will be treated as normal scope of work.

14.27 Buck Stay Checking & Rectification

Vendor has to carry out inspection, rectification, Cleaning of buck stays along with adjoin areas during erection, commissioning, Operation, trial run has to be done from time to time. Backstay corner link correction after initial erection has to be done and if changes noticed during operation of Unit has to be rectified. For this vendor has to arrange manpower and resources without any extra cost implication on BHEL treating it as normal scope of work. Any surrounding work in connection with inspection, rectification, cleaning of the same will be treated as normal scope of work.

14.28 Inspection, cleaning of pressure parts, Furnace, Pent House, Burners, ducts/and subsequent restoration, rectification, normalization.

During erection, pre-commissioning, commissioning, operation, Stabilisation period trial Run - Inspection, cleaning of pressure parts, Furnace, Burners, Pent House, ducts, hoppers, and allied areas are to be carried out. For this vendor has to arrange manpower, T&P, other resources for inspection, cleaning of ash /oil shoots, coal rejects /clinkers and other foreign materials, associated items from boiler & surrounding areas. For this installation of sky climbers, scaffoldings and other requirement/resources/consumables as required are to be arranged by vendors for inspection, cleaning, testing followed by restoration/rectification/normalization. Vendor has to repeat this type of activity no. of times till handing over Unit to customer without any cost implication on BHEL treating these types of jobs as normal cope of vendor's work.

14.29 RECONCILIATION OF MATERIAL ISSUED BY BHEL (FREE OF COST):

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- 14.29.1** All materials as specified in relevant BOQ shall be issued free of cost by BHEL for use in the work covered in this contract from BHEL stores/storage yard. The contractor shall collect these materials from BHEL stores/storage yard at specified places at his own cost and store the same at his stores as per standard norms. Materials issued will be used only for construction of permanent works.
- 14.29.2** The contractor shall in no case be entitled for any compensation (other than explicitly mentioned in the tender conditions) on account of any delay in supply or non-supply thereof for all or any such materials. However, in case of non-availability of any specific section(s) which delays the completion of work, such cases shall be recorded separately in monthly planning format (F 14) and shall be considered for time extension of contract in line with GCC.
- 14.29.3** The contractor shall maintain proper store account for all the BHEL issued materials and shall give **Three (03) copies of monthly-computerized reconciliation statement** of such account showing total receipt, consumption and balance at site to the BHEL. BHEL Engineer's certification for the reconciliation of steel shall be final. The detailed reconciliation (dia. Wise or Wt. wise or as required) shall be done **at least once in three months (03) or before submission of final bill which comes earlier.**
- 14.29.4** Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day-to-day update of materials, issued to contractor, accounting for surplus/scrap material returned etc. These functions shall also be carried out through computerized system utilizing suitable software. Contractor shall engage experienced software personnel to associate on dedicated basis for efficient discharge of the same in time.
- 14.29.5** BHEL issued materials, shall not be under any circumstances whatsoever, and shall be taken out of the project site unless otherwise permitted by BHEL for outside job.

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The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

15.0 WELDING, HEAT TREATMENT & RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

- 15.1** The pressure parts, equipments and piping shall be erected in conformity with the provisions of Indian Boiler Regulations and as may be directed, as per other standard / specification in practice in BHEL. The method of welding (viz) ARC, TIG or other methods as indicated in the detailed drawing or as instructed by BHEL Engineer shall be followed. BHEL Engineer will have the option to change the method to suit site conditions.
- 15.2** Welding of pressure parts, high tensile structural steel, Piping shall be done by certified high-pressure welders who possess valid certificate and who are approved by BHEL Engineer
- 15.3** All welders including tack welders, structural and high-pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification and performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.
- 15.4** Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expense. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the quality engineer.
- 15.5** The contractor shall carry out the root run welding of all PP, HP / LP piping, valves by TIG welding method only (or as specified in applicable procedure/manual issued by BHEL during execution). The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless-steel joints, the contractor shall before and during welding have to purge the pipes with inert gas.
- 15.6** All expenses for testing of contractor's welders including destructive and Non- destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost.

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- 15.7 Only BHEL approved electrodes and filler wire will be used.** All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number / batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved / accredited test house traceable to National / International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same. Separate ovens shall be used for baking and holding.
- 15.8** All butt / fillet welds shall be subject to Non-Destructive testing as per the Drawing/Procedures/Welding Schedules/Documents at no additional cost.
- 15.9** Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL Engineer. The quantum of radiographic inspection shall be as per provision of IBR / BHEL's Erection Welding Schedule (EWS). They may, however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer /boiler inspecting authority.
- 15.10** All RT (X-ray / gamma ray) films of weld joints shall be preserved properly and be handed over to BHEL / IBR authorities and requisite clearances shall be obtained by Contractor. Contractor shall be fully equipped with radiography equipment, films, chemicals and other dark room facility. There must be a number of radio-graphic personnel with sufficient experience and certified by BARC for field radiographic inspection. Further, contractor must follow strictly the safety rules laid down by BARC, from time to time. For preliminary evaluation of radiographic films, contractor must deploy competent personnel having at least ASNT / ISNT Level-II certification. It should also ensure compliance of all statutory requirement with respect to health hazard in handling the radiographic sources.
- 15.11** The field welded joints shall be subject to dye-penetrant / other non-destructive examination as specified in the respective engineering documents / as instructed by BHEL.
- 15.12** **Non-Destructive Testing such as UT, MPI, hardness test, SR etc. wherever applicable shall be in Contractor scope. In case of any delay in execution of NDT, BHEL shall be entitled to execute the work at cost recovery basis.**

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- 15.13** The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. Contractor has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final.
- 15.14** The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer. Prepared edges to be preserved / applied with weldable primer.
- 15.15** All welds shall be painted with anticorrosive red oxide paint once radiography and stress relieving works are over. Necessary consumables and scaffolding etc including paints shall be provided by contractor at his own cost.
- 15.16** Pre-heating and other NDT (AS APPPLICABLE) tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are parts of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer within the quoted rate. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.
- 15.17** Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor shall arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress-relieving operations. The contractor should take a note of the following,
- a) Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
 - b) All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.

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- c) The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of SR operations.

- 15.18** The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by contractor within the quoted rate.
- 15.19** In case the joint is not repairable, the same shall be cut, re-welded and re-radio graphed at contractor's cost.
- 15.20** Heat treatment may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary arrangements including labour, supervisors/ Engineer required the work as per directions of BHEL.
- 15.21** The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of Pressure Parts / piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules.
- 15.22** The contractor shall deploy required number of H.P. welders to carry out the H.P. weld joints. The welding works should not be held up due to shortage / want of I.B.R./H.P. welders.
- 15.23** All welded joints shall be subjected to acceptance by BHEL Engineer.
- 15.24** The technical particulars, specifications and other general details of work shall be in accordance with BHEL welding, Heat treatment and NDE manuals or equivalent as decided by BHEL Engineer.
- 15.25** The field joints preheating and post weld heat treatment shall be done as per BHEL procedure and manuals.
- 15.26** The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of Engineer. The decision of Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor.
- 15.27** The contractor shall also be equipped for carrying out NDT like liquid penetrant inspection, magnetic particle inspection, etc. as and when required in the interest of work within the quoted rates.
- 15.28** For carrying out ultrasonic testing of welded joints of large size tubes and pipes, it will be necessary to prepare the surface by grinding to a smooth finish and contour as desired by BHEL

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Engineer. The contractor's scope of work includes such preparation and no extra charges are payable for this.

- 15.29** It may also become necessary to adopt inter layer MPT / UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work.
- 15.30** The welded surface irrespective of place of welding shall be cleaned of slag and painted at the centre with primer paint to prevent corrosion at no extra cost towards this.
- 15.31** All welders shall be tested and approved by BHEL Engineer before they are actually engaged on work though they may possess the required certificate. BHEL reserves the right to reject any welders without assigning any reason. The welder Identification code as approved by the BHEL Engineer shall be stamped by the welder on each joint done by them. The contractor will be responsible for the periodic renewal, retesting of the welders as demanded by BHEL.
- 15.32** BHEL Engineer is entitled to stop any Welder from the work if his work is unsatisfactory for any technical reasons or there is a high percentage of rejection of joints welded by him, which in opinion of the BHEL Engineer will adversely affect the quality of the welding though the Welders, has earlier passed the tests prescribed by BHEL Engineers. The welders having passed qualification tests do not relieve the contractor of a contractual obligation to check the welder's performance.
- 15.33** All charges towards testing of Welders for destructive and non-destructive test, testing and approval of welders for engaging in the erection work shall be borne by the contractor.
- 15.34** The welding process, weld joint details, joint configuration and material specification may change to suit the design requirements. The contractors quoted rates shall be inclusive of each contingency. All welds involved in the erection of temporary pipe lines for hydraulic test, chemical cleaning, steam blowing etc. to be carried out within the quoted rates. The number of joints to be welded as mentioned in the welding schedule consists of butt welds. All other welds viz. attachment welds on pressure parts/non-pressure parts, fillet welds in non-pressure parts welding in the boiler and Rotating Machines has to be carried out by the bidder within quoted rates.
- 15.35** Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the Contractor in accordance with BHEL engineer's instructions. Where the electric resistance heating method is adopted, Contractor shall make all arrangement including heating equipment with automatic recording devices, all heating elements, thermocouples and attachment units, graph sheets, thermal chinks, & insulating

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materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

15.36 List of Penalties on Violations on Quality Provisions

Sr no	Violation	Penalty in Rs
1	Mother oven not working	500 per day & ban on its use
2	Slackness in control over baking of welding electrodes (Doc.)	200 per incident
3	Holding oven not working/plugged in	500 per incident/day & ban its use
4	Portable oven not working/Plugged in	100 per incident & welder to be sent home
5	Use of cold electrodes (Except E6013)	1000 per incident & welder to be sent home
6	Unauthorized welder on job	5000 per incident & welder to be sent home
7	Delay in NDT Agency deployment w.r.t jointly agreed Ere. Prog	500 per incident
8	Failure to monitor Welder's Performance (SR, Penalty Joint etc.)	5000 per week
9	Improper acts w.r.t maintain SR Charts	10000 per incident
10	Site Welding/QLY Engineer not deployed w.r.t mutually agreed Ere. Plan	500 per day
11	Delay in (SR, UT) report submission & customer acceptance Log sheets esp. for Billed qty. from dt. of Billing (Vendor)	10,000 per week

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12	Lack of safe approach Scaffolds/Platform for inspection & non-availability of calibrated MMDs –	1000 per incident.
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15.36.1 RECEIPT INSPECTION OF WELDING ELECTRODES / FILLER WIRES

1. All electrodes / filler wires received at site stores shall be segregated for type and size of electrode.
2. Ensure that electrode packets received are free from physical damage.
3. Where electrodes are damaged, the same shall be removed from use.
4. Only electrodes identified in the “Rationalized List of Electrodes” are to be accepted.
5. Where filler metals are supplied by manufacturing unit, inspect for damages, if any.
6. Ensure availability of relevant test certificates. Refer tables of chemical compositions and mechanical properties for acceptance.
7. Endorse acceptance / rejection on the test certificate.

15.36.2 STORAGE & IDENTIFICATION OF WELDING ELECTRODES / FILLER WIRES

1. **Scope**
 - 1.1 This procedure is applicable for storage of welding electrodes / filler wires used at sites.
2. **Procedure:**
 - 2.1 Only materials accepted (based on receipt inspection) shall be taken into account for storage.
 - 2.2 Storage Facility:
 - 2.2.1 The storage facility shall be identified.
 - 2.2.2 Access shall be restricted to authorized personnel.
 - 2.2.3 The storage area shall be clean and dry.

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2.2.4 Steel racks may be used for storage.

2.2.5 Avoid storing wood inside the storage room.

2.2.6 Maintain the temperature of the storage facility above the ambient temperature.

2.2.7 This can be achieved by the use of appropriate heating arrangement .

2.3 The electrodes / filler wire shall be segregated and identified for

1. Type of electrode e.g. E7018.

2. Size of electrode e.g. Dia 3.15 mm.

15.37 NDT and PWHT of Pressure part, integral piping, etc of all areas shall be guided by the site erection welding schedule.

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Chapter-XVI: HYDRAULIC TEST

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified)

- 16.1 The pressure testing for boiler / piping system shall be carried out as per IBR / Customer / customers' consultant specification / BHEL. Customers' consultant specification forms the part of this tender specification.
- 16.2 All pressure parts and piping systems shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall supply necessary labour and other services and make necessary arrangements to carry out the required tests as per the instructions and directions of the BHEL Engineers.
- 16.3 Soundness of the welds shall be tested hydraulically under the supervision of the BHEL Engineer and Customer, to the pressure indicated in the drawing. Prior to the test, the boiler / piping system shall be inspected by the BHEL Engineer to the extent necessary to ensure compliance with clearance for the test, which will be obtained by the contractor from the Engineer.
- 16.4 As far as the hydraulic pressure test is concerned, the same shall be conducted at various stages to the satisfaction of IBR inspectorate / BHEL / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost. The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for successful and reliable operation. These would include hydraulic test of piping, pre-boiler system detergent flushing/chemical cleaning, steam blowing, water washing etc. as instructed by BHEL.
- 16.5 Test records shall be made for pressure testing of above piping system. These records shall contain the following information:
 - a) Date of test
 - b) Identification of piping tested
 - c) Test fluid
 - d) Test pressure
 - e) Approval of the Engineer.
- 16.6 Contractor has to arrange required pumps with sufficient capacity for filling water in the tubes and pipes for conducting Hydraulic testing.

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Chapter-XVI: HYDRAULIC TEST

- 16.7 Hydraulic testing pumps for Boiler and Piping shall be in the scope of BHEL, in line with chapter IV & V above. Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 16.8 In certain places blanking has to be resorted prior to Hydraulic test and spool pieces have to be erected in place of control valves, orifices and other fittings and these spool pieces have to be subsequently replaced with the regular valves/ fittings by the contractor at no extra cost.
- 16.9 For conducting Hydro test / steam blowing internals of valves and NRVs are to be removed, Hydro Test devices are to be fixed and after Hydro Test the internals are to be re-assembled by the contractor as instructed by BHEL without any additional cost.
- 16.10 The contractor shall make all necessary arrangements including making of temporary closures / dummy on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost. Necessary blanks will be provided by BHEL.
- 16.11 The contractor shall see that the water shall not be allowed to accumulate in open trenches where work is in incomplete stage, precautionary works such as blank flanging the open ends of the pipe line and filling the pipe line with water etc. shall be taken as directed by the engineer. Such works shall be to the contractor's account and no separate payment will be made for the same.
- 16.12 The contractor shall carryout the required test on the pipelines such as Hydraulic Test of various piping systems, Ultrasonic Test for weld defects and finding thickness, Dye penetrant test, Magnetic particles test for Weld defects and materials defects etc. All facilities (manpower, materials, equipment, consumables etc.) including proper approaches wherever required shall be provided by the contractor for satisfactory conduction of above tests. Special equipment such as magnetic particle tester, ultrasonic test kit and engineers required for these tests shall be arranged by the contractor along with Qualified technician within finally accepted rates.
- 16.13 In general, Hydraulic testing of piping shall be performed after all eventual pipe branches have been completed and valves installed. Should it be required to hasten erection work, pressure tests may be performed by sections. For this scope of work, the erected pipe lines shall be hydraulically tested as per site requirement in segments. For conducting hydraulic test, both ends of pipe lines shall be blanked by welding of plates. Only one or two set of plates and structural materials for blanking required for one segment will be provided by BHEL free of charge. After completion of hydraulic test in one segment, the same plates are to be cut and

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Chapter-XVI: HYDRAULIC TEST

removed and utilized / welded on the other segment of the pipe lines, to carry out the hydraulic test for the respective segments. No separate plates for blanking for each segment will be provided. After completion of Hydraulic test, the required edge preparations shall be carried out on the end of pipe lines and to be welded with the respective pipe lines. In such cases joint connection shall be checked during a final and additional test, if required. The contractor shall note this aspect and quote accordingly.

- 16.14 During hydraulic test, the pipes being tested shall be isolated from the equipments to which they are connected.
- 16.15 Openings on piping for pressure / temperature impulse connections shall be fully closed during the test to prevent dust or foreign matter entering into the instrument piping inadvertently.
- 16.16 The following specifications shall also be completed with during hydrostatic test.
- a. Vent nozzles with valves shall be provided at the highest point of the runs, to eliminate air pockets. At the lowest point drain nozzles, with valves shall be provided to drain water from pipes. The nozzles and valves shall be of the same materials as the pipe.
 - b. The lowest part of the pipe shall always be filled first with water.
 - c. Pressure shall be slowly increased (without shocks) to the stipulated value and maintained as long as required to visually check all joints.
 - d. Following the control specified above the pressure shall be slowly decreased to the design pressure after which the pipe shall be subjected to the peening test, applying knocks every 150 mm approx. especially in the welded joint areas, with a 0.5 – 1.5 kg. Hammer (depending on the pipe wall thickness). The hammer used shall be a round headed one.
 - e. Following the peening test, the pressure shall be increased to the stipulated value and all welded joints shall be visually inspected.
 - f. Following these tests, the pipe shall be drained or pumped out to the other section to be hydro test using the drain out pump to be provided by Contractor and wherever necessary shall be flushed with air for all pipes.
 - g. The pressure test is considered satisfactory if no cracks, unjustified pressure reductions, leakages, seepages etc., appear.

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- h. Should defects be found, these shall be repaired in the same manner as these during radiographic examination. Hydraulic test shall be repeated after defects have been repaired.

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Chapter-XVII: Testing, Pre-Commissioning, Commissioning and Post Commissioning

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

17.0 TESTING, PRE – COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

- 17.1** The Contactor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would include **HT of pipelines, closed systems, tanks, vessels; Air leak test of Boiler, Ducts, hydraulic test of Boiler and MS Piping up to stop valve, and flow test, clean air flow test, assistance during chemical cleaning of power cycle piping and boiler, water washing, detergent cleaning, oil flushing of oil system, Steam blowing, Safety valve floating, full load operation, Trial/Initial Operation, etc.** as instructed by BHEL using contractors own consumables, labour and scaffoldings etc. Air leak test on pressure parts preliminary to hydraulic test by compressed air shall also be carried out to check and rectify the various leakage and defects etc. All the chemicals required for carrying out these activities will be supplied by BHEL free of cost.
- 17.2 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications though some of the tests / activities are not listed in these specifications.
- 17.3 After completion of erection of furnace, ducts and air heaters, a test shall be performed on the steam generator by the contractor to establish the tightness of the erected equipment from the outlet of Forced Draught (FD) fan through the steam generator up to stack.
- 17.4 The scope of pre-commissioning, commissioning and post commissioning activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning, steam blowing or any other tests as the case may be and will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the offsite disposal of effluents of the tests under the scope of this contract as per instruction of BHEL Engineer.
- 17.5 The contractor shall make all necessary arrangements including making of temporary closures on piping/ equipment for carrying out the hydro-static testing on piping equipment covered as per the scope at no additional cost. The contractor shall carryout the required test on the pipelines such as Hydraulic Test (as per IBR requirement/ instruction of BHEL), of piping systems as per the scope, Ultrasonic Test for weld defects and finding thickness, Dye penetrant test, Magnetic particles test for Weld defects and materials defects etc. All facilities (manpower, materials,

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equipment, consumables etc.) including proper approaches wherever required shall be provided by the contractor for satisfactory conduction of above tests. Special equipment such as magnetic particle tester, ultrasonic test kit and engineers required for these tests shall be arranged by the contractor along with qualified technician within finally accepted rates.

- All items / material required for conducting hydraulic test, alkali boil out, acid cleaning/Chemical cleaning, steam blowing etc., will be supplied by BHEL / its customer. However, servicing, dismantling and returning of the same to stores is the responsibility of the contractor who is erecting the equipment / piping. Broadly the work on temporary systems will be as under:
 - Erection of all temporary piping including valves, tanks, electrical control panel and cabling along with insulation and supports for steam blowing; chemical cleaning are to be carried out as part of work. Contractor will be responsible for their operation and any servicing required during the pre-commissioning activities. He will also service the equipment and handover the equipment to the other agency for further erection / commissioning activities. All the pumps, motors and electrical control panels/ switch gear, valves and actuators will be furnished to the contractor after due servicing.
 - Dismantling of the temporary equipment, piping and return the same to the BHEL stores as applicable is also included in the scope of work.

The above is only a broad breakup of the temporary works. The engineer at site will make final break up. His decision will be final and binding.

- 17.6 It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement. The required N2 will be provided by BHEL for boiler preservation if required.
- 17.7 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
- 17.8 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.

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- 17.9 During commissioning, opening / closing of valves, changing of gaskets, Re-alignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price /rates shall also include all such work.
- 17.10 All temporary supports shall be removed in such ways that pipe supports are not subjected to any sudden load. During hydraulic testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.
- 17.11 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.
- 17.12 Cleaning and servicing of all the filters / strainers, in the system shall be done by the contractor within the accepted price. All oils and greases to be filled in the main equipments as first fill and subsequent topping up's will be furnished by BHEL.
- 17.13 At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the BHEL Engineer and incorporate the same at no additional cost.
- 17.14 The valves, dampers, actuators etc. will have to be checked cleaned and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.
- 17.15 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable deaeration / venting / draining points with valves as per BHEL Engineer's instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL Contractor shall cut steel blanks from steel provided within quoted rate. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities / scars of cutting weld filled and ground as per BHEL Engineer's instructions. Seal welding of thermo-wells and blanks of Temperature Element are to be removed by grinding only after steam blowing.
- 17.16 All arrangement required for steam blowing including removal, and installation of steam blowing arrangements, temporary piping including steam blow off piping is included in the scope of work.

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- 17.17 The hydraulic testing of the equipment and piping, covered under this scope of work has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Before hydraulic test, all the hangers are to be locked by locking pin / plate or temporary support. After completion of Hydraulic test, these are to be removed and all hangers are to be readjusted if required, to the desired value within quoted value.
- 17.18 All the tests shall be repeated till **Boiler / Pipelines** / equipments satisfy the requirements / obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted at various stages to the satisfaction of BHEL / Boiler Inspector / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost.
- 17.19 Transportation of oil drums from customer/ BHEL's stores, filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer / BHEL stores. Similarly transport of chemicals for various pre-commissioning activities / processes mentioned in the above clauses and returning of remaining and / or the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.
- 17.20 Replacing / cleaning of filters of the erected equipments, piping system etc. during pre-commissioning / commissioning stage are within the scope of work.
- 17.21 Contractor shall lay the temporary pipelines with fittings, accessories and erection / commission pumps, valves, fittings, hangers and supports and other installations as instructed by BHEL, Engineer for the purpose of chemical cleaning / alkali flushing /detergent flushing/ steam blowing / steam washing / steam flushing / water flushing / water washing / oil flushing / carboard bursting etc. of piping and other equipments are in the scope of work. Necessary, materials for this will be provided by BHEL. Weight for the same will be based on jointly measured quantity and corresponding standard weights. No payment will be made for the equipments brought by the Contractor such as pumps etc and foundations made by the Contractor for temporary systems. Weight for the same will be based on jointly measured quantity and corresponding standard weights. Overhauling / cleaning / servicing of valves, pumps, fittings in temporary system, etc prior to the above operations / activities will also be carried out by the contractor at his cost. All the chemicals will be supplied by BHEL free of cost.
- 17.22 Steam blowing lines for Oil piping shall be erected as per the instructions of BHEL Engineer. Necessary pipes and other items will be supplied by BHEL free of cost. All arrangements for erection including welding have to be arranged by the contractor as a part of the work. After completion of

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steam blowing, all the temporary lines to be dismantled and restoration of piping to be carried out, within quoted rate.

- 17.23 During steam blowing operations the required manpower shall be arranged by the contractor as per the instructions of BHEL Engineer within the quoted rates. The manpower for the above operation may be required round the clock if necessary. The contractor shall carry out the above operation as per the instructions of BHEL Engineer within the quoted rates.
- 17.24 During the initial stages of work, trenches for draining water may not be available for alkali flushing or mass flushing for discharging and draining the system and piping. Necessary low point drains and temporary piping for this will have to be erected by contractor from materials provided by BHEL.
- 17.25 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, re-fixing, edge preparation and return to BHEL stores, area cleaning as per BHEL Engineer's instructions is within the scope of work/specification. The contractor, at his own cost, shall arrange experienced technicians for the above work, including required consumables.
- 17.26 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces.
- 17.27 Contractor may have to replace old/damaged gaskets / packing etc. for equipments and the same shall be carried out by contractor as per requirement. Materials will be given by BHEL.
- 17.28 In case any erection defect is detected during various tests / operations trial runs as detailed above such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. The parts to be replaced shall be provided by BHEL free of cost.
- 17.29 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 17.30 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

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- 17.31 During this period though the BHEL's / Client's staff will also be associated in the work, the contractor's responsibility will be to arrange required tools, man and plants till such time the commissioned units are taken over by BHEL's client.
- 17.32 For conducting gas tightness test, it may be required to erect the blowers and connecting ducts and commission the same for tightness test. It is the responsibility of the contractor to erect the blowers & dismantle once the test is over. Contractor shall carry out the work within the quoted rate and BHEL will provide dummies free of cost for conducting the test.
- 17.33 Contractor has to remove the all temporary supports, structures from inside of ducts and grind the all points after cutting and proper clean the duct and make it free from duct, weldments and burrs.
- 17.34 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programs made to achieve the schedule agreed with customer.
- 17.35 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part commissioning assistance for a mutually agreed period and decision of BHEL engineer shall be final.
- 17.36 Commissioning of the Boiler will involve trial runs of all the equipments erected, lighting up of the boiler for refractory drying, blowing of the steam lines, floating of safety valves, flushing of all the lines by air, oil or steam as the case may be, trial run of the fans, Lub. Oil pumps, Mills, servicing of all equipments like dampers, actuators, valves etc. and any other works incidental to commissioning. Contractor shall provide required workers along with supervisors with all the requisite tools round the clock and material for all these works, which shall form part of the work to be done.
- 17.37 After synchronization, the commissioning activities and trial/initial operations will continue till handing over of the unit and contractor shall provide the manpower for this period also. It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers as per the work requirement along with supervisors including necessary consumable tools etc., during this period. The rate quoted shall indicate all these contingencies also. The various categories of workers required for pre-commissioning, commissioning and post-commissioning activities are as follows:

- a) Pipe fitters

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- b) Millwright Fitters
- c) HP & structural welders
- d) Riggers
- e) Unskilled workers
- f) Supervisors
- g) Electricians
- h) Ladders
- i) Sheet metal fabricator/fitter
- j) Any other category of workers as may be required.

Further in addition to the above, contractor has to arrange the following minimum exclusively for assisting BHEL commissioning engineers during commissioning stabilization and trial operation period. This manpower will be directly controlled by BHEL commissioning engineers.

1. One Engineer in charge for three shifts.
2. Two supervisors per shift for three shifts
3. Three fitters per shift for three shifts
4. Six helpers per shift for three shifts

- 17.38 During commissioning any improvement or rectification due to design requirement is involved and if the contractor is asked to carry out the job, they shall be paid at man-day rates. For this purpose, daily labour report indicating therein nature of work carried out, consumables used, T&P Hired, etc. shall be maintained by contractor, and got signed by BHEL Engineer every day. It is not obligatory on the part of BHEL to get the works done by the contractor. They can employ any other agency if they so desire at that time.
- 17.39 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.
- 17.40 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load/Initial/Trial operation, are to be carried out by the contractor within Quoted Rate.
- 17.41 The contractor has to provide required man power assistance during pre-commissioning and commissioning checks of motor operated valves, actuators, control valves etc. without any extra charges.

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- 17.42 **Borescopic examination of headers etc. to be conducted by contractor as per instruction of BHEL engineer.** This requires cutting of tubes to facilitate the borescopic examination and re-welding etc. are part of work and the same to be carried out with in the quoted rate. The Nos. of headers to be examined shall be decided by BHEL/Customer. Borescope shall be provided by BHEL free of cost.
- 17.43 D.S.L / equivalent system for hoisting equipments are also to be erected and commissioned including load testing by the contractor within the quoted rates. Required manpower including electricians is to be arranged by the contractor for carrying out commissioning of electrical hoist and load testing of electrical hoist. Required loads will be provided by BHEL free of cost. Any minor rectification or for improvement of motor IR valve, arrangement to be made by contractor. Wherever OEM supplier required at site for supervision for E&C/commissioning, same shall be arranged by BHEL.
- 17.44 No payment will be made for temporary installations made for testing of systems & similarly no payment will be made for electrical installations made for any temporary system.

All materials, equipment's necessary for installation of temporary system as above will be supplied by BHEL as free returnable issue in random sizes / lengths. However, servicing, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the Contractor.

- a. Contractor shall cut / open / dismantle work, if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.
- b. Similarly, during the course of erection, if certain portion of equipments erected by the Contractor has to be undone for enabling other Contractors / agencies of BHEL / Customer to carry out their work, Contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other Contractors / agencies of BHEL / Customer as per BHEL engineer's / agencies of BHEL / Customer s instructions. Claims, if any, in this regard shall be governed as relevant clauses of 'General Conditions of Contract'.
- c. All surplus steel and all wastage materials will be taken back on weighment basis. Surplus, unused and untampered steel shall be sorted section-wise and returned separately at a place directed by BHEL/Engineer within the project area. For return of such materials, contractor will not be entitled to any handling and incidental charges. All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be promptly returned to the

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stores and a receipt obtained for material accounting purposes. Scrap for reinforcement steel and structural steel shall be returned separately.

- 17.45 Contractor shall provide assistance in conducting of performance guarantee test (PG test) of the equipments under the scope of work. Contractor shall install all necessary tapping points; instruments etc and provide necessary assistance within the quoted rates. In case PG test is getting delayed beyond the contract period (normal plus extension if any) due to reasons not attributable to the Contractor, PG test issue will be mutually discussed and decided. However, installation of necessary tapping points, impulse pipes, approaches etc are to be completed by the Contractor.
- 17.46 The contractor shall carry out all required tests, pre-commissioning and commissioning activities required for the successful and reliable operation of Boiler, Power Cycle Piping, Rotary machines, etc.
- 17.47 The duration of '**Trial Operation**' of the complete equipment in the automatic position of control system shall be fourteen (14) days. Out of the fourteen (14) days, minimum seventy-two (72) hours shall be in continuous operation on full load or any other duration as may be agreed to between the Owner and the BHEL.
- 17.48 Specialized test equipment, if any, shall be provided by BHEL / its client free of hire charges. However, contractor has to take proper care of the equipment issued to him.
- 17.49 Contractor shall conduct the air/gas tightness test of all the ducts, dampers and gates under the scope of work. Erection etc. of blowers and blanks and putty required for conducting air tightness test shall be carried out as part of work. (Putty to be procured by the contractor without any extra cost to BHEL).
- 17.50 It is possible that due to any reason the final supporting may not be completed before conducting Hydraulic Test. The contractor may have to strengthen or install any additional supports as per instruction of BHEL. This work is a part of the work and no additional payment shall be made on this account.
- 17.51 All the shafts of the equipment shall have to be properly aligned to that of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid over-heating of bearings or other conditions, which may tend to shorten the life of the equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and lubricated as per recommendations of BHEL engineer.

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- 17.52 Lubricating oil units of the rotating machines are to be cleaned thoroughly before pouring of final lubricating oil. Topping up of lubricants during running of the set till handing over to be done by the vendor. Required lubricants both for first filling and topping up are to be supplied by BHEL free of cost. The empty containers of the lubricating oils should be returned to BHEL stores/place indicated by BHEL from time to time.
- 17.53 The instruction of the motor manufacturer regarding storage of the motors and re conservation must be strictly followed without any deviation.
- 17.54 The contractor shall endeavour to complete the work undertaken in all designated areas/system/sub-system in all respect without any punch points including area cleaning alongwith desired progress of work. However, during commissioning/Initial Operation, punch points shall be consolidated jointly with customer representative(s). It shall be the responsibility of contractor to attend all punch points post commissioning/Initial Operation and resolve the deficiency as may be necessary for handing over the unit to BHEL's Client within the agreed time period.

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Chapter-XVIII: PAINTING

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified)

18.1 PAINTING :

- 18.2 The scope of work shall also include supply and application of, primer coat (if required), Intermediate coat and final painting of all the erected equipments as required and specified for the components of boiler and its auxiliaries **as per the Painting schedule.**
- 18.3 In the case of steel fabricated items, raw steel after fabrication has to be cleaned and subsequent painting to be carried out.
- 18.4 All the exposed metal parts of the equipment including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer and required number of finish coats as indicated in the Painting Specification in TCC which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL engineers for painting. Afterwards the above parts shall be finished with as per the instructions of BHEL/Customer official.
- 18.5 Paint shall be applied by brushing or by spray painting as per the instruction of BHEL Engineer. Spray painting gun and compressed air arrangement has to be made by the contractor himself. It shall be ensured that brush marks are a minimum.
- 18.6 Before applying the subsequent coats the thickness of each coat shall be measured and recorded with BHEL / Customer
- 18.7 The scope of painting includes application of colour bands, lettering the names of the systems equipments; tag Nos of valves, marking the directions of flow and other data required by BHEL within the quoted rate.
- 18.8 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated spots. Each coat (Primer, intermediate, finish) shall have a minimum thickness of dry film thickness (DFT) in microns and the DFT of finish paint shall not be less than the specified. Necessary instrument for measuring the thickness of paint applied is to be arranged by the contractor.

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Chapter-XVIII: PAINTING

- 18.9 Finish coat paint, No of coat and DFT shall be as indicated in the painting specification enclosed in this tender / relevant BHEL document/ customer's specifications. The painting specification which is forming part of this tender as in TCC shall be used as guidelines to be followed.
- 18.10 The actual colour to be applied shall be approved by the BHEL/customer before starting of actual painting work and shall be in accordance with approved painting schedule.
- 18.11 Primer, Intermediate & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the BHEL / Customer approved agencies only, and the paints should be as per the customer painting specification. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities.
- 18.12 Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.
- 18.13 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL/ Customer.
- 18.14 Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of ready mixed type in original sealed containers as packed by the paint manufacturer. Addition of thinners shall not be permitted
- 18.15 No painting shall be done in frost/foggy weather or when the humidity is high enough to cause condensation on the surface to be painted.
- 18.16 The scope of work also includes touch-up/re-painting/finish painting and colour bands, lettering, stencilling, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/Customer engineer at site for the equipments / components covered in these specifications.
- 18.17 Materials/ components those supplied with finish painting and during storage, handling or erection, if paint get peeled off / deteriorate then all such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final colour within the quoted rates.
- 18.18 Prior to application of refractory, bituminous painting (including supply) on the pressure parts and other area is under Contractor scope.

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Chapter-XVIII: PAINTING

18.19 PAINTING SCHEDULE: Attached

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Chapter-XIX: Lining and Insulation

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified)

19.0 APPLICATION OF INSULATION AND REFRACTORY

- 19.1 Handling at site stores / storage yard, Transportation to site of work, Application of refractory & Insulation materials and connected works for Boiler, Ducts etc. Rotary machines and binding and cladding with sheets etc., using their own tools plants, tackles, all consumables, supervisor and men as enumerated in the scope of contract.
- 19.2 Application of refractory, wool insulation, sheet metal cladding, welding of hooks / supports to hold insulation and refractory's as wherever necessary for all the equipment covered in this contract are to be carried out as per instruction of BHEL Engineer at site.
- 19.3 All insulations and refractory materials including iron components and other sheets casing materials, etc., required as per drawing will be supplied by BHEL and the same have to be erected / applied as per the drawings and specifications of BHEL by the contractor.
- 19.4 Clean the Surface to be Insulated from Rust, Dust, Grease, Loose scale, Oil, Moisture, etc. Care shall be taken that flexible insulation is not unduly compressed. After insulating the equipment, the gaps / joints shall be filled with loose wool/ moulded insulation as applicable
- 19.5 Painting of inner side of sheet metal covering over the insulation walls with two coats of anti-corrosive paint (IS-158) to be applied to the entire satisfaction of BHEL Engineer and application of bituminous sealing compound on cladding/ sheet metal joints shall also be carried out by the contractor. Retainer type 'A' must be coated with Aluminium paint. For which the required amount of paint, thinner and other accessories for painting, cleaning the surfaces etc., shall be supplied by the contractor within the quoted rate.
- 19.6 Supply of Bituminous sealing compound shall be in the scope of Contractor.
- 19.7 It is the responsibility of the contractor to ensure that the insulation and refractory materials and sheet metal covering issued to him for application are well protected against loss or damage or weather conditions tending to affect its quality by the provision of close / semi closed sheds at his cost. All the insulation and refractory materials and sheet metal covering etc., issued to the contractor shall be properly stored and handled before application due the same.

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Chapter-XIX: Lining and Insulation

- 19.8 Contractor is liable for the exact accounting of the materials issued to him and any unaccountable losses shall be made good by him. The necessary accounting of the material issued will have to be furnished by the contractor periodically.
- 19.9 Wherever iron components are to be welded on non-pressure parts, the contractor shall employ only approved structural welders. It shall also be the responsibility of the contractor to arrange for welding hooks, flats, plates, supports and other fixtures also. All consumables tools and plants etc., required for the work shall be arranged by the contractor at their cost.
- 19.10 Contractor shall observe all precautions for laying and curing of Castable refractory. Any defective works found shall be re-laid by contractor at his own cost including materials.
- 19.11 Wool insulations are received at site as bonded and un-bonded mattresses in standard sizes. These has to be dressed / cut to suit equipment / site work by the contractor.
- 19.12 For the insulation of hot air duct, gas duct, ID duct etc., unfaced bonded wool, mattresses are to be used with wire netting (wire netting is supplied separately) on the outside for rigidity.
- 19.13 Dressing of insulation bricks to suit site conditions curing the refractory concrete applied, sheet cladding over insulations, form the part of this work.
- 19.14 Removal type of insulation to be provided for valves fittings, expansion joints etc., as per the drawings or as directed by BHEL Engineer.
- 19.15 All piping insulations shall be carried out in such a manner as to facilitate removal of bolts nuts and washers from the flanges.
- 19.16 Refractory works at complete combustion chambers, ceiling heat recovery area, oil and coal burner areas and application of castable refractory wherever specified in drawing or as directed by BHEL Engineer have to be carried out.
- 19.17 Fabrication of covering sheets may be necessary like preparing the sheets to the sizes and shapes specified in drawings, beading, swaging, beveling of sheets crowning of the sheets if necessary the same to supports over wool insulation with screws as specified in BHEL drawings or as instructed by BHEL engineer.
- 19.18 Fabrication, fixing or welding of hooks / supports to equipment of boiler parts, piping and other connected equipment to support wool insulation applying of primer paint to welded portion parts welding certain supports on parts other than pressure parts to hold refractory's (by

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engaging approved welders) as per the drawings or as instructed by BHEL Engineer will have to be carried out by the contractor.

- 19.19 The contractor shall leave certain gap and opening while doing the work as per the instructions of BHEL Engineer to facilitate inspection by Boiler Inspector or doing commissioning to fix gauges, fittings, instruments. Those gaps will have to be finished as per drawings at a later date by the contractor at his cost, as required by BHEL.
- 19.20 Cladding sheets shall be suitably pressed along with diagonals to form diamond shape so as to improve the strength of the sheets, to avoid humpiness and to give aesthetic look.
- 19.21 Plates, bars, rods and other materials that are to be cut, and re-welded from the fabricated places to suit erection requirements for which no extra payment will be made to the contractor.
- 19.22 A logbook shall be maintained by the contractor for the clearance of the area for application of refractory and insulation. If the contractor does the work on his own accord without prior permission the area should be redone at his cost.
- 19.23 The contractor shall draw only one week's requirement of material for their work from BHEL stores and keep them in their semi-closed shed near to the work area. The materials required for a particular space of work only shall be taken to the work spot. At the end of the day's work the leftover or unused materials shall be taken back to their semi-closed shed for keeping the materials safe. Necessary records shall have to be maintained by the contractor in respect of the above drawls / deposits, on daily basis as instructed by BHEL.
- 19.24 Wastages allowance for the materials issued are envisaged as follows:
- a) Castable refractory - 2%
 - b) Insulation bricks & mortar - 2%
 - c) Wool/LRB mattresses - 5%
 - d) Cladding sheets - 5%
- 19.25 Making structural supporting works for pourable insulation, laying pourable insulation, adhering to all specifications and instructions shall be the responsibility of the contractor.
- 19.26 Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer. In the event of his failure to do so, the same will be arranged /

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removed by BHEL Engineer and the expenses incurred with 5% overhead will be recovered from the contractors.

- 19.27 Welding of hooks as per pitch, non-pressure parts, applying red oxide paint to the welded portion as directed as per drawings before application of mineral wool mattresses will have to be done by the contractor.
- 19.28 Applying different layers of mineral wool as directed and as per drawings and specifications for Boiler/ESP/Piping and its auxiliaries, pipelines valves and other vessels and after fixing require holdings materials, suitably if necessary, fabrication of rings etc., and fixing as directed and as per drawings and specifications shall also form part of this work.
- 19.29 If necessary, the hooks may have to be made from the rods, raw materials supplied in running lengths. The contractor may have to carry out this work also and use the same hooks.
- 19.30 In case the contractor is required to dismantle and re-erect certain area as and when required for pre-commissioning / commissioning activities the rate as indicated in the rate schedule shall be paid by BHEL for erection. However, for dismantling no extra charge will be paid under any circumstances.
- 19.31 Wherever additional / clamps, frame works, etc., are required to be fabricated and installed even though not indicated in the drawings shall be fabricated and installed at their cost. Only steel materials shall be given by BHEL free of cost, consumables like electrodes, gases etc., are to arranged by the contractor at his cost.
- 19.32 Contractor has to arrange required fire retardant covering material at their cost to protect the insulation materials drawn from BHEL before and after erection.
- 19.33 Delay in clearance of mechanical equipment and piping for insulations is unlikely to happen. However, if any delay occurs, the contractor shall not claim anything extra, like idle charges.
- 19.34 Welding of all seal boxes covers after completion of refractory work shall be done by the contractor. No extra charges will be payable for the same.
- 19.35 Application of Castable refractory between tubes around burners on ceiling and as directed by Engineers and as per detailed drawings and specifications will have to be done by the contractor.
- 19.36 Welding of iron components directly on pressure parts and HP piping is are to be carried out by certified IBR high pressure welders.

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- 19.37 All rectification including painting of Employer's structure which are damaged by contractor during his work.
- 19.38 Special type of insulation wool used in penthouse shall not be cut indiscriminately. All chicken mesh, cut bits shall be accounted for.
- 19.39 The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during all stages of work. Scaffolding materials (poles, gratings etc) shall be of light weight construction. Contractor shall arrange steel pipes & clamps with accessories like base plate attachment, fixing pins, struts etc for scaffolding required for this work. However, BHEL's decision in this regard shall be final and binding. Contractor shall arrange the scaffolding materials in sufficient quantity. In the event of his failure to do so, the same will be arranged / removed by BHEL Engineer and the expenses incurred with 5% overhead will be recovered from the contractors.
- 19.40 The Contractor shall provide the required quantity of wire, nails, and planks for formwork and other materials for shuttering and curing works.
- 19.41 All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. If necessary contractor may have to cut the hooks to correct length. Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work.
- 19.42 The mineral wool mattresses (bonded / un-bonded) / LRB mattresses are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.
- 19.43 The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing.
- 19.44 The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important.
- 19.45 It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions. Closed / semi closed sheds or any other arrangements required for this will by him at his cost. If any damage occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.

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- 19.46 Aluminum sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets, crowning the sheets if necessary will be carried out by him. Two coats of anti-corrosive black bituminous paint are to be applied on inner surfaces of the cladding. Bitumen sealing compound on the joints if necessary is included in the scope of this work. **Contractor may note that he will supply anti-corrosive black bituminous paint & bituminous sealing compound required for above works at his cost.**
- 19.47 Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractor's responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract.
- 19.48 All insulation and refractory materials including iron components and outer sheet casing materials, cladding sheets etc required will be supplied by BHEL and the same have to be erected/ applied as per the drawings and specifications of BHEL by the Contractor.
- 19.49 Wool insulation is received at site as loose bonded mattresses in standard sizes. These are to be dressed/cut to suite the equipments. Multiple layers of wool have to be applied as directed and as per drawings and specifications for all equipments/ systems covered under the scope of work.
- 19.50 The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for aluminum sheets have to be adhered to.
- 19.51 Cladding/outer casing shall be fixed expeditiously, so as to avoid damage to the insulation from the weather. The overlapping surface of outer casing/cladding sheet shall be coated with sealing compound, which will be supplied by Contractor.
- 19.52 To take care of bimetal corrosion due to variety of metals in contact of each other viz retainer to support, support to outer casing/cladding, cladding-to-cladding etc, suitable paints specified by BHEL, to be applied and/or neoprene rubber packing/strips or any other insert may have to be fixed as required.
- 19.53 If during erection and commissioning any of the parts are to be insulated temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature the same may

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necessitate removal and re-application of insulation and sheet metal cladding, which shall be done by the contractor and the erection rate quoted shall be inclusive of such contingencies.

- 19.54 Removable type of insulation shall be provided for valves, fittings, expansion joints etc. as per the drawings or as directed by BHEL Engineer.
- 19.55 All temporary pipelines required during testing, pre-commissioning and commissioning should be insulated as directed by BHEL
- 19.56 The following works are also included in the scope of this contract: -
- a) Cutting of cladding sheets as per the profile of the equipment and painting on inner surface two coats of bituminous paint. Paint will be arranged by Contractor.
 - b) Cutting of the wool mattresses in the required shape and application of finishing cement of required thickness wherever required.
- 19.57 Also, the contractor will demolish all the hutments, sheds, offices, constructed by him and shall clean the debris after the contract is over. In the event of his failure to do so, the same will be arranged / removed by BHEL Engineer and the expenses incurred with 5% overhead will be recovered from the contractors.

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Chapter-XX: PRESERVATION & PROTECTION OF COMPONENTS

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified)

20.0 PRESERVATION & PROTECTION OF COMPONENTS

- 20.1 At all stages of work, equipments/materials in the custody of Contractor, including those erected, will have to be preserved as per the instructions of BHEL. Necessary preservation agents including the primer & paint, for the above work shall be provided by the Contractor.
- 20.2 The Contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.
- 20.3 The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc shall be returned to BHEL stores by the Contractor.
- 20.4 The Contractor shall not waste any materials issued to agency. In case it is observed at any stage that the wastage/excess utilisation of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be affected with departmental charges from the Contractor. Decision of BHEL on this will be final and binding on the Contractor.
- 20.5 For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.

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Chapter-XXI: Specific Exclusion

21.0 Specific Exclusion:

The following works are specific exclusions from the scope of work under erection, testing & commissioning of tender specification-

- i. All electrical and control & instrumentation items except those specified elsewhere in these specifications.
- ii. BOP area
- iii. Regular Fabrication of Structure except to the extent specifically indicated elsewhere in this tender.
- iv. E&C work of cable trays, cables and earthing etc
- v. Control panels, EPMS, MCC etc.
- vi. Electrical & C&I items of handling system.
- vii. Civil works except to the extent specifically indicated elsewhere in this tender.
- viii. Pneumatic copper tubing and fittings thereof.
- ix. Testing and commissioning of heating elements, thermostats, HV rectifier transformers.
- x. Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.
- xi. Hume pipes for pipe crossing

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Chapter-XXII : Bill of Quantities and % Weightage of Individual Items

Erection, Testing, Commissioning, Trial Operation & Handing Over of Boiler and auxiliaries & associate integral piping, SCR & it's Auxiliaries, ESP & auxiliaries, pumps/Fans Ducts, Mills & auxiliaries , Power Cycle Piping, LP Piping etc. including Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site for erection, NDT, fixing of hangers & supports, application of lining, Insulation, painting including paint supply, Stencilling & Labelling etc. of unit-1,2 & 3 at 3x150 MW BTG package for Hindalco Industries Limited (HIL) Aditya Aluminium at Lapanga, Sambalpur, Odisha:

Package

SN	Area	Rate Schedule	UOM	Total Qty	Weightage/ Factor "X"
1.1	Structure	1A	MT	8590.08	0.24003825
1.2	Pressure Parts	1B	MT	4207.56	0.14138976
1.3	Non Pressure Parts	1C	MT	7222.68	0.20182809
1.4	Rotating Machines	2A & 2B	MT	3450.6	0.06164846
1.5	ESP	3A	MT	7661.31	0.13687706
1.6	Power Cycle Piping- P91/92	4A	MT	126	0.00900578
1.7	HP Piping including P-11, P-12, P-22, CS	4B	MT	1440	0.10292321
1.8	LP Piping	4C	MT	252	0.01801156
1.9	SS Piping	4D	MT	9	0.00064327
1.10	Hanger and Supports	4E	MT	330	0.00922141
1.11	Insulation- Wool Mattress	5A	MT	1412.1	0.03955066
1.12	Insulation- Refractory	5B	MT	534	0.01495648
1.13	Insulation- Iron Parts	5C	MT	486.9	0.01363729
1.14	Insulation- Aluminium Cladding Sheets	5D	MT	366.63	0.01026872
Total Weight (in MT)				36,089	1.0

Note: The quantity indicated in the BOQ is approximate only and is liable for variation. Payment will be as per actual quantity executed as certified by BHEL Engineer above Unit rate of individual items of BOQ.

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Chapter-XXII : Bill of Quantities and % Weightage of Individual Items

Instructions to the Bidders:-

1. Bidders shall quote "Total Price" (Lump-sum) for the entire scope of work (i.e. for quantity of unit-1,2 & 3 combined) in Price Bid at the designated place in the E-Procurement. Price mentioned elsewhere in the offer of the bidder shall be treated as Null and Void.
2. Evaluation shall be done on lowest total quoted price of the qualified bidder for total Scope of work, based on which L-1 bidder shall be finalised.
3. Entire package shall be awarded to L-1 Bidder (single agency), with acceptable L-1 rates to BHEL.
4. BHEL has fixed the % weightages as mentioned above. Considering BHEL pre-fixed "Weightage" and the "Total Price" quoted as per Sl.no. 1 above; amount of individual items shall be derived by Multiplying the "Weightage" and "Total price". Unit Rate shall be calculated by dividing amount of individual item with its quantity. This item amount & Unit rate shall be rounded off up to Two decimal places.
6. For the convenience of bidders, BHEL has issued an excel sheet with all requisite formulae as detailed above. However, this excel sheet shall not form part of contract document. Further, this sheet should not be uploaded by bidder at the e-Portal.
7. Bidders to note that this is an '**Item rate contract**'. Payment shall be made for the actual quantities of work executed in each unit at the Unit rate arrived as above.

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Chapter-XXIII : Technical Annexure

THIS TENDER SPECIFICATION CONSISTS OF FOLLWING ANNEXURE:

S.N.	DESCRIPTION
Annexure-1	BHEL HSE Plan
Annexure-2	Customer (Hindalco) Project Safety Management Standard
Annexure-3	T&P Hire charges
Annexure-4	GA Drawings
Annexure-5	HSFG Bolt tightening procedure
Annexure-6	Boiler Painting Schedule
Annexure-7	ESP, APH, Fans and G&D Painting schedule
Annexure-8	Insulation Guidelines
Annexure-9	Erection Welding Schedule (EWS)- PP and Piping
Annexure-A	BHEL Standard Guideline for Worker Accommodation

NOTE- ALL THE ABOVE-MENTIONED ANNEXURE ARE UPLOADED ON E-PROCUREMENT PORTAL.